# Volume 3

# Draft Supplemental Recirculated Environmental Impact Report REVISIONS to Title 19-KERN COUNTY ZONING ORDINANCE – (2020 A), Focused on Oil and Gas Local Permitting

**SCH# 2013081079**

***Draft Environmental Impact Report***
***REVISIONS to Title 19-KERN COUNTY ZONING ORDINANCE – (2015 C)***
**Focused on Oil and Gas Local Permitting**
***Chapters 1 through 11***

Kern County Planning and Natural Resource Department
2700 M Street, Suite 100
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(661) 862-8600

August 2020

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# Volume 3

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***Draft Environmental Impact Report***
***REVISIONS to Title 19-KERN COUNTY ZONING ORDINANCE – (2015 C)***
**Focused on Oil and Gas Local Permitting**
***Chapters 1 through 11***

Kern County Planning and Natural Resource Department
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*Technical Assistance by:*
Ecology and Environment, Inc., member of WSP
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August 2020

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# Draft Environmental Impact Report

**SCH# 2013091062**

***Volume 1***
***Chapters 1 through 11***

***REVISIONS to the KERN COUNTY ZONING ORDINANCE – 2015 (C)***
**Focused on Oil and Gas Local Permitting**

Kern County
Planning and Community Development Department
Bakersfield, California

July 2015

# Draft
# Environmental Impact Report

**SCH# 2013091062**

***Volume 1***
***Chapters 1 through 11***

***REVISIONS to the KERN COUNTY ZONING ORDINANCE – 2015 (C)***
**Focused on Oil and Gas Local Permitting**


Kern County Planning and Community Development Department
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July 2015

**PLANNING AND COMMUNITY DEVELOPMENT DEPARTMENT**

**Lorelei H. Oviatt, AICP, Director**
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**Web Address: www.co.kern.ca.us/planning**

***DEVELOPMENT SERVICES AGENCY***

**Engineering, Surveying and Permit Services**
**Planning and Community Development**
**Roads**

**DATE:** July 8, 2015

**To:** See Attached Mailing List

**FROM:** Kern County Planning and Community Development Department
Attn: Christopher Mynk, AICP
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**SUBJECT: DRAFT ENVIRONMENTAL IMPACT REPORT**

This is to advise that the Kern County Planning and Community Development Department has prepared an Environmental Impact Report (EIR) for the project identified below. As mandated by State law, the minimum public review period for this document is 45 days. The document and documents referenced in the Draft EIR are available for review at the Planning and Community Development Department, 2700 "M" Street, Suite 100, Bakersfield, CA 93301 or on the Departmental website (**http://pcd.kerndsa.com/planning/oil-gas-zoning-amendment**).

The Kern County Planning and Community Development Department will host a joint public briefing workshop with the Kern County Board of Supervisors and the Kern County Planning Commission to receive comments on the document on: **July 27, 2015** at 9:00 a.m., at the Chambers of the Board of Supervisors, First Floor, Kern County Administrative Center, 1115 Truxtun Avenue, Bakersfield, California.

Comments can be also be submitted at one of our additional public workshops that will be held at **6:00 p.m.** at the following locations and dates:

| | |
|---|---|
| Shafter Veterans Building, Room 2, 309 California Avenue, Shafter CA | **August 10, 2015** |
| Taft Veterans Hall, Room 1, 218 Taylor Street, Taft, CA | **August 17, 2015** |

A public hearing has been scheduled with the Kern County Planning Commission to receive comments on the document on: **October 5, 2015** at 5:00 p.m or soon thereafter, Chambers of the Board of Supervisors, First Floor, Kern County Administrative Center, 1115 Truxtun Avenue, Bakersfield, California.

The comment period for this document closes on **August 21, 2015**. Testimony at future public hearings may be limited to those issues raised during the public review period either orally or submitted in writing by 5:00 p.m. the day the comment period closes.

**Project Title**: Draft Environmental Impact Report for Revisions to the Kern County Zoning Ordinance – 2015 C, focused on Oil and Gas Local Permitting.

**Project Location**: The Project Boundary (Local Permitting Boundary Area) encompasses 3,110 square miles and generally includes the San Joaquin Valley Floor portion of Kern County up to an elevation of 2,000 feet. The boundary includes: west side-the San Luis Obispo County line, north side- the Kings and Tulare county lines, east and south sides-the 2,000-foot elevation contours, squared off to the nearest section line.

**Project Description:** The proposed Project consists of revisions to various Chapters of Title 19 Kern County Zoning Ordinance to implement a new permit process for oil and gas activities. The revisions include new site development standards and review processes for all oil and gas exploration, extraction, operations, and production activities in unincorporated Kern County by:

(a) Removing the "Unrestricted Drilling" Section in Chapter 19.98 and updated "Drilling by Ministerial Permit" and "Drilling by Conditional Use Permit" Sections;

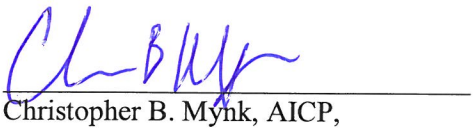
(b) Establishing a new "Tier Area" maps to address different land uses and zone districts where oil and gas activities occur and are proposed to occur in the future;

(c) Establishing an Oil and Gas Conformity Review and Minor Activity Review, as part of the "Drilling by Ministerial Permit" Section in Chapter 19.98, to ensure compliance with all applicable Development and Implementation Standards and Conditions;

(d) Establishing new Development and Implementation Standards and Conditions Section in Chapter 19.98;

(e) Establishing new requirements for site plan sign-off by owners of the surface and minerals for split estate ownership;

(f) Revising additional Chapters of the Zoning Ordinance to ensure consistency with the new requirements of this EIR. These Chapters include: 19.08 – Interpretations and General Standards, 19.48 – Drilling Island (DI) District, 19.50 – Floodplain Primary District, 19.66 – Petroleum Extraction (PE) Combining District, 19.81 - Outdoor Lighting (Dark Skies Ordinance), 19.88 – Hillside Development, 19.102 – Permit Procedures, and 19.108 – Nonconforming Uses, Structures, and Lots.

Signature: 

Name: Christopher B. Mynk, AICP,
Supervising Planner

Zoning Ordinance Revisions - Oil & Gas
WO #13280
I:\WP\LABELS\zo ord - oil & gas.nop.docx
Sc 05/12/15

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Taft, CA 93268

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Airport Div - Room 3000
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County Clerk

Kern County Administrative Officer

Kern County Engineering, Surveying,
& Permit Svs/Floodplain

Kern County Engineering, Surveying,
& Permit Svs/Survey

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Env Health Services Department

Kern County Fire Dept
Brian Marshall, Fire Chief

Kern County Fire Dept
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Lemoore, CA 93245

Pleistocene Foundation
2362 Lumill Street
Ridgecrest, CA 93555

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Chino, CA 91710-8511

Western Kern Resources Dist
P.O. Box 2393
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Tehachapi, CA 93561-2011

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1717 - 28th Street
Bakersfield, CA 93301

Kern County Library
Boron Branch
26967 Twenty Mule Team Road
Boron, CA 93516

Kern County Library
Arvin Branch
201 Campus Drive
Arvin, CA 93203

Kern County Library
Baker Branch
1400 Baker Street
Bakersfield, CA 93305

Kern County Library
Delano Branch
925 - 10th Street
Delano, CA 93215

Kern County Library
Kernville Branch
48 Tobias Street
Kernville, CA 93238

Kern County Library
Jackson/McFarland Branch
500 Kern Avenue
McFarland, CA 93250

Kern County Library
Rathburn Branch
200 West China Grade Loop
Bakersfield, CA 93308

Kern County Library
Shafter Branch
236 James Street
Shafter, CA 93263

Kern County Library
Tehachapi Branch
1001 West Tehachapi Blvd - Suite 400
Tehachapi, CA 93561

Bear Mountain Rec & Parks Dist
P.O. Box 658
Lamont, CA 93241

Shafter Rec & Parks Dist
700 East Tulare Avenue
Shafter, CA 93263

Tehachapi Valley Rec & Parks Dist
P.O. Box 373
Tehachapi, CA 93561

Highland Park Public Utility Dist
343 Arvin Street
Bakersfield, CA 93308

Kern County Library
Buttonwillow Branch
116 Buttonwillow Avenue
Buttonwillow, CA 93206

Kern County Library
Frazier Park Branch
3015 Mount Pinos Way
Frazier Park, CA 93225

Kern County Library
Kern River Valley Branch
7054 Lake Isabella Boulevard
Lake Isabella, CA 93240

Kern County Library
Mojave Branch
16916 1/2 Highway 14, Space D2
Mojave, CA 93501

Kern County Library
Ridgecrest Branch
131 East Las Flores
Ridgecrest, CA 93555

Kern County Library
Southwest Branch
8301 Ming Avenue
Bakersfield, CA 93311

Kern County Library
Wasco Branch
1102 Seventh Street
Wasco. CA 93280

Buttonwillow Rec & Parks Dist
P.O. Box 434
Buttonwillow, CA 93206-9320

State Dept of Parks/Hungry Valley
PO Box 1360
Lebec, CA 93243

West Side Rec & Parks Dist
P.O. Box 1406
Taft, CA 93268

Kern County Library
California City Branch
9507 California City Boulevard
California City, CA 93505

Kern County Library
Holloway/Gonzales Branch
506 East Brundage Lane
Bakersfield, CA 93307

Kern County Library
Lamont Branch
8304 Segrue Road
Lamont, CA 93241

Kern County Library
Northeast Branch
3725 Columbus Avenue
Bakersfield, CA 93306

Kern County Library
Wanda Kirk/Rosamond Branch
3611 Rosamond Boulevard
Rosamond, CA 93560

Kern County Library
Taft Branch
27 Emmons Park Drive
Taft, CA 93268

Kern County Library
Wofford Heights Branch
P.O. Box 1285
Wofford Heights, CA 93285

North of the River Rec & Parks Dist
405 Galaxy Avenue
Bakersfield, CA 93308

Tehachapi Parks & Recreation Dist
P.O. Box 373
Tehachapi, CA 93561

Bakersfield City Parks & Rec Dept
4101 Truxtun Avenue
Bakersfield, CA 93301

So. San Joaquin Muni Utility Dist
P.O. Box 279
Delano, CA 93216

Arvin Community Services Dist
309 Campus Drive
Arvin, CA 93203

Rosamond Community Serv Dist
3179 - 35th Street West
Rosamond, CA 93560

California City Public Works Dept
8190 California City Blvd.
California City, CA 93505

State Dept of Public Utilities Commission
505 Van Ness Avenue, Rm 2003
San Francisco, CA 94102-3214

Boron Community Service Dist
P.O. Drawer B
Boron, CA 93516

Enos Lane Public Utility Dist
22820 Sidding Road
Bakersfield, CA 93314

Desert Lake Community Service District
P.O. Box 567
Boron, CA 93516

East Niles Community Serv Dist
P.O. Box 6038
Bakersfield, CA 93306

Inyokern Community Serv Dist
P.O. Box 1418
Inyokern, CA 93527

Frazier Park Public Utility Dist
P.O. Box 1512
Frazier Park, CA 93225

Golden Hills Community Serv Dist
P.O. Box 637
Tehachapi, CA 93581

Lost Hills Utility Dist
P.O. Box 249
Lost Hills, CA 93249

Lake Isabella Community Serv Dist
P.O. Box 647
Lake Isabella, CA 93240

Lamont Public Utility Dist
8624 Segrue Road
Lamont, CA 93241

Wasco Public Works Dept
801 - 18th Street
Wasco, CA 93280

Mojave Public Utility Dist
15844 "K" Street
Mojave, CA 93501

North West Kern Resource Cons Dist
5000 California Avenue, Suite 100
Bakersfield, CA 93309

Shafter-Wasco Irrigation Dist
P.O. Box 1168
Wasco, CA 93280-8068

Stallion Springs Community Services Dist
28500 Stallion Springs Drive
Tehachapi, CA 93561

Semi Tropic Water Storage Dist
P.O. Box Z
Wasco, CA 93280

Stockdale Mutual Water Co
P.O. Box 788
Bakersfield, CA 93302

Quail Valley Water Dist
3200 21st Street, Ste 401
Bakersfield, CA 93301

Aerial Acres Water System
19161 Alma Street
Edwards, CA 93523

Rosedale-Rio Bravo Water Dist
P.O. Box 20820
Bakersfield, CA 93390-0820

Superior Mutual Water Co
19474 Enos Lane
Bakersfield, CA 93312-9501

Tehachapi-Cummings Co Water Dist
P.O. Box 326
Tehachapi, CA 93561

Arvin-Edison Water Storage Dist
P.O. Box 175
Arvin, CA 93203

Alta Sierra Mutual Water Co
10502 Sequoia Drive, No. 11
Wofford Heights, CA 93285

Antelope Valley-East Kern
Water Agency
6500 West Avenue N
Palmdale, CA 93551

Bella Vista Water Co
Attention Gerald Hyneman
P.O. Box 15309
Weldon, CA 93283

Ashe Water Dist
Dept of Water Resources
4101 Truxtun Avenue
Bakersfield, CA 93309

Bakersfield City Water Resource Dept
1000 Buena Vista Road
Bakersfield, CA 93311

Bodfish Water Co
P.O. Box 842
Lake Isabella, CA 93240

Belridge Water Storage Dist
21908 Seventh Standard Road
McKittrick, CA 93251

Berrenda Mesa Water Dist
14823 Highway 33
Lost Hills, CA 93249-9734

Buttonwillow County Water Dist
P.O. Box 874
Buttonwillow, CA 93206

Brock Mutual Water Co
12001 Brockridge Court
Bakersfield, CA 93309

Buena Vista Water Storage Dist
P.O. Box 756
Buttonwillow, CA 93206

Cawelo Water Dist
17207 Industrial Farm Road
Bakersfield, CA 93308-9801

Tejon-Castaic Water Dist
P.O. Box 1000
Lebec, CA 93243

Casa Loma Water Co
1016 Lomita Drive
Bakersfield, CA 93307

Edmonston Acres Muni Water Co
25465 Barbara Street
Arvin, CA 93203

California Water Service Co
3725 South "H" Street
Bakersfield, CA 93304

California Water Service Company
7138 Lake Isabella Boulevard
Lake Isabella, CA 93240

Erskine Creek Water Co
P.O. Box 656
Lake Isabella, CA 93240

Edgemont Acres Water Co
P.O. Box 966
North Edwards, CA 93523

Edmonston Acres Muni Water Co
25465 Barbara Street
Arvin, CA 93203

Vaughn Water Co.
10014 Glenn Street
Bakersfield, CA 93312

Friant Water Users Authority
854 North Harvard Avenue
Lindsay, CA 93247-1715

Goose Lake Water Co
2515 Wheeler
Bakersfield, CA 93308

Gosford Road Water Assoc
13958 Gosford Road
Bakersfield, CA 93313

West Kern Water Dist
P.O. Box 1105
Taft, CA 93268-1105

Wheeler Ridge-Maricopa Water Dist
12109 Highway 166
Bakersfield, CA 93313-9630

Indian Wells Water
Management Committee
P.O. Box 1329
Ridgecrest, CA 93556

Greenfield County Water Dist
551 Taft Highway
Bakersfield, CA 93307

Indian Wells Valley Water Dist
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Ridgecrest, CA 93556

Kern-Tulare Water Dist
5001 California Avenue, Suite 202
Bakersfield, CA 93309-1692

Kern Delta Water Dist
501 Taft Highway
Bakersfield, CA 93307

Kern River Valley Water Co
P.O. Box 1260
Lake Isabella, CA 93240

Lamont Storm Water Dist
P.O. Box 543
Lamont, CA 93241

Kern Water Bank Authority
1620 Mill Rock Way, Suite 500
Bakersfield, CA 93311

Lake of the Woods
Mutual Water Co.
7025 Cuddy Valley Road
Frazier Park, CA 93225

Davenport Mutual Water Assn
P.O. Box 1503
Rosamond, CA 93560

La Hacienda Water Co, Inc.
P.O. Box 60679
Bakersfield, CA 93386-0679

Lebec County Water Dist
P.O. Box 910
Lebec, CA 93243

Mettler County Water Dist
P.O. Box 345, Mettler RB
Bakersfield, CA 93381

Los Angeles Dept of Water & Power
111 North Hope Street, Rm 1121
Los Angeles, CA 90012

Lost Hills Water Dist
3008 Sillect Avenue, Ste 205
Bakersfield, CA 93308-6340

North Kern Water Storage Dist
P.O. Box 81435
Bakersfield, CA 93380-1435

Mountain Mesa Water Co
12707 Highway 178
Lake Isabella, CA 93240

North Edwards Water Dist
13001 Claymine Road
North Edwards, CA 93523

Olcese Water Dist
P.O. Box 60679
Bakersfield, CA 93386-0679

North of the River Muni Water Dist
P.O. Box 5638
Bakersfield, CA 93388-5638

Oildale Mutual Water Co
P.O. Box 5638
Bakersfield, CA 93388

Rand Communities Co Water Dist
P.O. Box 198
Randsburg, CA 93554

Pinion Pines Mutual Water Co
1467 Tecuya Street
Frazier Park, CA 93225

Metro Water Dist of So CA
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Environmental Planning Team
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Los Angeles, CA 90012

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309 Campus Drive
Arvin, CA 93203

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P.O. Box 856
Kernville, CA 93238

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44811 Date Avenue, #G
Lancaster, CA 93534-3136

Kern Valley Resource Cons Dist
P.O. Box 58
Weldon, CA 93283

Eastern Kern Resource Cons Dist
300 South Richmond Road
Ridgecrest, CA 93555-4436

Lerdo School Dist
331 Shafter Avenue
Shafter, CA 93263

Lost Hills Union School Dist
P.O. Box 158
Lost Hills, CA 93249

Midway School Dist
P.O. Box 39
Fellows, CA 93224

Mojave Unified School Dist
3500 Douglas
Mojave, CA 93501

Mountain View School Dist
8201 Palm Avenue
Lamont, CA 93241

Muroc Unified School Dist
17100 Foothill Avenue
North Edwards, CA 93523

Norris School Dist
6940 Calloway Drive
Bakersfield, CA 93312

Pond Union School District
29585 Pond Road
Wasco, CA 93280-9772

Richland-Lerdo Union School Dist
331 Shafter Avenue
Shafter, CA 93263

Rio Bravo-Greeley Union School Dist
6521 Enos Lane
Bakersfield, CA 93314

Rosedale Union School Dist
2553 Old Farm Road
Bakersfield, CA 93312

Semi Tropic School Dist
25300 Highway 46
Wasco, CA 93280-9540

Shafter High School Dist
526 Mannel Avenue
Shafter, CA 93263

Sierra Sands Unified School Dist
113 Felspar
Ridgecrest, CA 93555

South Fork Union School Dist
5225 Kelso Valley Road
Weldon, CA 93283

Southern Kern Unified School Dist
P.O. Box CC
Rosamond, CA 93560

Standard School Dist
1200 North Chester Avenue
Oildale, CA 93308

Taft City School Dist
820 North 6th Street
Taft, CA 93268

Taft Union High School Dist
701 7th Street
Taft, CA 93268

Tehachapi Unified School Dist
300 S Robinson Street
Tehachapi, CA 93561

Vineland School Dist.
8701 Weedpatch Highway
Bakersfield, CA 93307

Wasco Union High School Dist
P.O. Box 250
Wasco, CA 93280

Wasco Union Elementary School Dist
639 Broadway
Wasco, CA 93280

Maricopa Unified School Dist
Star Route 2, Box 618
Maricopa, CA 93252

Arvin High School
900 Varsity Street
Arvin, CA 93203

Bakersfield City School Dist
Education Center
1300 Baker Street
Bakersfield, CA 93305

Beardsley School Dist
1001 Roberts Lane
Bakersfield, CA 93308

Blake School Dist
P.O. Box 53
Woody, CA 93287

Panama-Buena Vista School Dist
4200 Ashe Road
Bakersfield, CA 93313

Buttonwillow Union School Dist
42600 Highway 58
Buttonwillow, CA 93206

Caliente Union School Dist
12400 Caliente Creek Road
Caliente, CA 93518

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29 Emmons Park Drive
Taft, CA 93268

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1720 Norwalk Street
Delano, CA 93215-1456

Delano Union School Dist.
1405 12th Avenue
Delano, CA 93215

DiGiorgio School Dist
Route 1, Box 34
Arvin, CA 93203

Edison School Dist
P.O. Box 368
Edison, CA 93220-0368

El Tejon Unified School Dist
P.O. Box 876
Lebec, CA 93243

Elk Hills School Dist
P.O. Box 129
Tupman, CA 93276

Fairfax Union School Dist
1501 South Fairfax Road
Bakersfield, CA 93307

Fruitvale School Dist.
7311 Rosedale Highway
Bakersfield, CA 93308-5738

General Shafter School Dist
1316 Shafter Road, RR 7
Bakersfield, CA 93313

Greenfield Union School Dist
Attn: Darrell Hawley, Director of Facilities
1624 Fairview Road
Bakersfield, CA 93307

Kern Community College Dist
2100 Chester Avenue
Bakersfield, CA 93301

McFarland Unified School Dist
601 Second Street
McFarland, CA 93250

Kern Valley High School
3340 Erskine Creek Road
Lake Isabella, CA 93240

Kernville Union School Dist
3240 Erskine Creek Road
Lake Isabella, CA 93240

Lakeside Union School Dist
14535 Old River Road
Bakersfield, CA 93311

Lamont School Dist
8201 Palm Avenue
Lamont, CA 93241

Maple School Dist
29161 Fresno Avenue
Shafter, CA 93263

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Attn: Steve Arenson
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San Francisco, CA 94105-2230

U.S. Army
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Fort Irwin, CA 92310

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Regional Community & Liaison Officer
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2800 Cottage Way, RM W-1623
Sacramento, CA 95825

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Aera
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Attn: Kathy Miller
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Chevron, USA
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**DRAFT ENVIRONMENTAL IMPACT REPORT**
**NOTICE OF AVAILABILITY FOR PUBLIC REVIEW**

This is to advise that the Kern County Planning and Community Development Department has prepared an Environmental Impact Report (EIR) for the project identified below. As mandated by State law, the minimum public review period for this document is 45 days. The document and documents referenced in the Draft EIR are available for review at the Planning and Community Development Department, 2700 "M" Street, Suite 100, Bakersfield, CA 93301 or on the Departmental website **(http://pcd.kerndsa.com/planning/oil-gas-zoning-amendment)**.

The Kern County Planning and Community Development Department will host a joint public briefing workshop with the Kern County Board of Supervisors and the Kern County Planning Commission to receive comments on the document on: **July 27, 2015** at 9:00 a.m., at the Chambers of the Board of Supervisors, First Floor, Kern County Administrative Center, 1115 Truxtun Avenue, Bakersfield, California.

Comments can be also be submitted at one of our additional public workshops that will be held at **6:00 p.m.** at the following locations and dates:

| | |
|---|---|
| Shafter Veterans Building, Room 2, 309 California Avenue, Shafter CA | **August 10, 2015** |
| Taft Veterans Hall, Room 1, 218 Taylor Street, Taft, CA | **August 17, 2015** |

A public hearing has been scheduled with the Kern County Planning Commission to receive comments on the document on: **October 5, 2015** at 5:00 p.m or soon thereafter, Chambers of the Board of Supervisors, First Floor, Kern County Administrative Center, 1115 Truxtun Avenue, Bakersfield, California.

The comment period for this document closes on **August 24, 2015**. Testimony at future public hearings may be limited to those issues raised during the public review period either orally or submitted in writing by 5:00 p.m. the day the comment period closes.

**Project Title**: Draft Environmental Impact Report for Revisions to the Kern County Zoning Ordinance – 2015 C, focused on Oil and Gas Local Permitting.

**Project Location**: The Project Boundary (Local Permitting Boundary Area) encompasses 3,110 square miles and generally includes the San Joaquin Valley Floor portion of Kern County up to an elevation of 2,000 feet. The boundary includes: west side-the San Luis Obispo County line, north side- the Kings and Tulare county lines, east and south sides-the 2,000-foot elevation contours, squared off to the nearest section line.

**Project Description:** The proposed Project consists of revisions to various Chapters of Title 19 Kern County Zoning Ordinance to implement a new permit process for oil and gas activities. The revisions include new site development standards and review processes for all oil and gas exploration, extraction, operations, and production activities in unincorporated Kern County by:

(a) Removing the "Unrestricted Drilling" Section in Chapter 19.98 and updated "Drilling by Ministerial Permit" and "Drilling by Conditional Use Permit" Sections;

(b) Establishing a new "Tier Area" maps to address different land uses and zone districts where oil and gas activities occur and are proposed to occur in the future;

(c) Establishing an Oil and Gas Conformity Review and Minor Activity Review, as part of the "Drilling by Ministerial Permit" Section in Chapter 19.98, to ensure compliance with all applicable Development and Implementation Standards and Conditions;

(d) Establishing new Development and Implementation Standards and Conditions Section in Chapter 19.98;

(e) Establishing new requirements for site plan sign-off by owners of the surface and minerals for split estate ownership;

Revising additional Chapters of the Zoning Ordinance to ensure consistency with the new requirements of this EIR. These Chapters include: 19.08 – Interpretations and General Standards, 19.48 – Drilling Island (DI) District, 19.50 – Floodplain Primary District, 19.66 – Petroleum Extraction (PE) Combining District, 19.81 - Outdoor Lighting (Dark Skies Ordinance), 19.88 – Hillside Development, 19.102 – Permit Procedures, and 19.108 – Nonconforming Uses, Structures, and Lots.

**Anticipated Significant Impacts on Environment:** Aesthetics, Agricultural Resources, Air Quality; Biological Resources; Cultural Resources, Greenhouse Gas, Energy, Hydrology and Water Quality, and Utilities and Services

**Document can be viewed online at:** http://pcd.kerndsa.com/planning/oil-gas-zoning-amendment

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LORELEI OVIATT, AICP, Director
Planning and Community Development Department

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CBM

cc: County Clerk (2) (with fee)
All Supervisorial Districts
Environmental Status Board
Planning Commissioners

# Notice of Completion & Environmental Document Transmittal

*Mail to:* State Clearinghouse, P. O. Box 3044, Sacramento, CA 95812-3044 (916) 445-0613
*For Hand Delivery/Street Address:* 1400 Tenth Street, Sacramento, CA 95814

**SCH #** 2013091062

**Project Title:** Draft Environmental Impact Report for Revisions to the Kern County Zoning Ordinance – 2015 C, focused on Oil and Gas Local Permitting

Lead Agency: Kern County Planning Department
Contact Person: Christopher B. Mynk
Mailing Address: 2700 "M" Street Suite 100
Phone: (661) 862-8607
City: Bakersfield
Zip: 93301-2323
County: Kern

**Project Location:** County: Kern
City/Nearest Community: Multiple
Cross Streets: n/a
Zip Code
Lat. / Long.:
Total Acres: 3,110 square miles
Assessor's Parcel No.: Multiple
Section:
Twp.:
Range:
Base:
Within 2 Miles: State Hwy #: 99, 58, 43, 46, 119, 223, 204, 33
Waterways: Kern River (multiple)
Airports: Multiple
Railways: Multiple
Schools: Multiple

**Document Type:**

CEQA:
- ☐ NOP
- ☐ Early Cons
- ☐ Neg Dec
- ☐ Mit Neg Dec
- ☒ Draft EIR
- ☐ Supplement/Subsequent EIR (Prior SCH No.)
- Other

NEPA:
- ☐ NOI
- ☐ EA
- ☐ Draft EIS
- ☐ FONSI

Other:
- ☐ Joint Document
- ☐ Final Document
- ☐ Other

**Local Action Type:**

- ☐ General Plan Update
- ☐ General Plan Amendment
- ☐ General Plan Element
- ☐ Community Plan
- ☐ Specific Plan
- ☐ Master Plan
- ☐ Planned Unit Development
- ☐ Site Plan
- ☐ Rezone
- ☐ Prezone
- ☐ Use Permit
- ☐ Land Division (Subdivision, etc.)
- ☐ Annexation
- ☐ Redevelopment
- ☐ Coastal Permit
- ☒ Amendment to Zone Ord.

**Development Type:**

- ☐ Residential: Units Acres
- ☐ Office: Sq.ft. Acres Employees
- ☐ Commercial: Sq.ft. Acres Employees
- Industrial: Sq.ft. Acres Employees
- ☐ Educational
- ☐ Recreational
- ☐ Water Facilities: Type MGD
- ☐ Transportation: Type
- ☐ Mining: Mineral
- ☐ Power: Type MW
- ☐ Waste Treatment: Type MGD
- ☐ Hazardous Waste: Type
- Other:

**Project Issues Discussed in Document:**

- ☒ Aesthetic/Visual
- ☒ Agricultural Land
- ☒ Air Quality
- ☒ Archeological/Historical
- ☒ Biological Resources
- ☐ Coastal Zone
- ☒ Drainage/Absorption
- ☐ Economic/Jobs
- ☐ Other
- ☐ Fiscal
- ☒ Flood Plain/Flooding
- ☒ Forest Land/Fire Hazard
- ☒ Geologic/Seismic
- ☒ Minerals
- ☒ Noise
- ☒ Population/Housing Balance
- ☒ Public Services/Facilities
- ☒ Recreation/Parks
- ☒ Schools/Universities
- ☒ Septic Systems
- ☒ Sewer Capacity
- ☒ Soil Erosion/Compaction/Grading
- ☒ Solid Waste
- ☒ Toxic/Hazardous
- ☒ Traffic/Circulation
- ☒ Vegetation
- ☒ Water Quality
- ☒ Water Supply/Groundwater
- ☒ Wetland/Riparian
- ☒ Wildlife
- ☒ Growth Inducing
- ☒ Land Use
- ☒ Cumulative Effects

**Present Land Use/Zoning/General Plan Designation:** Developed and undeveloped land in Kern County. Current Zoning Classifications and General Plan Map Code Designations to remain the same.

The Project Boundary (Local Permitting Boundary Area) encompasses 3,110 square miles and generally includes the San Joaquin Valley Floor portion of Kern County up to an elevation of 2,000 feet. The boundary includes: west side-the San Luis Obispo County line, north side- the Kings and Tulare county lines, east and south sides-the 2,000-foot elevation contours, squared off to the nearest section line.

**Project Description:** The proposed Project consists of revisions to various Chapters of Title 19 Kern County Zoning Ordinance to implement a new permit process for oil and gas activities. The revisions include new site development

standards and review processes for all oil and gas exploration, extraction, operations, and production activities in unincorporated Kern County by:

(a) Removing the "Unrestricted Drilling" Section in Chapter 19.98 and updated "Drilling by Ministerial Permit" and "Drilling by Conditional Use Permit" Sections;

(b) Establishing a new "Tier Area" maps to address different land uses and zone districts where oil and gas activities occur and are proposed to occur in the future;

(c) Establishing an Oil and Gas Conformity Review and Minor Activity Review, as part of the "Drilling by Ministerial Permit" Section in Chapter 19.98, to ensure compliance with all applicable Development and Implementation Standards and Conditions;

(d) Establishing new Development and Implementation Standards and Conditions Section in Chapter 19.98;

(e) Establishing new requirements for site plan sign-off by owners of the surface and minerals for split estate ownership;

(f) Revising additional Chapters of the Zoning Ordinance to ensure consistency with the new requirements of this EIR. These Chapters include: 19.08 – Interpretations and General Standards, 19.48 – Drilling Island (DI) District, 19.50 – Floodplain Primary District, 19.66 – Petroleum Extraction (PE) Combining District, 19.81 - Outdoor Lighting (Dark Skies Ordinance), 19.88 – Hillside Development, 19.102 – Permit Procedures, and 19.108 – Nonconforming Uses, Structures, and Lots.

Reviewing Agencies Checklist

Lead Agencies may recommend State Clearinghouse distribution by marking agencies below with and "**X**".
If you have already sent your document to the agency please denote that with an "**S**".

| | | | |
|---|---|---|---|
| S | Air Resources Board | | Office of Emergency Services |
| | Boating & Waterways, Department of | S | Office of Historic Preservation |
| S | California Highway Patrol | | Office of Public School Construction |
| x | CalFire | S | Parks & Recreation |
| S | Caltrans District # 6 & 9 | | Pesticide Regulation, Department of |
| S | Caltrans Division of Aeronautics | x | Public Utilities Commission |
| S | Caltrans Planning (Headquarters) | S | Regional WQCB # Lahontan & Central Valley |
| x | Central Valley Flood Protection Board | | Resources Agency |
| | Coachella Valley Mountains Conservancy | | S.F. Bay Conservation & Development Commission |
| | Coastal Commission | | San Gabriel & Lower L.A. Rivers and Mtns Conservancy |
| | Colorado River Board | | San Joaquin River Conservancy |
| | Conservation, Department of | | Santa Monica Mountains Conservancy |
| | Corrections, Department of | x | State Lands Commission |
| | Delta Protection Commission | | SWRCB: Clean Water Grants |
| | Education, Department of | | SWRCB: Water Quality |
| S | Energy Commission | | SWRCB: Water Rights |
| S | Fish & Game Region # Fresno | | Tahoe Regional Planning Agency |
| S | Food & Agriculture, Department of | S | Toxic Substances Control, Department of |
| | General Services, Department of | S | Water Resources, Department of |
| x | Health Services, Department of | | |
| x | Housing & Community Development | | Other _____ |
| S | Integrated Waste Management Board | | Other _____ |
| S | Native American Heritage Commission | | |

**Local Public Review Period (to be filled in by lead agency)**

Starting Date July 8, 2015 Ending Date August 24, 2015

**Lead Agency (Complete if applicable):**

Consulting Firm: _____
Address: _____
City/State/Zip: _____
Contact: _____
Phone: _____

Applicant: _____
Address: _____
City/State/Zip: _____
Phone: _____

**Signature of Lead Agency Representative:** _____ **Date:** July 8, 2015

Authority cited: Section 21083, Public Resources Code. Reference: Section 21161, Public Resources Code.

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Chapter 1

# Executive Summary

# Chapter 1
# Executive Summary

## 1.1 Introduction

The proposed Project consists of an Amendment to Chapter 19.98 (Oil & Gas Production) of the Kern County Zoning Ordinance and related sections of the Kern County Zoning Ordinance to include updated procedures, development standards, and conditions for future oil and gas exploration, development, and production activities in unincorporated Kern County. Representatives of the oil and gas industry associations—specifically the California Independent Petroleum Association (CIPA), the Independent Oil Producers Agency (IOPA), and the Western States Petroleum Association (WSPA) (collectively, "Project Applicant")—requested an amendment to Chapter 19.98 (Oil and Gas Production) and related chapters of the Kern County Zoning Ordinance to include additional provisions for local permitting of oil and gas activities. Under Chapter 19.112, amendments to the text of the Zoning Title of the Kern County Zoning Ordinance can only be initiated by the Kern County Board of Supervisors. The request was considered in a public hearing before the Board of Supervisors on January 22, 2013, and the Board directed Planning and Community Development Staff to proceed with processing the requested amendments. This revision of the Zoning Ordinance for local permitting also requires that other relevant references in the Zoning Ordinance be reviewed and revised for consistency. The Amended Zoning Ordinance, together with the implementation of future oil and gas activities expected to be undertaken pursuant to the Amended Zoning Ordinance, is the "Project" considered in this EIR (hereafter referred to as the "Project").

This Draft Environmental Impact Report (EIR) has been prepared by Kern County as the Lead Agency under the California Environmental Quality Act (CEQA). The EIR provides information about the environmental setting and impacts of the Project and alternatives. It informs the public about the Project and its impacts and provides information to meet the needs of local, state, and federal permitting agencies that are required to consider the Project. The EIR will be used by Kern County to determine whether to approve the proposed amendment to Chapter 19.98 and related chapters of the Kern County Zoning Ordinance.

This Executive Summary summarizes the requirements of the CEQA Statute and Guidelines, provides an overview of the Project and alternatives, identifies the purpose of the Draft EIR, outlines the potential impacts of the Project and the recommended mitigation measures, and discloses areas of controversy and issues to be resolved.

## 1.2 Project Summary

The Project is to amend Chapter 19.98 and related chapters of the Kern County Zoning Ordinance. The Project also includes a potential future oil and gas development scenario with oil and gas activities that are expected to be undertaken pursuant to the amendment to the Zoning Ordinance. The Draft EIR, once certified, will be used to satisfy the CEQA requirements for the following discretionary approvals:

1. Amendment of Kern County Zoning Ordinance Chapter 19.98 and related chapters for consistency with amended Chapter 19.98;
2. California Division of Oil, Gas & Geothermal Resources permitting of oil and gas activities, including well stimulation, in the Project Area;
3. San Joaquin Valley Air Pollution Control District permitting for oil and gas-related equipment/facilities, including, for example, boilers, steam generators, process heaters, flares, tanks, and portable equipment;
4. Central Valley Regional Water Quality Control Board Waste Discharge Requirements (WDRs) and Clean Water Act section 401 Water Quality Certifications and WDR waivers;
5. California Department of Fish and Wildlife incidental take permits;
6. California Department of Toxic Substances Control oversight of routine management and cleanup of non-petroleum spills and releases;
7. California Department of Transportation encroachment permits;
8. Central Valley Flood Protection Control Board encroachment permits;
9. Kern County Water Agency and other water districts' permits for water-related uses;
10. Approval of the proposed Project Mitigation Measure Monitoring Program;
11. Approval of the CEQA Findings pursuant to CEQA Guidelines Sections 15091 and 15093; and
12. Approval of a Statement of Overriding Consideration.

## 1.3 Purpose and Use of the Draft EIR

An EIR is a public informational document used for planning and decision-making purposes. The Kern County Planning Commission and Board of Supervisors will consider the information in the EIR, including the public comments and staff response to those comments, during the public hearing process. As a legislative action, the final decision is made by the Board of Supervisors, who may approve, conditionally approve, or deny the Project. The purpose of an EIR is to identify:

- The significant potential impacts of the Project on the environment and indicate the manner in which those significant impacts can be avoided or mitigated;
- Any unavoidable adverse impacts that cannot be mitigated; and
- Reasonable and feasible alternatives to the Project that would eliminate any significant adverse environmental impacts or reduce the impacts to a less-than-significant level.

An EIR also discloses growth-inducing impacts; impacts found not to be significant; and significant cumulative impacts of past, present, and reasonably anticipated future projects. CEQA requires an EIR be prepared that reflects the independent judgment of the lead agency regarding the impacts, the level of significance of the impacts both before and after mitigation, and mitigation measures proposed to reduce the impacts. A Draft EIR is circulated to responsible agencies, trustee agencies with resources affected by the Project, and interested agencies and individuals. The purposes of public and agency review of a Draft EIR include sharing expertise, disclosing agency analyses, checking for accuracy, detecting omissions, discovering public concerns, and soliciting counterproposals. Reviewers of a Draft EIR are requested to focus on the sufficiency of the document in identifying and analyzing the possible impacts on the environment and ways in which the significant effects of the Project might be avoided or mitigated. Comments are most helpful when they suggest additional specific alternatives or mitigation measures that would provide better ways to avoid or mitigate significant environmental effects.

This Draft EIR is being distributed directly to agencies, organizations, and interested groups and persons for comment during a 45-day formal review period in accordance with Section 15087 of the CEQA Guidelines. The EIR process, including means by which members of the public can comment on the EIR, is discussed further in Chapter 2, Introduction.

# 1.4 Project Overview

This section describes the local and regional setting, surrounding land uses, Project objectives, and Project characteristics. The Project is described in further detail in Chapter 3, Project Description. The Amended Zoning Ordinance is also included as Attachment A at the end of this Executive Summary for ready reference.

## 1.4.1 Local and Regional Setting

Kern County is California's third-largest county in terms of land area, encompassing 8,202 square miles. Located at the southern end of the Central Valley, Kern County serves as the gateway to southern California, the San Joaquin Valley, and California's high desert. The geography of Kern County is diverse, containing mountainous areas, agricultural lands, and desert areas.

Kern County is bounded by Kings, Tulare, and Inyo counties on the north, San Bernardino County on the east, Los Angeles and Ventura counties on the south, and Santa Barbara and San Luis Obispo Counties on the west. Kern County includes eight incorporated cities within the

portion of the county located in the San Joaquin Valley including Arvin, Bakersfield, Delano, Maricopa, McFarland, Shafter, Taft, and Wasco. Oil and gas exploration and development activities have historically occurred in the San Joaquin Valley Floor portion of the County and are likely to continue to occur in the same vicinity. For this reason, the EIR evaluates potential impacts of future oil and gas exploration and production activities within a defined boundary.

The Kern County General Plan describes the San Joaquin Valley region as "the southern San Joaquin Valley below an elevation of 1,000 feet mean sea level (MSL)" within Kern County. The San Joaquin Valley portion is characterized by relatively low rainfall, averaging less than 10 inches per year. Average temperatures are relatively high, and total evaporation exceeds total precipitation. Summers are relatively cloudless, hot, and dry. Winter is generally mild, but an occasional freeze does occur and may cause substantial agricultural damage. Average length of the growing season is 265 days. The San Joaquin Valley region is within the southern end of the San Joaquin Valley Air Basin (SJVAB) managed by the San Joaquin Valley Air Pollution Control District (SJVAPCD). This district encompasses Fresno, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare counties, as well as the San Joaquin Valley portion of Kern County. Further, the San Joaquin Valley region is within the Tulare Lake Groundwater Basin, which includes the Kern River Hydrographic Unit and the Poso Hydrographic Unit. These are subject to Regional Water Quality Control Board (RWQCB) oversight.

## 1.4.2 Surrounding Land Uses

The Project Area is bordered on the west by San Luis Obispo County. The border between the two counties approximates the San Andreas Fault line. The Temblor Range forms a general barrier between the more industrial oil drilling operations on the Kern County side of the border verses the more rural and agricultural nature of neighboring San Luis Obispo County, with the exception of the Midway Sunset Oilfield, which crosses into neighboring San Luis Obispo County. The portion of the Midway Sunset Oilfield located within San Luis Obispo County is outside of the Project Area and is not subject to Kern County jurisdiction. Other oil and gas uses exist to the west of the Project Area; however, such activities are less intensive in nature and dispersed throughout a rural area.

To the south, the Project Area is bordered by the San Emigdo Mountains and the Tehachapi Mountains. The Project Area extends to the border of the Los Padres National Forest. The unincorporated community of Frazier Park is located in the uplands several miles south of the Project Area and west of I-5.

To the north, the Project Area is bordered by Kings and Tulare counties. The bordering areas of these two counties contain agricultural and oil and gas operations, as well as dispersed rural residences. The incorporated City of Delano is located on the northern border of Kern County, and adjacent land uses in Tulare County consist of large lot residential, agriculture, and industrial uses.

To the east, the Project Area is bordered by the foothills of surrounding mountain ranges, such as the Greenhorn Mountains and Tehachapi Mountains, as well as the Tejon Hills southeast of the

incorporated City of Arvin. The Project Area also borders the Sequoia National Forest northeast of Bakersfield. Land uses along the border are generally rural in nature.

### 1.4.3 Project Objectives

## County Objectives

The County has defined the following objectives for the Project:

- Update the County's Zoning Ordinance to include additional procedures and compliance standards that address changes in laws and regulations by other agencies, and technological advancements within the oil and gas industry, for the purpose of reducing or eliminating potential significant adverse environmental impacts, to the extent feasible, of future oil and gas activities, and thereby ensure that current County ordinances reflect the County's interest in protecting the health, safety, and general welfare of residents and visitors.
- Encourage ongoing economic development by the oil and gas industry that creates quality, high paying jobs and promotes capital investment in Kern County, which enables the County to invest in capital improvement projects and social programs, which benefit County residents, retail businesses, and capital industries which ensures the County's fiscal stability.
- Continue Kern County's ongoing commitment to consult and cooperate with federal, state, regional, and local agencies by periodically reviewing adopted regulations to ensure the long-term viability of Kern County's resources.
- Continue to improve and streamline current energy regulations and increase County monitoring and involvement in state and federal energy legislation.
- Protect areas of important mineral, petroleum, and agricultural resource potential for future use by promoting sustainability and encouraging best management practices, which are mutually beneficial, through strategic short- and long-range planning.
- Ensure the protection of environmental resources by emphasizing the conservation of productive agricultural lands, the encouragement of planned urban growth, the promotion of clean air strategies to address existing air quality issues, and the promotion of long-term water conservation strategies which will ensure the quality and adequacy of surface and groundwater supplies for future growth of all of Kern County's industries.
- Contain new development within an area large enough to meet generous projections of foreseeable need, but in locations that will not impair the economic strength derived from residential developments, agriculture, rangeland, mineral resources, or diminish the other amenities that exist in Kern County.

# Applicant Objectives

The Project Applicants have defined the following objectives for the Project:

- Create an effective regulatory and permitting process for oil and gas exploration and production that can be relied on by the County of Kern, as well as the California Division of Oil, Gas and Geothermal Resources and other responsible agencies.
- Achieve an efficient and streamlined environmental review and permitting process for all oil and gas operations covered by the proposed Project.
- Provide for economically feasible and environmentally responsible growth of the Kern County oil and gas industry.
- Develop industry-wide best practices, performance standards, and mitigation measures that ensure adequate protection of public health and safety and the environment.
- Increase oil and gas exploration and production in Kern County as a means of reducing California's dependence upon foreign sources of energy.
- Increase oil and gas exploration and production in Kern County as a means of increasing employment opportunities and economic prosperity to Kern County's residents, businesses, and local government.

## 1.4.4 Project Characteristics

The proposed Project consists of an amendment to Title 19 of the Kern County Zoning Ordinance, Chapter 19.98 (Oil and Gas Production), and related sections of the Kern County Zoning Ordinance to include updated procedures, development standards and conditions for future oil and gas exploration, and development and production activities in unincorporated Kern County. In addition, the proposed Project includes the implementation of future oil and gas development activities expected to be undertaken pursuant to the amended ordinances.

# Proposed Zoning Code Amendment

The requested amendment to Title 19 of the Kern County Zoning Ordinance would incorporate a comprehensive update to all sections of the Zoning Ordinance related to oil and gas exploration and production. The amendment would establish updated development standards and conditions to address environmental impacts of pre-drilling exploration, well drilling, and the operation of wells and other oil and gas production-related equipment and facilities, including exploration, production, completion, stimulation, reworking, injection, monitoring and plugging, and abandonment. The requested amendment would also establish a new "Oil and Gas Conformity Review" ministerial permit procedure for County approval of future well drilling and operations to ensure compliance with the updated development standards and conditions and provide for ongoing tracking and compliance monitoring. The requested amendment to Title 19 of the Kern County Zoning Ordinance contains provisions that:

- Require all new oil and gas wells for exploration or production obtain approval from the Kern County Planning and Community Development Department prior to drilling commencement.
- Implement the Tier System to address the different land uses and Zone Districts where oil and gas activities occur.
- Require an Oil and Gas Conformity Review as part of the Drilling by Ministerial Permit Section, which would require consistent and comprehensive mitigation based on surrounding land uses.
- Update the Development Standards and Conditions Section to include mitigation measures in this EIR as well as other regulatory requirements.
- Require a signature block and set a review schedule for all Oil and Gas Conformity Review Site Plans submitted to the County.
- Set a specific application processing procedure and timeline for applications on split estate lands without a signature block signed by the Land/Surface Owner.
- Outline a new fee structure to support mitigation compliance and County application review costs.

Chapter 3, Project Description, includes a complete listing of all the text changes to the zoning ordinances (collectively, "Amended Zoning Ordinance") as proposed and analyzed in this EIR. The Amended Zoning Ordinance is also included at the end of this Executive Summary for ready reference.

# Potential Future Oil and Gas Development Scenario

Over the next 25 years, this EIR conservatively assumes that an average of 2,697 new producing wells per year could be drilled in the Project Area as part of the potential future oil and gas development scenario included in the proposed Project. The level of well drilling in any given year may be higher or lower than this average, consistent with the variations in well drilling activities that have historically occurred due to market and other conditions.

Each of the wells drilled may be associated with a number of oil and gas activities. For purposes of this EIR, oil and gas activities have been divided into two sets of components: (1) construction activities, which may include but would not be limited to geophysical surveys, access road and well pad construction, drilling, well completion and testing, distribution line construction, well re-working and workovers, well decommissioning, and well abandonment; and (2) operational activities, which may include but would not be limited to geophysical monitoring, produced fluids and natural gas treatment, water management, well stimulation treatment, enhanced oil recovery activities, and water and waste gas injection via injection well.

For more detailed information regarding the potential future oil and gas development scenario, see Chapter 3, Project Description.

# 1.5 Environmental Impacts

Section 15128 of the CEQA Guidelines requires that an EIR contain a statement briefly indicating the reasons that various, possible, new significant effects of a project were determined not to be significant, and were therefore not discussed in detail in the EIR. The County has engaged the public to participate in the scoping of the environmental document.

The contents of this Draft EIR were established based on a Notice of Preparation/Initial Study (NOP/IS) prepared in accordance with the CEQA Guidelines, as well as public and agency input that were received during the scoping process. The comments to the NOP/IS are found in Appendix D of this document. Based on the findings of the NOP/IS and the results of scoping, a determination was made that this EIR must contain a comprehensive analysis of all environmental issues identified in Appendix G of the CEQA Guidelines.

## 1.5.1 Impacts Not Further Considered in this EIR

All impacts are discussed in this Draft EIR. No resource areas were eliminated from discussion through the Initial Study.

## 1.5.2 Impacts of the Proposed Project

## No Potential for Impacts to Occur

Potential environmental effects of the Project and mitigation measures are discussed in detail in Chapter 4, Environmental Settings, Impacts, and Mitigation Measures, of this EIR. The following effects were determined to have no potential for impacts to occur:

### Agriculture and Forestry Resources

- Impact 4.2-3: Conflict with Existing Zoning For, Or Cause Rezoning Of, Forest Land or Timberland
- Impact 4.2-4: Result in the Loss of Forest Land or Conversion of Forest Land to Non-Forest Use
- Impact 4.2-6: Result in the Cancellation of an Open Space Contract Made Pursuant to the California Land Conservation Act of 1965 or Farmland Security Zone Contract for Any Parcel of 100 or More Acres

### Hydrology and Water Quality

- Impact 4.9-7: Place Housing within a 100-year Flood Hazard Area as Mapped on a Federal Flood Hazard Boundary or Flood Insurance Rate Map or Other Flood Hazard Delineation Map
- Impact 4.9-10: Contribute to Inundation by Seiche, Tsunami, or Mudflow

### Population and Housing

- Impact 4.13-2 Displace Substantial Numbers of Existing Housing, Necessitating the Construction of Replacement Housing Elsewhere
- Impact 4.13-3 Displace Substantial Numbers of People, Necessitating the Construction of Replacement Housing Elsewhere

## Less than Significant with Incorporation of Mitigation Measures

Potential environmental effects of the Project and mitigation measures are discussed in detail in Chapter 4, Environmental Settings, Impacts, and Mitigation Measures, of this EIR. After full analysis, the following effects were determined to be less than significant with the incorporation of mitigation measures.

### Agriculture and Forestry Resources

- Impact 4.2-1: Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland) to Non-Agricultural Use
- Impact 4.2-5: Involve Other Changes in the Existing Environment Which, Because of Their Location or Nature, Could Result in Conversion of Farmland to Non-agricultural Use or Conversion of Forest Land to Non-forest Use

### Air Quality

- Impact 4.3-1: Conflict With or Obstruct Implementation of the Applicable Air Quality Plan
- Impact 4.3-2: Violate Any Air Quality Standard as Adopted in (c)i or (c)ii, or Established by United States Environmental Protection Agency or Air District or Contribute Substantially to an Existing or Projected Air Quality Violation
- Impact 4.3-3: Expose Sensitive Receptors to Substantial Pollutant Concentrations

### Biological Resources

- Impact 4.4-1: Have a Substantial Adverse Effect, either Directly or through Habitat Modifications, on any Species Identified as a Candidate, Sensitive, or Special Status Species in Local or Regional Plans, Policies, or Regulations or by the California Department of Fish and Wildlife or the United States Fish and Wildlife Service
- Impact 4.4-2: Have a Substantial Adverse Effect on Any Riparian Habitat or Other Sensitive Natural Community Identified in Local or Regional Plans, Policies, Regulations, or by the California Department of Fish and Wildlife or the United States Fish and Wildlife Service

- Impact 4.4-3: Have a Substantial Adverse Effect on Federally Protected Wetlands as Defined by Section 404 of the Clean Water Act (Including, but Not Limited to, Marsh, Vernal Pool, Coastal, etc.) through Direct Removal, Filling, Hydrological Interruption, or Other Means
- Impact 4.4-4: Interfere Substantially with the Movement of any Native Resident or Migratory Fish or Wildlife Species, or with Established Native Resident or Migratory Wildlife Corridors, or Impede the Use of Native Wildlife Nursery Sites
- Impact 4.4-5: Conflict with Any Local Policies or Ordinances Protecting Biological Resources, Such as a Tree Preservation Policy or Ordinance
- Impact 4.4-6: Conflict with the Provisions of an Adopted Habitat Conservation Plan, Natural Community Conservation Plan, or Other Approved Local Regional, or State Habitat Conservation Plan

## Cultural Resources

- Impact 4.5-1: Cause a substantial adverse change in the significance of a historical resource
- Impact 4.5-2: Cause a substantial adverse change in the significance of an archaeological resource
- Impact 4.5-3: Directly or indirectly destroy a unique paleontological resource or site
- Impact 4.5-4: Disturb any human remains, including those interred outside of formal cemeteries

## Geology and Soils

- Impact 4.6-1: Expose People or Structures to Substantial Adverse Effects, Including the Risk of Loss, Injury, or Death Involving the Rupture of a Known Earthquake Fault
- Impact 4.6-2: Expose People or Structures to Substantial Adverse Effects, Including the Risk of Loss, Injury, or Death Involving Strong Seismic Ground Shaking
- Impact 4.6-3: Expose People or Structures to Substantial Adverse Effects, Including the Risk of Loss, Injury, or Death Involving Seismic-Related Ground Failure, Including Liquefaction
- Impact 4.6-4: Expose People or Structures to Substantial Adverse Effects, Including the Risk of Loss, Injury, or Death Involving Landslides
- Impact 4.6-5: Result in Substantial Soil Erosion or the Loss of Topsoil
- Impact 4.6-6: Be Located on a Geological Unit or Soil That is Unstable, or That Would Become Unstable as a Result of the Project, and Potentially Result in On- or Off-site Landslide, Lateral Spreading, Subsidence, Liquefaction, or Collapse
- Impact 4.6-7: Be Located on Expansive Soil, as Defined in Table 18-1-B of the Uniform Building Code (1994), Creating Substantial Risks to Life or Property

- Impact 4.6-8: Have Soils Incapable of Adequately Supporting the Use of Septic Tanks or Alternative Wastewater Disposal Systems Where Sewers Are Not Available for the Disposal of Wastewater
- Impact 4.6-9: Cumulative Impacts to Geologic and Soil Resources

## Greenhouse Gas Emissions

- Impact 4.7-1: Generate Greenhouse Gas Emissions, Either Directly or Indirectly, That May Have a Significant Impact on the Environment

## Hazards and Hazardous Materials

- Impact 4.8-1: Create a Significant Hazard to the Public or the Environment through the Routine Transport, Use, or Disposal of Hazardous Materials
- Impact 4.8-2: Create a Significant Hazard to the Public or the Environment through Reasonably Foreseeable Upset and Accident Conditions Involving the Release of Hazardous Materials into the Environment
- Impact 4.8-3: Emit Hazardous Emissions or Handle Hazardous or Acutely Hazardous Materials, Substances, or Waste within One-Quarter Mile of Existing or Proposed School.
- Impact 4.8-4: Create a Hazard to the Public or the Environment as a Result of Being a Site that is Included on a List of Hazardous Materials Sites Compiled Pursuant to Government Code Section 65962.5
- Impact 4.8-5: For a Project Located within the Adopted Airport Land Use Compatibility Plan, Result in a Safety Hazard for People Residing or Working in the Area
- Impact 4.8-8: Expose People or Structures to a Significant Risk of Loss, Injury, Or Death Involving Wildland Fires, Including Where Wildlands are Adjacent to Urbanized Areas or Where Residences are Intermixed with Wildlands
- Impact 4.8-9: Generate Vectors or Have a Component that Includes Agricultural Waste Exceeding Adopted Qualitative Thresholds
- Impact 4.8-10: Contribute to Cumulative Hazards and Hazardous Materials Impacts

## Hydrology and Water Quality

- Impact 4.9-1: Violate Any Water Quality Standards or Waste Discharge Requirements
- Impact 4.9-3: Substantially Alter the Existing Drainage Pattern of the Site or Area, Including Through the Alteration of the Course of a Stream or River, in a Manner That Would Result in Substantial Erosion or Siltation On-site or Off-site
- Impact 4.9-4: Substantially Alter the Existing Drainage Pattern of the Site or Area, Including Through the Alteration of the Course of a Stream or River, or Substantially

Increase the Rate or Amount of Surface Runoff in a Manner That Would Result in Flooding On-site or Off-site

- Impact 4.9-5: Create or Contribute Runoff Water That Would Exceed the Capacity of Existing or Planned Stormwater Drainage Systems or Provide Substantial Additional Sources of Polluted Runoff
- Impact 4.9-6: Otherwise Substantially Degrade Water Quality
- Impact 4.9-8: Place Within a 100-year Flood Hazard Area Structures that Would Impede or Redirect Flood Flows
- Impact 4.9-9: Expose People or Structures to a Significant Risk of Loss, Injury, or Death Involving Flooding, Including Flooding as a Result of the Failure of a Levee or Dam

## Land Use and Planning

- Impact 4.10-1: Physically Divide an Established Community

## Noise

- Impact 4.12-1: Exposure of Persons to, or Generate, Noise Levels in Excess of Standards Established in the Local General Plan or Noise Ordinance or Applicable Standards of Other Agencies
- Impact 4.12-3: A Substantial Permanent Increase in Ambient Noise Levels in the Project Vicinity Above Levels Existing Without the Project
- Impact 4.12-4: A Substantial Temporary or Periodic Increase in Ambient Noise Levels in the Project Vicinity Above Levels Existing without the Project
- Impact 4.12-5: For a Project Located within the Kern County Airport Land Use Compatibility Plan, Would the Project Expose People Residing or Working in the Project Area to Excessive Noise Levels
- Impact 4.12-6: For a project located within the vicinity of a private airstrip, would the Project expose people residing or working in the Project Area to excessive noise levels
- Impact 4.12-7: Cumulative Impact on Noise Receptors

## Public Services

- Impact 4.14-1: Result in Substantial Adverse Physical Impacts Associated with the Provision of New or Physically Altered Government Facilities, Need for New or Physically Altered Government Facilities, the Construction of Which Could Cause Significant Environmental Impacts, in Order to Maintain Acceptable Service Ratios, Response Times, or Other Performance Objectives for Any of the Public Services, which Include: Fire Protection, Police Protection, Schools, Parks, and Other Public Facilities
- Impact 4.14-2: Contribute to Cumulative Public Service Impacts

## Transportation and Traffic

- Impact 4.16-1: Conflict with an Applicable Plan, Ordinance, or Policy Establishing Measures of Effectiveness for the Performance of the Circulation System, Including but Not Limited to Intersections, Streets, Highways and Freeways, Pedestrian and Bicycle Paths, and Mass Transit
- Impact 4.16-2: Conflict with an Applicable Congestion Management Program, including, but not limited to Level of Service Standards and Travel Demand Measures, or Other Standards Established by the County Congestion Management Agency or Adopted County Threshold for Designated Roads or Highways
- Impact 4.16-3: Result in a Change in Air Traffic Patterns, including Either An Increase in Traffic Levels or a Change in Location that Results in Substantial Safety Risks
- Impact 4.16-4: Substantially Increase Hazards due to a Design Feature (e.g., Sharp Curves or Dangerous Intersections) or Incompatible Uses
- Impact 4.16-5: Result in Inadequate Emergency Access
- Impact 4.16-6: Conflict with Adopted Policies, Plans, or Programs regarding Public Transit, Bicycle, or Pedestrian Facilities, or Otherwise Decrease the Performance or Safety of Such Facilities
- Impact 4.16-7: Cumulative Impacts on Transportation and Traffic

## Utilities and Service Systems

- Impact 4.17-1: Exceed Wastewater Treatment Requirements of the Applicable Regional Water Quality Control Board
- Impact 4.17-2: Require or Result in the Construction of New Water or Wastewater Treatment Facilities or Expansion of Existing Facilities, the Construction of which could cause Significant Environmental Effects
- Impact 4.17-3: Require or Result in the Construction of New Stormwater Drainage Facilities or Expansion of Existing Facilities, the Construction of which could cause Significant Environmental Effects
- Impact 4.17-5: Result in a Determination by the Wastewater Treatment Provider that Serves or May Serve the Project that it has Adequate Capacity to Serve the Project's Projected Demand in Addition to the Provider's Existing Commitments
- Impact 4.17-6: Be Served by a Landfill with Insufficient Permitted Capacity to Accommodate the Project's Solid Waste Disposal Needs
- Impact 4.17-7: Fail to Comply with Federal, State, and Local Solid Waste Statutes and Regulations

# Unavoidable Significant Adverse Impacts

Section 15126.2(b) of the CEQA Guidelines requires that the EIR describe any significant impacts, including those that can be mitigated but not reduced to less-than-significant levels. Potential environmental effects of the Project and proposed mitigation measures are discussed in detail in Chapter 4, Environmental Settings, Impacts, and Mitigation Measures, of this EIR. The following environmental impacts were determined to be significant and unavoidable impacts (refer to Table 1-1, Summary of Significant Impacts of the Project).

**Table 1-1: Summary of Unavoidable Significant Adverse Impacts of the Project**

| Resources | Project Impacts | Cumulative Impacts |
|---|---|---|
| Aesthetics and Visual Resources | Although implementation of mitigation measures would reduce the adverse visual changes experienced at individual key observation point locations, there are no mitigation measures that would preserve the existing character and quality of the Project Area and its surroundings. Project-related oil and gas activities would continue to produce visible changes to the existing environment and the resultant visual impact is considered **significant and unavoidable**. The Project has the potential to create a new source of substantial light or glare that would adversely affect day or nighttime views in the area. After implementation of MM 4.1-6, this impact would remain **significant and unavoidable.** | The oil and gas industry has a visible presence on the landscape of the San Joaquin Valley Floor and, the Project in combination with the implementation of other reasonably foreseeable oil and gas projects will continue to result in adverse visible changes within Kern County. Therefore, the Project's cumulative contribution after implementation of the recommended mitigation measures would remain cumulatively **significant and unavoidable** as a result of these changes in visual character and quality. |
| Air Quality | The Project would continue to generate odors. With implementation of MM 4.3-7, impacts would still be **significant and unavoidable**. | The construction and operational activities of oil and gas activities that would be authorized under the Project would result in an increase of criteria pollutants (oxides of nitrogen [NOx], volatile organic compounds [VOC], carbon monoxide [CO], particulate matter less than 10 microns and less than 2.5 microns in diameter [$PM_{10}$ and $PM_{2.5}$, respectively]) in excess of the recommended criteria pollutant significance threshold adopted by the SJVAPCD Board. Emission sources in Kern County contribute between 11% and 21% of criteria pollutant emissions in the San Joaquin Valley Air Basin. The Project would contribute between |

**Table 1-1: Summary of Unavoidable Significant Adverse Impacts of the Project**

| Resources | Project Impacts | Cumulative Impacts |
|---|---|---|
| | | 2% and 14% of these pollutants in the San Joaquin Valley Air Basin or between 19% and 97% of Kern County's contribution. This analysis indicates that most sulfur dioxide ($SO_2$) emissions in Kern County would originate from oil and gas activities and the majority of $NO_X$ emissions. Therefore, the proposed Project would have a **cumulatively considerable** contribution of criteria pollutant ($NO_X$, $PM_{10}$, $PM_{2.5}$, CO and $SO_2$) emissions to the Kern County portion of the SJVAB. |
| Agricultural Resources | None. | The geographic scope for cumulative impacts to agricultural and forest resources encompasses the whole of Kern County. The oil and gas exploration and production activities that would be authorized through implementation of the proposed Project along with projected population growth could result in **significant and unavoidable** cumulative impacts on farmland conversion. |
| Biological Resources | None. | Future oil and gas exploration and production activities related to the proposed Zoning Ordinance amendment could contribute to a significant cumulative impact on Project Area biological resources because future use and development of federal, state, and incorporated urban lands are not within the County's jurisdiction or control. Future land uses and development could affect biological resources in each of these jurisdictions and would be undertaken as independent actions with associated impacts, avoidance and minimization requirements, and mitigation, if required, under applicable federal, state, regional and local agency law. Impacts would remain **significant and unavoidable** with mitigation. |
| Cultural Resources | None. | The geographic scope for cumulative impacts to cultural and paleontological resources includes |

**Table 1-1: Summary of Unavoidable Significant Adverse Impacts of the Project**

| Resources | Project Impacts | Cumulative Impacts |
|---|---|---|
| | | the area within a one-mile radius from the Project Area. Cumulative impacts could result when paleontological, historical, and archaeological resources or human remains cannot be avoided by future projects. For paleontological and archaeological resources, it is important to recover a scientifically significant sample so the information can be preserved. For historic buildings and structures, detailed recordings, including measured drawings and photographs, can preserve the information. For human remains, reburial in a location not slated for future development can protect those remains from future disturbance. There could be **significant cumulative impacts** to paleontological, historical, and archaeological resources or human remains as a result of the oil and gas exploration and production activities that would be authorized under the Project.<br><br>Implementation of best professional practices would reduce many impacts to a less than significant level. However, buried archaeological and paleontological resources could be damaged or destroyed. Direct mitigation using the measures above would reduce most of these impacts to a **less than significant level**. |
| Greenhouse Gases | The Project has the potential to conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases. With the implementation of MM 4.7-5, the impact would remain **significant and unavoidable.** | The geographic scope for cumulative impacts for GHGs includes the area within 6 miles of the external Project Area boundary, and areas (e.g., incorporated cities) within the Project Area. Climate change impacts are inherently global and cumulative, and not Project specific. While implementation of MM 4.7-1 through MM 4.7-3 and the 2014 Regional Transportation Plan mitigation measures would encourage reduction in GHG |

**Table 1-1: Summary of Unavoidable Significant Adverse Impacts of the Project**

| Resources | Project Impacts | Cumulative Impacts |
|---|---|---|
| | | emissions at a regional level, they do not provide a mechanism that guarantees GHG emission reductions on a cumulative basis. The Project's cumulative contribution after implementation of the recommended mitigation measures would remain **cumulatively significant and unavoidable** as a result of the GHG emissions associated with the Project. |
| Hydrology and Water Quality | As discussed in Section 4.17, Utilities and Service Systems, while MM 4.17-2 through MM 4.17-4 would encourage the additional reuse of produced water, the extent to which oilfield operators can increase produced water reuse and decrease M&I demand is uncertain. As a result, potential impacts to groundwater levels and aquifer volumes would be **significant and unavoidable with mitigation**. | Project impacts could result in cumulatively considerable impacts that would be considered significant. Implementation of MM 4.9-1 through MM 4.9-6 would reduce potential cumulative impacts to water quality, erosion risks, flooding and other hydrologic resources to less than significant with mitigation. As discussed in Section 4.17, Utilities and Service Systems, although MM 4.17-2 through MM 4.17-4 encourage the additional reuse of produced water, the extent to which oilfield operators can increase produced water reuse and decrease municipal and industrial (M&I) demand is uncertain. As a result, cumulative impacts to groundwater would be significant and unavoidable.<br>The County lacks jurisdiction and control over land conversions, and actions or approvals by other agencies that may cause cumulatively significant impacts to hydrology or water quality in the region; accordingly, this impact remains **significant and unavoidable**. |
| Utilities and Service Systems | Implementation of MM 4.17-2 to MM 4.17-4 could reduce water supply impacts, but the allocation of water supplies and water demands, the complex laws affecting water rights, the many water districts that have legal jurisdiction over one or more sources of water in the Project Area, the varied technical feasibility | The geographic scope for cumulative impacts to utilities and service systems includes the area within 6 miles of the external Project Area.<br><br>Cumulative impacts would be **significant and unavoidable with respect to water supply**. For other |

**Table 1-1: Summary of Unavoidable Significant Adverse Impacts of the Project**

| Resources | Project Impacts | Cumulative Impacts |
|---|---|---|
| | of treating produced water, and the produced water reuse opportunities all present complex variables that fall outside the scope of the County's jurisdiction or control under CEQA. Although mitigation measures would reduce water use impacts, water quality impacts would be **significant and unavoidable**. | public utilities, including municipal wastewater treatment, stormwater management, or landfills with mitigation, impacts would be **less than significant** with mitigation measures. |

## 1.5.3 Significant Cumulative Impacts

According to Section 15355 of the CEQA Guidelines, the term cumulative impacts "refers to two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." Individual effects that may contribute to a cumulative impact may be from a single project or a number of separate projects. Individually, the impacts of a project may be relatively minor, but when considered along with impacts of other closely related or nearby projects, including newly proposed projects, the effects could be cumulatively considerable.

This EIR has considered the potential cumulative effects of the proposed Project. Impacts for the following issue areas have been found to be cumulatively considerable:

- Aesthetics
- Agriculture and Forest Resources
- Air Quality
- Greenhouse Gases
- Biology
- Cultural
- Hydrology
- Utilities

Each of these significant cumulative impacts is discussed in the applicable section of Chapter 4, Environmental Settings, Impacts, and Mitigation Measures, of this EIR.

## 1.5.4 Growth Inducement

The KCGP recognizes that certain forms of growth are beneficial, both economically and socially. Section 15126.2(d) of the CEQA Guidelines provides the following guidance on growth-inducing impacts: a project is identified as growth inducing if it "could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment."

Growth inducement can be a result of new development that requires an increase in employment, removes barriers to development, or provides resources that lead to secondary growth. With respect to employment, 16,752 workers in Kern County were employed in the oil and gas extraction industry in 2012. Of this total, 14,067 were estimated to be "oilfield" employees. Future oil and gas exploration and production activities that would be authorized under the proposed Amendment to Chapter 19.98 (Oil & Gas Production) of the Kern County Zoning Ordinance would result in 2,697 new production wells being drilled annually, while 2,231 wells would be plugged and abandoned. Additionally, it is anticipated that 1,200 wells would receive some type of well stimulation treatment during this same timeframe. Given the long history of oil and gas development within Kern County, implementation of the Project would not result in a large increase in employment that would significantly induce growth.

With respect to removing barriers to development, such as through providing access to previously undeveloped areas, the oil and gas development activities would involve constructing temporary and permanent access roads. Some roads may be removed and restored after initial construction; some may be reduced in size; and others may be maintained at their construction size for the life of the associated oil and gas operation. In general, these roads would provide for access to oil and gas construction and operation areas and would not provide access into other areas thereby promoting growth-inducing development. No other development would be anticipated as a result of these roads, and oil and gas development would tend to preclude other development from occurring.

While the Project would contribute to energy supply, which supports growth, the development of additional oil and gas resources is a response to increased market demand and is not a factor that induces new growth. Kern County planning documents already permit and anticipate a certain level of growth in the area of the Project and in the state as a whole, along with attendant growth in energy demand. It is this anticipated growth that drives energy-production projects and development, not vice versa. The Project would supply oil and gas to accommodate and support existing demand and projected growth, but it would not foster any new growth. Therefore, any link between the Project and growth in Kern County would be speculative.

In Kerncrest Audubon Society v. Los Angeles Department of Water and Power, the analysis of growth-inducing effects contained in the EIR for the Pine Tree Wind Development Project was challenged. Plaintiffs argued that the discussion was too cursory to provide adequate information about how additional electricity generated by the Project would sustain further growth in the Los Angeles area. The court held that the additional electricity that the Project would produce was intended to meet the current forecast of growth in the Los Angeles area. As such, the wind

development project would not cause growth, and so it was not reasonable to require a detailed analysis of growth-inducing impacts. In addition, EIRs for similar energy projects have contained similarly detailed analyses of growth-inducing impacts. Their conclusions that increasing the energy supply would not create growth has been upheld, because: (1) the additional energy would be used to ease the burdens of meeting existing energy demands within and beyond the area of the Project; (2) the energy would be used to support already-projected growth; or (3) the factors affecting growth are so varied that any potential connection between additional energy production and growth would necessarily be too speculative and tenuous to merit extensive analysis. Thus, as has been upheld in the courts, this level of analysis is sufficient to inform the public and decision makers of the growth-inducing impacts of the Project.

### 1.5.5 Irreversible Impacts

Section 15126.2(c) of the CEQA Guidelines defines an irreversible impact as an impact that uses nonrenewable resources during the initial and continued phases of the Project. Irreversible impacts can also result from damage caused by environmental accidents associated with the Project. Irretrievable commitments of resources should be evaluated to ensure that such consumption is justified. Oil and gas development and operational activities associated with the implementation of the Amendment to Chapter 19.98 (Oil and Gas Production) and related ordinance amendments to the Kern County Zoning Ordinance would commit nonrenewable resources during construction and operation activities. During these activities, oil, gas, and other nonrenewable resources would be consumed. Therefore, an irreversible commitment of nonrenewable resources would occur as a result of the ongoing production of oil and gas in the Project Area as is authorized by the current and proposed Amended Zoning Ordinance. However, assuming that those commitments occur in accordance with the adopted goals, policies, and implementation measures of the Kern County General Plan (KCGP), as a matter of public policy, those commitments have been determined to be acceptable. The KCGP ensures that any irreversible environmental changes associated with those commitments will be minimized.

## 1.6 Alternatives to the Proposed Project

Section 15126.6 of the CEQA Guidelines states that an EIR must address "a range of reasonable alternatives to the Project, which would feasibly attain most of the basic objectives of the Project but would avoid or substantially lessen any of the significant effects of the Project, and evaluate the comparative merits of the alternatives." Based on the significant and unavoidable impacts related to aesthetics, agricultural resources, air quality, greenhouse gases, biology, cultural, hydrology and utilities, along with the proposed Project objectives, several alternatives were considered as summarized below and discussed in detail in Chapter 6, Alternatives.

### 1.6.1 Alternatives Eliminated from Further Consideration

The following alternatives were initially considered but were eliminated from further consideration in this EIR because they do not meet Project objectives and/or were infeasible.

- **No Drilling on Agriculturally Productive Lands:**
    - *Example:* The ordinance could require the conformity review process within a smaller area, which would not include land that is currently being used to produce agricultural products.
    - This alternative would accomplish some County Project objectives by increasing County oversight while reducing administrative burdens. It would accomplish Oil Applicant objectives of continued, projected development. However, it may not reduce environmental impacts of the oil development as much as the proposed Project.
- **Ban on all drilling:**
    - *Example:* The ordinance would ban all drilling.
    - *Rejected as Infeasible*: This alternative is legally infeasible because of takings issues. Such an ordinance would infringe on operators' rights to develop mineral resources. It would also frustrate most, if not all, of the Project's stated objectives.
- **Larger Project Area boundary:**
    - *Example***:** The ordinance would apply to a larger area than in the proposed Project.
    - *Rejected because Will Not Reduce Significant Impacts:* Analysis of this alternative would be meaningless. The Project boundary as currently defined is where oil occurs and drilling is expected. If no drilling is expected outside this area, no purpose is served by expanding the Project scope.
- **More wells within the proposed Project footprint:**
    - *Example*: As currently conceived, the ordinance will not have a limit on the number of future wells; therefore, this "alternative" has more to do with the assumptions used in the EIR rather than the Project/ordinance definition.
    - *Rejected because Will Not Reduce Significant Impacts:* A larger number of wells would not reduce significant impacts.
- **Fewer wells within the proposed Project footprint:**
    - *Example:* The ordinance would limit/constrain the number of wells drilled annually over the life of the Project.
    - *Feasibility:* This alternative should be rejected as legally infeasible because it may illegally restrict someone's rights to develop their resources. In addition, it does not accomplish basic Project objectives of the oil applicants.
- **Alternative location:**
    - *Feasibility:* This is not a feasible alternative because the development facilities need to be in proximity to the resources (Guidelines 15126.6(f)(2)(B)).
- **Alternative resource:**
    - *Example:* The ordinance would require alternative mineral extraction or energy production.
    - *Feasibility:* This is not a feasible alternative because it does not accomplish the Project objectives of increasing gas and oil exploration and production to reduce dependence of foreign sources. Also, not feasible because the amount of mineral

extraction and energy production needed to compare to oil and gas extraction would not likely have any reduced significant impacts.

- **Zero net gain:**
    - *Example:* The ordinance would require zero net gain of all future exploration and production activities/operations.
    - *Feasibility:* This is not a feasible alternative because it does not accomplish the Project objectives of increasing gas and oil exploration and production to reduce dependence of foreign sources. Also, not feasible because the Project would not likely have any reduced significant impacts.

## 1.6.2 Alternatives Analyzed in this EIR

Alternatives that would avoid or substantially lessen any of the significant effects of the Project and that would feasibly attain most of the basic Project objectives are discussed below. Each alternative is discussed with respect to its relationship to the Project objectives.

## Alternative 1: No Project

Alternative 1, the "No Project" Alternative, assumes that the Project's proposed amendment to Title 19 of the Kern County Zoning Ordinance will not be approved. Accordingly, Alternative 1 assumes that Chapter 19.98 of the Kern County Zoning Ordinance will not be amended to establish updated development standards and conditions to address environmental impacts of pre-drilling exploration, well drilling and the operation of wells and other oil and gas production-related equipment and facilities, including exploration, production, completion, stimulation, reworking, injection, monitoring and plugging and abandonment. Moreover, Alternative 1 assumes that Chapter 19.98 of the Kern County Zoning Ordinance will not be amended to establish a new "Oil and Gas Conformity Review" ministerial permit procedure for County approval of future well drilling and operations to ensure compliance with the updated development standards and conditions and provide for ongoing tracking and compliance monitoring. Moreover, under Alternative 1, the Zoning Ordinance would not be updated to incorporate the Project's relevant proposed development standards into the County's Dark Skies Ordinance or the Zoning Ordinance provisions governing the Floodplain Primary District, the Petroleum Extraction (PE) Combining District, and Hillside Development.

## Alternative 2: Conditional Use Permit

Under Alternative 2, the Conditional Use Permit (CUP) Alternative, all new oil and gas exploration, development, and production activities would be permitted in the Project Area only upon County's issuance of a conditional use permit that authorizes such activities. Under Alternative 2, Chapter 19.98 of the Kern County Zoning Ordinance would be amended to eliminate its Sections 19.98.020 (Unrestricted Drilling) and 19.98.030 (Drilling By Ministerial Permit), and amend Section 19.98.040 to require a conditional use permit for new oil and gas development and production activities in the following zoning districts: Exclusive Agriculture (A); Limited Agriculture (A-1); Medium Industrial (M-2); Heavy Industrial (M-3); Natural

Resource (NR); Light Industrial (M-1); Recreation-Forestry (RF); Estate District (E); Low, Medium, and High-Density Residential (R-1, R-2, R-3); Commercial Office (CO); Neighborhood Commercial (C-1); General Commercial (C-2); Highway Commercial (CH); Platted Lands (PL); Floodplain Primary (FPP); and Special Planning (SP). Conforming amendments would also be made to the Zoning Ordinance chapters applicable to each of the above zoning districts to clarify that oil and gas exploration, development, and production activities are conditionally permitted uses within such districts. In effect, Alternative 2 would amend the Zoning Ordinance to eliminate all unrestricted, and ministerial approval of, oil and gas exploration, development, and production activities. Under Alternative 2, such activities would only be permitted upon issuance of a conditional use permit in all zoning districts, except the Mobile Home Park District (MP) and the Open Space District (OS), were new oil and gas development and production activities would continue to be prohibited.

## Alternative 3: Reduced Ground Disturbance Alternative

Alternative 3, the Reduced Ground Disturbance Alternative, is identical to the Project, except that it would prohibit all new well drilling activities outside existing DOGGR-designated "Administrative Boundary" areas and would require subsurface oil and gas to be extracted from surface equipment located within such Administrative Boundary areas. This alternative would also limit the disturbance footprint on existing agricultural lands to requiring clustering of new wells in locations immediately adjacent to existing oil and gas equipment. The vast majority of future oil and gas production in Kern County will occur in and adjacent to Administrative Boundary areas. Accordingly, this alternative assumes that subsurface oil and gas resources located outside of existing Administrative Boundary areas could still be accessed from inside existing Administrative Boundary areas through use of directional and horizontal drilling techniques. Thus, Alternative 3's restrictions on oil and gas exploration and development are assumed to be legally feasible.

## Alternative 4: No Hydraulic Fracturing Alternative

Pursuant to its police power, the County has broad discretion to regulate oil and gas exploration and production activities within its jurisdiction. However, a local government's legal authority to regulate every step in the hydraulic fracturing process is the subject of legal disputes currently pending in certain California courts. Assuming the County has sufficient legal authority to regulate subsurface oil and gas exploration and development activities as contemplated by this alternative, Alternative 4, the No Hydraulic Fracturing Alternative, would implement the Project as proposed, except that it would amend Zoning Ordinance Chapter 19.98 to ban all hydraulic fracturing activities, a form of well stimulation, within the Project Area. In all other respects, the Alternative 4 is the same as the Project.

# Alternative 5: Low-Emission Enhanced Oil Recovery Technology Alternative

Alternative 5, the Low-Emission Enhanced Oil Recovery (EOR) Alternative, is identical to the proposed Project, except that the updated development standards and conditions required by the Project's proposed Zoning Ordinance amendment would be expanded to require oil and gas well permit applicants to implement low-emission "enhanced oil recovery" (EOR) technology as a condition of permit approval for new and replacement steam generators, and to replace existing steam generators constructed prior to 1990 within five years of enactment of the amended Ordinance. The EOR is a production technique used to increase the mobility of oil, most commonly through steam injection techniques that reduce the viscosity of the hydrocarbons and allow produced fluids to flow. There are four major types of EOR operations: waterflood; thermal (i.e., steamflood, cyclic steam and in-situ combustion); carbon dioxide or other gas (miscible and immiscible); and chemical/polymer flooding (i.e., alkaline flooding or micellar-polymer flooding). With thermal EOR, steam is injected into a well, which necessitates the installation of steam generators at the well. Steam generators are large heaters that generate steam, usually from produced groundwater. Under Alternative 5, all new and replacement steam generators for thermal EOR activities would be required to implement low-emission steam generation technology, such as the ClearSign Duplex Tile combustion technology or the equivalent. In all other respects, Alternative 5 would be identical to the Project.

# Alternative 6: Recycled Water Alternative

Under Alternative 6, the Recycled Water Alternative, the Applicants would be required to treat an amount of produced water that is currently being disposed of via underground injection wells which is equivalent to the amount of municipal and industrial (M&I) water used in Applicant's operations. The produced water reuse goal is 30,000 acre-feet per year, which would offset more than the current use of imported water and groundwater from non-oil bearing zones by the oil and gas industry. Such produced water would be required to be treated, recycled, and put to an alternate use, such as agricultural irrigation to the extent feasible. As explained in Section 4.9, Hydrology and Water Quality, oil-bearing formations in the Project Area include a mixture of usually saline or other poor-quality groundwater and hydrocarbons. Production wells extract a mixture of water and hydrocarbons that is separated in surface facilities, typically a series of tanks or "tank batteries," where lighter oil and gas compounds are isolated and skimmed from the heavier water. Residual water generated by the hydrocarbon separation process is generally referred to as "produced water" in the context of oil and gas exploration and production. Under current practices, much of this produced water is used in future oil and gas recovery operations (e.g., steam and water flooding) and for oil and gas maintenance activities, and the remainder is disposed of primarily through underground injection wells. In some portions of the Project Area, produced water is also treated and reused for agricultural irrigation purposes, as explained in Section 4.9.

Table 1-2, Comparison of Alternatives, provides a summary of the alternatives impact analysis. A more detailed alternatives analysis is provided in Chapter 6, Alternatives.

**Table 1-2: Comparison of Alternatives**

| | **Project**<br>**Summary of Impacts** | **Alternative 1**<br>**No Project** | **Alternative 2**<br>**CUP Alternative** | **Alternative 3**<br>**Reduced Ground Disturbance Alternative** | **Alternative 4**<br>**No Hydraulic Fracturing Alternative** | **Alternative 5**<br>**Low-Emission EOR Technology Alternative** | **Alternative 6**<br>**Recycled Water Alternative** |
|---|---|---|---|---|---|---|---|
| Aesthetics | Significant and Unavoidable | Greater than Project | Less than Project | Less than Project | Same as Project | Same as Project | Greater than Project |
| Agricultural and Forestry Resources | Significant and Unavoidable | Greater than Project | Greater than Project | Less than Project | Same as Project | Same as Project | Same as Project |
| Air Quality | Significant and Unavoidable | Greater than Project | Greater than Project | Greater than Project | Greater as Project | Less than Project | Greater than Project |
| Biological Resources | Significant and Unavoidable | Greater than Project | Greater than Project | Less than Project | Same as Project | Same as Project | Greater than Project |
| Cultural Resources | Significant and Unavoidable | Greater than Project | Same as Project | Less than Project | Same as Project | Same as Project | Greater than Project |
| Geology and Soils | Less than Significant | Greater than Project | Same as Project | Same as Project | Same as Project | Same as Project | Same as Project |
| Greenhouse Gas Emissions | Significant and Unavoidable | Greater than Project | Greater than Project | Greater than Project | Greater than Project | Less than Project | Greater than Project |
| Hazards and Hazardous Materials | Less than Significant | Greater than Project | Greater than Project | Same as Project | Less than Project | Same as Project | Same as Project |
| Hydrology and Water Quality | Significant and Unavoidable | Greater than Project | Greater than Project | Same as Project | Less than Project | Same as Project | Less than Project |
| Land Use and Planning | Less than Significant | Same as Project | Same as Project | Same as Project | Same as Project | Same as Project | Same as Project |
| Mineral Resources | Less than Significant | Same as Project | Same as Project | Same as Project | Same as Project | Same as Project | Same as Project |

**Table 1-2: Comparison of Alternatives**

| | **Project**<br>**Summary of Impacts** | **Alternative 1**<br>**No Project** | **Alternative 2**<br>**CUP Alternative** | **Alternative 3**<br>**Reduced Ground Disturbance Alternative** | **Alternative 4**<br>**No Hydraulic Fracturing Alternative** | **Alternative 5**<br>**Low-Emission EOR Technology Alternative** | **Alternative 6**<br>**Recycled Water Alternative** |
|---|---|---|---|---|---|---|---|
| Noise | Less than Significant | Greater than Project | Greater than Project | Greater than Project | Same as Project | Same as Project | Greater than Project |
| Population and Housing | Less than Significant | Same as Project | Same as Project | Same as Project | Same as Project | Same as Project | Same as Project |
| Public Services | Less than Significant | Same as Project | Same as Project | Same as Project | Same as Project | Same as Project | Same as Project |
| Recreation | Less than Significant | Same as Project | Same as Project | Same as Project | Same as Project | Same as Project | Same as Project |
| Trans. and Traffic | Less than Significant | Greater than Project | Greater than Project | Greater than Project | Same as Project | Less than Project | Same as Project |
| Utilities and Service Systems | Significant and Unavoidable | Greater than Project | Same as Project | Same as Project | Same as Project | Same as Project | Less than Project |

### 1.6.3 Environmentally Superior Alternative

An EIR must identify the environmentally superior alternative to the Project. Alternative 5 would be environmentally superior to the Project on the basis of the minimization or avoidance of physical environmental impacts. However, Section 15126.6(e)(2) of the CEQA Guidelines states that if the no Project alternative is found to be environmentally superior, "the EIR shall also identify an environmentally superior alternative among the other alternatives." The environmentally superior alternative is Alternative 5, the Low-Emission EOR Technology Alternative. Compared to the Project, Alternative 5 would have less environmental effects related to air quality, greenhouse gasses, and transportation and traffic. Moreover, Alternative 5 would not result in any environmental impacts that are greater than those of the Project.

## 1.7 Areas of Controversy

Areas of controversy were identified through written agency and public comments received during the scoping period. Public comments received during scoping are provided in Appendix D. In summary, the following issues were identified during scoping and are addressed in the appropriate sections of Chapter 4, Environmental Setting, Impacts, and Mitigation Measures:

- Aesthetics
    - Light pollution
- Agriculture and Forest Resources
    - Conflict with Williamson Act contracts
    - Water use conflicts between oil and gas development and agricultural operations
- Biological Resources
    - Noise impacts to birds
    - Restoration of well pads after use
    - Spread of invasive species due to road and pipeline construction and operation
    - Road construction and impacts to species, including avoidance, mortality, and composition changes
    - Pipeline corridor effects on species dispersal
    - Habitat fragmentation
- Geology and soils
    - Induced seismicity due to injection of wastewater
- Greenhouse gases
    - Fugitive methane emissions from wells

- Hazards and Hazardous Materials
    - Health impacts due to proximity to petroleum operations
- Hydrology and Water Quality
    - Well casing failure
    - Oil spills
    - Surface runoff
    - Drinking water contamination
    - Groundwater contamination
- Noise
    - Compressor noise over the long-term
- Utilities and Service Systems
    - Cumulative impacts of freshwater use
    - Disposal of hazardous waste

## 1.8 Issues to Be Resolved

Section 15123(b) (3) of the CEQA Guidelines requires that an EIR contain issues to be resolved, which includes the choices among alternatives and whether or how to mitigate significant impacts. The major issues to be resolved regarding the Project include decisions by the lead agency as to whether or not:

- The Draft EIR adequately describes the environmental impacts of the Project;
- The recommended mitigation measures should be adopted or modified; or
- Additional mitigation measures need to be applied.

## 1.9 Summary of Environmental Impacts and Mitigation

The following is a summary of the environmental impacts of the Project, mitigation measures, and unavoidable significant impacts identified and analyzed in Chapter 4, Environmental Settings, Impacts, and Mitigation Measures, of this EIR. Refer to the appropriate EIR section for additional mitigation.

**Table 1-3: Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation**

| Impact | Level of Significance before Mitigation | Mitigation Measure(s) | Level of Significance after Mitigation | Applicable Tier |
|---|---|---|---|---|
| **Aesthetics** | | | | |
| Impact 4.1-1<br>Have a Substantial Adverse Effect on a Scenic Vista | Less than significant | No mitigation measures are proposed. | Less than significant | All Tiers |
| Impact 4.1-2<br>Substantially Damage Scenic Resources, Including, but Not limited to, Trees, Rock Outcroppings, and Historic Buildings within a State Scenic Highway | Less than significant | No mitigation measures are proposed. | Less than significant | All Tiers |
| Impact 4.1-3<br>Substantially Degrade the Existing Visual Character or Quality of the Site and its Surroundings | Potentially Significant | **MM 4.1-1** The Applicant shall use existing roads whenever possible. If use of existing roads is not feasible, construction of new roads should be routed to minimize the amount of disturbance without impeding existing surface use.<br>**MM 4.1-2** All derricks, boilers, and other drilling equipment used to drill, repair, clean out, deepen or redrill any well with oil, gas, or other hydrocarbon shall be removed from the drill site within 90 days after completion of production tests or after abandonment of any well. Earthen sumps used in drilling shall be filled within 90 days after any well has been placed in production (unless such sumps are to be used within six months for the drilling of another well), and any sump used in productions shall be filled after its abandonment and restored to a uniform grade within ninety days.<br>**MM 4.1-3** Sumps and ponds shall be permitted only to the extent authorized by the Central Valley Regional Water Quality Control Board (via waiver, Waste Discharge Requirements, or other form of authorized written documentation) and shall comply with all applicable legal requirements and mitigation measures for sumps serving as storage, percolation or evaporation ponds for produced water.<br>**MM 4.1-4** Oil or gas tanks located within 200 feet of any sensitive receptor shall be partially screened from public view by shrubs, trees or solid screen fencing. Similarly, pump sites (including multiple well pump sites) within 500 feet of any dwelling must be surrounded by a fence, at least 6 feet in height, constructed of dark-colored chain-link with wood or metal slates, dark green or brown fabric material, or other more visually restrictive fencing material. The height of all pumping units shall not exceed 80 feet, and shall be painted in accordance with the Kern County Zoning Ordinance.<br>**MM 4.1-5** Project signage is limited to directional, warning, safety, security and identification signs in connection with oil, gas, or other hydrocarbon drilling and development operations in accordance with Chapter 19.84.135 of the Kern County Zoning Ordinance. For any signage necessary for wayfinding, safety, or security, the Applicant shall use the minimum necessary to adequately communicate the required information. | Significant and unavoidable | All Tiers |
| Impact 4.1-4<br>Create a New Source of Substantial Light or Glare that Would Adversely Affect Day or Nighttime Views in the Area | Potentially significant | **MM 4.1-6** Permanent nighttime lighting that will be installed for facilities operations will only be lighting required for safety or security. During operations when the lighting is in use, lighting for safety and security will be shielded and oriented downward, bare bulbs will be fully screened from view from sensitive viewing receptors such as residences, and on-demand lighting and/or timers will be used to minimize visual impacts of lighting. In doing so, the Applicant shall comply with the standards in the amended Chapter 19.81 – Outdoor Lighting "Dark Sky Ordinance." | Significant and unavoidable | All Tiers |

**Table 1-3: Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation**

| Impact | Level of Significance before Mitigation | Mitigation Measure(s) | Level of Significance after Mitigation | Applicable Tier |
|---|---|---|---|---|
| Impact 4.1-5<br>Contribute to Cumulative Aesthetic Impacts | Cumulatively considerable | Implement MM 4.1.1 through 4.1.6, as described above. No additional feasible mitigation measures exist to avoid or reduce significant adverse cumulative impacts to aesthetics to a less than significant level. | Significant unavoidable | All Tiers |
| **Agricultural Resources** | | | | |
| Impact 4.2-1<br>Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland) to Non-Agricultural Use | Potentially significant | **MM 4.2-1** For future oil and gas exploration and extraction activities that are: 1) on land designated Prime, Farmland of Statewide Importance or Unique Farmland; and 2) that have been actively farmed 5 years or more out of the last 10 years, agricultural land mitigation is required at a ratio of 1:1. The 1:1 ratio is applied to actual ground disturbance area for oil and gas activities (inclusive of temporary construction and permanent operational impact areas), but excludes non-farmed existing areas such as roads, and tank and maintenance areas, and lands for which agricultural mitigation has previously been provided at a 1:1 ratio. Prior to ground disturbing activity, the Applicant shall submit to the County written evidence of completion of one or more of the following measures to achieve this 1:1 mitigation ratio:<br>a. Funding and/or purchasing agricultural conservation easements or similar instrument acceptable to the County (to be managed and maintained by an appropriate entity).<br>b. Purchasing of credits for conservation of agricultural lands from an established agricultural farmland mitigation bank or an equivalent agricultural farmland preservation program managed by the County.<br>c. Restoring agricultural lands to productive use through the removal of legacy oil and gas production equipment, including well abandonment and removal of surface equipment.<br>d. Participating in any agricultural land mitigation program adopted by Kern County that provides equal or more effective mitigation than the measures listed above.<br>Mitigation lands shall meet the definition of Prime Farmland, Farmland of Statewide Importance, and/or Unique Farmland, and be of similar or higher agricultural quality as the lands, as established by the California Department of Conservation. Completion of the selected measure or, with the Kern County Planning and Community Development Director's approval, a combination of measures, are to occur on qualifying land in Kern County. If qualifying lands cannot be found in Kern County, upon written application to the County, the mitigation lands may be located within the San Joaquin Valley (San Joaquin, Stanislaus, Merced, Fresno, Madera, Kings, Tulare, or Kern County) or outside the San Joaquin Valley with written evidence that the same or equivalent crops can be produced on the mitigation land. | Less than significant | All Tiers |
| Impact 4.2-2<br>Conflict with Existing Zoning For Agricultural Use or a Williamson Act Contract | Less than significant | No mitigation measures are required. | Less than significant | All Tiers |
| Impact 4.2-3<br>Conflict with Existing Zoning for, or Cause Rezoning of, Forest Land or Timberland | No impact | No mitigation measures are required. | No impact | All Tiers |
| Impact 4.2-4<br>Result in the Loss of Forest Land or Conversion of Forest Land to Non-Forest Use | No impact | No mitigation measures are required. | No impact | All Tiers |

**Table 1-3: Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation**

| Impact | Level of Significance before Mitigation | Mitigation Measure(s) | Level of Significance after Mitigation | Applicable Tier |
|---|---|---|---|---|
| Impact 4.2-5<br><br>Involve Other Changes in the Existing Environment Which, Because of Their Location or Nature, Could Result in Conversion of Farmland to Non-agricultural Use or Conversion of Forest Land to Non-Forest Use | Potentially significant | **MM 4.2-2** To protect crops and structures adjacent to oil and gas activities on active agricultural lands, each Applicant/operator shall comply with the following mitigation measures set forth in other chapters of this Environmental Impact Report:<br><br>a. Surface water runoff and drainage on the well pads shall be mitigated as described in mitigation measures for Hydrology and Water Quality.<br><br>b. A Spill Prevention Countermeasure and Contingency Plan or Division of Oil Gas and Geothermal Resources Assembly Bill 1960 spill plan, as applicable, shall be prepared for the site and oil and chemical spills treated in accordance with the Division of Oil Gas and Geothermal Resources Senate Bill 4 Regulations for the site to protect adjacent farmland, as described in Mitigation Measure for Hazards.<br><br>c. Speed limits for oil and gas trucks shall be posted on unpaved roads to reduce dust generation; in the absence of signage, speed limits shall be limited to 25 miles per hour (or an alternate, more stringent dust suppression standard as adopted by the San Joaquin Valley Air Pollution Control District), and Applicants shall attest that employees have been trained in the appropriate speed limits.<br><br>d. Unpaved roads shall be watered or otherwise treated for dust suppression and control as described in Mitigation Measure for Air Quality.<br><br>e. Vehicle tracking control shall be installed where unpaved roads intersect with paved roads, to prevent tracking of mud, dust, and weed seeds off site. This shall consist of a 50-foot length of a 3 inch-thick layer of gravel one inch or larger in diameter (or an alternate, more stringent dust suppression technique as approved by the San Joaquin Valley Air Pollution Control District).<br><br>f. Stormwater control shall be required at construction sites during well drilling, reworking, and/or decommissioning as described in mitigation measures for Hydrology.<br><br>g. Hazardous materials shall be stored within secondary containment as described in mitigation measures for Hazards.<br><br>h. Overhead electrical or communication lines shall be shown on the Site Plan, and shall be aligned to the greatest extent feasible with existing access roads and the minimum distance between the access road and the well installation or other oil and gas facility, parallel to tree or row crops, described further in mitigation measures for Public Utilities. If the use of existing roads is not feasible, lines shall be routed to minimize surface disturbance and minimize the impacts to surface activity<br><br>i. Underground pipelines serving the Project shall be shown on the Site Plan with locations marked and recorded with USAA, and periodically inspected and maintained as described in mitigation measures for Hazards. | Less than significant | All Tiers |
| Impact 4.2-6<br><br>Result in the Cancellation of an Open Space Contract Made Pursuant to the California Land Conservation Act of 1965 or Farmland Security Zone Contract for Any Parcel of 100 or More Acres | No impact | No mitigation measures are required. | No impact | All Tiers |
| Impact 4.2-7<br><br>Cumulative Impacts to Agricultural or Forest Resources | Potentially significant | Implement mitigation measure MM 4.2-1 and MM 4.2-2. | Significant and unavoidable | All Tiers |

**Table 1-3: Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation**

| Impact | Level of Significance before Mitigation | Mitigation Measure(s) | Level of Significance after Mitigation | Applicable Tier |
|---|---|---|---|---|
| **Air Quality** | | | | |
| Impact 4.3-1<br>Conflict With or Obstruct Implementation of the Applicable Air Quality Plan | Potentially significant | **MM 4.3-1** Consistent with the requirements of the San Joaquin Valley Air Pollution Control District Regulation II-Permits, the Applicant shall obtain an Authority to Construct permit and a Permit to Operate for any facility or equipment requiring a permit from the San Joaquin Valley Air Pollution Control District, such as stationary sources required to obtain permits pursuant to District Rule 2010. All emissions increases from permitted equipment shall comply with District Rule 2201.<br>**MM 4.3-2** The Applicant shall develop and implement a Fugitive Dust Control Plan in compliance with San Joaquin Valley Air Pollution Control District fugitive dust suppression regulations to further reduce emissions, during construction, of particulate matter that is 10 microns or less and 2.5 microns or less in diameter. The Fugitive Dust Control Plan shall include:<br>a. Name(s), address(es), and phone number(s) of person(s) responsible for the preparation, submission, and implementation of the plan.<br>b. Description and location of operation(s).<br>c. Listing of all fugitive dust emissions sources included in the operation.<br>d. The following dust control measures shall be implemented:<br>1. All on-site unpaved roads shall be effectively stabilized using water or chemical soil stabilizers that can be determined to be as efficient as or more efficient for fugitive dust control than California Air Resources Board approved soil stabilizers, and that shall not increase any other environmental impacts including loss of vegetation.<br>2. All material excavated or graded will be sufficiently watered to prevent excessive dust. Watering will occur as needed with complete coverage of disturbed areas. The excavated soil piles will be watered as needed to limit dust emissions to less than 20% opacity or covered with temporary coverings.<br>3. Construction activities that occur on unpaved surfaces will be discontinued during windy conditions when winds exceed 25 miles per hour and those activities cause visible dust plumes. Construction activities may continue if dust suppression measures are used to minimize visible dust plumes.<br>4. Track-out debris onto public paved roads shall not extend 50 feet or more from an active operation and track-out shall be removed or isolated such as behind a locked gate at the conclusion of each workday.<br>5. All hauling materials should be moist while being loaded into dump trucks.<br>6. All haul trucks hauling soil, sand, and other loose materials on public roads shall be covered (e.g., with tarps or other enclosures that would reduce fugitive dust emissions).<br>7. Soil loads should be kept below 6 inches or the freeboard of the truck.<br>8. Drop heights should be minimized when loaders dump soil into trucks.<br>9. Gate seals should be tight on dump trucks.<br>10. Traffic speeds on unpaved roads shall be limited to 25 miles per hour.<br>11. All grading activities shall be suspended when visible dust emissions exceed 20%.<br>12. Other fugitive dust control measures as necessary to comply with San Joaquin Valley Air Pollution Control District Rules and Regulations. | Less than significant | All Tiers |

**Table 1-3: Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation**

<table>
<tr><th>Impact</th><th>Level of Significance before Mitigation</th><th>Mitigation Measure(s)</th><th>Level of Significance after Mitigation</th><th>Applicable Tier</th></tr>
<tr><td></td><td></td><td>13. Disturbed areas should be minimized.<br>14. Disturbed areas should be re-vegetated as soon as possible after disturbance if area is no longer needed for oil and gas activities.<br>MM 4.3-3 All off-road construction diesel engines not registered under California Air Resources Board’s Statewide Portable Equipment Registration Program, which have a rating of 50 horsepower or more, shall meet, at a minimum, the Tier 3 California Emission Standards for Off-road Compression-Ignition Engines as specified in California Code of Regulations, Title 13, section 2423(b)(1) unless that such engine is not available for a particular item of equipment. In the event a Tier 3 engine is not available for any off-road engine larger than 100 horsepower, that engine shall be equipped with retrofit controls that would provide nitrogen oxides and particulate matter emissions that are equivalent to Tier 3 engine.<br>a. All equipment shall be turned off when not in use. Engine idling of all equipment shall be limited to five minutes, except under exemptions specified in California Code of Regulations Title 13 Section 2449(d)(2)(A).<br>b. All equipment engines shall be maintained in good operating condition and in proper tune per manufacturers’ specifications.<br>MM 4.3-4 To further reduce emissions of oxides of nitrogen from on-road heavy-duty diesel haul vehicles:<br>a. 2007 engines or pre-2007 engines shall comply with California Air Resources Board retrofit requirements set forth in California Code of Regulations Title 13 Section 2025.<br>b. All on-road construction vehicles, except those meeting the 2007/California Air Resources Board-certified Level 3 diesel emissions controls, shall meet all applicable California on-road emission standards and shall be licensed in the State of California. This does not apply to worker personal vehicles.<br>c. All on-road construction vehicles shall be properly tuned and maintained in accordance with the manufacturers’ specifications.</td><td></td><td></td></tr>
<tr><td>Impact 4.3-2<br>Violate Any Air Quality Standard as Adopted in (c)i or (c)ii, or Established by United States Environmental Protection Agency or Air District or Contribute Substantially to an Existing or Projected Air Quality Violation</td><td>Potentially significant</td><td>Implement MM 4.3-1 through MM 4.3-4, as described above.</td><td>Less than significant</td><td>All Tiers</td></tr>
<tr><td>Impact 4.3-3<br>Expose Sensitive Receptors to Substantial Pollutant Concentrations</td><td>Potentially significant</td><td>MM 4.3-5 The Site Plan Application shall include a Site Vicinity Figure showing the location of any sensitive receptor(s) within 3,000 feet of the construction site (potential impact area) for the proposed new well or other ancillary facility or equipment (excluding pipelines).<br>a. If there are no sensitive receptors within this potential impact area, then no construction mitigation measures shall be required.<br>b. If there are sensitive receptors within the potential impact area, then additional information must be provided showing the setback from the closest edge of the well pad to the property line of the nearest sensitive receptor. The minimum distances shall be as follows:<br><table><tr><th>Well Depth (Feet)</th><th>Minimum Setback Distance from Well Site to Adjacent Property Line of an Existing Sensitive Receptor (Feet)</th></tr></table></td><td>Less than significant</td><td>All Tiers</td></tr>
</table>

**Table 1-3: Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation**

| Impact | Level of Significance before Mitigation | Mitigation Measure(s) | Level of Significance after Mitigation | Applicable Tier |
|---|---|---|---|---|
| | | **Western Subarea**<br>10,000 — 367<br>5,000 — 116<br>2,000 — NA<br>**Central Subarea**<br>10,000 — 367<br>5,000 — 116<br>2,000 — NA<br>**Eastern Subarea**<br>10,000 — 296<br>5,000 — NA<br>2,000 — NA<br><br>c. If the above setbacks cannot be met, the Applicant shall implement the following risk minimization measures, or other such measures that are demonstrated by the Applicant to achieve a level of risk less than the threshold risk level:<br>1. Placement of engines in the potential impact area away from the sensitive receptors.<br>2. Utilize directional drilling to locate rig away further from the sensitive receptor(s).<br>3. Use of late-model engines, low-emission diesel products, alternative cleaner fuels (e.g., natural gas or liquefied petroleum gas), engine retrofit technology, add-on devices such as diesel particulate filters or oxidation catalyst, and/or other options as such become available to reduce emissions from off-road and other equipment.<br>4. Utilize electricity line power if available.<br>5. Shutdown all equipment when not in use, and otherwise minimize engine idling by limiting idling to 15 minutes.<br>6. Use of automatic rigs.<br>7. Assist and pay to relocate residents to an area hotel during well construction, drilling, and completion activities.<br><br>**MM 4.3-6** Applicants shall include in their Worker Environmental Awareness Program information on how to recognize the symptoms of Valley Fever and to promptly report suspected symptoms of work-related Valley Fever to a supervisor. Workers exposed to fugitive dust shall be provided with the option of using a filter fitted over their nose and mouth, secured by a strap, including training for appropriate mask practices as part of the Worker Environmental Awareness Training Program. | | |
| Impact 4.3-4<br>Create Objectionable Odors Affecting a Substantial Number of People | Potentially significant | **MM 4.3-7** Applicant shall submit an Odor Complaint Management Plan to the County prior to receiving its first Site Plan conformity review approval. The Plan shall include a designated contact for odor complaints, creation of a log for odor complaints, and protocol for handling odor complaints. The Odor log and report files shall be available for public review upon request. | Significant and unavoidable | All Tiers |

**Table 1-3: Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation**

| Impact | Level of Significance before Mitigation | Mitigation Measure(s) | Level of Significance after Mitigation | Applicable Tier |
|---|---|---|---|---|
| Impact 4.3-5<br><br>Result in a Cumulatively Considerable Net Increase of any Criteria Pollutant for which the project Region is Nonattainment under an Applicable Federal or State Ambient Air Quality Standard (Including Releasing Emissions which Exceed Quantitative Thresholds for Ozone Precursors) | Potentially significant | Implement MM 4.3-1 through MM 4.3-4, as described above.<br><br>**MM 4.3-8** For Project facilities or equipment that are not required to offset emissions under a District rule as described in MM 4.3-1, and for Project vehicle and other mobile source emissions, the County will enter into emission reduction agreement with the San Joaquin Valley Air Pollution Control District, pursuant to which the Applicant shall pay fees to fully offset Project emissions of oxides of nitrogen, reactive organic gases, and particulate matter of 10 microns or less in diameter (including as applicable mitigating for reactive organic gases by additive reductions of particulate matter of 10 microns or less in diameter) (collectively, "designated criteria emissions") to avoid any net increase in these pollutants. The air quality mitigation fee shall be paid to the County as part of the Site Plan review and approval process, and shall be used to reduce designated criteria emissions to fully offset Project emissions that are not otherwise required to be fully offset by District permit rules and regulations.<br><br>As an alternative to paying the fee, an Applicant may reduce emissions for one or more designated criteria emissions through actual reductions in air emissions from other Applicant sources, as submitted to the County and validated by the District. This Project offset requirement shall be enforced by the County and verified by San Joaquin Valley Air Pollution Control District. If a voluntary emission reduction agreement is not executed by the County and San Joaquin Valley Air Pollution Control District, then each Applicant must mitigate for the full amount of designated criteria pollutants as verified by the San Joaquin Valley Air Pollution Control District, with evidence of such District-verified offsets presented as part of the Site Plan Conformity Review application documentation.<br><br>Examples of feasible air emission reduction activities that may be funded by air quality fees paid by Applicant or proposed and implemented by the Applicant under the emission reduction agreement include, but are not limited to, the following:<br><br>a. Replacing or retrofitting diesel-powered stationary equipment such as motors on generators, pumps and wells with electric or other lower-emission engines that are not subject to Title V reductions.<br><br>b. Replacing or retrofitting diesel-powered school, transit, municipal and other community mobile sources such as buses, car fleets, and maintenance equipment, with electric or other lower-emission engines.<br><br>c. Reducing emissions from public infrastructure sources such as water and wastewater treatment and conveyance facilities, and reducing water-related emissions through water conservation and reclamation.<br><br>d. Funding lower-emission equipment and processes for local businesses, schools, non-profit and religious institutions, hospitals, city and county facilities. | Significant and unavoidable | All Tiers |
| **Biological Resources** | | | | |
| Impact 4.4-1<br><br>Have a Substantial Adverse Effect, either Directly or through Habitat Modifications, on any Species Identified as a Candidate, Sensitive, or Special Status Species in Local or Regional Plans, Policies, or Regulations or by the California Department of Fish and Wildlife or the United States Fish and Wildlife Service | Potentially significant | **MM 4.4-1** With the exception of focused surveys that are seasonally restricted, special status wildlife surveys must be completed by a qualified biologist within a 30-day period prior to commencement of new ground-disturbance construction activities. The purpose of the pre-disturbance surveys is to confirm the presence or absence of any species listed as threatened or endangered under the federal Endangered Species Act, threatened or endangered under the California Endangered Species Act, or designated as fully-protected in the California Fish and Game Code (collectively, "Protected Species"), and to confirm the presence or absence of any other species considered "sensitive" under California Environmental Quality Act ("Sensitive Species"), and to identify and implement feasible avoidance and minimization measures for such species. The surveys shall be conducted in accordance with all currently-applicable presence and absence survey and/or species protocols established by the United States Fish and Wildlife Service and the California Department of Fish and Wildlife ("Species Protocols"). In the absence of any approved protocols, the survey shall extend for a minimum of 250 feet from all areas where any ground disturbance activities would occur, provided that permission to access has been obtained. As an alternative to individual pre-disturbance surveys for each application, and after consultation with and concurrence by the California Department of Fish and Wildlife and the United | Less than significant | All Tiers |

**Table 1-3: Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation**

| Impact | Level of Significance before Mitigation | Mitigation Measure(s) | Level of Significance after Mitigation | Applicable Tier |
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| | | States Fish and Wildlife Service, multiple parcels or areas of oil and gas production lands (including lands which may have multiple surface or mineral ownership) may be consolidated for the purpose of more efficiently managing pre-disturbance surveys and determinations regarding the absence of protected species in areas of proposed new ground disturbance activities.<br><br>**MM 4.4-2** No incidental take of any species listed as threatened or endangered under the federal Endangered Species Act, threatened or endangered under the California Endangered Species Act , or designated as fully-protected in the California Fish and Game Code (Protected Species) may occur unless the incidental take is authorized by applicable state and federal wildlife agencies in the form of a permit or other written authorization, an approved state or federal conservation plan, or in accordance with an approved regional plan such as the Draft Valley Floor Habitat Conservation Plan and/or Natural Community Conservation Plan.<br><br>**MM 4.4-3** Exclusion barriers or buffers may be used, where effective and feasible in the opinion of the qualified biologist, to avoid any unauthorized incidental take of Protected Species, and to minimize any incidental take of Sensitive Species, by separating the planned disturbance area from any locations where pre-disturbance surveys or previously conducted focused surveys have detected the presence of Protected Species or Sensitive Species. All buffers must extend for a minimum of 50 feet from the nearest point of disturbance unless a smaller avoidance buffer has been established by either the United States Fish and Wildlife Service or the California Department of Fish and Wildlife as the minimum to avoid unauthorized take of protected species, and the barriers must prevent the potential migration of wildlife into the construction area and unlawful incidental take of any Protected Species during ground disturbance activities. The minimum buffer distance shall be increased if required to avoid unauthorized incidental take of any Protected Species as determined by a qualified biologist. Exclusion barriers, buffer distances, and other avoidance measures that may be implemented to avoid impacts to Protected Species or Sensitive Species must be consistent with the United States Fish and Wildlife Service and/or the California Department of Fish and Wildlife, and shall be implemented and overseen by the qualified biologist.<br><br>**MM 4.4-4** Occupied burrowing owl burrows shall not be disturbed during the species nesting season (February 1 through August 31). The following distances shall be maintained between all disturbance areas and burrowing owl nesting sites (Table 4.4-84). | | |

**Table 4.4-84: Setback Distances for Burrowing Owl Nesting Sites by Level of Proposed Project Impacts**

| **Location** | | |
|---|---|---|
| Nesting sites | Nesting sites | Nesting sites |
| **Time of Year** | | |
| April 1–Aug 15 | Aug 16–Oct 15 | Oct 16–Mar 31 |
| **Project Impact Level** | | |
| **Low** | | |
| 656 feet (200 meters) | 656 feet (200 meters) | 164 feet (50 meters) |
| **Medium** | | |
| 1,640 feet (500 meters) | 656 feet (200 meters) | 328 feet (100 meters) |
| **High** | | |
| 1,640 feet (500 meters) | 1,640 feet (500 meters) | 1,640 feet (500 meters) |

**Table 1-3: Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation**

| Impact | Level of Significance before Mitigation | Mitigation Measure(s) | | Level of Significance after Mitigation | Applicable Tier |
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| | | | Burrowing owls present in proposed disturbance areas or within 500 feet or as specified under an approved Habitat Conservation Plan (as identified during pre-disturbance surveys) outside of the breeding season (between September 1 and January 31) may be moved away from the disturbance area using passive relocation techniques approved by the California Department of Fish and Wildlife. Passive relocation techniques in the California Department of Fish and Wildlife *Staff Report on Burrowing Owl Mitigation Guidelines* (California Department of Fish and Game 2012) include installing one-way doors in burrow entrances for 48 hours, to ensure the owl(s) have left the burrow, daily monitoring during the passive relocation period, and collapsing existing burrows to prevent reoccupation. A minimum of one or more weeks will be required to relocate the owl(s) and allow for acclimatization to alternate off-site burrows. Prior to burrow exclusion or eviction, a burrowing owl management plan shall be prepared and approved by the California Department of Fish and Wildlife. Destruction of burrows shall occur only pursuant to a management plan for the species approved by the California Department of Fish and Wildlife; burrow excavation shall be conducted by hand whenever possible.<br><br>As an alternative to passive relocation, occupied burrows identified off-site within 500 feet of construction activities may be buffered with hay bales, fencing (e.g. sheltering in place), or as directed by the qualified biologist and the California Department of Fish and Wildlife, to avoid disturbance of burrows. | | |
| | | **MM 4.4-5** | The pre-disturbance surveys shall determine whether active bat maternity roosts are located in or within 250 feet of any disturbance area. All active bat maternity roosts shall be avoided during breeding periods, including postponing disturbance activities if required, and to the maximum extent feasible at other times. If an active bat maternity roost location cannot feasibly be avoided by disturbance, the United States Fish and Wildlife Service and California Department of Fish and Wildlife must be contacted to identify appropriate impact minimization measures prior to initiating any disturbance that would affect the roost. | | |
| | | **MM 4.4-6** | Any potential San Joaquin kit fox dens (as defined in United States Fish and Wildlife Service 2011) detected during pre-disturbance surveys shall be reevaluated for species activity no more than 14 days prior to the commencement of ground disturbance. Potential kit fox dens shall be marked and a 50-foot avoidance buffer shall be delineated using stakes and flagging or similar materials to prevent inadvertent damage to the potential den. If a potential den cannot feasibly be avoided, the den may be hand excavated in accordance with the United States Fish and Wildlife Service *Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox Prior to or During Ground Disturbance* (United States Fish and Wildlife Service 2011). If species activity is detected, the location shall be identified as a "known" kit fox den in accordance with the U.S. Fish and Wildlife Service species guidelines (United States Fish and Wildlife Service 2011). A minimum 100-foot buffer from any disturbance area shall be maintained for known dens and a minimum 500-foot buffer from any disturbance area shall be maintained for natal dens. No excavation of a known or natal den shall occur without prior authorization from the United States Fish and Wildlife Service and the California Department of Fish and Wildlife. For activities occurring on land covered under an approved Habitat Conservation Plan, the requirements set forth in those documents shall be implemented. Other standard measures to protect San Joaquin kit fox, including capping pipes, covering trenches, adding exit ramps to excavated areas, shall be implemented in accordance with MM 4.4-19. | | |
| | | **MM 4.4-7** | Occupied American badger dens detected during pre-disturbance surveys shall be flagged and ground-disturbing activities avoided within 50 feet of the den. Maternity dens shall be avoided and a minimum 200-foot buffer from disturbance shall be maintained during pup-rearing season (February 15 through July 1). Maternity dens must be avoided to the maximum extent feasible. If a maternity den cannot feasibly be avoided, the California Department of Fish and Wildlife must be contacted to identify appropriate impact minimization measures prior to initiating any disturbance that would affect the den, including potential passive relocation by excavation before or after the rearing season. | | |
| | | **MM 4.4-8** | Pre-disturbance surveys for all sites located above 2,000 feet in elevation, or within 200 feet down gradient from the 2,000-foot elevation contour line, shall specifically survey for any golden eagle nests located within 2 miles of the site. If golden eagle nests are detected by the surveys, the qualified biologist shall conduct a nest-specific viewshed analysis. No disturbance may occur within 0.25 mile, or within 0.5 mile of the viewshed of an active golden eagle nest. The United States Fish and Wildlife Service and California Department of Fish and | | |

**Table 1-3: Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation**

| Impact | Level of Significance before Mitigation | Mitigation Measure(s) | Level of Significance after Mitigation | Applicable Tier |
|---|---|---|---|---|
| | | Wildlife must be notified prior to the commencement of any disturbance activities within 1 mile of an active golden eagle nest to avoid golden eagle take.<br><br>**MM 4.4-9** All sites located above 2,000 feet in elevation, or within 200 feet down gradient from the 2,000-foot elevation contour line, shall implement the following measures to avoid and minimize potential adverse impacts to the California condor:<br>a. The site shall, at all times, be maintained to avoid any trash, debris, food sources and microtrash, such as bottle caps, that could be ingested by or attract California condor. Trash shall be disposed in animal-proof containers as required in BIO 4.4-19.<br>b. The Worker Environmental Awareness Program described in BIO MM 4.4-18 shall include information about microtrash and potential effects to California condor, and shall prohibit the disposal of trash (and microtrash) on the site of oil and gas activities.<br>c. If a condor is observed in a proposed construction site, all disturbance activities must immediately cease within 500 feet of the condor until the animal has moved from the site. If condor occurrence persists, the United States Fish and Wildlife Service and the California Department of Fish and Wildlife must be contacted to identify appropriate avoidance measures prior to initiating or resuming any disturbance activity.<br>d. All condor observations shall be reported within 24 hours to the United States Fish and Wildlife Service and the California Department of Fish and Wildlife.<br>e. All tanks, liquid storage facilities, and any open area containing water or other liquid materials, including drilling sumps, must be covered or otherwise shielded in a manner that prevents condor intrusion and potential entrapment.<br>f. No overhead transmission lines may be used at the site without the prior approval of the United States Fish and Wildlife Service and the California Department of Fish and Wildlife.<br><br>**MM 4.4-10** Pre-disturbance surveys for active bird nests must be conducted no more than 10 days prior to the commencement of disturbance. Surveys shall follow United States Fish and Wildlife and California Department of Fish and Wildlife guidance and/or protocols, as applicable. If no active nests or nesting birds are identified, then Project construction activities may proceed and no further mitigation measures for nesting birds are required. If active nest(s) are identified, the active nest(s) should be continuously surveyed for the first 24 hours after detection, to establish a behavioral baseline prior to any construction-related activities. Once construction commences, all nests shall be continuously monitored to detect any behavioral changes as a result of the Project (i.e., nest avoidance or abandonment). If behavioral changes are observed, the work causing that change should cease and the California Department of Fish and Wildlife and the United States Fish and Wildlife should be consulted for additional avoidance and minimization measures. If continuous monitoring of identified nests by a qualified wildlife biologist is not feasible, a minimum no-disturbance buffer of 250 feet will be established around active nests and a 500-foot no-disturbance buffer around the nests of raptors until the breeding season has ended, or until a qualified biologist has determined that the birds have fledged and are no longer reliant upon the nest or parental care for survival, and any adult birds are no longer occupying the nest. Variance from these no-disturbance buffers may be implemented a qualified biologist concludes that work within the buffer area would not cause nest avoidance or abandonment (e.g., when the disturbance area would be concealed from a nest site by topography). The California Department of Fish and Wildlife and the United States Fish and Wildlife must be notified in advance of implementing of a variance in the no-disturbance buffer.<br><br>**MM 4.4-11** The following measures will be implemented to avoid take of blunt-nosed leopard lizard and to ensure protection of these animals during Project activities:<br>a. Project activities will avoid all potential burrows that may be occupied by blunt-nosed leopard lizards. Suitable burrows within and adjacent to potential habitat for the species should be avoided by a minimum distance of 50-feet in all areas where ground-disturbing Project activities will occur. | | |

**Table 1-3: Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation**

| Impact | Level of Significance before Mitigation | Mitigation Measure(s) | Level of Significance after Mitigation | Applicable Tier |
|---|---|---|---|---|
| | | b. No more than one year prior to ground disturbing activities, focused surveys following current California Department of Fish and Wildlife and United States Fish and Wildlife protocols for detection of this species or other methods approved by both agencies shall be conducted in all potential blunt-nosed leopard lizard habitat within the work site and a 250-foot buffer area. If no individual blunt-nosed leopard lizards are observed during focused surveys, and surveys are current (e.g., completed in the same calendar year), then Project activities may proceed.<br>c. If blunt-nosed leopard lizards are detected during focused surveys, a blunt-nosed leopard lizard avoidance plan shall be prepared for the Project that will result in avoidance of incidental take of this species unless take is separately authorized under a Natural Communities Conservation Plan and appropriate federal authorization is obtained. At a minimum, the blunt-nosed leopard lizard avoidance plan shall contain the following elements:<br>1. A Worker Environmental Awareness Program shall be implemented for all construction personnel before construction begins (see MM 4.4-18).<br>2. During periods that are optimal for blunt-nosed leopard lizard activity (early spring through late fall), a qualified biologist will be present during all ground disturbing activities. The qualified biologist will check the Project site(s) and access route(s) daily during the blunt-nosed leopard lizard active season to determine presence or absence of lizards in or near the work areas. Monitoring by a qualified biologist is not required during periods of inactivity (the winter season).<br>3. All open trenches or excavations shall be covered at the end of each workday or protected with the use of exclusion fencing to prevent wildlife entrapment. If an excavation is too large to cover, escape ramps shall be installed at an incline ratio of no greater than 2:1. All trenches and pipes shall be inspected for the presence of wildlife each day prior to the commencement of work. If blunt-nosed leopard lizards are observed at the work site during construction, construction shall cease within a 250-foot radius and the United States Fish and Wildlife Service and the California Department of Fish and Wildlife shall be consulted to determine what additional measures would be necessary to prevent take of this species.<br>4. Offsite locations where blunt-nosed leopard lizards have been observed or are likely to occur shall be clearly marked to prevent workers from driving off the road and to prevent inadvertent destruction of burrows. Barriers, such as exclusionary fencing may be installed. All construction equipment and construction personnel vehicles will be checked prior to moving to ensure no blunt-nosed leopard lizard are under equipment/vehicles.<br>5. A speed limit of 10 miles per hour shall be posted and observed within 0.25 miles of any reported blunt-nosed leopard lizard observation.<br>6. Construction activities shall avoid burrows that may be used by blunt-nosed leopard lizards. Any location of proposed construction activity with potential to collapse or block burrows (i.e., stockpile storage, parking areas, staging areas, trenches) will be identified prior to construction in the blunt-nosed leopard lizard avoidance plan and approved by the qualified biologist. The qualified biologist may allow certain activities in burrow areas if the combination of soil hardness and activity impact is not expected to collapse burrows and no blunt-nosed leopard lizards have been found during pre-Project surveys in the impact area.<br>7. All individual blunt-nosed leopard lizards observed above-ground will be avoided. Any individual blunt-nosed leopard lizard that may enter the Project site(s) would be allowed to leave unobstructed, and on its own accord. If a blunt-nosed leopard lizard is detected during biological monitoring or observed at any other point, the California Department of Fish and Wildlife and the United States Fish and Wildlife Service shall be notified to determine what additional measures would be necessary to prevent take of the species.<br>**MM 4.4-12** The Applicant shall comply with the following:<br>a. Plant surveys for Protected Species and Sensitive Species must be completed by a qualified biologist during the appropriate blooming | | |

**Table 1-3: Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation**

| Impact | Level of Significance before Mitigation | Mitigation Measure(s) | Level of Significance after Mitigation | Applicable Tier |
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| | | periods for species identification and detection. Plant surveys shall be conducted in accordance with all applicable protocols established by the United States Fish and Wildlife Service and the California Department of Fish and Wildlife for particular plant species ("Plant Survey Protocol"), and shall extend 50 feet from areas where any new disturbance would occur unless a greater survey distance is specified in the Plant Survey Protocol. All detected plant populations of Protected Species and Sensitive Species shall be identified in the field during the surveys with temporary flags or other appropriate materials to avoid and minimize impacts to the plant populations from any disturbance activities.<br>b. No incidental take or relocation of any plant listed under the California Endangered Species Act may occur unless the incidental take is authorized by the California Department of Fish and Wildlife in a permit or other authorization, or in an approved Natural Communities Conservation Plan. If pre-construction surveys detect the presence of any California Endangered Species Act Plant, the plant populations shall be buffered from disturbance activities by implementing applicable impact avoidance protocols established by the California Department of Fish and Wildlife. Projects covered under incidental take authority shall conduct activities in accordance with the take authorization. The California Department of Fish and Wildlife may be contacted to determine the appropriate buffer required to prevent incidental take of a California Endangered Species Act Plant if avoidance protocols have not been established for the species. The qualified biologist shall confirm that all applicable California Endangered Species Act Plant buffers have been implemented prior to the commencement of any disturbance activity.<br>c. If any non-listed sensitive plant species are identified that may be impacted by new ground disturbing activities, populations must be avoided by a 50-foot buffer. | | |
| | | **MM 4.4-13** No incidental take or relocation of any plant listed under the California Endangered Species Act may occur unless the incidental take is authorized by the California Department of Fish and Wildlife in a permit or other authorization, or in an approved Natural Communities Conservation Plan. If pre-construction surveys detect the presence of any California Endangered Species Act Plant, the plant populations shall be buffered from disturbance activities by implementing applicable impact avoidance protocols established by the California Department of Fish and Wildlife, unless incidental take authority is obtained. Projects covered under incidental take authority shall minimize disturbance in accordance with the take authorization. The California Department of Fish and Wildlife shall be contacted to determine the appropriate buffer required to prevent incidental take of a California Endangered Species Act Plant if avoidance protocols have not been established for the species. The qualified biologist shall confirm that all applicable California Endangered Species Act Plant buffers have been implemented prior to the commencement of any disturbance activity. If any non-listed sensitive plant species are identified that may be impacted by new ground disturbing activities, populations must be avoided by a 50-foot buffer.<br>**MM 4.4-14** A Worker Environmental Awareness Program shall be developed and implemented for all personnel that could access the site prior to commencing any disturbance activities. The program shall consist of an on-site or center presentation that will describe the locations and types of sensitive plant, wildlife, and sensitive natural communities (collectively, "Biological Resources") on and near the site, an overview of the laws and regulations governing the protection of Biological Resources, the reasons for protecting the Biological Resources, the specific protection and avoidance measures that are applicable to the site, and the identity of designated points of contact should questions or issues arise, including the qualified biologist. The program shall provide training to recognize, avoid and report to applicable qualified biologists any Biological Resources on the site.<br>a. The Worker Environmental Awareness Program shall emphasize the need to avoid contact with onsite wildlife, and avoid entry into areas where Biological Resources have been identified based on pre-disturbance field surveys and to implement the buffer avoidance or other protection measures established by the United States Fish and Wildlife Service shall be identified California Department of Fish and Wildlife or required by the Biological Resource mitigation measures. The training shall emphasize the importance of not feeding or domesticating wildlife and the need to avoid any trash, microtrash, or potential food disposal onsite except in animal-proof containers emptied daily to avoid attracting, or causing adverse impacts to special status wildlife. | | |

**Table 1-3: Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation**

| Impact | Level of Significance before Mitigation | Mitigation Measure(s) | Level of Significance after Mitigation | Applicable Tier |
|---|---|---|---|---|
| | | b. All onsite personnel must sign a statement verifying that they have completed the Worker Environmental Awareness Program, and that they understand and agree to implement the biological requirements for the worksite. If signed employee statements are not available, documentation may be provided by Worker Environmental Awareness Program training records, which shall be kept by the Applicant for a minimum of 5 years. Each Applicant shall maintain a list of all persons who have completed the training program, and shall provide the list to the County or to state and federal wildlife agency representatives upon request.<br><br>**MM 4.4-15** The following additional measures shall be implemented to avoid and minimize potential significant adverse impacts to Protected and Sensitive Species:<br><br>a. All vehicles shall observe a 20-mile-per-hour speed limit in all areas of disturbance and on unpaved roads unless otherwise posted. Off-road traffic outside of designated access routes is prohibited. Speed limit signs shall be posted in visible locations at the point of site entry and at regular intervals on all unpaved access roads.<br><br>b. All disturbance activities, except emergency situations or drilling that may require continuous operations, shall only occur during daylight hours. Night time disturbance activity for drilling purposes shall use directed lighting, shielding methods, or reduced lumen intensity to avoid unnecessary visual disturbance to wildlife and to comply with applicable lighting mitigation measures.<br><br>c. All food-related trash items and all forms of microtrash, such as wrappers, cans, bottles, bottle tops, and food scraps shall be disposed of in closed, animal proof containers and removed daily from the site.<br><br>d. Excavations, spoils piles, access roadways, and parking and staging areas shall subject to dust control as set forth in the dust control mitigation measures.<br><br>e. The use of herbicides for vegetation control shall be restricted to those approved by the United States Fish and Wildlife Service and the California Department of Fish and Wildlife. No rodenticides shall be used on any site unless approved by the United States Fish and Wildlife Service, and the California Department of Fish and Wildlife, and shall observe label and other restrictions mandated by the United States Environmental Protection Agency, California Department of Food and Agriculture, and state and federal laws and regulations. For split estates, no herbicides for vegetation control may occur in Tier 2 areas without surface owner approval.<br><br>f. No plants or wildlife shall be collected, taken, or removed from the site or any adjacent locations except as necessary for Project-related vegetation removal or wildlife relocation by a qualified biologist and subject to all applicable permits and authorizations.<br><br>g. All open trenches or excavations shall be covered at the end of each workday to prevent wildlife entrapment. If an excavation is too large to cover, escape ramps shall be installed at an incline ratio of no greater than 2:1 to. All trenches and pipes shall be inspected for the presence of wildlife each day prior to the commencement of work.<br><br>h. To enable San Joaquin kit foxes and other wildlife to pass through the Project site, any perimeter fencing shall include a 4- to 8-inch opening between the fence mesh and the ground or the fence shall be raised 4 inches above the ground except blunt-nosed leopard lizard exclusion fencing. The bottom of the fence fabric shall be knuckled (wrapped back to form a smooth edge) to protect wildlife.<br><br>i. All vertical tubes used in Project construction and chain link fencing poles, shall be temporarily or permanently capped to avoid the entrapment and death of special-status wildlife and birds.<br><br>j. All dead or injured special status wildlife shall be left in place and reported to the United States Fish and Wildlife Service and the California Department of Fish and Wildlife within 48 hours of discovery for rescue or salvage. Discovery of state or federal listed species that are injured or dead shall also be reported immediately via telephone and within 24 hours in writing, and with a copy to Kern County Planning and Community Development.<br><br>k. All drilling installations and operations will comply at all times with the applicable federal, State, county, and local law ordinances and | | |

**Table 1-3: Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation**

| Impact | Level of Significance before Mitigation | Mitigation Measure(s) | Level of Significance after Mitigation | Applicable Tier |
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| | | regulations.<br>l. All activity shall use previously disturbed areas to the maximum extent feasible to minimize the amount of new disturbance.<br>m. Vehicle, equipment, and material storage must be limited to previously disturbed areas. No construction or operational materials may be placed or stored outside of the planned disturbance area or stockpiled for future disposal. All concrete and asphalt debris should be removed from the site for recycling or proper disposal.<br>n. No vehicles or construction equipment shall be parked within a wetland or waterbody/dry wash.<br>o. Tracked vehicles and other construction equipment must be washed or maintained to be weed-free prior to entering and working within areas of new disturbance.<br>p. All washing of trucks, paint, equipment, or similar activities should occur in areas where runoff is fully contained for collection and offsite disposal. Wash water may not be discharged from the site and shall be located at least 100 feet from any water body, or sensitive Biological Resources.<br>q. Locate all extra work areas (such as staging areas and additional spoil storage areas) at least 50 feet away from wetland boundaries or waterbody, except where the adjacent upland consists of cultivated or rotated cropland or other disturbed land.<br>r. All areas that must be avoided as result of the pre-disturbance surveys, and areas where new disturbance will occur, shall be clearly delineated by fencing or staking and flagging and/or rope or cord.<br>s. No firearms shall be allowed on any site.<br>t. No pets shall be allowed on any site.<br>u. No smoking may occur except in designated areas.<br>v. If ground disturbance is intended to be temporary, perform topsoil segregation during construction activities to preserve the seed bank for restoration efforts. Store the segregated topsoil separate from the subsoil and restore segregated topsoil to its original location. | | |
| | | **MM 4.4-16** Ground disturbance shall be mitigated at a 1.0 to 1.0 ratio (one-acre of new disturbance shall require one-acre of mitigation) except in Tier 1 areas that contain existing disturbance of 70% or greater which shall be mitigated at a 1.0 to 0.5 ratio (one-acre of new disturbance shall require one-half acre of mitigation). This compensatory mitigation requirement does not apply to construction on ground for which compensatory mitigation has already been provided, or on ground that has been previously disturbed (e.g., cleared of vegetation for other oil and gas extraction uses, existing unpaved roads, and existing unvegetated well pads). Ground disturbance activities that are authorized by permits or other written authorizations approved by the United States Fish and Wildlife Service and the California Department of Fish and Wildlife, which include avoidance and compensatory mitigation acreage requirements, may be used to satisfy this County compensatory mitigation ratio. Compensatory mitigation shall be required for the actual acreage of ground disturbance documented during the site plan review and completion process. New disturbance mitigation may be satisfied by one or a combination of the following measures:<br>a. The recordation of a conservation easement or similar permanent, long-term conservation management agreement in a form acceptable to the County for land within the Project Area on land that has mitigation value. The easement lands may be owned by an Applicant or a third party under contract with an Applicant. Larger land areas may be placed under a conservation easement or similar agreement, and an Applicant may “draw down” the conserved land as needed to satisfy the acreage mitigation requirements for multiple site plan review conformity permits or other authorizations from the County for oil and gas activities.<br>b. Acquisition of land preservation credits from a mitigation bank located within the Project Area which is owned by the County, on other lands approved by the County, or on lands approved for mitigation or conservation purposes by the United States Fish and Wildlife | | |

**Table 1-3: Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation**

| Impact | Level of Significance before Mitigation | Mitigation Measure(s) | Level of Significance after Mitigation | Applicable Tier |
|---|---|---|---|---|
| | | Service or the California Department of Fish and Wildlife.<br>c. Removal of legacy oil and gas equipment, inclusive of compliance with applicable legal requirements (e.g., well plugging and abandonment requirements under state or federal regulations), restoration of the surface grade to be consistent with surrounding lands, complete a reseeding effort using native species, and notification of the site owner (if not the Applicant) of the completion of the removal and grading restoration work.<br>d. Enhancement or restoration of existing habitat on lands already subject to a conservation easement or similar agreement, or which become subject to a conservation easement or similar agreement subsequent to the certification of this Environmental Impact Report, provided that such activities are covered in a permit or authorization, conservation plan, Habitat Conservation Plan, or Natural Community Conservation Plan, approved by the United States Fish and Wildlife Service or the California Department of Fish and Wildlife.<br>e. Payment of a biological resources mitigation fee for the acquisition and management of mitigation lands, legacy equipment removal, and/or land enhancement already subject to conservation easements or a similar agreements under the terms of any biological resource mitigation program that is adopted by Kern County and approved by the United States Fish and Wildlife Service or the California Department of Fish and Wildlife. The County shall coordinate with the United States Fish and Wildlife Service or the California Department of Fish and Wildlife to identify priority conservation areas and potential conservation partners and funding sources to increase the efficiency and effectiveness of mitigation fee expenditures. | | |
| Impact 4.4-2<br>Have a Substantial Adverse Effect on Any Riparian Habitat or Other Sensitive Natural Community Identified in Local or Regional Plans, Policies, Regulations, or by the California Department of Fish and Wildlife or the United States Fish and Wildlife Service | Potentially significant | Implement MM 4.4-1 through 4.4.18, described above, and dust control, spill and hazardous material avoidance and containment, and surface and subsurface water quality and hydrology mitigation measures.<br>**MM 4.4-17** Pre-disturbance surveys shall be conducted by a qualified biologist during the appropriate periods for detecting Sensitive Natural Communities that could occur within the Project Area. The surveys shall be completed consistent with applicable protocols approved by the United States Fish and Wildlife Service and/or the California Department of Fish and Game, including the Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities (California Department of Fish and Wildlife 2009). The qualified person shall map and identify all sensitive natural communities, including riparian communities that occur in or within 100 feet of any new disturbance area. The site plan for the proposed activity shall identify waters, wetlands and other riparian habitats that occur in and within 100 feet of the disturbance area.<br>**MM 4.4-18** No land disturbance activity in any Sensitive Natural Community that requires a state or federal permit, including state or federally regulated wetlands and waters, shall occur unless the activity is specifically authorized by the issuance of permits or approvals as required by state and federal law. This provision is not intended to restrict survey activities. | Less than significant | All Tiers |
| Impact 4.4-3<br>Have a Substantial Adverse Effect on Federally Protected Wetlands as Defined by Section 404 of the Clean Water Act (Including, but Not Limited to, Marsh, Vernal Pool, Coastal, etc.) through Direct Removal, Filling, Hydrological Interruption, or Other Means | Potentially significant | Implementation of the Biological Resources mitigation measures would ensure that oil and gas activities would not disturb state or federally regulated wetlands and waters unless the activity is specifically authorized by the issuance of permits or approvals as required by state and federal laws and that activities in the vicinity of wetlands and water bodies would not adversely disturb them. Other mitigation measures identified in this Environmental Impact Report would further reduce potential state or federally jurisdictional wetland and waters, including dust control, spill and hazardous material avoidance and containment, surface and subsurface water quality and hydrology, mitigation measures. | Less than significant | All Tiers |

**Table 1-3: Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation**

| Impact | Level of Significance before Mitigation | Mitigation Measure(s) | Level of Significance after Mitigation | Applicable Tier |
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| Impact 4.4-4<br>Interfere Substantially with the Movement of any Native Resident or Migratory Fish or Wildlife Species, or with Established Native Resident or Migratory Wildlife Corridors, or Impede the Use of Native Wildlife Nursery Sites | Potentially significant | Implementation of the Biological Resources mitigation measures would reduce wildlife movement impacts. Other mitigation measures identified in this Environmental Impact Report to further reduce wildlife movement impacts, include dust control, nighttime lighting, noise controls, spill and hazardous material avoidance and containment,, and surface and subsurface water quality and hydrology (including but not limited to Kern River and Poso Creek channels), measures. | Less than significant | All Tiers |
| Impact 4.4-5<br>Conflict with Any Local Policies or Ordinances Protecting Biological Resources, Such as a Tree Preservation Policy or Ordinance | Potentially significant | **MM 4.4-19** In the event that new disturbance would occur at a site within an oak woodland area as defined in Section 1.10.10 of the Kern County General Plan Land Use, Open Space and Conservation Element (10% or greater oak tree cover), the Applicant shall comply with the minimum 30% canopy retention standard in Section 1.10.10 KK (a). Impacts to oak trees in other locations, and in locations that meet the criteria for an oak woodland area, shall be avoided to the maximum extent practicable, including modification of the disturbance area, if feasible, to avoid existing oak trees within a site. | Less than significant | All Tiers |
| Impact 4.4-6<br>Conflict with the Provisions of an Adopted Habitat Conservation Plan, Natural Community Conservation Plan, or Other Approved Local, Regional, or State Habitat Conservation Plan | Potentially significant | **MM 4.4-20** Applicants shall fund through the Site Conformity Review administrative fee, preparation by Kern County of, an annual report describing the Project's ground disturbance acreage, and the acreage of compensatory mitigation lands, in each sub-area. | Less than significant | All Tiers |
| Impact 4.4-7<br>Cumulative Impact to Biological Resources | Potentially significant | Implement MM 4.4-1 through MM 4.4-20, as described above. | Significant and unavoidable | All Tiers |

**Table 1-3: Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation**

| Impact | Level of Significance before Mitigation | Mitigation Measure(s) | Level of Significance after Mitigation | Applicable Tier |
|---|---|---|---|---|
| **Cultural Resources** | | | | |
| Impact 4.5-1<br><br>Cause a Substantial Adverse Change in the Significance of a Historical Resource as Defined in Section 15064.5 | Potentially significant | **MM 4.5-1** Prior to initiating ground disturbance activities for an activity for which a conformity review is required, the Applicant shall:<br><br>a. Have an archival records search completed by a qualified archaeologist. This shall include an examination of the California Historical Resources Information Files at the Southern San Joaquin Valley Information Center, California State University, Bakersfield, and a search of the Native American Heritage Commission Sacred Lands Files, Sacramento. The Applicant may rely on a previously performed records search for subsequent ground disturbing activities.<br><br>b. If an application location has been previously surveyed and no cultural resources have been recorded on it, no further cultural resources studies shall be required.<br><br>c. Implement either:<br><br>1. If an application site plan is within a section that has experienced 100% previous ground-surface disturbance, as indicated by 300 or more existing oil wells or other agricultural, industrial or urban uses, and the records searches indicate that the parcel has been previously surveyed and no cultural or Native American resources are known on it, no further cultural resources studies shall be required. All other application locations shall be subject to intensive (100%) pedestrian ground-surface survey (Phase I survey/Class III inventory) by qualified archaeologists. The Applicant may rely on a previously performed ground surface survey for subsequent ground disturbing activities; or<br><br>2. If an application location has not been previously surveyed based on the records search information, an intensive (100%) pedestrian ground-surface survey (Phase I survey/Class III inventory) by qualified archaeologists shall be required.<br><br>d. All prehistoric/Native American archaeological sites, whether identified during the records searches or during the intensive survey, shall be demarcated by a qualified archaeologist, fenced by the Applicant, and preserved in place.<br><br>e. Historical (Euro-American) archaeological sites that are potentially eligible for listing in the National Register of Historic Places shall be evaluated by a qualified archaeologist and must meet the requirements of the National Historic Preservation Act of 1966 in order to qualify. Qualifying sites, structures and equipment that are identified during the records search or field survey shall be fenced and preserved in open-space, removed and curated, or treated using appropriate data recovery procedures.<br><br>f. Historical (Euro-American) archaeological site types relating to oil and gas activities that have been determined Not Significant/Unique shall require no archaeological study or treatment.<br><br>g. All oil and gas industry employees conducting work in the area identified on the Conformity Site Plan shall complete Worker Environmental Awareness Program training including training dedicated to cultural resources protection. | Less than significant | All Tiers |
| Impact 4.5-2<br><br>Cause a Substantial Adverse Change in the Significance of an Archaeological Resource as Defined in Section 15064.5 | Potentially significant | Implement MM 4.5-1, as described above. | Less than significant | All Tiers |

**Table 1-3: Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation**

| Impact | Level of Significance before Mitigation | Mitigation Measure(s) | Level of Significance after Mitigation | Applicable Tier |
|---|---|---|---|---|
| Impact 4.5-3<br>Directly or Indirectly Destroy a Unique Paleontological Resource or Site or Unique Geologic Feature | Potentially significant | **MM 4.5-2** As part of any Worker Environmental Awareness Program training, all construction personnel shall be trained regarding the recognition of possible buried paleontological resources and protection of paleontological resources during construction, prior to the initiation of construction or ground-disturbing activities. Training shall inform construction personnel of the procedures to be followed upon the discovery of paleontological materials. All personnel shall be instructed that unauthorized collection or disturbance of fossils is unlawful.<br>**MM 4.5-3** All well permits that use Enhanced Oil Recovery or Well Stimulation methods shall pay a mitigation fee of $50 per well shall be paid to the Buena Vista Museum to fund the continued education and curation of paleontological resources and provide educational support regarding the paleontological history of the region. | Less than significant | All Tiers |
| Impact 4.5-4<br>Disturb any Human Remains, Including Those Interred Outside of Formal Cemeteries | Potentially significant | **MM 4.5-4** In the event archaeological materials are encountered during the course of ground disturbance or construction, the Project operator/contractor shall cease any ground disturbing activities within 50 feet of the find. The qualified archaeologist shall evaluate the significance of the resources and recommend appropriate treatment measures. Per California Environmental Quality Act Guidelines Section 15126.4(b)(3), Project redesign and preservation in place shall be the preferred means to avoid impacts to significant historical resources. Consistent with California Environmental Quality Act Guidelines Section 15126.4(b)(3)(C), if it is demonstrated that resources cannot be avoided, the qualified archaeologist shall develop additional treatment measures in consultation with the County, which may include data recovery or other appropriate measures. The Planning and Community Development Department shall consult with appropriate Native American representatives in determining appropriate treatment for unearthed cultural resources if the resources are prehistoric or Native American in nature. If after consultation it is deemed appropriate, archaeological materials recovered during any investigation shall be curated at an accredited curation facility. The qualified archaeologist shall prepare a report documenting evaluation and/or additional treatment of the resource. A copy of the report shall be provided to the Kern County Planning and Community Development Department and to the Southern San Joaquin Valley Information Center.<br>**MM 4.5-5** If human remains are uncovered during Project construction, the Applicant shall immediately halt all work, contact the Kern County Coroner to evaluate the remains, and follow the procedures and protocols set forth in Section 15064.4 (e)(1) of the California Environmental Quality Act Guidelines. The Kern County Planning and Community Development Department shall be notified concurrently. If the County Coroner determines that the remains are Native American, the Project proponent shall contact the Native American Heritage Commission, in accordance with Health and Safety Code Section 7050.5, subdivision (c), and Public Resources Code 5097.98 (as amended by Assembly Bill 2641). The Native American Heritage Commission shall designate a Most Likely Descendant for the remains per Public Resources Code 5097.98. Per Public Resources Code 5097.98, the landowner shall ensure that the immediate vicinity, according to generally accepted cultural or archaeological standards or practices, where the Native American human remains are located, is not damaged or disturbed by further development activity until the landowner has discussed and conferred with the most likely descendant regarding their recommendations, if applicable, taking into account the possibility of multiple human remains. If the remains are determined to be neither of forensic value to the Coroner, nor of Native American origin, provisions of the California Health and Safety Code (7100 et. seq.) directing identification of the next-of-kin will apply. | Less than significant | All Tiers |
| Impact 4.5-5<br>Cumulative Impacts to Historical, Archaeological, or Paleontological Resources and Human Remains | Potentially significant | Implement MM 4.5-1 through MM 4.5-5, as described above. | Significant and unavoidable | |

**Table 1-3: Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation**

| Impact | Level of Significance before Mitigation | Mitigation Measure(s) | Level of Significance after Mitigation | Applicable Tier |
|---|---|---|---|---|
| **Geology and Soils** | | | | |
| Impact 4.6-1<br><br>Expose People or Structures to Substantial Adverse Effects, Including the Risk of Loss, Injury, or Death Involving the Rupture of a Known Earthquake Fault | Potentially significant | **MM 4.6-1** Prior to beginning a ground disturbance activity, the Applicant shall comply with the following regulations (as applicable) and confirm compliance in its Site Plan Conformity Review application documentation:<br>a. Alquist-Priolo Earthquake Fault Zoning Act.<br>b. California Building Code.<br>c. Division of Oil Gas and Geothermal Resources regulations, as identified in the California Code of Regulations, Title 14, Division 2, Chapter 4, including regulations implementing Senate Bill 4 as applicable. If hydraulic fracturing is conducted for any well associated with the Site Plan Conformity Review, the Applicant shall comply with requirements to monitor the California Integrated Seismic Network for indication of an earthquake of magnitude 2.7 or greater for the period of 10 days following the end of hydraulic fracturing. The earthquake search radius shall be consistent with Division of Oil Gas and Geothermal Resources Senate Bill 4 regulations. The data will be submitted to Division of Oil Gas and Geothermal Resources for an evaluation of the risks and actions consistent with the Division of Oil Gas and Geothermal Resources Senate Bill 4 regulations.<br>d. Additionally, the Applicant shall:<br>1. Avoid placement of structures intended for human occupancy on or within 50 feet of any active faults designated and mapped pursuant to the Alquist-Priolo Earthquake Fault Zoning Act where the fault breaks the surface.<br>2. Have a professional geologist prepare a fault rupture hazard evaluation according to guidelines in California Geological Survey Special Publication 42, 2007 for new developments with structures that are intended for human occupancy.<br>3. All Class II injection wells shall be authorized, and shall comply with all applicable legal requirements, Underground Injection Control Program Approval permit conditions, and be operated according to the California Code of Regulations Title 14 requirements, as described in the mitigation measures for Hydrology and Water Quality.<br>4. Ensure that active fault trace placement restrictions are in place for all permanent tanks and storage reservoirs used to store, treat, or transport hazardous materials or materials that are considered pollutants to surface water and groundwater, located in an Earthquake Fault Zone.<br>Ensure that all pipelines designated for the transportation of hazardous materials are engineered and constructed in compliance with the requirements of the pipeline safety regulations, 49 Code of Federal Regulations Parts 192 and 195.f) Ensure that all new pipelines designated for or water used for fire suppression are engineered and constructed in compliance with the requirements of California Building Code Chapter 9, Fire Protection Systems, and the California Fire Code to address potential fault rupture displacements.<br>**MM 4.6-2** All structures designed for human occupancy shall be designed to withstand substantial ground shaking in accordance with applicable California Building Code seismic design standards and Kern County Building Code. | Less than significant | All Tiers |
| Impact 4.6-2<br><br>Expose People or Structures to Substantial Adverse Effects, Including the Risk of Loss, Injury, or Death Involving Strong Seismic Ground Shaking | Potentially significant | Implement MM 4.6-1 and MM 4.6-2, as described above. | Less than significant | All Tiers |

**Table 1-3: Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation**

| Impact | Level of Significance before Mitigation | Mitigation Measure(s) | Level of Significance after Mitigation | Applicable Tier |
|---|---|---|---|---|
| Impact 4.6-3<br>Expose People or Structures to Substantial Adverse Effects, Including the Risk of Loss, Injury, or Death Involving Seismic-Related Ground Failure, Including Liquefaction | Potentially significant | Implement MM 4.6-1 and MM 4.6-2, as described above. | Less than significant | All Tiers |
| Impact 4.6-4<br>Expose People or Structures to Substantial Adverse Effects, Including the Risk of Loss, Injury, or Death Involving Landslides | Potentially significant | **MM 4.6-3** Operators shall avoid siting structures on slopes greater than 30% unless the Applicant determines that mineral recovery is infeasible from a different location, and site-specific Professional Engineering certification is submitted concluding that the new equipment will not cause landslides. | Less than significant | All Tiers |
| Impact 4.6-5<br>Result in Substantial Soil Erosion or the Loss of Topsoil | Potentially significant | Implement stormwater mitigation measures, as described in Section 4.9, Hydrology and Water Quality. | Less than significant | All Tiers |
| Impact 4.6-6<br>Be Located on a Geological Unit or Soil That is Unstable, or That Would Become Unstable as a Result of the Project, and Potentially Result in On- or Off-site Landslide, Lateral Spreading, Subsidence, Liquefaction, or Collapse | Potentially significant | Implement MM 4.6-3and MM 4.6-4, as described above, and the following:<br>**MM 4.6-4** The Applicant shall confirm compliance with, and shall implement, a Division of Oil Gas and Geothermal Resources approved re-pressuring plan as required by Division 3, Chapter 1, Article 5.5 of the Public Resources Code, commencing with Section 3315. In developed areas where subsidence is confirmed or suspected, subsidence monitoring shall be required using Synthetic Aperture Radar studies and/or other methods as approved by the Division of Oil Gas and Geothermal Resources to quantify and evaluate the potential effect on the area. | Less than significant | All Tiers |
| Impact 4.6-7<br>Be Located on Expansive Soil, as Defined in Table 18-1-B of the Uniform Building Code (1994), Creating Substantial Risks to Life or Property | Potentially significant | **MM 4.6-5** The Applicant shall avoid building infrastructure on expansive soils unless the Applicant determines that mineral recovery is infeasible from a different location, and site-specific Professional Engineering certification is submitted concluding that the new equipment will not cause substantial risks to life or property. | Less than significant | All Tiers |
| Impact 4.6-8<br>Have Soils Incapable of Adequately Supporting the Use of Septic Tanks or Alternative Wastewater Disposal Systems Where Sewers Are Not Available for the Disposal of Wastewater | Less than significant | Implement MM 4.6-1, as described above. | Less than significant | All Tiers |
| Impact 4.6-9<br>Cumulative Impacts to Geologic and Soil Resources | Potentially significant | Implement MM 4.6-1 through MM 4.6-5, as described above. | Less than significant | All Tiers |

**Table 1-3: Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation**

| Impact | Level of Significance before Mitigation | Mitigation Measure(s) | Level of Significance after Mitigation | Applicable Tier |
|---|---|---|---|---|
| **Green House Gas Emissions** | | | | |
| Impact 4.7-1<br>Generate Greenhouse Gas Emissions, Either Directly Or Indirectly, that may have a Significant Impact on the Environment | Potentially significant | **MM 4.7-1** An Applicant with permitted stationary sources shall comply with the Cap-and-Trade regulation (e.g., by reducing greenhouse gas emissions within their facilities or by surrendering greenhouse gas allowances, offset credits, or other compliance instruments to offset the greenhouse gas increases), and implement Best Performance Standards applicable to greenhouse gas reduction for Components at Light Crude Oil and Natural Gas Production, Natural Gas Processing Facilities, Petroleum Refineries, Gas Liquids Processing Facilities, and Chemical Plants (San Joaquin Valley Air Pollution Control District 2010), Thermally Enhanced Oil Recovery Wells (San Joaquin Valley Air Pollution Control District 2010a), Steam Generators (San Joaquin Valley Air Pollution Control District 2010b), and Front-line Organic Liquid Storage Tanks (San Joaquin Valley Air Pollution Control District 2011).<br>**MM 4.7-2** Each Applicant shall comply with applicable Cap and Trade regulations, and other applicable greenhouse gas emission control and reduction regulations as these may be adopted or amended over time, to reduce, avoid, mitigate and/or sequester greenhouse gas emissions from Project-related air emissions.<br>**MM 4.7-3** Each Applicant shall implement methods to recover for reuse or destroy methane existing in associated gas and casinghead gas, as follows:<br>a. Recover all associated gas produced from the reservoir via new wells, regardless of the well type, except for gas produced from wildcat and delineation wells or as a result of start-up, shutdown and maintenance activities (whether planned or unplanned), system failures, and emergencies in accordance with San Joaquin Valley Air Pollution Control District regulations (Rule 4401 and 4409), as this may be amended over time.<br>b. Compliance with the expected California Air Resources Board methane regulation.<br>**MM 4.7-4** Each Applicant shall offset all greenhouse gas emissions not covered by the Cap-and-Trade program or other mandatory greenhouse gas emission reduction measures through Applicant reductions of greenhouse gas emissions as verified by the San Joaquin Valley Air Pollution Control District, through acquisition of offset credits from the California Air Pollution Control Officers Association Exchange Register or other third party greenhouse gas reductions as verified by the San Joaquin Valley Air Pollution Control District, or through inclusion in an Emission Reduction Agreement, to offset Project-related greenhouse gas emissions that are not included in the Cap and Trade program to assure that no net increase in greenhouse gas emissions from the Project. | Less than significant | All Tiers |
| Impact 4.7-2<br>Conflict with any Applicable Plan, Policy, or Regulation Adopted for the Purpose of Reducing the Emissions of Greenhouse Gases | Potentially significant | Implement MM 4.7-3, as described above. | Significant and unavoidable | All Tiers |
| Impact 4.7-3<br>Cumulative Greenhouse Gas Emissions Impacts | Potentially significant | Implement MM 4.7-4, as described above. | Significant and unavoidable | All Tiers |

**Table 1-3: Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation**

| Impact | Level of Significance before Mitigation | Mitigation Measure(s) | Level of Significance after Mitigation | Applicable Tier |
|---|---|---|---|---|
| **Hazards and Hazardous Materials** | | | | |
| Impact 4.8-1<br><br>Create a Significant Hazard to the Public or the Environment through the Routine Transport, Use, or Disposal of Hazardous Materials | Potentially significant | **MM 4.8-1** The Applicant shall provide a comprehensive Worker Environmental Awareness Program to the County with its first Site Plan Conformity Review permit application in each calendar year. The program shall include all training requirements identified in Applicant Best Management Practices and mitigation measures, and include training for all field personnel (including Applicant employees, agents and contractors). The Worker Environmental Awareness Program shall include hazardous materials and hazardous waste management, and emergency preparedness, release reporting, and response requirements.<br><br>**MM 4.8-2** The Applicant shall arrange for transportation, storage and disposal of all hazardous materials in compliance with the Hazardous Materials Transportation Act. Drivers transporting hazardous materials or wastes should follow the measures recommended by the Federal Motor Carrier Safety Administration for avoiding roll-over accidents. To avoid roll-over accidents involving cargo tank trucks:<br>a. Avoid sudden movements that may lead to roll-overs.<br>b. Control your load in turns and on straight roadways.<br>c. Identify high risk areas on roads.<br>d. Remain alert and attentive behind the wheel.<br>e. Control speed and maintain proper “speed cushions.”<br><br>**MM 4.8-3** The Applicant shall implement the following practices:<br>a. Construction activities shall be conducted to allow for easy clean-up of spills. Construction crews shall have sufficient tools, supplies, and absorbent and barrier materials to contain and recover spilled materials.<br>b. Fuels and lubricants shall be stored only at designated staging areas. Fuel and lubricant tanks shall have appropriate secondary spill containment (e.g., curbs).<br>c. Storage of fuel and lubricants in the staging area shall be at least 100 feet away from the edge of water bodies. Refueling and lubrication of equipment shall be restricted to upland areas at least 100 feet away from stream channels and wetlands.<br>d. Any fuel truck shall carry an oil spill response kit and spill response equipment at all times.<br>e. Applicants shall be required to perform all routine equipment maintenance at the well pad, and promptly collect and lawfully dispose of wastes at an authorized recycling, treatment or disposal facility.<br>f. Berms and/or dikes (secondary containment) shall be constructed around the permanent above-ground bulk tanks and the foundations shall be installed with a passive leak detection system, so that potential spill materials shall be contained and collected in specified areas isolated from any water bodies. Tanks shall not be placed in areas subject to periodic flooding or washout.<br>g. A sufficient supply of sorbent and barrier materials shall be maintained on construction sites, and sorbent and barrier materials shall also be utilized to contain runoff from contaminated areas.<br>1. Shovels and drums shall be stored at each well pad or readily available. If small quantities of soil become contaminated, shovels shall be used to collect the soil and the material shall be stored in 55-gallon drums. Large quantities of contaminated soil may be bio-remediated on-site or at a designated remediation facility, subject to government approval, or collected utilizing heavy equipment, and stored in drums or other suitable containers prior to disposal. Should contamination occur adjacent to staging areas as a result of runoff, shovels and/or heavy equipment shall be utilized to collect the contaminated material. Contaminated soil shall | Less than significant | All Tiers |

**Table 1-3: Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation**

| Impact | Level of Significance before Mitigation | Mitigation Measure(s) | Level of Significance after Mitigation | Applicable Tier |
|---|---|---|---|---|
| | | be disposed of in accordance with state and federal regulations.<br>2. Above-ground tanks, valves and other equipment shall be visually inspected monthly and when the tank is refilled. Inspection records shall be maintained. Applicants shall periodically check tanks for leaks or spills.<br>3. Drain valves on temporary tanks shall be locked to prevent accidental or unauthorized discharges from the tank.<br>4. Equipment maintenance shall be conducted in staging areas to the extent practical.<br>5. The Applicant shall maintain equipment in operating condition to reduce the likelihood of fuel or oil line breaks and leakage. Any vehicles with chronic or continuous leaks shall be removed from the construction site and repaired before being returned to operation.<br>**MM 4.8-4** The Applicant shall implement the following measures to prevent, repair, and remediate accidental leaks and spills from oil and gas operations.<br>a. The Applicant shall identify gas, oil and produced water pipelines to be used for each new or reworked well site in its Site Review Plan, and shall show the location of any sensitive receptor located within 200 feet of any such pipeline. For any pipeline located within 200 feet of a sensitive receptor, the Applicant shall present evidence that each such pipeline has been integrity tested using pressure testing or other accepted test methods by a qualified professional within a two-year period prior to submittal of the Site Review Plan, and shall provide a copy of the test result to the County. For all waste gas lines less than or equal to 4 inches in diameter, a Pipeline Management Plan shall be developed and implemented in accordance with Division of Oil Gas and Geothermal Resources regulations Title 14, Division 2, Chapter 4, Section 1774.2. The Pipeline Management Plan shall include:<br>1. A listing of information on each pipeline including, but not limited to:<br>i. Pipeline type.<br>ii. Grade.<br>iii. Installation date of pipeline.<br>iv. Design and operational pressure.<br>v. Any leak, repair, inspection and testing history.<br>2. A description of the testing method and schedule for all pipelines.<br>b. The Applicant shall notify the County of reportable quantities of fuel, gas, petroleum or hazardous materials leaks to the County within 48 hours of discovery, and to other applicable agencies as required by other laws. The Applicant shall immediately contain the leak (e.g., by isolating or shutting down the leaking equipment), clean up contaminated media (e.g., soils), and repair the leak prior to recommencing operations. The Applicant shall report the status and progress of the leak repair and remediation work to the County on monthly intervals until the repair has been completed, and any contaminated media has been remediated.<br>**MM 4.8-5** If, during grading or excavation work, the Applicant observes visual or olfactory evidence of contamination or if soil contamination is otherwise suspected, work near the excavation site shall be terminated, the work area cordoned off and appropriate health and safety procedures implemented for the location by the contractor's Health and Safety Officer. Samples shall be collected by a trained and qualified individual. Analytical data from suspected contaminated material shall be reviewed by the contractor's Health and Safety Officer. If the sample testing determines that contamination is not present, work may proceed at the site; however, if contamination is detected above regulatory limits, the Kern County Public Health Services Department shall be notified. All actions related to encountering unanticipated | | |

**Table 1-3: Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation**

| Impact | Level of Significance before Mitigation | Mitigation Measure(s) | Level of Significance after Mitigation | Applicable Tier |
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| | | hazardous materials at the site shall be documented and submitted to the Kern County Public Health Services Department.<br><br>**MM 4.8-6** The Applicant shall implement the most up-to-date best management practices as part of their normal operations. Specifically, operators and/or their contractors shall implement measures to prevent the release or accidental spillage of solid waste, garbage, construction debris, sanitary waste, industrial waste, naturally occurring radioactive materials, oil and other petroleum products, and other wastes into water bodies or water sources. The best management practices in the most up-to-date versions of the following documents shall be followed: *Exemption of Oil and Gas Exploration and Production Wastes From Federal Hazardous Waste Regulations (EPA 2002).*<br>a. Classify the various oil and gas exploration and production wastes for proper disposal as described in United States Environmental Protection Agency 2002.<br>b. Size reserve pits properly to avoid overflows.<br>c. Use closed loop mud systems when practical, particularly with oil-based muds.<br>d. Review safety data sheets of materials used, and select less toxic alternatives when possible.<br>e. Minimize waste generation, such as by designing systems with the smallest volumes possible (e.g., drilling mud systems).<br>f. Reduce the amount of excess fluids entering reserve and production pits.<br>g. Keep non-exempt wastes out of reserve or production pits.<br>h. Design the drilling pad to contain stormwater and rigwash.<br>i. Recycle and reuse oil-based muds and high density brines, when practical.<br>j. Perform routine equipment inspections and maintenance to prevent leaks or emissions.<br>k. Reclaim oily debris and tank bottoms when practical.<br>l. Minimize the volume of materials stored at facilities.<br>m. Construct adequate berms around materials and waste storage areas to contain spills.<br>n. Perform routine inspections of materials and waste storage areas to locate damaged or leaking containers.<br>o. Train personnel to use sensible waste management practices.<br><br>**MM 4.8-7** Conduct exploration and development activities as described in *Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development The Gold Book* (Bureau of Land Management 2007). The following specific measures should be undertaken at a minimum:<br>a. Sufficiently impervious secondary containment, such as containment dikes, containment walls, and drip pans, should be constructed and maintained around all qualifying petroleum facilities, including tank batteries and separation and treating areas consistent with the Environmental Protection Agency's Spill Prevention, Control, and Countermeasures regulation (40 Code of Federal Regulations 112). The containment structure must have sufficient volume to contain, at a minimum, the content of the largest storage tank containing liquid hydrocarbons within the facility/battery and sufficient freeboard to contain precipitation, unless more stringent protective requirements are deemed necessary by the authorized officer. Drip pans should be routinely checked and cleaned of petroleum or chemical discharges and designed to prevent access by wildlife and livestock.<br>b. Chemical containers should not be stored on bare ground, exposed to the sun and moisture. Containers and labels are subject to | | |

**Table 1-3: Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation**

| Impact | Level of Significance before Mitigation | Mitigation Measure(s) | Level of Significance after Mitigation | Applicable Tier |
|---|---|---|---|---|
| | | degradation and punctured drums could leak contents on the ground.<br>c. Chemicals containers should be maintained in good condition and placed within secondary containment in case of a spill or high velocity puncture.<br>d. Containment dikes are not to be constructed with topsoil or coarse, insufficiently impervious spoil material. Containment is strongly suggested for produced water tanks. Chemicals should be placed within secondary containment and stored so that the containers are not in contact with soil or standing water and product and hazard labels are not exposed to weathering.<br>e. Maintain a clean well location. Remove trash, junk, and other materials not in current use<br>**MM 4.8-8** Applicants shall use the appropriate American Petroleum Institute Standards, or other recognized sources imposing the same or equivalent standards, for their facility, such as the following:<br>a. Use cements and well materials in well completions as described in Specifications for Cements and Materials for Well Cementing (American Petroleum Institute 2011).<br>b. Prior to start-up of all new facilities, verify and prove the construction, installation, integration, testing, and preparation of systems have been completed as designed following the practices described in Facilities Systems Completion Planning and Execution (American Petroleum Institute 2013a).<br>c. When the use of centralizers and stop-collars are required during well completion activities, follow the installation and testing requirements described in Recommended Practice for Centralizer Placement and Stop-collar Testing (American Petroleum Institute 2010a).<br>d. Limit the environmental footprint of oil and gas exploration and production and reduce the incidence of releases of hazardous substances following the practices described in Environmental Protection for Onshore Oil and Gas Production Operations and Leases (American Petroleum Institute 2009).<br>e. Minimize improper disposal by following the practices described in American Petroleum Institute Order No. G00004, Guidelines for Commercial Exploration and Production Waste Management Facilities (American Petroleum Institute 2001) or other recognized methods. These guidelines discuss the relevant regulations and permitting requirements; siting, construction, and technical consideration for various waste disposal options; as well as mitigation options.<br>f. Minimize the environmental footprint of exploration and production activities following the practices described in Land Drilling Practices for Protection of the Environment (American Petroleum Institute 2010b) or other recognized sources.<br>g. Prior to pressurizing or re-pressurizing petroleum product pipelines, ensure the integrity of pipelines following the practices described in Recommended Practice for the Pressure Testing of Steel Pipelines for the Transportation of Gas, Petroleum Gas, Hazardous Liquids, Highly Volatile Liquids, or Carbon Dioxide (American Petroleum Institute 2013b) or other recognized sources.<br>h. To minimize releases of hazardous substances during oilfield construction, pit and sump operations shall be conducted in accordance with State Water Resources Control Board General Orders or appropriate Regional Water Quality Control Board waste discharge requirements or general orders.<br>**MM 4.8-9** For all operations subject to the Oil and Gas Conformity Review, the Applicant shall comply with the pipeline management plan, including inspection and maintenance requirements, as administered by the Division of Oil Gas and Geothermal Resources pursuant to 14 California Code of Regulations 1774. | | |

**Table 1-3: Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation**

| Impact | Level of Significance before Mitigation | Mitigation Measure(s) | Level of Significance after Mitigation | Applicable Tier |
|---|---|---|---|---|
| Impact 4.8-2<br><br>Create a Significant Hazard to the Public or the Environment through Reasonably Foreseeable Upset and Accident Conditions Involving the Release of Hazardous Materials into the Environment | Potentially significant | Implement MM 4.8-1 through MM 4.8-9, as described above, and<br><br>**MM 4.8-10** The Applicant shall incorporate annual maintenance checks for leaks and corrosion that cause releases into current operations, maintenance, and inspection schedules as provided by the Division of Oil Gas and Geothermal Resources pursuant to 14 California Code of Regulations Sections 1774.1 and 1774.2, the Applicant shall visually inspect all above-ground pipelines for leaks and corrosion at least once per year, comply with the pipeline testing requirements included therein, shall maintain records of such inspections and testing; and shall make inspection and testing records available to the County for review upon request.<br><br>**MM 4.8-11** As part of the Hazardous Materials Business Plan and the spill prevention, control, And countermeasures Plan, the Applicant shall require annual worker training requirements to: increase awareness of the most common types of failures and methods to avoid mistakes, shall maintain records of employee training, and shall make such records available to the County for review upon request.<br><br>**MM 4.8-12** An Applicant who plans to perform cyclic steam injection activities above reservoir fracture levels shall conduct such activities in accordance with the requirements set forth in the Division of Oil Gas and Geothermal Resources site-specific Project Approval Letter for the injection project. The following requirements from a Project Approval Letter for an injection project are examples of the types of conditions that would be triggered if a surface expression were to occur, though such conditions may be modified by the Division of Oil Gas and Geothermal Resources to reflect site-specific conditions and changing regulatory requirements.<br><br>a. Cease cyclic steaming operations in accordance with the site-specific Project Approval Letter. Streaming can resume following the Division of Oil Gas and Geothermal Resources specifications outlined in the Project Approval Letter.<br><br>b. All new or reactivated surface expressions that discharge oil in a reportable quantity shall be reported as an oil spill to the California Emergency Management Agency at (800) 852-7550.<br><br>c. Any measures to address surface expressions from the well and associated Project shall be reviewed by the Division of Oil Gas and Geothermal Resources prior to initiating.<br><br>d. Immediately control any water, steam, or oil flowing from a surface expression and contained. All discharged material shall be removed and disposed of in a manner approved by all state and local agencies.<br><br>e. Cordon off and clearly mark all surface expressions to prevent inadvertent access.<br><br>f. Conduct air sampling of any emissions associated to a recent surface expression in accordance to the local air board requirements to ensure a health hazard condition does not exist.<br><br>g. Report immediately to the Division of Oil Gas and Geothermal Resources all surface expressions within 300 feet of the Project site. If the surface expression continues to flow after five days, all wells within a 300-foot radius shall cease steaming until the surface expression ceases to flow. If the surface expression continues to flow, the damage will be evaluated at the Supervisor's discretion, as assigned by Section 3106 of the Public Resources Code and existing laws and regulations.<br><br>**MM 4.8-13** The Applicant shall comply with the Division of Oil Gas and Geothermal Resources requirements for assuring safe drilling and drill casing practices, well design, construction and well management requirements, blowout requirements, and all other provisions of 14 California Code of Regulations 1744 and other applicable Division of Oil Gas and Geothermal Resources regulations. The Applicant shall also reduce the incidence of well control loss by following the practices described in Recommended Practice for Well Control Operations (American Petroleum Institute 2012).<br><br>**MM 4.8-14** The Applicant shall report contamination caused by oil and gas activities, including previously unknown injection wells, of a reportable quantity of hazardous substances, as specified in the Code of Federal Regulations Title 40 and/or the California Code of Regulations Titles 22 and 23, which is discovered during Project construction activities and operations. Notification must be made to Kern County | Less than significant | All Tiers |

**Table 1-3: Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation**

| Impact | Level of Significance before Mitigation | Mitigation Measure(s) | Level of Significance after Mitigation | Applicable Tier |
|---|---|---|---|---|
| | | Environmental Health and the appropriate implementing regulatory agency that has responsibility or oversight of the specific contamination conditions. The Applicant shall remediate such contamination outside Tier 1 areas as required by the Kern County Environmental Health and the appropriate implementing regulatory agency. | | |
| Impact 4.8-3<br>Emit Hazardous Emissions or Handle Hazardous or Acutely Hazardous Materials, Substances, or Waste within One-Quarter Mile of an Existing or Proposed School | Potentially significant | Implement toxic air contaminant setback mitigation measures, as described in Section 4.3, Air Quality, and<br>**MM 4.8-15** The Applicant who intends to use acutely hazardous chemicals, including chemicals at or above the specified threshold quantities or a process which involves a Category 1 flammable gas or a flammable liquid with a flashpoint below 100 degrees Fahrenheit (37.8 degrees Celsius) on site in one location, in a quantity of 10,000 pounds (4535.9 kilograms) or more according to 8 California Code of Regulations Section 5189, Appendix A, within 0.25 mile from a school must:<br>a. Evaluate whether other alternative chemicals that are less hazardous could be used.<br>b. Ensure that the smallest quantity of necessary acutely hazardous materials are stored on site.<br>c. Notify the occupants of the buildings when and where acutely hazardous materials would be used.<br>d. Notify Kern County Fire Department about the details of the use of acutely hazardous materials (e.g., when, where, how much).<br>e. Ensure that all employees who would contact the acutely hazardous materials are trained on the handling, transport, storage, and disposal of the materials.<br>f. Ensure that all employees who would contact the acutely hazardous materials are trained and are provided the proper personal protective equipment.<br>g. Ensure that all employees who would contact the acutely hazardous materials are trained and have exercised on the Spill Prevention, Control, and Countermeasures P Plan that addresses these chemicals. | Less than significant | All Tiers |
| Impact 4.8-4<br>Create a Hazard to the Public or the Environment as a Result of Being a Site that is Included on a List of Hazardous Materials Sites Compiled Pursuant to Government Code Section 65962.5 | Potentially significant | Implement MM 4.8-14, as described above, and MM 4.8-17 and MM 4.8-18, as described under Impact 4.8-5. | Less than significant | All Tiers |
| Impact 4.8-5<br>For a Project Located within the Adopted Airport Land Use Compatibility Plan, Result in a Safety Hazard for People Residing or Working in the Area | Potentially significant | **MM 4.8-17** The Applicant shall determine whether any proposed construction or alteration meets requirements for notification of the Federal Aviation Administration. If a proposed construction or alteration is found to require notification, the Applicant shall notify the Federal Aviation Administration and request that the Federal Aviation Administration issue a Determination of No Hazard to Air Navigation. If the Federal Aviation Administration determines that the construction or alteration would result in a potential hazard to air navigation, the Applicant would be required to work with the Federal Aviation Administration to resolve any adverse effects or airport operations. The Applicant shall notify the Federal Aviation Administration and the nearest Airport, by completing and submitting Federal Aviation Administration Form 7460-1 if oil and gas related exploration, production, or associated development activities are planned that meet one or more of the following criteria:<br>a. Any construction or alteration exceeding 200 feet above ground level.<br>b. Any construction or alteration within 20,000 feet of all public use airports except Poso-kern Airport which exceeds a 100:1 surface from any point on the runway. | Less than significant | All Tiers |

**Table 1-3: Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation**

| Impact | Level of Significance before Mitigation | Mitigation Measure(s) | Level of Significance after Mitigation | Applicable Tier |
|---|---|---|---|---|
| | | c. Any construction or alteration within 10,000 feet of the Poso-Kern Airport which exceeds a 50:1 surface from any point on the runway.<br>d. Any construction or alteration within 5,000 feet of a public use heliport which exceeds a 25:1 surface.<br>e. When requested by the Federal Aviation Administration.<br>f. Any construction or alteration located on a public use airport or heliport regardless of height or location.<br>**MM 4.8-18** The Applicant shall determine the distance from the proposed operation to the nearest boundary of the Joint Service Restricted R-2508 Complex, using a map of this Complex provided by the County. The Applicant shall notify the Joint Service Restricted R2508 Complex representative identified by the County if oil and gas related exploration, production, or associated development activities are planned that meet one or more of the following criteria:<br>a. Any structure within 75 miles of the R-2508 Complex that is greater than 50 feet tall.<br>b. Any project within 50 miles of the R-2508 Complex that emit radio and communication frequencies.<br>c. Any project that would create environmental impacts such as visibility or elevated obstructions within 25 miles of the R-2508 Complex.<br>**MM 4.8-19** All oil and gas related development activities shall review the Kern County Airport Land Use Compatibility Plan for compliance with all applicable policies. | | |
| Impact 4.8-6<br>Result in Safety Hazard for People Residing or Working in Project Area within Vicinity of a Private Airstrip | Less than significant | None required. | Less than significant | All Tiers |
| Impact 4.8-7<br>Impair Implementation of, or Physically Interfere with, an Adopted Emergency Response Plan or Emergency Evacuation Plan | Less than significant | None required. | Less than significant | All Tiers |

**Table 1-3: Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation**

| Impact | Level of Significance before Mitigation | Mitigation Measure(s) | Level of Significance after Mitigation | Applicable Tier |
|---|---|---|---|---|
| Impact 4.8-8<br><br>Expose People or Structures to a Significant Risk of Loss, Injury, or Death Involving Wildland Fires, Including Where Wildlands are Adjacent to Urbanized Areas or Where Residences are Intermixed with Wildlands | Less than significant | **MM 4.8-20** The Applicant is required to implement the following measures:<br>a. Comply with Kern County Fire Codes.<br>b. Maintain firefighting apparatus and supplies required by the Kern County Fire Department.<br>c. Maintain of a list of all relevant fire-fighting authorities for each work site.<br>d. Have available equipment to extinguish incipient fires and or construction of a fire break, such as: chemical fire extinguishers, shovels, axes, chain saws, etc.<br>e. Carry water or fire extinguishers and shovels in non-passenger vehicles in the field.<br>f. Have and maintain an adequate supply of fire extinguishers for welding, grinding, and brushing crews.<br>g. Protect individual safety to contain any fire that occurs and notify local emergency response personnel.<br>h. Remove any flammable wastes generated during oil and gas activities regularly.<br>i. Store all flammable materials used in oil and gas activities away from ignition sources and in approved containers.<br>j. Allow smoking only in designated smoking areas.<br>k. Prohibit smoking where flammable products are present and when the fire hazard is high. Train personnel regarding potential fire hazards and their prevention.<br>l. All internal combustion engines, stationary and mobile, shall be equipped with spark arresters. Spark arresters shall be in good working order.<br>m. Light trucks and cars with factory-installed (type) mufflers shall be used only on roads where the roadway is cleared of vegetation. Said vehicle types shall maintain their factory-installed (type) muffler in good condition.<br>n. Fire rules shall be posted on the Project bulletin board at the contractor's field office and areas visible to employees.<br>o. Equipment parking areas and small stationary engine sites shall be cleared of all extraneous flammable materials.<br>p. Personnel shall be trained in the practices of the Fire Safety Plan relevant to their duties. Construction and maintenance personnel shall be trained and equipped to extinguish small fires in order to prevent them from growing into more serious threats.<br>**MM 4.8-21** The Applicant should restrict the use of chainsaws, chippers, vegetation masticators, grinders, tractors, torches, and explosives at its locations, and ensure the sites where this equipment is used are equipped with portable or fixed fire extinguishers and/or a water tank, with hoses, fire rakes, and other tools to extinguish and or control incipient stage fires. The Worker Environmental Awareness Program shall include fire prevention and response training for workers using these tools. | Less than significant | All Tiers |

**Table 1-3: Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation**

| Impact | Level of Significance before Mitigation | Mitigation Measure(s) | Level of Significance after Mitigation | Applicable Tier |
|---|---|---|---|---|
| Impact 4.8-9<br>Generate Vectors or Have a Component that Includes Agricultural Waste Exceeding Adopted Qualitative Thresholds | Less than significant | Implement dust control and Valley Fever education and mask measures as described in Section 4.3, Air Quality, and<br>**MM 4.8-22** Applicants shall ensure that trash is stored in closed containers and removed from the site at regular intervals. Open containers shall be inverted and construction ditches shall not be allowed to accumulate water. Construction and maintenance operations shall not generate standing water. Naturally occurring depressions, drainages, or pools at the site shall not be drained or filled without consulting with the appropriate resource agency (Kern County, United States Army Corps of Engineers, United States Fish and Wildlife Service, California Department of Fish and Wildlife) as applicable, and obtaining the appropriate permits. | Less than significant | All Tiers |
| Impacts 4.8-10<br>Contribute to Cumulative Hazards and Hazardous Materials Impacts | Potentially significant | Implement MM 4.8-1 through MM 4.8-22, as described above, and dust control and toxic air contaminant setback mitigation measure, as described in Section 4.3, Air Quality, risk reduction measures, as described in Section 4.6, Geology and Soils, and mitigation measures to maintain water quality, as described in Section 4.9, Hydrology and Water Quality. | Less than significant | All Tiers |
| **Hydrology and Water Quality** | | | | |
| Impact 4.9-1<br>Violate any Water Quality Standards or Waste Discharge Requirements | Potentially significant | **MM 4.9-1** The Applicant shall comply with all applicable federal, state, regional and local agency water quality protection laws and regulations, and commonly utilized industry standards, including (where applicable) obtaining coverage under the stormwater construction general permit and industrial general permit issued by the State Water Resources Control Board and complying with industry stormwater management standards for construction and operational activities.<br>**MM 4.9-2** For any oil and gas activity that is not subject to state or federal stormwater management laws, regulations or general permits, the Applicant shall prepare a drainage plan that is designed to minimize runoff and minimize the potential for impeding or redirecting 100-year flood flows. The drainage plan shall be prepared in accordance with the Kern County Grading Code, the Green Code and approved by the Kern County Engineering, Surveying and Permit Services Department, Floodplain Management Section. The plan shall specify best management practices to prevent all construction pollutants from contacting stormwater, with the intent of keeping sedimentation or any other pollutants from moving offsite and into receiving waters. The requirements of the Plan shall be incorporated into design specifications. Recommended best management practices for the construction phase shall include the following:<br>a. Erosion Control -<br>1. Scheduling of construction activities to avoid rain events.<br>2. Limiting vegetation removal to the maximum extent practicable.<br>b. Sediment Control -<br>1. Secure stockpiling of soil.<br>2. Installation of a stabilized construction entrance/exit and stabilization of disturbed areas.<br>c. Non-stormwater Control -<br>1. Proper fueling and maintenance of equipment and vehicles.<br>2. Proper concrete handling techniques.<br>d. Waste and Material Management -<br>1. Properly managing construction materials, designating construction staging areas in or around the Project site. | Less than significant | All Tiers |

**Table 1-3: Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation**

| Impact | Level of Significance before Mitigation | Mitigation Measure(s) | Level of Significance after Mitigation | Applicable Tier |
|---|---|---|---|---|
| | | 2. Stockpiling and disposing of demolition debris, concrete, and soil properly.<br>3. Aggressive control of litter.<br>4. Proper disposal of demolition debris, concrete and soil.<br>5. Proper protections for fueling and maintenance of equipment and vehicles.<br>e. Post-Construction Stabilization -<br>1. Ensuring the stabilization of all disturbed soils per revegetation or application of a soil binder.<br>**MM 4.9-3** All drilling operations must either use a closed loop system to avoid discharges of drilling muds and fluids, or obtain coverage under the State Water Resources Control Board low threat discharge General Order (Waste Discharge Requirements General Order 2003-0003-DEW), obtain individual Waste Discharge Requirements issued by the Central Valley Regional Water Quality Control Board for the unit, or obtain coverage under a general order issued by the Central Valley Regional Water Quality Control Board applicable to drilling ponds. Any surface ponds or sumps must be cleared of fluids and muds in accordance with the State Water Resources Control Board general order, applicable Water Discharge Requirements and Division of Oil Gas and Geothermal Resources regulations. Compliance with the State Water Resources Control Board or Central Valley Regional Water Quality Control Board low-threat discharge orders or Water Discharge Requirements, if closed-loop systems are not used, and applicable laws, regulations and standards will reduce potential surface water quality impacts from contact with drilling muds or fluids during drilling and construction to less than significant levels.<br>**MW 4.9-4** For any activity for which Chapter 19.98 applies, the Applicant shall not conduct any injection activity regulated by the Underground Injection Control program, including enhanced oil recovery activities that discharge into any underground source of drinking water unless the aquifer has been exempted by the United States Environmental Protection Agency or injection has otherwise been authorized by the U.S. Environmental Protection Agency or by Division of Oil Gas and Geothermal Resources under delegated authority under the Safe Drinking Water Act.<br>**MW 4.9-5** For any activity for which Chapter 19.98 applies, the Applicant shall not discharge produced water into any surface disposal facility unless the facility has received the Waste Discharge Requirements from the Central Valley Regional Water Quality Control Board, or the need for Water Discharge Requirements has been waived by the Central Valley Regional Water Quality Control Board.<br>**MM 4.9-6** For any oil and gas activity within a mapped 100-year floodplain, the Applicant shall ensure that all constructed facilities are protected from the maximum potential elevation of flooding during a 100-year flood by elevating structures or by implementing containment berms or other protective measures in compliance with the standards in the Kern County Floodplain Management Code and Chapters 19.50 and 19.70 of the Kern County Zoning Code. | | |
| Impact 4.9-2<br>Substantially Deplete Groundwater Supplies or Interfere Substantially with Groundwater Recharge such that There Would be a Net Deficit In Aquifer Volume or a Lowering of the Local Groundwater Table Level (e.g., the Production Rate of Pre-Existing Nearby Wells Would Drop to a Level That Would Not Support Existing Land Uses or Planned Uses for Which Permits Have Been Granted) | Potentially significant | Implement MM 4.9-1 through MM 4.9-6, as described above, and the groundwater mitigation measures described in Section 4.17, Utilities and Service Systems. | Significant and unavoidable | All Tiers |

**Table 1-3: Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation**

| Impact | Level of Significance before Mitigation | Mitigation Measure(s) | Level of Significance after Mitigation | Applicable Tier |
|---|---|---|---|---|
| Impact 4.9-3<br>Substantially Alter the Existing Drainage Pattern of the Site or Area, Including Through the Alteration of the Course of a Stream or River, in a Manner That Would Result in Substantial Erosion or Siltation On-site or Off-site | Less than significant | Implement MM 4.9-1 through MM 4.9-6, as described above, and the groundwater mitigation measures described in Section 4.17, Utilities and Service Systems. | Less than significant | All Tiers |
| Impact 4.9-4<br>Substantially Alter the Existing Drainage Pattern of the Site or Area, Including Through the Alteration of the Course of a Stream or River, or Substantially Increase the Rate or Amount of Surface Runoff in a Manner That Would Result in Flooding On-site or Off-site | Less than significant | Implement MM 4.9-1 through MM 4.9-6, as described above, and the groundwater mitigation measures described in Section 4.17, Utilities and Service Systems. | Less than significant | All Tiers |
| Impact 4.9-5<br>Create or Contribute Runoff Water That Would Exceed the Capacity of Existing or Planned Stormwater Drainage Systems or Provide Substantial Additional Sources of Polluted Runoff | Less than significant | Implement MM 4.9-1 through MM 4.9-6, as described above. | Less than significant | All Tiers |
| Impact 4.9-6<br>Otherwise Substantially Degrade Water Quality | Less than significant | Implement MM 4.9-1 through MM 4.9-6, as described above, and the groundwater mitigation measures described in Section 4.17, Utilities and Service Systems. | Less than significant | All Tiers |
| Impact 4.9-7<br>Place Housing within a 100-year Flood Hazard Area as Mapped on a Federal Flood Hazard Boundary or Flood Insurance Rate Map or Other Flood Hazard Delineation Map | No impact | No mitigation measures are required since the Project does not include housing development. | No impact | All Tiers |
| Impact 4.9-8<br>Place Within a 100-Year Flood Hazard Area Structures That Would Impede or Redirect Flood Flows | Potentially significant | Implement MM 4.9-1 through MM 4.9-6, as described above. | Less than significant | All Tiers |

**Table 1-3: Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation**

| Impact | Level of Significance before Mitigation | Mitigation Measure(s) | Level of Significance after Mitigation | Applicable Tier |
|---|---|---|---|---|
| Impact 4.9-9<br>Expose People or Structures to a Significant Risk of Loss, Injury, or Death Involving Flooding, Including Flooding as a Result of the Failure of a Levee or Dam | Potentially significant | Implement MM 4.9-1 through MM 4.9-6, as described above, and the groundwater mitigation measures described in Section 4.17, Utilities and Service Systems. | Less than significant | All Tiers |
| Impact 4.9-10<br>Contribute to Inundation by Seiche, Tsunami, or Mudflow | No impact | No mitigation measures are required. | No impact | All Tiers |
| Impact 4.9-11<br>Contribute to Cumulative Hydrology and Water Quality Impacts | Potentially significant | Implement MM 4.9-1 through MM 4.9-6, as described above, and the groundwater mitigation measures described in Section 4.17, Utilities and Service Systems. The County lacks jurisdiction and control over land conversions, and actions or approvals by other agencies that may cause cumulatively significant impacts to hydrology or water quality in the region; accordingly this impact remains significant and unavoidable. | Significant and unavoidable | All Tiers |
| **Land Use and Planning** | | | | |
| Impact 4.10-1<br>Physically Divide an Established Community | Less than significant | Implement specified mitigation measures, including those that are applicable from Section 4.1, Aesthetics and Visual Resources, Section 4.3, Air Quality, Section 4.4 Biological Resources, Section 4.12, Noise, Section 4.15, Recreation, and Section 4.17, Utilities and Service Systems. | Less than significant | All Tiers |
| Impact 4.10-2<br>Conflict with Any Applicable Land Use Plan, Policy, or Regulation of an Agency with Jurisdiction Over the Project | Less than significant | No mitigation measures are required. | Less than significant | All Tiers |
| Impact 4.10-3<br>Conflict with Any Applicable Habitat Conservation Plan or Natural Community Conservation Plan | Less than significant | No mitigation measures are required. | Less than significant | All Tiers |
| Impact 4.10-4<br>Contribute to Cumulative Land Use Impacts | Less than significant | No mitigation measures are required. | Less than significant | All Tiers |
| **Minerals** | | | | |
| Impact 4.11-1<br>Result in the Loss of Availability of a Known Mineral Resource that Would be of Value to the Region and the Residents of the State | Less than significant | No mitigation measures are required. | Less than significant | All Tiers |

**Table 1-3: Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation**

<table>
<tr><th>Impact</th><th>Level of Significance before Mitigation</th><th>Mitigation Measure(s)</th><th>Level of Significance after Mitigation</th><th>Applicable Tier</th></tr>
<tr><td>Impact 4.11-2<br><br>Result in the Loss of Availability of a Locally Important Mineral Resource Recovery Site Delineated on a Local General Plan, Specific Plan, or Other Land Use Plan</td><td>Less than significant</td><td>No mitigation measures are required.</td><td>Less than significant</td><td>All Tiers</td></tr>
<tr><td>Impact 4.11-3<br><br>Contribute to Cumulative Mineral Resources Impacts</td><td>Less than significant</td><td>No mitigation measures are required.</td><td>Less than significant</td><td>All Tiers</td></tr>
<tr><td colspan="5">Noise</td></tr>
<tr><td>Impact 4.12-1<br><br>Exposure of Persons to, or Generate, Noise Levels in Excess of Standards Established in the Local General Plan or Noise Ordinance or Applicable Standards of Other Agencies</td><td>Potentially significant</td><td>MM 4.12-1 The Site Plan Application shall include a Site Vicinity Figure showing the location of any sensitive receptor(s) within 3,000 feet of the construction site (potential impact area) for the proposed new well or other ancillary facility or equipment (excluding pipelines). This Figure need not be prepared for Tier 1 areas unless a sensitive receptor is located within 3,000 feet of a construction site inside the Tier 1 area.<br><br>a. If there are no sensitive noise receptors within this potential impact area, then no construction mitigation measures shall be required.<br><br>b. If there are sensitive human noise receptors within the potential impact area, then additional information must be provided showing the type of equipment being used and the noise contours with levels not exceeding 65 dBA at the nearest exterior wall of the sensitive receptor or more than 1 dBA higher than the ambient noise levels, if in excess of 65 dBA. If noise levels are shown to exceed 65 dBA or more than 1 dBA higher than the ambient noise levels in excess of 65 dBA, then one or more of the following mitigation measures shall be taken:<br><br>1. Placement of a temporary sound attenuation wall(s) shall be placed at the optimal distance to the sensitive receptor, as determined by an acoustical expert.<br><br>2. Construction of a temporary berm shall be placed at the optimal distance to the sensitive receptor, as determined by an acoustical expert.<br><br>3. Modification of equipment to reduce noise impacts.<br><br>4. Implementation of a quiet mode drilling plan or other sound reduction technology or practices as documented in a report submitted to the County.<br><br>5. Arranging for the voluntary, temporary relocation of the occupants of the sensitive receptor during the construction period.<br><br>6. Use the following setback distances for the activities specified:<br><br>Construction Noise Setbacks<br><table><tr><th>Activity</th><th>Setback Distance (feet)</th></tr><tr><td>Well Pad Preparation</td><td>800</td></tr><tr><td>Drilling (Well Advancement)</td><td>1,420</td></tr><tr><td>Drilling (Pull Out Of Well/Borehole)</td><td>750</td></tr></table></td><td>Less than significant</td><td>All Tiers</td></tr>
</table>

**Table 1-3: Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation**

| Impact | Level of Significance before Mitigation | Mitigation Measure(s) | Level of Significance after Mitigation | Applicable Tier |
|---|---|---|---|---|
| | | Large-Scale Exploratory Drilling[1] — 3,000<br>Well Workover — 850<br>Source: Brown-Buntin 2015<br>Note:<br>[1]Kenai Drill Rig #7<br><br>Information submitted with the Site Plan Application must detail the combination and methods used to determine the level of reduction and shall not exceed 65 dBA or any ambient levels in excess of 65 dBA or more than 1 dBA higher than the ambient noise levels, if in excess of 65 dBA.<br><br>**MM 4.12-2** New oil and gas wells shall be a minimum 190 feet from the closest sensitive receptor. | | |
| Impact 4.12-2<br>Exposure of Persons to, or Generate, Excessive Groundborne Vibration or Groundborne Noise Levels | Less than significant | No mitigation measures are required. | Less than significant | All Tiers |
| Impact 4.12-3<br>A Substantial Permanent Increase in Ambient Noise Levels in the Project Vicinity Above Levels Existing Without the Project | Potentially significant | Implement MM 4.12-2, as described above. | Less than significant | All Tiers |
| Impact 4.12-4<br>A Substantial Temporary or Periodic Increase in Ambient Noise Levels in the project Vicinity Above Levels Existing Without the Project | Potentially significant | Implement MM 4.12-1, as described above. | Less than significant | All Tiers |
| Impact 4.12-5<br>For a Project Located Within the Kern County Airport Land Use Compatibility Plan, Would the Project Expose People Residing or Working in the Project Area to Excessive Noise Levels | Potentially significant | Implement MM 4.12-1 and MM 4.12-2, as described above. | Less than significant | All Tiers |
| Impact 4.12-6<br>For a Project Located Within the Vicinity of a Private Airstrip, Would the Project Expose People Residing or Working in the Project Area to Excessive Noise Levels | Potentially significant | Implement MM 4.12-1 and MM 4.12-2, as described above. | Less than significant | All Tiers |

**Table 1-3: Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation**

| Impact | Level of Significance before Mitigation | Mitigation Measure(s) | Level of Significance after Mitigation | Applicable Tier |
|---|---|---|---|---|
| Impact 4.12-7<br>Cumulative Impact on Noise Receptors | Potentially significant | Implement MM 4.12-1 and MM 4.12-2, as described above. | Less than significant | All Tiers |
| **Population and Housing** | | | | |
| Impact 4.13-1<br>Induce Substantial Population Growth in an Area, Either Directly or Indirectly | Less than significant | No mitigation measures are required. | Less than significant | All Tiers |
| Impact 4.13-2<br>Displace Substantial Numbers of Existing Housing, Necessitating the Construction of Replacement Housing Elsewhere | No Impact | No mitigation measures are required. | Less than significant | All Tiers |
| Impact 4.13-3<br>Displace Substantial Numbers of People, Necessitating the Construction of Replacement Housing Elsewhere | No impact | No mitigation measures are required. | Less than significant | All Tiers |
| Impact 4.13-4<br>Cumulative Impact on Population and Housing | Less than significant | No mitigation measures are required. | Less than significant | All Tiers |
| **Public Services** | | | | |
| Impact 4.14-1<br>Result in Substantial Adverse Physical Impacts Associated with the Provision of New or Physically Altered Governmental Facilities, Need for New or Physically Altered Governmental Facilities, the Construction of which could Cause Significant Environmental Impacts, in Order to Maintain Acceptable Service Ratios, Response Times, or Other Performance Objectives for Any of the Public Services, which Include: Fire Protection, Police Protection, Schools, Parks, and Other Public Facilities | Potentially significant | **MM 4.14-1** Applicant shall contribute to funding the acquisition of a Combination Walk-in/Non-Walk-in Industrial Firefighting vehicle capable of responding with a minimum of five firefighters with the tools and equipment necessary for industrial firefighting and rescue. Each Applicant shall pay $150 per well on each Oil and Gas Conformity Review permit until the total cost of the vehicle purchase is reached, not to exceed $850,000, to be paid through mitigation fees on Oil and Gas Conformity Review permits. Subsequent Applicants shall not be subject to this mitigation measure.<br>**MM 4.14-2** Applicant shall provide funding in the amount of $425 per Oil and Gas Conformity Review permit issued for the Sheriff's Rural Crime Unit. Funding shall be used for one Sergeant, two Senior Deputies (investigators), three Deputies, One Support Technician (clerical), and helicopter usage, based on the amount of funding provided by this permit mitigation fee. The Sheriff's department shall annually report on the expenditure of funds for the Rural Crimes Unit, including incident reports and response times. If other sources of funding for the Rural Crimes Unit are secured, then the mitigation fee amount shall be adjusted to pay only the gap between actual costs and funding provided from other sources. | Less than significant | All Tiers |
| Impact 4.14-2<br>Contribute to Cumulative Public Service Impacts | Potentially significant | Implement MM 4.14-1 and MM 4.14-2, as described above. | Less than significant | All Tiers |

**Table 1-3: Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation**

| Impact | Level of Significance before Mitigation | Mitigation Measure(s) | Level of Significance after Mitigation | Applicable Tier |
|---|---|---|---|---|
| **Recreation** | | | | |
| Impact 4.15-1<br>Increase the Use of Existing Neighborhood and Regional Parks or Other Recreational Facilities Such That Substantial Physical Deterioration Would Occur or Be Accelerated | Less than significant | No mitigation measures required. | Less than significant | All Tiers |
| Impact 4.15-2<br>Include Recreational Facilities or Require Construction or Expansion of Recreational Facilities That Might Have an Adverse Physical Effect on the Environment | Less than significant | No mitigation measures required. | Less than significant | All Tiers |
| Impact 4.15-3<br>Cumulative Impact on Recreational Facilities | Less than significant | No mitigation measures required. | Less than significant | All Tiers |
| **Transportation and Traffic** | | | | |
| Impact 4.16-1<br>Conflict with an Applicable Plan, Ordinance, or Policy Establishing Measures of Effectiveness for the Performance of the Circulation System, Including, but Not Limited to, Intersections, Streets, Highways and Freeways, Pedestrian and Bicycle Paths, and Mass Transit | Potentially significant | **MM 4.16-1** The Applicant shall pay a road maintenance mitigation fee of $1,500 per permit for new wells to pay for roadway maintenance and related improvements to address wear and tear on roads caused by oil and gas industry traffic. The Roads department shall annually report on the expenditure of funds from the Oil and Gas Roadway Maintenance Fee. Expenditures from the fund shall be as determined by the Roads Commissioner, using as a reference the list of roadways identified in the Environmental Impact Report as being used for traffic by the oil and gas industry. If Kern County secures funding from a sales tax dedicated to transportation funding, then the amount of the traffic mitigation fee shall be re-evaluated at the time the County becomes a self-help county.<br>**MM 4.16-2** Applicants who are using an arterial or collector, or Caltrans route, for access to a construction site, shall consult with the Kern County Public Works Department – Roads Division to determine if a Construction Traffic Control Plan is required based on the timing and volume of larger vehicle rigs and the volume of traffic to address public safety and congestion management. If a Plan is required, the Applicant shall prepare and submit a Construction Traffic Control Plan to the Kern County Roads Department and to the California Department of Transportation (District 9 office) for approval. The Construction Traffic Control Plan must be prepared in accordance with both the California Department of Transportation Manual on Uniform Traffic Control Devices and Work Area Traffic Control Handbook and shall include, but not be limited to, the following issues:<br>a. Timing of deliveries of heavy equipment and building materials.<br>b. Placing temporary signing, lighting, and traffic control devices as necessary to indicate the presence of heavy vehicles and construction traffic.<br>c. Determining the need for construction work hours and arrival/departure times outside peak traffic periods.<br>d. Ensuring access for emergency vehicles to the Project site. | Less than significant after mitigation | All Tiers |

**Table 1-3: Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation**

| Impact | Level of Significance before Mitigation | Mitigation Measure(s) | Level of Significance after Mitigation | Applicable Tier |
|---|---|---|---|---|
| | | e. Any temporary closure of travel lanes or disruptions to street segments and intersections during well development.<br>f. Maintaining access to adjacent property. | | |
| Impact 4.16-2<br>Conflict with an Applicable Congestion Management Program, Including, but Not Limited to Level of Service Standards And Travel Demand Measures, or Other Standards Established by the County Congestion Management Agency for Designated Roads or Highways<br>-Metropolitan Bakersfield General Plan Level of Service "C"<br>-Kern County General Plan Level of Service "D"<br>-Caltrans Endeavors to Maintain a Target Level of Service at the Transition between Level of Service "C" and Level of Service "D" | Less than significant | Implement MM 4.16-2, as described above. | Less than significant after mitigation | All Tiers |
| Impact 4.16-3<br>Result in a Change in Air Traffic Patterns, including Either an Increase in Traffic Levels or a Change in Location that Results in Substantial Safety Risks | Potentially significant | Implement airport-related mitigation measures, as described in Section 4.8, Hazards and Hazardous Materials. | Less than significant after mitigation | All Tiers |
| Impact 4.16-4<br>Substantially Increase Hazards due to a Design Feature (e.g., Sharp Curves or Dangerous Intersections) or Incompatible Uses | Potentially significant | Implement MM 4.16-2, as described above. | Less than significant after mitigation | All Tiers |
| Impact 4.16-5<br>Result in Inadequate Emergency Access | Potentially significant | Implement MM 4.16-2, as described above. | Less than significant after mitigation | All Tiers |
| Impact 4.16-6<br>Conflict with Adopted Policies, Plans, or Programs regarding Public Transit, Bicycle, or Pedestrian Facilities, or Otherwise Decrease the Performance or Safety of Such Facilities | Potentially significant | Implement MM 4.16-2, as described above. | Less than significant after mitigation | All Tiers |

**Table 1-3: Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation**

| Impact | Level of Significance before Mitigation | Mitigation Measure(s) | Level of Significance after Mitigation | Applicable Tier |
|---|---|---|---|---|
| 4.16-7<br>Cumulative Impacts on Transportation and Traffic | Potentially significant | Implementation of MM 4.16-1 and MM 4.16-2, as described above. | Less than significant after mitigation | All Tiers |
| **Utilities and Service Systems** | | | | |
| Impact 4.17-1<br>Exceed Wastewater Treatment Requirements of the Applicable Regional Water Quality Control Board | Less than significant | Implement stormwater mitigation measures, as described in Section 4.9, Hydrology and Water Quality. | Less than significant | All Tiers |
| Impact 4.17-2<br>Require or Result in the Construction of New Water or Wastewater Treatment Facilities or Expansion of Existing Facilities, the Construction of which could cause Significant Environmental Effects | Potentially significant | **MM 4.17-1** Prior to the issuance of building permits for an operations and maintenance building, the method of sewage disposal shall be as required and approved by the Kern County Public Health Services Department. Compliance with this requirement will necessitate that the Project proponent obtain the necessary approvals for the design of the septic system from the Kern County Engineering, Surveying and Permit Services Department. The septic system disposal field shall be located a minimum of 100 feet from a classified stream or 25 feet from a non-classified stream and shall not be located where it would impact State wetlands or special-status plant species. | Less than significant | All Tiers |
| Impact 4.17-3<br>Require or Result in the Construction of New Stormwater Drainage Facilities or Expansion of Existing Facilities, the Construction of which could cause Significant Environmental Effects | Less than significant | Implement stormwater mitigation measures, as described in Section 4.9, Hydrology and Water Quality. | Less than significant | All Tiers |
| Impact 4.17-4<br>Not Have Sufficient Water Supplies Available to Serve the Project from Existing Entitlements and Resources, or New or Expanded Entitlements Would Be Needed | Potentially significant | **MM 4.17-2** Applicant shall increase the re-use of produced water, and reduce its use of municipal and industrial-quality ground or surface water use to the extent feasible. By the end of 2016, the Applicants shall review water use data submitted to Division of Oil Gas and Geothermal Resources under Senate Bill 1281 and identify the five biggest oil industry users of municipal and industrial water by volume. The five biggest oil industry users of municipal and industrial water shall work together to develop and implement a plan identifying new measures to reduce municipal and industrial water use by 2020. The plan shall address the following activities, as appropriate: steam generation; drilling and completions (including hydraulic fracturing); dust control; compaction activities related to construction; and landscaping. Through the KernFLOWS initiative or other efforts (e.g., Groundwater Sustainability Agency), the five biggest oil industry users of municipal-and-industrial water shall also work with local agricultural producers and water districts to identify new opportunities to increase the use of produced water for agricultural irrigation and other activities, as appropriate. Any produced water treated and used for agricultural irrigation or other activities shall be tested and monitored to assure compliance with applicable standards for such agricultural irrigation or other uses.<br>**MM 4.17-3** In the County's required participation for the formulation of a Groundwater Sustainability Agency, the Applicant shall work with the County to integrate into the Groundwater Sustainability Plan for the Tulare Lake-Kern Basin, best practices from the oil and gas industry to encourage the re-use of produced water from oil and gas activities, and (with appropriate treatment) to produce new water supplies for other uses such as agricultural irrigation and groundwater recharge. The produced water re-use goal is 30,000 acre-feet per year, which would offset more than the current use of imported water and groundwater from non-oil bearing zones by the oil and gas industry. | Significant and unavoidable | All Tiers |

**Table 1-3: Summary of Impacts, Mitigation Measures, and Level of Impacts after Mitigation**

| Impact | Level of Significance before Mitigation | Mitigation Measure(s) | Level of Significance after Mitigation | Applicable Tier |
|---|---|---|---|---|
| | | **MM 4.17-4** The Applicant shall work with the County on the Groundwater Sustainability Plan to increase Applicant use of reclaimed water and reduce the Applicant's use of municipal-and-industrial quality imported surface water or groundwater. | | |
| Impact 4.17-5<br>Result in a Determination by the Wastewater Treatment Provider that Serves or May Serve the Project that it has Adequate Capacity to Serve the Project's Projected Demand in Addition to the Provider's Existing Commitments | Less than significant | Implement MM 4.17-1, as described above. | Less than significant | All Tiers |
| Impact 4.17-6<br>Be Served by a Landfill with Insufficient Permitted Capacity to Accommodate the Project's Solid Waste Disposal Needs | Potentially significant | Implement MM 4.17-2 and MM 4.17-3, as described above, and the following:<br>**MM 4.17-5** During construction activities for Project facilities, the Applicant shall not store construction waste onsite for longer than the duration of the construction activity, or transport any waste to any unpermitted facilities. The Applicant shall also reduce construction waste transported to landfills by recycling solid waste construction materials, such as taking materials to recycling and reuse locations listed in the brochure on recycling construction and demolition materials available on the Kern County Waste Management Department website. | Less than significant | All Tiers |
| Impact 4.17-7<br>Fail to Comply with Federal, State, and Local Solid Waste Statutes and Regulations | Potentially significant | Implement MM 4.17-5, as described above. | Less than significant | All Tiers |
| Impact 4.17-8<br>Cumulative Impacts on Utilities and Service Systems | Potentially significant | Implement MM 4.17-1 through MM 4.17-5, as described above. | Significant and unavoidable | All Tiers |

Attachment A

# Zoning Ordinance Amendments

# DRAFT
## C H A P T E R 19.98

## OIL AND GAS ACTIVITIES

**SECTIONS:**


**19.98.010 PURPOSE AND APPLICATION**
**19.98.020 DEFINITIONS OF OIL AND GAS PRODUCTION ACTIVITES**
**19.98.030 TIER AREAS**
**19.98.040 OIL AND GAS ACTIVITIES BY MINISTERIAL PERMIT**
**19.98.050 OIL AND GAS ACTIVITIES BY CONDITIONAL USE PERMIT**
**19.98.060 IMPLEMENTATION STANDARDS AND CONDITIONS**
**19.98.070 OIL AND GAS CONFORMITY REVIEW AND APPROVAL ── REQUIRED**
**19.98.080 OIL AND GAS CONFORMITY REVIEW -- APPLICATION CONTENTS**
**19.98.090 OIL AND GAS CONFORMITY REVIEW – WITH REQUIRED SURFACE OWNER SIGNATURE**
**19.98.100 OIL AND GAS CONFORMITY REVIEW – WITHOUT REQUIRED SURFACE OWNER SIGNATURE**
**19.98.110 MINOR ACTIVITY REVIEW ── APPLICATION CONTENTS**
**19.98.120 MINOR ACTIVITY REVIEW**
**19.98.130 SELF_CERTIFICATION**
**19.98.140 INSPECTION COMPLIANCE**
**19.98.150 PLUGGED AND ABANDONED**
**19.98.160 PERMIT REVOCATION AND MODIFICATION**
**APPENDIX A - DEFINITIONS**


### 19.98.010 PURPOSE AND APPLICATION

The purpose of this chapter is to promote the economic and streamlined recovery of oil, gas, and other hydrocarbon substances in a manner compatible with surrounding land uses and protection of the public health and safety by establishing reasonable limitations, safeguards, and controls on exploration, drilling, and production of hydrocarbon resources. The procedures and standards contained in this chapter shall apply to all exploration drilling and production activities related to oil, gas, and other hydrocarbon substances carried out within the unincorporated San Joaquin Valley portion of Kern County (See Figure 19.98.015). This effective date of this version of Chapter 19.98 is MONTH, DAY, YEAR.

### 19.98.020 DEFINITIONS OF OIL AND GAS PRODUCTION ACTIVITIES

Oil and Gas exploration and operations contain many highly technical activities. For the purposes of this Chapter 19.98, definitions of activities are located in Appendix A.

### 19.98.030 TIER AREAS

The Oil and Gas Production Boundary Area is divided into five (5) Tier Areas and depicted in Figure 19.98.015. Changes to the boundries of Figure 19.98.015 shall be through the procedures in Chapter 19.112. The Tier Areas are generally, described as follows:

A. Tier 1 Area is defined as all areas in which oil and gas activity is the primary land use. The existing well and activity densities preclude almost all other uses.

B. Tier 2 Area is defined as all land that is classified with the Exclusive Agriculture (A) or Limited Agriculture (A-1) Districts and has agriculture as the primary land use not already included in Tier 1.

C. Tier 3 Area is defined as other areas not within the Tier 1 Area and in one of the following zone districts:

- Natural Resource (NR)
- Recreation Forestry (RF)
- Light Industrial (M-1)
- Medium Industrial (M-2)
- Heavy Industrial (M-3)
- Floodplain Primary (FPP)
- Drilling Island (DI)
- Zone Districts that have the Petroleum Extraction (PE) Combining District

D. Tier 4 Area is defined as areas not within Tier 3, containing at least one of the following zone districts:

- Estate (E)
- Low–Density Residential (R-1)
- Medium-Density Residential (R-2)
- High-Density Residential (R-3)
- Commercial Office (CO)
- Neighborhood Commercial (C-1)
- General Commercial (C-2)
- Highway Commercial (CH)
- Platted Lands (PL)
- Mobilehome Park (MP)

Authorized oil and gas activities in Tier 4 are subject to approval of a conditional use permit in accordance with 19.104 of this Title. The Open Space (OS) District are those areas where oil or gas exploration and production activities are prohibited, but ancillary facilities are an allowable use.

E. Tier 5 are areas including all current and future Specific Plan boundaries either adopted with a Special Planning (SP) District or which include specific provisions for oil and gas operations. Oil or gas exploration and production activities would be allowed with a conditional use permit or as permitted by the regulations contained within the adopted Specific Plan in Tier 5 areas.

F. All other areas not defined as Tier 1-5 Areas are considered Non-Jurisdictional. These areas include lands under the administration of the United States, State of California or an incorporated city. The regulations set forth in this chapter do not pertain to these areas.

**19.98.040 OIL AND GAS ACTIVITIES BY MINISTERIAL PERMIT**

A. No well for use as an injection well and no well for the exploration for or development or production of oil or gas or other hydrocarbon substances may be drilled, and no related accessory equipment, structure, or facility may be installed in Tier 1, 2, 3 and 5 Areas

until an application for Oil and Gas Conformity Review or Minor Activity Review has been submitted to and approved by the Planning Director as consistent with the standards set out in Section 19.98.060 of this chapter and in accordance with the procedures set out in Sections 19.98.070 through 19.98.120 of this chapter.

B. Disposal of nonhazardous oilfield fluid waste and production water is considered an accessory facility only if the facility complies with the following:

1. The nonhazardous oilfield fluid waste or production water is produced and disposed of within the same designated oilfield; or

2. The nonhazardous oilfield fluid waste or production water disposed of outside the designated oilfield of origin is produced by and disposed of solely and only by the same individual, corporation, or entity.

**19.98.050 OIL AND GAS ACTIVITIES BY CONDITIONAL USE PERMIT**

A. No well for use as an injection well and no well for the exploration for or development or production of oil, gas, or other hydrocarbon substances may be drilled, and no related accessory equipment, structure, or facility may be installed in any zoning district described in this title in which such uses are permitted as conditional uses until an application for a conditional use permit, which includes the information specified in Section 19.98.080, has been submitted to and approved by the Planning Commission as consistent with the standards set out in Section 19.98.060 of this chapter and in accordance with the standards and procedures set out in Sections 19.102.130 through 19.102.180 and Chapter 19.98 of this title. In approving a conditional use permit, the Planning Commission may waive any condition set out in Section 19.98.060 of this chapter if it determines that such waiver will not result in material detriment to the public welfare or the property of other persons located in the vicinity, based on findings of fact.

B. No well for use as an injection well and no well for the exploration for or development or production of oil, gas, or other hydrocarbon substances may be drilled, and no related accessory equipment, structure, or facility, outside the boundaries as defined in Figure 19.98.015, may be installed in any zoning district described in this title in which such uses are permitted until an application for a conditional use permit, which includes the information specified in Section 19.98.080, has been submitted to and approved by the Planning Commission as consistent with the standards set out in Section 19.98.060 of this chapter and in accordance with the standards and procedures set out in Sections 19.102.130 through 19.102.180 and Chapter 19.98 of this title. In approving a conditional use permit, the Planning Commission may waive any condition set out in Section 19.98.060 of this chapter if it determines that such waiver will not result in material detriment to the public welfare or the property of other persons located in the vicinity, based on findings of fact.

C. Should any activity requiring approval of an Oil and Gas Conformity Review or Minor Activity Review pursuant to Sections 19.98.070 through 19.98.120 of this chapter, not be able to comply with the Implementation Standards and Conditions set forth in Section 19.98.060, an application for a conditional use permit, which includes the information specified in Section 19.98.080, shall be submitted to and approved by the Planning Commission in accordance with the standards and procedures set out in

Sections 19.102.130 through 19.102.180 and Chapter 19.98 of this title. In approving a conditional use permit, the Planning Commission may waive/modify any condition set out in Section 19.98.060 of this chapter if it determines that such waiver or modification will not result in material detriment to the public welfare or the property of other persons located in the vicinity, based on findings of fact.

D. If a producing well or service well is not completed upon land subject to a conditional use permit issued pursuant to this chapter and Chapter 19.104 of this title within twelve (12) months from the date of issuance of the permit, or within any extended period thereof, the conditional use permit shall expire and the premises shall be restored as nearly as practicable to their original condition. No permit shall expire while the permittee is continuously conducting drilling, redrilling, completing or abandoning activities, or related operations, in a well on the lands covered by such permit, which activities were commenced while said permit was otherwise in effect. Continuous activites are those suspended not more than thirty (30) consecutive days. If, at the expiration of the twelve- (12-) month period, the permittee has not completed his drilling program on the lands covered by such permit, the decision making authority, upon a written request of the permittee, may extend the permit for the additional time requested by permittee for the completion of such drilling program, in accordance with the standards and procedures set out in Sections 19.102.130 through 19.102.180.

**19.98.060 IMPLEMENTATION STANDARDS AND CONDITIONS**

Pursuant to this chapter, all activities for the exploration for or development or production of oil, gas, and other hydrocarbon substances and related facilities and activities shall comply with the following standards, unless otherwise provided in this chapter:

A. No oil or gas well shall be drilled within:

1. One hundred (100) feet of any public highway or building not necessary to the operation of the well;
2. One hundred and ninety (190) feet of any dwelling unit (single or multifamily);
3. Three hundred (300) feet of any building used as a place of public assembly, institution, or school; or
4. One hundred (100) feet of any building utilized for commercial purposes, not used for oil and gas operations.

B. All drilling and production activities shall conform to all applicable fire and safety regulations. Firefighting apparatus and supplies required by the Kern County Fire Department shall be maintained on the site at all times during drilling and production operations.

C. All required federal, State, and County rules and regulations shall be complied with at all times, including, but not limited to, the rules and regulations of the following agencies:

1. California Division of Oil and Gas (DOGGR)
2. Kern County Fire Department
3. Kern County Public Health Department
4. Regional Water Quality Control Board
5. San Joaquin Valley Air Pollution Control District
6. Kern County Public Works Department

D. The applicant shall demonstrate compliance with all applicable Mitigation Measures as listed in the approved Mitigation Monitoring and Reporting Program (MMRP) for the Revisions to the Zoning Ordinance (C) - 2015.

**19.98.070 OIL AND GAS CONFORMITY REVIEW AND APPROVAL ── REQUIRED**

Except as provided in this section, no permitted use shall be established, no permitted development shall occur, and no building permit or grading permit shall be issued for any permitted use or development subject to this chapter until an Oil and Gas Conformity Review or Minor Activities Review has been submitted to and approved by the Planning Director in accordance with the procedures set out in Sections 19.102.040 through 19.102.060 of this title.

| Activity | Conformity Review | Minor Activity Review | No Permit Required |
|---|---|---|---|
| **Drilling & Completion** | | | |
| Production Well ( including cyclic steam production well) | ✓ | | |
| Reworked Well | ✓ | | |
| Injection Well | ✓ | | |
| Temperature Observation Well | ✓ | | |
| SB4-Regulated Activities | ✓ | | |
| Drilling Pit or Sump | ✓ | | |
| Sidetrack | ✓ | | |
| Deepening | ✓ | | |
| **Exploration and Development** | | | |
| Geophysical Survey or Drilling by Scientific Means | ✓ | ✓ | |
| Well Pad Preparation | ✓ | ✓ | |
| Access Road Construction | ✓ | ✓ | |
| Electric Distribution Line | ✓ | ✓ | |
| Pipeline | ✓ | ✓ | |

| Activity | Conformity Review | Minor Activity Review | No Permit Required |
|---|---|---|---|
| **Production Operations** | | | |
| Steamflood | ✓ | | |
| Waterflood | ✓ | | |
| Gas Injection | ✓ | | |
| Chemical EOR | ✓ | | |
| Well Workover | | | ✓ |
| Geophysical Monitoring | | | ✓ |
| Oil/Gas Treatment | | ✓ | |
| Produced Water Treatment | | ✓ | |
| Well Maintenance | | ✓ | |
| Well Testing | | | ✓ |
| Pipeline | ✓ | ✓ | |
| Pipelines (Oil, Produced Water, Waste Gas) | ✓ | ✓ | |
| Electric Lines | ✓ | ✓ | |
| Wastewater Treatment and Injection Disposal | ✓ | ✓ | |
| Wastewater Treatment and Surface Disposal | ✓ | ✓ | |
| Waste Treatment and Disposal | ✓ | ✓ | |
| Access Road | ✓ | ✓ | |
| Vegetation | | | ✓ |
| Reactivation of Idle Wells | ✓ | | |
| **Support Facilities** | | | |
| Administrative Building | ✓ | ✓ | |

| Activity | Conformity Review | Minor Activity Review | No Permit Required |
|---|---|---|---|
| Steam Generator | ✓ | ✓ | |
| Flare | ✓ | ✓ | |
| Electric Lines | ✓ | ✓ | |
| Electric Substations | ✓ | ✓ | |
| Export Pipelines | ✓ | ✓ | |
| Tanks | ✓ | ✓ | |
| Oil/Water Treatment | ✓ | ✓ | |
| Produced Water Treatment | ✓ | ✓ | |
| Production Sump | ✓ | ✓ | |
| Produced Water Percolation Pond/Sump | ✓ | ✓ | |
| Emergency Pit, Sump or Secondary Containment | ✓ | ✓ | |
| Fencing | | | ✓ |
| Well Abandonment | | | ✓ |
| Revegetation | | | ✓ |
| Short Term Employee Housing | ✓ | ✓ | |
| Pre-Ordinance Activities that Cause New Ground Disturbance and/or Subject to the Emission Reduction Agreement | ✓ | ✓ | |
| Note: All activities denoted with a check mark in multiple columns, above, are subject to Oil and Gas Conformity Review only when in conjunction with another activity subject to only Oil and Gas Conformity Review; otherwise are only subject to Minor Activity Review. These activities shall be considered incidental to the Oil and Gas conformity Review for fee purposes. | | | |

**19.98.080 OIL AND GAS CONFORMITY REVIEW — APPLICATION CONTENTS**

Applications for an Oil and Gas Conformity Review within Tiers 1-3 or Tier 5 Areas, pursuant to Section 19.98.040 of this chapter, or a conditional use permit, for oil and gas activities within a Tier 4 Area, pursuant to Section 19.98.050 of this chapter, shall include the following:

A. Name, telephone number and address of the applicant.

B. Name(s), telephone number(s) and address(es) of the property owner(s), mineral owner(s), oil and gas operator (if different than the applicant).

C. Assessor's parcel number(s) of all parcels located within the boundaries of the proposed operation, including accessory equipment, structures, and/or facilities. Latitude/Longitude coordinates for all existing and proposed wells.

D. Preliminary Title Report, not over ninety (90) days old.

E. Legal description of the project area located within the boundaries of the proposed operation, including accessory equipment, structures, and/or facilities in aliquot format, unless a more precise legal description is determined to be needed by the Planning Director.

F. A site plan drawn to scale no larger than 11x17, which includes the following information: All information required in Tier 2, 3, 4 and 5. Tier 1 information to be determined based on density of pre-ordinance oilfield development, as determined by the Director.

1. Topography and proposed grading of the site plan.

2. Project boundary lines and dimensions, including lease lines and property lines.

3. Location and coordinates of all proposed well holes and related accessory equipment. Location of all roadways, pipelines, tanks, treatment or other structures and facilities to be installed, and any existing or abandoned wells if such are known to exist .

4. Location of all existing dwellings and structures, located within three thousand (3000) feet of the proposed well holes, identification of the use of each structure, and distances between well holes and existing buildings. Location of existing property lines and distance from well site to property line.

5. Location of all new flare gas production lines, lines for production, electrical lines, and location of tank farms to be used.

6. North arrow, date the site plan was prepared, and scale.

7. Location of all recorded easements onsite, roads, section/midsection lines, located within ½ mile of the proposed wells.

8. Location of all accessory/ancillary facilities (including trucking parking, onsite storage, etc.) to be installed with the proposed wells.

9. Description of parcel in relation to Tier areas as indicated in Figure 19.98.015.

10. DOGGR permit application number, if available.

11. Identify the 100-year floodplain.

12. Identify the proposed source of water (domestic or production), if applicable.

13. Show location of all proposed underground pipelines. Identify if pipelines connect to a Gas Distribution System.

14. Location of any existing Oil and Gas Conformity Review boundaries within and/or contiguous to the proposed boundary.

G. Signature Block and Statement (Land/Surface Owner, Mineral Owner and Operator.
The following statement shall be included to the first page of the site plan. In Tier 1 Areas it shall be signed by both the Mineral Owner and the Operator. In Tier 2, 3, 4 and 5 Areas it shall be signed by all parties, irrespective of ownership relationship. Multiple lines may be added for multiple ownership signatures. A dated letter of authorization, with specific Assessor Parcel Numbers, from the Land/Surface Owner addressed to the County of Kern may be submitted asking that the signature on the site plan be waived.

REQUIRED STATEMENT

The undersigned Land/Surface Owner is the owner of APN#_____. The undersigned is the Mineral Owner and/or Operator or Lessee of the Mineral Owner. The Land/Surface Owner and the Mineral Owner and/or the Operator or Lessee have come to an agreement regarding the use of the surface of the property in connection with the Kern County permit that is being issued with this site plan.

| Land/Surface Owner: | Mineral Owner: | Operator: |
|---|---|---|
| _____ | _____ | _____ |
| Print Name | Print Name | Print Name |
| _____ | _____ | _____ |
| Title/Company | Title/Company | Title/Company |
| _____ | _____ | _____ |
| Signature | Signature | Signature |
| _____ | _____ | _____ |
| Date | Date | Date |

H. Notification Requirements - Tier 1, 2, 3, 4 and 5 Areas.

1. A physical letter of notification of application that requires a signature for delivery shall be sent by the applicant to all Land/Surface Owners of the property for which the Conformity Review is being requested, if the Land/Surface Owners are different from the mineral owners providing the notice required by State law and including an official County handout explaining the conformity review process. The package shall be sent 30 days before submittal of the application. The application shall include evidence that the letter was sent and the signatures received. Any letter returned or failure to obtain a signature shall provide evidence that the Land/Surface Owner of the property cannot be located through normal means such as tax records. A dated letter of authorization, with specific Assessor Parcel Numbers, from the Land/Surface Owner addressed to the County of Kern may be submitted asking that the notification be waived as allowed by State law.

2. Within a Tier 1 Area only, a second letter shall be sent, by the applicant, when the application is submitted to the County. A dated letter of authorization, with specific Assessor Parcel Numbers, from the Land/Surface Owner, addressed to the County of Kern, may be submitted asking that the notification of application submitted be waived.

**19.98.090 OIL AND GAS CONFORMITY REVIEW – WITH REQUIRED SURFACE OWNER SIGNATURE**

A. An applicant for a ministerial permit pursuant to this chapter shall submit an application to the Planning Director in the format and number of copies specified by the Planning Director. The application shall contain all the information specified for the application by the applicable section of this chapter. The application shall be accompanied by the fee established by the Board of Supervisors pursuant to Section 19.06.040 of this Title. For Tier 2, 3 and 5 Areas, a copy of the application shall be provided to the Land/Surface owner per the requirements of 19.98.080.F above. The application must contain the signature block and statement pursuant to Section 19.98.080.F, or shall contain a letter from the Land/Surface Owner waiving the need for said signature on the specified parcel of the proposed application. The waiver letter must be dated and provide specific language as to the length of time the letter is valid if to be used for future Oil and Gas Conformity Reviews.

B. The Planning Director shall make reasonable efforts to inform the applicant in writing within seven (7) business days of receipt that the application is complete and shall issue the permit if he/she determines that the proposed use meets the implementation standards and conditions specified in the applicable provisions of this chapter or inform the applicant that additional information is needed to complete the application.

C. Within three (3) business days of reviewing the second submittal, if required, to correct any deficiencies, the Planning Director shall make reasonable efforts to issue the permit if he/she determines that the proposed use meets the implementation standards and conditions specified in the applicable provisions of this chapter or inform the applicant that additional information is needed to complete the application.

D. Within seven (7) business days of reviewing the third submittal to correct any deficiencies, the Planning Director shall make reasonable efforts to issue the permit if he/she determines that the proposed use meets the implementation standards and conditions specified in the applicable provisions of chapter. If additional information is needed, a mandatory in person meeting with the applicant, and any consultant processing the application will be required to resolve the issues preventing issuance of the permit. The in-person meeting cannot be waived.

E. Any reviews beyond three (3) shall require additional fees to be paid, as set forth pursuant to Section 19.06.040 of this Title, and shall be conducted within thirty (30) days.

F. Prior to conducting any drilling activity the operator must have received and have on file both the approved Permit to Conduct Well Operations from DOGGR and an approved Oil and Gas Conformity Review unless the activity involves facility placement not subject to DOGGR permit approval.

G. Upon issuance of this permit, the County shall send a notification to the applicable responsible agencies stating a permit has been issued by the County and that the agency has certain requirements under the California Environmental Quality Act as a responsible agency.

## 19.98.100 OIL AND GAS CONFORMITY REVIEW - WITHOUT REQUIRED SURFACE OWNER SIGNATURE

The provisions contained in this section apply only to applications submitted within Tier 2, 3 and 5 Areas, which do not contain the surface owner signature as required by Section 19.98.070, above:

A. An applicant for a ministerial permit pursuant to this chapter shall submit an application to the Planning Director in the format and number of copies specified by the Planning Director. The application shall contain all the information specified for the application by the applicable provisions of this chapter. A copy of the application shall be provided to the Land/Surface Owner per the requirements of Section 19.98.080.F above. The application shall be accompanied by the fee established by the Board of Supervisors pursuant to Section 19.06.040 of this Title.

B. The Planning Director shall make reasonable efforts to inform the applicant in writing within thirty (30) calendar days of receipt that the application is complete or that additional information is needed to complete the application. No sooner than thirty (30) calendar days from issuance of the Kern County Oil and Gas Conformity Review and any other necessary state or federal permits, the applicant may begin construction of the facility. The Planning and Community Development Department shall notify the Surface/Land Owner that the permit has been issued.

C. Within thirty (30) calendar days of reviewing the second submittal, if required, to correct any deficiencies, the Planning Director shall make reasonable efforts to issue the permit if he/she determines that the proposed use meets the implementation standards and conditions specified in the applicable provisions of this chapter or inform the applicant that additional information is needed to complete the application.

D. Within thirty (30) calendar days of reviewing the third submittal, if required, to correct any deficiencies, the Planning Director shall make reasonable efforts to issue the permit if he/she determines that the proposed use meets the development standards and conditions specified in the applicable provisions of this chapter or inform the applicant that additional information is needed to complete the application. If additional information is needed, a mandatory in-person meeting with the applicant, and any consultant processing the application will be required to resolve the issues preventing issuance of the permit. The in-person meeting cannot be waived.

E. At any time during the review periods in Sections 19.98.100.A or B the applicant submits proof of the required surface owner signature on the site plan, the application will be deemed acceptable to be processed under the provisions set forth in Section 19.98.090.

F. Prior to conducting any drilling activity the operator must have received and have on file both the approved Permit to Conduct Well Operations, from DOGGR and an approved Oil and Gas Conformity Review unless the activity involves facility placement not subject to DOGGR permit approval.

G. Upon issuance of this permit, the County shall send a notification to the applicable responsible agencies stating a permit has been issued by the County and that the agency has certain requirements under the California Environmental Quality Act as a responsible agency.

**19.98.110 MINOR ACTIVITY REVIEW — APPLICATION CONTENTS**

An application for Minor Activity Review for Tier 1-3 and 5 Areas, pursuant to Section 19.98.040 of this chapter, shall include the following:

A. Name, telephone number and address of the applicant.

B. Name(s), telephone number(s) and address(es) of the property owner(s), mineral owner(s), oil and gas operator (if different than the applicant).

C. Assessor's parcel number(s) of all parcels located within the boundaries of the proposed operation, including accessory equipment, structures, and/or facilities. Latitude/Longitude coordinates for all wells.

D. Preliminary Title Report, not over ninety (90) days old.

E. Description of proposed oil and gas activity and documentation of compliance with applicable Mitigation Measures (see incorporated Mitigation Monitoring and Reporting Program).

F. Sufficient number of photographs to identify the extent of existing ground disturbance.

G. For Tier 2, 3 and 5 Areas only, documentation of letter submitted to the Land/Surface Owner(s), if different, informing the owner of the Minor Activity Review application, mailed and received a minimum of thirty (30) days prior to application being submitted to the County for review.

**19.98.120 MINOR ACTIVITY REVIEW**

A. An applicant for a ministerial permit pursuant to this chapter shall submit an application to the Planning Director in the format and number of copies specified by the Planning Director. The application shall contain all the information specified for the application by the applicable section of this chapter. The application shall be accompanied by the fee established by the Board of Supervisors pursuant to Section 19.06.040 of this Title. For Tier 2, 3 and 5 Areas, a copy of the application shall be provided to the Land/Surface Owner per the requirements of Section 19.98.080.F above.

B. The Planning Director shall make reasonable efforts to inform the applicant in writing within seven (7) business days of receipt that the application is complete and shall issue the permit if he/she determines that the proposed use meets the development standards and conditions specified in the applicable provisions of this chapter or inform the applicant that additional information is needed to complete the application.

C. Within three (3) business days of reviewing the second submittal, if required, to correct any deficiencies, the Planning Director shall make reasonable efforts to issue the permit if he/she determines that the proposed use meets the development standards and conditions specified in the applicable provisions of this chapter or inform the applicant that additional information is needed to complete the application.

D. Within seven (7) business days of reviewing the third submittal, if required, to correct any deficiencies, the Planning Director shall make reasonable efforts to issue the permit if he/she

determines that the proposed use meets the development standards and conditions specified in the applicable provisions of Title. If additional information is needed, a mandatory in-person meeting with the applicant, and any consultant processing the application will be required to resolve the issues preventing issuance of the permit. The in-person meeting cannot be waived.

E. Any reviews beyond three shall require additional fees be paid, as set forth pursuant to Section 19.06.040 of this Title, and shall be conducted within thirty (30) days.

F. Prior to conducting any activity the operator must have received and have on file both approved applicable DOGGR permit(s), if necessary, and an approved Minor Activity Review pursuant to the chapter.

G. Upon issuance of this permit, the County shall send a notification to the applicable responsible agencies stating a permit has been issued by the County and that the agency has certain requirements under the California Environmental Quality Act as a responsible agency.

**19.98.130 SELF-CERTIFICATION**

Upon issuance of Oil and Gas Conformity Review or Minor Activity Review, as specified in Sections 19.98.090 and 19.98.120 of this chapter, and any other necessary state or Federal permits, the applicant may begin construction of the facility. The provisions of this section do not apply to issuance of an Oil and Gas Conformity Review pursuant to 19.98.100 of this chapter. The applicant must self-certify compliance with Chapter 19.98 during the construction and operation process. Once the project applicant has completed the construction of the oil and gas facilities, as indicated on the approved site plan, the project applicant will provide a self-certified statement, in writing, to the County, in a format specified by the Director.

During construction and continued operations of the activities specified by the approved site plan, the applicant will be responsible for complying with the issued Oil and Gas Conformity Review, and all applicable implementation standards as outlined in this chapter. Should a violation of a permit issued under this chapter occur on-site, a Certification and Finalization process for the Oil and Gas Conformity Review will be conducted by the County Oil and Gas Inspector, and self-certification for the permit will no longer be permitted for the applicant for the next issued permit, as a probationary period. Once the applicant has demonstrated compliance on the following permit, any subsequent permit may be self-certified.

**19.98.140 INSPECTION COMPLIANCE**

Upon receipt of an issued permit pursuant to Section 19.98.100, the applicant must contact the Planning and Community Development Department and the Public Works Department to schedule an inspector to be present during all activities related to the Oil and Gas Conformity Review. During construction and continued operations of the activities specified by the approved site plan, the applicant will be responsible for complying with the issued Oil and Gas Conformity Review, and all applicable standards and conditions as outlined in the permit.

**19.98.150 PLUGGED AND ABANDONED**

Any permit issued pursuant to this chapter must plug and abandon all wells per the following procedures:

A. The applicant shall plug and abandon all facilities in accordance with DOGGR.

B. Within thirty (30) days from completion of the plugged and abandoned procedures for any well constructed after the amendment of this Chapter 19.98, the applicant shall submit to

the Planning and Community Development Department a letter stating which facilities have been abandoned, including the unique well identification number for each well.

**19.98.160 PERMIT REVOCATION AND MODIFICATION**

Any permit issued pursuant to this chapter may be revoked or modified pursuant to Section 19.102.020 of this Title.

# OTHER SECTIONS OF THE ZONING ORDINANCE NEEDED REVISIONS (Revisions in Underline and ~~Strikethrough~~)

## C H A P T E R 19.48

## DRILLING ISLAND (DI) DISTRICT

**19.48.080 HEIGHT LIMITS**

Height limits in the DI District are as follows:

A. None on derricks and other equipment used during the exploration and drilling phase of development.

B. Pumping units shall not exceed ~~thirty-five (35)~~ eighty (80) feet in height.

**19.48.130 SPECIAL REVIEW PROCEDURES AND DEVELOPMENT STANDARDS**

A. All drilling and other hydrocarbon development activity in the DI District shall be carried out in accordance with the standards and procedures set out in Section 19.98.~~050~~060 of this title. All activities subject to an Oil and Gas Conformity Review or Minor Activity Review shall comply with the provisions of Section 19.98.060 of the title.

B. Development in the DI District shall comply with the interpretations and provisions of Chapter 19.08 of this title.

## CHAPTER 19.81

## OUTDOOR LIGHTING

## "DARK SKIES ORDINANCE"

**19.81.050 EXEMPTIONS**

The following are permanently exempt from the provisions of this chapter:

1. Outdoor lighting specifically approved in conjunction with a discretionary permit.

2. Federal and State Facilities: Outdoor light fixtures on, in, or in connection with facilities and land owned or operated by the government of the United States of America or the State of California; however, these agencies are encouraged to comply with the provisions of this ordinance.

3. Airports and Other Lighting Required by the Federal Aviation Administration: Outdoor lighting for public and private airports and any other uses that are regulated by the Federal Aviation Administration.

4. Correctional Institutions: Outdoor lighting for federal, State, and County-owned or operated correctional institutions; however, voluntary compliance with the intent and provisions of this chapter is encouraged.

5. Emergency Light: Temporary emergency lighting needed by the sheriff's department, police department, fire department, public utility, rescue operation or in conjunction with any other emergency service.

6. Temporary Construction: All temporary lighting used for the construction or repair of roadways, utilities, and other public infrastructure.

7. Internally Illuminated Signs: All internally illuminated signs, including those used for on-site and off-site advertising purposes. Such signs are regulated by the provisions of Chapter 19.84 (Signs) of the Kern County Zoning Ordinance.

8. Neon, Argon, or Krypton: All fixtures illuminated solely by neon, argon, or krypton.

9. United States Flag and State of California Flag: Lighting used to illuminate a properly displayed United States Flag and/or the State of California Flag.

10. Lighting Required by Building Codes or other Regulations: Communication towers, exit signs, lighting for stairs/ramps, lighting for points of ingress/egress to buildings, and all other illumination required by air navigation safety provisions, building codes, OSHA standards, and other permitting requirements from State or federal agencies.

11. Fossil Fuel Light: All outdoor light fixtures producing light directly by the combustion of fossil fuels (such as kerosene lanterns, gas lamps, etc.)

12. Street Lighting: Lighting equipment within a public or private right-of-way or easement for the principal purpose of illuminating streets, roadways, and/or other areas open to transport by vehicle or pedestrian traffic.

13. Seasonal Displays: Displays using multiple low wattage bulbs or lasers, provided that they do not constitute a fire hazard, create a nuisance, and are maintained in a safe condition. Such displays shall not be illuminated for more than forty-five (45) days per calendar year.

14. Water Features: Lighting in swimming pools and other water features governed by Article 680 of the National Electrical Code.

~~15. Oil and Gas Exploration and Production: Outdoor lighting in association with oil and gas exploration and production operations and related facilities shall be exempt from this chapter and are regulated by the provisions of Chapter 19.98 of the Kern County Zoning Ordinance.~~

~~16.~~ 15. Temporary Event Lighting: Temporary lighting for special events that does not conform to this chapter shall be reviewed as part of an application for a Temporary Event Permit (TEP), pursuant to Chapter 19.08.340 of the Kern County Zoning Ordinance. Any temporary lighting exemption approved via the TEP process shall be utilized for a period of time that exceeds a combined total of twelve (12) combined days on any one (1) parcel during a calendar year. Exemptions are renewable for a period of not more than twelve (12) additional combined days. Requests for renewal of a temporary exemption shall be processed in the same manner as the original request. No outdoor light fixtures shall be exempted from this chapter for more than twenty-four (24) days combined during a calendar year.

~~17.~~ 16. Steeples: Lighting used to illumination the tall ornamental tower that forms the superstructure of a church, temple, office building, etc., shall be exempt from this chapter.

~~18.~~ 17. Temporary Agricultural Activities: Lighting used to illuminate temporary agricultural activities such as harvesting on property zoned A (Exclusive Agriculture) or A-1 (Limited Agriculture) and lasting no more than twelve (12) consecutive days and no more than twenty four (24) combined days on any one parcel during a calendar year.

## C H A P T E R 19.50

## FLOODPLAIN PRIMARY (FPP) DISTRICT

### 19.50.130 SPECIAL REVIEW PROCEDURES AND DEVELOPMENT STANDARDS

A. All development within the FPP District is subject to the requirements of the Flood Damage Prevention Ordinance, Chapter 17.48 of this code.

B. Development in the FPP District shall comply with the interpretations and provisions of Chapter 19.08 of this title.

C. Oil or gas exploration and production shall comply with Section 19.98.~~050~~060 and the following standards:

1. The following uses are permitted within the FPP District if they will not obstruct flows, will not cause peripheral flooding of other properties, will not cause any increase in flood levels during the occurrence of the base flood discharge, will be

resistant to floatation and immune to extensive damage by flooding, and will not endanger life or property:

(a) All oil or gas wells, including pumps and all other associated equipment.

(b) Feasible remedial work, improvements, and flood-proofing of facilities.

2. No oil or gas well shall be drilled on the slope or within ten (10) feet of the top or toe of the bank of a river or stream located within the FPP District. The required setback on the top of bank shall be measured from an imaginary plane on a slope two (2) horizontal to one (1) vertical projected upward from the toe of the existing bank.

3. All oil or gas wells in the FPP District, including pumps and all other associated equipment, shall be designed such that they are resistant to damage by flooding.

4. All pipelines in the FPP District shall be flood-proofed by burial to sufficient depth to prevent rupture during flood conditions or by suspension at least two (2) feet above the surface of the base flood. Supports for elevated pipelines shall also carry a catwalk to facilitate removal of debris caught by supports during floods.

5. The location of all buried pipelines shall be recorded on appropriate maps by the company that owns said pipelines, and the maps shall be made available to any public agency that shall request a copy.

6. All drilling, redrilling, and producing, including remedial work, well pulling, work-overs, and deepening, shall conform to all applicable fire, safety, spacing, and environmental State law and regulations.

7. Proven technological improvements generally accepted and used in drilling and production methods shall be adopted as they may from time to time become available, if capable of reducing factors of nuisance and annoyance.

8. Prior to the commencement of any drilling, a copy of a Spill Prevention Control and Countermeasure Plan, as required by the United States Environmental Protection Agency, shall be filed with the Kern County ~~Engineering and Survey Services~~ Public Works Department.

9. All pumps expected to be inaccessible during times of flood shall be equipped with an accessible remote switch to shut off the pumps during emergencies.

10. The derrick, all boilers, and all other drilling equipment used pursuant to this chapter to drill any well hole or to repair, clean out, deepen, or redrill any completed or drilling well shall be removed within ninety (90) days after completion of production tests following completion of such drilling, or after abandonment of any well, unless such derrick, boilers, and drilling equipment are to be used within a reasonable time limit, determined by the Kern County

~~Engineering and Survey Services~~ Public Works Department, for the drilling of another well or wells on the premises.

11. After any well has been placed in production, no earthen sumps shall be used for the storage of petroleum or gas.

12. Within ninety (90) days after any well has been placed in production or after its abandonment, earthen sumps used in drilling or production or both shall be emptied by vacuum truck or other approved means, then filled, and the drilling site restored as nearly as practicable to a uniform grade, unless such sumps are to be used within a reasonable time limit, as determined by the Kern County ~~Engineering and Survey Services~~ Public Works Department.

13. Any derrick used for servicing operations shall be of the portable type; provided, however, that upon presentation of proof that the well is of such depth or has such other characteristics, or for other cause, that a portable-type derrick will not properly service such well, the Kern County ~~Engineering and Survey Services~~ Public Works Department may approve the use of a standard type of derrick.

14. Directional and warning signs, and those required for identification of the well, shall be constructed, erected, placed, or maintained on the premises, except those required by law to be displayed in connection with the drilling or maintenance of the well.

15. If a producing or service well is not secured twelve (12) months from the date of commencement of drilling operations or any extended period granted by the Kern County ~~Engineering and Survey Services~~ Public Works Department, the premises shall be restored to the original condition as nearly as practicable to do so. If at the expiration of the twelve- (12-) month period, the drilling program has not been completed, the Kern County ~~Engineering and Survey Services~~ Public Works Department may, upon a written request, grant an additional period of time as requested for the completion of such drilling program.

## C H A P T E R 19.66

## PETROLEUM EXTRACTION (PE) COMBINING DISTRICT

### 19.66.080 HEIGHT LIMITS

Height limit requirements in a PE District are as follows:

A. No height limit on derricks and other equipment used during the exploration and drilling phase of development.

B. Pumping units shall not exceed ~~thirty-five (35)~~ eighty (80) feet in height.

C. All other uses permitted by the base district shall conform to the height limits of the base district with which the PE District is combined.

### 19.66.130 SPECIAL REVIEW PROCEDURES AND DEVELOPMENT STANDARDS

All drilling and hydrocarbon development activities in a PE District shall be carried out in accordance with the standards and procedures set out in Section 19.98.~~050~~060 of this title. All activities subject to an Oil and Gas Conformity Review or Minor Activity Review shall comply with the provisions of Section 19.98.060 of the title.

## C H A P T E R 19.102

## PERMIT PROCEDURES
## ARTICLE II. MINISTERIAL PERMITS ISSUED BY THE PLANNING DIRECTOR

### 19.102.040 GENERAL REQUIREMENTS — PERMIT TYPES

The ministerial permits specified in this title for review pursuant to this article shall be issued by the Planning Director upon submission of an application containing the information specified in applicable sections of this title and a determination by the Planning Director that the proposed use or development meets the development standards and conditions specified in the applicable section or sections of this title. These permits include:

A. CRV recycling center permit (Section 19.08.480)

B. Temporary animal permit plot plan review (Sections 19.14.130 and 19.60.130 through 19.60.160)

C. Extensions for temporary mobilehomes and recreational vehicles (Sections 19.16.130 and 19.18.160)

D. Mobilehome park plot plan review (Sections 19.26.130 through 19.26.190)

E. Minor plan modifications (Section 19.52.130 through 19.52.180, 19.56.130 through 19.52.180, 19.56.130 through 19.56.200, 19.58.130 through 19.58.180, and 19.100.050

F. Commercial wind farm plot plan review (Section 19.64.130 through 19.64.150)

G. Geologic hazard plot plan review (Section 19.68.130 through 19.68.150)

H. Special development standards plot plan review (Sections 19.80.040 through 19.80.070)

I. Off-street parking plot plan review not in conjunction with a ministerial permit (Sections 19.82.100 through 19.82.130)

J. Landscaping plot plan review not in conjunction with a ministerial permit (Sections 19.86.070 through 19.86.100)

K. Density bonus permit (Sections 19.92.030 through 19.92.060)

L. Home occupation permit (Sections 19.94.050 through 19.94.080)

M. Production water injection wells for the purpose of disposing of production wastewater produced in the same oilfield in which the injection well is located (Section 19.98.030)

N. ~~Oil and gas plot plan review (Section 19.98.030)~~ Oil and Gas Conformity Review and Minor Activity Review (Section 19.98.070 through 19.98.120)

O. Large family day-care permit - no hearing (Sections 19.96.030 through 19.96.060)

P. Temporary batch plant (thirty (30) days or less) plot plan review (Section 19.08.290)

Q. Secondary residential unit plot plan review (Section 19.90.040 through 19.90.060)

R. Truck parking as accessory to residential use permit (Section 19.08.252)

## C H A P T E R 19.108

## NONCONFORMING USES, STRUCTURES, AND LOTS

### 19.108.040 NONCONFORMING USES OF LAND

A. A nonconforming use of land shall not be expanded, extended, or intensified in any way with respect to scope, duration, or frequency of the use, except as follows:

The Planning Commission may authorize the expansion or intensification of legal, nonconforming uses if, after consideration at a public hearing noticed pursuant to Section 19.102.150, both of the following findings can be made:

1. The proposed expansion will not create any significant adverse impacts to surrounding properties.

2. The only other remedy to bring the use into conformance would require an amendment to the applicable General Plan.

Public hearing notification shall consist of mailing notices to property owners having property within three hundred (300) feet from the exterior boundaries of the subject property. Published notice in a local newspaper shall not be required, unless the Planning Director determines that such additional notice is warranted. In consideration of a

request to expand or intensify a legal, nonconforming use, the terms and conditions for any approval shall be as specified in Section 19.104.050.

B. A nonconforming use of land shall not be changed to or replaced by any other use except a use that complies with the regulations of the zoning district in which the subject property lies.

C. Any nonconforming use of land that has been discontinued or abandoned for a period of one (1) year or more shall not be reestablished. In instances where the assessed value of improvements on the property exceeds fifty thousand dollars ($50,000), as determined by the County Assessor, the nonconforming use shall not be reestablished if the use has been discontinued or abandoned for a period of two (2) years or more.

D. The exploration for or development or production of oil, gas, or other hydrocarbon substances ~~shall not be considered nonconforming uses of land~~ lawfully constructed prior to MONTH, DAY, YEAR shall be considered nonconforming uses of land. Any subsequent alteration or expansion of these facilities is subject to Chapter 19.98 of this Title.

E. A legal nonconforming dwelling in any zone district may be replaced with the approval of the Planning Director, provided that all applicable requirements of this title, other than density or conditional use permit requirements, can be satisfied.

F. Any use of land continuously in existence for a period of twenty (20) years or more may qualify as a legal, nonconforming use pursuant to Section 19.108.080, irrespective of when zoning requirements became effective for that property, provided that the Planning Director determines that the use is not significantly incompatible with surrounding land uses and that there is no significant threat to the public health, safety, and welfare in allowing the use to continue.

## C H A P T E R 19.08

## INTERPRETATIONS AND GENERAL STANDARDS

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~~**19.08.230 PRIVATE OIL PIPELINES AND RELATED FACILITIES — COUNTY REVIEW**~~

~~The provisions of this title shall not be construed to apply to the construction, installation, operation, and maintenance of pipelines for the transmission of crude oil or natural gas operated by private enterprises; provided, however, before any right-of-way for transmission lines is acquired for regional or interstate facilities, the proposed route shall be submitted for the Planning Director review and recommendation.~~

~~**19.08.260 OIL AND GAS EXPLORATION BY SCIENTIFIC MEANS**~~

~~The provisions of this title shall not be construed to apply to the exploration for oil and gas by scientific means.~~

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## C H A P T E R 19.26

## MOBILEHOME PARK (MP) DISTRICT

### 19.26.030 USES PERMITTED WITH A CONDITIONAL USE PERMIT

The following uses are permitted in the MP District with a conditional use permit:

A. RECREATION, ENTERTAINMENT, AND TOURIST FACILITIES

— Recreational vehicle park, except as permitted by Subsection 19.26.020.B

B. MISCELLANEOUS USES

— Drainage sump
— Water system, large

— Water treatment plant

C. RESOURCE EXTRACTION AND ENERGY DEVELOPMENT USES

— Oil or gas exploration and production pursuant to Chapter 19.98 of this title

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Chapter 2

# Introduction

# Chapter 2
# Introduction

## 2.1 Intent of California Environmental Quality Act

The Kern County Planning and Community Development Department (KCPCDD), as Lead Agency, has determined that an Environmental Impact Report (EIR) is the appropriate environmental analysis document, pursuant to the California Environmental Quality Act (CEQA), for the proposed Amendment to Title 19 – Kern County Zoning Ordinance, focused on Chapter 19.98 (Oil and Gas Production) of the Kern County Zoning Ordinance for Oil and Gas Local Permitting, and related provisions of the Kern County Zoning Ordinance ("Project" or "proposed Project"), as described in detail in Section 3.1.1 (see Chapter 3, Project Description). This EIR has been prepared in accordance with requirements of the following documents:

- CEQA (California Public Resources Code [PRC] Section 21000 et seq.);
- State CEQA Guidelines, Title 14, California Code of Regulations (CCR), Chapter 3, Section 15000 et seq.; and
- Kern County CEQA Implementation Document.

The overall purposes of the CEQA process are as follows:

- Inform governmental decision makers and the public about the potential significant effects, if any, of proposed activities;
- Provide opportunities for other agencies and the public to review and comment on draft environmental documents;
- Ensure that the environment and public health and safety are protected in the face of discretionary projects initiated by public agencies or private concerns;
- Identify the significant effects to the environment of a project, identify alternatives, and indicate the manner in which those significant effects can be avoided or mitigated; and
- Provide for full disclosure of the project's environmental effects to the public, the agency decision makers who will approve or deny the project, and responsible and trustee agencies charged with managing resources (e.g., wildlife, air quality) that may be affected by the project.

# 2.2 Purpose of this Environmental Impact Report

An EIR is a public informational document used in the planning and decision making process. This EIR will analyze the environmental impacts of the proposed Project. The Kern County Planning Commission and Board of Supervisors will consider the information in the EIR, including public comments and staff responses to those comments, during the public hearing process. As amending the Zoning Ordinance is a legislative action, the final decision will be made at the Board of Supervisors' public hearing, where the Project may be approved, conditionally approved, or denied.

The purpose of an EIR is to identify:

- The significant potential impacts of a proposed project on the environment and the manner in which those significant impacts can be avoided or mitigated;
- Any unavoidable adverse impacts that cannot be mitigated; and
- Reasonable and feasible alternatives to the project that would eliminate any significant adverse environmental impacts or reduce the impacts to a less than significant level.

An EIR also discloses growth-inducing impacts, impacts found not to be significant, and significant cumulative impacts of past, present, and reasonably anticipated future projects.

CEQA requires an EIR to reflect the independent judgment of the lead agency regarding the impacts, the level of significance of the impacts both before and after mitigation, and mitigation measures proposed to reduce the impacts. A Draft EIR (DEIR) is circulated to public agencies, special districts, responsible and trustee agencies who manage resources affected by the project, and interested agencies and individuals. The purposes of public and agency review of a DEIR include sharing expertise, disclosing agency analyses, checking for accuracy, detecting omissions, discovering public concerns, and soliciting counterproposals.

Reviewers of a DEIR should focus on the sufficiency of the document in identifying and analyzing the possible impacts on the environment and ways in which the significant effects of the project might be avoided or mitigated. Comments are most effective when they suggest additional and specific alternatives or mitigation measures that would provide better ways to avoid or mitigate significant environmental effects.

## Issues to Be Resolved

Section 15123(b) (3) of the CEQA Guidelines requires that an EIR contain issues to be resolved, which include the choices among alternatives and whether or how to mitigate significant impacts. The major issues to be resolved regarding a project include decisions by the lead agency as to whether or not:

- The DEIR adequately describes the environmental impacts of the project;

- The recommended mitigation measures should be adopted or modified;
- The alternatives evaluated should be adopted or rejected; or
- Additional mitigation measures need to be required.

# 2.3 Terminology

To assist readers in understanding this EIR, terms used are defined in the following manner:

- "**Project**" means the whole of an action that has the potential for resulting in a physical change in the environment, or a reasonably foreseeable indirect physical change in the environment.
- "**Project Area"** means the area within which the proposed amendment to Title 19 – Kern County Zoning Ordinance, focused on Chapter 19.98 (Oil and Gas Production) of the Kern County Zoning Ordinance for Oil and Gas Local Permitting would apply and generally includes most of the San Joaquin Valley Floor portion of Kern County up to an elevation of 2,000 feet. The Project Area includes all unincorporated lands within the 409-square-mile Metropolitan Bakersfield General Plan (MBGP); but excludes portions of Metropolitan Bakersfield that are within the jurisdiction of the City of Bakersfield, and excludes all other city jurisdictions, including Taft, Delano, Shafter, Arvin, McFarland, Maricopa, and Wasco. Lands under the jurisdiction of various state and federal agencies, including the Bureau of Land Management (BLM), the U.S. Fish and Wildlife Service (USFWS), and the California State Lands Commission (CSLC) are also excluded.
- "**Environmen**t" means the physical conditions that exist within the area that will be affected by the proposed Project, including, but not limited to, land, air, water, minerals, flora, fauna, ambient noise, and objects of historical or aesthetic significance. The area involved is the locale in which significant direct or indirect impacts would occur as a result of the Project. The environment includes both natural and man-made conditions.
- "**Impacts**" analyzed under CEQA are changes to the physical environment anticipated from a development proposal. Impacts are:
    - Direct or primary – Impacts that are caused by the proposed Project and occur at the same time and place of project implementation; or
    - Indirect or secondary – Impacts that are caused by the proposed Project at a later time or farther removed in distance but are still reasonably foreseeable. Indirect or secondary impacts may include growth-inducing impacts and other effects related to induced changes in the pattern of land use, population density or growth rate, or related effects on air, water, and other natural systems, including ecosystems.
- "**Significant impact on the environment**" means a substantial, or potentially substantial, adverse change in any of the physical conditions in the Project vicinity affected by the proposed Project, including land, air, water, minerals, flora, fauna, ambient noise, and objects of historical or aesthetic significance. An economic or social change resulting

from a project by itself is not considered a significant impact on the environment. A social or economic change related to a physical change may be considered in determining whether the physical change is significant.

- "**Mitigation**" consists of measures to avoid or substantially reduce the proposed Project's significant environmental impacts by:
  - Avoiding the impacts altogether by not taking a certain action or parts of an action;
  - Minimizing impacts by limiting the degree or magnitude of the action and its implementation;
  - Rectifying the impact by repairing, rehabilitating, or restoring the affected environment;
  - Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the actions; or
  - Compensating for the impacts by replacing or providing substitute resources or environments.
- **"Cumulative Impacts"** are two or more individual impacts that, when considered together, are considerable or that compound or increase other environmental impacts. The following statements also apply when considering cumulative impacts:
  - The individual impacts may be changes resulting from a single project or separate projects; and
  - The cumulative impact from several projects is the change in the environment that results from the incremental impact of the Project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor, but collectively significant, projects taking place over time.

This EIR uses a variety of terms to describe the level of significance of adverse impacts. These terms are defined as follows:

- **Less than significant**: An impact that is adverse but that does not exceed the defined thresholds of significance. Less than significant impacts do not require mitigation.
- **Significant**: An impact that exceeds the defined thresholds of significance and would or could cause a substantial adverse change in the environment. Mitigation measures are recommended to eliminate the impact or reduce it to a less than significant level.
- **Significant and unavoidable**: An impact that exceeds the defined thresholds of significance and cannot be eliminated or reduced to a less than significant level through the implementation of mitigation measures.

A glossary, including acronyms, abbreviations, and specific technical terms used throughout the EIR, is provided in Chapter 11 of this EIR.

# 2.4 Decision-Making Process

CEQA requires lead agencies to solicit and consider input from other interested agencies, citizen groups, and individual members of the public. CEQA also requires the project to be monitored after it has been permitted to ensure that mitigation measures are carried out.

CEQA requires the lead agency to provide the public with a full disclosure of the expected environmental consequences of the project and with an opportunity to provide comments. In accordance with CEQA, the following is the process for public participation in the decision-making process:

- **Initial Study (IS)/Notice of Preparation (NOP).** Kern County prepared and circulated an IS/NOP to the State Clearinghouse, public agencies, special districts, responsible and trustee agencies, and other interested parties for review and comment on August 30, 2013. In conjunction with this public notice, four scoping meetings and community workshops were held by Kern County at the locations and dates identified in Table 2-1. The purpose of these workshops/meetings was to introduce the Project and to solicit input from agencies, organizations, and other interested parties regarding the proposed Project, alternatives, mitigation measures, and environmental impacts to be analyzed in the EIR. The IS/NOP, scoping meeting and community workshop materials, comment letters received, and a complete summary of all written and verbal comments are included in Appendix A of this EIR.

**Table 2-1: Scoping Meetings and Community Workshops**

| Location | Date | Time |
|---|---|---|
| Lost Hills Recreation Building, Lost Hills Park<br>Hwy. 46, Lost Hills, CA | Sept. 16, 2013 | 6:30 p.m. |
| Taft Veterans Hall, Room 1<br>218 Taylor St., Taft, CA | Sept. 18, 2013 | 6:30 p.m. |
| Kern County Board Chambers, 1st Floor Board Chambers<br>1115 Truxtun Ave., Bakersfield, CA | Sept. 23, 2013 | 6:30 p.m. |
| Shafter Veterans Building, Room 2<br>309 California Ave., Shafter, CA | Sept. 25, 2013 | 6:30 p.m. |

- **Preparation of DEIR/Notice of Completion (NOC)**. A DEIR will be prepared, incorporating public and agency responses to the IS/NOP and scoping process. The DEIR will be circulated for review and comment to appropriate agencies and additional individuals and interest groups who have requested to be notified of EIR projects. Per Section 15105 (Public Review Period for a DEIR or a Proposed Negative Declaration or Mitigated Negative Declaration) of the State CEQA Guidelines, Kern County will provide for a 45-day public review period on the DEIR. The NOC will be prepared with the DEIR in accordance with Section 15085 (Notice of Completion) of the CEQA

Guidelines. The purpose of the NOC is to notify reviewing agencies and the public that a DEIR has been prepared and completed for public review.

- **Preparation of Final EIR (FEIR)**. In accordance with Section 15088 (Evaluation of and Response to Comments) of the CEQA Guidelines, following completion of the 45-day public review period, Kern County will respond to each comment on the DEIR through a "Response to Comments" chapter in the FEIR. Written responses will be provided to each commenting agency, organization, or person at least two weeks before the scheduled Kern County Planning Commission hearing.
- **Certification of FEIR**. Acting as an advisory body to the Kern County Board of Supervisors, the Kern County Planning Commission will consider and make recommendations on the FEIR and proposed Zoning Ordinance amendment. Upon receipt of the Planning Commission's recommendations, the Board of Supervisors will consider the FEIR, all public comments, and the proposed Zoning Ordinance amendment before taking final action on the Project. At least one public hearing will be held by the Planning Commission and by the Board of Supervisors to consider the FEIR, take public testimony, and either approve, conditionally approve, or deny the proposed Project.
- **Preparation of Notice of Determination (NOD)**. In accordance with Section 15094 (Notice of Determination), within five working days following certification of the FEIR, Kern County shall prepare and file the NOD with the State Clearinghouse. The NOD, which notifies the public that Kern County has certified the FEIR, will be posted for at least 30 days.

### 2.4.1 Initial Study/Notice of Preparation

In accordance with CEQA Guidelines Section 15082 (a) (Notice of Preparation) and the County's Guidelines, KCPCDD circulated an IS/NOP for a 30-day public review. The IS/NOP was sent to the State Clearinghouse, public agencies, special districts, responsible and trustee agencies, and other interested parties for a public review period that began on August 30, 2013 and ended on September 30, 2013. The purpose of the IS/NOP is to formally covey that Kern County, as the lead agency, solicited input regarding the scope and proposed content of the EIR. The IS/NOP, scoping meeting and community workshop materials, comment letters received, and a complete summary of all scoping comments are included as Appendices A, C, and D, respectively.

## IS/Notice of Preparation Written Comments

The County received 43 letters with substantive comments in response to the IS/NOP. The comments are summarized in Table 2-2.

**Table 2-2: Summary of Written Comments on the Initial Study/Notice of Preparation**

| Commenter | Summary of Comment |
|---|---|
| **State** | |
| California Governor's Office of Planning and Research (OPR) State Clearinghouse and Planning Unit<br>Letter dated August 28, 2013 | Provided transmittal of the NOP to reviewing agencies and reminded the agencies to comment in a timely manner. Issued SCH No. 2013081079. No comments were made on the content of the NOP. |
| California Department of Conservation Division of Oil, Gas, & Geothermal Resources (DOGGR)<br>Letter dated September 30, 2013 | Requests that the EIR quantify the amount of oil and gas production activities reasonably contemplated with the Zoning Ordinance Amendment and explain how the quantifications and other assumptions are used in the EIR. Requests that the EIR clearly explain the significance of impacts and identify mitigation measures and Project alternatives to reduce or eliminate significant impacts. Requests the EIR describe and analyze activities subject to the ministerial permit procedure and how qualifying for approval under the Conformity Review process will result in ministerial action by the County. Also requests the EIR take into account the statutory provisions of Senate Bill 4 (Pavley) or "SB-4," signed by Governor Brown on September 20, 2013. |
| California Department of Fish and Wildlife (CDFW), Central Region<br>Letter dated September 26, 2013 | Indicates the Project Area contains thousands of acres of protected conservation lands, core population areas for multiple state and federally listed plant and animal species, and supports rare natural communities. Further indicates the Project Area includes the only known habitat for many special status species and important geographic and topographic habitat areas identified as critical to meet the recovery goals for many state and federally listed species. Indicates the CDFW's concern that future oil and gas project activities could result in impacts to these resources and recommends that their suggested avoidance, minimization, and mitigation measures be included in the DEIR as enforceable mitigation measures, as appropriate. |
| California Department of Transportation (Caltrans) Planning South Branch, District 6<br>Letter dated September 18, 2013 | Indicates that the Project would have significant impacts to the state facilities and impacts on Interstate 5 and State Routes (SR) 33, 43, 46, 58, 65, 99, 119, 155, 166, 204, and 223. Requests that the DEIR evaluate impacts to state highways and identify mitigation. Also indicates that any future oil and gas exploration, extraction, operations, and production activities adjacent to or requiring access to a State Route should be sent to Caltrans for review. |
| California State Lands Commission (CSLC)<br>Letter dated September 26, 2013 | Indicates the proposed Project may involve school lands, sovereign lands, and State parks, including current CSLC leases within the Project Area. Requests the EIR include a thorough and complete Project description and that mitigation be presented as specific, feasible, enforceable obligations, or as formulas |

**Table 2-2: Summary of Written Comments on the Initial Study/Notice of Preparation**

| Commenter | Summary of Comment |
|---|---|
| | containing "performance standards." Requests the EIR consider the Project's potential to encourage the establishment or proliferation of invasive plant and animal species and recommends actions to prevent their release and spread. Requests that the EIR describe results of cultural resource surveys and consultation and/or outreach with Native American communities. Also requests the EIR include calculations or estimates of potential air and greenhouse gas (GHG) emissions from Project-related activities and address potential impacts of hydraulic fracturing as well as restricted or diminished use and enjoyment of recreational lands. |
| Native American Heritage Commission<br>Letter dated September 3, 2013 | Advises of the State and federal statutes relating to Native American historic properties and cultural significance. Requests that known archaeological resources recorded on or adjacent to the Project are listed in the EIR. Further recommends early consultation with Native American tribes, contacting the California Office of Historic Preservation for pertinent archaeological data, and notes historic properties of religious or cultural significance may be subject to confidentiality. A contact list of Kern County tribes is also provided. |
| **Local Agencies** | |
| Eastern Kern Air Pollution Control District<br>Letter dated September 3, 2013 | Verified receipt of the NOP by the Eastern Kern Air Pollution Control District. No comments were made on the content of the NOP. |
| Kern County Airports Department<br>Letter dated September 3, 2013 | Verified receipt of the NOP by the Kern County Airports Department. No comments were made on the content of the NOP. |
| Kern County Department of Agriculture and Measurement<br>Letter dated August 30, 2013 | Verified receipt of the NOP by the Kern County Department of Agriculture and Measurement. No comments were made on the content of the NOP. |
| Kern County Development Services Agency Roads Department<br>Letter dated September 10, 2013 | Verified receipt of the NOP by the Kern County Development Services Agency Roads Department. No comments were made on the content of the NOP. |
| Kern County Engineering and Survey Department<br>Letter dated September 3, 2013 | Verified receipt of the NOP by the Kern County Engineering and Survey Department. No comments were made on the content of the NOP. |
| Kern County Library - Local History Room<br>Letter dated September 12, 2013 | Verified receipt of the NOP by the Kern County Library - Local History Room. No comments were made on the content of the NOP. |
| Kern County Library<br>Letter dated September 3, 2013 | Verified receipt of the NOP by the Kern County Library. No comments were made on the content of the NOP. |
| Kern County Roads Department | Verified receipt of the NOP by the Kern County Roads |

**Table 2-2: Summary of Written Comments on the Initial Study/Notice of Preparation**

| Commenter | Summary of Comment |
|---|---|
| Letter dated September 4, 2013 | Department. No comments were made on the content of the NOP. |
| Kern County Sheriff's Office<br>Letter dated September 9, 2013 | Verified receipt of the NOP by the Kern County Sheriff's Office. No comments were made on the content of the NOP. |
| Kern County Waste Management Department<br>Letter dated September 3, 2013 | Verified receipt of the NOP by the Kern County Waste Management Department. No comments were made on the content of the NOP. |
| Kern County Water Agency<br>Letter dated September 27, 2013 | Indicates development of oil and gas facilities under the Project has the ability to negatively impact groundwater levels and quality. The DEIR should include an analysis of the Project's potential impacts to groundwater resources and groundwater quality and quality. |
| Kern County Engineering, Surveying, and Permit Services<br>Letter dated September 3, 2013 | Verified receipt of the NOP by the Kern County Engineering, Surveying, and Permit Services. No comments were made on the content of the NOP. |
| North of the River Recreation and Park District<br>Letter dated September 12, 2013 | Indicates the Project could have a significant impact on the North of the River Recreation and Park District's services and facilities due to a potential increase of population, resulting in the possible expansion of services and facilities. |
| San Joaquin Valley Air Pollution Control District<br>Letter dated September 30, 2013 | Indicates existing and post-Project emissions for individual oil and gas emissions should be identified and quantified. Recommends stationary sources and mobile sources be analyzed separately and construction emissions mitigation include the use of off-road construction fleets. Recommends the California Emissions Estimator Model (CalEEMod) be used to analyze equipment emissions and those nuisance odors and health impacts of toxic air contaminants are evaluated. Also recommends the EIR include: information on the methodology, model assumptions, and inputs used; Project components, Project phases and associated emissions; and cumulative impact assessment along with mitigation measures, including a Voluntary Emissions Reduction Agreement (VERA) for non-permitted source emissions. |
| Stanislaus County Environmental Review Committee (ERC)<br>Letter dated September 30, 2013 | Indicates Stanislaus County ERC reviewed the subject Project and had no comments. |
| **Interested Parties** | |
| Association of Irritated Residents (AIR)<br>Letter dated September 8, 2013 | Indicates the County needs to define the type and extent of activities that would be regulated. Recommends the EIR include: number of wells and total land requirements; impacts on important farmland/farmland conversion; water demand, sources and disposal options; facility's proximity to homes and schools; air |

**Table 2-2: Summary of Written Comments on the Initial Study/Notice of Preparation**

| Commenter | Summary of Comment |
|---|---|
| | and GHG; fuel requirements for co-generation or steam production; environmental justice analysis; evaluation of health impacts; well testing of all irrigation wells and/or domestic water wells within one mile of drilling site(s); and notification of residents within one mile of any drilling or other similar activity. |
| Center for Biological Diversity<br>Letter dated September 27, 2013 | Indicates unconventional extraction methods multiply and intensify impacts from oil and gas activities. Indicates expansion of oil and gas operations creates dangers inherent to oil and gas operations, in general. Recommends the County impose prohibition on the use of unconventional oil and gas extraction techniques. |
| Center on Race, Poverty, and the Environment<br>Letter dated September 30, 2013 | Recommends the County place a moratorium on all new well development until amendments to the Zoning Ordinance are finalized. Recommends the County reconsider ministerial permitting for new wells and look at comprehensive, project-by-project review. |
| Citizens Coalition for a Safe Community<br>Letter dated September 30, 2013 | Stated that the IS/NOP included numerous inconsistencies in terminology and recommends the County provide revised Scoping documents. Recommends industry technical terms be included in a glossary. Indicates that if the County's CEQA process is to be used by DOGGR for their considerations, then the DEIR must include an assessment of all aspects of subsurface oil and gas exploration and production within the Project Boundary Area.<br><br>Indicates the DEIR must include a statement of purposes and needs and recommends the EIR include the following alternatives: No Project; Project Expansion for All Exploration and Production Facilities and Activities; Project Expansion with All Future Exploration and Production Facilities and Activities Beyond and Beneath Existing Facilities and Activities; an alternative for the proposed amendment to apply to all existing and future oil and gas exploration and production facilities, equipment, and activities, including those abandoned (e.g., orphan wells and abandoned well blowouts); and Project Expanded and Conducted as a Programmatic EIR.<br><br>Indicates the DEIR must evaluate all impacts, direct, cumulative, and indirect, on agriculture, air quality, biological resources, cultural resources, geology and soils, GHG emissions, hazards and hazardous materials, hydrology and water quality (including flooding), land use and planning, mineral resources, noise, public services, recreation, transportation and traffic, utilities and service systems, and growth inducement. Further indicates that the DEIR and Zoning Ordinance |

**Table 2-2: Summary of Written Comments on the Initial Study/Notice of Preparation**

| Commenter | Summary of Comment |
|---|---|
| | Amendment must require oil and gas projects to generate their own clean electricity during production using photovoltaic (PV) solar, direct line power, or both, to eliminate all needs for operational power diesel generator onsite. Also recommends the EIR include a full and comprehensive fiscal and economic analysis, including employment and jobs.<br><br>In addition, indicates the DEIR must include mitigation monitoring and reporting requirements to improve and ensure compliance and, as needed, penalize non-compliance. Also requests that the Mitigation, Monitoring, and Reporting Program (MMRP) be included with the DEIR. |
| Earthworks, Oil and Gas Accountability Project<br>Letter dated September 30, 2013 | Indicates a comprehensive analysis is required, including cumulative impacts, to ensure the protection of public health and the environment and to mitigate any potentially significant effects. Recommends no new wells be allowed in the County until a FEIR is completed and the permitting process is updated. Indicates impacts could include: conversion of farmland to non-agricultural uses; regional air quality impacts, GHG emissions; depletion of surface and groundwater supplies and quality and increased seismic activity. Indicates the County should consider all possible alternatives. Requests a full economic analysis, a health impact study, and an extensive public review period prior to amending the Zoning Ordinance. |
| Environmental Working Group<br>Letter dated October 1, 2013 | Indicates a comprehensive analysis is required, including cumulative impacts, to ensure the protection of public health and the environment and to mitigate any potentially significant effects. Recommends no new wells be allowed in the County until a FEIR is completed and the permitting process is updated. Indicates impacts could include: conversion of farmland to non-agricultural uses; regional air quality impacts, GHG emissions; depletion of surface and groundwater supplies and quality and increased seismic activity. Indicates the County should consider all possible alternatives. Requests a full economic analysis, a health impact study, and an extensive public review period prior to amending the Zoning Ordinance. |

**Table 2-2: Summary of Written Comments on the Initial Study/Notice of Preparation**

| Commenter | Summary of Comment |
|---|---|
| Kern Audubon Society<br>Letter dated September 27, 2013 | Indicates the EIR needs to include a statement that counties are agents of the state and are required to enforce state law. Further indicates that a revised amendment must include a statement that state law supersedes County ordinances when a conflict appears. Indicates the proposed amendment should reflect SB-4. Further indicates the EIR must discuss the relationship between DOGGR and the KCPCDD relative to permitting of petroleum/gas exploration and production. Indicates the EIR must identify the added work duties of current KCPCDD staff and if additional staff will be required, the EIR must include a list of potential funds.<br><br>Indicates that permitting of oil drilling should be reviewed by a community-based Review Group as well as an Oversight Panel for drilling permits that are to be considered significant, either by size (acres) or location (farming operations, housing). Indicates the EIR needs to consider factors that will 'trigger' the Oversight Review Panel process. |
| Natural Resources<br>Defense Council<br>Letter dated September 30, 2013 | Indicates that an update to the County's development standards and conditions must consider a broad range of environmental and human health impacts. Also indicates that the EIR must analyze all potential environmental impacts related to the oil and gas activities contemplated by the Project and meet other CEQA requirements, including consideration of feasible mitigation, reasonable alternatives, environmental baselines, cumulative impacts, and a health risk assessment. Indicates the EIR must include a full life cycle analysis of all methods of extraction. Indicates the EIR must present reasonable alternatives "capable of avoiding or substantially lessening any significant effects of the Project, even if these alternatives would impede attainment of Project objectives, or would be more costly." In addition, indicates a ministerial permit would be problematic because CEQA does not apply to ministerial permits. |
| Sierra Club, Kern-Kaweah Chapter<br>Letter dated September 8, 2013 | Indicates the EIR must contain the proposed language of the amendment to the Zoning Ordinance and complete information regarding the physical location and description of activities anticipated during all Project phases. Indicates the Zoning Ordinance should include: specific requirements for advanced notification of the intent to use well stimulation techniques; public disclosure on an agency-run website; disclosure of sources, composition, volumes and disposition of water; notification of well casing failures; groundwater testing prior to any well stimulation operations; monitoring to establish baseline ground movement and seismic activity and post-fracturing seismicity; air quality |

**Table 2-2: Summary of Written Comments on the Initial Study/Notice of Preparation**

| Commenter | Summary of Comment |
|---|---|
| | protections; a prohibition on fracking confidential/exploratory wells; disclosure of all well reworks; prohibition on fracking in or around sensitive areas; requirement for projects to generate their own clean electricity during production using PV solar; and elimination of trade secret protections.<br><br>Indicates the EIR must address the impacts of oil and gas development and include an adequate, complete, and enforceable MMRP. Indicates the EIR's alternatives evaluation should include an alternative that focuses on clean, renewable energy rather than increased dependence on fossil fuels. Also indicates that if the EIR is to be used by DOGGR, it must include assessment of subsurface oil and gas exploration and production within the Project Area. |
| Tejon Indian Tribe<br>Letter dated September 9, 2013 | Indicates the Tejon Indian tribe has no conflict with this Project nor do they know of any cultural resources that might be impacted at this site. Requests immediate notification if any site(s) and/or artifacts are discovered in the area. |
| Law Office of Todd T. Cardiff, Citizens Coalition for a Safe Community<br>Letter dated September 30, 2013 | Indicates the maximum number of wells, well pads, roads and other infrastructure should be analyzed and potentially limited. Indicates the EIR should consider a No Project Alternative of not permitting an increase in drilling as the baseline. Indicates the EIR should discuss the rate of oil well casing failures within 1 year, 5 years, and 25 years of drilling and whether stimulation techniques increase rate of casing failures. Indicates the EIR should identify all instances where oil and gas development have caused water contamination in California.<br><br>Indicates the EIR should discuss: whether density of oil development (i.e. oil wells per acre) increases or decreases chances of a spill; why oil and gas development does not conflict with "Williamson Act Contracts;" the reasons that oil and gas development is/is not compatible with agriculture; if there is a conflict between water needs for agriculture and for oil and gas development; if there should be a limit on the amount of water resources devoted to oil and gas development; and if recycling (instead of re-injection) of produced or recovered water should be mandated.<br><br>Requests the EIR identify jobs related to oilfield development, including workers necessary for drilling, oilfield maintenance, and refinement, as well as average wages for such workers. Requests the EIR clarify whether GHG emissions can be reduced to a level of significance by requiring the capture of methane from |

**Table 2-2: Summary of Written Comments on the Initial Study/Notice of Preparation**

| Commenter | Summary of Comment |
|---|---|
| | the well heads. Questions whether a ministerial permit process for oil and gas development should be approved. |
| Law Office of Todd T. Cardiff, Citizens Coalition for a Safe Community<br>Letter dated October 3, 2013 | Requests an article by Ellen M Gilmer, E&E reporter, "*Geologists link Okla.'s largest quake to injection wells*," published March 27, 2013, be included in the administrative record for the Oil and Gas Zoning Amendment. |
| Nossaman, LLP<br>Letter dated September 30, 2013 | Requests inclusion of a discussion in the IS/NOP of the basis for a project-level EIR rather than a program EIR. Indicates the final Project description should include: a statement of the Project's objectives; a general description of the Project's technical, economic, and environmental characteristics; a statement of the intended uses of the EIR; and a list of related environmental review and consultation requirements. Indicates the KCPCDD should consult with DOGGR and other state agencies involved in implementation of SB-4 and those federal agencies involved in the study of hydraulic fracturing in California. Indicates all impacts from loss of farmland should be considered in the EIR, including assessment of the provision of adequate turnarounds for farm equipment. Indicates the EIR must identify all constituent elements found in produced water to properly assess impacts, including potential groundwater impacts. |
| Smith, Mark A.<br>Letter dated September 3, 2013 | Indicates the Independent Oil Producers Agency's name is referred to in the NOP as the "Independent Oil Producers Association" but it is an "Agency." Notices that the IS/NOP mailing list does not include many oil operators. Thinks the KCPCDD should obtain the list of active operators from DOGGR and send the NOP to those addressees. |
| Smith, Mark A.<br>Letter dated September 9, 2013 | Requests consideration of "economic factors." Requests the EIR discuss alternatives to the Project, including a No Project Alternative. The implication of this alternative is that it would have an unacceptable impact on the local and statewide economy and jobs. The impact on the economy and jobs must be explored and detailed. Requests other alternatives be explored, especially those with the potential to impact the economy, jobs, and small businesses. Requests clarification on information required to demonstrate compliance with the ordinance and clarification of KCPCDD's authority as it relates to future and ongoing DOGGR regulations and responsibilities. Requests the Kern County Valley Floor Habitat Conservation Plan be drafted in time for information in the Plan to be incorporated into the Chapter 19 Amendments. |

**Table 2-2: Summary of Written Comments on the Initial Study/Notice of Preparation**

| Commenter | Summary of Comment |
|---|---|
| Law Office of Todd T. Cardiff, Citizens Coalition for a Safe Community<br>Letter dated October 16, 2013 | Requests inclusion of Microsoft Power Point slides regarding fracking in Pennsylvania: "*Ecological Risks of Shale Gas Development Department of Ecosystem Science and Management*," Penn State University, into the administrative record. Notes that, while the Power Point presentation is specific to Pennsylvania, it provides some areas of analysis for the Oil and Gas Zoning Amendment EIR. |
| Lebec County Water District<br>Letter dated October 7, 2013 | Had no specific comments regarding the scope of the DEIR, and recognizes it may be outside of the Project Area. However, the District urges the County to rigorously review all potential impacts to groundwater levels and quality in the DEIR. The District notes their concern about potential impacts to groundwater resulting from the increased oil and gas exploration and development activities and urges the County to require designs and procedures to provide maximum protection. |
| Law Office of Todd T. Cardiff, Citizens Coalition for a Safe Community<br>Letter dated October 31, 2013 | Requested an article by Mike Lee, E&E reporter, entitled "*Gas Production More Water-Intensive Than Expected, Research Shows,"* published Thursday, October 31, 2013, be included in the administrative record for the EIR. Indicates the article demonstrates that the cumulative impacts of freshwater use must be carefully considered for fracking and other types of well stimulation. |
| Law Office of Todd T. Cardiff, Citizens Coalition for a Safe Community<br>Letter dated November 4, 2013 | Requests an article by Mark Grossi, entitled "*Fracking Probe Expands In Central Valley*," published in the Fresno Bee, November 2, 2013, regarding fracking flowback and waste discharge, be included in the administrative record for the EIR. |
| Law Office of Todd T. Cardiff, Citizens Coalition for a Safe Community<br>Letter dated December 17, 2013 | Provided an article on the discovery of elevated endocrine disruptor chemicals (EDC) in water supplies surrounding fracked wells, by Neela Banerjee, entitled "*Hormone-Disrupting Chemicals Found In Water At Fracking Sites*," published in the Los Angeles Times, December 16, 2013. Also provided an abstract of the study to the article. Indicates that he does not have access to the actual study. Requests that the EIR consider the potential impacts caused by EDCs and include the article and the study in the administrative record for the EIR. |
| Law Office of Todd T. Cardiff, Citizens Coalition for a Safe Community<br>Letter dated December 18, 2013 | Requests the study on endocrine disruptor chemicals (EDCs) in groundwater near fracking, entitled "Estrogen and Androgen Receptor Activities of Hydraulic Fracturing Chemicals and Surface and Ground Water in a Drilling-Dense Region," by Christopher D. Kassotis et al., published online in Endocrinology Journal, Volume 155, Issue 3, published December 16, 2013, be provided to the consultants |

**Table 2-2: Summary of Written Comments on the Initial Study/Notice of Preparation**

| Commenter | Summary of Comment |
|---|---|
| | preparing the EIR for the Amendment of Title 19.98 (Oil and Gas regulation) and be included in the administrative record. |
| Law Office of Todd T. Cardiff, Citizens Coalition for a Safe Community<br>Letter dated December 20, 2013 | Requests an article by Gayathri Vaidyanathan, E&E reporter, entitled "*'Frack Hit' Is Possible Culprit In Leaking Colo. Well,*" published Thursday, December 19, 2013, be included in the administrative record for the amendment to the Oil and Gas Regs. EIR. States that the article indicates that there is phenomena called "Frack Hits" whereby fracking a well near another well may result in a casing failure and leaking. |
| Law Office of Todd T. Cardiff, Citizens Coalition for a Safe Community<br>Letter dated February 6, 2014 | Requests EIR investigate the pattern of birth defects in hydraulic fracturing communities and consider how the Zoning Ordinance can mitigate the potential impacts to pregnant women and unborn children. |
| Law Office of Todd T. Cardiff, Citizens Coalition for a Safe Community<br>Letter dated April 16, 2014 | Requests EIR investigate potential impact to health and the environment and consider how the Kern County Zoning Ordinance can mitigate the impacts caused by radioactive waste associated with fracking The article attached reports that North Dakota is having a problem with disposal of "radioactive socks" used to filter frackwater. North Dakota regulators have discovered illegal dumping of such radioactive waste. |
| Law Office of Todd T. Cardiff, Citizens Coalition for a Safe Community<br>Letter dated October 9, 2014 | Requested a press release from the American Chemical Society, entitled "*'Fracking' wastewater that is treated for drinking produces potentially harmful compounds*," released September 24, 2014, be included in the administrative record and be discussed in the EIR. |
| Law Office of Todd T. Cardiff, Citizens Coalition for a Safe Community<br>Letter dated November 17, 2014 | Requests EIR include a map of all injection wells in the County, all protected and unprotected aquifers, and all aquifers known to be contaminated. Requested an article by Stephen Stock, Liza Meak, Mark Villarreal, and Scott Pham, NBC Bay Area website, entitled "*Waste Water from Oil Fracking Injected into Clean Aquifers,*" published Friday, November 14, 2014, be included in the administrative record for the Project. |

## 2.4.2 Scoping Meetings/Community Workshops

Pursuant to Section 15206 (Projects of Statewide, Regional, or Area-Wide Significance) of the State CEQA Guidelines, the lead agency is required to conduct at least one scoping meeting for all projects of State-wide, regional, or area-wide significance. The scoping meeting is for jurisdictional agencies and interested persons or groups to provide comments regarding, but not limited to, the range of actions, alternatives, mitigation measures, and environmental effects to be analyzed. Kern County hosted four scoping meetings and community workshops at the locations and dates identified in Table 2-1.

# Scoping Meetings/Community Workshops Results

Verbal comments were received at the scoping meetings and community workshops. Specific environmental concerns raised in the comments received during the meetings are presented in Table 2-3. The IS/NOP, scoping meeting and community workshop materials, comment letters received, and a complete summary of all scoping comments are included as Appendices A, C, and D, respectively.

**Table 2-3: Summary of Verbal Comments from the Scoping Meetings and Community Workshops**

| |
|---|
| **Lost Hills Scoping Meeting/Community Workshop – September 16, 2013** |
| – The commenter is in support of the Project and will submit more specific comments to the KCPCDD in writing.<br>– The commenter would like to see an amendment that maintains the County's streamlining process for oil and gas activities. |
| **Taft Scoping Meeting/Community Workshop – September 18, 2013** |
| – The commenter is in support of the Project and will submit more specific comments to the KCPCDD in writing.<br>– The commenter asked "Will a scoping report be available?"<br>– The commenter asked "Will Kern County be addressing both surface and subsurface activities?"<br>– The commenter stated the Project description should include a discussion of preemption and why the County cannot permit the down-hole oil and gas activities.<br>– The commenter applauds the County for taking the initiative to pursue this EIR and Project.<br>– The commenter stated it is important that a local agency address these issues because they understand the local conditions better. The County understands its waterways better than a larger government body. For example, Sandy Creek in Taft is better understood by local governments. The commenter appreciates the County's work to look for a "local solution" and raise awareness of local issues.<br>– The commenter stated that, regarding the economy potential significant impact section, the NOP should be expanded to include the consideration of jobs and fiscal impacts.<br>– The commenter suggests a single industry-recognized glossary be used for the oil and gas terms used in the report.<br>– The commenter stated that, as a farmer, he looks forward to finding an equitable compromise to the oil and gas solution. |
| **Bakersfield Scoping Meeting/Community Workshop – September 23, 2013** |
| – The commenter is in support of the Project and will submit more specific comments to the KCPCDD in writing.<br>– The commenter asked the County to consider whether the EIR is a project-level or programmatic-level EIR. The commenter would like to see this resolved in the EIR.<br>– The commenter stated that employment, social economics, and fiscal economics are missing in the Economy section of the IS. The commenter would also like to see the revenues received by the County from the oil and gas industries' activities.<br>– The commenter stated that the IS did not include Environmental Justice. Is the Project just?<br>– The commenter stated that the IS did not include how subsurface properties are going to be regarded. The commenter would like to see this included in the EIR.<br>– The commenter would like to see orphan wells and their issues addressed in the EIR.<br>– The commenter requested the issue of abandoned wells on properties be included in the EIR.<br>– The commenter asked "Will the subsurface rights holder be responsible for any down-hole information?" |

**Table 2-3: Summary of Verbal Comments from the Scoping Meetings and Community Workshops**

| |
|---|
| – The commenter stated the Project description should include a discussion of preemption and why the County cannot permit the down-hole oil and gas activities.<br>– The commenter suggested all existing fields should be restricted to existing pools.<br>– The commenter noted the EIR should consider the issue of exploratory wells and confidentiality.<br>– The commenter request that the EIR not refer to fracfocus.org because there is no penalty for fraud. If the County does refer to the website, they should specify the liability of perjury.<br>– The commenter stated the Federal Government requires a scoping report and highly recommends a scoping document be released between now and the release of the DEIR.<br>– The commenter supports the County's efforts to streamline permits and increase economic growth<br>– The commenter stated that hydraulic fracturing practices surprise people [sic] in and they cannot find information about hydraulic fracturing. There should be rules for the oil companies to inform the public about hydraulic fracturing practices.<br>– The commenter would like a moratorium on hydraulic fracturing until the issues are resolved.<br>– The commenter stated that oil companies need to disclose "trade secrets." The commenter fears environmental consequences and that communities are damaged by oil activities, and the commenter wants to prepare for this.<br>– The commenter supports local control.<br>– The commenter wants to ensure that the final Zoning Ordinance create an understandable process so it will not hurt the contract workers employed by the oil and gas industry.<br>– The commenter supports Kern County's efforts and hopes this process is speedy and reduces unemployment.<br>– The commenter stated that streamlining and certainty are very important. It is good to establish rules for industries, especially resource industries.<br>– The commenter asked that, while the County is going through this process, will oil permitting for wells be stopped? How many wells will be drilled between now and the end of the process? Will the County consider having a moratorium between now and then so we can understand the environmental impacts? |
| **Shafter Scoping Meeting/Community Workshop – September 25, 2013** |
| – The commenter is in support of the Project and will be submitting more specific comments to the KCPCDD in writing.<br>– The commenter asked, in regards to below surface activities, where will the County differ from DOGGR? Is the County going to extend past the regulations that DOGGR has established? Is it theoretically possible for the County to go beyond what DOGGR regulates?<br>– The commenter would like the County to go beyond what DOGGR and the San Joaquin Air District require.<br>– The commenter stated that hydraulic fracturing companies have been working without regulations. The commenter is afraid of fraudulent practices.<br>– The commenter stated, "We have a community garden behind Sequoia School," and asked if the garden will be safe from the chemicals, hydraulic fracturing, and oil and gas activities?<br>– The commenter asked, "Is my house safe from hydraulic fracturing?"<br>– The commenter stated concern about oil and gas activities affecting the health of the commenter's family (Asthma and Valley Fever).<br>– The commenter would like to stop hydraulic fracturing.<br>– The commenter stated concern after hearing about the drilling factory, in regard to the community garden and the impact it will have on vegetables.<br>– The commenter is against oil and gas.<br>– The commenter stated that farming and oil/gas production do not work well together.<br>– The commenter stated there is an overdraft in our water supply and we already do not have enough water to farm. Yet, oil and gas production companies receive water from the Friant Kern Water canal, "It bothers me to see pristine water being used for injection and immediate water contamination." |

**Table 2-3: Summary of Verbal Comments from the Scoping Meetings and Community Workshops**

- The commenter stated, regarding water, oil companies should be required to clean produced water.
- The commenter stated the EIR and permitting process needs to look at well permitting cumulatively.
- The commenter would like to see mitigation measures address the amount of water oil and gas companies use because these companies use a lot of water cumulatively.
- The commenter stated that, cumulatively, oil and gas activities use a lot of prime agriculture land. The commenter would like to see mitigation measures that address this and cumulative air impacts.
- The commenter stated that flaring is a problem, and that it is the burning of unclean gas which releases nitrogen oxide and volatile organic compound emissions that gives us "air problems." The commenter also stated that the current permit says oil and gas companies should minimize flaring and that there needs to be "teeth" in that regulation. The regulation should include a percent limit on the amount of time they can flare gas. (In 2012, a flare burned 22 million cubic feet of gas a half a mile north of a Shafter elementary school and community garden). The commenter stated that flaring is a problem and Shafter has worse air quality than Edison.
- The commenter has seen drilling activities that use diesel engines for drilling activities. The commenter stated that this pollutes our air. Wells could be hooked to electricity rather than diesel trucks.
- The commenter stated that pipeline leaks are an issue.
- The commenter wants to protect public health.
- The commenter stated that regulations need to be proactive rather than reactive.
- The commenter stated that abandoned wells need to be removed and fully rehabilitated so that the land can be farmed again.
- The commenter stated that there needs to be enforcement of the rules. Strict rules need to be established and enforcement needs to be employed so that the rules are followed.
- The commenter stated the County should charge the oil and gas companies enough money so that they can afford to do the enforcement.
- The commenter stated they would like to see enforcement on the proximity of wells to schools.
- The commenter stated they think the permitting process should be more complicated rather than streamlined.
- The commenter stated the County should consider human needs over business needs, and health needs over economy needs.
- The commenter stated, regarding cattle, "I am concerned about the cattle traffic through our city. There are cattle on one side of the freeway which are being driven through to the other side of town for the milk factory."

# 2.5 Availability of the DEIR

This DEIR is being distributed directly to agencies, organizations, and interested groups and persons for comment during a 45-day formal review period, in accordance with Section 15087 (Public Review of DEIR) of the State CEQA Guidelines. This DEIR and the full administrative record for the Project, including all studies, are available for review during normal business hours, Monday through Friday, at the Kern County Planning Department, located at:

**Kern County Planning and Community Development Department**
2700 M Street, Suite 100
Bakersfield, California 93301-2370
Phone: (661) 862-8600, Fax: (661) 862-8601

# 2.6 Format and Content

This DEIR addresses the potential environmental effects of the proposed Project and was prepared following input from the public and the responsible and affected agencies through the EIR scoping process, as discussed previously. The contents of this DEIR were established based on the findings in the IS/NOP and public and agency input. Based on this input, a determination was made that an EIR was required to address potentially significant environmental effects on the following resources:

- Aesthetics;
- Agriculture and Forest Resources;
- Air Quality;
- Biological Resources;
- Cultural Resources;
- Geology and Soils;
- Greenhouse Gas Emissions;
- Hazards and Hazardous Materials;
- Hydrology and Water Quality;
- Land Use and Planning;
- Mineral Resources;
- Noise;
- Population and Housing;
- Public Services;
- Recreation;
- Transportation/Traffic; and
- Utilities and Service Systems.

## 2.6.1 Required EIR Contents

This DEIR includes all of the sections required by CEQA. Table 2-4 contains a list of sections required under CEQA, along with a reference to the chapter in which they can be found in this document.

**Table 2-4: Required EIR Contents**

| Requirement (CEQA Section) | Location in EIR |
|---|---|
| Table of Contents (Section 15122) | Table of Contents |
| Summary (Section 15123) | Chapter 1 |
| Issues to be Resolved (Section 15123(b)) | Chapter 2 |
| Project Description (Section 15124) | Chapter 3 |
| Environmental Setting (Section 15125) | Chapter 4 |
| Significant Environmental Impacts (Section 15126.2) | Chapter 4 |
| Mitigation Measures (Section 15126.4) | Chapter 4 |
| Cumulative Impacts (Section 15130) | Chapter 4 |
| Effects Found not to be Significant (Section 15128) | Chapters 1, 4, and 5 |
| Unavoidable Significant Environmental Impacts (Section 15126.2(b)) | Chapters 4 and 5 |
| Significant Irreversible Changes (Section 15126.2(c)) | Chapter 5 |
| Growth-Inducing Impacts (Section 15126.2(d)) | Chapter 5 |
| Alternatives to the Proposed Project (Section 15126.6) | Chapter 6 |
| Organizations and Persons Consulted (Section 15129) | Chapter 8 |
| List of Preparers (Section 15129) | Chapter 9 |
| References (Section 15148) | Chapter 10 |

## 2.6.2 Baseline

The CEQA Guidelines state that "An EIR must include a description of the physical environmental conditions in the vicinity of the project, as they exist at the time the notice of preparation is published, or if no notice of preparation is published, at the time environmental analysis is commenced, from both a local and regional perspective. This environmental setting will normally constitute the baseline physical conditions by which a lead agency determines whether an impact is significant" (CEQA Guidelines 15125(a)). The NOP for this EIR was published on August 30, 2013. However, "[n]either CEQA nor the CEQA Guidelines mandates a uniform, inflexible rule for determination of the existing conditions baseline. Rather, an agency enjoys the discretion to decide, in the first instance, exactly how the existing physical conditions without the project can most realistically be measured, subject to review, as with all CEQA factual determinations, for support by substantial evidence." (Communities for a Better Environment v. South Coast Air Quality Management District [2010] 48 Cal.4th 310, 327-238 [CBE v. SCAQMD])

For purposes of this EIR, one component of existing conditions is the current level of oil and gas activity. The existing conditions, with respect to oil and gas activity at the time that the NOP was published, are best represented by activity data from 2012. At the time that the environmental analysis for this EIR commenced, 2012 was the last year for which complete data were available from California Department of Conservation Division of Oil, Gas, & Geothermal Resources (DOGGR) and other regulatory agencies. 2012 is a reasonable choice for existing conditions because it reflects the current state of the oilfields in the County, as well as the cumulative technological developments and the regulatory factors that influence activity levels.

DOGGR data from 1985 through 2012 demonstrate wide fluctuations in activity. The number of new well completions in the County dropped from a peak of 3,005 new well completions in 1985 to a low of 730 new well completions in 1992. Since that time, drilling activity gradually increased again, peaking in 2007 with 2,896 wells drilled. In late 2008 through 2009, fluctuating oil prices and general economic conditions resulted in another drop in activity. From 2010 through 2012, activity levels increased again, reaching 2,619 wells drilled in 2012.

As this data set indicates, oil and gas exploration and production activity has fluctuated considerably over time. The shifts reflect four primary drivers: changes in available technology; available reserves; regulatory requirements; and the price of oil. Many of the oilfields in the County are mature fields that are experiencing declining oil production and increasing production of associated water. In recent decades, drilling and production technologies have steadily advanced, as the industry developed and implemented cost-effective technologies that allowed operators to maintain production levels even as reserves have declined in established oilfields. New technologies are occasionally sudden "breakthroughs," but more often there is a general trend of incremental developments that are gradually adopted by the industry. For example, hydraulic fracturing commenced in California in the 1940s, and the first successful steam flood occurred in 1968, each prompting rapid changes in the industry. But more recent technological changes have spread incrementally. Changes in regulatory requirements (discussed in the "Regulatory Setting" sections of this EIR) also have affected overall industry activity levels, in particular DOGGR requirements on abandonment of idle wells and air emission regulations requiring installation of pollution control equipment and use of cogeneration and electric engines. Data from the 2012 baseline year incorporate all of these technology- and regulation-induced changes in activity.

In the context of an industry that experiences fluctuations and trends, courts have concluded that "the date for establishing baseline cannot be a rigid one. Environmental conditions may vary from year to year and in some cases it is necessary to consider conditions over a range of time periods" (CBE v. SCAQMD at 327-28, citing Save Our Peninsula Committee v. Monterey County Bd. of Supervisors [2001] 87 Cal.App.4th 99, 125). "In some circumstances, peak impacts or recurring periods of resource scarcity may be as important environmentally as average conditions" (Save Our Peninsula at 125-26). Moreover, in light of the past fluctuations in activity, an alternative baseline consisting of average activity levels over a range of prior years would tend to underrepresent the amount of activity under existing conditions.

Accordingly, conditions reflected in the 2012 data set, which was the best available complete data set at the time, are considered to best represent baseline conditions existing at the time of the NOP.

### 2.6.3 Project Level EIR

Based on the comprehensive analyses, mitigation measures, and performance standards included in the EIR and revised ordinance, it is anticipated that in the vast majority of future oil and gas production activities, implementation of the new ordinance will not result in the need for the County, or for responsible agencies with ministerial or discretionary review and approval processes, to prepare additional CEQA documents for individual well or field development proposals. For discretionary approval processes, additional CEQA review would be required only if the criteria for supplemental CEQA review under CEQA Section 21166 are met (14 CCR §§ 15096(e)(3), 15162). Such streamlined permitting is a permissible objective reflecting land use policy decisions within the authority of a county board of supervisors (San Diego Citizenry Group v. County of San Diego, 219 Cal.App.4th 1 [2013]).

Ministerial projects, on the other hand, are those where the governmental approval sought requires "little or no personal judgment by the public official as to the wisdom or manner of carrying out the project (and the public official merely applies the law to the facts as presented but uses no special discretion or judgment in reaching a decision" (14 CCR § 15369). CEQA does not apply to ministerial projects (PRC § 21080(b)(l)).

The CEQA Guidelines encourage public agencies to identify, in their implementing regulations or ordinances, the types of projects and actions which are deemed ministerial under the applicable laws and ordinances (14 CCR § 15268(c)). Under the amended Zoning Ordinance, the County's implementation of the Oil and Gas Conformity Review provides a ministerial permitting process for new oil and gas activities that incorporate the mitigation measures and development standards identified in this EIR.

Because the ordinance incorporates impact avoidance measures and provides a method for determining whether such measures have been met without the exercise of the County's discretion, the ordinance properly sets forth a ministerial permitting process. See Sierra Club v. Napa County Board of Supervisors, 205 Cal. App. 4th 162 (2012) [certain lot line adjustments in ordinance were properly identified as ministerial where the lot line application was required to comply with specified standards]; San Diego Citizenry Group v. County of San Diego, supra [upholding an EIR for a Zoning Ordinance amendment to allow by-right wineries, where the EIR identified impact avoidance measures built into the Zoning Ordinance]; Health First v. March Joint Powers Authority, 174 Cal. App. 4th 1135 (2009) [where a design plan for a development project complied with conditions set forth by specific plan that had been approved pursuant to CEQA, approval of the design plan via a 125-question checklist was ministerial and the project was exempt from CEQA review.]

The proposed Project establishes new procedures and additional compliance requirements for oil and gas exploration, production, and related activities the County. The County's current ordinance

currently authorizes "by right" oil and gas activities in certain areas provided that specified requirements are met, and requires conditional use permits in other Zoning Districts. The ordinance amendments strengthen environmental protection mitigation measures and development standards, and add further procedural and notice requirements, for oil and gas activities.

The degree of specificity in this EIR corresponds to the degree of specificity in the proposed Project, and serves as a "project-level" EIR for CEQA purposes. For example, for the new ministerial site plan review process for formerly "by right" oil and gas activities, the County will review site plans for compliance with required measures, and once compliance is verified thereafter will issue ministerial permits (e.g., for individual wells) which would not trigger the need for further CEQA review. The County's inspection and enforcement resources are also increased with a mandatory permit fee program.

A project-level EIR is appropriate for three primary reasons. First, by examining both the broad implications of the ordinance changes and the detailed site-specific impacts, this approach facilitates identification of the most effective development standards and mitigation requirements to be incorporated into the site plan review process. Second, a project-level EIR allows the Board of Supervisors and the public to be informed by a comprehensive analysis of impacts at the time the Board considers whether and how to modify existing County ordinances. Finally, a project-level EIR provides responsible agencies with the level of completed CEQA process required to inform and reach final decisions regarding subsequent discretionary approvals and other actions regarding these County oil and gas activities. If the criteria for supplemental CEQA review are triggered for a particular activity regulated by the revised County ordinances, additional CEQA review would be necessary (14 CCR §§ 15096(e)(3), 15162).

The County's long experience with oil and gas exploration and development allows it to identify and analyze reasonably foreseeable actions and impacts associated with the ordinance amendment at a project level review. Oil exploration, drilling, and production activities have been conducted in Kern County for more than 100 years. In the late nineteenth and early twentieth century, massive oilfields were discovered in the San Joaquin Valley using simple hand-auger drills, followed by rotary drilling rigs. The first commercial oilfield in Kern County, the McKittrick Field, was established in 1898. The Kern River Field near Bakersfield was discovered the following year. By 1903, the Kern River Field had been developed with 800 wells and had produced nearly 17 million barrels of oil. As the industry developed in California, so did the governing state regulatory regimes.

The primary state regulating entity, DOGGR, was established in 1915. The County Zoning Ordinances addressed oil and gas development as early as 1957. Other responsible and trustee agencies also have a long history regulating the activities and infrastructure associated with oil and gas production and development, and both oil and gas technologies, and the laws and regulations affecting that technology (and the oil and gas industry as a whole) continue to evolve. Kern County currently contains approximately 76 active oil and gas production fields, and over 2,500 wells are drilled in the County every year.

In preparing this EIR, the County has drawn on its own extensive experience with oil and gas development, and has also reviewed information compiled for decades by other public agencies. In addition, oil and gas industry associations representing current producers and future permit applicants provided the County with forecasts of their estimated future well drilling activity. Finally, the designation of Subareas, Tiers, and Core Areas further facilitated the completion of the Project-level analysis included in this EIR. These detailed classifications, based on environmental characteristics, existing land uses, and existing and planned oil and gas production activities, allow this EIR to efficiently forecast reasonably foreseeable future development and the location and magnitude of environmental impacts.

## 2.6.4 State Preemption of Subsurface Oil and Gas Activities

CEQA defines the term "project" to mean the whole of the action that has a potential for resulting in either a direct physical change or a reasonably foreseeable indirect physical change in the environment (CEQA Guidelines § 15378). An EIR must consider potential impacts from the entire project (see, e.g., CEQA Guidelines§§ 15126, 15126.2). Therefore, this EIR evaluates all impacts from the proposed ordinance amendments, including the surface and subsurface aspects of future oil and gas activities carried out pursuant to the amended ordinances. However, DOGGR is the state agency responsible for regulating the subsurface operations from oil and gas activities. This EIR describes DOGGR regulatory requirements, and the regulatory requirements of other agencies, in the "Regulatory Setting" portion of each resource section of the EIR. The EIR also describes how applicable regulatory requirements avoid or reduce significant adverse impacts on the environment as relevant to each resource section of the EIR.

As explained in the CEQA Guidelines, CEQA "supplements" the discretionary power of a lead agency "to mitigate or avoid significant effects on the environment when it is feasible to do so with respect to projects subject to the powers of the agency" (CEQA § 15040(c), emphasis added). The CEQA Guidelines also clarify that CEQA is "intended to be used in conjunction with discretionary powers granted to public agencies by other laws."

Under CEQA, lead agencies may enforce only "feasible" mitigation measures. "Feasibility" is defined in the CEQA Guidelines to include "legal feasibility" (i.e., can the mitigation be lawfully enforced by the lead agency). In general, the County lacks the legal authority to regulate subsurface oil and gas activities. As the California Attorney general has explained:

> State laws on drilling and production activities of oil, gas and geothermal resources wells for the purpose of conserving and protecting those resources take precedence over local regulations, particularly where the State law approves of or specifies plans of operation, methods, materials, procedures, or equipment to be used by the well operator or where activities are to be carried out under direction of the State Supervisor. With regard to state regulation for other purposes, such as land use control and environmental protection, the State has not fully occupied the field, and more stringent, supplemental regulation by cities and counties is valid to the extent that it does not conflict or interfere with state regulation (59 Ops. Cal. Atty. Gen. 461, Opinion No. SO 76-32 [1976]).

The Attorney General further reasoned that “the State has so fully occupied [the underground phases of oil and gas activities] that there is no room left for local regulation” (Id at 477-478). This basic law has not changed over the past 50 years.

With respect to Class II injection wells, the U.S. Environmental Protection Agency (EPA) implements the Underground Injection Control program, but may delegate enforcement responsibility to a state (a designation known as "primacy") (40 Code of Federal Regulations [CFR] Part 145). Therefore, the EPA has delegated primacy for Class II injection wells to the State of California, through DOGGR (48 CFR § 6336 [Feb. 4, 1983], as described in greater detail in Section 4.9, Hydrology and Water Quality). DOGGR's implementing regulations set forth detailed requirements for well design, construction, equipment, ancillary pipelines, and abandonment (14 CCR, Div. 2, Ch. 4. DOGGR's jurisdiction includes the regulation of production wells and “Class II” injection wells under the Underground Injection Control (“UIC”) Program of the federal Safe Drinking Water Act, 42 United States Code [U.S.C.] § 300f et seq.). The term Class II refers to injection, disposal, and storage wells associated with oil and gas exploration (40 CFR § 144.6). DOGGR issues permits and establishes conditions, including as to the design, construction, and operation, for Class II well activity (14 CCR § 1712 et seq.). In addition, California recently passed SB-4, which directs DOGGR to adopt regulations governing well stimulation treatment activities (PRC § 3150 et seq.). SB-4 regulations similarly address design, construction, and operations.

This EIR does, however, explain the applicable federal and state legal requirements of other agencies, including DOGGR. Where compliance with these requirements would avoid or lessen a potentially significant environmental impact, this EIR operates in conjunction with these other requirements to identify these as mitigation measures for EIR purposes. The process for assuring implementation of mitigation measures is described in the Mitigation, Monitoring, and Reporting Program (MMRP); for mitigation measures based on compliance with other regulatory programs, the MMRP provides a mechanism by which the County, in its lead agency role, will work with responsible agencies, such as DOGGR, to track implementation of mitigation measures that require compliance with the regulatory requirements of responsible agencies.

## 2.6.5 Organization of the EIR

The content and organization of this EIR are designed to meet the requirements of CEQA, State CEQA Guidelines, and the Kern County CEQA Implementation Document, as well as to present issues, analysis, mitigation, and other information in a logical and understandable way. This EIR is organized into the following sections:

- **Chapter 1, “Executive Summary,”** provides a Project description and a summary of the environmental impacts and mitigation measures.
- **Chapter 2, “Introduction,”** provides CEQA compliance information, an overview of the decision-making process, organization of the EIR, and a list of responsible and trustee agencies.

- **Chapter 3, "Project Description,"** provides a description of the location, characteristics, objectives, and relationship of the Project to other plans and policies.
- **Chapter 4, "Environmental Setting, Impacts, and Mitigation Measures,"** contains a detailed environmental analysis of the existing conditions, Project impacts, mitigation measures, and unavoidable adverse impacts.
- **Chapter 5, "Consequences of Project Implementation"** (Mandatory CEQA Sections)**,** presents an analysis of the Project's cumulative and growth-inducing impacts and other CEQA requirements, including significant and unavoidable impacts and irreversible commitments of resources.
- **Chapter 6, "Alternatives,"** describes a reasonable range of alternatives to the Project that could avoid or reduce the significant environmental effects of the Project.
- **Chapter 7, "Responses to Comments,"** is reserved for responses to comments on this DEIR.
- **Chapter 8, "Organizations and Persons Consulted,"** lists the agencies, organizations, and persons contacted during preparation of this DEIR.
- **Chapter 9, "List of Preparers,"** identifies persons involved in the preparation of the DEIR.
- **Chapter 10, "Bibliography,**" identifies reference sources for the DEIR.
- **Chapter 11, "Acronyms, Abbreviations, and Glossary,"** lists all acronyms, abbreviations, and technical terms mentioned in the DEIR with corresponding definitions.
- **"Appendices,"** provide information and technical studies that support the environmental analysis contained within the DEIR.

The analysis of each environmental category in Chapter 4, Environmental Setting, Impacts, and Mitigation Measures, is organized as follows:

- **"Introduction"** provides a brief overview on the purpose of the resource being analyzed with regard to the Project.
- **"Environmental Setting"** describes the physical conditions that exist at this time and that may influence or affect the resource being analyzed.
- **"Regulatory Setting"** provides state and federal laws, and the Kern County General Plan (KCGP) goals, policies, and implementation measures that apply to the resource being analyzed.
- **"Impacts and Mitigation Measures"** discusses the impacts of the Project in each category, including direct, indirect, and cumulative impacts, presents the determination of the level of significance, and provides a discussion of feasible mitigation measures to reduce any impacts.

# 2.7 Responsible and Trustee Agencies

Projects or actions undertaken by the lead agency, in this case Kern County, may require subsequent oversight, approvals, or permits from other public agencies in order to be implemented. Other such agencies are referred to as "responsible agencies" and "trustee agencies." Pursuant to Sections 15381 (Responsible Agency) and 15386 (Trustee Agency) of the State CEQA Guidelines, as amended, responsible agencies and trustee agencies are defined as follows:

- A "responsible agency" is a public agency that proposes to carry out or approve a project, for which a lead agency is preparing or has prepared an EIR or Negative Declaration. For the purposes of CEQA, the term "responsible agency" includes all public agencies other than the lead agency that have discretionary approval power over the project (Section 15381).
- A "trustee agency" is a state agency having jurisdiction by law over natural resources affected by a project that are held in trust for the people of the State of California (Section 15386).

The various public, private, and political agencies and jurisdictions with a particular interest in the Project include, but are not limited to, the following:

## Federal Agencies

- U.S. Fish and Wildlife Service (USFWS);
- U.S. Army Corps of Engineers (USACE);
- U.S. Environmental Protection Agency (EPA);
- U.S. Department of the Interior, Bureau of Land Management (BLM), Bakersfield Field Office;
- Federal Aviation Administration (FAA); and
- U.S. Department of Agriculture (USDA).

## State Agencies

- California Air Resources Board (CARB);
- California Department of Conservation Division of Oil, Gas, & Geothermal Resources (DOGGR);
- California Department of Fish and Wildlife (CDFW);
- California Department of Public Health (DTSC);
- California Department of Toxic Substance Control;

- California Energy Commission (CEC);
- California Highway Patrol (CHP);
- California Public Utilities Commission (CPUC);
- California Native American Heritage Commission (NAHC);
- California Office of Historic Preservation;
- California State Lands Commission (CSLC);
- Governor's Office of Planning and Research (OPR);
- Regional Water Quality Control Board, Central Valley District (RWQCB); and
- State Water Resources Control Board (SWRCB).

## Local Agencies

- San Joaquin Air Pollution Control District (SJAPCD);
- Kern Council of Governments (COG);
- Kern County Waste Management Department (KCWMD);
- Kern County Engineering, Surveying, and Permit Services Department;
- Kern County Fire Department (KCFD);
- Kern County Planning and Community Development Department (KCPCDD);
- Kern County Public Health Services Department, Environmental Health Division;
- Kern County Roads Department;
- Kern County Planning Commission; and
- Kern County Board of Supervisors.

# 2.8 Incorporation by Reference

In accordance with Section 15150 (Incorporation by Reference) of the State CEQA Guidelines, to reduce the size of the report, the following documents are hereby incorporated by reference into this DEIR and are available for public review at the KCPCDD. A brief synopsis of the scope and content of these documents is provided below.

## Kern County General Plan

The KCGP is a policy document with planned land use maps and related information and is designed to give long-range guidance to those County officials making decisions affecting the growth and resources of the unincorporated Kern County jurisdiction, excluding the Metropolitan Bakersfield Planning Area. This document, adopted on June 14, 2004, and last amended on

September 22, 2009, helps to ensure that day-to-day decisions conform to the long-range program designed to protect and further the public interest as related to the County's growth and development and to mitigate environmental impacts. The KCGP also serves as a guide to the private sector of the economy in relating its development initiatives to the County's public plans, objectives, and policies.

## Kern County Zoning Ordinance

According to Chapter 19.02.020, Purposes, Title 19 was adopted to promote and protect the public health, safety, and welfare through the orderly regulation of land uses throughout the unincorporated area of the County. Further, the purposes of this title are to:

- Provide the economic and social advantages resulting from an orderly planned use of land resources;
- Encourage and guide development consistent with the KCGP;
- Divide Kern County into Zoning Districts of a number, size, and location deemed necessary to carry out the purposes of the KCGP and this title;
- Regulate the size and use of lots, yards, and other open spaces;
- Regulate the use, location, height, bulk, and size of buildings and structures;
- Regulate the intensity of land use;
- Regulate the density of population in residential areas;
- Establish requirements for off-street parking;
- Regulate signs and billboards; and
- Provide for the enforcement of the regulations of Chapter 19.02.

## 2014 Regional Transportation Plan/Sustainable Community Strategy

The 2014 Regional Transportation Plan (RTP)/Sustainable Communities Strategy (SCS), was adopted in 2014 and is a 26-year blueprint that establishes a set of establishes a set of regional transportation goals, objectives, policies, and actions intended to guide development of the planned multimodal transportation systems in the County. The RTP/SCS has been developed through a continuing, comprehensive, and cooperative planning process, and provides for effective coordination between local, regional, state, and federal agencies. New to the 2014 RTP, California's Sustainable Communities and Climate Protection Act, or SB-375, calls for the Kern RTP to include a SCS that reduces greenhouse gas (GHG) emissions from passenger vehicles and light-duty trucks by 5% per capita by 2020 and 10% per capita by 2035, as compared to 2005. In addition, SB-375 provides for closer integration of the RTP/SCS with the Regional Housing Needs Allocation (RHNA), ensuring consistency between low income housing need and

transportation planning. The 2014 RTP/SCS exceeds SB-375 reduction targets for the region and is consistent with the RHNA.

## Kern County Airport Land Use Compatibility Plan (2008)

The Kern County Airport Land Use Compatibility Plan (ALUCP) was originally adopted in 1996 and has since been amended to comply with Aeronautics Law, Public Utilities Code (Chapter 4, Article 3.5) regarding public airports and surrounding land use planning. As required by that law, proposals for public or private land use developments that occur within defined airport influence areas are subject to compatibility review. The principle airport land use compatibility concerns addressed by the ALUCP are: (1) exposure to aircraft noise; (2) land use safety with respect to both people and property on the ground and the occupants of aircraft; (3) protection of airport air space; and (4) general concerns related to aircraft overflights.

The ALUCP identifies policies and compatibility criteria for influence zones or planning area boundaries. The ALUCP maps and labels these zones as A, B1, B2, C, D, and E, ranging from the most restrictive (A – airport property runway protection zone) to the least restrictive (D – disclosure to property owners only), while the E zone is intended to address special land use development. As required by law, the following affected cities have adopted the ALUCP for their respective airports: Bakersfield, California City, Delano, Shafter, Taft, Tehachapi, and Wasco.

## County of Kern Housing Element (2008–2013)

The development and preservation of adequate and affordable housing is important to the well-being of the residents and the economic prosperity of the County. To plan for the development of adequate housing for all income segments, a housing element was prepared as a part of the KCGP. This document constitutes the Housing Element, which specifically addresses housing needs and resources in the County's unincorporated areas. The Housing Element must maintain consistency with the other elements of the KCGP.

# 2.9 Sources

This DEIR is dependent upon information from many sources. Some sources are studies or reports that have been prepared specifically for this document. Other sources provide background information related to one or more issue areas that are discussed in this document. The sources and references used in the preparation of this DEIR are listed in Chapter 10, Bibliography, and are available for review during normal business hours at the:

**Kern County Planning and Community Development Department**
2700 "M" Street, Suite 100
Bakersfield, California 93301-2370

Section 15123(b)(3) of the CEQA Guidelines requires that an EIR contain issues to be resolved, which include the choices among alternatives and whether or how to mitigate significant impacts.

The major issues to be resolved regarding the Project include decisions by the lead agency as to whether or not:

- The DEIR adequately describes the environmental impacts of the Project;
- The recommended mitigation measures should be adopted or modified; or
- Additional mitigation measures need to be applied.

Chapter 3

# Project Description

# Chapter 3
# Project Description

## 3.1 Project Overview

Kern County, California (County) is one of the richest oil-producing counties in the United States. The valley floor area of the County and the lower elevations of the surrounding mountain ranges contain numerous deposits of oil and gas resources, a major economic resource for the County.

Oil and natural gas exploration and extraction has occurred for more than 100 years in California, and specifically in Kern County. In 2012, Kern County produced 80% of the on-shore oil and gas produced in California. In 2012 and 2013, California produced 197.5 and 199.6 million barrels of oil annually, respectively, making California the third largest state in terms of daily production (DOGGR 2014b).

Representatives of the oil and gas industry associations, specifically the California Independent Petroleum Association (CIPA), the Independent Oil Producers Agency (IOPA), and the Western States Petroleum Association (WSPA), (collectively, "Project Proponents"), have requested an amendment to Chapter 19.98 (Oil and Gas Production) and related chapters of the Kern County Zoning Ordinance to include additional provisions for local permitting of oil and gas activities. Under Chapter 19.112, amendments to the text of the Zoning Title of the Kern County Zoning Ordinance can only be initiated by the Kern County Board of Supervisors. The request was considered in a public hearing before the Board of Supervisors on January 22, 2013, and the Board directed Planning and Community Development Staff to proceed with processing the requested amendments. This revision of the Zoning Ordinance for local permitting also requires that other relevant references in the Zoning Ordinance be reviewed and revised for consistency. Section 3.2.4 describes the text changes to the Zoning Ordinance, and the complete listing of all the text changes to the Zoning Ordinances (collectively, "Amended Zoning Ordinance") as proposed and analyzed in this Environmental Impact Report (EIR) are appended to the end of this chapter. The Amended Zoning Ordinance, together with the implementation of future oil and gas activities expected to be undertaken pursuant to the Amended Zoning Ordinance, is the "Project" considered in this EIR (hereafter referred to as the "Project"). The development standards and conditions contained in the Zoning Ordinance modifications would apply throughout the unincorporated County. However, for purposes of this EIR, the "Project Area" is defined as the portion of unincorporated Kern County that is depicted in Figure 3-1 (Project Area). The Project Area represents the geographic scope of foreseeable environmental impacts from the Project in the oil and gas producing zones of the County, primarily consisting of the Valley Floor area. In the unlikely event that oil and gas production activities are proposed outside the defined Project Area, supplemental environmental review under CEQA would be required.

This EIR has been prepared to identify and evaluate potential environmental impacts associated with future oil and gas exploration, development, and production activities in the Project Area expected to be undertaken pursuant to the Amended Zoning Ordinance.

The Board of Supervisor's referral to the Kern County Planning and Community Department of the proposed Project would amend the Kern County Zoning Ordinance to include additional provisions to protect human health and safety and the environment as part of the permitting process for oil and gas activities under the jurisdiction of the Kern County.

Kern County has determined that consideration of the Amended Zoning Ordinance requires a project-level EIR under the California Environmental Quality Act (CEQA), with Kern County as the Lead Agency, to cover implementation of the Project for the future Kern County oil and gas exploration and production activities described below. The EIR impact and mitigation analysis has also resulted in the inclusion, into the amended text, of the ordinance of development standards and conditions, including required implementation of applicable mitigation measures for oil and gas activities, which will allow for a streamlined surface use permitting process for oil and gas activities.

As described in Chapter 2, Introduction, the Kern County Planning Commission and Board of Supervisors will consider the information in this EIR, including public comments and Staff responses to those comments, during the public hearing process. As approval of amended ordinances is a legislative action, the final decision will be made at the Board of Supervisors' public hearing, where the Project may be approved, conditionally approved, or denied.

The EIR will also be utilized by state, regional, and local agencies and departments with discretionary approval authority for some component of the oil and gas activities covered by this EIR (Responsible Agencies). The primary Responsible Agencies for oil and gas activities in Kern County include:

- The California Department of Conservation Division of Oil, Gas, and Geothermal Resources (DOGGR), which oversees: surface and subsurface operations of oil, gas, and injection wells; well exploration, drilling, and construction; well testing; well completion, stimulation, and workovers; oil and gas operations and maintenance; and well removal, plugging, and abandonment. DOGGR is completing a programmatic EIR for statewide well stimulation activities, as required by Senate Bill (SB) 4 (Pavley). However, this EIR, which is not limited to well stimulation, is broader in scope and independent of, not "tiered" under, DOGGR's SB 4 EIR. This EIR provides project-level CEQA coverage on which DOGGR can rely, as a Responsible Agency, for permitting of oil and gas activities, including well stimulation treatment, in the Project Area within Kern County.

- The San Joaquin Valley Air Pollution Control District (SJVAPCD), which oversees air quality permitting, as well as regional air quality planning and regulatory programs to attain regional and localized ambient air quality standards. While the SJVAPCD does not issue individual permits for wells, it oversees permitting for oil- and gas-related equipment/facilities, including boilers, steam generators and process heaters, flares,

tanks, and portable equipment. In addition, SJVAPCD permits thermally enhanced oil recovery (TEOR) operations. This EIR provides project-level CEQA coverage for most future oil and gas air permits issued by SJVAPCD, and also requires additional air quality mitigation for oil and gas activities pursuant to a new Voluntary Emission Reduction Agreement (VERA), as described in Section 4.3, Air Quality. This EIR does not provide CEQA coverage for new or expanded cogeneration facilities, which likely would not be required as part of the Project.

- The Central Valley Region of the Regional Water Quality Control Board (RWQCB) oversees permitting for discharges of wastewater and stormwater, as well as water basin planning and regulatory programs to attain and maintain compliance with applicable water quality standards and objectives. The RWQCB is responsible for permitting discharge of produced water to percolation and evaporation ponds, drilling sumps and wastewater disposal sumps, through issuance of waste discharge requirements (WDRs), or other forms of discharge authorization such as Clean Water Act Section 401 water quality certification and WDR waivers. In addition, the RWQCB also oversees the cleanup of petroleum-related spills and releases, as well as spills and releases of other chemicals. This EIR provides project-level CEQA coverage for future oil and gas WDRs or other water quality authorizations, and basin plan amendments for oil and gas activities in Kern County, including discharges of stormwater, produced water, and well stimulation fluids, and wastewater treatment, storage, and disposal activities. This EIR does not provide project-level CEQA coverage for specific remediation activities requiring RWQCB approval (e.g., either offsite removal, onsite treatment, or onsite capping and management) for accidental spills or releases of petroleum or hazardous substances from oil and gas activities.

- The California Department of Fish and Wildlife (CDFW) oversees permitting for activities that could result in the incidental take of protected wildlife and plant species, as well as regional and sub-regional habitat conservation planning and permitting, and serves as the natural resources trustee under CEQA. CDFW is also responsible for the conservation, protection, and management of fish, wildlife, and native plant resources under the lake and streambed alteration program. This EIR provides project-level CEQA coverage for CDFW permits and approvals, including incidental take permits (ITPs) and habitat conservation plan and natural community plans, for oil and gas activities in Kern County. Several such permits and plan approval applications are pending before CDFW, including, for example, habitat conservation plans and related CDFW approvals for Lokern and Elk Hills, as described in further detail in Section 4.4, Biological Resources. This EIR does not provide project level CEQA coverage for site specific remediation activities (described above), or for habitat enhancement, or restoration activities, other than oil and gas activities, that occur in the San Joaquin Valley, and which may also require permits or approvals from CDFW.

- The California Department of Toxic Substances Control (DTSC) oversees hazardous waste management, as well as the cleanup of non-petroleum spills and releases. This EIR

provides project-level CEQA coverage for the routine management of hazardous substances and wastes, but does not provide CEQA coverage for remediation activities (described above), or for new solid or hazardous waste landfills.

- The California Department of Resources Recycling and Recovery (CalRecycle) oversees certain types of solid waste management and recycling programs. This EIR does not provide CEQA coverage for new or expanded solid waste landfills for solid wastes generated by oil and gas activities; no such new or expanded landfills would be anticipated as part of the Project.

- The California Department of Transportation (Caltrans) oversees construction and maintenance of state highways. While no new or expanded state highway facilities would be anticipated as part of the Project, Caltrans may issue encroachment permits for ancillary facilities, such as pipelines/distribution lines and pipe bridges. This EIR provides project-level CEQA coverage for such encroachment permits.

- The Central Valley Flood Protection Board (CVFPB) administers activities affecting designated floodways, including Kern River and the Outlet Canal/Buena Vista Slough. These features bisect several oil and gas fields, and CVFPB may issue encroachment permits for ancillary facilities, such as pipelines/distribution lines and pipe bridges. This EIR provides project-level CEQA coverage for such encroachment permits.

- The Kern County Water Agency and other water districts in the Project Area oversee the distribution and use of surface and groundwater resources in the Project Area. Although almost all water produced, used, and disposed of by the oil and gas industry is from the same geologic formation that contains oil and gas, additional water is used, treated, re-used, and/or disposed of, as discussed in Section 4.9, Hydrology and Water Quality, and Section 4.17, Utilities and Services. This EIR provides project-level CEQA coverage for these ongoing water-related uses, but does not provide CEQA coverage for new diversions or distributions of local surface waters for uses not addressed in Section 4.9.

This EIR may also be used as an informational resource by other federal, state, and local agencies. For example, federal agencies are encouraged to use CEQA documents as part of the National Environmental Policy Act (NEPA) review process for: federally regulated activities, such as the potential for incidental take of, and habitat conservation planning for, federally protected species, as regulated by the U.S. Fish and Wildlife Service (USFWS); the discharge of dredged materials or fill into federally jurisdictional waters, as permitted by the U.S. Army Corps of Engineers (USACE); compliance with applicable federal standards and requirements for air and water quality, waste and wastewater management, and cleanup of contamination as overseen by the U.S. Environmental Protection Agency (EPA); protection of archaeological and historic resources by the State Historic Preservation Office (SHPO); oversight of certain floodplain activities by the Federal Emergency Management Agency (FEMA); and management of, and access to, federal lands and mineral resources within Kern County by the U.S. Department of Interior, Bureau of Land Management (BLM).

Federal and state agencies that are not Responsible Agencies but engage in planning or management activities that could be informed by the Project may use this EIR, including, for example: the California Department of Water Resources (DWR), Bureau of Reclamation, and related entities in the management of surface water supplies from the Sacramento Delta, which has historically supplied a small portion of the water used by the oil and gas industry; the Native American Heritage Commission (NAHC), which coordinates consultation with tribal representatives; and the Kern County Council of Governments (Kern COG), which coordinates certain federal highway and transportation funding activities and engages in regional transportation and greenhouse reduction planning. Local agencies, including but not limited to cities and districts located within outer boundaries of the Project Area, may also use the information included in this EIR for local planning and other activities.

# 3.2 Environmental Setting

## 3.2.1 Regional Location

Kern County is California's third-largest county in terms of land area, encompassing 8,202 square miles. Located at the southern end of the Central Valley, Kern County serves as the gateway to southern California, the San Joaquin Valley, and California's high desert. The geography of Kern County is diverse, containing mountainous areas, agricultural lands, and desert areas.

Kern County is bounded by Kings, Tulare, and Inyo counties on the north, San Bernardino County on the east, Los Angeles and Ventura counties on the south, and Santa Barbara and San Luis Obispo counties on the west. Kern County includes eight incorporated cities within the portion of the County located in the San Joaquin Valley, including Arvin, Bakersfield, Delano, Maricopa, McFarland, Shafter, Taft, and Wasco. Oil and gas exploration and development activities have historically occurred in the San Joaquin Valley Floor portion of the County and are likely to continue to occur in the same vicinity. For this reason, this EIR evaluates potential impacts of future oil and gas exploration and production activities in a defined boundary. For the purposes of this EIR, the area depicted in Figure 3-1 defines the Project Area. The regional location of the Project is shown on Figure 3-2 (Regional Location).

The Kern County General Plan (KCGP) describes the San Joaquin Valley region as "the southern San Joaquin Valley below an elevation of 1,000 feet mean sea level (MSL)" within Kern County. The San Joaquin Valley portion is characterized by low rainfall, averaging less than 10 inches per year. Average temperatures are relatively high, and total evaporation exceeds total precipitation. Summers are generally cloudless, hot, and dry. Winter is generally mild, but an occasional freeze does occur and may cause substantial agricultural damage. The average length of the growing season is 265 days. The San Joaquin Valley region is within the southern end of the San Joaquin Valley Air Basin (SJVAB) managed by the SJVAPCD. This district encompasses Fresno, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare counties, as well as the San Joaquin Valley portion of Kern County. Further, the San Joaquin Valley region is within the Tulare Lake

Groundwater Basin, which includes the Kern River Hydrographic Unit and the Poso Hydrographic Unit. These are subject to RWQCB oversight.

### 3.2.2 Project Area

The Project Area is defined on Figure 3-1 and encompasses 3,700 square miles, which generally includes most of the San Joaquin Valley Floor portion of Kern County and additional areas in the southern portion of the Project Area. The boundary includes: west side – the San Luis Obispo, Monterey, and Santa Barbara county lines; north side – the Kings and Tulare county lines; east side – the 2,000-foot elevation contours, squared off to the nearest section line; and south side – the northern boundary of the Los Padres National Forest and portions of the San Emigdo and Tehachapi Mountains. The Project Area boundary is based on information regarding areas with potential or confirmed oil and gas resources within the County's jurisdiction.

Although the Project Area encompasses 3,700 square miles, the EIR impact analysis includes only unincorporated County land. Therefore, the analysis includes unincorporated County land within the 409-square-mile Metropolitan Bakersfield Planning Area (a joint planning area containing both County and City land), but excludes all adjacent City of Bakersfield land. The EIR analysis also excludes all other city jurisdictions, such as Taft, Delano, Shafter, Arvin, McFarland, Maricopa, and Wasco. Lands under the jurisdiction of various state and federal agencies, including the BLM, USFWS, and the California State Lands Commission, are also included within the 3,700-square-mile Project Area but are excluded from the EIR impact analysis. Ancillary equipment and land uses (e.g., pipelines and access roads on unincorporated County lands are included in the Project Area, and analyzed in the EIR, and regulated by the County even though such equipment and land uses may serve wells on non-jurisdictional County lands (e.g., incorporated cities or federal/state lands). By conservatively assuming that all new well activities in Kern County would occur in the Project Area of the County's jurisdictional lands, this EIR presents a conservative analysis of likely impacts in the Project Area. This EIR also addresses non-jurisdictional areas as part of the cumulative impacts analysis.

In order to facilitate detailed analysis, the Project Area is divided into three Subareas, as depicted in Figure 3-1 (Project Area). In general, the Project Subareas are divided along the major transportation corridors.

## Western Subarea

The Western Subarea consists of 1,714 square miles (1,096,840 acres) and is generally bounded by the Kern County border on the north and west, Los Padres National Forest on the south, and by Interstate 5 (I-5) on the east. The Western Subarea contains many of the large-scale oil and gas extraction-level operations. The Western Subarea contains 37 active oil and gas fields, including five of California's largest producing oilfields (by volume). The area also includes dispersed agricultural operations. The Western Subarea contains unincorporated areas around the cities of Taft and Maricopa that are located in the Western Subarea.

## Central Subarea

The Central Subarea consists of 1,025 square miles (656,003 acres) and is generally bounded by the Kern County border on the north, by I-5 on the west, and State Route 65 and State Route 223 on the East. The Central Subarea contains 21 active oil and gas fields, some with large-scale production activity. The Central Subarea contains some of the County's deepest wells, with oil operations co-locating with predominant agricultural activities in this Subarea. The Central Subarea contains parts of the unincorporated Metropolitan Bakersfield area and includes unincorporated areas around the cities of Shafter, Delano, Wasco, and McFarland.

## Eastern Subarea

The Eastern Subarea consists of 953 square miles (over 600,000 acres) and is generally bounded by the County border on the north, State Route 65 and State Route 223 on the west, and mountain ranges on the east and the south. The Eastern Subarea contains 20 active oil and gas fields along with several large-scale oil and gas production areas, such as the Kern River Oilfield north of the City of Bakersfield, in the Oildale area. The Eastern Subarea includes parts of the unincorporated Metropolitan Bakersfield area and unincorporated areas around the city of Arvin.

## 3.2.3 Land Uses Surrounding the Project Area

The Project Area is bordered on the west by San Luis Obispo County. The border between the two counties approximates the San Andreas Fault line. The Temblor Range forms a general barrier between the more industrial oil drilling operations on the Kern County side of the border versus the more rural and agricultural nature of neighboring San Luis Obispo County, with the exception of the Midway Sunset Oilfield, which crosses into neighboring San Luis Obispo County. The portion of the Midway Sunset Oilfield located within San Luis Obispo County is outside of the Project Area and is not subject to Kern County jurisdiction. Other oil and gas uses exist to the west of the Project Area; however, such activities are less intensive in nature and dispersed throughout a rural area.

Similarly, in the southwest, the Project Area extends to the border of the Los Padres National Forest, and in the southeast includes portions of the San Emigdo Mountains and the Tehachapi Mountains. The unincorporated community of Frazier Park is located in the uplands several miles south of the Project Area and west of I-5.

To the north, the Project Area is bordered by Kings and Tulare Counties. The bordering areas of these two counties contain agricultural and oil and gas operations, as well as dispersed rural residences. The incorporated City of Delano is located on the northern border of Kern County and adjacent land uses in Tulare County consist of large lot residential, agriculture, and industrial uses.

To the east, the Project Area is bordered by the foothills of surrounding mountain ranges, such as the Greenhorn Mountains and Tehachapi Mountains, as well as the Tejon Hills southeast of the

incorporated City of Arvin. The Project Area also borders the Sequoia National Forest northeast of Bakersfield. Land uses along the border are generally rural in nature.

## 3.2.4 Areas Not Subject to Kern County Land Use Jurisdiction Located Within Project Area

As described above and in Figure 3-1, there are several incorporated cities, as well as lands and minerals owned by the federal or state government, that fall within the Project Area. Although the Project does not directly affect these areas outside the County's land use jurisdiction, the EIR assumes that oil and gas activities that occur in these areas will continue to occur in the future, and this EIR addresses County jurisdictional activities that occur as ancillary activities in support of oil and gas production in these areas, including, for example, electric transmission lines, pipelines, and access roads. Oil and gas activities in these areas are also considered in the cumulative impacts analysis of this EIR. However, well count projections, which are used to assess many types of impacts in this EIR, exclude anticipated development that would occur in these areas (i.e., incorporated cities and BLM lands) within the Project Area.

In the event that future changes to municipal boundaries result in the removal of a portion of the Project Area from Kern County's jurisdiction, municipal zoning would apply rather than the County's Amended Zoning Ordinance. As noted above, cities and other local agencies within the Project Area may use the information included in this EIR for local planning and other activities, while federal agencies may use information included in this EIR in their NEPA review. Conversely, in the event that future changes to municipal boundaries result in a transfer of current municipal lands to the County's jurisdiction, the Amended Zoning Ordinance would apply to those lands.

## 3.2.5 Kern County Zoning Ordinance

Section 19.98.020 of the existing Kern County Zoning Ordinance currently authorizes "unrestricted drilling," with no County permit required, in County lands zoned for Exclusive Agriculture (A), Limited Agriculture (A-1), Medium Industrial (M-2), Heavy Industrial (M-3), and Natural Resource (NR), subject to compliance with specified conditions and standards that augment DOGGR, the SJVAPCD, and applicable fire and safety ordinances and regulations of the County of Kern. In these Zoning Districts, no County review or permit is required for the drilling of any steam injection well, steam drive well, service well, or any well intended for the exploration for, or development or production of, oil, gas, and other hydrocarbon substances, or for any related ancillary equipment, structure, or facility used as part of the oil and gas production process. The existing ordinance further requires that drilling cannot occur within 100 feet of any existing residence without the written consent of the owner thereof.

Oil or gas exploration or production is allowed within the Floodplain Primary District (FPP), subject to the Special Review Procedures and Development Standards in Section 19.50.130. Oil or gas exploration or production is permitted within a Special Planning District (SP), provided it

is consistent with the KCGP land use designation applicable to the subject property and does not create a conflict with the public health, safety, and welfare.

Section 19.98.030 provides for drilling by "ministerial permit" in several other Zoning Districts. A "ministerial" permit requires an application and review process, but the County does not impose site-specific conditions in such permits and the applicant is entitled to receive the permit once it demonstrates that relevant standards are met. Ministerial permits are required in the Light Industrial (M-1) and Recreation-Forestry (RF) districts, subject to specified development standards, which also apply in Drilling Island (DI) zone districts and Petroleum Extraction (PE) combining districts. Under this ministerial permit provision, no injection well and no well for the exploration for, or development or production of, oil or gas or other hydrocarbon substances may be drilled, and no related accessory equipment, structure, or facility may be installed in the above-referenced zone categories, until an application for a plot plan review has been submitted to and approved by the Kern County Planning Director; the application must show consistency with the development standards set out in Section 19.98.050. These development conditions and standards are presented below.

A Conditional Use Permit (CUP), which is a discretionary permit process allowing the County to establish site-specific conditions and, under appropriate circumstances, deny an application, is required for oil or gas exploration or production in all residential districts, including the Estate District (E), as well as in the Low-, Medium-, and High-Density Residential Districts (R-1, R-2, and R-3, respectively). A CUP is also required in commercial districts, including the Commercial Office District (CO), Neighborhood Commercial District (C-1), General Commercial District (C-2), and the Highway Commercial District (CH), as well as in the Platted Lands District (PL). The CUP provisions are set out in Section 19.104.

Oil or gas exploration or production is prohibited in the Mobile Home Park District (MP) (Section 19.26.040) and in the Open Space District (OS) Zoning Districts (Section 19.44.040).

Table 3-1 summarizes the type of County approvals required for oil or gas exploration or production activities, as well as required setback distances from designated types of nearby land uses, for each type of zone district under the existing County ordinance.

**Table 3-1: Kern County Zoning Ordinance – Existing County Approval Procedure and Setback Requirements for New Oil and Gas Production**

| Zone Districts | | Type of County Approval Required | | | | Set Back Required (in feet) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Unrestricted [1] | Ministerial Permit [2] | CUP | Prohibited | Dwelling | Public Highway or Building | Buildings Used as Place of Assembly, Institution or School | Any Building Used for Commercial Purposes |
| | **1. Agricultural Districts** | | | | | | | | |
| **A** | Exclusive Agriculture District | ● | | | | 100 | N/A | N/A | N/A |
| **A-1** | Limited Agriculture District | ● | | | | 100 | N/A | N/A | N/A |
| | **2. Residential Districts** | | | | | | | | |
| **E** | Estate District | | | ● | | 150 | 100 | 300 | 50 [3] |
| **R-1** | Low-Density Residential District | | | ● | | 150 | 100 | 300 | 50 [3] |
| **R-2** | Medium-Density Residential District | | | ● | | 150 | 100 | 300 | 50 [3] |
| **R-3** | High-Density Residential District | | | ● | | 150 | 100 | 300 | 50 [3] |
| **MP** | Mobile Home Park District | | | | ● | | | | |
| | ***3. Commercial Districts*** | | | | | | | | |
| **CO** | Commercial Office District[7] | | | ● | | 150 | 100 | 300 | 50 [3] |
| **C-1** | Neighborhood Commercial District[7] | | | ● | | 150 | 100 | 300 | 50 [3] |
| **C-2** | General Commercial District[7] | | | ● | | 150 | 100 | 300 | 50 [3] |
| **CH** | Highway Commercial District[7] | | | ● | | 150 | 100 | 300 | 50 [3] |

**Table 3-1: Kern County Zoning Ordinance – Existing County Approval Procedure and Setback Requirements for New Oil and Gas Production**

| Zone Districts | | Type of County Approval Required | | | | Set Back Required (in feet) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Unrestricted [1] | Ministerial Permit [2] | CUP | Prohibited | Dwelling | Public Highway or Building | Buildings Used as Place of Assembly, Institution or School | Any Building Used for Commercial Purposes |
| | **4. Industrial Districts** | | | | | | | | |
| **M-1** | Light Industrial District | | ● | | | 150 | 100 | 300 | 50 [3] |
| **M-2** | Medium Industrial District | ● | | | | 100 | N/A | N/A | N/A |
| **M-3** | Heavy Industrial District | ● | | | | 100 | N/A | N/A | N/A |
| | **5. Special Purpose Districts** | | | | | | | | |
| **RF** | Recreation-Forestry District | | ● | | | 150 | 100 | 300 | 50 [3] |
| **OS** | Open Space District | | | | ● | N/A | N/A | N/A | N/A |
| **NR** | Natural Resource District | ● | | | | 100 | N/A | N/A | N/A |
| **DI** | Drilling Island District (used within subdivided residential areas) | | | | | 300 | 100 | 300 | 50 [3] |
| **FPP** | Floodplain Primary District | ● [4] | | | | (6) | (6) | (6) | (6) |
| **SP** | Special Planning District | ● [5] | | | | N/A | N/A | N/A | N/A |
| **PL** | Platted Lands District [7] | | | ● | | 150 | 100 | 300 | 50 [3] |
| **PE** | Petroleum Extraction[7][8] | | ● | | | 300 | 100 | 300 | 50 [3] |

**Table 3-1: Kern County Zoning Ordinance – Existing County Approval Procedure and Setback Requirements for New Oil and Gas Production**

| Zone Districts | Type of County Approval Required | | | | Set Back Required (in feet) | | | |
|---|---|---|---|---|---|---|---|---|
| | Unrestricted (1) | Ministerial Permit (2) | CUP | Prohibited | Dwelling | Public Highway or Building | Buildings Used as Place of Assembly, Institution or School | Any Building Used for Commercial Purposes |

Notes:

N/A = Not Applicable

(1) "Unrestricted Drilling" requires no County review or County permit, subject to compliance with specified conditions and standards that augment DOGGR, SJVAPCD, and other agency regulations.

(2) Ministerial Permit requires submittal of an Application for Plot Plan Review to Kern County Planning Director.

(3) A well is not permitted within 50 feet of any building used for commercial purposes without written consent of structure owner prior to the commencement of such drilling

(4) Subject to Special Review Procedures and Development Standards in Section 19.50.130, including Flood Damage Prevention Ordinance, Chapter 17.48 of the Code.

(5) Allowed if use is consistent with General Plan Land Use designation and will not conflict with public health, safety, or welfare.

(6) No minimum setback required. Building and structures are not allowed.

(7) Zone districts that require a CUP for new oil and gas production wells Per Section 19.98.050 and 19.98.040, allows for standards such as setbacks to be reduced or waived as part of the CUP approval process if it is determined that it would not be detrimental to public welfare and/or adjacent property owners.

(8) Per Section 19.66.020(A), new wells are to be more than 300 feet from an existing dwelling. Section 19.66.030(A) specifies that wells located closer than 300 feet to an existing residence or buildings used for commercial purposes can be authorized through the issuance of a CUP.

## Existing Development Standards and Conditions

Chapter 19.98 (Oil and Gas Production) of the Kern County Zoning Ordinance currently contains the procedures and standards that apply to the exploration for development or production of oil, gas, and other hydrocarbon substances and related facilities carried out in unincorporated Kern County pursuant to Section 19.48.020, 19.98.030, and 19.98.040 of the Zoning Ordinance. Existing development standards and conditions included in Chapter 19.98 were designed to address various environmental and public health and welfare concerns, and are summarized below. These existing standards and conditions would be modified and/or supplemented by the Amended Zoning Ordinances:

- **Specific well setback distances from public highways and buildings** (19.98050.A) – No oil or gas well shall be drilled within one hundred (100) feet of any public highway or building not necessary to the operation of the well, or within one hundred and fifty (150) feet of any dwelling, or within three hundred (300) feet of any building used as a place of public assembly, institution, or school, or within fifty (50) feet of any building utilized for commercial purposes constructed prior to the commencement of such drilling, without the written consent of the owner of such structure. The required setbacks in various zone districts are presented on Table 3-1.
- **Fire and safety regulations** (19.98.050.B) – All drilling and production activities shall conform to all applicable fire and safety regulations, and firefighting apparatus and supplies required by the Kern County Fire Department shall be maintained on the site at all times during drilling and production operations.
- **Limitations on project signage** (19.98.050.C) – No signs, other than directional and warning signs and those required for identification of the well, shall be constructed, erected, maintained, or placed on the premises or any part thereof, except those required by law or ordinance to be displayed in connection with the drilling or maintenance of the well.
- **Sanitary toilet and washing facilities** (19.98.050.D) – Sanitary toilet and washing facilities, if required by the Kern County Health Department or other governmental agencies, shall be installed and maintained in a clean and sanitary condition during drilling operations, and at such other times as specified by these agencies.
- **Proven technological improvements** (19.98.050.E) – Proven technological improvements generally accepted and used in drilling and production methods shall be employed as they may become available if they are capable of reducing nuisances or annoyances.
- **Timely removal of drilling equipment** (19.98.050.F) – All derricks, boilers, and other drilling equipment used to drill, repair, clean out, deepen, or redrill any completed or drilling well must be removed within 90 days after completion of production tests or after abandonment of any well, unless such derricks, boilers, and drilling equipment are to be used within a reasonable time for the drilling of another well or on the premises.

- **Filling of earthen sumps and restoration of drilling sites** (19.98.050.G) – Within ninety (90) days after any well has been placed in production, or after its abandonment, earthen sumps used in drilling or production or both (unless such sumps are to be used within a reasonable time as determined by the Planning Director for the drilling of another well or wells) shall be filled and the drilling site restored as nearly as practicable to a uniform grade. Temporary earthen sumps may be used for cleanout or remedial work on an existing well or other production facility. However, these sumps shall be filled and the site restored as nearly as practicable to uniform grade within ninety (90) days after the cleanout or other remedial work is completed. Such restoration work shall comply with all applicable regulations of the California Division of Oil and Gas.
- **Portable derricks** (19.98050.H) – Any derrick used for servicing operations shall be of the portable type, provided, however, that upon presentation of proof that the well is of such depth or has such other characteristics, or for other cause, that a portable type derrick will not properly service such well, the Planning Director may approve the use of a standard type of derrick.
- **Tank setbacks, landscaping and fencing** (19.98.050.I) – Whenever oil or gas is produced into and shipped from tanks located on the premises, such tanks, whenever located within five hundred (500) feet of any dwelling or commercial building, shall be surrounded by shrubs or trees, planted and maintained so as to develop attractive landscaping or shall be fenced in such a manner as to, insofar as practicable, screen such tanks from public view. Such fencing shall comply with the requirements of the California Division of Oil and Gas (promulgated in California Code of Regulations [CCR], Title 14, Division 2, Chapter 4, Subchapter 2, Section 1778).
- **Material delivery restrictions** (19.98.050.J) – Whenever a well is located within five hundred (500) feet from an existing dwelling unit, except in case of an emergency, no materials, equipment, tools, or pipe used for either drilling or production operations shall be delivered to or removed from the drilling site, except between the hours of eight (8:00) a.m. and eight (8:00) p.m., unless otherwise required by the California Division of Oil and Gas.
- **Electric motors/muffled engines** (19.98.050.K) – Pumping wells shall be operated by electric motors or muffled internal combustion engines.
- **Height restrictions and paint requirements for pumping units** (19.98.050.L) – The height of all pumping units shall not exceed thirty five (35) feet and shall be painted and kept in neat order.
- **Dust abatement requirements for parking areas** (19.98.050.M) – All vehicle parking and maneuvering areas must be treated and maintained with oiled sand or a similar dust binding material.
- **Landscaping and fencing requirements for oil tanks** (19.98.050.N) – After production begins and a pump is installed on the wellhead, a fence at least six (6) feet in height shall be installed around the pump site or drilling island for public safety. This fence shall be constructed of chain link with wood or metal slats or other screening fence as may be

approved by the Planning Director. This fencing and screening requirement shall apply only to those pump sites located within five hundred (500) feet of any dwelling. Such fencing shall comply with the requirements of the California Division of Oil and Gas.

- **Compliance with federal, state, and County rules** (19.98.050.O) – All required federal, state, and County rules and regulations shall be complied with at all times, including, but not limited to, the rules and regulations of the following agencies:
    1. California Division of Oil and Gas
    2. Kern County Fire Department
    3. Kern County Health Department
    4. Regional Water Quality Control Board
    5. Air Pollution Control District
    6. Kern County Engineering and Survey Services Department
- **Dark skies ordinance** (19.51) – The existing dark skies ordinance does not apply to oil and gas activities.

# 3.3 History, Existing Operations, and Background

Oil drilling in Kern County has a long history. The first commercially developed oilfield in Kern County was the McKittrick Field, which was developed in 1898. Development was facilitated by existence of the Southern Pacific Railroad from Bakersfield to McKittrick. The Kern River Field, north of Bakersfield, was established in 1899 with the discovery of oil at that time. By 1903, 796 wells produced almost 17 million barrels of oil from the Kern River Field.

In the mid-1930s, several valley oilfields were found in large anticlines in Miocene oil sands beneath the valley floor. These discoveries were made following the advent of the reflection seismograph. Discoveries included Ten Section, Greeley, Rio Bravo, North Coles Levee, South Coles Levee, and Strand.

Kern County is the largest oil producing county in the state. According to the DOGGR, in 2012, Kern County, with nearly 43,000 active oil and gas, dry gas, and gas storage wells, contained 78% of all active wells in California (DOGGR 2013a). In addition, 80% of all oil and natural gas produced in California came from wells in Kern County.

Kern County is located within District #4 of DOGGR. All resources produced in the District listed in state publications are from Kern County, except for about 1% that comes from Tulare, Kings and San Luis Obispo counties. Table 3-2 presents a summary of oil and gas production statistics for Kern County, from 2002 to 2013.

**Table 3-2: Kern County/Oil and Gas Production Statistics (2002 through 2013)**

| Year | Well Count | | Oil Production (bbl) | Total Gas Production (Mcf) | Produced Water (bbl) |
|---|---|---|---|---|---|
| | Active | Inactive | | | |
| 2013 [1] [2] | 43,568 | 15,863 | 141,642,659 | 137,775,170 | 1,794,103,912 |
| 2012 [3] [4] | 42,875 | 15,803 | 141,693,959 | 143,161,183 | 1,847,748,513 |
| 2011 [5] | NA | NA | 143,286,239 | 150,138,919 | 1,729,110,447 |
| 2010 [6] | NA | NA | 148,149,302 | 159,891,426 | 1,623,436,443 |
| 2009 [7] | 42,067 | 14,344 | 154,862,689 | 143,803,250 | 1,571,530,199 |
| 2008 [8] | 42,347 | 13,968 | 162,286,447 | 154,497,502 | 1,452,401,425 |
| 2007 [9] | 40,820 | 14,667 | 166,169,131 | 164,996,739 | 1,360,061,057 |
| 2006 [9] | 40,066 | 15,113 | 170,164,866 | 178,641,271 | 1,307,556,746 |
| 2005 [10] | 38,762 | 15,849 | 176,700,868 | 179,705,645 | 1,308,930,959 |
| 2004 [11] | 38,144 | 15,556 | 185,222,203 | 184,787,625 | 1,257,553,976 |
| 2003 [11] | 37,480 | 15,662 | 191,634,994 | 193,094,181 | 1,194,529,857 |
| 2002 [12] | 37,178 | 16,405 | 198,839,444 | 209,485,454 | 1,159,205,228 |

Note:
NA = Data Not Available. MCF = 1,000 cubic feet of gas

Sources:
(1) DOGGR 2014a
(2) DOGGR 2014b
(3) DOGGR 2013a
(4) DOGGR 2013b
(5) DOGGR 2012
(6) DOGGR 2011
(7) DOGGR 2010
(8) DOGGR 2009
(9) DOGGR 2008
(10) DOGGR 2006
(11) DOGGR 2005
(12) DOGGR 2003

## Surface and Mineral Rights

Petroleum exploration and extraction involves the use of surface land for the establishment of well drilling and associated activities. The "surface rights"—that is, the right to use the surface of the land—are distinct from the "mineral rights," which pertain to minerals beneath the surface. The rights to use the land surface for these activities are governed by applicable laws, regulations, court orders, and agreements that oil and gas operators have established with various landowners. In some cases, the surface rights and the mineral rights to the same area of land may be owned by two different parties. This is referred to as a "split estate."

Although the reservoir that contains the oil and gas may be under land that has businesses, parks, and residences on them, the minerals can be extracted because an oil or gas operator owns the "mineral rights" to the minerals beneath the land surface. A mineral right is an interest in real property and may be sold, transferred, leased, or retained separately from the surface rights, in which case the mineral rights are said to be "severed". Mineral rights are distinct from "surface rights," or the right to the use of the surface of the land for residential, agricultural, recreational, commercial, or other purposes.

A person may own all of the mineral rights for a parcel or any fraction of the rights. A person may also own rights to only one kind of mineral, such as oil and gas, or to only one formation or depth interval. The ownership of the producing mineral rights in a parcel can usually be determined by examining the deed abstract for the property. The rights of the mineral owner to use of the surface of the real property are dominant to the rights of the owner of the surface estate, meaning that the mineral owner has an appurtenant right to reasonable access to develop its mineral right. The rights of a mineral owner to use of the surface estate can only be restricted by an express grant of such rights from the mineral owner to the surface owner. Mineral rights are, in all respects, real property rights. Real property rights are those rights primarily established under the common law of California and generally governed by the California Civil Code, Division 2, Part 2.

## 3.3.1 Administrative Oilfields

A total of 100 active or abandoned "Administrative Oilfields" (AOFs), which are delineated by DOGGR under applicable state regulations, are located on County jurisdictional lands within the Project Area. As shown in Table 3-3, these DOGGR delineated AOFs vary widely in size, from the smallest being the Kernsumner and Temblor East wellfields at 0.2 square mile, to the largest being Midway Sunset Oilfield at 99.7 square miles. The boundaries of these AOFs are referred to as "Administrative Boundaries." Oil and gas production also occurs outside of DOGGR delineated oilfield Administrative Boundaries. Table 3-3 notes whether each oilfield is within the Western, Central, or Eastern Subarea, as proposed by the Project and as shown on Figure 3-3, and whether the field is active or has been abandoned.

**Table 3-3: Oilfields Currently Delineated by DOGGR within the Project Area**

| Count | Administrative Oilfield [Alpha Order] | Square Miles * | Acres * | W/C/E |
|---|---|---|---|---|
| 1 | Ant Hill | 1.7 | 1,098.0 | E |
| 2 | Antelope Hills | 4.4 | 2,823.7 | W |
| 3 | Antelope Plains Gas (Abd) | 0.3 | 160.5 | W |
| 4 | Asphalto | 4.6 | 2,975.5 | W |
| 5 | Beer Nose | 1.0 | 644.8 | W |
| 6 | Belgian Anticline | 15.4 | 9,864.9 | W |
| 7 | Bellevue | 3.6 | 2,326.4 | C |
| 8 | Blackwells Corner | 3.6 | 2,308.1 | W |
| 9 | Bowerbank | 16.2 | 10,352.4 | C |
| 10 | Buena Vista | 46.9 | 29,993.3 | W |
| 11 | Buttonwillow Gas (Abd) | 10.0 | 6,378.7 | C |
| 12 | Cal Canal Gas | 5.5 | 3,515.2 | W |
| 13 | Calders Corner | 1.5 | 970.0 | C |

**Table 3-3: Oilfields Currently Delineated by DOGGR within the Project Area**

| Count | Administrative Oilfield [Alpha Order] | Square Miles * | Acres * | W/C/E |
|---|---|---|---|---|
| 14 | Canal | 3.9 | 2,476.7 | C |
| 15 | Canfield Ranch | 13.3 | 8,536.4 | C |
| 16 | Capitola Park | 1.0 | 651.5 | W |
| 17 | Carneros Creek | 1.5 | 967.3 | W |
| 18 | Chico Martinez | 2.6 | 1,634.8 | W |
| 19 | Cienaga Canyon | 0.6 | 402.4 | W |
| 20 | Comanche Point | 1.9 | 1,202.7 | E |
| 21 | Cymric | 21.5 | 13,757.8 | W |
| 22 | Devils Den | 12.8 | 8,175.4 | W |
| 23 | Dyer Creek | 0.4 | 239.9 | E |
| 24 | Eagle Rest | 0.5 | 309.3 | W |
| 25 | Temblor, East (Abd) | 0.2 | 154.6 | W |
| 26 | Edison | 34.0 | 21,742.3 | E |
| 27 | Elk Hills | 72.9 | 46,630.7 | W |
| 28 | English Colony | 1.1 | 681.5 | C |
| 29 | Fruitvale | 18.3 | 11,714.2 | E |
| 30 | Garrison City Gas (Abd) | 4.7 | 3,017.4 | C |
| 31 | Gonyer Anticline (Abd) | 0.5 | 344.9 | W |
| 32 | Goosloo | 3.0 | 1,935.4 | C |
| 33 | Greeley | 9.4 | 6,022.4 | C |
| 34 | Jasmin | 10.3 | 6,607.4 | E |
| 35 | Jerry Slough (Abd) | 0.5 | 318.0 | C |
| 36 | Kern River | 25.8 | 16,532.6 | E |
| 37 | Kern Bluff | 4.2 | 2,668.6 | E |
| 38 | Kern Front | 19.0 | 12,136.1 | E |
| 39 | Kernsumner (Abd) | 0.2 | 159.7 | E |
| 40 | Lakeside | 1.3 | 804.0 | C |
| 41 | Landslide | 2.1 | 1,373.9 | W |
| 42 | Los Lobos | 6.1 | 3,892.3 | W |
| 43 | Lost Hills | 33.2 | 21,273.1 | W |
| 44 | McClung (Abd) | 0.5 | 319.6 | C |
| 45 | McDonald Anticline | 3.7 | 2,372.4 | W |
| 46 | McKittrick | 10.6 | 6,776.8 | W |

**Table 3-3: Oilfields Currently Delineated by DOGGR within the Project Area**

| Count | Administrative Oilfield [Alpha Order] | Square Miles * | Acres * | W/C/E |
|---|---|---|---|---|
| 47 | Midway – Sunset ** | 99.7 | 63,832.8 | W |
| 48 | Monument Junction | 3.3 | 2,085.6 | W |
| 49 | Mountain View | 28.5 | 18,251.2 | E |
| 50 | Mount Poso | 45.9 | 29,360.5 | E |
| 51 | Antelope Hills, North | 3.9 | 2,466.8 | W |
| 52 | Belridge, North | 9.1 | 5,800.9 | W |
| 53 | Coles Levee, North | 15.1 | 9,671.0 | W |
| 54 | Shafter, North | 7.5 | 4,768.3 | C |
| 55 | Tejon, North | 9.2 | 5,914.3 | C |
| 56 | Edison, Northeast | 0.6 | 408.8 | E |
| 57 | Lost Hills, Northwest | 8.6 | 5,507.7 | W |
| 58 | Semitropic Gas, Northwest (Abd) | 0.5 | 322.5 | C |
| 59 | Paloma | 29.7 | 18,985.0 | W |
| 60 | Pioneer | 1.0 | 642.8 | W |
| 61 | Pleito | 3.0 | 1,927.3 | W |
| 62 | Poso Creek | 30.9 | 19,806.9 | E |
| 63 | Railroad Gap | 1.7 | 1,101.2 | W |
| 64 | Rio Bravo | 6.1 | 3,925.0 | C |
| 65 | Rio Viejo | 4.1 | 2,641.7 | W |
| 66 | Rose | 5.5 | 3,522.1 | C |
| 67 | Rosedale | 3.6 | 2,321.0 | C |
| 68 | Rosedale Ranch | 5.0 | 3,213.3 | C |
| 69 | Round Mountain | 19.2 | 12,265.9 | E |
| 70 | Round Mountain South | 0.4 | 276.7 | E |
| 71 | San Emidio Nose | 7.6 | 4,880.5 | W |
| 72 | San Emigdio (Abd) | 0.5 | 306.1 | W |
| 73 | San Emigdio Creek (Abd) | 0.5 | 340.7 | W |
| 74 | Semitropic | 25.1 | 16,077.3 | C |
| 75 | Seventh Standard | 0.5 | 320.3 | C |
| 76 | Shafter (Abd) | 0.5 | 321.2 | C |
| 77 | Shafter Southeast Gas (Abd) | 1.0 | 641.5 | C |
| 78 | Shale Flats Gas (Abd) | 1.0 | 647.1 | W |
| 79 | Shale Point Gas | 0.6 | 387.2 | W |

**Table 3-3: Oilfields Currently Delineated by DOGGR within the Project Area**

| Count | Administrative Oilfield [Alpha Order] | Square Miles * | Acres * | W/C/E |
|---|---|---|---|---|
| 80 | Belridge, South | 25.3 | 16,218.0 | W |
| 81 | Coles Levee, South | 17.7 | 11,328.4 | W |
| 82 | Lakeside, South (Abd) | 0.3 | 160.4 | C |
| 83 | Stockdale | 2.4 | 1,567.5 | E |
| 84 | Strand | 7.9 | 5,068.5 | C |
| 85 | Tejon | 11.3 | 7,227.8 | E |
| 86 | Tejon Flats (Abd ) | 0.3 | 161.0 | E |
| 87 | Tejon Hills | 6.7 | 4,283.2 | E |
| 88 | Temblor Hills | 1.0 | 643.9 | W |
| 89 | Temblor Ranch | 0.5 | 318.4 | W |
| 90 | Ten Section | 7.4 | 4,725.9 | C |
| 91 | Trico Gas ** | 6.8 | 4,359.4 | C |
| 92 | Union Ave. | 1.0 | 655.3 | E |
| 93 | Valpredo | 0.3 | 163.1 | E |
| 94 | Wasco | 4.0 | 2,575.6 | C |
| 95 | Welcome Valley | 0.8 | 490.4 | W |
| 96 | Bellevue, West | 2.0 | 1,248.3 | C |
| 97 | Jasmin, West (Abd) | 0.5 | 321.6 | E |
| 98 | Wheeler Ridge | 8.1 | 5,203.7 | W |
| 99 | White Wolf | 1.3 | 846.3 | W |
| 100 | Yowlumne | 10.1 | 6,446.8 | W |
| | **TOTAL** | **931.4** | **596,198.3** | **--** |

Source: DOGGR 2013c.
Notes:
* Numbers are approximate.
** Oilfield is located on the border of Kern County and an adjacent county; acreages within Kern County are approximate.
Key:
Abd = Abandoned.

The locations of AOFs within the Project Area are shown on Figure 3-3.

# 3.4 Project Description

## 3.4.1 Proposed Project/Proposed Zoning Code Amendment

The proposed Project consists of an amendment to Title 19 of the Kern County Zoning Ordinance, Chapter 19.98 (Oil and Gas Production), and related sections of the Kern County Zoning Ordinance to include updated procedures, development and implementation standards, and conditions for future oil and gas exploration, development, and production activities in unincorporated Kern County. In addition, the proposed Project includes the implementation of future oil and gas development activities expected to be undertaken pursuant to the amended ordinances.

The proposed Project would amend sections of the Kern County Zoning Ordinance relating to oil and gas drilling, including but not limited to Chapter 19.98 (Oil and Gas Production), to address oil and gas exploration and operation activities in greater detail, by:

a) Establishing updated development, implementation standards and conditions to address environmental impacts of pre-drilling exploration, well drilling, and the operation of wells and other oil and gas production-related equipment and facilities, including exploration, production, completion, stimulation, reworking, injection, monitoring, and plugging and abandonment;

b) Establishing new "Oil and Gas Conformity Review" and "Minor Activity Review" ministerial permit procedures for County approval of future well drilling and operations to ensure compliance with the updated development and implementation standards and conditions and provide for ongoing tracking and compliance monitoring.

The Amended Zoning Ordinance incorporates a comprehensive update to all sections of the Zoning Ordinance related to oil and gas exploration and production. The following description outlines the proposed changes to the Zoning Ordinance. (Note: A complete copy of the amendments to the Zoning Ordinance is provided at the end of this chapter as Attachment A.)

a) A comprehensive overhaul of Chapter 19.98 would be made to remove the "Unrestricted Drilling" section and to update the "Drilling by Ministerial Permit" and "Drilling by Conditional Use Permit" sections. This update would require all new oil and gas wells for exploration or production to obtain approval from the Kern County Planning and Community Development Department prior to commencing drilling.

b) The Tier System, described fully in Section 3.4.4 of this EIR, would be incorporated into Chapter 19.98 to address the different land uses and zone districts where oil and gas activities occur. The Tier system is made up of 5 distinct Tiers, including, Tier 1 Areas – primarily existing oil and gas activities, Tier 2 Areas – primarily existing agricultural activities, Tier 3 Areas – primarily existing industrial development, Tier 4 Areas – primarily existing urban development (CUP Required), and Tier 5 Areas –consisting of

existing and future adopted Specific Plans. The Tier Areas within the Project Area are depicted on Figure 3-4.

c) An Oil and Gas Conformity Review would be required as part of the "Drilling by Ministerial Permit" Section, noted above. This review will allow for comprehensive review of all drilling activities and will require consistent, comprehensive mitigation based on defined Tiers of surrounding land uses, as specified in the Amended Zoning Ordinance. An application package must be submitted that includes a site plan and written documentation assuring compliance with all applicable Development and Implementation Standards and Conditions.

d) A Minor Activity Review would be required as part of the "Drilling by Ministerial Permit" Section, noted above. This review will allow for comprehensive review of minor oil and gas activities and will require consistent, comprehensive mitigation based on defined Tiers of surrounding land uses, as specified in the Amended Zoning Ordinance. An application package must be submitted with written documentation assuring compliance with all applicable Development and Implementation Standards and Conditions.

e) The Development and Implementation Standards and Conditions Section would be updated to require compliance with all applicable mitigation measures and additional regulatory requirements as set forth in this EIR. Some of these new standards include: setbacks from sensitive receptors, reductions in overall footprint of drilling areas, new screening requirements, and measures to avoid or reduce impacts to resources such as biological and cultural areas, ground water and air quality, as specified in the Amended Zoning Ordinance.

f) For all Oil and Gas Conformity Review Site Plans submitted to the County, the Applicant would be required to submit a signature block and statement as part of the Application package. The signature block will provide for the signatures of the Applicant and, if different, the Mineral Owner. In addition, for activities occurring on split estate lands, where the Land/Surface Owner is different from the Mineral Owner, the signature block will provide for the signature of the Land/Surface Owner. For applications submitted with the required signature block and statement, the first review by the County will take place within seven business days. If the County finds the application to be incomplete and requests additional information, the second review will take place within three business days upon receipt of the requested information.

g) The new ordinance also includes a separate application processing procedure for applications on split estate lands that are lacking a signature block signed by the Land/Surface Owner. For applications submitted without the required signature block and statement, the review process will take 30-days to allow time for surface owner consultation, with an automatic 30-day second review period. Should the applicant obtain the Land/Surface Owner's signature during either 30-day review period, the application

will be processed within seven days. However, an application will not be rejected for lack of a signature by the Land/Surface Owner.

h) A new fee structure would be included to ensure that all mitigation is complied with and that the County will be sufficiently staffed to review all new applications.

i) Other Sections of the Zoning Ordinance would be updated to ensure consistency with the new requirements of this EIR. These Sections include: 19.08 – Interpretations and General Standards, 19.48 – Drilling Island (DI) District, 19.50 – Floodplain Primary District, 19.66 – Petroleum Extraction (PE) Combining District, 19.81 - Outdoor Lighting (Dark Skies Ordinance), 19.88 – Hillside Development, 19.102 – Permit Procedures, and 19.108 – Nonconforming Uses, Structures, and Lots.

Section 3.4.5 provides a more detailed description of the Oil and Gas Conformity Review Process.

## 3.4.2 Geographic Scope

For purposes of this EIR, the Project Area is defined as shown on Figure 3-1. The updated development standards and conditions would apply to all oil and gas activities throughout unincorporated Kern County, including but not limited to those that fall within the Project Area. However, the proposed geographic scope of the environmental evaluation considered in this EIR is limited to the Project Area, which represents the portion of the County in which oil and gas development has historically occurred and is reasonably foreseeable to occur in the coming decades. In the unlikely event that oil and gas production activities are proposed outside the Project Area, supplemental environmental review under CEQA would be required.

## 3.4.3 Core Areas

DOGGR requires oil and gas production wells to be reported, and each is ultimately included in an "Administrative Boundary" area for DOGGR's regulatory oversight purposes. However, oil and gas exploration and production does take place outside of existing Administrative Boundaries. If a new well is drilled outside the Administrative Boundary, the boundary may be adjusted by DOGGR upon written request of the operator once the new well reaches a sustained and documented production output for a minimum of six months.

For purposes of this EIR, DOGGR's existing Administrative Boundaries were useful in predicting where the vast majority of future oil and gas production activity would occur (i.e., in and adjacent to areas within Administrative Boundaries). This EIR uses the term "Core Area" to describe locations within and immediately adjacent to DOGGR's Administrative Boundary areas. Figure 3-5 depicts Core Areas in relation to DOGGR's Administrative Boundaries.

The County's zoning and land use planning procedures are designed to remain stable for orderly administration over time; therefore, the DOGGR Administrative Boundary adjustment process did not provide a useful framework for zoning purposes. For purposes of administering zoning

requirements within and adjacent to DOGGR's Administrative Boundaries, Core Areas were defined by making the following adjustments, as applicable, to each DOGGR Administrative Boundary, to administratively manage County zoning requirements in oil and gas production areas:

1. Each area within DOGGR Administrative Boundaries was first defined as a "Core Area" for oil and gas production purposes;

2. Adjacent areas within DOGGR Administrative Boundaries were combined into a single Core Area;

3. Consistent with County zoning practice, the irregular boundaries of each Core Area were then "squared off" and defined by the nearest Section and quarter Section lines;

4. To accommodate the probability of continued expansion at the edges of these known producing areas, the Core Area was then extended at least one-half Section from the DOGGR Administrative Boundary;

5. To accommodate known oil production activities that were adjacent to but not yet within a DOGGR Administrative Boundary, the Core Area was expanded to include adjacent Sections that either contained at least two wells in the Section, or contained two wells within a 640-acre area of the Section; and

6. Where the Core Area mapping process described above left isolated islands or narrow strips of lands between Core Areas, the Core Area was combined to eliminate these orphaned areas.

Historically, more than 95% of oil and gas production occurs within DOGGR's Administrative Boundaries. This EIR anticipates that this same percentage of production would occur in the designated "Core Areas."

## 3.4.4 Tiers

Oil and gas production in Kern County varies in intensity, depending on historic uses, surrounding land uses and zoning designation, and quality of other potential land uses (e.g., agricultural land). As part of this project-level EIR process, both Core and non-Core areas within the overall Project Area were further categorized based on existing and zoned land uses. The Project Area was divided into five Tier Areas (Figure 3-4), a description of which is provided below:

## Tier 1

Tier 1 is defined as the area in which current oil and gas activity is the primary land use. The well and activity densities preclude almost all other uses. According to DOGGR well information,

87% of all active oil and gas wells within the Project Area in 2014 were located within Tier 1 Areas.

The Tier 1 areas were developed through the use of well location database and oilfield Administrative Boundary geographic information system (GIS) shape files for District 4 obtained from DOGGR. Tier 1 areas generally include all quarter-quarter Sections (40 acres) that contained a minimum of four wells.

Tier 1 does not include sensitive land uses, such as schools, daycare centers, hospitals, cemeteries, etc. It should also be noted that the quarter-quarter Sections that contained Important Farmlands, as identified by the Department of Conservation's (DOC's) Farmland Mapping and Monitoring Program for Kern County, are included in Tier 2, rather than Tier 1, as described below.

# Tier 2

Tier 2 includes all lands within the following agricultural zone districts that are not within Tier 1:

- All land that is zoned Exclusive Agriculture (A); and
- All land that is zoned Limited Agriculture (A-1).

Tier 2 also includes the following Important Farmlands identified by the DOC Farmland Mapping and Monitoring Program for Kern County 2012, which is the most recent available data:

- Prime Farmland;
- Farmland of Statewide Importance;
- Unique Farmland; and
- Confined Animal Agriculture.

# Tier 3

Tier 3 is defined as zone districts where historic drilling activity has been or could have been approved as "Unrestricted" or "Ministerial" under the existing Zoning Ordinance, and those areas that are not categorized as Tiers 1 or 2. These Zone Districts include:

- Natural Resource (NR);
- Recreation Forestry (RF);
- Light Industrial (M-1);
- Medium Industrial (M-2);
- Heavy Industrial (M-3);
- Floodplain Primary (FPP);

- Drilling Island (DI); and
- Zone districts that have a Petroleum Extraction (PE) combining district.

## Tier 4

Tier 4 consists of all zone districts where oil or gas exploration and production activities are currently or proposed to be allowed with a CUP. These zone districts include:

- Estate District (E);
- Low-density Residential (R-1);
- Medium-density Residential (R-2);
- High-density Residential (R-3);
- Commercial Office (CO);
- Neighborhood Commercial (C-1);
- General Commercial (C-2);
- Highway Commercial (CH);
- Platted Lands (PL); and
- Mobile Home Park (MP).

Authorized oil and gas activities in Tier 4 are subject to approval of a CUP in accordance with 19.104 of this Title. The Open Space (OS) zone district includes those areas where oil or gas exploration and production activities are prohibited, but ancillary facilities are an allowable use.

## Tier 5

Tier 5 are areas including current and future Specific Plan boundaries either adopted with a Special Plan Zone District or which include specific provisions for oil and gas operations. Oil or gas exploration and production activities would be allowed with a CUP or as permitted by the regulations contained within the adopted Specific Plan(s) in Tier 5 areas.

## Non-Jurisdictional Areas

Non-Jurisdictional Areas are those areas where Kern County currently does not have land use authority or zone districts where oil or gas exploration and production are prohibited. These areas include lands under the administration of the Federal Government, State of California, and incorporated cities.

The land area within each Tier (in acres) is provided on Table 3-4.

**Table 3-4: Summary of Tier Acreages**

| Tier | Acreage [1] | |
|---|---|---|
| Tier 1 | | 206,747 |
| Tier 2 | | 1,791,303 |
| Tier 3 | | 16,203 |
| Tier 4 | | 34,450 |
| Tier 5 | | 2,512 |
| Non Jurisdictional Land | | 283,828 |
| Federal | 117,138 | |
| State | 25,548 | |
| Incorp. Cities [2] | 141,142 | |
| Other [3] | | 27,691 |
| **TOTAL [4]** | | 2,362,734 |

Source: Prepared by Ecology and Environment, January 28, 2015.
Notes:
(1) Rounded to nearest 10th of an acre.
(2) Arvin, Bakersfield, Delano, Maricopa, McFarland, Ridgecrest, Shafter, Taft, Tehachapi, and Wasco.
(3) Includes schools, cemeteries, hospitals, and road/freeway rights-of-way.
(4) Total area based on GIS acreage of 3,692 $mi^2$ rounded up to 3,700 $mi^2$ for Project Area.

The new five-Tier zoning structure allows for project-level analysis and mitigation for oil and gas impacts in relation to differing existing and planned land uses.

## 3.4.5 Oil and Gas Conformity Review and Minor Activity Review Process

## Oil and Gas Conformity Review

The following Oil and Gas Conformity Review process would become a mandatory process for all new oil and gas production activities occurring within Kern County (Figure 3-6). The general process is described below.

a) The applicant would submit an Oil and Gas Conformity Review application and site plan to the County with evidence of surface/Land Owner notification. Concurrently, if needed, the Applicant would submit a Notice of Intention (NOI) to DOGGR, together with a copy of the Notice of Determination for this EIR as documentation of CEQA compliance.

b) County Staff would review the Oil and Gas Conformity Application. At the conclusion of a seven business days, the County would issue either:

1) Transmit a copy of the permit issuance to the Applicant, DOGGR, the Mineral Owner, and the Surface/Land Owner, or

2) A memo indicating outstanding items that require additional documentation to the applicant.

If an Applicant receives a Kern County Oil and Gas Conformity Review Issuance, they must still obtain any other necessary State or federal permits, prior to commencing construction of the facility. The Applicant must self-certify their project's compliance with the Zoning Ordinance and applicable mitigation measures during the construction and operation process. The County would provide a County Well Identification number and the Applicant would be required to place a sticker/sign on the wellhead to identify the well. Once the Applicant has completed construction of the oil and gas facilities, as indicated on the approved site plan, they would provide a self-certified statement to the County. Then, the County would "finalize" the Oil and Gas Conformity Review in the Planning and Community Development Department's records. This permit would be active for up to one year. The Applicant may request a one year extension through the Planning Director. If an Applicant wishes to change the approved site plan in the future, they must provide a description of the new oil and gas activities or facilities and submit a new site plan with the proposed change(s), including updated signatures from all requires parties.

If an Applicant receives an outstanding items memo, they must submit evidence documenting compliance with the items addressed in the memo. County Staff would review the submitted information and provide a response to the Applicant within three business days of the documentation submittal. The County will conduct up to three reviews. After the third submittal, if outstanding items are still not submitted, the County will require an in-person meeting with the Applicant, and any consultant processing the application to resolve the issues preventing issuance of the permit. The in-person meeting cannot be waived. The County may request additional fees to supplement the County review process which will be shown in the Ordinance for any reviews past three total (initial application submittal and two reviews).

## Surface/Land Owner Sign-Off Process

Surface/Land owners who are not mineral owners must receive notification of the intention to drill at least 30 days prior to submittal to County of Oil and Gas Conformity Review application, unless they have waived the need for written notification. The written notification must include the County's handout explaining the process and full contact information for the Surface/Land Owner (name, address for contact, phone number and email (if known). The Surface/Land Owner can choose to sign-off or not. If they do sign-off, the conformity process described above would occur. If the surface owner chooses not to sign off, then the following process would occur.

a) The Kern County Planning and Community Development Department would conduct a review of the submitted application.

b) The County would contact the Surface/Land Owner and offer an in-person meeting to review the county process, development and implementation standards, Mitigation

Monitoring and Reporting Program (MMRP) and answer any questions. The Applicant would not be present and no facilitation of the negotiations would be offered or provided.

c) One of the following responses would be provided to the Applicant 30 business days after application submittal.

   1) The County would provide zoning issuance of the Oil and Gas Conformity Review for the proposed Oil and Gas land use activity(s);

   2) The County would provide a memo to the Applicant indicating outstanding items that require documentation prior to zoning issuance, then the process described in item (b) of the previous section would be followed; or

   3) Should the Applicant receive Surface/Land Owner sign off and provide the County with a site plan that includes the surface owner's signature(s), then the process described item (b) in the Oil and Gas Conformity Review section would be followed.

# Minor Activity Review

The following Minor Activity Review process would become a mandatory process for all minor activities occurring within Kern County (Figure 3-6). The general process is described below.

a) The applicant would submit a Minor Activity Review application to the County with evidence of surface owner notification.

b) County Staff would review the Application. At the conclusion of a seven business days, the County would issue either:

   1) Transmit a copy of the Minor Activity Review Issuance to the Applicant, Mineral Owner, and the Surface/Land Owner, or

   2) A memo indicating outstanding items that require additional documentation to the Applicant.

If an Applicant receives issuance, they must still obtain any other necessary State or federal permits, prior to commencing construction of the facility. The Applicant must self-certify their project's compliance with the Zoning Ordinance and applicable mitigation measures during the construction and operation process. Once the Applicant has completed construction of the oil and gas facilities, they would provide a self-certified statement to the County. Then, the County would "finalize" the Oil and Gas Conformity Review in the Planning and Community Development Department's records. This permit would be active for up to one year. The Applicant may request a one-year extension through the Planning Director. If the Applicant wishes to change the approved permit in the future, they must provide a description of the new oil and gas activities or facilities and must submit a new site plan with the proposed change(s), including updated signatures from all requires parties.

If an Applicant receives an outstanding items memo, they must submit evidence documenting compliance with the items addressed in the memo. County Staff will review the submitted information and provide a response to the project applicant within 3 business days of the

documentation submittal. The County will conduct up to three reviews. After the third submittal, if outstanding items are still not submitted, County will require an in person meeting with the Applicant, and any consultant processing the application to resolve the issues preventing issuance of the permit. The in-person meeting cannot be waived. The County may request additional fees to supplement the County review process which will be shown in the Ordinance for any reviews past 3 total. (Initial application submittal and two reviews.)

## 3.5 Potential Future Oil and Gas Development Scenario

This section provides a description of the potential future drilling and operational activities that could occur within the Project Area. For analytical purposes, as described in Chapter 2, Introduction, this EIR assumes that 2,697 new producing wells per year—a relatively high level of new oil and gas production activity—would be projected to occur each year for the next 20 years. In practice, annual activity levels would likely be lower. There is no scheduled expiration date for a Zoning Ordinance, and the development standards and conditions specified in the Amended Zoning Ordinance would continue to apply unless and until the Zoning Ordinance is amended again. Further environmental review would not likely be needed for annual oil and gas activities that qualify for ministerial permits under the Conformity Review Process, so long as the annual projected activity level is not exceeded (e.g., no more than 2,697 new producing wells are drilled in a single calendar year) and the total projected activity level assumed to occur over the next 25 years is not exceeded (e.g., no more than 67,425 wells are drilled). However, at the point that either the annual Project activity level or total projected activity level is exceeded, the County will need to consider whether the exceedance triggers further CEQA review in accordance with the criteria provided in CEQA (Pub. Res. Code) Section 21166 and CEQA Guidelines Section 15162 (e.g., due to new or substantially more severe significant environmental impacts than those considered in this EIR). If the criteria for subsequent or supplemental CEQA review are met, further review would be required for continued reliance on the Conformity Review Process.

By amending the existing Zoning Ordinance to provide a new review process and site development standards, the Proposed Project would provide for the continuation of existing oil and gas activity, which would have continued even if there were no project, under current zoning. As such, the Potential Future Oil Development Scenario represents a continuation of existing oil and gas activities that, in conventional CEQA analysis, would be considered baseline conditions. If anything, the Proposed Project's impacts on the existing environment would be beneficial by imposing new site development standards which incorporate more stringent, environmentally protective conditions than exist in the current Zoning Ordinance.

This Draft EIR takes a more environmentally conservative approach to the impact analysis. The future environmental impacts associated with new oil and gas activities subject to approval by the County, utilizing the new Oil and Gas Conformity Review process, are considered impacts of the Proposed Project.

For example, air emissions associated with construction and operation of new wells or new wellbore re-entry activities (e.g., deepening, redrilling, workovers, reworking etc.), all subject to Oil and Gas Conformity Review under the amended Zoning Ordinance, are attributed to the

Proposed Project even though these emissions have occurred in the past and are likely to occur at the same levels in the future whether or not the ordinance is amended. In addition, emissions from operation of ancillary facilities are attributed to the wells that receive Oil and Gas Conformity Review, on a per-well basis, even though a specific well may utilize existing ancillary facilities that have emitted in the past and are likely to continue emitting at the same levels in the future, whether or not the ordinance is amended. Thus, all construction and operational emissions from, and associated with, wells that are subject to Oil and Gas Conformity Review are treated as new emissions of the Proposed Project, regardless of whether or not County-wide emissions would change from historic baseline levels as a result of the amended ordinance.

It should be emphasized that this approach differs from the conventional use of baselines in CEQA impact analysis. In the conventional analysis, the anticipated County-wide emissions after the Proposed Project zoning amendments take effect would be estimated, and then the baseline emissions from existing oil and gas activities would be subtracted from post-Project emissions, in order to determine the extent of impacts attributable to the Proposed Project. As a simplistic example, assuming that the average historic levels of oil and gas activities that generate air emissions do not change at all after the Zoning Ordinance amendments take effect, emissions would remain constant at the baseline, or perhaps even decline due to implementation of the performance standards that would be required by the amended ordinance. By definition, so long as the baseline standards were not exceeded, there would be no air quality impacts, even if thousands of new wells were drilled and began operating. By contrast, in the analytic approach in this Draft EIR, post-Project emissions have been evaluated to identify impacts without subtracting baseline emissions. Thus, even if County-wide emissions remain constant at the baseline, the air quality impacts of the Proposed Project would be determined by the total operational emissions of the new wells and ancillary activities approved under the amended Zoning Ordinance.

This analysis is more conservative than the conventional approach, by capturing ongoing environmental effects that otherwise would come under the baseline. Moreover, the conventional approach would not serve the objective of providing an environmental analysis that can be relied on by DOGGR and other responsible agencies in their own permitting and approval processes, as well as by Kern County.

The Draft EIR applies a similar approach to other categories of environmental impacts, although the details vary for some impact categories. For example, land disturbance, habitat loss and biological resource impacts associated with construction and operation of wells (and related ancillary facilities) that receive Oil and Gas Conformity review would be considered impacts of the Proposed Project. However, land disturbance, habitat loss and other biological resource impacts associated with pre-existing wells, constructed under the current Zoning Ordinance, are part of the baseline and not impacts of the Proposed Project. Unlike air emissions, which are emitted anew each day even if just due to continuing a pre-existing activity, land that has been disturbed remains in its disturbed state unless it is restored. As Communities for a Better Environment v. South Coast Air Quality Management District (2010) 48 Cal. 4th 310 emphasized, EIRs should not use a hypothetical baseline of conditions that do not actually exist;

therefore, this EIR does not assume a pristine, pre-oil and gas landscape where none currently exists. Similarly, the analysis of aesthetics/visual impacts takes into account existing permanent installed facilities and existing disturbed landscapes.

## 3.5.1 Potential Future Drilling of New Wells

Over the next 25 years, this EIR conservatively assumes that an average of 2,697 new producing wells per year could be drilled in the Project Area. Table 3-5 through 3-8 provide an annual breakdown of potential drilling activities for years 2015 through 2040 for the Western, Central and Eastern Subareas, and for the Tiers. The level of well drilling in any given year may be higher or lower than this average, consistent with the variations in well drilling activities that have historically occurred due to market and other conditions.

**Table 3-5: Annual Well Forecast - Project Subareas (1)**

| Well Type | Subarea | | | Total |
|---|---|---|---|---|
| | Western | Central | Eastern | |
| New Producing Wells (2) | 1,730 | 131 | 836 | **2,697** |
| Water Disposal | 30 | 5 | 13 | 48 |
| Water Flood Injectors | 153 | 2 | 3 | 158 |
| Idle Wells, Non-Cyclic | 256 | 19 | 105 | 381 |
| Observation Wells | 43 | 1 | 13 | 56 |
| Steam Flood Injectors | 231 | 4 | 69 | 304 |
| Air Injection | 0 | 0 | 0 | 0 |
| Gas Disposal | 4 | 0 | 1 | 5 |
| **TOTAL NEW WELLS (ANNUALLY)** | **2,447** | **162** | **1,040** | **3,649** |
| Cyclic Wells | 977 | 0 | 668 | 1,645 |
| SB 4 Activities | 1,050 | 125 | 25 | 1,200 |
| Plugged & Abandoned | 1,831 | 38 | 352 | 2,221 |

Notes:
(1) Source = CATC (with County team modifications)
(2) Producing Wells = Oil and Gas, Dry Gas, Dry Hole and Liquid Petroleum Gas Wells

**Table 3-6: Annual Well Forecast (By Tiers), Western Subarea (1)**

| Well Type | Tier 1 | Tier 2 | Tier 3 | Tier 4 | Tier 5 | Total |
|---|---|---|---|---|---|---|
| New Producing Wells (2) | 1,630 | 74 | 15 | 10 | 1 | **1,730** |
| Water Disposal | 25 | 5 | 0 | 0 | 0 | **30** |
| Water Flood Injectors | 149 | 4 | 0 | 0 | 0 | **153** |
| Idle Wells, Non-Cyclic | 213 | 43 | 0 | 0 | 0 | **256** |

**Table 3-6: Annual Well Forecast (By Tiers), Western Subarea [1]**

| Well Type | Tier 1 | Tier 2 | Tier 3 | Tier 4 | Tier 5 | Total |
|---|---|---|---|---|---|---|
| Observation Wells | 42 | 1 | 0 | 0 | 0 | **43** |
| Steam Flood Injectors | 228 | 3 | 0 | 0 | 0 | **231** |
| Air Injection | - | 0 | 0 | 0 | 0 | **-** |
| Gas Disposal | 4 | 0 | 0 | 0 | 0 | **4** |
| **TOTAL NEW WELLS (ANNUALLY)** | **2,292** | **128** | **15** | **10** | **1** | **2,447** |
| Cyclic Wells | 938 | 39 | 0 | 0 | 0 | **977** |
| SB 4 Activities [3] | 989 | 45 | 9 | 6 | 1 | **1,050** |
| Plugged & Abandoned | 1,596 | 222 | 12 | 0 | 1 | **1,831** |

Notes:
(1) Source = CATC (with County team modifications)
(2) Producing Wells = Oil and Gas, Dry Gas, Dry Hole and Liquid Petroleum Gas Wells
(3) Tier Distribution of SB-4 Activities is assumed to be the same percentage as Distribution of New Producing Wells

**Table 3-7: Annual Well Forecast (By Tiers), Central Subarea [1]**

| Well Type | Tier 1 | Tier 2 | Tier 3 | Tier 4 | Tier 5 | Total |
|---|---|---|---|---|---|---|
| New Producing Wells [2] | 100 | 20 | 5 | 5 | 1 | 131 |
| Water Disposal | 4 | 1 | 0 | 0 | 0 | 5 |
| Water Flood Injectors | 2 | 0 | 0 | 0 | 0 | 2 |
| Idle Wells, Non-Cyclic | 16 | 3 | 0 | 0 | 0 | 19 |
| Observation Wells | 1 | 0 | 0 | 0 | 0 | 1 |
| Steam Flood Injectors | 4 | 0 | 0 | 0 | 0 | 4 |
| Air Injection | 0 | 0 | 0 | 0 | 0 | 0 |
| Gas Disposal | 0 | 0 | 0 | 0 | 0 | 0 |
| **TOTAL NEW WELLS (ANNUALLY)** | **127** | **24** | **5** | **5** | **1** | **162** |
| Cyclic Wells | 0 | 0 | 0 | 0 | 0 | 0 |
| SB 4 Activities [3] | 95 | 19 | 5 | 5 | 1 | 125 |
| Plugged & Abandoned | 33 | 5 | 0 | 0 | 0 | 38 |

Notes:
(1) Source = CATC (with County team modifications)
(2) Producing Wells = Oil and Gas, Dry Gas, Dry Hole and Liquid Petroleum Gas Wells
(3) Tier Distribution of SB-4 Activities is assumed to be the same percentage as Distribution of New Producing Wells

**Table 3-8: Annual Well Forecast (By Tiers), Eastern Subarea [(1)]**

| Well Type | Tier 1 | Tier 2 | Tier 3 | Tier 4 | Tier 5 | TOTAL |
|---|---|---|---|---|---|---|
| New Producing Wells [(2)] | 700 | 75 | 50 | 10 | 1 | 836 |
| Water Disposal | 11 | 2 | 0 | 0 | 0 | 13 |
| Water Flood Injectors | 3 | 0 | 0 | 0 | 0 | 3 |
| Idle Wells, Non-Cyclic | 88 | 18 | 0 | 0 | 0 | 105 |
| Observation Wells | 13 | 0 | 0 | 0 | 0 | 13 |
| Steam Flood Injectors | 68 | 1 | 0 | 0 | 0 | 69 |
| Air Injection | 0 | 0 | 0 | 0 | 0 | 0 |
| Gas Disposal | 1 | 0 | 0 | 0 | 0 | 1 |
| **TOTAL NEW WELLS (ANNUALLY)** | **883** | **96** | **50** | **10** | **1** | **1,040** |
| Cyclic Wells | 641 | 27 | 0 | 0 | 0 | 668 |
| SB 4 Activities [(3)] | 21 | 1 | 0 | 0 | 0 | 25 |
| Plugged & Abandoned | 307 | 43 | 2 | 0 | 0 | **352** |

Notes:
(1) Source = CATC (with County team modifications)
(2) Producing Wells = Oil and Gas, Dry Gas, Dry Hole and Liquid Petroleum Gas Wells
(3) Tier Distribution of SB-4 Activities is assumed to be the same percentage as Distribution of New Producing Wells

While it is not possible to identify the exact location of each of these future wells, these locations have been grouped into the three Subareas described above. Within each Subarea, future well locations are further predicted to occur by Core Area, since over 95% of historic oil and gas activities occurred within Core Areas and this pattern is assumed to continue in the future.

## 3.5.2 Oil and Gas Activities

As described above, the proposed Project consists of both an amendment to Kern County Zoning Ordinance, Chapter 19.98 (Oil and Gas Production), and related sections of the Kern County Zoning Ordinance, and the implementation of future oil and gas development activities expected to be undertaken pursuant to the amended ordinances. Oil and gas activities are comprised of a number of different components, beginning with geophysical exploration, and ending with well plugging and abandonment. The early stages of well drilling and testing are of short duration, lasting a few days up to a month or more at any specific location, while production may last for many years. Well plugging and abandoning lasts only a few days and the site is reclaimed or repurposed.

For the purposes of this EIR, oil and gas activities have been divided into two sets of components: (1) construction activities, which include both initial construction activities (e.g., well pad construction, drilling, and installation of new wells or construction of new ancillary equipment facilities, modification of existing wells and equipment through "reworking" or re-drilling

existing wells, and dismantling or removal of equipment and well abandonment); and (2) operational activities, including the routine maintenance and operation of equipment. Construction activities have a limited duration in any one location (e.g., a particular well pad); however, due to the volume of oil and gas activity in Kern County, these construction activities routinely occur throughout the Project Area. The purpose of this methodology is not to imply a specific chronological sequence of events, but rather to group together short-term activities with similar potential impacts for analysis purposes as distinct from long-term activities during production.

# Overview of Construction Activities

Exploration and development involves geophysical testing and drilling test (exploration) wells to assess the quality and quantity of oil and natural gas present in a previously undeveloped location either inside or outside the administrative boundaries of an existing wellfield. Assuming successful testing, additional wells are drilled until the extent of the reservoir is determined. The field is then further developed by constructing additional wells and installing gas and oil processing equipment and transportation facilities.

Wells may also need to be "re-worked" during the operating life span of the well, to adjust for evolving field conditions or new technologies (e.g., well stimulation). Finally, decommissioning and abandonment involves well abandonment and plugging activities. Accordingly, while construction activities are considered separately from operational activities because of their limited duration, activities categorized as "construction" occur continually throughout exploration, development, production, and closure.

## Itemized Construction Activities

Exploration, development, production, and closure involve the following short-term construction activities. At a particular site, these activities may take place in the order listed below or in a different sequence:

- Geophysical Surveys;
- Well Pad Preparation;
- Testing;
- Access Road Construction;
- Electrical Distribution Line and Substation Construction;
- Drilling;
- Well Completion;
- Construction of Oil, Gas Treatment Facilities;
- Construction of Water Treatment Facilities;
- Steam Generator Construction;

- Construction of Tankage and Containment Structures;
- Pipeline Installation;
- Construction of Sumps, Evaporation Ponds and Percolation Ponds;
- Installation of Produced Water Injection Wells;
- Construction of Fencing;
- Administrative Facility Construction;
- Well Re-Working and Workovers;
- Well Stimulation;
- Decommissioning and Abandonment; and
- Reactivation of Idle Wells.

## Itemized Operational Activities

During well operations, when oil is being produced, the following routine operations and maintenance activities occur at well locations:

- Geophysical Monitoring;
- Treatment of Produced Water, Oil and Gas;
- Water Management;
- Enhanced Oil Recovery (EOR) Activities;
- Injection Wells (Class II Fluids);
- Sumps;
- Percolation and Evaporation Ponds;
- Vegetation Control;
- Spill Prevention, Control, and Countermeasure (SPCC) Procedures;
- Non-Hazardous Solid Waste Management;
- Well, Pipeline, Tank and Vessel Testing and Maintenance;
- Centralized Oil/Water Separation;
- Steam Generators;
- Electric Distribution Line and Substation Maintenance;
- Access Road Maintenance;
- Distribution of Crude Oil; and
- Administrative Building and Personnel Housing.

In addition to oil and gas wells, installation and operation of ancillary equipment and facilities are integral components of oil and gas exploration and production. All wells, for example, are connected by pipelines to tanks that separate oil from the other extracted liquids (primarily "produced water" from the same geologic strata as the oil or gas, along with water and additives that may be injected as steam or liquid to help extract the oil). Wells also have monitoring devices, and may have electric and telecommunication equipment, and waste gas collection lines.

"Tank farms" that include tanks for separating oil and water, and storing both, typically serve several wells and vary in size and distance from wells. Produced water collected in tanks is typically re-used for further extraction purposes, stored in surface impoundments where it percolates into groundwater and/or evaporates, or disposed of by injection well. Some produced water requires treatment prior to reuse for extraction, or disposal, and some produced water is treated and reclaimed for other purposes, as discussed further in Section 4.9, Hydrology and Water Quality, and Section 4.17, Utilities and Services.

Extraction technologies also include injecting large volumes of water (water flooding) or steam (steam flooding) into production strata, and managing the time that each well is active and idle to maximize the recovery efficiency. Additional ancillary equipment and facilities required for these enhanced recovery methods include producing steam, and pressurizing steam or water, typically through larger cogeneration plants serving the wellfields where these techniques are utilized.

Personnel conducting wellfield construction, maintenance and operating activities are typically dispatched from centralized facilities (most located in Bakersfield), although some workers are staffed onsite, especially at larger oilfields.

More information about each of these Project activities is provided below.

## 3.5.3 Construction Activities in Detail

# Exploration and Development

The purpose of exploratory wells is to find new deposits of hydrocarbons or to define the lateral limits of hydrocarbons outside of a known producing area and then develop the site for production. Activities that occur during this exploration and development process include geophysical surveys, access road and well pad construction, drilling, well completion, and testing, and distribution line construction. In addition, temporary equipment, such as storage tanks and other equipment, are placed in the drilling area.

Once the reservoir boundaries have been established, infield wells may be drilled within the field boundaries to fully develop the reservoir. Activities for infield wells may include well pad construction, access road construction, and flowline construction.

# Geophysical Surveys

Geophysical surveys may be conducted to determine the extent of natural gas and oil reserves present, and whether such resources warrant additional development. Geophysical surveys generate low-frequency sound waves by various means, and the data are recorded by small geophones that have been strategically placed within the survey area. The energy source is applied using specialized trucks to vibrate the ground (vibroseis), or detonating charges underground (shothole). Both of these methods include the deployment and recovery of geophone receivers that are connected by cables to a recording station (seismograph) mounted on a specialized truck. The vibroseis technique utilizes truck-mounted vibroseis units to generate vibrations. The shothole technique utilizes holes drilled in a variable spacing pattern, usually less than 60 feet deep with a diameter of 3 to 5 inches. Explosive charges are placed in the holes and detonated to generate seismic waves that are recorded by the seismograph. Explosive charges are required in areas of steep terrain where a vibroseis source cannot safely operate or where farmers indicate a preference (i.e., orchards where low branches cannot accommodate vibroseis units or tilled fields where vibration will damage crops). Electronic encoded detonation caps and biodegradable charges are used to ensure the safety of shothole operations.

# Well Pad Preparation

Preparation of both the exploratory and development well pads begins with clearing and grading an area to accommodate the well and any drilling activities or ancillary facilities that may be required. After the well pads are developed, the drilling rig is moved onto the well pad and set up. Temporary facilities, equipment, and materials necessary for the drilling operation may also be set up and stored on the well pad (i.e., drilling mud supplies, water, drilling materials and casing, crew support trailers, pumps and piping, portable generators, field flares, fuels and lubricants, etc.). Containments (temporary pits, operations sumps and/or portable tanks) may be set up to store drilling fluids, wellbore cuttings, and drilling wastes. Portable tanks may also be set up to mix and store other needed liquids or slurries, such as drilling fluids and completion fluids.

The size of the well pad is dependent upon the size of the drilling rig footprint, the number of wells anticipated to be drilled on the pad, the type of equipment that would be placed on the well during production, the depth of the well, and the number of additional wells (if any) from this well pad. The drilling support equipment is dependent upon the depth of the well and the type of activities required for production. For example, a deeper well requiring hydraulic fracturing would necessitate a larger well pad because more space would be needed for vehicles, pumps, and storage equipment. In contrast, a shallower well would require less equipment and, therefore, a smaller well pad.

Because the depth to formation varies throughout the Project Area, the amount of land required for well pad construction varies accordingly. In general, the deepest wells are located in the Central Subarea, and the shallowest wells are located in the Eastern Subarea. As discussed in Appendix F, existing land use disturbance associated with oil and gas exploration and production activity in each Subarea was analyzed by dividing the total observed disturbance acreage by the number of production wells in the 10 largest oil fields located in each Subarea. This methodology

accounts for well pad size and ancillary disturbance variability—such as tanks, roads, and administrative facilities—that reflects construction and operational conditions in each Subarea. The observed average disturbance per production well in each Subarea was further increased to provide a conservative assessment of potential Project impacts. The disturbance acreage that is assumed to occur for each new production well in the Project Area varies by Subarea as follows:

- Western Subarea: 2 acres
- Central Subarea: 3 acres
- Eastern Subarea: 1.2 acres

These estimates assume that each new well would require new land disturbance for well pad construction, ancillary facilities, access, infrastructure and other construction and operational activities. The actual level of new disturbance associated with each production well would be lower in the event that, as is likely to occur in more developed oil fields, existing disturbed areas, such as existing roads, ancillary facilities, and infrastructure, are used under future conditions. The calculation of potential future disturbance by Subarea is discussed in detail in Appendix F.

## Testing

After an exploratory or other well is completed, monitoring and sampling is initiated to determine whether the area should be further developed for production. For an exploratory well, oil and water are typically produced into temporary tanks, while any associated gas may be burned off using a permitted temporary flare at the well site, or used to power the artificial lift for the well. For a development well or in-fill activities, the well is connected to the field infrastructure that pipes the production to a centralized facility during the testing phase. These facilities have equipment to separate and process all of the production (oil, gas and water) for sale. The produced oil/water mixture is then separated via gravity or centrifugal separation, and the oil-to-water ratio is recorded.

## Access Road Construction

If an existing road cannot be used to access a new well location, a new road would be extended from adjacent existing roads. Access roads are typically 16 to 20 feet in width and vary in length, depending upon the distance from an existing roadway. The potential new land disturbance that could be associated with future access road construction is included in the disturbance acreage estimates discussed above and in Appendix F. Access road construction typically includes clearing of vegetation and grading to provide a flat surface. Dust suppression and soil compaction activities would also be conducted. Although some access roads may be paved, it is assumed that almost all (95%) of new access roads would be unpaved dirt roads.

Exploratory wells generally would require the construction of new roads, rather than the extension of an existing road. By contrast, for development of in-fill wells, extension of an existing road up to several hundred feet would be typical. Both the roadbed and shoulder areas of all roads would be maintained during drilling and production to provide a smooth surface and

adequate drainage. Repairs, such as culvert repairs and replacements, would also correct normal wear and tear or storm damage.

## Electrical Distribution Lines and Substations

Distribution lines are used to supply power to individual wells. During exploration, if an electrical distribution line is not readily available, a diesel-powered generator may be used to provide power to a well in a remote location. Depending upon the commercial success of the exploration well and the extent of the oil and gas reservoir, if additional wells are drilled, electrical distribution lines would be extended to the new wells. If the existing electrical distribution system is not adequate, additional electrical facilities and distribution system may be constructed.

Electrical distribution lines would be connected to the public utility transmission grid via a local electrical substation. The California Public Utilities Commission (CPUC) defines distribution lines as electrical lines under 50 kilovolts (kV). CPUC General Order 131-D exempts distribution lines from CPUC review; however, utility companies need approval from local jurisdictions regarding land use.

For the purposes of this analysis, it was assumed that for each well 467 feet of distribution line would be constructed. Distribution lines are assumed to be suspended from wooden poles 30 feet tall. Electrical conductor (wire that conducts electricity) is 12 kV and is stepped down to 480 volts before being connected to individual motors. Electrical distribution poles are typically approximately 200 feet apart and would be scattered throughout the site, depending upon the number of wells or other equipment requiring electricity. Distribution poles are assumed to be constructed along the existing access road rights-of-way (ROWs) or within the well pad area. Therefore, ground disturbance for distribution line construction was assumed to be included in the new oil and gas well disturbance acreages.

Activities associated with distribution lines include the installation, use, maintenance, modification, repair, replacement, and removal of subsurface, surface, and aboveground lines. Switching and transformer facilities are also typical oilfield infrastructure to manage electrical distribution facilities. In contrast to onsite “distribution lines” (i.e., below 50 kV), which are extended, as necessary, to supply power to individual wells and equipment, “transmission lines” are defined by the CPUC as 50 kV and above and are used to transport large amounts of power from the source of electricity generation (a power plant) to industrial, commercial, and population centers. Extending existing high-voltage electric transmission lines (i.e., lines above 50 kV) to provide a permanent supply of electricity to a new well pad or facility may be required. However, transmission lines above 50 kV are regulated by the CPUC and would require separate project-level CEQA review. Construction of new transmission lines is not within the scope of this EIR.

# Drilling and Well Completion

## Drilling

Well drilling is the process of drilling a hole in the ground for the purpose of extracting crude oil or natural gas resources or for the injection of a fluid from the surface into a subsurface oil or gas reservoir. Drilling may be "exploratory" or "development" (sometimes referred to as "in-fill" drilling. Exploratory drilling is intended to verify where hydrocarbon deposits exist, or to define the lateral limits of hydrocarbons outside of a known producing area (referred to as a "step-out zone"). Development or in-fill drilling is intended to maximize recovery of oil and natural gas within the defined and known subsurface reserves as established during the exploratory phase. Development drilling consists of drilling wells to extract known hydrocarbon resources to efficiently maximize the development of the reservoir or field. Most current drilling projects are classified as development or in-fill within existing administrative boundaries of oilfields. In addition to exploratory wells, production wells, and injection wells, other wells may include observation wells, which are used to monitor reservoir temperatures, or water monitoring wells, which are used to observe and monitor water quality.

After the well pad is prepared, the drilling rig and associated equipment would be brought to the site and assembled. While the number of workers required for drilling may vary, it is anticipated that 12 workers would be required per well. Due to the complexity of drilling and the hazards associated with leaving a well unattended during the drilling process, drilling operations are conducted 24 hours a day. Night lighting is required in order to maintain continuous drilling operations.

During a standard hydraulic fracturing operation, there are up to approximately eight to 15 employees on each shift, and usually no more than one shift is needed per day. Additional personnel from the owner/operator may be onsite to observe and run ancillary equipment, as necessary.

Although the depth of each well varies, wells in the Western Subarea average 2,305 feet, wells in the Central Subarea average 10,414 feet, and wells in the Eastern Subarea average 2,220 feet. Depending upon the depth of the formation, some wells may take less than 24 hours to drill, while some wells in deeper formations may take more than 60 days to drill. For the purposes of the EIR, it is assumed that wells take 23 days to drill on average, ranging from a minimum of 18 days to a maximum of 28 days, depending on well depth. While drilling continues, temporary oil, water, and gas handling equipment, such as tanks, vessels, pumps, and compressors, would be located onsite, as needed. Depending upon the location of the operation and the intensity of activities in the area, drill rigs would be powered by diesel- or gasoline-fueled generators or by local electrical service, where available, as described above in the "Distribution Lines" subsection.

All drilling activities would occur on the well pad.

## Well Completion

After a well has been drilled, well completion activities are conducted. Well completion activities include the following:

- **Casing and Cementing:** Production casing (metal pipe) is set into the wellbore at the appropriate depth in compliance with DOGGR requirements. Drilling mud is first pumped through the casing to ensure consistent and unrestricted circulation of fluids in the wellbore. Cement is then pumped into the casing via a cement truck, the volume of which depends upon the specific requirements of that well. When the cement reaches the bottom of the casing, it flows out of the casing and up into the space between the wellbore and casing until it reaches the surface. This process encapsulates the casing in a cement sheath, isolating the casing from the surrounding geologic formation. The hydraulic isolation formed by the hardened cement protects groundwater by preventing oil and gas reservoirs and the groundwater from contaminating each other and seals the hydrocarbon zone. This seal allows the drilling crew at the surface to control the fluid extraction process. Casing and cementing is completed as stipulated by DOGGR regulations and in accordance with Title 14 CCR, Division 2, Chapter 4, Subchapter 1, Article 3, Sections 1722, 1722.2, 1722.3, 1722.4, 1722.5 and 1722.6. DOGGR engineers are required to be present for tests and other operations, and additional casing is required in freshwater zones to protect water quality, as well as to seal off anomalous pressure zones and isolate production.
- **Open-Hole vs. Cased-Hole Completion:** An "open-hole" completion refers to a well that is drilled to the top of the hydrocarbon reservoir. The well is then cased and cemented with the only hole in the casing being at the bottom. Also known as "top sets" and "barefoot" completions, open-hole completions are used to reduce the cost of casing where the reservoir is consolidated (e.g., where a reservoir is encapsulated in a solid geologic formation, such as a larger reservoir encased in bedrock). In contrast, a "cased-hole" completion requires casing to be run farther into the reservoir. Special tools, such as perforation guns, are then lowered into the casing until they reach reservoir level, and used to perforate the casing and cement, thereby creating holes into the reservoir. The holes in the casing and cement allow hydrocarbons to flow into the casing and up to the surface. Cased-hole completion is effective when the reservoir is less consolidated (e.g., when there are dispersed pockets of hydrocarbons throughout the reservoir).
- **Sand Control Techniques:** Depending upon the formation, a filtration system may be required to allow production of formation fluids while restricting the entry and production of formation sand. If necessary, a casing liner, which is a type of casing with holes or slots placed opposite a producing formation, is used to prevent sand from entering the well. Additionally, gravel packing is a method used in which a slotted or perforated liner, often wire-wrapped, is placed in the well and surrounded by gravel. If open-hole, the well is sometimes enlarged by underreaming at the point where the gravel is packed. The mass of gravel acts as a filter, which excludes sand from entering the wellbore, but allows the continued flow of hydrocarbons.

- **Wellhead Installation:** Wellhead installation (also known as a "production tree" or "Christmas tree") and pumping unit installation are the final steps in the well completion process. The wellhead device includes casing heads and a tubing head and allows operators to control subsurface conditions from the surface of the well.
- **Flowline Installation:** Flowlines are typically built for new wells and are installed aboveground on concrete or wooden sleepers or metal pipe supports. The pipeline runs from the nearest gauge station to the edge of the well location. Gauge stations serve as collection points for production fluids from nearby wells and allow for the flow testing (oil and water) of each well. The final section of flowline connecting to the wellhead is installed after the drilling rig finishes drilling the well and moves off the location.
- **Artificial Lift System:** Most wells require some form of artificial lift to bring produced fluids from the reservoir to the surface and move the fluids to a tank farm. The most common type of artificial lift is the pumping unit working in conjunction with a sucker rod pump system. These systems consist of a prime mover (usually an electric motor), a gear reducer, the pumping unit that translates the rotating motion of the electric motor into reciprocating motion, the sucker rod string that extends down the well bore inside a production tubing string, and the subsurface pump located near the bottom of the well. A production rig is usually required to install the downhole components of the system (tubing, rod string, and pump). The pumping unit is installed immediately adjacent to the wellhead such that the reciprocating motion will alternate between lifting and lowering the rod string. A column of production fluid will be further lifted inside the tubing string with each stroke of the pumping system. Artificial lifts may be powered by electrical power or in remote locations where electrical infrastructure does not exist, by internal combustion engines. Other types of artificial lifts employed are electrical submersible pumps and gas jacks.
- **Electrical Power**: Electrical power to operate the pumping unit motor is required at each well. Power is distributed throughout the oilfield at the 12kV level and then stepped down to 480v before connection to individual motors. The appropriate motor starter equipment is installed near each well.
- **Workover Rig**: Well completions may occur with the drilling rig onsite or the drilling rig may be removed. A workover rig could replace the drilling rig or the completion design may be rigless.

# Oil and Gas Treatment Facility Construction

Production fluids from the wells must be separated into the individual components prior to sale or custody transfer to pipeline systems. In larger oil fields, produced gas is typically first separated from the oil and water liquids at a centralized gas treatment plant. The liquid oil and water (typically a mixture composed of 3 to 10% oil and 90 to 97% water) are further separated at oil treatment facilities, such as tanks in smaller operations, or in treatment plants in larger oil fields. The oil, gas and produced water separation and treatment process and related facilities area described in more detail below. The potential new land disturbance that could be associated with

future oil, gas and produced water treatment plants and facilities is included in the disturbance acreage estimates discussed above and in Appendix F.

## Water Treatment Facility Construction

Water treatment facilities are generally used to treat produced water for reuse in enhanced oil recovery (EOR) activities. EOR treatment generally involves water softening or removal of salts and other constituents for steam generation purposes. As discussed in Section 4.9, produced water is also treated and blended with other water sources by the Cawelo Water District in the Eastern Subarea for agricultural irrigation purposes. Depending on facility design and intensity of the treatment process, the facilities can also provide for reuse of the produced water, including but not limited to, agricultural irrigation, land restoration, and animal stock drinking water. It was assumed that for every 27 wells, a centralized water treatment plant would be constructed, and the average water treatment plant would require 0.11 acres of disturbance. The potential new land disturbance that could be associated with future EOR and agricultural reuse produced water treatment plants and facilities is included in the disturbance acreage estimates discussed above and in Appendix F.

## Steam Generator Construction

Thermal enhanced oil recovery production techniques may require the use of steam, which may necessitate the installation of steam generators. Steam generators are large heaters that generate steam, usually from produced groundwater. These generators are typically powered by electricity or natural gas. A thermal generator may be installed at an individual injection site or built in a centralized location to reach multiple injection sites. A water storage tank would be connected to the thermal generator, and aboveground pipelines would connect the thermal generator to the injection sites. The decision to construct a centralized steam generator would be based on whether cogeneration facilities were or were not located nearby, and whether it is more economically viable to build a centralized steam generator rather than a cogeneration facility. The number of wells that can be served by a single steam generator is determined by the amount of steam required to effectively heat the reservoir and the size of the generator unit itself. For the purposes of this EIR, it was assumed that for every 30 to 60 wells, a centralized steam generator would be constructed. The average industrial boiler system would require 1 acre of disturbance per generator. Generators may be co-located with other equipment (e.g., separation tanks, etc.).

Some existing oil and gas production operations utilize cogeneration facilities to provide the steam required for enhanced oil recovery. However, it has been more than 10 years since the last cogeneration facility was proposed and approved. In the intervening years, the electricity markets have changed substantially in ways that make it less attractive to construct new cogeneration facilities in many locations. Due to these changes, it is uncertain whether any new cogeneration facilities would be proposed, and any estimate regarding the number or technology for future cogeneration facilities would be entirely speculative. For these reasons, cogeneration facilities proposed in the future, if any, will require a CUP and separate CEQA review, as appropriate.

## Construction of Tankage and Containment Structures

In compliance with EPA SPCC requirements and DOGGR facilities regulations, secondary containment structures would be constructed around tanks, chemical containers, etc., to ensure that oil or chemicals are not discharged into natural drainage ditches and the environment. Corrugated pipe filled with concrete, concrete berms, and earthen berms are typically used and are designed and constructed to contain a minimum of 110% of the volume of the largest tank that is located within the facility. Various sizes of tanks typically are utilized to store oil prior to offsite transport. Such storage facilities can range in size from small to large tank arrangements with supportive piping and conveyance facilities.

## Pipeline Installation

Pipeline installation activities include new construction and maintenance of pipelines, access roads, related support facilities (e.g., aerial and ground markers, spans, meter sites, etc.), storage tanks, valve stations, regulators, and compressor stations. Pipelines are installed to transport produced oil, water, and natural gas into storage tanks or separation tanks for further processing. Pipelines are also required to pump water, steam, or other substances into the reservoir during well stimulation and enhanced oil recovery procedures. Construction of the following types of pipelines is considered within the scope of this Project:

- **Flowline or Injection Line**: any pipeline that connects the wellhead to a manifold (header) or to production facilities.
- **Gathering Line**: a pipeline (independent of size) that transports liquid hydrocarbons between any of the following: multiple wells, a testing facility, a treating and production facility, a storage facility, or a custody transfer facility.
- **Header**: a pipe arrangement that connects flowlines from several wellheads into a single gathering line. A header has production and testing valves to control the flow of each well, thus directing the produced fluids to production or testing vessels. Individual gas/oil ratios and well production rates of oil, gas, and water can be assigned by opening and closing selected valves in a header and using individual metering equipment or separators.
- **Pipeline**: a tube or system of tubes used for transporting crude oil and natural gas from the field or gathering system.

In general, most onsite pipelines, such as those described above, are installed aboveground but may also be installed underground, if necessary (e.g., to cross a roadway). Some portions of pipelines are installed aboveground on the surface of the well pad and do not require further ground disturbance if production facilities are not co-located at the well pad. However, additional clearing and grading would be required for pipeline segments that cross outside of the well pad area. In these cases, the pipeline would generally run along the existing roadway, if possible. Permanent disturbance would occur from sleepers, pipe racks, and any new access roads that may need to be constructed. If the pipeline runs under a roadway or is required to be placed

underground, the construction process would involve clearing, trenching, shoring (as appropriate), pipe laying, pipe zone backfill, trench backfill, and final grading. Although buried pipelines would create more temporary disturbance than aboveground installations and require more earthmoving, disturbance would be temporary. For excavation, repair, or replacement of transmission lines, a width of 100 feet or less is typically required for pipelines. Equipment may include a crane, backhoe, flatbed trucks, welding equipment, pick-up trucks, and additional personnel. The duration varies with the length and size of the transmission line being replaced or repaired. Cathodic devices may also be installed and maintained to protect pipelines from corrosion as a result of low pipe to soil electrical potential.

A pipeline corridor width of 20 feet or less is typically required for pipeline installation. Depending upon the size and nature of the pipeline, construction equipment may include a crane, backhoe, flatbed trucks, welding equipment, pick-up trucks, and additional personnel. For the purposes of the EIR, it was assumed that the workers required for pipeline installation activities are included in the workforce numbers for well pad construction, drilling, and completion activities. The potential new land disturbance that could be associated with future pipeline construction is included in the disturbance acreage estimates discussed above and in Appendix F.

Construction of distribution pipelines (i.e., pipelines intended to transport crude oil to an oil refinery) was not included in these estimates. Distribution pipelines were assumed to be existing and would not be constructed under this proposed Project.

Cathodic protection systems may also be installed and maintained to protect pipelines and well casings from corrosion. Cathodic protection is carried out by including the metal to be protected as part of a low voltage electrical circuit (as the cathode) along with a separate sacrificial metal (as the anode). The anode material is more easily corroded and prevents the pipeline or well casing from degradation by soil side corrosion.

The type of cathodic protection used varies by location and field conditions. Typical groundbed designs include both impressed current and galvanic/sacrificial anodes. Common impressed current anodes are tubular and solid rod shapes or continuous ribbons of various materials, including high silicon cast iron, graphite, mixed metal oxide, platinum and niobium coated wire, and other materials. The most common galvanic/sacrificial anode used is magnesium. Primarily used for pipeline cathodic protection, the magnesium anodes are manufactured in various sizes and are prepackaged in gypsum backfill to maintain low resistance to earth. Anodes may be arranged in vertical or horizontal/distributed groundbeds. Typical vertical groundbed installations vary in depth from 10 to 420 feet and are installed by use of auger or drilling equipment with a diameter of <12 inches. Typical horizontal/distributed groundbed installations vary in depth from 8 to 10 feet and may be installed by use of trenching equipment adjacent to the pipeline within the pipeline corridor.

## Construction of Sumps, Evaporation Ponds and Percolation Ponds

A sump is a lined or unlined excavated depression in the ground which collects crude oil, produced water, or solids, such as drilling muds or cuttings, in oil producing fields. Drilling sumps are utilized to collect drilling fluids and cuttings (collectively known as "drilling muds"), which are produced during drilling operations. Operations sumps are utilized to store fluids and solids, which are produced during the life of the operational well as well as potential workover activities. Sumps are used in combination with other separation and treatment facilities and may be in greater or lesser use depending upon the size of the operation. For example, larger operators rely more heavily on aboveground tank systems, while smaller operators rely more heavily on sumps due to the dispersed nature of production

A percolation pond is used to dispose of water associated with hydrocarbon production by percolation into the soil. A natural or artificial evaporation pond is a pond with a large surface area that is designed to efficiently evaporate water by exposure to sunlight. Percolation and evaporation ponds vary in size, but are typically between 2 and 5 acres and can be as shallow as 5 feet deep. Drilling sumps and operations sumps and ponds are subject to state and, where applicable, federal permit requirements. In general, the use of drilling sumps has been reduced in the Project Area as well field operators increasingly utilize closed-loop drilling systems that avoid mud or fluid discharges to land during the well drilling process.

## Installation of Produced Water Injection Wells

Injection wells used for disposing produced water are sited in underground formations, such as sandstone, that are porous and permeable enough to accept injected fluids or gas. Rock formations in the zones that are utilized for injection are covered by impermeable formations, such as shale, in order to isolate the injected liquids from potential migration to other formations.

Injection wells are drilled, cased, and cemented similar to production wells, or in some cases, production wells are converted into injection wells. Several tests are then run to make sure the injection well is operating properly and the injected fluids are confined to the intended injection zone. As discussed in Section 4.9, all injection wells must be permitted by DOGGR in accordance with federal requirements under a primacy agreement with the EPA.

## Fencing

Fencing may be installed around the perimeter of a site to provide for security, health and safety, as well as for environmental protection to prevent unauthorized access that could cause habitat disturbance, such as off-highway vehicle (OHV) activity. Various types of fences are utilized. Use of existing roads and some off-road travel would be required to access the perimeter fence or for fence installation. In larger extraction-level operations, fencing may not be required because wells are in remote locations and operations are conducted over 24 hours. Therefore, there are

fewer security issues in these areas. In contrast, in more urban settings, such as areas within the Metropolitan Bakersfield Planning Area, fencing is required for security and aesthetics.

## Administrative Building Construction

Most employees doing construction and maintenance work on wells and oilfield equipment are dispatched from central contracting facilities located in Bakersfield. Some staffed administrative offices are located in wellfields, particularly in more established Tier 1 areas. Administrative offices typically range from 1,000 to 10,000 square feet, depending on the size of the development and number of day-to-day personnel. Future development would rely mostly on existing employee and administrative staffing infrastructure. In addition to office space, an administrative office in an oilfield could include control and monitoring equipment, material storage, an equipment warehouse, restrooms, and a kitchen.

The area for the administrative office would be cleared and graded. An administrative office would also require the installation of a septic system (or connection to sewer service if available), water connection, electrical and telecommunication hook-ups, parking lot, and access roads.

## Equipment List

Section 4.3, Air Quality, includes an estimate of equipment type, quantity, and hours per day required for grading, earthwork, and facility construction.

## Well Re-Working and Workovers

During production, construction activities include well re-working and workovers. Well re-working and workover construction activities are implemented on existing well pads. A re-work or workover operation generally consists of a rig, support trucks, portable tanks, pumps, and various other equipment (depending on the complexity of the planned work). Most of the portable engines used in these operations are regulated by the California Air Resources Board's (CARB's) portable engine program. Well re-work typically lasts for a period of a few days; however, some large-scale jobs can take a week or more. Well re-working requires filing an NOI with DOGGR for well changes, such as changing the well casing, re-perforating, plugging to produce from shallower levels, and redrilling including deepening and side-tracking. Well workovers are more routine well maintenance activities including liner replacement, casing repairs, pump repair or replacement, well stimulation, and well clean-out (the removal of sand, sediment, or debris build-up or equipment). In an effort to reduce habitat disturbances, existing well pads are used, or sometimes extended, to perform remedial well work. Extensions are only performed if it is necessary to provide a safe well-workover environment.

## Ancillary Facility Expansion or Replacement

Over time, existing ancillary facilities may need to be expanded or replaced in order to process production fluids. Expansion may be needed to support drilling of additional wells or because older wells mature changing the oil/water mixtures causing changes to the handling capacity of

the ancillary facilities. Ancillary facilities may also need to be replaced due to age of the equipment which can diminish efficiency and reduce overall processing capacity. The expansion or replacement activities may include expanding the footprint of an existing plant to install new equipment such as tanks, vessels, electrical distribution systems, liquid and gas gathering pipeline systems, and oil/water/gas separation and treatment facilities. A typical expansion or replacement would result in temporary and permanent disturbances of varying extent depending on the site circumstances and size of the expansion project.

Site preparation activities for expansion or replacement projects would be very similar to activities for building a new plant or facility and would include activities such as clearing, grading, construction of tanks, piping, vessels, steam generators, and utilities. Construction of an expansion or replacement facility could result in new land disturbance, which is conservatively assumed in this EIR to be permanent.

The potential new land disturbance that could be associated with future expansion or replacement facility construction is included in the disturbance acreage estimates discussed above and in Appendix F.

# Well Stimulation Treatment

Well stimulation can be conducted as part of the well completions process or as part of a well work-over process. This EIR presents the well stimulation practices, including hydraulic fracturing, used in Kern County and as managed by DOGGR. Hyrdaulic fracturing as conducted in other states has different characteristics and, therefore, different environmental impacts. Practices utilized in other states are summarized in Appendix U.

Decisions on whether a well stimulation operation is required are generally dictated by the geologic characteristics of the reservoir. Stimulation is performed on a well to increase or restore production from new or under-producing existing wells. Public Resources Code Section 3157 of Division 3, Chapter 1, as amended, defines oil and gas well stimulation as “any treatment of a well designed to enhance oil and gas production or recovery by increasing the permeability of the formation. Well stimulation treatments include, but are not limited to, hydraulic fracturing treatments and acid well stimulation treatments. Well stimulation treatments do not include steam flooding, water flooding, or cyclic steaming. Likewise, well stimulation treatments do not include routine well cleanout work, routine well maintenance, routine removal of formation damage due to drilling, bottom hole pressure surveys, or routine activities that do not affect the integrity of the well or the formation. Depending on the type of formation and the current state of the wellbore, only one of the following common well stimulations treatment methods may be required on any given well:

## Hydraulic Fracturing

Hydraulic fracturing is a type of well stimulation process conducted as part of the well completion process used after drilling and before production. It is designed to open permeable fracture pathways in the hydrocarbon-bearing geologic formation and entails the injection of

"fracture fluid," which is generally comprised of water, a proppant (usually sand or ceramic beads) and carrier fluids (typically proprietary chemicals designed to enhance recovery yields), into a well bore and into the geologic formation to increase the flow of hydrocarbons. Prior to conducting a hydraulic fracturing job, a model is developed that provides guidance on how much fluid and pressure is needed to generate a fracture of a specific desired length. Hydraulic fracturing is then performed in three steps. First, a large amount of hydraulic fracturing fluids are pumped into the well. The high-pressure of the hydraulic fracturing fluids and the continual pumping increases the pressure in the well, eventually clearing or reopening the pore space of the reservoir rocks. This process is carried out until the fracture reaches the desired length. Second, fracturing fluid and propping agents are introduced into the well to extend the breaks and pack them with proppants, or small spheres composed of quartz sand grains, ceramic spheres or aluminum oxide pellets, that hold the fractures open after pumping has ceased. This prevents the geologic overburden from forcing the newly induced fractures closed and allows the hydrocarbons to flow through the open cracks in the reservoir rocks into the well. Third, the well is backflushed to remove the hydraulic fracturing fluids. The hydraulic fracturing fluids are either treated and recycled or disposed along with other oil production by-products. Other well stimulation techniques place various chemicals in the well to react with well bore scale or the productive formation to allow increased well production. Well stimulation can occur multiple times during the well's productive life.

Kern County completed a study in June of 2015 with the following objectives:

- Identify differences in the most prominent plays across the nation;
- Identify the subsequent drilling and stimulation techniques that would apply to wells being drilled in Kern County as compared to those in other shale plays and conventional oil and gas operations conducted across the nations; and
- Highlight the impact differences between them.

One key factor identified in the study was that drilling in Kern County associated with hydraulic fracturing is vertical (or follows conventional methods). The study is attached as Appendix U and is associated with Section 4.9, Hydrology and Water Quality.

## Frac-Packing

Frac-packing is another type of operation that can be defined as a well stimulation treatment, depending on how the operation is designed. The frac-packing treatment combines a hydraulic fracturing process with a gravel pack process.

Conventional gravel pack operations are not classified as well stimulation. A gravel pack is a sand control method used to prevent the flow of formation sand into the producing well. In gravel pack operations, a steel screen is placed in the wellbore and the surrounding annulus is packed with prepared gravel of specific size designed to prevent the passage of formation sand. The gravel is circulated into place at pressures below the fracture gradient of the formation. The gravel pack helps prevent formation sand from obstructing the well bore. This method also helps

to prevent damaging equipment and having to dispose of the formation sand after it is separated out of the hydrocarbons produced from the well.

By contrast, in frac-packing operations, the gravel pack is pumped in under pressures high enough to fracture the formation. The operation can be used to create a wider radius screen in formations with unconsolidated or poorly consolidated sands. Depending on how the operation is designed, the frac-packing operation can generate reservoir stimulation effects.

## Acid Fracturing and Acid Matrix Stimulation

The primary type of acid-based well stimulations consist of acid fracturing and matrix acidizing. Acid fracturing is the pumping of acid at pressures that exceed the reservoir fracture gradient into the well to dissolve limestone, dolomite, and calcite cement within the reservoir rocks. A matrix acid job involves pumping acid into the well so that it fills the pores of the reservoir rocks. The acids then modify the permeability of the formation by dissolving natural solids that are inhibiting the permeability of the rock. The process enlarges the pores of the reservoir and stimulates the flow of hydrocarbons. Matrix acidizing is regulated as a form of well stimulation under SB 4 if the volume of acid used exceeds the Acid Volume Threshold (as defined in DOGGR regulations, 14 CCR 1761 (a)(3)), unless the treatment as designed does not enhance production or recovery by increasing the permeability of the formation. (Note: Acid may also be injected at lower volumes for well maintenance, which does not increase formation permeability and is not considered a form of well stimulation.) The difference between matrix acidizing and fracture acidizing is that matrix acidizing is done at a low enough pressure such that the reservoir rock is not fractured. In contrast, fracture acidizing involves pumping highly pressurized acid into the well, such that the reservoir rock is physically fractured. Fracturing the reservoir rock dissolves the impermeable sediments, thus creating channels through which hydrocarbons flow.

Hydrochloric acid is a common type of acid used during matrix and fracture acidizing, which removes carbonate reservoirs, or limestones and dolomites, from the rock. Also, when hydrochloric acid is combined with a mud acid, or hydrofluoric acid, the mixture can be used to dissolve quartz, sand, and clay.

In order to protect well integrity, inhibitor additives are introduced to the completed well to prohibit the acid from breaking down the steel casing. Also, a sequestering agent can be added to block the formation of gels or precipitate of iron, which can clog the reservoir pores during an acid job.

After an acid job is performed, the used acid and sediments removed from the reservoir, known as flowback fluid, are washed out of the well. Flowback fluid from well stimulation operations can be handled in several ways. In mature, developed field operations, the most likely scenario is that the well is connected to the field's water handling system, which would pipe the flowback fluid directly into this system. Once it is co-mingled with other fluids and treated, it is disposed of using the common disposal practice of that field. As discussed elsewhere in this document, fluid disposal could be facilitated through waste injection wells or percolation ponds.

Based on data compiled from FracFocus, in 2012, a total of 936 wells in Kern County were subjected to well stimulation treatment regulated under SB-4 (i.e., hydraulic fracturing, acid fracturing, and acid matrix stimulation), including 900 wells in the Western Subarea, 35 wells in the Central Subarea, and 1 well in the Eastern Subarea. The levels and distribution of SB 4 regulated activity in the County would likely be similar in future years. However, to be conservative, an average of 1,200 wells subjected to well stimulation treatment was assumed in the future activity projections (see Table 3-5).

# Decommissioning and Abandonment

Wells undergo plugging and abandonment once they can no longer perform their intended purpose and are no longer otherwise needed. Idle wells that are not yet plugged and abandoned must also be maintained in compliance with DOGGR regulations.

In decommissioning a formerly producing oil well, equipment such as pumping units, well cellars, pipelines, and other associated infrastructure would be disassembled and salvaged or appropriately disposed of. Plugs of cement are placed across specified intervals in the well casing to isolate oil and gas zones and to prevent degradation of useable waters. The well casing is cut off below the surface, sealed with a cement plug, and a steel plate is welded across the top of the casing. The well pad location is then restored to grade and allowed to revegetate. Typical construction equipment, such as bulldozers, motor graders, front end loaders, cement and dump trucks, and well workover rigs, would be utilized to accomplish this work. Work is typically restricted to the pre-disturbed areas of the well pad, but some well plugging and abandonments require expansion of the existing well pads to accommodate equipment. Re-abandonment of a well may be required when there is evidence that the original plugging abandonment no longer retains its integrity.

Facilities such as production test setting, including pipe headers, tank farms, valve stations, or pipelines that are no longer needed for operations are dismantled and removed. The length of time necessary to decommission a facility depends on the size.

Decommissioning and abandonment includes closure of sumps when no longer required. Two types of sumps are used in typical oilfield operations, drilling sumps and operations sumps. Their respective uses and closure are described below:

1) Drilling sumps are utilized to collect drilling fluids and cuttings, collectively known as “drilling muds,” which are produced during drilling operations. Drilling sumps are typically located adjacent to the well pad and can vary in size, depending on the depth of the well. Drilling sumps are regulated by DOGGR pursuant to 14 CCR Chapter 4, Subchapter 2, Article 3, Section 1770(c) and 1776(a) and (b). The disposal of drilling muds to land is covered under the State Water Resources Control Board State General Order 2003-0003-DWQ for low threat discharges to land and requires sumps covered under this order to be constructed in uncontaminated soils. The drilling muds are non-hazardous and do not contain halogenated solvents. Drilling muds must first be dried prior to back-filling, and the bottom of the sump must be at least 5 feet above

groundwater levels. Fluids must be removed from the drilling sumps within 30 days of completion pursuant to DOGGR sump requirements. Drilling sumps must be restored to pre-construction state within 60 days of completion or abandonment of a well pursuant to DOGGR well site and lease restoration requirements.

2) Operations sumps are utilized to store fluids and solids, which are produced during the life of the operational well as well as potential workover activities. Operations sumps can range from small pits located next to the well, to centralized sumps that collect workover fluids at the well site and for transfer to centralized sumps for processing. In accordance with DOGGR Assembly Bill 1960 regulations, fluids from operations sumps must be removed from the sump within 14 days of completion of workover activities.

Decommissioning and abandonment also includes removal of cathodic protection systems, when no longer required. Cathodic protections systems, such as sacrificial anode beds or deep cathodic protection wells, are located throughout Kern County oilfields. Eventually, these systems become depleted and no longer function. When these systems are no longer functional, the cathodic protection wells must be properly abandoned to protect the environment. Kern County Ordinance G-5006 regulates abandonment of deep cathodic protection wells (>50 feet) and permits to abandon these wells are obtained from the Kern County Environmental Health Services Division. Abandonment activities include those actions typically associated with plugging and abandonment of an oil well and site restoration.

# Reactivation of Idle Wells

DOGGR defines an idle well as a well that has not been injected into or produced for six consecutive months. Idle wells are created when a well is uneconomical to operate due to the cost of needed repairs, low production rates, or a low price of oil. However, depending on economic conditions, an idle well may become economically viable in the future. Reactivation of an idle well may range from simple activities, such as replacement of a well pump, to well deepening, sidetracking, or re-working.

# Project Operational Activities

Project operational activities may include: geophysical monitoring; operation of EOR facilities and production facilities (e.g., tanks, compressors, generators, heater treaters, free water knockout facilities, etc.); water, extraction, use and disposal combustion, steam, gas, and chemical flood projects; pipeline replacement or repair; operation, maintenance, demolition, and removal of equipment, buildings, warehouses, storage yards, offices, and other structures, berms, percolation ponds, fences, distribution lines, and other facilities; production activities; responses to and remediation of spills or emergencies; hydrotesting and other non-destructive testing of pipelines, tanks, and vessels; expansion of active well locations to provide safe well-workover activity; brush and weed removal around production equipment; maintenance of pipeline ROWs; and access road maintenance and use.

# Geophysical Monitoring

Geophysical monitoring wells are used to monitor the orientation (azimuth and dip), volume, complexity, and approximate location of fractures in the earth's crust (both natural and man-made). The equipment used is a highly sensitive electric level, containing an electrically amplified fluid filled with bubbles. When the instrument tilts, the bubble shifts to one side and to indicate the direction of the shift. These wells are typically installed on the corner of existing well pads and do not result in any new surface disturbance.

# Treatment Processes, Equipment, and Facilities

A variety of surface facilities support oil and natural gas processing and storage. Depending upon the intensity of development and the location of a wellfield, centralized treatment facilities may or may not be constructed. Various sizes of tanks, which are utilized to store oil prior to offsite transport, can range in size from small to large tank arrangements with supportive piping and conveyance facilities.

In addition, the nature of a produced substance dictates the type of facilities required. For example, in many areas in Kern County, an oil/water mixture is produced. The ratio of oil to water differs and is determined during testing. The oil and water must be treated (i.e., separated) so that each substance can undergo further treatment in order to prepare the oil or water for sale, or to prepare the water for reuse in further production operations, for other recycling uses or for disposal. If natural gas is present in the produced oil/water mixture, the gas may be burned off, re-injected into DOGGR-approved gas disposal wells or treated for sale or used as fuel for various production activities. Although the majority of the extraction operations in Kern County are oil production, many wells produce some quantity of natural gas, which may be made available for sale or other use.

## Treatment of Produced Fluids

Produced fluids from multiple wells are piped to a centralized production header into a gathering line before entering a separator. In some cases, a test header allows the diversion of fluids from a single well through a well test station. The well test station allows the testing of the well quality and flow characteristics. Once the fluid passes through the well test station, it is typically directed back to the gross line and commingled with the other fluids. Fluids from the gross line are then piped into separators to perform an initial separation of the oil, gas and water. Gas is typically separated earlier in the process by using a larger tank to drop the pressure, thus allowing the gas to break out of the mixture. The remaining oil and water separate from each other as they settle in the "knock out" vessel or tank. Oil is lighter than water, so it rises to the top of the oil/water mixture (referred to as gravity separation). The water can be removed from the bottom of the tank and the oil emulsion skimmed from the top of the tank.

## Water Treatment

As described above, the produced oil, gas, and water are separated from each other before the produced water to be used for EOR or agricultural reuse undergoes further treatment. To further

separate the oil and water, the water flows through or is transferred between a series of separator tanks. As the water passes from one tank to the other, it passes through filters, often manufactured out of sand, diatomaceous earth or walnut shells. The oil molecules are larger than water, such that most of the oil adheres to the filters, and the water passes through to the next tank. Air or dissolved oxygen also may be added to produced fluids to encourage separation of oil and water. This process is repeated until the water is treated to the desired level, depending upon its final disposition – either reuse of disposal. Different types of facilities are required depending on the final use of the water. These facilities typically consist of a series of tanks, filters and gathering systems to collect and transport the produced water that is removed from oil. Produced water may also be transported, via truck, to other, existing produced water treatment facilities. These other types of water treatment facilities may require additional capacity to treat produced water prior to reuse or disposal. This could involve expansion of the existing facilities, such as waterflood or steamflood plants which supply injection water or steam for EOR operations, drilling additional EOR injection wells, modifications to increase the pumping capacity, pipeline and distribution systems, as well as converting existing wells from production to injection. Depending on the facility design, the facilities can also provide for the reuse of treated produced water, including but not limited to, agricultural irrigation, land restoration and animal stock drinking water. For more information on produced water reuse and disposal, see the Water Management section, below.

There are four basic physical/chemical treatment processes that allow produced water to be reused in Kern County and surrounding areas with the following end uses: (1) steam generation; (2) agricultural irrigation; (3) aquifer recharge; and (4) surface discharge. These processes increase in complexity and cost from (1) to (4) in accordance with operational and regulatory standards. Although generalized here, produced water treatment processes are based on field-specific characteristics (e.g., water quality parameters of produced water, its possible use considering the treatment available, and end user availability, agreements, and regulatory concerns) so it should not be assumed that the same treatment processes can be adopted uniformly throughout Kern County.

There are multiple ways of treating produced water for steam generation, which can involve the following steps:

1) Collection of water from the bottom of primary, secondary, and tertiary oil/water separation tanks and vessels. This is usually accomplished by gravity flow.

2) Water, nominally containing 200 ppm of free oil content, is fed to various types of flotation systems. Such systems rely on gas bubble creation and injection into the water. These bubbles assist small droplets of free oil to accumulate, and rise to the surface, where they are skimmed off. A polymer chemical may be injected, to aid this process.

3) The water, now containing nominally 20 ppm of free oil, is then sent to an oil removal filter. These often include ground walnut shells, or a walnut/pecan mixture, but multimedia (anthracite/ garnet) and other types of filters can be utilized. These filters will reduce free oil content down to less than 5 ppm.

4) The de-oiled water is now sent to ion exchange softener vessels, which usually include both a primary, and secondary (polisher) softening step. The primary will usually be a Strong Acid Cation softener, which is regenerated using concentrated salt brine. The polisher can be either another Strong Acid Cation softener, or a Weak Acid Cation softener. Weak Acid Cation softeners are regenerated using acid and caustic.

5) The softened water is stored in tanks, ready to be pumped to steam generator or cogeneration sites.

Treatment of produced water for agricultural irrigation (e.g., Chevron's Kern River field) includes steps 1) – 3) above, but not steps 4) – 5) because produced water from this field is often low in mineral content. Even so, the permit to discharge this water to Cawelo Water District relies upon dilution of certain mineral constituents with fresh water provided by the District Dilution takes place in Cawelo Reservoir B.

Treatment of produced water for aquifer recharge (e.g., Chevron's San Ardo Field in Monterey County) generally involves the following steps:

6) Collection, flotation, and filtering, as per steps 1), 2), and 3) above;

7) Cooling;

8) Degasification, through the addition of acid;

9) A chemical precipitation softener, operating at elevated pH (>10);

10) Further cooling;

11) Multi-Media filtration;

12) Weak Acid Cation softeners;

13) Cartridge filtration;

14) A two-pass Reverse Osmosis system;

15) Neutralization with sulfuric acid, and carbon dioxide ($CO_2$);

16) Calcium chloride injection, to control sodium adsorption ratio;

17) Post-treatment constructed wetlands;

18) Percolation through recharge basins

Treatment of produced water for surface discharge (e.g., Freeport McMoRan's Arroyo Grande field in San Luis Obispo County) is similar to the aquifer recharge scenario described above, but utilizes ceramic membranes to reduce the size of the chemical precipitation softener.

## Oil Treatment

When the oil leaves the separator, it is directed to a tank or goes through further separation. Separation may include additional separation time in a knock out vessel or tank, or utilizing a heater treater for the addition of heat, which allows excess water to drop from the oil. Further separation of the oil and the remaining, smaller amount of water is accomplished in a wash tank. Chemicals are usually added to enhance the separation of the oil from the water and increase the efficiency of the system. Typically, saleable oil can be skimmed from the wash tank and moved to a shipping tank. Once the oil meets sale specifications, it is sold and transported primarily by pipeline, but also by truck.

## Gas Treatment

Natural gas is usually produced along with the liquid oil and water mixture and separated in the field from the liquids. Some natural gas treatment systems can be extremely simple, such as gas sent from a separation vessel straight to permitted combustion sources, such as flares, generators, or gas disposal wells. If the natural gas is intended for sale to a transportation pipeline, it is typically moved to a central gas treatment plant containing more complex equipment to treat the gas to a desired specification for use or sale to a pipeline system. Separation and compression are typically required. Once the natural gas leaves the separator, it may be compressed to increase the pressure of the gas for treatment. If hydrogen sulfide ($H_2S$) or other impurities are present, they are removed by scrubbers utilizing a non-hazardous amine system. The natural gas may be further processed at gas plants to remove water and natural gas liquids such as propane, butane and natural gasoline. These natural gas liquids are stored and sold via an adjacent natural gas liquids tanker truck loading facility or sales pipelines. A natural gas liquids loading facility typically consists of tank storage and tanker truck loading racks for delivery to offsite purchasers. Natural gas is delivered to these facilities via pipelines from the gas processing facilities. Processed natural gas is then either transported through sales pipelines to sales metering stations to natural gas purchasers, or may be combusted as fuel for gas-fired equipment, or re-injected in oilfield operations for reservoir pressure maintenance.

Gas gathering, gas sales and gas reinjection systems utilize field compressors and pipelines to transport the natural gas to its intended use. Field gas compression facilities typically consist of an electric or natural gas-fired compressor engines. To the extent practicable, existing systems are used. Staging and installation activities occur on adjacent existing disturbed areas when possible. As gas operations vary over time in the field, relocation of these units is sometimes necessary to optimize gas operations. Natural gas pipelines would be extended along existing ROWs when possible to minimize new disturbances.

In certain instances, the produced gas stream associated with oil production may contain constituents that make it unsuitable for resale or use in onsite facilities. In these instances, the produced gas stream is gathered via small pipelines using a system of vapor recovery units. The gas is then transported via pipeline to a dedicated “waste gas” injection well that disposes of the gas into depleted oil reservoirs. Waste gas injection wells are permitted as Class II injection wells by DOGGR. Among other requirements, the permitting process involves calculating the

estimated gas storage volume of the depleted reservoir and evaluating the integrity of any existing wellbores within a quarter-mile of the proposed injection well before the well is authorized. Monitoring requirements for H2S and limitations on injection pressures are commonly attached to the permit conditions. Quarterly reports are filed with DOGGR that summarize the content of the waste gas stream being injected.

# Water Management

Water is required for a variety of purposes related to oil and gas extraction activities, including the following:

- Drilling operations;
- Well Stimulation (including hydraulic fracturing);
- Workover activities;
- EOR (such as water and steam flooding);
- Hydrostatic Testing (to test pipeline and well integrity);
- Dust Suppression (during well pad and access road construction);
- Sanitary Purposes (associated with ancillary facilities, including for domestic purposes related to office and field facilities); and
- Reinjection to arrest surface subsidence.

Water required for oil and gas extraction activities, including the production of steam, can come from a variety of sources. Depending upon the well's proximity to the water source, water can be transported to the wells via truck and/or pipeline. Common sources include:

- Recycled water from hydrocarbon-bearing formations (produced groundwater), which has been treated as described above;
- Non-potable water from private onsite groundwater wells belonging to the operators;
- Existing surface water entitlements; and
- Public or private water storage districts, which may use water from reservoirs, groundwater, or surface water.

As discussed in Section 4.9, in 2012 the total water demand for oil and gas operations in the Project Area was about 97,590 acre-feet. Produced water was used to meet 88,812 acre-feet, or 91% of the total oil and gas water demand. Other sources, which this EIR conservatively assumes to consist of water suitable for municipal and industrial purposes, accounted for about 8,778 acre-feet, or 9% total oil and gas water demand in 2012.

Oil producers in the southern San Joaquin Valley currently extract about 12 to 13 barrels (42 gallons) of produced water for every barrel of oil produced. Produced water is non-potable because it is produced as an oil/water mixture from a hydrocarbon-bearing formation, generally

contains high salinity, and must undergo treatment before it can be reused for other purposes. The fluid produced from the well dictates the type of production facility required. For wells that produce oil, gas, and water, separation and treatment of these fluids allows the oil and gas to be sold and the water to be disposed of, reused, or re-injected.

## Produced Water Reuse for Oil and Gas Activities

As discussed in Section 4.9, about 234,949 acre-feet of produced water was generated in the Project Area during 2012. About 38% of the produced water (88,812 acre-feet) was treated in the manner described above in "Water Treatment" and recycled for well completion operations or EOR activities. About 14% of the produced water (32,771 acre-feet) was treated and supplied to the Cawelo Water District in the Eastern Subarea for agricultural reuse. About 48% of the produced water was disposed into Class II injection wells permitted by DOGGR (84,571 acre-feet) or discharged to surface facilities (30,223 acre-feet). As discussed above, about 91% of oil and gas water demand in the Project Area is met by treating and reusing produced water. In addition to water conservation concerns, operators generally prefer to use produced water as opposed to freshwater in the event that any clays are encountered during drilling. When freshwater contacts clay, the clay swells, effectively blocking any further hydrocarbon production and requiring remedial action to re-stimulate the flow of hydrocarbons. About 9% of the oil and gas water demand, primarily for drilling and steam production activities that require higher-quality water supplies, is met by using municipal and industrial water.

For a description of how water is used in EOR activities, see the Enhanced Oil Recovery (EOR) Activities section, below. For a description of water use during well stimulation activities, such as hydraulic fracturing, see the Well Stimulation Treatment section, below.

## Produced Water Reuse for Agricultural Irrigation

Produced water from certain oil fields in the Eastern Subarea is treated and sold to water districts, such as the Cawelo Water District, which sell the water to agricultural operators for use in crop production. The treated produced water is blended with other supplies and subject to water quality requirements under permits issued by the CVRWQCB. As discussed in Section 4.17, of the 2.7 million acre-feet of water used for crop production in Kern County, 32,771 acre-feet (1.2%) in 2012 was derived from produced groundwater that had undergone treatment processes similar to those listed above. Injection wells are described below.

Cogeneration facilities may also use de-mineralized (softened) fresh water for evaporative cooling to increase power output when ambient temperatures are elevated and untreated fresh water for steam condensation, pump seal flushing and other process uses requiring fresh water.

## Water Disposal

Water treatment and disposal facilities consist of pipeline gathering systems to collect and transport produced water removed from oil. Excess produced water that is not injected into disposal wells, used for EOR operations or other drilling or well completion activity, may be disposed of in wastewater disposal ponds (also known as percolation or evaporation ponds).

These are regulated under WDRs issued by the RWQCB. The ponds must be maintained in good condition and in accordance with the conditions and monitoring program established in the WDR. The ponds may require periodic renovation to restore their percolation capabilities, by dredging out the ponds bottoms and restoring the original grade of the ponds.

Disposal facilities handle produced groundwater not otherwise utilized and transport water via pipeline to wastewater disposal ponds or to disposal injection wells where the produced water is reinjected into zones, permitted and regulated by the DOGGR underground injection control program. Some of the water sent to disposal wells is also wastewater generated by other oilfield processes, such as brine regeneration in the water softening system.

# Enhanced Oil Recovery (EOR) Activities

EOR is a production technique used to increase the mobility of oil, most commonly through steam injection techniques, which reduce the viscosity of the hydrocarbons and allow produced fluids to flow. EOR operations should not be confused with well completion and well stimulation operations as defined by DOGGR. There are three major types of EOR operations: thermal (i.e., steamflood, cyclic steam and in-situ combustion); $CO_2$ or other gas (miscible and immiscible); and chemical/polymer flooding (i.e., alkaline flooding or micellar-polymer flooding). While cyclic steam operations have been used in California since the 1950s and steamflood operations since the 1960s, EOR operations have increased since the early 1980s as a result of a 1979 Presidential Order that exempted most heavy crude oil from federal price controls in order to stimulate the nation's declining oil production. EOR facilities typically include the same infrastructure as required for oil and gas production: including pipeline distribution, pumps, and compression systems to supply and deliver the material being utilized for EOR to the reservoir, injection wells and observation wells, and production wells, as well as the associated oil, gas and water separation and processing equipment and facilities. Process water for EOR activities is typically composed of treated produced water. Treatment of produced water is described under the Water Management section, above.

DOGGR overseas the state's Underground Injection Control Program, which permits and regulates injection wells for waste disposal and wells for increasing oil recovery through EOR. Wastewater injection wells are described in the Injection Wells section, below.

## Thermal

With thermal EOR, steam is injected on either a continuous ("steam-flood") or an intermittent ("cyclic steam") basis. Depending on the geologic properties of the formation being steamed, different types of cyclic steam operations may be designed. The injected steam may also include proprietary chemical additives to enhance the thermal recovery of heavy oil. These differences are explained in further detail below. Steam may be produced via steam generators or cogeneration facilities. Cogeneration facilities are used to produce heat for thermal process use, thermal EOR, and the generation of electric power for use by the oilfield operator, or for sale to other operators.

- **Steam-Flood:** Steam-flooding involves injecting a continuous rate of steam into the reservoir through dedicated wells (steam injectors) to heat up heavier oil to the point it can flow to the wellbore. For production zones using a continuous steam-flood EOR method, injection and observation wells may be placed into the intended reservoir in a specific pattern to sweep the reservoir so as to displace oil and gas to an adjacent ring of producing wells for recovery. These wells can be an existing wellbore converted to an injection or observation well or new wells can be installed for these purposes, which would be constructed as described above under the Construction Activities section. Once established, the EOR pattern is typically developed outwards in a concentric fashion to sweep a larger portion of the reservoir. Pipeline and infrastructure expansions are conducted to support the EOR from the new portion of the reservoir.

- **Cyclic Steam:** Cyclic steam or intermittent injection of steam into producing wells can be one of three types: (1) maintenance cyclic steam; (2) cyclic steam injected below the reservoir fracture pressure; or (3) cyclic steam injected above the reservoir fracture pressure. Maintenance cyclic steam refers to steam used on an infrequent basis on heavy oil producing wells within a steam-flood where there are dedicated injectors. Steam is injected below formation fracture pressure to clean the wellbore or provide near wellbore heating to allow better reservoir fluid influx from the reservoir to the wellbore through perforated casing or slotted liner.

  Cyclic steam can also be used in areas where the reservoir is cold and there are no dedicated steam injectors. This technique involves alternating steam injection and production in the same wellbore. In this method steam is not continuously injected but, instead, a pre-determined rate of steam is injected into an oil-producing well on an intermittent basis. In these types of operations, the steam typically is applied on a predetermined basis (e.g., every several weeks) or can be applied as determined by the production trends of the individual well. The operation is designed to lower the viscosity of oil and produce the reservoir fluids from the same wellbore. After steaming, the well is shut-in for a period of time to allow the steam to condense and transfer heat to the reservoir (referred to as the soak period). After the soak period, which varies per well and formation, the well is opened up, hydrocarbons begin flowing into the well casing, and production continues.

  Cyclic steam injected below the reservoir fracture pressure is used where the reservoir has moderate to high permeability to lower the viscosity of the heavy oil. Cyclic steam injected at or above the reservoir fracture pressure is conducted in reservoirs characterized by low permeability to create and improve connectivity in the reservoir, lower the viscosity of oil and produce the reservoir fluids from the same wellbore. For cyclic steam operations, the depth of the formation and geologic properties of the over laying formations determine whether site specific mitigations are required to ensure that that the injection fluid is confined to the permitted zone or zones of injection. These determinations are made by DOGGR based on the site-specific geologic characteristics.

DOGGR is in the process of developing regulations that will apply to various types of thermal steam production operations. This EIR is intended to cover all activities that will fall within the scope of the new DOGGR regulations once they have been adopted.

### Gas Injection

Gas injection EOR techniques use gases to enhance production. Gases that expand in a reservoir without mixing with the oil are called immiscible gases. Immiscible gases effectively push the reservoir oil toward a producing well where it is recovered to the surface. In contrast, gases that mix with the oil are called miscible gases. Miscible gases lower the oil's viscosity thus enabling the oil to flow easier to the well bore for recovery. Examples of immiscible gases that could be used in these operations include natural gas, nitrogen, or $CO_2$. Miscible gases include propane, methane enriched with other light hydrocarbons, methane under high pressure, and $CO_2$ under pressure.

### Water Flooding (Water Injection)

Water flooding is the process of injecting water into the reservoir via an injection well for the purposes of "sweeping" the hydrocarbons to a nearby production well where it can be recovered to the surface.

### Chemical Injection

Chemical injection involves the use of long-chained molecules called polymers to increase the effectiveness of water floods or the use of detergent-like surfactants to help lower the surface tension that often prevents oil droplets from moving through a reservoir. Chemical techniques are rarely used in the United States for EOR operations; however, there are three types of chemical injection techniques used in Kern County:

- **Polymer Flooding:** Polymer flooding involves mixing polymers with injection-water to increase water viscosity. Increasing the viscosity puts pressure on the reservoir, pushing the oil from the injection well to the producing well.
- **Surfactant Flooding:** Surfactant flooding involves pushing a "soap" through the reservoir to reduce the surface tension of oil droplets. Reducing the surface tension increases the mobility of the oil, stimulating production.
- **Surfactant Polymer Flooding:** Similar to Surfactant Flooding except that no alkali is used. Used in reservoirs where more saline water is present.

## Injection Wells

Injection wells used for disposing produced water are sited in underground formations, such as sandstone, that are porous and permeable enough to accept injected fluids or gas. Rock formations in the zones that are utilized for injection are covered by impermeable formations, such as shale, in order to isolate the injected liquids from potential migration to other formations.

Injection wells are drilled, cased, and cemented similar to production wells, or in some cases, production wells are converted into injection wells. Several tests are then run to make sure the injection well is operating properly and the injected fluids are confined to the intended injection zone. As discussed in Section 4.9, all injection wells must be permitted by DOGGR in accordance with federal requirements under a primacy agreement with the EPA.

Injection wells are used to increase oil recovery and to safely dispose of the water associated with oil and natural gas production and waste gas. Injection wells are classified by the EPA into six classes according to the type of fluid they inject and where the fluid is injected. The Project, for purposes of this EIR, includes only "Class II injection wells," which include wells that inject brines and other fluids associated with oil and gas production, or storage of hydrocarbons. Class II well types include salt water disposal wells, enhanced recovery wells, and hydrocarbon storage wells (EPA 2012). As of January 1, 2013, there were more than 42,000 Class II wells in Kern County, including production wells that are temporarily idled for steam or water EOR injection.

All Class II injection wells are regulated by DOGGR, under provisions of the state Public Resources Code and the federal Safe Drinking Water Act (DOGGR 2013d). (Note: The Project does not include hazardous and non-hazardous waste injection wells into the lowermost source of drinking water, or any other regulated category of injection well.)

Injection wells may be located within the wellfield or fluids may be trucked from treatment tanks onsite to commercial injection facilities located apart from the oilfield operations.

## Sumps

As discussed above, a sump is a lined or unlined excavated depression in the ground which collects crude oil, produced water, or solids, such as drilling muds or cuttings, in oil producing fields. For example, a sump allows oil producers to store oil temporarily if a storage tank needs to be drained and repaired. Sumps are also used in tank overflow situations. In other cases, the sump collects water and allows the water to percolate into the ground in lieu of a disposal well in areas where groundwater is absent or compromised (i.e., where groundwater formations are saline or contain high levels of dissolved solids, making the groundwater non-potable prior to oil and gas development in the area). Sumps are used in combination with other separation and treatment facilities and may be in greater or lesser use depending upon the size of the operation. For example, larger operators rely more heavily on aboveground tank systems, while smaller operators rely more heavily on sumps due to the dispersed nature of production. The following types of operational sumps typically have been associated with oil and gas production in Kern County:

- **First Stage Production Sump:** A sump that receives a stream of crude oil and produced water directly from an oil production well(s) or a field gathering system(s). This type of sump is no longer in service. First stage fluid production is sent to tanks.

- **Second Stage Sump:** A sump that receives produced water from one or more upstream first stage separation processes, including sumps, free water knockout vessels, wash tanks, etc.
- **Third Stage Sump:** A sump that receives produced water from one or more upstream second stage sumps, or subsequent separation processes.

The SWRCB has issued general WDRs for discharges to land with a low threat to water quality (Water Quality Order No. 2003-0003-DWQ), which covers evaporation and percolation ponds for the following:

- Wells/Boring Waste, Well Development Discharge, Monitoring Well Purge Water Discharge, Boring Waste Discharge;
- Clear Water Discharges, Water Main/Water Storage Tank/Water Hydrant Flushing, Pipelines/Tank Hydrostatic Testing Discharge, Commercial and Public Swimming Pools;
- Small/Temporary Dewatering Projects (such as excavations during construction); and
- Miscellaneous, Small Inert Solid Waste Disposal Operations and Cooling Discharge.

## Percolation and Evaporation Ponds

Similar to a sump, a percolation pond acts as a holding facility while gravity allows the water to percolate or seep through the soils. A percolation pond is used to dispose of water associated with hydrocarbon production. A natural or artificial evaporation pond is a pond with a large surface area that is designed to efficiently evaporate water by exposure to sunlight. Percolation and evaporation ponds vary in size, but are typically between 2 and 5 acres and can be as shallow as 5 feet deep. Some facilities contain multiple ponds totaling as much as 80 acres. The CVRWQCB adopts site-specific WDRs for percolation and evaporation ponds.

## Vegetation Control

Vegetation along roadsides and critical facilities such as tank settings and compressor stations is controlled as needed through the use of mowing, grading, weed-whacking, and spot treatments of herbicides approved by USFWS and CDFW. This activity typically occurs in previously disturbed sites. Application of herbicides to prevent re-growth of vegetation in and around facilities is limited and only certified applicators and licensed firms are used.

## Spill Prevention, Control, and Countermeasure (SPCC) Procedures

Assembly Bill 1960, passed in 2008, required DOGGR to prescribe, by regulation, standards for oil and natural gas production facilities. These regulations were developed to ensure that industry operations remain protective of the environment and reduce the risk associated with leaks and spills through a comprehensive regulatory program, and address the following areas:

- Life of well/life of facility bonding requirements;
- Facility maintenance standards including:
  - Requirements for secondary containment around permanent facilities,
  - Maintenance, testing, and leak detection standards for tanks and tank bottoms,
  - Pipeline installation and testing standards,
  - Requirements for idle and out-of-service facilities;
- Spill Contingency Plan; and
- Inspection and document retention requirements.

In addition, in accordance with EPA SPCC rule (40 CFR part 112), facilities storing, processing, refining, using, or consuming oils must prevent a discharge of oil into navigable waters or adjoining shorelines. Facilities that qualify under this rule must prepare and implement a SPCC Plan. Although each SPCC Plan is unique to the facility, there are certain elements that must be described in every SPCC Plan including:

**Prevention Measures:** Steps that a facility owner/operator can take to prevent oil spills could include:

- Using containers designed for the oil stored;
- Providing overfill prevention for oil storage containers (e.g., a high-level alarm or audible vent);
- Periodically inspecting and testing pipes and containers. Visually inspecting aboveground pipes and oil containers according to industry standards; leak testing buried pipes when they are installed or repaired, and including a written record of inspections;
- Implementing security measures to prevent acts of vandalism, including locks, motion activated lights, and enclosed storage; and
- Providing annual trainings and briefings regarding revisions to the SPCC for trained personnel.

**Control Measures:** Steps that a facility owner/operator can take to control oil spills could include:

- Providing sized secondary containment for bulk storage containers, such as a dike or a remote impoundment. The containment needs to hold the full capacity of the container plus possible rainfall. The dike may be constructed of earth or concrete;
- Providing general secondary containment to catch the most likely oil spill where oil is transferred to and from containers and for mobile refuelers and tanker trucks (e.g., sorbent materials, drip pans or curbing for these areas); and

- Detailing response measures, including shutting down pumps or equipment, identifying and securing source of the discharge and containing the discharge with sorbents, sandbags, or other material from the spill kits, if safe to do so.

**Countermeasures:** Steps that a facility owner/operator can take to clean and mitigate oil spills could include:

- Identifying the reporting requirements of regulatory authorities and other response personnel and organizations after the discovery of a discharge (including DOGGR's San Joaquin Valley Oil Spill Reporting Criteria; Assembly Bill 1376). The reporting requirement should detail the reportable quantity requirements for each contact, contact information, and a list of information to be provided to the contacts regarding the discharge;
- Identifying contaminated soil through visual and olfactory senses and soil sampling (testing);
- Monitoring air quality during excavation of contaminated soil;
- Collecting water from decontamination procedures and treating or disposing of it at an appropriate disposal site;
- Identifying appropriate transportation and disposal facilities. Procuring all necessary permits and pay necessary fees, for the transport and disposal of contaminated soils;
- Excavating contaminated soil. If temporary stockpiling of contaminated soil is necessary, implementing control measures to prevent discharge; and
- Defining discharges that can be remediated by onsite personnel (e.g., managed with shovels) and discharges that required assistance from a cleanup contractor (e.g., mobilization of heavy equipment, construction of berms, and excavation of contaminated soils).

In compliance with EPA SPCC requirements and DOGGR facilities regulations, secondary containment structures are required to be constructed around tanks, chemical containers, etc., to ensure that oil or chemicals are not discharged into natural drainage ditches and the environment. Corrugated pipe filled with concrete, concrete berms, and earthen berms are typically used and are designed and constructed to contain a minimum of 110% of the volume of the largest tank that is located within the facility. Periodic inspections of secondary containment berms would be conducted to ensure that the integrity has not been compromised, and maintenance work is conducted as necessary.

Oil spill prevention and cleanup measures are required at bulk storage tanks, facility transfer operations, loading and unloading racks, production facilities, and oil drilling facilities. Mechanical containment, chemical and biological methods, and physical methods are used. Some spills can require minimal efforts to remediate (i.e., managed with shovels), however, larger spills may require mobilization of heavy equipment, construction of berms, and excavation of

contaminated soils. All of the related oil spills prevention measures and the cleanup plans must be in accordance with EPA and DOGGR regulations.

Releases from unplanned events, such as power outages, wildfires, extreme weather, etc., equipment failures, and emergencies have the potential for impacting the environment during and after the response to the release. In addition, unknown contaminated sites, either related or not related to oil and gas activities, could be discovered that would require investigation, characterization and remedial action. Remedial activities normally involve site sampling to characterize the magnitude and extent of the contamination. Risk-based corrective measures are then developed, and contaminants such as hydrocarbons or other chemicals above action levels would be excavated, removed from the site and properly disposed of. Environmental restoration could also be required at some locations that were heavily impacted.

# Non-Hazardous Solid Waste Management

During production, a number of waste management activities are conducted, depending upon the type of waste. The oil industry typically divides oil development non-hazardous solid wastes into two categories: (1) drilling and other wastes associated with exploration and production; and (2) other wastes.

## Drilling and Other Associated Wastes

Drilling wastes include drilling muds, drill cuttings, wash water, and other related wastes. The actual amount differs based on the depth of the well. EPA regulations exempt drilling fluids, produced waters, and other wastes associated with the exploration, development, or production of crude oil and natural gas (oilfield wastes) from hazardous waste requirements under the RCRA. California regulations exempt oilfield wastes from designation as a California non-RCRA hazardous waste based on toxicity characteristics. However, California did not adopt state regulations that provide exemptions similar in scope to the federal RCRA exemption and does not offer a blanket exemption from state hazardous waste requirements. Oilfield wastes in California may be considered state hazardous waste and potentially subject to regulation, depending on how they are managed. The generator of the waste has an obligation to properly characterize the waste, either based on generator knowledge of the waste stream or waste-generator process, or by testing representative samples of the waste.

Oilfield-related wastes that exhibit hazardous waste characteristics or that are listed hazardous wastes (e.g., spent solvents), and that are not otherwise excluded or exempt, are typically sent offsite for disposal at facilities authorized by the DTSC or are sent out of state for disposal. However, most drilling and production wastes, including oily dirt from spill cleanup operations and produced water, are nonhazardous and, thus, not subject to regulation by DTSC. Allowable methods for managing these wastes include the following:

- Underground injection such as in disposal wells;
- Onsite burial such as in pits, and landfills;

- Land treatment such as by land spreading, land farming, and road spreading;
- Evaporation;
- Discharge to percolation ponds;
- Offsite disposal; or
- Recycling.

### Other Waste

Other types of waste generated in the course of oilfield operations include wood, metal equipment parts, damaged tools, construction debris, excess soil and vegetation generated from cutting and grading, wood, concrete residue, pallets, cardboard boxes, papers, plastics, banding materials, scrap steel, scrap aluminum, scrap wire, and general trash. These wastes are collected at specially permitted in-field solid waste transfer stations or disposed of in onsite permitted facilities, or transported to offsite landfills or recycling facilities as appropriate on a regular basis. Transfer stations consist of containers where waste is collected for transfer to Kern County landfills or other approved sites. It is estimated that 11 cubic feet of road mix would be generated per well. Excess soil and vegetation (mulched) found to be nonhazardous could be used as ground cover.

Land farms accept biodegradable non-hazardous oily materials and are permitted by the RWQCB. Daily operations at permitted land farms in the Project Area include, but are not limited to, the discharge, spreading and discing of the biodegradable non-hazardous oily wastes. Other activities within or adjacent to the pre-disturbed land farms area might include: (1) vacuum truck washouts and sumps; (2) portable tank staging; and (3) drainage control grading maintenance.

## Well, Pipeline, Tank and Vessel Testing and Maintenance

### Well Mechanical Integrity and Standard Annular Pressure Testing

If a well has been idle for several years, prior to resuming production, DOGGR requires that the well be tested to determine the integrity of the well casings and to ensure that casings effectively isolate the well from the surrounding formations. A pressure test is conducted using a fluid to fill the annular space between the casing, tubing and packer. Pressure is maintained for a specified period of time at a specified pressure. If the closed system retains pressure after the pressure source is removed, the well is determined to have mechanical integrity. Loss of test pressure during the procedure indicates a lack of mechanical integrity in which case downhole components are leaking and require corrective action prior to returning the well to service. The tests are conducted by well servicing equipment that is restricted to the existing well pad.

### Pipeline, Tank and Vessel Testing and Maintenance

Pipelines, tanks, and vessels are hydrostatically tested to meet regulatory pressure requirements. To conduct a hydrostatic test, a section of a pipeline is filled with fresh water, and the pressure is increased to determine whether there are any leaks. If pressure is lost during the test, then the pipeline is repaired before being put back into service. The hydrostatic test water can be stored in

tanks, released in sumps, or collected for transport to existing wastewater disposal facilities. Fluid disposal complies with the requirements of the RWQCB.

Other types of non-destructive testing include radiography, ultrasonic testing, and electromagnetic testing. These methods monitor thickness of pipe walls or coatings, identify cracks in joints, welds or pipeline components, or detect other defects and anomalies. Areas of potential weakness caused by corrosion, erosion, or stress are then identified so that corrective action can be taken.

Pipeline maintenance also includes pigging, which is a method of using a mechanical device called a "pig" to scour the inside of a pipeline. Pigging helps keep the line clean and protects it from erosion. Pigs are introduced into a section of pipeline to be cleaned or tested at a "pig launcher" facility and removed from the pipeline at a "pig receiver" facility. These launching and receiving facilities typically have secondary containment structures such as lined or concrete pits to contain liquids generated from the cleaning and testing. "Smart pigs" containing electronic instruments are used to conduct surveillance and testing of pipelines.

## Steam Generators

As described above, steam generators are used to generate steam for thermal enhanced oil recovery. Steam generators are large heaters that generate steam, usually from produced groundwater. These generators are typically powered by electricity or natural gas. A thermal generator and water storage tank may be installed at an individual injection site or built in a centralized location to reach multi-injection sites. Aboveground pipelines would connect the thermal generator and water storage site to the injection sites. Generators may be co-located with other equipment (e.g., separation tanks), etc.

## Electric Distribution Line and Substation Maintenance

Electrical distribution networks and substations require periodic maintenance, repairs, and upgrades. For electrical distribution lines, this work requires a bucket truck and pick-up trucks that drive to individual pole locations. These activities utilize existing roads and occasional cross country travel. No new roads are created for these activities. Substation repairs and upgrades are infrequent. These activities involve replacement or upgrades of switches, transformers, and conductors within the footprint of the substation. Due to the size of some of the equipment, delivery could be required by semi-truck. Cranes, bucket trucks, and crew pick-ups trucks are typically used in these activities, as well.

## Access Road Maintenance

Both the roadbed and shoulder areas may be maintained to provide a smooth surface and adequate drainage. Repairs will occur, as needed, to correct normal wear and tear or storm damage such as culvert repairs and replacements

# Distribution of Crude Oil

Crude oil produced in Kern County is shipped to offsite storage facilities or refineries to be processed into gasoline and other products via distribution pipelines, and/or tanker trucks. Railcars are not used for crude oil transportation of crude produced in Kern County. There are 22 refineries and about 52 related storage distribution facilities operating in California (CEC 2008); only three refineries and 23 storage distribution facilities are located within the Bakersfield area of Kern County (CEC 2012). However, no improvements, expansions, or modifications to existing refineries or storage distribution facilities in Kern County are anticipated as part of the proposed Project.

## Transmission Pipelines

Transmission pipelines are used to transport produced crude oil to refineries or to offsite storage facilities. The vast majority of crude oil produced in Kern County is transported via transmission pipelines (95 to 98%). Produced crude oil is pumped into each oil production operation's onsite storage facility. transmission pipelines from the operation's onsite storage facility. All three refineries and storage transmission facilities operating in Kern County are connected to the existing produced crude oil distribution pipeline network.

Newly constructed transmission pipelines (e.g., from new wells) are generally connected to the existing network of transmission pipelines which already serve established wellfields, rather than directly to the intended destination.

Transmission pipelines can range in size from 6 inches to 42 inches in diameter and are typically located underground. Twenty-inch transmission pipelines can move crude oil at a rate of about 4,000 barrels per/hour. Due to the viscosity and inertia of the crude oil, some transmission pipelines systems require external heating. Booster stations are placed at intervals on the line where heating and or pumping units facilitate the flow of the crude oil through the line (CEC 2006).

Distribution pipelines are regulated by the State Fire Marshal's office pursuant to California Government Code Section 51010 et seq. The State Fire Marshal ensures that all intrastate non gravity-fed (or at a stress level above 20%) pipelines transporting crude oil meet the requirements of the Hazardous Liquid Pipeline Safety Act (49 United States Code [U.S.C.] Sec. 2001 et seq.) and federal pipeline safety regulations, as necessary to obtain annual federal certification. The construction of distribution pipelines requires several approvals by federal, state, and local agencies, depending on the location, in addition to certification and decisions on state and federal environmental documents.

## Tanker Trucks

Crude oil is also distributed to refineries or to offsite storage facilities using tanker trucks. Two to 5% of crude oil produced in Kern County is transported via tanker trucks to central facilities. At times the trucks carry crude to local refineries, other times trucks carry crude to a facility where it is placed into a pipeline system. In either case, crude oil would be loaded into tanker trucks

directly from the operation's onsite storage facility. All three refineries and related storage distribution facilities in Kern County are equipped to accept oil from tanker trucks. The crude oil delivered to storage distribution facilities would later be pumped into a distribution pipeline or tanker trucks to transport the crude oil to offsite locations.

A typical tanker truck is able to transport 9,000 gallons of crude oil. The transportation of crude oil via tanker truck is regulated by Caltrans and U.S. Department of Transportation (USDOT) motor carrier regulations.

### Administrative Building and Personnel Housing

As described in the Construction Activities section, above, some staffed administrative offices are located in wellfields, particularly in more established Tier 1 areas. Administrative offices typically range from 1,000 to 10,000 square feet, depending on the size of the development and number of day-to-day personnel. In addition to office space, an administrative office in an oilfield could include control and monitoring equipment, material storage, equipment warehouse, restrooms, and a kitchen. Personnel would be present in the administrative office during business hours, generally from 6:30 a.m. to 4:30 p.m., five days a week.

Sanitary wastewater for administrative offices in communities such as Bakersfield are managed through the municipal wastewater treatment systems, and for offices in oilfields wastewater is managed with septic systems. Existing septic systems are maintained by pumping on a regular schedule by approved septic pumper subcontractors. The wastes are hauled offsite to an approved disposal site. Repairs to existing septic systems or installation of new systems require a building permit from the Kern County Building Department. Septic systems must comply with the Uniform Plumbing Code unless the system size/soil conditions require an engineered septic system. Engineered septic systems are designed by a civil engineer and plans are submitted to Kern County Building Department for approval.

Oilfield personnel may also utilize mobile housing facilities. These facilities provide up to 50 spaces for recreational vehicles or travel trailers to house onsite oilfield personnel on a rotating basis. Such facilities provide living quarters for personnel of the oil company owning the property and are accessory and incidental to existing oilfield operations. Additional RVs/travel trailers travel with drilling rigs and are used as living quarters for drill crew members.

## 3.5.4 Truck Trips

A description of round-trips associated with the Project is provided in Section 4.16, Transportation and Traffic. The Applicant's Traffic Study (see Appendix W) includes more details regarding vehicle trips. For purposes of this EIR, truck trips include both construction vehicles and the light-duty pick-up trucks and automobiles used most frequently by staff servicing oilfield equipment.

## 3.5.5 Best Management Practices

The following Best Management Practices (BMPs) were submitted by the Project Applicant on October 30, 2013. These BMPs were considered in preparing this EIR, and in many instances are already required by applicable law and regulations. For purposes of analyzing the potential significance of an environmental impact, the EIR does not assume that any of these BMPs will be implemented. Many of these BMPs (or measures that are similar to or more protective than these BMPs) have been included in this EIR as Mitigation Measures, which are enforceable obligations of Applicants and are included in the MMRP.

### Operational Provisions

1. All drilling installations and operations shall comply with the requirements of state law and with applicable fire and safety ordinances and regulations of the County of Kern.
2. Proven technological improvements generally accepted and used in drilling and production methods shall be employed as they may become available if they are capable of reducing nuisances or annoyances.
3. All derricks, boilers, and other drilling equipment employed pursuant to this section to drill any well hole or to repair, clean out, deepen, or redrill any completed or drilling well shall be removed within 90 days after completion of production tests following completion of such drilling, or after abandonment of any well, unless such derricks, boilers, and drilling equipment are to be used within a reasonable time, as determined by the Planning Director, for the drilling of another well or wells on the premises.
4. Any derrick used for servicing operations shall be of the portable type, provided, however, that upon presentation of proof that the well is of such depth or has such other characteristics, or for other cause, that a portable type derrick will not properly service such well, the Planning Director may approve the use of a standard type of derrick.
5. Whenever a well is located within 500 feet from an existing dwelling unit, except in case of an emergency, no materials, equipment, tools, or pipe used for either drilling or production operations shall be delivered to or removed from the drilling site, except between the hours of 8:00 a.m. and 8:00 p.m., unless otherwise required by DOGGR to protect the integrity of the well bore or to protect public health, safety, and the environment.

### Compliance with Other Regulatory Agency Requirements

1. All applicable federal, state, and County rules and regulations shall be complied with at all times, including, but not limited to, the rules and regulations of the following agencies:
   - California Division of Oil and Gas and Geothermal Resources;
   - Kern County Fire Department;
   - Kern County Health Department;
   - USFWS;

- CDFW;
- DTSC;
- RWQCB;
- SJVAPCD; and
- Kern County Engineering, Survey and Permitting Services Department.

## Land Use

1. Drilling shall not be commenced within 100 feet of any existing residence without the written consent of the owner of such structure.
2. No oil or gas well shall be drilled within 100 feet of any public highway or building not necessary to the operation of the well (or within 150 feet of any dwelling,), or within 300 feet of any building used as a place of public assembly, institution, or school, or within 50 feet of any building utilized for commercial purposes constructed prior to the commencement of such drilling, without the written consent of the owner of such structure. This provision does not apply to administrative and other buildings that are ancillary to oil and gas operations.
3. Whenever oil or gas is produced into and shipped from tanks located on the premises, such tanks, whenever located within 500 feet to any dwelling or commercial building, shall be surrounded by shrubs or trees, planted and maintained so as to develop attractive landscaping or shall be fenced in such a manner as to, insofar as practicable, screen such tanks from public view. Such fencing shall comply with the requirements of DOGGR.

## Agricultural Resources

1. When the applicant/operator is conducting operations on land that has surface co-users, it shall engage the other user(s) and ensure principles/guidelines are established for work in the area (gate closures, potential crop damage and subsequent management, safety of workers in the area, etc.).
2. Fugitive dust emissions from un-surfaced access roads and construction sites shall be managed as per SJVAPCD regulations or as needed to ensure worker/receptor safety.

## Biological Resources

1. Within 14 days before any ground disturbance activities on previously undisturbed property, a qualified biologist shall conduct a focused survey to determine the presence/absence of sensitive species protected by state and federal Endangered Species Acts and potential impacts to sensitive species onsite. The survey shall be conducted in accordance with the standard protocol of USFWS and CDFW.
2. If take of covered endangered or threatened species has the potential to occur, the appropriate USFWS and CDFW Endangered Species Act compliance provisions shall be followed.

3. Operator shall, by appropriate design, maintain ground openings in order to protect wildlife from becoming entrapped within them. Leakage from facilities which may impact wildlife shall be minimized.
4. If the operator, its employees, contractors, or agents kills or injures a state or federally listed species, or finds any such animal dead, injured, or entrapped, operator shall notify the CDFW and USFWS immediately. The operator shall also contact the local CDFW warden. A qualified biologist shall document all circumstances of death, injury, or entrapment of state or federally listed species. The biologist shall: (1) take all reasonable steps to enable the individual animal to escape, if it is entrapped; (2) contact CDFW or other appropriate authorities to identify an approved rehabilitation center and appropriate capture and transport techniques, if the animal is injured; and (3) if the animal is dead, document circumstances of death in writing and photograph the dead animal in situ.
5. All vehicles shall observe a speed limit of 25 miles per hour or less on non-public roads during construction, operation and maintenance activities. When necessary, a lower speed limit may be implemented.
6. All pipe 3-inch or greater in diameter stored overnight on a location must have end caps that prevent wildlife from entering the pipe.
7. All food-related trash such as wrappers, cans, bottles and food scraps shall be disposed of in closed containers only, and regularly removed from the Project site. Feeding of wildlife is prohibited.
8. An educational briefing shall be conducted for all Project personnel on previously undisturbed property prior to the start of the covered Project/activity. The briefing shall include a discussion of all sensitive species that may be encountered in the Project Area, the laws and codes that affect protected species and the protection measures that must be followed to avoid and minimize impacts.
9. The Applicant/Operator shall consult with the CDFW as necessary to determine if a Section 1600 Streambed Alteration Agreement will be required for Project implementation.
10. Prior to construction in any potential wetland drainage feature, a wetland delineation report shall be prepared by a qualified consultant and any recommendations implemented.

## Soils and Geological Resources

1. Design runoff control features related to oilfield structures and activities to minimize soil erosion.
2. Minimize ground disturbance and control erosion by avoiding steep slopes and by minimizing the amount of surface disturbance needed for roads, well pads, pipelines, and electrical lines. Keep equipment and vehicles within the limits of the initially disturbed areas to the extent possible.

## Water Resources

1. Avoid streams, wetlands, and drainages, where possible. Locate access roads to minimize stream crossings and to minimize impacts where crossings cannot be avoided. Obtains CDFW Streambed Alteration Agreement prior to any work in a state jurisdictional waterway.
2. The Applicant/Operator shall obtain coverage under and comply with the terms of the appropriate storm water permit and shall develop a storm water management plan to ensure compliance with state regulations and prevent offsite migration of contaminated storm water or increased soil erosion.

## Flooding

1. Well pads should be developed outside 100-year floodplains, where possible.

## Fire Safety

1. Drilling and production activities shall conform to all applicable fire and safety regulations, and firefighting apparatus and supplies required by the Kern County Fire Department shall be maintained onsite at all times during drilling and production operations.
2. Applicant/Operator shall minimize human-caused wildfires by carrying water or fire extinguishers and shovels in non-passenger vehicles in the field. The use of shields, protective mats and other fire prevention methods shall be used during grinding and welding to minimize the potential for fire. Personnel shall be trained regarding potential fire hazards and their prevention.

## Odor Management

1. When adjacent to residential uses, the Operator shall undertake an odor minimization measure to reduce or eliminate odors from oilfield equipment, including wells and drilling operations.

## Noise

1. Operate pumping wells by electric motors or muffled internal combustion engines.
2. Locate all stationary construction equipment (i.e. compressors and generators) and exploratory and production wells as far as practicable from nearby residences and other sensitive receptors. If drilling equipment will be placed near residences or other sensitive receptors, sound walls should be installed during drilling activities.
3. Route heavy truck traffic supporting construction and drilling activities away from adjacent residences and other sensitive receptors.

## Aesthetics/Visual

1. The height of all pumping units shall not exceed 60 feet measured from the base of the pumping unit, unless required to lift reservoir fluids, and shall be painted and kept in neat condition.

## Health Safety

1. Sanitary toilet and washing facilities, if required by the Kern County Environmental Health Services or other governmental agencies, shall be installed and maintained in a clean and sanitary condition during drilling operations, and at such other times as specified by these agencies.

## Public Safety

1. After production begins and a pump is installed on the wellhead, a fence at least 6 feet in height shall be installed around the pump site or drilling island for public safety. This fence shall be constructed of chain link with wood or metal slats or other screening fence as may be approved by the Planning Director. This fencing and screening requirement shall apply only to those pump sites located within 500 feet of any dwelling. Such fencing shall comply with the requirements of the California Division of Oil and Gas.

## Air Quality

1. Development and operation of stationary source facilities shall comply with all SJVAPCD rules and regulations.
2. Fugitive dust emissions from un-surfaced access roads, maneuvering (turn-arounds), parking areas, and construction sites shall be managed as per SJVAPCD regulations, or as needed to ensure worker/receptor safety.
3. Minimize the amount of well site disturbance and areas cleared of vegetation.
4. Use dust abatement techniques, in accordance with SJVAPCD regulations, on unpaved surfaces where adjacent to residential use to minimize airborne dust during earthmoving activities.
5. Post and enforce speed limits to reduce airborne fugitive dust caused by vehicular traffic.

## Cultural and Paleontological Resources

1. During all phases of the Project, keep equipment and vehicles within the limits of the disturbed well site areas as much as possible.
2. Should cultural, archaeological or paleontological resources be identified on the Project site during any ground disturbing activities related to the Project, ground disturbing activities proximate to the Project shall cease. Operator shall notify and retain a qualified archaeologist or paleontologist to provide an evaluation of the find in conformance with CEQA Guidelines Section 15064.5.
3. If human remains are found during construction, further work or disturbance of the site will be halted. The discovery will be inspected and the remains handled in a manner consistent with California Public Resources Code Section 5097.98-99, Health and Safety Code 7050.5 and CEQA Section 15064.5.

## Lighting

1. The Applicant/Operator shall ensure that any exterior night lighting installed within 500 feet of residences utilize low intensity, low glare design, minimum height, and be hooded to direct light downwards.

## Spill Prevention and Remediation Measures

1. Oil and chemical spills shall be cleaned up in accordance with the EPA SPCC Plan for the site to protect personnel, wildlife, and habitat provided, however, that nothing herein contained shall be construed to alter operator's obligations under existing laws and regulations. When a spill occurs, emergency actions to stop the spill or leak as soon as possible and ensure the safety of personnel shall be taken.

## Oilfield Waste Management

1. Oilfield waste (hazardous and non-hazardous) shall be managed as required by rules and regulations and shall be properly disposed of at an appropriate facility.

## Signage

1. Signs shall be limited to directional, warning, and identification in connection with oil, gas, or other hydrocarbon drilling and development operations.
2. No signs, other than directional and warning signs and those required for identification of the well, shall be constructed, erected, maintained, or placed on the premises or any part thereof, except those required by law or ordinance to be displayed in connection with the drilling or maintenance of the well.

## Abandonment/Reclamation

1. Within 60 days after any well has been placed in production, or after its abandonment, earthen sumps used in drilling or production or both (unless such sumps are to be used within a reasonable time as determined by the Planning Director for the drilling of another well or wells) shall be filled and the drilling site restored as nearly as practicable to a uniform grade. Temporary earthen sumps may be used for cleanout or remedial work on an existing well or other production facility. However, these sumps shall be filled and the site restored as nearly as practicable to uniform grade within 60 days after the cleanout or other remedial work is completed. Such restoration work shall comply with all applicable regulations of DOGGR. Centralized drilling sumps serving multiple drilling locations are allowed provided: (1) the existence of the centralized facility reduces the number of sumps used by the operator; (2) the sump remains in active use and has not been idle for more than 60 days; (3) appropriate steps have been taken to screen the sump for protection of wildlife; and (4) the sump is maintained and operated in accordance with all applicable rules and regulations of DOGGR and the Central Valley RWQCB (CVRWQCB).

2. Reclamation and re-vegetation of abandoned or disturbed areas no longer needed for oil and gas activities shall be implemented to minimize erosion and reduce air pollution from disturbed areas. Re-vegetation shall be in accordance with native vegetation in the immediate area.

# 3.6 Project Objectives

## 3.6.1 County Objectives

The County has defined the following objectives for the Project:

- Update the County's Zoning Ordinance to include additional procedures and compliance standards that address changes in laws and regulations by other agencies, and technological advancements within the oil and gas industry, for the purpose of reducing or eliminating potential significant adverse environmental impacts, to the extent feasible, of future oil and gas activities and, thereby, ensure that current County ordinances reflect the County's interest in protecting the health, safety and general welfare of residents and visitors.
- Encourage ongoing economic development by the oil and gas industry that creates quality, high paying jobs and promotes capital investment in Kern County, which enables the County to invest in capital improvement projects and social programs, which benefit County residents, retail businesses, and capital industries, which ensures the County's fiscal stability.
- Continue Kern County's ongoing commitment to consult and cooperate with federal, state, regional, and local agencies by periodically reviewing adopted regulations to ensure the long-term viability of Kern County's resources.
- Continue to improve and streamline current energy regulations and increase County monitoring and involvement in state and federal energy legislation.
- Protect areas of important mineral, petroleum, and agricultural resource potential for future use by promoting sustainability and encouraging BMPs, which are mutually beneficial, through strategic short and long range planning.
- Ensure the protection of environmental resources by emphasizing the conservation of productive agricultural lands, the encouragement of planned urban growth, the promotion of clean air strategies to address existing air quality issues, and the promotion of long-term water conservation strategies which will ensure the quality and adequacy of surface and groundwater supplies for future growth of all of Kern County's industries.
- Contain new development within an area large enough to meet generous projections of foreseeable need but in locations that will not impair the economic strength derived from residential developments, agriculture, rangeland, mineral resources, or diminish the other amenities that exist in Kern County.

### 3.6.2 Applicant Objectives

The Project proponents have defined the following objectives for the Project:

- Create an effective regulatory and permitting process for oil and gas exploration and production that can be relied on by the County of Kern, as well as the DOGGR and other responsible agencies.
- Achieve an efficient and streamlined environmental review and permitting process for all oil and gas operations covered by the proposed Project.
- Provide for economically feasible and environmentally responsible growth of the Kern County oil and gas industry.
- Develop industry-wide best practices, performance standards, and mitigation measures that ensure adequate protection of public health and safety and the environment.
- Increase oil and gas exploration and production in Kern County as a means of reducing California's dependence upon foreign sources of energy.
- Increase oil and gas exploration and production in Kern County as a means of increasing employment opportunities and economic prosperity for Kern County's residents, businesses, and local government.

## 3.7 Cumulative Projects

CEQA requires that an EIR evaluate a project's cumulative impacts. Cumulative impacts are the project's impacts combined with the impacts of other related past, present, and reasonably foreseeable future projects. As set forth in the CEQA Guidelines, the discussion of cumulative impacts must reflect the severity of the impacts, as well as the likelihood of their occurrence; however, the discussion need not be as detailed as the discussion of environmental impacts attributable to the project alone. As stated in CEQA, Public Resources Code, Section 21083(b)(2), "a project may have a significant effect on the environment if the possible effects of a project are individually limited but cumulatively considerable."

According to Section 15355 of CEQA Guidelines:

Cumulative impacts refer to two or more individual effects, which, when considered together, are considerable and which compound or increase other environmental impacts.

(a) The individual effects may be changes resulting from a single project or a number of separate projects.

(b) The cumulative impact from several projects is the change in the environment, which results from the incremental impact of the project when added to other closely related past, present, and reasonable foreseeable probable future projects. Cumulative impacts can result from

> individually minor but collectively significant projects taking place over a period of time (CCR, Title 14, Division 6, Chapter 3, §15355).

In addition, as stated in the CEQA Guidelines, it should be noted that:

> The mere existence of significant cumulative impacts caused by other projects alone shall not constitute substantial evidence that the proposed project's incremental effects are cumulatively considerable (CCR, Title 14, Division 6, Chapter 3, Section 15064[h][4]). "Cumulatively considerable" means that the incremental effects of an individual projects are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.

Cumulative impact discussions for each environmental topic area are provided at the end of each technical analysis contained within Chapter 4, under "Impacts and Mitigation Measures." As previously stated, and as set forth in the CEQA Guidelines, related projects consist of "closely related past, present, and reasonable foreseeable probable future projects that would likely result in similar impacts and are located in the same geographic area" (CCR, Title 14, Division 6, Chapter 3, Section 15355).

An adequate discussion of significant cumulative impacts must include either a list of past, present, and probable future projects producing related or cumulative effects, or a summary of projections from an adopted local, regional, or statewide plan, related planning document, or related environmental document that describes conditions contributing to the cumulative effect (CEQA Guidelines Section 15130(b)(1)). This cumulative analysis uses the plan/projection approach, and includes both the KCGP and the regional growth plan and projections included in the Kern COG Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) approved in 2014.

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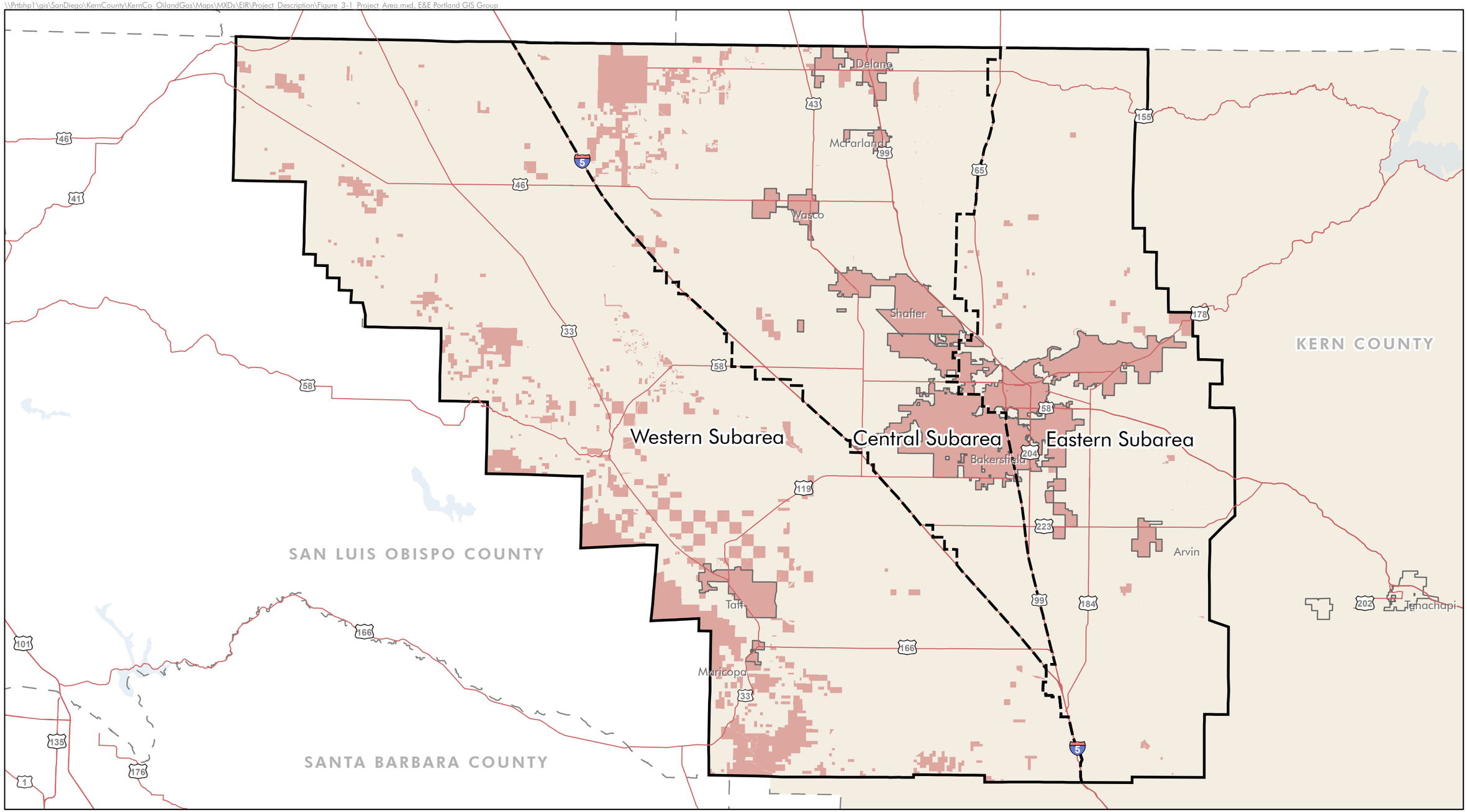


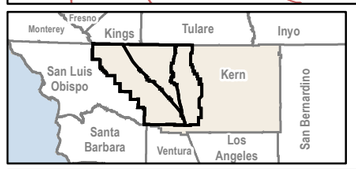


0 10
Miles

Project Boundary
Subarea
Non-jurisdictional
Kern County
City Limits
Highways
County Boundary

Data Sources: Kern County, 2013, ESRI 2010

Figure 3-1
Project Area Map

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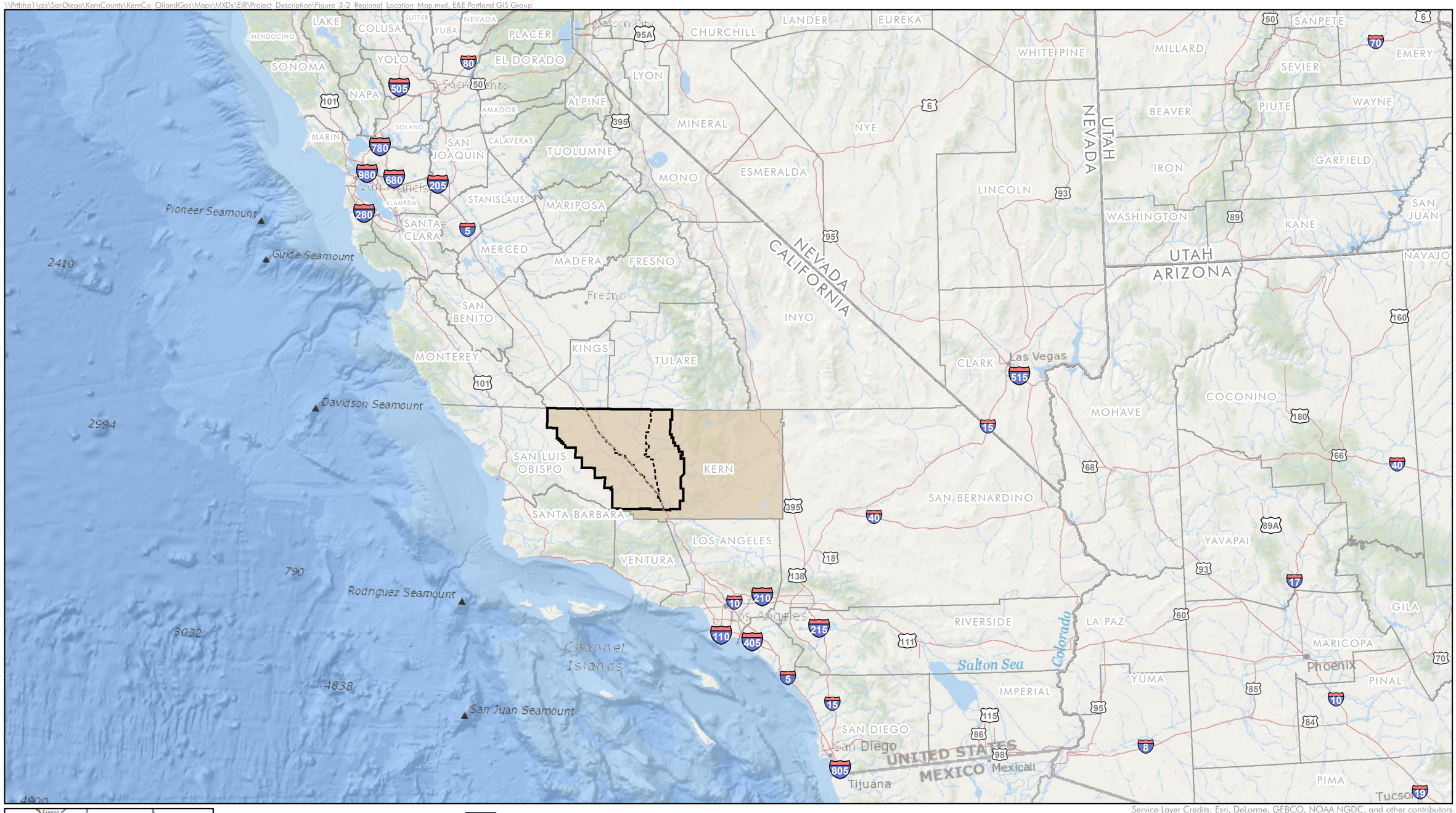


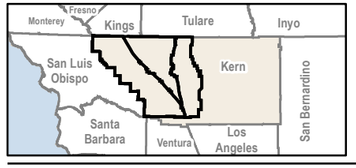


0 50
Miles

Project Boundary
Subarea
Kern County
Highways
County Boundary
State Boundary

Service Layer Credits: Esri, DeLorme, GEBCO, NOAA NGDC, and other contributors
Sources: Esri, GEBCO, NOAA, National Geographic, DeLorme, HERE, Geonames.org, and other contributors
Data Sources: ESRI 2010, Kern County, 2013

Figure 3-2
Regional Location Map

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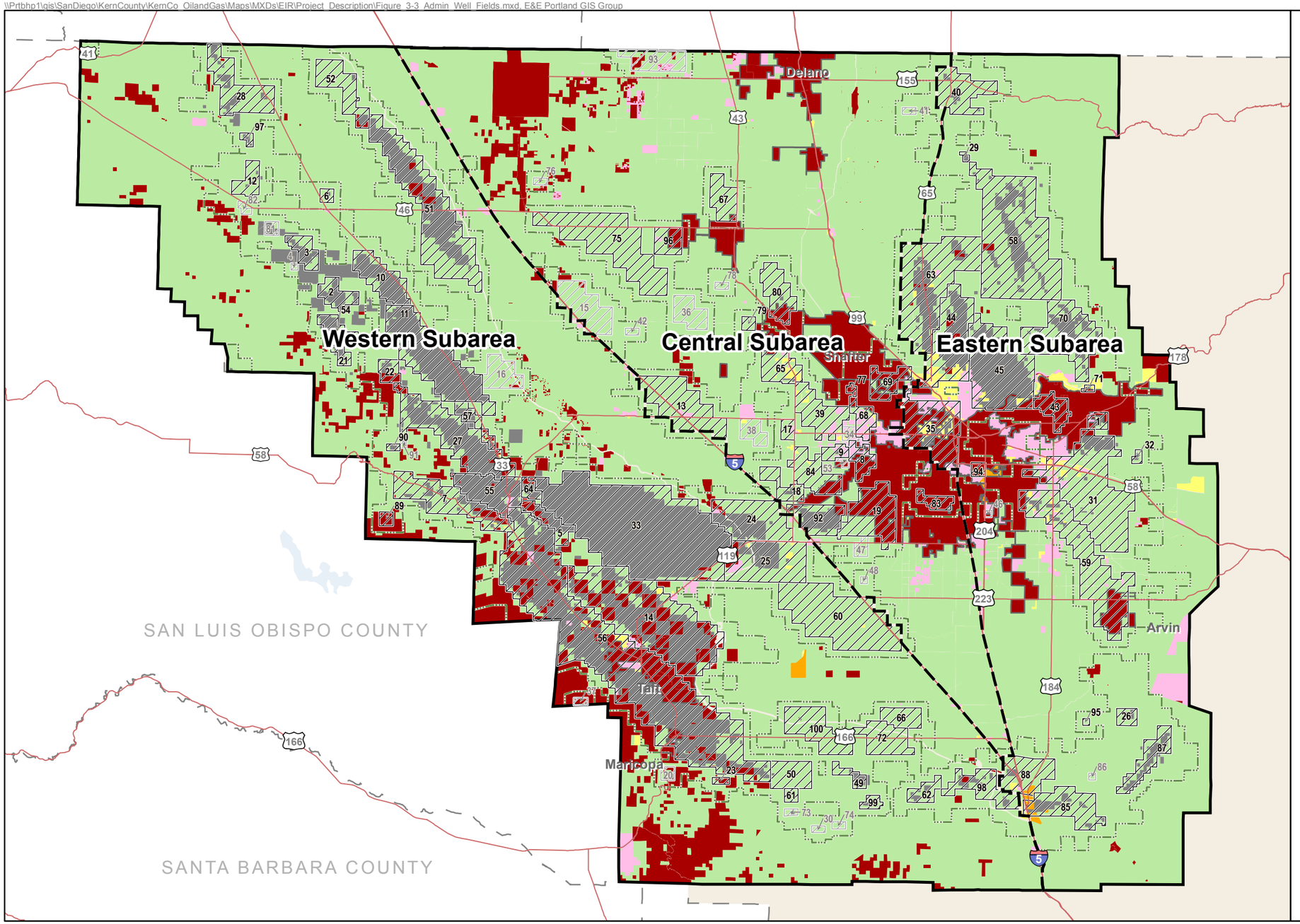
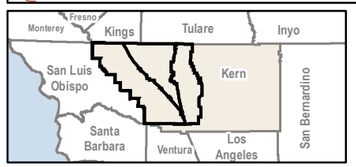



## Oil & Gas Fields in the Project Area

1. Ant Hill
2. Antelope Hills
3. Antelope Hills, North
4. Antelope Plains Gas (Abd)
5. Asphalto
6. Beer Nose
7. Belgian Anticline
8. Bellevue
9. Bellevue, West
10. Belridge, North
11. Belridge, South
12. Blackwells Corner
13. Bowerbank
14. Buena Vista
15. Buttonwillow Gas (Abd)
16. Cal Canal Gas (Abd)
17. Calders Corner
18. Canal
19. Canfield Ranch
20. Capitola Park (Abd)
21. Carneros Creek
22. Chico Martinez
23. Cienaga Canyon
24. Coles Levee, North
25. Coles Levee, South
26. Comanche Point
27. Cymric
28. Devils Den
29. Dyer Creek
30. Eagle Rest (Abd)
31. Edison
32. Edison, Northeast
33. Elk Hills
34. English Colony (Abd)
35. Fruitvale
36. Garrison City Gas (Abd)
37. Gonyer Anticline (Abd)
38. Goosloo (Abd)
39. Greeley
40. Jasmin
41. Jasmin, West (Abd)
42. Jerry Slough (Abd)
43. Kern Bluff
44. Kern Front
45. Kern River
46. Kernsumner (Abd)
47. Lakeside (Abd)
48. Lakeside, South (Abd)
49. Landslide
50. Los Lobos
51. Lost Hills
52. Lost Hills, Northwest
53. McClung (Abd)
54. McDonald Anticline
55. McKittrick
56. Midway - Sunset
57. Monument Junction
58. Mount Poso
59. Mountain View
60. Paloma
61. Pioneer
62. Pleito
63. Poso Creek
64. Railroad Gap
64. Pyramid Hills
65. Rio Bravo
66. Rio Viejo
67. Rose
68. Rosedale
69. Rosedale Ranch
70. Round Mountain
71. Round Mountain South
72. San Emidio Nose
73. San Emigdio (Abd)
74. San Emigdio Creek (Abd)
75. Semitropic
76. Semitropic Gas, Northwest (Abd)
77. Seventh Standard
78. Shafter (Abd)
79. Shafter Southeast Gas
80. Shafter, North
81. Shale Flats Gas (Abd)
82. Shale Point Gas (Abd)
83. Stockdale
84. Strand
85. Tejon
86. Tejon Flats (Abd )
87. Tejon Hills
88. Tejon, North
89. Temblor Hills
90. Temblor Ranch
91. Temblor, East (Abd)
92. Ten Section
93. Trico Gas (Abd)
94. Union Ave.
95. Valpredo
96. Wasco
97. Welcome Valley
98. Wheeler Ridge
99. White Wolf
100. Yowlumne




0 10 Miles

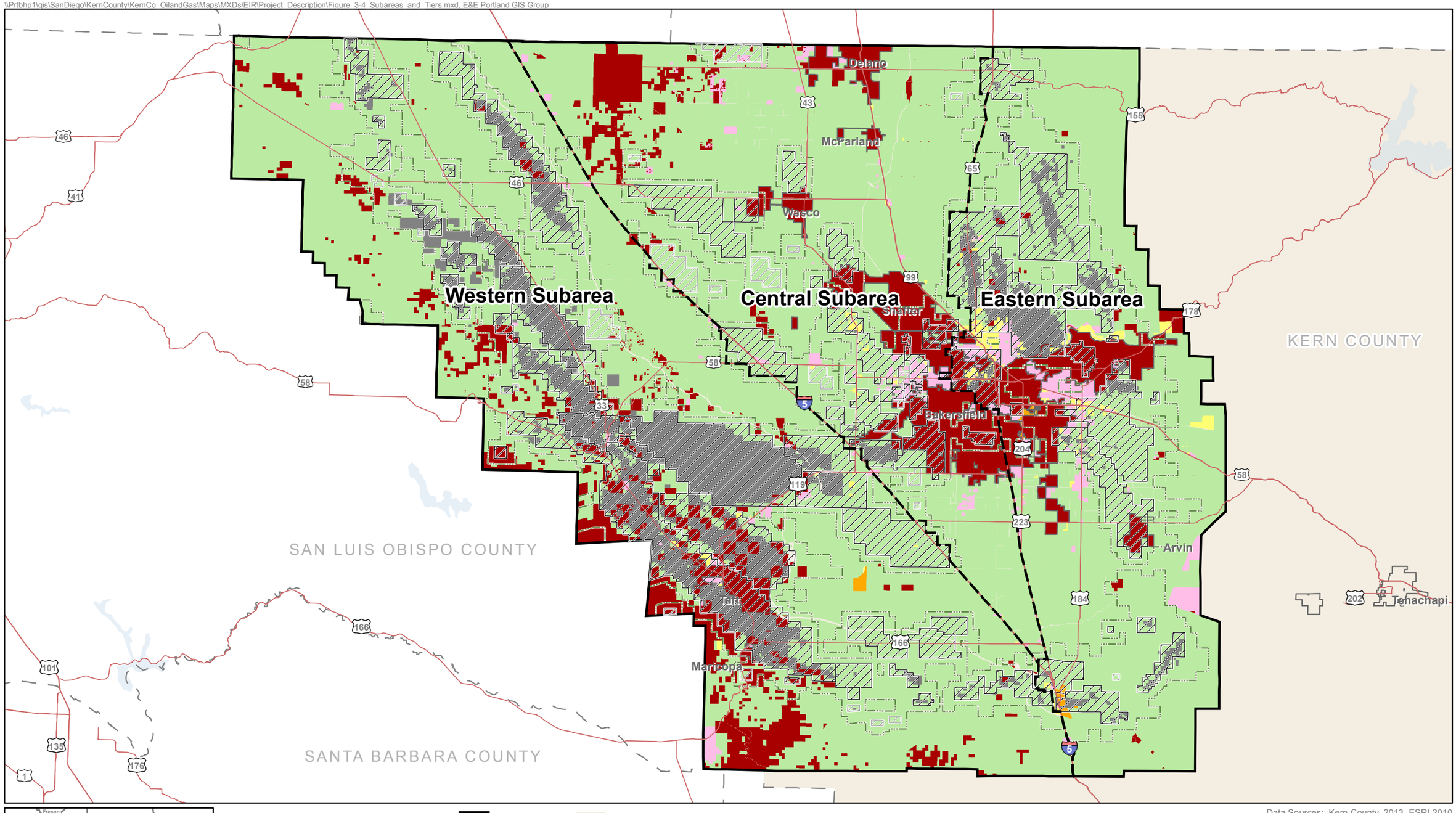
- Project Area
- Subarea
- Kern County
- Highways
- County Boundary
- City Limits
- DOGGR Administrative Well Field Boundaries
- DOGGR Administrative Well Field Boundaries (Abd)
- Core Area

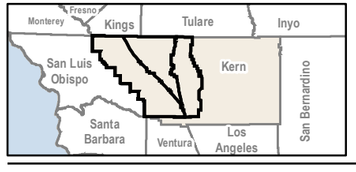
Tier Levels

- Tier 1
- Tier 2
- Tier 3
- Tier 4
- Tier 5
- Non-jurisdictional

Data Sources: Kern County, 2013, ESRI 2010; DOGGR, 2013

**Figure 3-3**
**Location of Administrative Wells Fields**




0 10 Miles

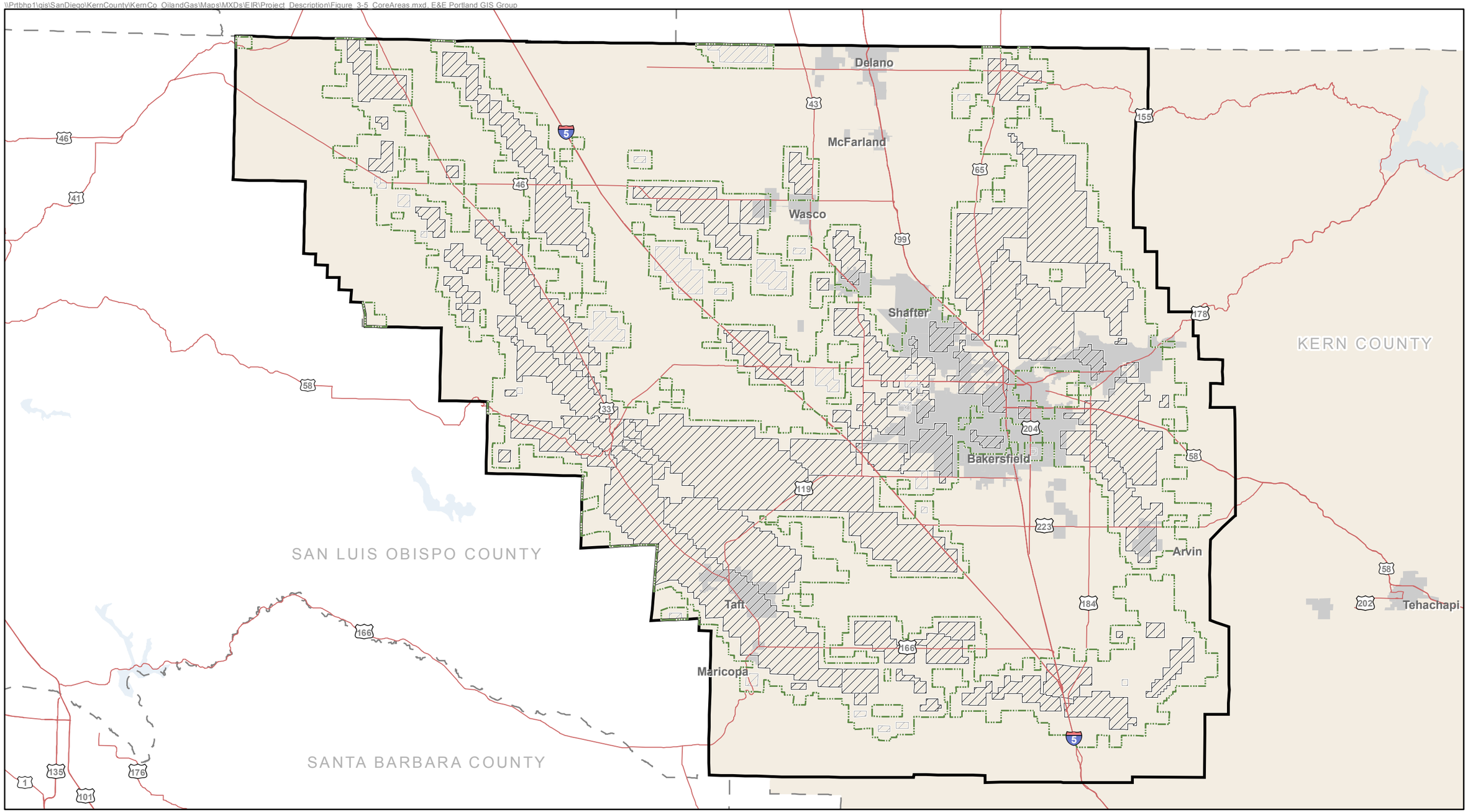
Project Area
Subarea
Core Area
Kern County
City Limits
Highways
County Boundary
DOGGR Administrative Well Field Boundaries
DOGGR Administrative Well Field Boundaries (Abd)

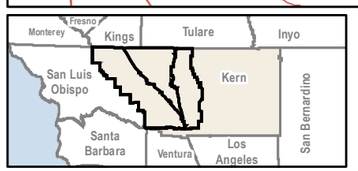
Tier Levels
Tier 1
Tier 2
Tier 3
Tier 4
Tier 5
Non-jurisdictional

Data Sources: Kern County, 2013, ESRI 2010

**Figure 3-4**
**Project Subareas and Tiers Map**

\\Prtbhp1\gis\SanDiego\KernCounty\KernCo_OilandGas\Maps\MXDs\EIR\Project_Description\Figure_3-5_CoreAreas.mxd, E&E Portland GIS Group



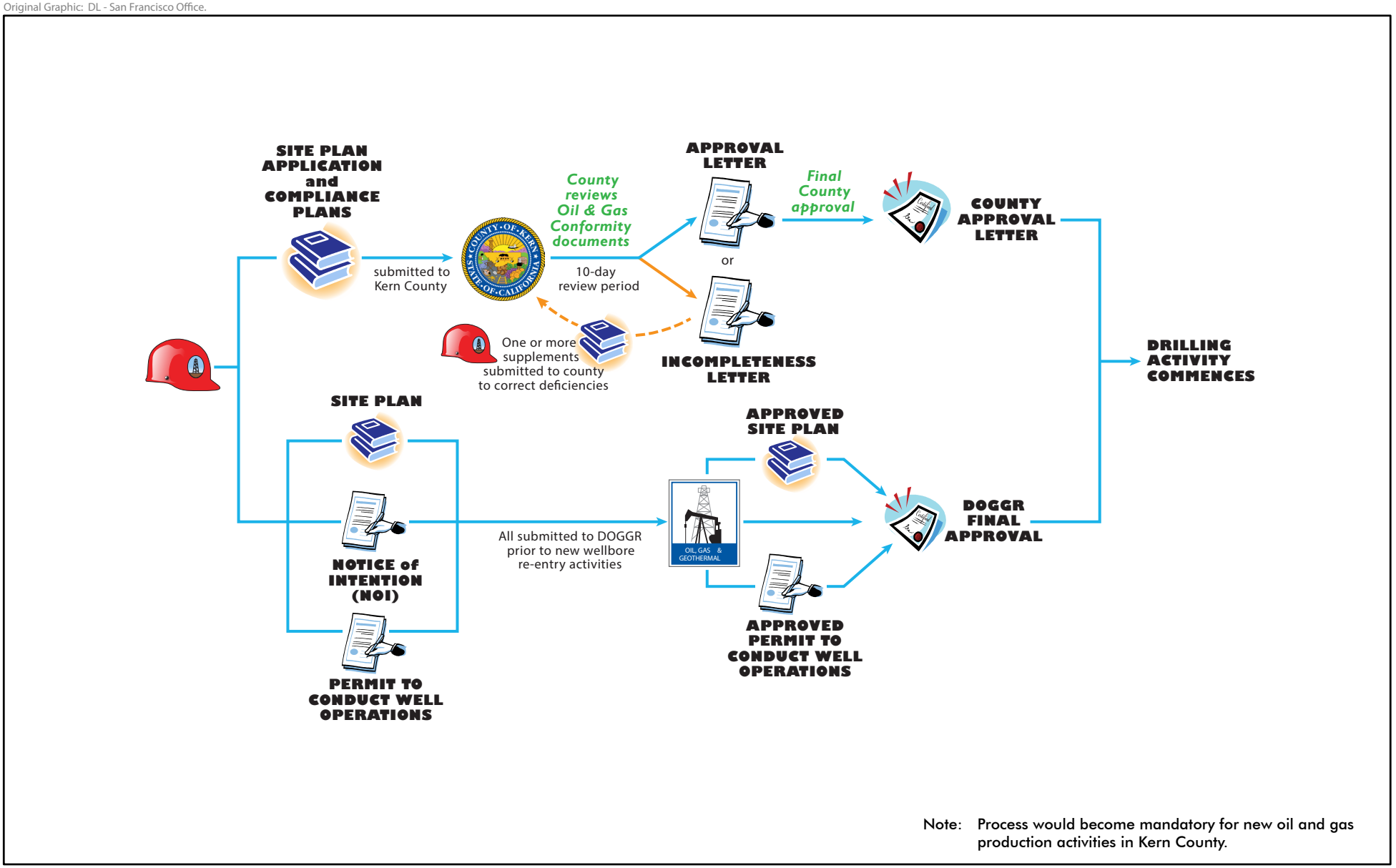

0 10
Miles

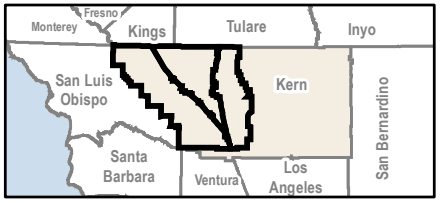
Project Area
Core Area
Kern County
City Limits
Highways
County Boundary
DOGGR Administrative Well Field Boundaries (Abd)
DOGGR Administrative Well Field Boundaries

Data Sources: Kern County, 2013, ESRI 2010

**Figure 3-5**
**Core Areas Map**

Original Graphic: DL - San Francisco Office.




LEGEND

Kern County

Operator

Division of Oil, Gas and Geothermal Resources (DOGGR)

Figure 3-6
Oil and Gas Conformity Review Process

Attachment A

# Zoning Ordinance Amendments

# DRAFT
## C H A P T E R 19.98

## OIL AND GAS ACTIVITIES

**SECTIONS:**


**19.98.010 PURPOSE AND APPLICATION**
**19.98.020 DEFINITIONS OF OIL AND GAS PRODUCTION ACTIVITES**
**19.98.030 TIER AREAS**
**19.98.040 OIL AND GAS ACTIVITIES BY MINISTERIAL PERMIT**
**19.98.050 OIL AND GAS ACTIVITIES BY CONDITIONAL USE PERMIT**
**19.98.060 IMPLEMENTATION STANDARDS AND CONDITIONS**
**19.98.070 OIL AND GAS CONFORMITY REVIEW AND APPROVAL ── REQUIRED**
**19.98.080 OIL AND GAS CONFORMITY REVIEW -- APPLICATION CONTENTS**
**19.98.090 OIL AND GAS CONFORMITY REVIEW – WITH REQUIRED SURFACE OWNER SIGNATURE**
**19.98.100 OIL AND GAS CONFORMITY REVIEW – WITHOUT REQUIRED SURFACE OWNER SIGNATURE**
**19.98.110 MINOR ACTIVITY REVIEW ── APPLICATION CONTENTS**
**19.98.120 MINOR ACTIVITY REVIEW**
**19.98.130 SELF_CERTIFICATION**
**19.98.140 INSPECTION COMPLIANCE**
**19.98.150 PLUGGED AND ABANDONED**
**19.98.160 PERMIT REVOCATION AND MODIFICATION**
**APPENDIX A - DEFINITIONS**


### 19.98.010 PURPOSE AND APPLICATION

The purpose of this chapter is to promote the economic and streamlined recovery of oil, gas, and other hydrocarbon substances in a manner compatible with surrounding land uses and protection of the public health and safety by establishing reasonable limitations, safeguards, and controls on exploration, drilling, and production of hydrocarbon resources. The procedures and standards contained in this chapter shall apply to all exploration drilling and production activities related to oil, gas, and other hydrocarbon substances carried out within the unincorporated San Joaquin Valley portion of Kern County (See Figure 19.98.015). This effective date of this version of Chapter 19.98 is MONTH, DAY, YEAR.

### 19.98.020 DEFINITIONS OF OIL AND GAS PRODUCTION ACTIVITIES

Oil and Gas exploration and operations contain many highly technical activities. For the purposes of this Chapter 19.98, definitions of activities are located in Appendix A.

### 19.98.030 TIER AREAS

The Oil and Gas Production Boundary Area is divided into five (5) Tier Areas and depicted in Figure 19.98.015. Changes to the boundries of Figure 19.98.015 shall be through the procedures in Chapter 19.112. The Tier Areas are generally, described as follows:

A. Tier 1 Area is defined as all areas in which oil and gas activity is the primary land use. The existing well and activity densities preclude almost all other uses.

B. Tier 2 Area is defined as all land that is classified with the Exclusive Agriculture (A) or Limited Agriculture (A-1) Districts and has agriculture as the primary land use not already included in Tier 1.

C. Tier 3 Area is defined as other areas not within the Tier 1 Area and in one of the following zone districts:

- Natural Resource (NR)
- Recreation Forestry (RF)
- Light Industrial (M-1)
- Medium Industrial (M-2)
- Heavy Industrial (M-3)
- Floodplain Primary (FPP)
- Drilling Island (DI)
- Zone Districts that have the Petroleum Extraction (PE) Combining District

D. Tier 4 Area is defined as areas not within Tier 3, containing at least one of the following zone districts:

- Estate (E)
- Low–Density Residential (R-1)
- Medium-Density Residential (R-2)
- High-Density Residential (R-3)
- Commercial Office (CO)
- Neighborhood Commercial (C-1)
- General Commercial (C-2)
- Highway Commercial (CH)
- Platted Lands (PL)
- Mobilehome Park (MP)

Authorized oil and gas activities in Tier 4 are subject to approval of a conditional use permit in accordance with 19.104 of this Title. The Open Space (OS) District are those areas where oil or gas exploration and production activities are prohibited, but ancillary facilities are an allowable use.

E. Tier 5 are areas including all current and future Specific Plan boundaries either adopted with a Special Planning (SP) District or which include specific provisions for oil and gas operations. Oil or gas exploration and production activities would be allowed with a conditional use permit or as permitted by the regulations contained within the adopted Specific Plan in Tier 5 areas.

F. All other areas not defined as Tier 1-5 Areas are considered Non-Jurisdictional. These areas include lands under the administration of the United States, State of California or an incorporated city. The regulations set forth in this chapter do not pertain to these areas.

**19.98.040 OIL AND GAS ACTIVITIES BY MINISTERIAL PERMIT**

A. No well for use as an injection well and no well for the exploration for or development or production of oil or gas or other hydrocarbon substances may be drilled, and no related accessory equipment, structure, or facility may be installed in Tier 1, 2, 3 and 5 Areas

until an application for Oil and Gas Conformity Review or Minor Activity Review has been submitted to and approved by the Planning Director as consistent with the standards set out in Section 19.98.060 of this chapter and in accordance with the procedures set out in Sections 19.98.070 through 19.98.120 of this chapter.

B. Disposal of nonhazardous oilfield fluid waste and production water is considered an accessory facility only if the facility complies with the following:

1. The nonhazardous oilfield fluid waste or production water is produced and disposed of within the same designated oilfield; or

2. The nonhazardous oilfield fluid waste or production water disposed of outside the designated oilfield of origin is produced by and disposed of solely and only by the same individual, corporation, or entity.

**19.98.050 OIL AND GAS ACTIVITIES BY CONDITIONAL USE PERMIT**

A. No well for use as an injection well and no well for the exploration for or development or production of oil, gas, or other hydrocarbon substances may be drilled, and no related accessory equipment, structure, or facility may be installed in any zoning district described in this title in which such uses are permitted as conditional uses until an application for a conditional use permit, which includes the information specified in Section 19.98.080, has been submitted to and approved by the Planning Commission as consistent with the standards set out in Section 19.98.060 of this chapter and in accordance with the standards and procedures set out in Sections 19.102.130 through 19.102.180 and Chapter 19.98 of this title. In approving a conditional use permit, the Planning Commission may waive any condition set out in Section 19.98.060 of this chapter if it determines that such waiver will not result in material detriment to the public welfare or the property of other persons located in the vicinity, based on findings of fact.

B. No well for use as an injection well and no well for the exploration for or development or production of oil, gas, or other hydrocarbon substances may be drilled, and no related accessory equipment, structure, or facility, outside the boundaries as defined in Figure 19.98.015, may be installed in any zoning district described in this title in which such uses are permitted until an application for a conditional use permit, which includes the information specified in Section 19.98.080, has been submitted to and approved by the Planning Commission as consistent with the standards set out in Section 19.98.060 of this chapter and in accordance with the standards and procedures set out in Sections 19.102.130 through 19.102.180 and Chapter 19.98 of this title. In approving a conditional use permit, the Planning Commission may waive any condition set out in Section 19.98.060 of this chapter if it determines that such waiver will not result in material detriment to the public welfare or the property of other persons located in the vicinity, based on findings of fact.

C. Should any activity requiring approval of an Oil and Gas Conformity Review or Minor Activity Review pursuant to Sections 19.98.070 through 19.98.120 of this chapter, not be able to comply with the Implementation Standards and Conditions set forth in Section 19.98.060, an application for a conditional use permit, which includes the information specified in Section 19.98.080, shall be submitted to and approved by the Planning Commission in accordance with the standards and procedures set out in

Sections 19.102.130 through 19.102.180 and Chapter 19.98 of this title. In approving a conditional use permit, the Planning Commission may waive/modify any condition set out in Section 19.98.060 of this chapter if it determines that such waiver or modification will not result in material detriment to the public welfare or the property of other persons located in the vicinity, based on findings of fact.

D. If a producing well or service well is not completed upon land subject to a conditional use permit issued pursuant to this chapter and Chapter 19.104 of this title within twelve (12) months from the date of issuance of the permit, or within any extended period thereof, the conditional use permit shall expire and the premises shall be restored as nearly as practicable to their original condition. No permit shall expire while the permittee is continuously conducting drilling, redrilling, completing or abandoning activities, or related operations, in a well on the lands covered by such permit, which activities were commenced while said permit was otherwise in effect. Continuous activites are those suspended not more than thirty (30) consecutive days. If, at the expiration of the twelve- (12-) month period, the permittee has not completed his drilling program on the lands covered by such permit, the decision making authority, upon a written request of the permittee, may extend the permit for the additional time requested by permittee for the completion of such drilling program, in accordance with the standards and procedures set out in Sections 19.102.130 through 19.102.180.

**19.98.060 IMPLEMENTATION STANDARDS AND CONDITIONS**

Pursuant to this chapter, all activities for the exploration for or development or production of oil, gas, and other hydrocarbon substances and related facilities and activities shall comply with the following standards, unless otherwise provided in this chapter:

A. No oil or gas well shall be drilled within:

1. One hundred (100) feet of any public highway or building not necessary to the operation of the well;
2. One hundred and ninety (190) feet of any dwelling unit (single or multifamily);
3. Three hundred (300) feet of any building used as a place of public assembly, institution, or school; or
4. One hundred (100) feet of any building utilized for commercial purposes, not used for oil and gas operations.

B. All drilling and production activities shall conform to all applicable fire and safety regulations. Firefighting apparatus and supplies required by the Kern County Fire Department shall be maintained on the site at all times during drilling and production operations.

C. All required federal, State, and County rules and regulations shall be complied with at all times, including, but not limited to, the rules and regulations of the following agencies:

1. California Division of Oil and Gas (DOGGR)
2. Kern County Fire Department
3. Kern County Public Health Department
4. Regional Water Quality Control Board
5. San Joaquin Valley Air Pollution Control District
6. Kern County Public Works Department

D. The applicant shall demonstrate compliance with all applicable Mitigation Measures as listed in the approved Mitigation Monitoring and Reporting Program (MMRP) for the Revisions to the Zoning Ordinance (C) - 2015.

**19.98.070 OIL AND GAS CONFORMITY REVIEW AND APPROVAL ── REQUIRED**

Except as provided in this section, no permitted use shall be established, no permitted development shall occur, and no building permit or grading permit shall be issued for any permitted use or development subject to this chapter until an Oil and Gas Conformity Review or Minor Activities Review has been submitted to and approved by the Planning Director in accordance with the procedures set out in Sections 19.102.040 through 19.102.060 of this title.

| Activity | Conformity Review | Minor Activity Review | No Permit Required |
|---|---|---|---|
| **Drilling & Completion** | | | |
| Production Well ( including cyclic steam production well) | ✓ | | |
| Reworked Well | ✓ | | |
| Injection Well | ✓ | | |
| Temperature Observation Well | ✓ | | |
| SB4-Regulated Activities | ✓ | | |
| Drilling Pit or Sump | ✓ | | |
| Sidetrack | ✓ | | |
| Deepening | ✓ | | |
| **Exploration and Development** | | | |
| Geophysical Survey or Drilling by Scientific Means | ✓ | ✓ | |
| Well Pad Preparation | ✓ | ✓ | |
| Access Road Construction | ✓ | ✓ | |
| Electric Distribution Line | ✓ | ✓ | |
| Pipeline | ✓ | ✓ | |

| Activity | Conformity Review | Minor Activity Review | No Permit Required |
|---|---|---|---|
| **Production Operations** | | | |
| Steamflood | ✓ | | |
| Waterflood | ✓ | | |
| Gas Injection | ✓ | | |
| Chemical EOR | ✓ | | |
| Well Workover | | | ✓ |
| Geophysical Monitoring | | | ✓ |
| Oil/Gas Treatment | | ✓ | |
| Produced Water Treatment | | ✓ | |
| Well Maintenance | | ✓ | |
| Well Testing | | | ✓ |
| Pipeline | ✓ | ✓ | |
| Pipelines (Oil, Produced Water, Waste Gas) | ✓ | ✓ | |
| Electric Lines | ✓ | ✓ | |
| Wastewater Treatment and Injection Disposal | ✓ | ✓ | |
| Wastewater Treatment and Surface Disposal | ✓ | ✓ | |
| Waste Treatment and Disposal | ✓ | ✓ | |
| Access Road | ✓ | ✓ | |
| Vegetation | | | ✓ |
| Reactivation of Idle Wells | ✓ | | |
| **Support Facilities** | | | |
| Administrative Building | ✓ | ✓ | |

| Activity | Conformity Review | Minor Activity Review | No Permit Required |
|---|---|---|---|
| Steam Generator | ✓ | ✓ | |
| Flare | ✓ | ✓ | |
| Electric Lines | ✓ | ✓ | |
| Electric Substations | ✓ | ✓ | |
| Export Pipelines | ✓ | ✓ | |
| Tanks | ✓ | ✓ | |
| Oil/Water Treatment | ✓ | ✓ | |
| Produced Water Treatment | ✓ | ✓ | |
| Production Sump | ✓ | ✓ | |
| Produced Water Percolation Pond/Sump | ✓ | ✓ | |
| Emergency Pit, Sump or Secondary Containment | ✓ | ✓ | |
| Fencing | | | ✓ |
| Well Abandonment | | | ✓ |
| Revegetation | | | ✓ |
| Short Term Employee Housing | ✓ | ✓ | |
| Pre-Ordinance Activities that Cause New Ground Disturbance and/or Subject to the Emission Reduction Agreement | ✓ | ✓ | |
| Note: All activities denoted with a check mark in multiple columns, above, are subject to Oil and Gas Conformity Review only when in conjunction with another activity subject to only Oil and Gas Conformity Review; otherwise are only subject to Minor Activity Review. These activities shall be considered incidental to the Oil and Gas conformity Review for fee purposes. | | | |

**19.98.080 OIL AND GAS CONFORMITY REVIEW — APPLICATION CONTENTS**

Applications for an Oil and Gas Conformity Review within Tiers 1-3 or Tier 5 Areas, pursuant to Section 19.98.040 of this chapter, or a conditional use permit, for oil and gas activities within a Tier 4 Area, pursuant to Section 19.98.050 of this chapter, shall include the following:

A. Name, telephone number and address of the applicant.

B. Name(s), telephone number(s) and address(es) of the property owner(s), mineral owner(s), oil and gas operator (if different than the applicant).

C. Assessor's parcel number(s) of all parcels located within the boundaries of the proposed operation, including accessory equipment, structures, and/or facilities. Latitude/Longitude coordinates for all existing and proposed wells.

D. Preliminary Title Report, not over ninety (90) days old.

E. Legal description of the project area located within the boundaries of the proposed operation, including accessory equipment, structures, and/or facilities in aliquot format, unless a more precise legal description is determined to be needed by the Planning Director.

F. A site plan drawn to scale no larger than 11x17, which includes the following information: All information required in Tier 2, 3, 4 and 5. Tier 1 information to be determined based on density of pre-ordinance oilfield development, as determined by the Director.

1. Topography and proposed grading of the site plan.

2. Project boundary lines and dimensions, including lease lines and property lines.

3. Location and coordinates of all proposed well holes and related accessory equipment. Location of all roadways, pipelines, tanks, treatment or other structures and facilities to be installed, and any existing or abandoned wells if such are known to exist .

4. Location of all existing dwellings and structures, located within three thousand (3000) feet of the proposed well holes, identification of the use of each structure, and distances between well holes and existing buildings. Location of existing property lines and distance from well site to property line.

5. Location of all new flare gas production lines, lines for production, electrical lines, and location of tank farms to be used.

6. North arrow, date the site plan was prepared, and scale.

7. Location of all recorded easements onsite, roads, section/midsection lines, located within ½ mile of the proposed wells.

8. Location of all accessory/ancillary facilities (including trucking parking, onsite storage, etc.) to be installed with the proposed wells.

9. Description of parcel in relation to Tier areas as indicated in Figure 19.98.015.

10. DOGGR permit application number, if available.

11. Identify the 100-year floodplain.

12. Identify the proposed source of water (domestic or production), if applicable.

13. Show location of all proposed underground pipelines. Identify if pipelines connect to a Gas Distribution System.

14. Location of any existing Oil and Gas Conformity Review boundaries within and/or contiguous to the proposed boundary.

G. Signature Block and Statement (Land/Surface Owner, Mineral Owner and Operator.
The following statement shall be included to the first page of the site plan. In Tier 1 Areas it shall be signed by both the Mineral Owner and the Operator. In Tier 2, 3, 4 and 5 Areas it shall be signed by all parties, irrespective of ownership relationship. Multiple lines may be added for multiple ownership signatures. A dated letter of authorization, with specific Assessor Parcel Numbers, from the Land/Surface Owner addressed to the County of Kern may be submitted asking that the signature on the site plan be waived.

REQUIRED STATEMENT

The undersigned Land/Surface Owner is the owner of APN#_____. The undersigned is the Mineral Owner and/or Operator or Lessee of the Mineral Owner. The Land/Surface Owner and the Mineral Owner and/or the Operator or Lessee have come to an agreement regarding the use of the surface of the property in connection with the Kern County permit that is being issued with this site plan.

| Land/Surface Owner: | Mineral Owner: | Operator: |
|---|---|---|
| _____ | _____ | _____ |
| Print Name | Print Name | Print Name |
| _____ | _____ | _____ |
| Title/Company | Title/Company | Title/Company |
| _____ | _____ | _____ |
| Signature | Signature | Signature |
| _____ | _____ | _____ |
| Date | Date | Date |

H. Notification Requirements - Tier 1, 2, 3, 4 and 5 Areas.

1. A physical letter of notification of application that requires a signature for delivery shall be sent by the applicant to all Land/Surface Owners of the property for which the Conformity Review is being requested, if the Land/Surface Owners are different from the mineral owners providing the notice required by State law and including an official County handout explaining the conformity review process. The package shall be sent 30 days before submittal of the application. The application shall include evidence that the letter was sent and the signatures received. Any letter returned or failure to obtain a signature shall provide evidence that the Land/Surface Owner of the property cannot be located through normal means such as tax records. A dated letter of authorization, with specific Assessor Parcel Numbers, from the Land/Surface Owner addressed to the County of Kern may be submitted asking that the notification be waived as allowed by State law.

2. Within a Tier 1 Area only, a second letter shall be sent, by the applicant, when the application is submitted to the County. A dated letter of authorization, with specific Assessor Parcel Numbers, from the Land/Surface Owner, addressed to the County of Kern, may be submitted asking that the notification of application submitted be waived.

**19.98.090 OIL AND GAS CONFORMITY REVIEW – WITH REQUIRED SURFACE OWNER SIGNATURE**

A. An applicant for a ministerial permit pursuant to this chapter shall submit an application to the Planning Director in the format and number of copies specified by the Planning Director. The application shall contain all the information specified for the application by the applicable section of this chapter. The application shall be accompanied by the fee established by the Board of Supervisors pursuant to Section 19.06.040 of this Title. For Tier 2, 3 and 5 Areas, a copy of the application shall be provided to the Land/Surface owner per the requirements of 19.98.080.F above. The application must contain the signature block and statement pursuant to Section 19.98.080.F, or shall contain a letter from the Land/Surface Owner waiving the need for said signature on the specified parcel of the proposed application. The waiver letter must be dated and provide specific language as to the length of time the letter is valid if to be used for future Oil and Gas Conformity Reviews.

B. The Planning Director shall make reasonable efforts to inform the applicant in writing within seven (7) business days of receipt that the application is complete and shall issue the permit if he/she determines that the proposed use meets the implementation standards and conditions specified in the applicable provisions of this chapter or inform the applicant that additional information is needed to complete the application.

C. Within three (3) business days of reviewing the second submittal, if required, to correct any deficiencies, the Planning Director shall make reasonable efforts to issue the permit if he/she determines that the proposed use meets the implementation standards and conditions specified in the applicable provisions of this chapter or inform the applicant that additional information is needed to complete the application.

D. Within seven (7) business days of reviewing the third submittal to correct any deficiencies, the Planning Director shall make reasonable efforts to issue the permit if he/she determines that the proposed use meets the implementation standards and conditions specified in the applicable provisions of chapter. If additional information is needed, a mandatory in person meeting with the applicant, and any consultant processing the application will be required to resolve the issues preventing issuance of the permit. The in-person meeting cannot be waived.

E. Any reviews beyond three (3) shall require additional fees to be paid, as set forth pursuant to Section 19.06.040 of this Title, and shall be conducted within thirty (30) days.

F. Prior to conducting any drilling activity the operator must have received and have on file both the approved Permit to Conduct Well Operations from DOGGR and an approved Oil and Gas Conformity Review unless the activity involves facility placement not subject to DOGGR permit approval.

G. Upon issuance of this permit, the County shall send a notification to the applicable responsible agencies stating a permit has been issued by the County and that the agency has certain requirements under the California Environmental Quality Act as a responsible agency.

## 19.98.100 OIL AND GAS CONFORMITY REVIEW - WITHOUT REQUIRED SURFACE OWNER SIGNATURE

The provisions contained in this section apply only to applications submitted within Tier 2, 3 and 5 Areas, which do not contain the surface owner signature as required by Section 19.98.070, above:

A. An applicant for a ministerial permit pursuant to this chapter shall submit an application to the Planning Director in the format and number of copies specified by the Planning Director. The application shall contain all the information specified for the application by the applicable provisions of this chapter. A copy of the application shall be provided to the Land/Surface Owner per the requirements of Section 19.98.080.F above. The application shall be accompanied by the fee established by the Board of Supervisors pursuant to Section 19.06.040 of this Title.

B. The Planning Director shall make reasonable efforts to inform the applicant in writing within thirty (30) calendar days of receipt that the application is complete or that additional information is needed to complete the application. No sooner than thirty (30) calendar days from issuance of the Kern County Oil and Gas Conformity Review and any other necessary state or federal permits, the applicant may begin construction of the facility. The Planning and Community Development Department shall notify the Surface/Land Owner that the permit has been issued.

C. Within thirty (30) calendar days of reviewing the second submittal, if required, to correct any deficiencies, the Planning Director shall make reasonable efforts to issue the permit if he/she determines that the proposed use meets the implementation standards and conditions specified in the applicable provisions of this chapter or inform the applicant that additional information is needed to complete the application.

D. Within thirty (30) calendar days of reviewing the third submittal, if required, to correct any deficiencies, the Planning Director shall make reasonable efforts to issue the permit if he/she determines that the proposed use meets the development standards and conditions specified in the applicable provisions of this chapter or inform the applicant that additional information is needed to complete the application. If additional information is needed, a mandatory in-person meeting with the applicant, and any consultant processing the application will be required to resolve the issues preventing issuance of the permit. The in-person meeting cannot be waived.

E. At any time during the review periods in Sections 19.98.100.A or B the applicant submits proof of the required surface owner signature on the site plan, the application will be deemed acceptable to be processed under the provisions set forth in Section 19.98.090.

F. Prior to conducting any drilling activity the operator must have received and have on file both the approved Permit to Conduct Well Operations, from DOGGR and an approved Oil and Gas Conformity Review unless the activity involves facility placement not subject to DOGGR permit approval.

G. Upon issuance of this permit, the County shall send a notification to the applicable responsible agencies stating a permit has been issued by the County and that the agency has certain requirements under the California Environmental Quality Act as a responsible agency.

**19.98.110 MINOR ACTIVITY REVIEW — APPLICATION CONTENTS**

An application for Minor Activity Review for Tier 1-3 and 5 Areas, pursuant to Section 19.98.040 of this chapter, shall include the following:

A. Name, telephone number and address of the applicant.

B. Name(s), telephone number(s) and address(es) of the property owner(s), mineral owner(s), oil and gas operator (if different than the applicant).

C. Assessor's parcel number(s) of all parcels located within the boundaries of the proposed operation, including accessory equipment, structures, and/or facilities. Latitude/Longitude coordinates for all wells.

D. Preliminary Title Report, not over ninety (90) days old.

E. Description of proposed oil and gas activity and documentation of compliance with applicable Mitigation Measures (see incorporated Mitigation Monitoring and Reporting Program).

F. Sufficient number of photographs to identify the extent of existing ground disturbance.

G. For Tier 2, 3 and 5 Areas only, documentation of letter submitted to the Land/Surface Owner(s), if different, informing the owner of the Minor Activity Review application, mailed and received a minimum of thirty (30) days prior to application being submitted to the County for review.

**19.98.120 MINOR ACTIVITY REVIEW**

A. An applicant for a ministerial permit pursuant to this chapter shall submit an application to the Planning Director in the format and number of copies specified by the Planning Director. The application shall contain all the information specified for the application by the applicable section of this chapter. The application shall be accompanied by the fee established by the Board of Supervisors pursuant to Section 19.06.040 of this Title. For Tier 2, 3 and 5 Areas, a copy of the application shall be provided to the Land/Surface Owner per the requirements of Section 19.98.080.F above.

B. The Planning Director shall make reasonable efforts to inform the applicant in writing within seven (7) business days of receipt that the application is complete and shall issue the permit if he/she determines that the proposed use meets the development standards and conditions specified in the applicable provisions of this chapter or inform the applicant that additional information is needed to complete the application.

C. Within three (3) business days of reviewing the second submittal, if required, to correct any deficiencies, the Planning Director shall make reasonable efforts to issue the permit if he/she determines that the proposed use meets the development standards and conditions specified in the applicable provisions of this chapter or inform the applicant that additional information is needed to complete the application.

D. Within seven (7) business days of reviewing the third submittal, if required, to correct any deficiencies, the Planning Director shall make reasonable efforts to issue the permit if he/she

determines that the proposed use meets the development standards and conditions specified in the applicable provisions of Title. If additional information is needed, a mandatory in-person meeting with the applicant, and any consultant processing the application will be required to resolve the issues preventing issuance of the permit. The in-person meeting cannot be waived.

E. Any reviews beyond three shall require additional fees be paid, as set forth pursuant to Section 19.06.040 of this Title, and shall be conducted within thirty (30) days.

F. Prior to conducting any activity the operator must have received and have on file both approved applicable DOGGR permit(s), if necessary, and an approved Minor Activity Review pursuant to the chapter.

G. Upon issuance of this permit, the County shall send a notification to the applicable responsible agencies stating a permit has been issued by the County and that the agency has certain requirements under the California Environmental Quality Act as a responsible agency.

**19.98.130 SELF-CERTIFICATION**

Upon issuance of Oil and Gas Conformity Review or Minor Activity Review, as specified in Sections 19.98.090 and 19.98.120 of this chapter, and any other necessary state or Federal permits, the applicant may begin construction of the facility. The provisions of this section do not apply to issuance of an Oil and Gas Conformity Review pursuant to 19.98.100 of this chapter. The applicant must self-certify compliance with Chapter 19.98 during the construction and operation process. Once the project applicant has completed the construction of the oil and gas facilities, as indicated on the approved site plan, the project applicant will provide a self-certified statement, in writing, to the County, in a format specified by the Director.

During construction and continued operations of the activities specified by the approved site plan, the applicant will be responsible for complying with the issued Oil and Gas Conformity Review, and all applicable implementation standards as outlined in this chapter. Should a violation of a permit issued under this chapter occur on-site, a Certification and Finalization process for the Oil and Gas Conformity Review will be conducted by the County Oil and Gas Inspector, and self-certification for the permit will no longer be permitted for the applicant for the next issued permit, as a probationary period. Once the applicant has demonstrated compliance on the following permit, any subsequent permit may be self-certified.

**19.98.140 INSPECTION COMPLIANCE**

Upon receipt of an issued permit pursuant to Section 19.98.100, the applicant must contact the Planning and Community Development Department and the Public Works Department to schedule an inspector to be present during all activities related to the Oil and Gas Conformity Review. During construction and continued operations of the activities specified by the approved site plan, the applicant will be responsible for complying with the issued Oil and Gas Conformity Review, and all applicable standards and conditions as outlined in the permit.

**19.98.150 PLUGGED AND ABANDONED**

Any permit issued pursuant to this chapter must plug and abandon all wells per the following procedures:

A. The applicant shall plug and abandon all facilities in accordance with DOGGR.

B. Within thirty (30) days from completion of the plugged and abandoned procedures for any well constructed after the amendment of this Chapter 19.98, the applicant shall submit to

the Planning and Community Development Department a letter stating which facilities have been abandoned, including the unique well identification number for each well.

**19.98.160 PERMIT REVOCATION AND MODIFICATION**

Any permit issued pursuant to this chapter may be revoked or modified pursuant to Section 19.102.020 of this Title.

# OTHER SECTIONS OF THE ZONING ORDINANCE NEEDED REVISIONS (Revisions in Underline and ~~Strikethrough~~)

## C H A P T E R 19.48

## DRILLING ISLAND (DI) DISTRICT

**19.48.080 HEIGHT LIMITS**

Height limits in the DI District are as follows:

A. None on derricks and other equipment used during the exploration and drilling phase of development.

B. Pumping units shall not exceed ~~thirty-five (35)~~ eighty (80) feet in height.

**19.48.130 SPECIAL REVIEW PROCEDURES AND DEVELOPMENT STANDARDS**

A. All drilling and other hydrocarbon development activity in the DI District shall be carried out in accordance with the standards and procedures set out in Section 19.98.~~050~~060 of this title. All activities subject to an Oil and Gas Conformity Review or Minor Activity Review shall comply with the provisions of Section 19.98.060 of the title.

B. Development in the DI District shall comply with the interpretations and provisions of Chapter 19.08 of this title.

## CHAPTER 19.81

## OUTDOOR LIGHTING

## "DARK SKIES ORDINANCE"

**19.81.050 EXEMPTIONS**

The following are permanently exempt from the provisions of this chapter:

1. Outdoor lighting specifically approved in conjunction with a discretionary permit.

2. Federal and State Facilities: Outdoor light fixtures on, in, or in connection with facilities and land owned or operated by the government of the United States of America or the State of California; however, these agencies are encouraged to comply with the provisions of this ordinance.

3. Airports and Other Lighting Required by the Federal Aviation Administration: Outdoor lighting for public and private airports and any other uses that are regulated by the Federal Aviation Administration.

4. Correctional Institutions: Outdoor lighting for federal, State, and County-owned or operated correctional institutions; however, voluntary compliance with the intent and provisions of this chapter is encouraged.

5. Emergency Light: Temporary emergency lighting needed by the sheriff's department, police department, fire department, public utility, rescue operation or in conjunction with any other emergency service.

6. Temporary Construction: All temporary lighting used for the construction or repair of roadways, utilities, and other public infrastructure.

7. Internally Illuminated Signs: All internally illuminated signs, including those used for on-site and off-site advertising purposes. Such signs are regulated by the provisions of Chapter 19.84 (Signs) of the Kern County Zoning Ordinance.

8. Neon, Argon, or Krypton: All fixtures illuminated solely by neon, argon, or krypton.

9. United States Flag and State of California Flag: Lighting used to illuminate a properly displayed United States Flag and/or the State of California Flag.

10. Lighting Required by Building Codes or other Regulations: Communication towers, exit signs, lighting for stairs/ramps, lighting for points of ingress/egress to buildings, and all other illumination required by air navigation safety provisions, building codes, OSHA standards, and other permitting requirements from State or federal agencies.

11. Fossil Fuel Light: All outdoor light fixtures producing light directly by the combustion of fossil fuels (such as kerosene lanterns, gas lamps, etc.)

12. Street Lighting: Lighting equipment within a public or private right-of-way or easement for the principal purpose of illuminating streets, roadways, and/or other areas open to transport by vehicle or pedestrian traffic.

13. Seasonal Displays: Displays using multiple low wattage bulbs or lasers, provided that they do not constitute a fire hazard, create a nuisance, and are maintained in a safe condition. Such displays shall not be illuminated for more than forty-five (45) days per calendar year.

14. Water Features: Lighting in swimming pools and other water features governed by Article 680 of the National Electrical Code.

~~15. Oil and Gas Exploration and Production: Outdoor lighting in association with oil and gas exploration and production operations and related facilities shall be exempt from this chapter and are regulated by the provisions of Chapter 19.98 of the Kern County Zoning Ordinance.~~

~~16.~~ 15. Temporary Event Lighting: Temporary lighting for special events that does not conform to this chapter shall be reviewed as part of an application for a Temporary Event Permit (TEP), pursuant to Chapter 19.08.340 of the Kern County Zoning Ordinance. Any temporary lighting exemption approved via the TEP process shall be utilized for a period of time that exceeds a combined total of twelve (12) combined days on any one (1) parcel during a calendar year. Exemptions are renewable for a period of not more than twelve (12) additional combined days. Requests for renewal of a temporary exemption shall be processed in the same manner as the original request. No outdoor light fixtures shall be exempted from this chapter for more than twenty-four (24) days combined during a calendar year.

~~17.~~ 16. Steeples: Lighting used to illumination the tall ornamental tower that forms the superstructure of a church, temple, office building, etc., shall be exempt from this chapter.

~~18.~~ 17. Temporary Agricultural Activities: Lighting used to illuminate temporary agricultural activities such as harvesting on property zoned A (Exclusive Agriculture) or A-1 (Limited Agriculture) and lasting no more than twelve (12) consecutive days and no more than twenty four (24) combined days on any one parcel during a calendar year.

## C H A P T E R 19.50

## FLOODPLAIN PRIMARY (FPP) DISTRICT

### 19.50.130 SPECIAL REVIEW PROCEDURES AND DEVELOPMENT STANDARDS

A. All development within the FPP District is subject to the requirements of the Flood Damage Prevention Ordinance, Chapter 17.48 of this code.

B. Development in the FPP District shall comply with the interpretations and provisions of Chapter 19.08 of this title.

C. Oil or gas exploration and production shall comply with Section 19.98.~~050~~060 and the following standards:

1. The following uses are permitted within the FPP District if they will not obstruct flows, will not cause peripheral flooding of other properties, will not cause any increase in flood levels during the occurrence of the base flood discharge, will be

resistant to floatation and immune to extensive damage by flooding, and will not endanger life or property:

(a) All oil or gas wells, including pumps and all other associated equipment.

(b) Feasible remedial work, improvements, and flood-proofing of facilities.

2. No oil or gas well shall be drilled on the slope or within ten (10) feet of the top or toe of the bank of a river or stream located within the FPP District. The required setback on the top of bank shall be measured from an imaginary plane on a slope two (2) horizontal to one (1) vertical projected upward from the toe of the existing bank.

3. All oil or gas wells in the FPP District, including pumps and all other associated equipment, shall be designed such that they are resistant to damage by flooding.

4. All pipelines in the FPP District shall be flood-proofed by burial to sufficient depth to prevent rupture during flood conditions or by suspension at least two (2) feet above the surface of the base flood. Supports for elevated pipelines shall also carry a catwalk to facilitate removal of debris caught by supports during floods.

5. The location of all buried pipelines shall be recorded on appropriate maps by the company that owns said pipelines, and the maps shall be made available to any public agency that shall request a copy.

6. All drilling, redrilling, and producing, including remedial work, well pulling, work-overs, and deepening, shall conform to all applicable fire, safety, spacing, and environmental State law and regulations.

7. Proven technological improvements generally accepted and used in drilling and production methods shall be adopted as they may from time to time become available, if capable of reducing factors of nuisance and annoyance.

8. Prior to the commencement of any drilling, a copy of a Spill Prevention Control and Countermeasure Plan, as required by the United States Environmental Protection Agency, shall be filed with the Kern County ~~Engineering and Survey Services~~ Public Works Department.

9. All pumps expected to be inaccessible during times of flood shall be equipped with an accessible remote switch to shut off the pumps during emergencies.

10. The derrick, all boilers, and all other drilling equipment used pursuant to this chapter to drill any well hole or to repair, clean out, deepen, or redrill any completed or drilling well shall be removed within ninety (90) days after completion of production tests following completion of such drilling, or after abandonment of any well, unless such derrick, boilers, and drilling equipment are to be used within a reasonable time limit, determined by the Kern County

~~Engineering and Survey Services~~ Public Works Department, for the drilling of another well or wells on the premises.

11. After any well has been placed in production, no earthen sumps shall be used for the storage of petroleum or gas.

12. Within ninety (90) days after any well has been placed in production or after its abandonment, earthen sumps used in drilling or production or both shall be emptied by vacuum truck or other approved means, then filled, and the drilling site restored as nearly as practicable to a uniform grade, unless such sumps are to be used within a reasonable time limit, as determined by the Kern County ~~Engineering and Survey Services~~ Public Works Department.

13. Any derrick used for servicing operations shall be of the portable type; provided, however, that upon presentation of proof that the well is of such depth or has such other characteristics, or for other cause, that a portable-type derrick will not properly service such well, the Kern County ~~Engineering and Survey Services~~ Public Works Department may approve the use of a standard type of derrick.

14. Directional and warning signs, and those required for identification of the well, shall be constructed, erected, placed, or maintained on the premises, except those required by law to be displayed in connection with the drilling or maintenance of the well.

15. If a producing or service well is not secured twelve (12) months from the date of commencement of drilling operations or any extended period granted by the Kern County ~~Engineering and Survey Services~~ Public Works Department, the premises shall be restored to the original condition as nearly as practicable to do so. If at the expiration of the twelve- (12-) month period, the drilling program has not been completed, the Kern County ~~Engineering and Survey Services~~ Public Works Department may, upon a written request, grant an additional period of time as requested for the completion of such drilling program.

## C H A P T E R 19.66

## PETROLEUM EXTRACTION (PE) COMBINING DISTRICT

### 19.66.080 HEIGHT LIMITS

Height limit requirements in a PE District are as follows:

A. No height limit on derricks and other equipment used during the exploration and drilling phase of development.

B. Pumping units shall not exceed ~~thirty-five (35)~~ eighty (80) feet in height.

C. All other uses permitted by the base district shall conform to the height limits of the base district with which the PE District is combined.

**19.66.130 SPECIAL REVIEW PROCEDURES AND DEVELOPMENT STANDARDS**

All drilling and hydrocarbon development activities in a PE District shall be carried out in accordance with the standards and procedures set out in Section 19.98.~~050~~060 of this title. All activities subject to an Oil and Gas Conformity Review or Minor Activity Review shall comply with the provisions of Section 19.98.060 of the title.

# C H A P T E R 19.102

# PERMIT PROCEDURES
# ARTICLE II. MINISTERIAL PERMITS ISSUED BY THE PLANNING DIRECTOR

**19.102.040 GENERAL REQUIREMENTS — PERMIT TYPES**

The ministerial permits specified in this title for review pursuant to this article shall be issued by the Planning Director upon submission of an application containing the information specified in applicable sections of this title and a determination by the Planning Director that the proposed use or development meets the development standards and conditions specified in the applicable section or sections of this title. These permits include:

A. CRV recycling center permit (Section 19.08.480)

B. Temporary animal permit plot plan review (Sections 19.14.130 and 19.60.130 through 19.60.160)

C. Extensions for temporary mobilehomes and recreational vehicles (Sections 19.16.130 and 19.18.160)

D. Mobilehome park plot plan review (Sections 19.26.130 through 19.26.190)

E. Minor plan modifications (Section 19.52.130 through 19.52.180, 19.56.130 through 19.52.180, 19.56.130 through 19.56.200, 19.58.130 through 19.58.180, and 19.100.050

F. Commercial wind farm plot plan review (Section 19.64.130 through 19.64.150)

G. Geologic hazard plot plan review (Section 19.68.130 through 19.68.150)

H. Special development standards plot plan review (Sections 19.80.040 through 19.80.070)

I. Off-street parking plot plan review not in conjunction with a ministerial permit (Sections 19.82.100 through 19.82.130)

J. Landscaping plot plan review not in conjunction with a ministerial permit (Sections 19.86.070 through 19.86.100)

K. Density bonus permit (Sections 19.92.030 through 19.92.060)

L. Home occupation permit (Sections 19.94.050 through 19.94.080)

M. Production water injection wells for the purpose of disposing of production wastewater produced in the same oilfield in which the injection well is located (Section 19.98.030)

N. ~~Oil and gas plot plan review (Section 19.98.030)~~ Oil and Gas Conformity Review and Minor Activity Review (Section 19.98.070 through 19.98.120)

O. Large family day-care permit - no hearing (Sections 19.96.030 through 19.96.060)

P. Temporary batch plant (thirty (30) days or less) plot plan review (Section 19.08.290)

Q. Secondary residential unit plot plan review (Section 19.90.040 through 19.90.060)

R. Truck parking as accessory to residential use permit (Section 19.08.252)

## C H A P T E R 19.108

## NONCONFORMING USES, STRUCTURES, AND LOTS

### 19.108.040 NONCONFORMING USES OF LAND

A. A nonconforming use of land shall not be expanded, extended, or intensified in any way with respect to scope, duration, or frequency of the use, except as follows:

The Planning Commission may authorize the expansion or intensification of legal, nonconforming uses if, after consideration at a public hearing noticed pursuant to Section 19.102.150, both of the following findings can be made:

1. The proposed expansion will not create any significant adverse impacts to surrounding properties.

2. The only other remedy to bring the use into conformance would require an amendment to the applicable General Plan.

Public hearing notification shall consist of mailing notices to property owners having property within three hundred (300) feet from the exterior boundaries of the subject property. Published notice in a local newspaper shall not be required, unless the Planning Director determines that such additional notice is warranted. In consideration of a

request to expand or intensify a legal, nonconforming use, the terms and conditions for any approval shall be as specified in Section 19.104.050.

B. A nonconforming use of land shall not be changed to or replaced by any other use except a use that complies with the regulations of the zoning district in which the subject property lies.

C. Any nonconforming use of land that has been discontinued or abandoned for a period of one (1) year or more shall not be reestablished. In instances where the assessed value of improvements on the property exceeds fifty thousand dollars ($50,000), as determined by the County Assessor, the nonconforming use shall not be reestablished if the use has been discontinued or abandoned for a period of two (2) years or more.

D. The exploration for or development or production of oil, gas, or other hydrocarbon substances ~~shall not be considered nonconforming uses of land~~ lawfully constructed prior to MONTH, DAY, YEAR shall be considered nonconforming uses of land. Any subsequent alteration or expansion of these facilities is subject to Chapter 19.98 of this Title.

E. A legal nonconforming dwelling in any zone district may be replaced with the approval of the Planning Director, provided that all applicable requirements of this title, other than density or conditional use permit requirements, can be satisfied.

F. Any use of land continuously in existence for a period of twenty (20) years or more may qualify as a legal, nonconforming use pursuant to Section 19.108.080, irrespective of when zoning requirements became effective for that property, provided that the Planning Director determines that the use is not significantly incompatible with surrounding land uses and that there is no significant threat to the public health, safety, and welfare in allowing the use to continue.

## C H A P T E R 19.08

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**19.08.480 BEVERAGE CONTAINER RECYCLING (CRV) COLLECTION CENTER**

~~**19.08.230 PRIVATE OIL PIPELINES AND RELATED FACILITIES — COUNTY REVIEW**~~

~~The provisions of this title shall not be construed to apply to the construction, installation, operation, and maintenance of pipelines for the transmission of crude oil or natural gas operated by private enterprises; provided, however, before any right-of-way for transmission lines is acquired for regional or interstate facilities, the proposed route shall be submitted for the Planning Director review and recommendation.~~

~~**19.08.260 OIL AND GAS EXPLORATION BY SCIENTIFIC MEANS**~~

~~The provisions of this title shall not be construed to apply to the exploration for oil and gas by scientific means.~~

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## C H A P T E R 19.26

## MOBILEHOME PARK (MP) DISTRICT

### 19.26.030 USES PERMITTED WITH A CONDITIONAL USE PERMIT

The following uses are permitted in the MP District with a conditional use permit:

A. RECREATION, ENTERTAINMENT, AND TOURIST FACILITIES

— Recreational vehicle park, except as permitted by Subsection 19.26.020.B

B. MISCELLANEOUS USES

— Drainage sump
— Water system, large

— Water treatment plant

C. RESOURCE EXTRACTION AND ENERGY DEVELOPMENT USES

— Oil or gas exploration and production pursuant to Chapter 19.98 of this title

Chapter 4

# Environmental Setting, Impacts, and Mitigation Measures

Section 4.1

# Aesthetics

Section 4.1

# Aesthetics

## 4.1.1 Introduction

This section describes the affected environment and regulatory setting for aesthetic and visual resources. It also describes the impacts on aesthetic and visual resources that would result from implementation of the Amendment to Chapter 19.98 (Oil and Gas Production) and related ordinance amendments to the Kern County Zoning Ordinance, future oil and gas development activities pursuant to the Amended Ordinance (Project), and mitigation measures that would reduce these impacts, if necessary.

This analysis is primarily based on the information provided in the Visual Resources Technical Report prepared by Ecology and Environment, Inc. (E & E) in May 2015 (E & E 2015), provided in Appendix G and incorporated by reference herein. Where additional information has been used to evaluate the potential impacts, the information has been referenced. Regulatory standards were also investigated, including the Kern County General Plan (KCGP) and the Kern County Zoning Ordinance.

Degradation of the visual character of a site is usually addressed through a qualitative evaluation of the changes to the aesthetic characteristics of the existing environment and the project-related modifications that would alter the visual setting.

Aesthetics, as addressed in the California Environmental Quality Act (CEQA), refers to visual considerations in the physical environment. Because a person's reaction and attachment to a given viewshed are subjective, visual changes inherently affect viewers differently. Accordingly, aesthetics analysis, or visual resource analysis, is a systematic process to logically assess visible change in the physical environment and the anticipated viewer response to that change. The Aesthetics section of this Environmental Impact Report (EIR) describes the existing landscape character of the Project Area, existing views of the area from various on-the-ground vantage points, the visual characteristics of the proposed Project, and the landscape changes that would be associated with the oil and gas extraction and production activities, as seen from various vantage points.

## Visual Resource Terminology and Concepts

When viewing the same landscape, people may have different responses to that landscape and any proposed visual changes, based upon their values, familiarity, concern, or expectations for that landscape and its scenic quality. Because each person's attachment to and value for a particular landscape is unique, visual changes to that landscape inherently affect viewers differently. However, generalizations can be made about viewer sensitivity to scenic quality and visual changes. Recreational users (e.g., hikers, equestrians, tourists, and people driving and cycling for pleasure) are expected to have high concern for scenery and landscape character.

People who are commuting daily through the same landscape generally have a moderate concern for scenery, while people working at industrial sites generally have a lower concern for scenic quality or changes to existing landscape character. The visual sensitivity of a landscape is affected by the viewing distances at which it is seen, such as close-up or far away. The visual sensitivity of a landscape also is affected by the travel speed at which a person is viewing the landscape (high speeds on a highway, low speeds on a hiking or cycling trail, or stationary at a residence).

The same feature of a project can be perceived differently by people depending on the distance between the observer and the viewed object. This distance is defined as "viewing distance" or "distance zones." For the purpose of this analysis, distance zones are delineated as foreground, middleground, and background. When a viewer is closer in proximity to a viewed object in the landscape (foreground), more detail can be seen, and there is greater potential influence of the object on visual quality because of its form or scale (relative size of the object in relation to the viewer). When the same viewed object is viewed at background distances, details may be imperceptible but overall forms of terrain and vegetation are evident, and the horizon and skyline are dominant. In the middleground, some detail is evident (like the foreground) and landscape elements are seen in context with landforms and vegetation patterns (like the background). For this analysis, the following three viewing distances were used, based on distance zones described and defined by the United States Forest Service (USFS 1995):

- Foreground (0 to 0.5 mile);
- Middleground (0.5 mile to 4 miles);
- Background (4 miles to the horizon);

In addition, the following terms and concepts are used in the discussion below to describe and assess the aesthetics setting and impacts from the Project:

- **Color**: The hue (e.g., red, brown) and value (e.g., light, dark) of the light reflected by objects in the visual landscape.
- **Contrast**: The opposition or unlikeness of different forms, lines, colors, or textures in a landscape.
- **Form**: The visual mass, bulk, or shape of an object or objects in the visual landscape that appear unified. This element of visual character is usually the strongest.
- **Key Observation Point** (KOP): One or a series of points on a travel route or at a use area or potential use area where the view of a management activity (project) would be the most revealing.
- **Line**: The well-defined edges of shapes or masses created in the visual landscape by horizons, silhouettes, or human-made features. This element of visual character is usually the second strongest.

- **Texture**: The apparent surface coarseness of the visual landscape caused by the aggregation or density of surface features and vegetation (e.g., fine, medium, coarse). This element of visual character is usually the least dominant.
- **Viewshed**: The landscape that can be directly seen under favorable atmospheric conditions from a viewpoint or along a transportation corridor.
- **View Corridor**: A view corridor is typically defined as the line of sight of an observer from a public viewpoint, looking toward an object of significance to the community (e.g., ridgeline, river, historic building) or as the route that directs the viewers' attention.
- **Visual (Sensitive) Receptor**: Any scenic vista, designated scenic highway, residence, or public recreational area located within the project viewshed that provide people with views of a site.

Visual character typically consists of the landforms, vegetation, water features, and cultural modifications that impart an overall visual impression of an area's landscape. Scenic areas typically include open space, landscaped corridors, and viewsheds. Visual character is influenced by many different landscape attributes including color contrasts, landform prominence, repetition of geometric forms, and uniqueness of textures among other characteristics.

## 4.1.2 Environmental Setting

# Regional Character

The Project Area is defined in the Project Description, Figure 3-1, and encompasses 3,700 square miles, which generally includes most of the San Joaquin Valley Floor portion of Kern County up to an elevation of 6,000 feet. The boundary includes: west side – the San Luis Obispo and Santa Barbara County lines; north side – the Kings and Tulare County lines; east side – the 6,000-foot elevation contours, squared off to the nearest section line; and south side – the northern boundary of the Los Padres National Forest.

The Project Area also includes all unincorporated County lands within the 409-square-mile Metropolitan Bakersfield General Plan (MBGP). In addition, the Project Area, as defined in Figure 3-1, includes portions of Metropolitan Bakersfield that are within the jurisdiction of the City of Bakersfield, and includes all other city jurisdictions, including: Taft, Delano, Shafter, Arvin, McFarland, Maricopa, and Wasco. The Project Area is based on generally available information regarding areas with potential or confirmed oil and gas resources within the County's jurisdiction.

The KCGP Update describes the San Joaquin Valley region as "the southern San Joaquin Valley below an elevation of 1,000 feet mean sea level (MSL)" within Kern County. The San Joaquin Valley portion is characterized by relatively low rainfall, averaging less than 10 inches per year. Average temperatures are relatively high, and total evaporation exceeds total precipitation. Summers are relatively cloudless, hot, and dry. Winter is generally mild, but an occasional freeze does occur and may cause substantial agricultural damage. Average length of the growing season

is 265 days. The San Joaquin Valley region is within the southern end of the San Joaquin Valley Air Basin (SJVAB) managed by the San Joaquin Valley Air Pollution Control District (SJVAPCD). This district encompasses Fresno, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare counties, as well as the San Joaquin Valley portion of Kern County. Further, the San Joaquin Valley region is within the Tulare Lake Groundwater Basin, which includes the Kern River Hydrographic Unit and the Poso Hydrographic Unit.

The Project Area contains a range of visual resources and areas with differing visual character. Most of the terrain within the Project Area is flat to gently rolling with some hilly and steeply rolling terrain near the west, south, and east boundaries of the Project Area (Figure 4.1-1). The central part of the Project Area is mostly flat and contains a variety of wetlands with natural vegetation. Several stream corridors, including the Kern River, that descend into the valley from the east also contain natural riparian vegetation. However, most of the Project Area consists of diverse agricultural croplands, orchards, and grazing lands or oil and gas development and oil and gas facilities are often interspersed in the agricultural areas. In the more urbanized portions of the Project Area, a combination of residential, commercial, and industrial scenes dominate the views, with smaller amounts of recreational, open space, and other typical urban structures and activities. Urban land uses and associated views occur in a small portion (approximately 2%) of the overall Project Area. Outside of the urbanized areas, the predominant land uses and associated views are agricultural, oil and gas-related uses, and recreational and other open space. Within agricultural lands, views include irrigated and non-irrigated lands, row crops and orchards, rangeland, and support and processing facilities. Views of agricultural lands are considered an important attribute of the County's visual character and quality. Within Tier 2, existing views are predominantly of agricultural activities. Areas with existing oil and gas development likewise can include a variety of land disturbance, facilities, uses, and intensities, with corresponding views. In Tier 1 and Core Areas, views are dominated by intensive oil and gas-related structures and activities.

## State Scenic Highways

Regional access to wellfields in the Project Area could be obtained via the numerous highways that traverse the area including, Interstate 5 and State Routes (SR) 33, 46, 58, 65, 99, 119, 155, 166, 178, 204, and 223. According to the California Department of Transportation's (Caltrans') California Scenic Highway Mapping System, there are no Designated State Scenic Highways or scenic resources in the Project Area (Caltrans 2011). One Eligible State Scenic Highway, Highway 41, crosses through the extreme northwest corner of the Project Area. This segment of the highway is approximately 5 miles long. Two other Eligible State Scenic Highway sections, SR 14 and 58, are located 30 miles east of the Project Area and the Project Area is not visible from these highway segments.

## Light and Glare

Existing sources of light and glare occur throughout much of the Project Area and are more concentrated in developed areas. Glare is reflective light that can be visually unpleasant or possibly unsafe due to the potential for temporary blindness. Glare may be caused by light from artificial sources or the sun reflecting off of light-colored or smooth surfaces such as metal, glass,

water, or polished stone. Glare intensity varies depending on the source and intensity of the light, time of day, time of year, angle of reflectance, weather, atmospheric conditions, the reflectivity, color, and texture of material surface finish, length of exposure, nature and sensitivity of receptors, and other factors. Nighttime lighting in oil and gas production areas also occurs, as does the use of a limited number of flares (which are more visible at night). Table 4.1-1 provides information on 66 oil and gas flares in the Project Area. Most are used either for emergencies or for limited uses under specified circumstances, and only four are in continuous use. Two of the four have no visible flames, and the remaining two are located more than 3000 feet away from sensitive receptors.

## 4.1.3 Regulatory Setting

This section describes the federal, state, and local statutes, ordinances, or policies that govern the light, glare, viewshed, and scenic character that must be considered by Kern County during the decision-making process for projects that have the potential to affect aesthetics.

# Federal

### U.S. Department of Agriculture, Forest Service

The National Trails System Act (NTSA) of 1969 seeks to preserve scenic and natural qualities along trails and recognizes the rights of private landowners and provides that "full consideration shall be given to minimizing the adverse effects upon the adjacent landowner or user and his operation" in the development and use of a trail (USFS 2009). The NTSA assigns management responsibility for trails to various federal resource agencies, depending on which agency holds jurisdiction over the public lands on which the trail is located in a given area (U.S. Forest Service [USFS], National Park Service [NPS], or the Bureau of Land Management [BLM]).

The Pacific Crest Trail was created under the NTSA to provide for outdoor recreation opportunities and the conservation of significant scenic, historic, natural, or cultural qualities. The Pacific Crest Trail stretches 2,650 miles from Mexico to Canada through California, Oregon, and Washington and is designated in the KCGP as a scenic feature. The USFS administers the Pacific Crest Trail in the vicinity of the Project. The Pacific Crest Trail is located 10 miles beyond the Project Area at its closest point. Therefore, Project compliance with the NTSA was considered in this analysis and no regulations would be applicable for development of oil and gas facilities in the Project Area because the Project Area would not be visible from the Pacific Crest Trail.

**Table 4.1-1: Flares in Use in the Project Area**

| Company | Flare Permit No. | Field or Location | Subarea | Emergency (Yes/No) | Limited Use (Yes/No) | Continuous Use (Yes/No) | Type | Flame visible (Yes/No) | Stack Height (feet) | Distance to Nearest Receptor (feet) | Days of Use per year | Hours of Use per Year | Avg. Hours of Use per day |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FMOG | S-1372-74-15 | MWSS | Western | Y | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | S-1372-76-20 | | | Y | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | S-1372-77-20 | | | Y | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | S-1372-312-12 | | | Y | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | S-1372-388-4 | | | N | Y | Y | Elevated - Open | N | 20' | 2,640' | 365 | | |
| | S-1372-87-15 | Cymric | | N | N | Y | Elevated - Open | N | 12' | 18,480' | 365 | 8760 | 24 |
| | S-1372-99-8 | | | N | N | Y | Elevated - Open | N | 12' | 13,200' | 365 | 8760 | 24 |
| | S-1372-100-30 | | | Y | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | S-1372-408-0 | McKittrick | | N | Y | Y | Elevated - Open | N | 35' | 6,600' | 365 | 8760 | 24 |
| Aera Energy LLC | S-1543-7 | Belridge | Western | N | Y | Y | Elevated - Open | Y | 60 | 9,500 | 365 | 8,600 | 24 |
| | S-1543-33 | | | N | Y | N | Elevated - Open | Y | 90 | 9,500 | 365 | 8,700 | 24 |
| | S-1547-414 | | | N | Y | N | Elevated - Open | Y | 21 | 3,780 | 200 | 470 | |
| | S-1547-588 | MWSS | | N | Y | N | Elevated - Open | N - slightly visible at night | 21 | 5,000 | 2 | 19.46 | 9.7 |

**Table 4.1-1: Flares in Use in the Project Area**

| Company | Flare Permit No. | Field or Location | Subarea | Emergency (Yes/No) | Limited Use (Yes/No) | Continuous Use (Yes/No) | Type | Flame visible (Yes/No) | Stack Height (feet) | Distance to Nearest Receptor (feet) | Days of Use per year | Hours of Use per Year | Avg. Hours of Use per day |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | when operating | | | | | |
| | S-1548-113 | Belridge | | N | Y | N | Elevated - Open | Y | 42 | 6,750 | 90 | 170 | |
| | S-1548-134 | | | N | Y | N | Elevated - Open | Y | 30 | 2,000 | 25 | 90 | |
| | S-1548-144 | | | N | Y | N | Elevated - Open | Y | 36 | 20,300 | 120 | 45 | |
| | S-1548-389 | | | N | Y | N | Elevated - Open | Y | 48 | 11,600 | 0 | 0 | 0 |
| | S-1548-424 | | | N | Y | N | Elevated - Open | Y | 28 | 5,000 | 30 | 75 | |
| | S-1699 | | | N | Y | N | Elevated - Open | Y | Approx. 10 | 10,500 | 0 | 0 | |
| LINN Energy | 1246 | SMWSS | Western | Y | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | 3585 | Poso Creek | Eastern | Y | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | 1330 | So. Belridge | Western | Y | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Chevron | S-55-11 | Lost Hills | Western | N | Y | N | Elevated - Open | Y | 85 | 4,350 | 84 | 15 | 0.2 |
| | S-1128-116 | Cymric | | Y | N | N | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | S-1128-934 | Cymric | | N | Y | N | Elevated - Open | Y | 35 | 2,600 | 165 | 239 | 1.4 |

**Table 4.1-1: Flares in Use in the Project Area**

| Company | Flare Permit No. | Field or Location | Subarea | Emergency (Yes/No) | Limited Use (Yes/No) | Continuous Use (Yes/No) | Type | Flame visible (Yes/No) | Stack Height (feet) | Distance to Nearest Receptor (feet) | Days of Use per year | Hours of Use per Year | Avg. Hours of Use per day |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S-1128-1004/ S-2010-317 | Cymric/MWSS | | N | Y | N | Elevated - Open | Y | 15 | 1,000 | 91 | 2,123 | 23.3 |
| | S-1141-513 | MWSS | | Y | N | N | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | S-1141-514 | MWSS | | Y | N | N | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | S-1131-1085 | Kern River | Eastern | N | Y | N | Elevated - Open | Y | 20 | 4,750 | 0 | 0 | 0 |
| | S-1131-1086 | | | N | Y | N | Elevated - Open | Y | 20 | 1,460 | 0 | 0 | 0 |
| | S-1131-1087 | | | N | Y | N | Elevated - Open | Y | 20 | 3,00 | 0 | 0 | 0 |
| | S-1131-1108 | | | N | Y | N | Elevated - Open | Y | 20 | 1,600 | 0 | 0 | 0 |
| Naftex | S-1121-84-1 | Edison | Eastern | N | N | Y | Elevated - Open | Y | 20 | 3,600 | 365 | 8,760 | 24 |
| | S-1122-4-4 | | | N | N | Y | Elevated - Open | Y | 20 | 3,200 | 365 | 8,760 | 24 |
| California Resources Elk Hills, LLC | S-382-7-9 | Elk Hills | Light Oil Western Stationary Source | N | Y | N | Elevated - Open | Y | 20 | 4,000 | 25 | 25 | 1 |
| | S-382-74-3 | | | Y | | | | | | | | | |
| | S-382-669-3 | | | N | Y | N | Elevated - Open | Y | 20 | 6,000 | 25 | 25 | 1 |
| California Resources | S-1326-27-18 | Section 2 East CVR | Heavy Oil Central | N | N | Y | Elevated - Open | Y | | | 365 | 7,860 | |

**Table 4.1-1: Flares in Use in the Project Area**

| Company | Flare Permit No. | Field or Location | Subarea | Emergency (Yes/No) | Limited Use (Yes/No) | Continuous Use (Yes/No) | Type | Flame visible (Yes/No) | Stack Height (feet) | Distance to Nearest Receptor (feet) | Days of Use per year | Hours of Use per Year | Avg. Hours of Use per day |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Production Corporation | S-1326-28-17 | | Stationary Source | | | | | | | | | | |
| | S-1326-35-14 | | | | | | | | | | | | |
| | S-1326-382-2 | | | | | | | | 25 | | | | |
| | S-1327-42-8 | | | | | | | | | | | | |
| | S-1327-70-1 | | | | | | | | | | | | |
| | S-1327-83-1 | | | | | | | | | | | | |
| California Resources Production Corporation | S-1737-146-2 | North Shafter | Light Oil Central | Y | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | S-1737-157-6 | North Shafter | | Y | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | S-1737-167-5 | Multiple Locations (Last located in North Shafter) | | Y | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | S-1737-178-1 | Semitropic | | N | N | Y | Ground Level | Y | 25 | | 365 | 8,760 | 24 |
| | S-1737-180-2 | Multiple Locations (Currently located at Rose) | | Y | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

**Table 4.1-1: Flares in Use in the Project Area**

| Company | Flare Permit No. | Field or Location | Subarea | Emergency (Yes/No) | Limited Use (Yes/No) | Continuous Use (Yes/No) | Type | Flame visible (Yes/No) | Stack Height (feet) | Distance to Nearest Receptor (feet) | Days of Use per year | Hours of Use per Year | Avg. Hours of Use per day |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S-1738-7-16 | Landslide | Light Oil Western | Y | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | S-1738-279-5 | North Tejon KCL G-North | | Y | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | S-1738-347-1 | Paloma | | N | Y | N | Elevated - Open | Y | 15 | >1000 | <365 | 20 @ full cap | n/a |
| | S-1738-349-2 | Belgian Anticline/M &M Lease | | N | Y | Y | Elevated - Open | Y | 30 | >1,000 | 365 | 8,760 | 24 |
| | S-1738-354-1 | Yowlumne | | Y | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | S-1738-449-3 | Multiple Locations/Twissleman Lease | | N | Y | Y | Elevated - Closed | N | 20 | >1,000 | >187 | 4,488 | 0 |
| | S-1738-455-2 | South Belridge | | N | Y | Y | Elevated - Open | Y | 25 | >1,000 | 365 | 318 @ full cap | 0 |
| California Resources Elk Hills, LLC | S-2234-8-3 | Elk Hills | Light Oil Western Stationary Source | Y | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | S-2234-14-3 | | | Y | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | S-2234-204-2 | | | Y | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | S-2234-205-2 | | | Y | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | S-2234-235-0 | | | Y | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

**Table 4.1-1: Flares in Use in the Project Area**

| Company | Flare Permit No. | Field or Location | Subarea | Emergency (Yes/No) | Limited Use (Yes/No) | Continuous Use (Yes/No) | Type | Flame visible (Yes/No) | Stack Height (feet) | Distance to Nearest Receptor (feet) | Days of Use per year | Hours of Use per Year | Avg. Hours of Use per day |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| California Resources Production Corporation | S-8452-32-1 | | Heavy Oil Central | N | Y | N | Elevated - Open | Y | | | 292 | 7,008 | |
| | S-8453-1-1 | | | N | N | Y | Elevated - Open | Y | | | 365 | 8,760 | |
| | S-8454-6-1 | Layman Tank Battery | Light Oil Western | N | N | Y | Elevated - Open | Y | | | 365 | 8,760 | |
| MOC | S-1703-27 | West Mt Poso | Central | N | Y | N | | | | | 12 | 2 | |
| | S-4159-7 | Hoyt | Western | N | N | Y | | | | | | 2,544 | |

# State

## California Department of Transportation

The California's Scenic Highway Program was created by the State Legislature in 1963. The purpose of this program is to preserve and protect scenic highway corridors from change that would diminish the aesthetic value of lands adjacent to highways. The state laws governing the Scenic Highway Program are found in the Streets and Highways Code, Section 260 et seq. Caltrans manages the State Scenic Highway Program, provides guidance, and assists local government agencies, community organizations, and citizens with the process to officially designate scenic highways (Caltrans 2008).

A highway may be designated as scenic depending upon how much of the natural landscape can be seen by travelers, the scenic quality of the landscape, and the extent to which development intrudes upon the traveler's enjoyment of the view. The California Scenic Highway System includes a list of highways that are either eligible for designation as scenic highways or have been so designated. The status of a state scenic highway changes from eligible to officially designated when the local jurisdiction adopts a scenic corridor protection program, applies to Caltrans for scenic highway approval, and receives notification from Caltrans that the highway has been designated as a scenic highway (Caltrans 2008).

A number of highways and state routes are located within the Project Area. The Project Area does not contain Designated State Scenic Highways or scenic resources. However, the Project Area does include a segment of one Eligible State Scenic Highway consisting of an approximately 5-mile-long segment of Highway 41, which crosses through the extreme northwest corner of the Project Area.

# Kern County

## Kern County General Plan

The Project Area is located within the KCGP area and, therefore, would be subject to applicable policies and measures of the KCGP. The Land Use, Conservation, and Open Space Element, the Circulation Element, and the Energy Element of the KCGP include goals, policies, and implementation measures related to aesthetics that apply to the Project, as described below.

The Land Use, Conservation, and Open Space Element of the KCGP evaluates the visual and aesthetic setting of Kern County and assesses the potential for visual impacts. The KCGP Circulation Element provides guidelines for development near Scenic Routes. A Scenic Route is defined in the KCGP as any freeway, highway, road, or other public right-of-way (ROW) that traverses an area of exceptional scenic quality. A roadway can only be designated as a Scenic Route by direct action of the Kern County Board of Supervisors or the State of California. A route may not be selected as scenic until a visual assessment has been conducted to determine if the route meets the current scenic highway criteria as mentioned above, and to what extent development has encroached on the scenic views. In addition, the County must prepare and adopt

a plan and program for the protection and enhancement of adjacent roadside viewshed land. No Scenic Routes have been designated in the Project Area.

## Chapter 1. Land Use, Conservation, and Open Space Element

### 1.10.7. Light and Glare

#### Policies

**Policy 47.** Ensure that light and glare from discretionary new development projects are minimized in rural as well as urban areas.

**Policy 48.** Encourage the use of low-glare lighting to minimize nighttime glare effects on neighboring properties.

**Implementation Measure AA.** The County shall utilize CEQA Guidelines and the provisions of the Zoning Ordinance to minimize the impacts of light and glare on adjacent properties and in rural undeveloped areas.

## Chapter 2. Circulation Element

### 2.3.9. Scenic Route Corridors

None of the goals, policies, or implementation measures contained in Section 2.3.9 are applicable to the proposed Project.

## Chapter 5. Energy Element

### 5.3.5. Reuse of Nonproductive Petroleum Resource Areas

#### Policies

**Policy 3.** The County shall promote and encourage the safe reuse of former petroleum production lands by developments compatible with surrounding land use designations. The guidelines for site reestablishment include the following:

a. Removal of oil-laden soil

b. Shaping of disturbed lands back to natural grade and the elimination of pad areas, settling ponds, and similar disturbances.

c. Stabilization of sites by seedlings and plantings as appropriate.

d. Other measures as may be stipulated by the State Division of Oil, Gas and Geothermal Resources.

e. Proper identification and abandonment of all oil and natural gas wells.

### 5.4.7. Transmission Lines

#### Policies

**Policy 5.** The County should discourage the siting of aboveground transmission lines in visually sensitive areas.

## Metropolitan Bakersfield General Plan

The MBGP, a joint effort between the Kern County Planning Department and the City of Bakersfield Planning Division, was last adopted on December 11, 2007. The MBGP includes both city and unincorporated County lands. The MBGP describes the community's physical development as well as its economic, social and environmental goals and is currently undergoing an update. The Project Area includes a total of 152,040 acres of unincorporated County lands that are covered under the MBGP (7.41%). Project-related development on unincorporated lands within the MBGP Planning Area would be subject to the following applicable policies and implementation measures of the MBGP, with respect to aesthetics.

## Chapter II. Land Use Element

#### Policies

**Policy 35.** Encourage upgrading of visual character of heavy manufacturing industrial areas through the use of landscaping or screening-of visually unattractive buildings and storage areas (I-1, I-6, I-8).

**Policy 36.** Require that industrial uses provide design features, such as screen walls, landscaping and height, setback and lighting restrictions between the boundaries of adjacent residential land use designations so as to reduce impacts on residences due to light, noise, sound and vibration (I-1, I-6, I-8).

**Policy 37.** Street frontages along all new industrial development shall be landscaped (I-1, I-6, I-8).

## Chapter V. Conservation Element

### B. Mineral Resources

#### Goals

**Goal 4.** Protect land, water, air quality and visual resources from environmental damage resulting from mineral and energy resource development.

#### Policies

**Policy 15.** Require petroleum production sites in urban areas which are subject to discretionary permits, to install peripheral landscaping to help reduce the noise, dust and visual impacts to adjacent sensitive receptors and public ways (I-4).

## Kern County Specific Plans

Kern County has adopted 24 Specific Plans for properties within the Project Area. These Specific Plans are intended to be an amplification of the goals and policies of the KCGP and are, therefore, consistent therewith. As depicted in Figure 4.10-3, less than 8% of the Project Area is located wholly or partially within adopted Specific Plan areas. Future oil and gas exploration and production activities that would be authorized under the proposed Amendment to Chapter 19.98 (Oil & Gas Production) of the Kern County Zoning Ordinance that would be located within the boundary of an adopted Specific Plan would be regulated according to County zoning, with the exception of the Specific Plans identified as Tier 5.

## Kern River Plan Element (Chapter XII of the Kern County General Plan)

The Kern River Plan Element, which is included in both the KCGP and the MBGP, was prepared as a joint effort by the City of Bakersfield and Kern County. The following Kern River Plan Element policies and implementation measures are applicable to the proposed Project with respect to aesthetics for all unincorporated County lands within the Kern River Planning Area.

### 3.2. Open Space Versus Development

#### Policies

**Policy 11.** New or relocated utility lines shall be placed underground, except in areas subject to intensive agricultural uses, areas designated as A.4 (Mineral and Petroleum) and electrical power lines to oil wells, water wells, and water control devises in areas designated as 8.5 (Resource Management) unless otherwise required by law, and at River crossings, or where it can be shown that the specific nature of the facility is such that it is entirely infeasible to do so.

### 4.8. Industrial

#### Policies

**Policy 5.** Industrial areas should be separate from residential areas to protect both homes and factories.

**Policy 6.** Industrial areas adjacent to the Kern River primary or secondary floodway should be buffered by landscaping or vegetation to provide the least possible conflict with open space values of the River.

#### B. Open Space and Development

#### Implementation Policies

**Implementation Policy 2.** Any new non-open space development, including projects by public agencies, shall not occur without prior City or County approval of a "Development Plan." The "Development Plan" shall be reviewed for completeness and consistency with the following guidelines:

b. Landscaping plan which provides for screening of obnoxious uses and respects existing views of the Kern River channel.

c. Grading and Revegetation Plan

**Implementation Policy 5.** In order to preserve views of the River, reasonable height limits will be imposed through the "Development Plan" review process on any new non-open space development within any floodway. Criteria for height limits shall be based on existing site factors, such as surrounding land use, vegetation, and distance to the Kern River course.

### C. Riparian Vegetation

### Implementation Policies

**Implementation Policy 1.** The City and County shall develop a master list of plant species for criteria to approve “Development Plans.” This list shall be considered for incorporation into this plan by General Plan Amendment. Revegetation or landscaping with native or compatible shrubs and trees shall be required as part of all public and private projects. Areas of unique habitat value, such as the Mesquite-Saltbush Association in the vicinity of Enos lane, shall be preserved in accordance with the City’s approved plan for use of the 2,800-acre recharge area and River channel maintenance.

**Implementation Policy 2.** Prior to any development within the Kern River Plan boundaries, including residential, commercial, industrial, recreational, water recharge, channel improvement, and resource recovery projects, a landscaping plan shall be submitted to the respective City or County Planning Department for review and approval.

**Implementation Policy 3.** For all new development in residentially, commercially, and industrially zoned properties within the plan boundaries, the River setback area shall be either landscaped or revegetated. Except as might be required by the City or County Fire Department, no clearing of shrubs or tree cutting will be allowed unless otherwise provided for by this plan.

### F. Mineral and Petroleum Extraction

### Implementation Policies

**Implementation Policy 1.** The City and County shall revise. within two years from adoption of this plan, mineral and petroleum extraction regulations and provisions of their respective floodplain Zoning Ordinances consistent with all plan policies and incorporate the following features:

b. Restrictions on the removal of riparian vegetation.

d. Requirements for aesthetic treatment (painting, landscaping, screening) of production facilities (i.e., oil pump units, tanks, gravel crushers, etc.) located within the plan boundaries.

## Kern County Zoning Ordinance

Chapter 19.98 (Oil and Gas Production) of the Kern County Zoning Ordinance contains the procedures and standards that apply to all exploration drilling and production activities related to oil, gas, and other hydrocarbon substances carried out in unincorporated Kern County. At present, general development standards and conditions in Chapter 19.98 that are relevant to visual and/or aesthetic resources require the following:

- **Specific well setback distances from various structures** (19.98050.A) – Required setbacks in various Zone Districts are presented on Table 4.1-2;
- **Limitations on project signage**: Signs are limited to directional, warning, and identification signs in connection with oil, gas, or other hydrocarbon drilling and development operations (19.98.020.C);
- **Timely removal of drilling equipment**: All derricks, boilers, and other drilling equipment used to drill, repair, clean out, deepen or redrill any completed or drilling well must be removed within 90 days after completion of production tests or after abandonment of any well, unless such derricks, boilers, and drilling equipment are to be used within a reasonable time for the drilling of another well or on the premises (19.98050.F);
- **Filling of earthen sumps and restoration of drilling sites**: Earthen sumps used in drilling or production or both must be filled and the drilling site restored as nearly as practicable to a uniform grade within 90 days after any well has been placed in production, or after its abandonment, (19.98050.G);
- **Landscaping and fencing requirements for oil tanks**: Oil or gas tanks located within 500 feet of any dwelling or commercial building must be screened from public view by shrubs, trees or fencing that comply with DOGGR requirements (19.98050.I). Similarly, pump sites within 500 feet of any dwelling must be surrounded by a fence, at least six feet in height, constructed of chain-link with wood or metal slates, or other screening fencing that complies with the requirements of DOGGR (19.98050.N);
- **Height restrictions and paint requirements for pumping units:** The height of all pumping units shall not exceed 35 feet and shall be painted and kept in neat order (19.98.050.L); and
- **Dust abatement requirements for parking areas:** All vehicle parking and maneuvering areas must be treated and maintained with oiled sand or a similar dust binding material (19.98.050.M).

The Kern County Zoning Ordinance includes a number of setback requirements for oil and gas wells, as provided in Table 4.1-2.

**Table 4.1-2: Kern County Existing Setback Requirements for Oil and Gas Wells**

| Zone Districts | | Required Setbacks (in feet) | | | |
|---|---|---|---|---|---|
| | | Dwelling(2) | Public Highway or Building | Buildings Used as Places of Assembly, Institution or School | Any Building Used for Commercial Purposes |
| A | Exclusive Agriculture | 100 | N/A | N/A | N/A |
| A-1 | Limited Agriculture | 100 | N/A | N/A | N/A |
| M-2 | Medium Industrial | 100 | N/A | N/A | N/A |
| M-3 | Heavy Industrial | 100 | N/A | N/A | N/A |
| NR | Natural Resource | 100 | N/A | N/A | N/A |
| RF | Recreation Forestry | 150 | 100 | 300 | 50 (1) |
| M-1 | Light Industrial | 150 | 100 | 300 | 50 (1) |
| PE | Petroleum Extraction | 150 | 100 | 300 | 50 (1) |
| DI | Drilling Island | 150 | 100 | 300 | 50 (1) |
| Zone Districts where CUPs are required | | 150 | 100 | 300 | 50 (1) |

Notes:
(1) For wells within 50 feet of a building used for commercial purposes, written consent must be obtained from the structure's Owner prior to the commencement of drilling.
(2) Fencing and screening is required for pumps sites within 500 feet of any dwelling. (19.98.050.N Development Standards).
Key:
N/A = Not applicable

## Chapter 19.81, Dark Skies Ordinance (Outdoor Lighting)

This chapter of the Kern County Zoning Ordinance provides requirements for outdoor lighting within specified unincorporated areas of Kern County in order to accomplish the following objectives:

1. Encourage a safe, secure, and less light-oriented nighttime environment for residents, businesses, and visitors.
2. Promote a reduction in unnecessary light intensity and glare, and to reduce light spillover onto adjacent properties.
3. Protect the ability to view the night sky by restricting unnecessary upward projections of light.
4. Promote energy conservation and a reduction in the generation of greenhouse gases by reducing wasted electricity that can result from excessive or unwanted outdoor lighting.

In accordance with Chapter 19.81.050 of the Kern County Zoning Ordinance, outdoor lighting in association with oil and gas exploration and production operations and related facilities are exempt from this chapter and are regulated by the provisions of Chapter 19.98, described above.

## 4.1.4 Impacts and Mitigation Measures

This section describes the impact analysis relating to aesthetics for the proposed Project. It describes the methods used to determine the impacts of the Project and lists the thresholds used to conclude whether an impact would be significant. Measures to mitigate (i.e., avoid, minimize, rectify, reduce, eliminate, or compensate for) significant impacts accompany each impact discussion, where applicable.

# Methodology

The methodology used for this aesthetic assessment is based on the Federal Highway Administration's (FHWA's) visual impact assessment system (FHWA 1981) in combination with other established visual assessment systems. The FHWA's methodology for Visual Impact Assessment for Highway Projects (FHWA 1981) is often used to assess the potential aesthetic impacts of proposed development projects with a variety of different landscape settings. The visual impact assessment process involves identification of the following:

- Visual resources (i.e., visual character and quality) of the region and the immediate Project Area;
- Important viewing locations (e.g., roads, trails, and overlooks) and the general visibility of the Project Area and the site using descriptions and photographs;
- Viewer groups and their sensitivity;
- Relevant federal, state, and local government policies and concerns for protection of visual resources;
- Impacts and the levels of significance of visual impacts of the proposed Project; and
- Mitigation measures that would reduce significant impacts to less than significant levels.

As part of the visual assessment, KOPs were selected to represent a range of typical views within the Project Area where oil and gas development could occur. Concept plans and photosimulations have been prepared for each KOP to illustrate potential changes that could occur due to oil and gas development within the area visible in the view. The concept plans and photosimulations illustrate potential likely oil and gas development that could occur during construction and operation. Factors used to evaluate the photosimulations include:

- Visual sensitivity and impacts are affected by the distance and/or the travel speed at which something is viewed in the landscape. Features viewed in close proximity tend to take on greater importance.
- Visual sensitivity is based on people's awareness of and concern for the visual quality of the landscape and changes to it and is generally highest for viewers such as residents and people engaging in recreation or leisure activities and lower for people engaged in or commuting for work or conducting personal business.

- A feature is described as "noticeable" if it has the potential to attract viewer attention because it introduces substantial visual change in form, line, color and/or texture in the landscape.

In addition, photosimulations have been prepared to illustrate the application of best management practices that would help reduce aesthetic impacts and mitigation measures that would help reduce potentially significant aesthetic impacts to less than significant levels.

# Visual Characteristics

The visual character and quality of the environmental setting of the Project Area are described using criteria established by the FHWA for visual landscape relationships. The criteria for describing visual quality include vividness, intactness, and unity, as defined below:

- Vividness is the visual power or memorability of landscape components as they combine in striking or distinctive visual patterns.
- Intactness is the visual integrity of the natural and human-built landscape and its freedom from encroaching elements; this factor can be present in well-kept urban and rural landscapes, as well as in natural settings.
- Unity is the visual coherence and compositional harmony of the landscape considered as a whole; it frequently attests to the careful design of individual components in the landscape. (FHWA 1981)

The appearance of the landscape is described below using these criteria and descriptions of the dominance elements of form, line, color, and texture as appropriate. These dominance elements are the basic components commonly used to describe visual character and quality for many visual assessments (USFS 1995; FHWA 1981).

# Sensitive Viewers

Viewer sensitivity or concern is based on the visibility of resources in the landscape, the proximity of viewers to visual resources, the elevational position of viewers relative to visual resources, the frequency and duration of views, the number of viewers, and the type of expectations of individuals and viewer groups.

The criteria for identifying importance of views are related in part to the viewer's position relative to the resource. An area of the landscape that is visible from a particular location (e.g., a park or overlook) or series of points (e.g., a road or trail) is defined as a viewshed. To identify the importance of views of resources, a viewshed may be broken into distance zones of foreground, middleground, and background. Generally, the closer a resource is to the viewer, the more dominant it is and the greater its importance to the viewer. Although distance zones in viewsheds may vary between different geographic regions or types of terrain, a commonly used set of criteria identifies the foreground distance zone as within one half mile from the viewer, the middleground distance zone as extending from one half mile to 4 miles from the viewer, and the background zone as extending from 4 miles to the horizon (USFS 1995). Also, resources that are

higher in elevation than the viewer tend generally to take on greater visual importance than resources located at a lower elevation than the viewer.

Viewer sensitivity also depends on the number and types of viewers and the frequency and duration of views. Generally, viewer sensitivity increases with an increase in total numbers of viewers, the frequency of viewing (e.g., daily or seasonally), and the duration of views (i.e., how long a scene is viewed). Viewer sensitivity is also higher for views seen by people who are driving for pleasure; people engaging in recreational activities, such as hiking, biking, or camping; and homeowners. Viewer sensitivity tends to be lower for views seen by people driving to and from work or as part of their work (USFS 1995; FHWA 1981; U.S. Soil Conservation Service 1978). Views from recreation trails and areas, scenic highways, and scenic overlooks are generally assessed as having high viewer sensitivity.

In many areas of the County, oil and gas development activities would be visible to sensitive viewer groups with moderately high to high concern for aesthetic impacts because it would be visible from residences, parks, and open space areas. In other more remote and less populated areas of the County where there is little public access, the proposed Project would have little or no effect on sensitive viewers because the volume, frequency, and duration of views of the proposed Project would be low and viewers primarily would be people driving to and from work or as part of their work. Within the environmental setting of the proposed Project, KOPs have been selected that represent typical views within the County where oil and gas development is likely to occur. Viewer sensitivity is described below for these KOPs using criteria established by the FHWA.

# Sensitive Viewing Areas and Key Observation Points

Following is a description of ten KOPs selected by the County in 2013. The KOPs were selected to represent typical views of the Project components and views from sensitive locations. Figure 4.1-1 shows the location of KOPs within the Project Area Figures 4.1-2 through 4.1-6 show existing views from each of the selected KOPs. The representative KOP locations include views of and from Tier 1, 2, 3 and 4 areas.

## KOP 1 – Panorama Park, Bakersfield (Tier 1)

KOP 1 (Figure 4.1-2) represents the view looking north from Panorama Park in north Bakersfield. The linear park extends 1.5 miles along the top of a steep bluff and borders Panorama Drive. Views north from the bluff-top park are expansive. The foreground of the view is dominated by scattered trees and grassland on a mostly flat and gently sloping plain below the bluff. Beyond this area and extending through the middleground and background to the horizon, the view is dominated by a very high density of oil and gas development facilities, including pump jacks, tanks, power lines, pipes, roads, and related facilities. Colors of facilities are mostly grays, tans, browns, and similar earth-tone colors. Patches of yellow grass and barren ground are interspersed among the facilities.

Intactness and unity for this view are low because of the presence of extensive encroaching elements and lack of visual coherence and compositional harmony due to the presence of numerous elements of various forms and lines scattered throughout the landscape. Vividness is moderately high because of the visual power and memorability of the view overlooking extensive oil and gas facilities sprawling across the expansive landscape.

Viewer sensitivity is high for views from this and other locations along the linear, bluff-top Panorama Park because the view is experienced on a regular basis by a large number of viewers with high sensitivity who use the park for recreation and leisure activities.

## KOP 2 – Night - Panorama Park, Bakersfield (Tier 1)

KOP 2- Night (Figure 4.1-2) represents the nighttime view looking north from Panorama Park in north Bakersfield. The linear park extends 1.5 miles along the top of a steep bluff and borders Panorama Drive. Views north from the bluff-top park are expansive. The nighttime view is dominated by lights of varying colors and brightness scattered throughout the mostly flat and gently sloping plain extending northward below the bluff. Lights are associated with the oil and gas development facilities described above for KOP 1A and housing below the bluff. Colors vary from bright white to various shades of yellow and orange with a few red lights interspersed.

Intactness and unity for this view are low because of the presence of extensive encroaching elements and lack of visual coherence and compositional harmony due to the scattered and uneven pattern of lights and their reflectance off of scattered and irregular forms in the landscape. Vividness is moderately high to high because of the visual power and memorability of the panoramic view of scattered and various colored lights contrasting against the dark expanse of the landscape and night sky.

Viewer sensitivity is high for views from this and other locations along the linear, bluff-top Panorama Park because the nighttime view is experienced on a regular basis by a large number of viewers with high sensitivity using the park for recreation and leisure activities, especially nighttime gathering, socializing, and viewing. During summer months, high numbers of viewers use the park after dark when temperatures are cooler and outdoor activities are more enjoyable.

## KOP 3 – Comanche Road, South of SR 58 (Tier 2)

KOP 3 (Figure 4.1-3) represents the view looking west from Comanche Road south of SR 58 in the eastern part of the Project Area. This view is typical of views within this area of predominately flat agricultural lands and scattered oil and gas development facilities. The view from KOP 3 consists of the following features: a broad, tilled agricultural field in the foreground; a small complex of tan-colored tanks and other oil and gas facilities at the far end of the tilled field; dark green orchards beyond the open field; and various low vertical wood power poles extending above the tops of orchard trees along the horizon. The roadway and a portion of a wood power pole are also visible in the foreground. Although the field in this view consists of yellowish-tan bare earth, the appearance of this and other agricultural fields throughout the area changes regularly depending on the season and crop types planted.

Intactness for this view is moderate because the predominant elements are orderly agricultural fields and orchards with some encroaching elements (i.e., oil and gas facilities and vertical wood power poles). Also, unity is moderate due to the presence of the forms and lines of the oil and gas facilities and power poles contrasting with the otherwise orderly and visually coherent patterns of the agricultural landscape.

Vividness is low because this and similar views in this area lack striking visual components or distinctive patterns that would produce visual power or memorability.

Viewer sensitivity is generally low for views from this and other locations in the vicinity because these views are primarily experienced by moderate numbers of viewers with low sensitivity who are working or travel this and other local roads largely for purposes of work or commuting rather than for recreation or leisure activities.

## KOP 4 – Hwy 223, East of Arvin (Tier 2)

KOP 4 (Figure 4.1-3) represents the view looking west from an overlook along Highway 223 east of the community of Arvin in the eastern portion of the Project Area. This KOP represents views for motorists travelling westbound on Highway 223 and descending into the San Joaquin Valley through the transitional foothills of the southern Sierra Nevada. The foreground of this view consists of the following features: tall grasses and a low shrub; a portion of barbed wire fencing; rocky outcrops; and yellow grass-covered slopes of the lower foothills merging into open, yellow, grass-covered fields. Beyond the open fields, the landscape transitions to flat agricultural fields and orchards of various colors in rectilinear patterns extending west into the distance across the broad San Joaquin Valley. Several small communities, rural residences, and agricultural operations are visible interspersed in the predominantly agricultural landscape.

Intactness and unity for this view are high because there are no noticeable encroaching elements detracting from the visual coherence of the natural and rural landscape setting. Vividness is moderately high due to the distinctive transition from undulating, yellow, grass-covered foothills to flat, green and tan agricultural lands laid out in rectilinear, straight-edged patterns.

Viewer sensitivity is moderately high for views in this area because these views are experienced by moderately high numbers of motorists and others traveling through this area for pleasure and recreation. Viewer awareness is heightened for views in this area because it functions as a visual ecotone, or area of landscape character transition, and has virtually no encroaching elements.

## KOP 5 – SR 99 and I-5 Junction, West of SR 99 (Mix of Tier 3 and Tier 4)

KOP 5 (Figure 4.1-4) represents the view looking southwest near the junction of SR 99 and I-5 in the southern portion of the Project Area. This KOP is located on a frontage road adjacent to and just west of SR 99 and represents views for motorists travelling southbound on SR 99 and I-5. The foreground of this view consists of the following features: low, rolling hills covered with yellow grasses and a few scattered shrubs; a graded road extending up the hillslope; low wood-post fences; low, vertical wood power poles and sweeping power lines; and a short pole and sign adjacent to the roadway. The background is dominated by low, rugged mountains covered

predominantly with yellow grasses and dark patches of trees and shrubs. This view represents a substantial and abrupt transition from the predominantly flat agricultural fields of the broad San Joaquin Valley to the rugged and varied mountains and canyons of the San Emigdio Mountains that anchor the south end of the valley and Kern County.

Intactness and unity for this view are moderately high because there are only a few encroaching elements which detract slightly from the visual coherence of the rural and natural landscape setting. Vividness is also moderately high due the somewhat dramatic and distinctive backdrop of rugged mountains contrasting with the smooth and low rolling hills in the foreground.

Viewer sensitivity is moderate to high for views from this area because these views are experienced by very high numbers of motorists traveling on two major highways that serve as major north-south conduits for people traveling both for pleasure and work. Viewer awareness is heightened for views in this area because it functions as a visual ecotone, or area of landscape character transition, and has few encroaching elements.

## KOP 6 – Wind Wolves Preserve, Spring Wildflowers Trailhead (South of SR 166) (Tier 2)

KOP 6 (Figure 4.1-4) represents the view looking northeast from the Spring Wildflowers Trailhead in the Wind Wolves Preserve in the southern portion of the Project Area. This KOP represents views for visitors to this open space preserve who are engaged in recreation and leisure activities. Visible features in the foreground of this view include: a narrow, asphalt-surfaced road; a gravel-covered parking area; a wood rail fence with several rock support monuments; fields of tall yellow grasses sloping gently northward; and cattle grazing in the grassy field. Visible near the edge of the yellow grassy fields are an entry gate to the preserve and several low wood power poles spaced regularly along the field edge. Beyond the gently sloping grassy fields, the landscape transitions to flat, mostly dark green orchards and green and tan agricultural fields extending northward into the distance across the broad San Joaquin Valley. A few small isolated structures are barely visible in the green orchards and in the distance.

Intactness and unity for this view are high because there are no noticeable encroaching elements detracting from the visual coherence of the natural and agricultural landscape setting. The parking area, narrow road, wood rail fence, and rock structures are in scale and character with the preserve's purpose and function as a place for leisure and recreation activities. Vividness is moderately high due to the distinctive transition from gently sloping, yellow, grass-covered fields to flat, green, and tan agricultural lands.

Although views are experienced by low to moderate numbers of visitors to the preserve, viewer sensitivity is high because viewers are engaged in activities for leisure and recreation. Viewer awareness is heightened for views in this area because it functions as a visual ecotone, or area of landscape character transition, between the rugged and natural San Emigdio Mountains to the south and the broad, predominantly agricultural San Joaquin Valley to the north.

## KOP 7 – Sunnybank Avenue, West of Renfro Road (Tier 4)

KOP 7 (Figure 4.1-5) represents the view looking north from Sunnybank Avenue, west of Renfro Road, in the central portion of the Project Area west of the City of Bakersfield. This KOP represents views within predominantly residential areas where oil and gas facilities occur in close proximity to residences development. This view is of a small undeveloped parcel with adjacent oil and gas facilities and residences. Visible in the immediate foreground of this view are an undeveloped parcel of land consisting of bare gray soil, sparse yellow grasses, several large green shrubs, short wood posts, and a hedge of mounding, dark green shrubs and taller trees lining its north edge. A portion of a residence and dark wood fence are visible on the right side of the view and several large, light-colored tanks and two pump jacks are visible on the left side of and near the center of the view.

Intactness and unity for this view are low because of the presence of encroaching elements of pump jacks and rusting tanks and lack of visual coherence and compositional harmony due to the various forms scattered throughout the view. Vividness is also low because this and similar views in this area lack striking visual components or distinctive patterns that would produce visual power or memorability.

Viewer sensitivity is moderately high to high for views from this and other locations in the vicinity because these views are primarily experienced by local residents from in and around their homes in this predominantly residential area. Viewer sensitivity is somewhat reduced by the presence in the view and surrounding area of existing oil and gas facilities, which may somewhat reduce viewer concern.

## KOP 8 – SR 58 (Lokern Road) at SR 43 (Enos Road) Intersection (Tier 2)

KOP 8 (Figure 4.1-5) represents the view looking southwest from the intersection of SR 58 (Lokern Road) and SR 43 (Enos Road) in the central portion of the Project Area west of the City of Bakersfield. This view is typical of views within this area of predominately flat agricultural lands and scattered rural residences and oil and gas development facilities. The view from KOP 6 consists of the following features: a broad, green, agricultural field dominating the foreground; a small cluster of tan-colored tanks, dark-colored residences and other single-story structures, and large dark green trees beyond the field to the left in the view; dark green orchards beyond the open field to the right in the view; and various vertical power poles extending above the tops of trees along the horizon. Although the field in this view consists of dark green crops, the appearance of this and other agricultural fields throughout the area changes regularly depending on the season and crop types planted.

Intactness for this view is moderately high because the predominant elements are orderly agricultural fields, orchards, and a few low-profile rural buildings with associated tall trees with only a few encroaching elements (i.e., the small cluster of tanks and some vertical power poles). Also, unity is moderately high due to the predominance of agricultural and rural character elements, with only a few contrasting elements that reduce the otherwise orderly and visually coherent patterns of the landscape.

Vividness is low because this and similar views in this area lack striking visual components or distinctive patterns that would produce visual power or memorability.

Viewer sensitivity is generally low for views from this and other locations in the vicinity because these views are primarily experienced by moderate numbers of viewers with low sensitivity who are working or traveling through this area largely for purposes of work or commuting rather than for recreation or leisure activities.

## KOP 9 – SR 58, West of McKittrick (Mix of Tier 1 and Tier 2)

KOP 9 (Figure 4.1-6) represents the view looking west along SR 58 in the western portion of the Project Area. This KOP represents views for motorists travelling westbound on SR 58 toward the Carrizo Plain and Central Coast region in San Luis Obispo County. The foreground of this view consists of the roadway, fences, several wood power poles, and predominantly flat to gently undulating fields covered with tan and yellow grasses. Beyond the open fields, the landscape transitions to low, rolling, grass-covered hills with gentle draws, a small patch of medium green trees and shrubs, a few wood power poles, a light-colored structure, and several widely scattered pump jacks near the base of the hills. Barely visible in the background along the ridge line to the right in the view are several tall, metal, lattice, high-voltage transmission structures. This view is representative of views for motorists and others traveling west in the transitional foothills of the rugged Temblor Range separating the broad and predominantly flat San Joaquin Valley from the narrower, more enclosed Carrizo Plain and coastal hills.

Intactness and unity for this view are moderately high because there are only a few encroaching elements which detract slightly from the visual coherence of the rural and natural landscape setting. Vividness is moderate due to the somewhat varied terrain and rural and natural character of the view. The low rolling hills, open grazing lands, and stark openness provide a somewhat distinctive character to the view.

Viewer sensitivity is moderately high for views in this area because these views are experienced by moderate numbers of motorists and others traveling through this area for pleasure and recreation, often to recreation destinations in the Carrizo Plain, Los Padres National Forest, and coastal communities in the Central Coast Region. Viewer awareness is heightened for views in this area because it functions as a visual ecotone, or area of landscape character transition, and has few encroaching elements.

## KOP 10 – Lost Hills County Park (Tier 2)

KOP 10 (Figure 4.1-6) represents the view looking northeast from Lost Hills County Park near the edge of the small community of Lost Hills in the northwestern portion of the Project Area. This view of open lands northeast of the developed park is typical of views of predominately flat and open lands within this general area. Although not visible in this view, the area contains widely scattered rural residences and oil and gas development facilities. The foreground view from KOP 10 consists of a portion of a green, turf-covered playfield, a metal goal post, light poles topped with photovoltaic panels, a par course sign and station, a few large green shrubs, and a chain link fence bordering the park. Beyond the park perimeter are open fields with yellow

grasses and dense stands of mounded light-green shrubs. A large group of low, dark-colored posts are visible in the fields to the right of the view. Barely visible in the background is a line of tall, metal lattice, high-voltage transmission structures extending above the horizon.

Intactness for this view is moderately high because the predominant elements are somewhat orderly recreation facilities and open fields of natural appearing grasslands and fields with few encroaching elements (i.e., the low posts and distant transmission structures). Also, unity is moderately high due to the predominance of orderly recreation facilities and natural appearing vegetation with only a few contrasting elements that reduce the visually coherent patterns of the landscape. Vividness is low because this and similar views in this area lack striking visual components or distinctive patterns that would produce visual power or memorability.

Viewer sensitivity is generally high for views from this developed park because these views are primarily experienced by moderate to high numbers of viewers with high sensitivity who are engaged in recreation or leisure activities at the park. In addition, this view represents similar views from residences in the community by viewers with high viewer sensitivity.

# Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist state that a project would have a significant impact on recreation if it would:

- Have a substantial adverse effect on a scenic vista;
- Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway;
- Substantially degrade the existing visual character or quality of the site and its surroundings; or
- Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area.

Based on these standards, the effects of the Project have been categorized as either a “less than significant impact” or a “potentially significant impact.” Mitigation measures are recommended for potentially significant impacts. If a potentially significant impact cannot be reduced to a less than significant level through the application of mitigation, it is categorized as a “significant unavoidable impact.”

# Project Impacts

For each of the representative KOPs, the amount of potential visual change in unity, intactness, and vividness that would be introduced into the existing landscape and the degree to which viewers are likely to be impacted and react to the change are described below for each applicable threshold of significance. Impacts are assessed for likely potential scenarios of oil and gas development that may occur within the view from each representative KOP during construction, operation, well stimulation, and decommissioning/abandonment. Figures AES-CP1 – AES-CP9

(Appendix G) illustrate concepts for likely potential scenarios of oil and gas development that could occur within the view from each representative KOP during operation. Photo simulations described below are based on these concept diagrams.

## Impact 4.1-1: Have a Substantial Adverse Effect on a Scenic Vista

There are currently no designated scenic vistas within the Project Area. Therefore, future oil and gas exploration and production activities that would be authorized under the proposed Amendment to Chapter 19.98 (Oil and Gas Production) of the Kern County Zoning Ordinance would not result in significant impacts related to having a substantial adverse effect on a scenic vista during construction, operation, well stimulation, or decommissioning/abandonment. Impacts to non-designated scenic vistas are evaluated in detail for each KOP under Impact 4.1-3, below.

### Mitigation Measures

No mitigation measures are proposed.

### Level of Significance

Impacts would be less than significant.

## Impact 4.1-2: Substantially Damage Scenic Resources, including, but Not Limited to, Trees, Rock Outcroppings, and Historic Buildings within a State Scenic Highway

There are currently no Designated State Scenic Highways within the Project Area. However, an approximately 5-mile-long segment of Highway 41, which is identified as an Eligible State Scenic Highway, crosses through the northwest corner of the Project Area. With the exception of a short portion near the far eastern end of this segment, near its crossing of the County boundary, this segment of Highway 41 travels through a valley bounded by low hills. Almost all views south and east from the highway toward the central portion of the Project Area are screened by the hills. The short eastern segment of the highway in the flat valley east of the hills has open views of the northern portion of the Project Area to the east and southeast. The nearest Core Area to this segment of Highway 41 is approximately 5 miles east. At this distance, oil and gas facilities would not be noticeable during operation. Although very tall drilling rigs may be visible at this distance, they also would not be noticeable to travelers when viewed from the highway in this area. For these reasons, intactness, vividness, and unity would not be reduced for views from this segment of Highway 41.

Therefore the Project would not substantially damage any scenic resources within a Designated or Eligible State Scenic Highway within the Project Area, and there would be no aesthetic impacts for construction, operation, well stimulation, or decommissioning/abandonment. Aesthetic impacts of the Project under this criterion would be less than significant.

### Mitigation Measures

No mitigation measures are proposed.

### Level of Significance

Impacts would be less than significant.

## Impact 4.1-3: Substantially Degrade the Existing Visual Character or Quality of the Site and Its Surroundings

Impacts on aesthetic resources due to construction, operation, well stimulation, or decommissioning/abandonment of oil and gas development facilities would result from changes to existing views of the landscape by viewers with high visual sensitivity (i.e., people with high interest and concern for the visual quality of the landscape and changes to it, such as residents from the vicinity of their homes or people engaging in recreation or leisure activities). Aesthetic impacts may include a substantial change to the landscape character (e.g., from rural, agricultural, or natural to more developed or industrial-appearing) or reduction in scenic quality (e.g., substantially altering views of agricultural, agrarian, or natural landscapes that characterize the area or are valued by local or regional residents for their scenic quality).

For each of the representative KOPs, the amount of potential visual change in unity, intactness, and vividness that would be introduced into the existing landscape and the degree to which viewers are likely to be impacted and react to the change is described below for each applicable threshold of significance. Impacts are assessed for likely potential scenarios of oil and gas development that may occur within the view from each representative KOP during construction, operation, well stimulation, and decommissioning/abandonment. Figures AES-CP1 – AES-CP9 (Appendix G) illustrate concepts for likely potential scenarios of oil and gas development that could occur within the view from each representative KOP during operation. Photo simulations described below are based on these concept diagrams.

### Construction Impacts

Short-term impacts on the existing visual character or quality of a site and its surroundings may occur during construction of oil and gas facilities. Construction activities include geophysical surveys, well pad construction, drilling, well completion, testing and ancillary facility construction. Short-term impacts could result from land clearing and grading for pads and work areas, temporary construction access roads, temporary construction areas, and vehicle and equipment operations for facility construction. Some construction phase activities, such as access road construction and placement of temporary construction areas (e.g., construction yards and staging and laydown areas) would involve grading and removal of vegetation, which would later be restored following construction. Some access roads would be wider during construction to accommodate larger construction vehicles, such as drill rigs, thereby resulting in a greater impact during construction than operation. Likewise, some access roads would be temporary and fully restored at the end of construction. Clearing of land may also involve removal of vegetation in some areas that would later be restored. Short-term aesthetic impacts could result from a reduction in unity, intactness, or vividness created by vegetation removal, grading that noticeably alters existing landforms, and materials, equipment, vehicles, structures, fences, and other elements that would be present during construction.

Vehicle and equipment operations may produce visible dust during land-clearing operations and from traveling on unpaved existing and new roadways. Drill rigs, and possibly cranes, are likely to be visible from long distances silhouetted against the sky, especially in the flatter and more open landscapes within the County. Ground-level activities, such as land clearing and site preparation, require equipment such as bulldozers, excavators, loaders, and dump trucks. Foundation and facility construction activities would require large delivery vehicles and concrete trucks. The local increase in general vehicle traffic could be a source of visual impact, depending upon the number of trips to and from a specific area. Onsite parking could be noticeable during construction if certain sites require a larger number of workers and, consequently, their vehicles. Nighttime lighting for construction or safety and security in construction areas may also result in short-term aesthetic impacts; these impacts associated with creating new sources of substantial light or glare are addressed separately under Impact 4.1-4.

The severity of construction-related aesthetic impacts would depend not only on the reduction in unity, intactness, and vividness produced by the construction activities, but also on the visibility and proximity of these activities to viewers and the sensitivity of viewers to changes in the landscape's character and quality. Although construction activities for a particular well, group of wells, or storage tank area may be temporary and somewhat brief (i.e., on the order of a several weeks to several months), staggered development of multiple wells or other oil and gas facilities within a particular area could occur over the course of several years. Because of this, construction activities that substantially reduce unity, intactness, or vividness in areas with high visual sensitivity and persist for a month or longer would result in significant aesthetic impacts.

Construction-related aesthetic impacts would occur during exploration and initial development in areas that do not currently contain oil and gas development facilities as well as areas that contain remnant facilities no longer in operation. Construction-related aesthetic impacts would also occur in areas with existing oil and gas operations where construction activities would occur at the same time as operation activities (e.g., new wells would be being drilled in areas where existing wells are operating). Figures AES-C1 – AES-C10 (Appendix G) show views of construction activities that would include drilling rigs, grading activities, trailers, vehicles, laydown areas, and other work areas.

### Eastern Subarea

Figures AES-C1 and AES-C2 (Appendix G) show existing and potential views for KOPs 1 and 2 with construction activities for expanding oil and gas development in the area north of Panorama Park in north Bakersfield where there is extensive existing oil and gas development. With the exception of the immediate foreground that includes the Kern River, the area within the view from this KOP is of Tier 1 lands. This KOP is representative of other views in the Project Area where there is existing extensive oil and gas development. Although vividness is moderately high for the existing view of expansive oil and gas development, unity and intactness are low. Construction activities would introduce new tall drill rigs, extensive grading activities, equipment storage and laydown areas, vehicles, equipment, and dust in foreground and middleground views with high visual sensitivity. These activities would introduce new forms and lines in an area in the foreground of the view that currently is not developed for oil and gas. Although these new

features would be noticeable in foreground views, they would be similar to numerous existing features in the view and would not substantially reduce intactness or unity for views for sensitive viewers. For these reasons, aesthetic impacts of construction activities for oil and gas development for KOPs 1 and 2 would be less than significant.

Figure AES-C3 (Appendix G) shows existing and potential views for KOP 3 with construction activities for expanding oil and gas development in an agricultural area where there are some existing oil and gas facilities. The area within the view from KOP 3 is of Tier 2 lands. This KOP is representative of similar agricultural areas in the Project Area where construction activities for oil and gas development may occur with some existing oil and gas development in the view. Some of the existing oil and gas facilities, such as the wells, are somewhat distant and not easily noticeable in the view. However, the existing tanks are large and dominant elements in the view. Intactness and unity are moderate and vividness is low for this KOP. Construction activities would introduce new tall drill rigs, extensive grading activities, equipment storage and laydown areas, vehicles, equipment, and dust in foreground and middleground views. These construction activities would introduce new, dominant, and highly noticeable elements in foreground views; however, due to the presence of the large and dominant tanks in the existing view, intactness and unity would be only somewhat reduced. Although visual sensitivity is low because most viewers are traveling for work or working in the area, views of agricultural lands in the County are considered an important attribute of the County's visual character and quality. Because introducing new elements of construction activities would only somewhat reduce the intactness and unity of the view, the visual character and quality of the site and its surroundings would be only somewhat degraded in this view. However, as a visible change on the landscape, this degradation in visual character is considered significant for construction activities for oil and gas development for KOP 3 and similar views of predominately agricultural areas in the Project Area with some existing dominant oil and gas development operations present.

Figure AES-C4 (Appendix G) shows existing and potential views for KOP 4 with construction activities for expanding oil and gas development in an agricultural area where existing oil and gas facilities are either not present or so distant that they are not noticeable. The area within the view from KOP 4 is of Tier 2 lands. This KOP is representative of similar areas in the Project Area where construction activities for oil and gas development may occur without existing oil and gas development noticeable in the view. Intactness, unity, and vividness are high or moderately high for this KOP. Although visual sensitivity is high and construction activities would introduce some new elements in the view, these elements would not be noticeable due to their distance and construction activities would not substantially reduce intactness, unity, or vividness in this view. For these reasons, aesthetic impacts would be less than significant for construction activities for oil and gas development for KOP 4 and similar views in the Project Area where existing oil and gas operations are not present or are so distant that they are not noticeable.

Figure AES-C5 (Appendix C) shows existing and potential views for KOP 5 with construction activities occurring in an area that does not contain existing oil and gas operation activities. The area within the view from this KOP is a mix of Tier 3 and Tier 4 lands, with Tier 1 land immediately to the north. This KOP is representative of similar areas in the Project Area where

construction activities for oil and gas development may occur without existing oil and gas development in the view. Intactness, unity, and vividness are moderately high for this KOP. Construction activities would introduce new tall drill rigs, extensive grading activities, equipment storage and laydown areas, vehicles, equipment, and dust in foreground and middleground views with high visual sensitivity. These activities would introduce new forms and lines that would substantially reduce intactness, unity, and vividness in an area that currently is not developed for oil and gas. These construction activities would be noticeable in foreground views to high numbers of sensitive viewers traveling the two major highways. For these reasons, aesthetic impacts would be significant for construction activities for oil and gas development for KOP 5 and similar views in the Project Area without existing oil and gas development operations.

## Central Subarea

Figure AES C7 (Appendix G) shows existing and potential views for KOP 7 with construction activities for expanding oil and gas development in a residential area where there are some existing oil and gas facilities. The view for KOP 7 is of Tier 4 land. This KOP is representative of similar areas in the Project Area where construction activities for oil and gas development may occur in close proximity to residences with some existing oil and gas development in the view. Intactness, unity, and vividness for this KOP are low due to the presence of oil and gas and other industrial facilities in the view. Construction activities would introduce a new tall drill rig, some grading activities, equipment, materials, vehicles, and dust in immediate foreground views with moderately high to high visual sensitivity. These activities would introduce new forms and lines that would further reduce intactness, unity, and vividness in the view. Although the view currently includes oil and gas facilities, these existing elements are partially screened and more distant in view than the elements associated with construction activities. The construction activities would be dominant and highly noticeable in immediate foreground views to sensitive residential viewers and would further degrade the visual character and quality of the site and surrounding residential neighborhood. For these reasons, aesthetic impacts would be significant for construction activities for oil and gas development for KOP 7 and similar views in the Project Area where residences are in proximity to some existing oil and gas development operations.

Figure AES-C8 (Appendix G) shows existing and potential views for KOP 8 with construction activities for expanding oil and gas development in an agricultural area where there are some existing oil and gas facilities. The area within the view from KOP 8 is of Tier 2 lands. This KOP is representative of similar agricultural areas in the Project Area where construction activities for oil and gas development may occur with some existing oil and gas development in the view. The existing oil and gas facilities in the view are partially screened, blend somewhat with other structures in the background, and, though noticeable, are not dominant elements in the view. Intactness and unity are moderately high and vividness is low for this KOP. Construction activities would introduce new tall drill rigs, extensive grading activities, equipment storage and laydown areas, vehicles, equipment, and dust in immediate foreground and foreground views. These construction activities would introduce new, dominant, and highly noticeable elements in foreground views that would substantially reduce the intactness and unity of a predominately agricultural area with some oil and gas facilities present. Although visual sensitivity is low because most viewers are traveling for work or working in the area, views of agricultural lands in

the County is considered an important attribute of the County's visual character and quality. Introducing new elements of construction activities in foreground views of the predominantly agricultural area would degrade the visual character and quality of the site and its surroundings. For these reasons, aesthetic impacts would be significant for construction activities for oil and gas development for KOP 8 and similar views of predominantly agricultural lands in the Project Area.

### Western Subarea

Figure AES-C6 (Appendix G) shows existing and potential views for KOP 6 with construction activities for expanding oil and gas development in an agricultural area where existing oil and gas facilities are either not present or so distant that they are not noticeable. The area within the view from KOP 6 is Tier 2 lands. This KOP is representative of similar areas in the Project Area where construction activities for oil and gas development may occur without existing oil and gas development noticeable in the view. Intactness, unity, and vividness are high or moderately high for the existing view for this KOP. Construction activities would introduce new tall drill rigs, grading activities, equipment storage and laydown areas, vehicles, equipment, and dust in views with high visual sensitivity. These activities, in particular the tall drill rigs, would introduce new forms and lines that would be noticeable in middleground views for sensitive viewers visiting the preserve and would reduce intactness, unity, and vividness in an area that currently is not developed for oil and gas. For these reasons, aesthetic impacts would be significant for construction activities for oil and gas development for KOP 6 and similar views in predominantly agricultural areas without existing oil and gas development operations in the Project Area.

Figure AES-C9 (Appendix G) shows existing and potential views for KOP 9 with construction activities for expanding oil and gas development in an agricultural grazing area with some existing oil and gas facilities present. The area within the view from KOP 9 is of Tier 1 and Tier 2 lands. This KOP is representative of similar agricultural areas in the Project Area where construction activities for oil and gas development may occur with some existing oil and gas development in the view. The existing oil and gas facilities in the view are somewhat distant and, though noticeable, are not dominant elements in the view. Intactness and unity are moderately high and vividness is moderate for the existing view for this KOP. Construction activities would introduce new tall drill rigs, extensive grading activities, equipment storage and laydown areas, vehicles, equipment, and dust in immediate foreground, foreground, and middleground views with high visual sensitivity. These construction activities would introduce new, dominant, and highly noticeable elements that would substantially reduce the intactness, unity, and vividness of a predominately agricultural area with some oil and gas facilities present. For these reasons, aesthetic impacts would be significant for construction activities for oil and gas development for KOP 9 and similar views of agricultural lands with some existing oil and gas development operations in the Project Area.

Figure AES-C10 (Appendix G) shows existing and potential views for KOP 10 with construction activities for expanding oil and gas development in an area with agricultural, recreation, and industrial uses land where existing oil and gas facilities are either not present or not noticeable. The area within the view from KOP 10 is of Tier 2 lands. This KOP is representative of similar

areas in the Project Area where construction activities for oil and gas development may occur without existing oil and gas development noticeable in the view. Intactness and unity are moderately high and vividness is low for this KOP. Although visual sensitivity is high and construction activities would introduce some new elements in the view that would be noticeable, these elements would not be dominant due to the presence of other more dominant vertical elements in the foreground of the view, and these construction activities would not substantially reduce intactness, unity, or vividness in this view. For these reasons, aesthetic impacts would be less than significant for construction activities for oil and gas development for KOP 10 and similar views in the Project Area where existing oil and gas operations are either not present or not noticeable.

## Operation Impacts

Following completion of the well, the drilling equipment would be removed. Long-term impacts on the existing visual character or quality of a site and its surroundings may occur primarily during operation of oil and gas facilities. Long-term impacts for these facilities could occur due to strong contrast with existing landscape conditions produced by a mix of irregular vertical and geometric forms and lines, irregular and often haphazard layout and spacing, or colors and textures that do not blend with their surroundings. Where introduced, these structures, particularly large storage tanks, may be silhouetted against the sky above the horizon line, which draws viewer attention and increases their contrast in open landscapes. The presence of other structures of similar form nearby tends to somewhat reduce their level of contrast. However, increased numbers of structures, especially ones with different forms or colors, may add to the texture of existing structures and increase contrast in the landscape. New oil and gas facilities introduced into the landscape, particularly storage tanks, where other similar structures are not present, would tend to be dominant and create strong contrast. Where new facilities are adjacent to or in the vicinity of existing facilities of similar type and height, or other structures (e.g., industrial facilities, metal warehouses, and processing plants) are common features, the new structures are more likely to be co-dominant with the existing ones and produce less contrast.

New vertical elements, such as gas flare pipes and power lines consisting of a series of poles or lattice structures, and horizontal elements, such as access roads, well pads, and collection and distribution pipes, may produce contrast in form, line, color, or texture with the existing landscape character. Long-term aesthetic impacts could result from the following: a reduction in unity, intactness, or vividness created by loss of vegetation cover; landform changes that noticeably contrast with existing landforms; pumpjacks, vertical pumps, or other well types and associated ancillary facilities; storage tanks; pipes; and materials, equipment, vehicles, structures, fences, and other elements that would be present during operation. In addition to their form, line, and texture, oil and gas facilities may also produce strong contrast due to the reflectivity or color of the finish of elements, especially is they have a shiny, metallic galvanized finish or are painted with bright or contrasting colors. Nighttime lighting for safety and security or intermittent flaring of excess natural gas as a byproduct of production during operation may also result in long-term aesthetic impacts; these impacts associated with creating new sources of substantial light or glare are addressed separately under Impact 4.1-4, below.

The severity of operation-related aesthetic impacts would depend not only on the reduction in unity, intactness, and vividness produced by the operation activities, but also on the visibility and proximity of these activities to viewers and the sensitivity of viewers to changes in the landscape's character and quality. Because of this, operation activities that substantially reduce unity, intactness, or vividness in foreground views with high visual sensitivity would result in significant aesthetic impacts. Aesthetic impacts during operation of oil and gas development facilities are most likely to occur in areas that have no or very few noticeable existing oil and gas facilities or where existing facilities are visible but not dominant contrasting elements in the landscape. Because views of agricultural lands in the County are considered an important attribute of the County's visual character and quality, introducing new oil and gas facilities or substantially expanding these facilities in predominantly agricultural areas, particularly in foreground views, are likely to degrade the visual character and quality of the site and its surroundings and result in significant aesthetic impacts.

Figures AES-O1 – AES-O10 (Appendix G) show existing and potential views of operation activities that would include wells and well pads, graded areas, storage tanks, pipes, and other storage and operation areas.

### Eastern Subarea

Figures AES-O1 and AES-O2 (Appendix G) show existing and potential views for KOPs 1 and 2 with operation activities for expanding oil and gas development in the area north of Panorama Park in north Bakersfield where there is extensive existing oil and gas development. With the exception of the immediate foreground that includes the river, the area within the view from this KOP is of Tier 1 lands. This KOP is representative of other views in the Project Area where there is existing extensive oil and gas development. Although vividness is moderately high for the existing view of expansive oil and gas development, unity and intactness are low. Operation activities would introduce numerous new well pads with wells of varying types and sizes, extensive new access roads, large storage tanks and ancillary facilities, numerous power poles, equipment and equipment storage areas, aboveground collection and distribution pipes, vehicles, and occasional dust in foreground and middleground views with high visual sensitivity. These activities would introduce new forms and lines in an area in the foreground of the view that currently is not developed for oil and gas. Although these new features would be noticeable in foreground views, they would be similar to numerous existing features in the view and would not substantially reduce intactness or unity for views for sensitive viewers. For these reasons, aesthetic impacts of operation activities for oil and gas development for KOPs 1 and 2 would be less than significant.

Figure AES-O3 (Appendix G) shows existing and potential views for KOP 3 with operation activities for expanding oil and gas development in an agricultural area where there are some existing oil and gas facilities. The area within the view from KOP 3 is of Tier 2 lands. This KOP is representative of similar agricultural areas in the Project Area where operation activities for oil and gas development may occur with some existing oil and gas development in the view. Some of the existing oil and gas facilities, such as the wells, are somewhat distant and not easily noticeable in the view. However, the existing tanks are large and dominant elements in the view. Intactness

and unity are moderate and vividness is low for this KOP. Operation activities would introduce new well pads with wells of varying types and sizes, new access roads, large storage tanks and ancillary facilities, power poles, equipment and equipment storage areas, aboveground collection and distribution pipes, vehicles, and occasional dust in foreground and middleground views. These operation activities would introduce new, dominant, and highly noticeable elements in foreground views; however, due to the presence of the large and dominant tanks in the existing view, intactness and unity would be only somewhat reduced. Although visual sensitivity is low because most viewers are traveling for work or working in the area, views of agricultural lands in the County are considered an important attribute of the County's visual character and quality. Because introducing new elements of operation activities would only slightly reduce the intactness and unity of the view, the visual character and quality of the site and its surroundings would be only somewhat degraded in this view. For these reasons, aesthetic impacts would be less than significant for operation activities for oil and gas development for KOP 3 and similar views of predominately agricultural areas in the Project Area with some existing dominant oil and gas development operations present.

Figure AES-O4 (Appendix G) shows existing and potential views for KOP 4 with operation activities for expanding oil and gas development in an agricultural area where existing oil and gas facilities are either not present or so distant that they are not noticeable. The area within the view from KOP 4 is of Tier 2 lands. This KOP is representative of similar areas in the Project Area where operation activities for oil and gas development may occur without existing oil and gas development noticeable in the view. Intactness, unity, and vividness are high or moderately high for the existing view for this KOP. Although visual sensitivity is high and operation activities would introduce some new elements in the view, these elements would not be noticeable due to their distance and operation activities would not substantially reduce intactness, unity, or vividness in this view. For these reasons, aesthetic impacts would be less than significant for operation activities for oil and gas development for KOP 4 and similar views in the Project Area where existing oil and gas operations are not present or are so distant that they are not noticeable.

Figure AES-O5 (Appendix G) shows existing and potential views for KOP 5 with operation activities occurring in an area that does not contain existing oil and gas operation activities. The area within the view from this KOP is a mix of Tier 3 and Tier 4 lands, with Tier 1 land immediately to the north. This KOP is representative of similar areas in the Project Area where operation activities for oil and gas development may occur without existing oil and gas development in the view. Intactness, unity, and vividness are moderately high for the existing view for this KOP. Operation activities would introduce new well pads with wells of varying types and sizes, new access roads, large storage tanks and ancillary facilities, power poles, equipment and equipment storage areas, aboveground collection and distribution pipes, vehicles, and occasional dust in foreground and middleground views with high visual sensitivity. These activities would introduce new forms and lines that would substantially reduce intactness, unity, and vividness in an area that currently is not developed for oil and gas. These operation activities would be noticeable in foreground views to high numbers of sensitive viewers traveling the two major highways. For these reasons, aesthetic impacts would be significant for operation activities

for oil and gas development for KOP 5 and similar views in the Project Area without existing oil and gas development operations.

### Central Subarea

Figure AES-O7 (Appendix G) shows existing and potential views for KOP 7 with operation activities for expanding oil and gas development in a residential area where there are some existing oil and gas facilities. The view for KOP 7 is of Tier 4 land. This KOP is representative of similar areas in the Project Area where operation activities for oil and gas development may occur in close proximity to residences with some existing oil and gas development in the view. Intactness, unity, and vividness for the existing view for this KOP are low due to the presence of oil and gas and other industrial facilities in the view. Operation activities would introduce a new well pad and well, some ancillary facilities, a new access road, a new power pole and line, and occasional vehicles and dust in immediate foreground views with moderately high to high visual sensitivity. These activities would introduce new forms and lines that would further reduce intactness, unity, and vividness in the view. Although the view currently includes oil and gas facilities, these existing elements are partially screened and more distant in view than the elements associated with the new operation activities. The operation activities would be dominant and highly noticeable in immediate foreground views to sensitive residential viewers and would further degrade the visual character and quality of the site and surrounding residential neighborhood. For these reasons, aesthetic impacts would be significant for operation activities for oil and gas development for KOP 7 and similar views in the Project Area with existing oil and gas development operations.

Figure AES-O8 (Appendix G) shows existing and potential views for KOP 8 with operation activities for expanding oil and gas development in an agricultural area where there are some existing oil and gas facilities. The area within the view from KOP 8 is of Tier 2 lands. This KOP is representative of similar agricultural areas in the Project Area where operation activities for oil and gas development may occur with some existing oil and gas development in the view. The existing oil and gas facilities in the view are partially screened, blend somewhat with other structures in the background, and, though noticeable, are not dominant elements in the view. Intactness and unity are moderately high and vividness is low for the existing views for this KOP. Operation activities would introduce new well pads with wells of varying types and sizes, new access roads, large storage tanks and ancillary facilities, power poles, equipment and equipment storage areas, aboveground collection and distribution pipes, vehicles, and occasional dust in immediate foreground and foreground views. These operation activities would introduce new, dominant, and highly noticeable elements in foreground views that would substantially reduce the intactness and unity of a predominately agricultural area with some oil and gas facilities present. Although visual sensitivity is low because most viewers are traveling for work or working in the area, views of agricultural lands in the County are considered an important attribute of the County's visual character and quality. Introducing new elements of operation activities in foreground views of the predominantly agricultural area would degrade the visual character and quality of the site and its surroundings. For these reasons, aesthetic impacts would be significant for operation activities for oil and gas development for KOP 8 and similar views of predominantly agricultural lands in the Project Area.

### Western Subarea

Figure AES-O6 (Appendix G) shows existing and potential views for KOP 6 with operation activities for expanding oil and gas development in an agricultural area where existing oil and gas facilities are either not present or so distant that they are not noticeable. The area within the view from KOP 6 is of Tier 2 lands. This KOP is representative of similar areas in the Project Area where operation activities for oil and gas development may occur without existing oil and gas development noticeable in the view. Intactness, unity, and vividness are high or moderately high for the existing view for this KOP. Operation activities would introduce new well pads with wells of varying types and sizes, new access roads, power poles, equipment and equipment storage areas, aboveground collection and distribution pipes, and occasional vehicles and dust in views with high visual sensitivity. These activities would introduce new forms and lines that would be noticeable in middleground views for sensitive viewers visiting the preserve and reduce intactness, unity, and vividness in an area that currently is not developed for oil and gas. For these reasons, aesthetic impacts would be significant for operation activities for oil and gas development for KOP 6 and similar views without existing oil and gas development operations in the Project Area.

Figure AES-O9 (Appendix G) shows existing and potential views for KOP 9 with operation activities for expanding oil and gas development in an agricultural grazing area with some existing oil and gas facilities present. The area within the view from KOP 9 is of Tier 1 and Tier 2 lands. This KOP is representative of similar agricultural areas in the Project Area where operation activities for oil and gas development may occur with some existing oil and gas development in the view. The existing oil and gas facilities in the view are somewhat distant, and, though noticeable, are not dominant elements in the view. Intactness and unity are moderately high and vividness is moderate for the existing view for this KOP. Operation activities would introduce new well pads with wells of varying types and sizes, new access roads, large storage tanks and ancillary facilities, power poles, equipment and equipment storage areas, aboveground collection and distribution pipes, and occasional vehicles and dust in immediate foreground, foreground, and middleground views with high visual sensitivity. These operation activities would introduce new, dominant, and highly noticeable elements that would substantially reduce the intactness, unity, and vividness of a predominately agricultural grazing area with some oil and gas facilities present. For these reasons, aesthetic impacts would be significant for operation activities for oil and gas development for KOP 9 and similar views with some existing oil and gas development operations in the Project Area.

Figure AES-O10 (Appendix G) shows existing and potential views for KOP 10 with operation activities for expanding oil and gas development in an area with agricultural, recreation, and industrial uses land where existing oil and gas facilities are either not present or not noticeable. The area within the view from KOP 10 is of Tier 2 lands. This KOP is representative of similar areas in the Project Area where operation activities for oil and gas development may occur without existing oil and gas development noticeable in the view. Intactness and unity are moderately high and vividness is low for the existing view for this KOP. Although visual sensitivity is high and operation activities would introduce some new elements (e.g., power poles and wells of different types) in the view that would be noticeable, these elements would not be

dominant due to the presence of other more dominant vertical elements in the foreground of the view and these operation activities would not substantially reduce intactness, unity, or vividness in this view. For these reasons, aesthetic impacts would be less than significant for operation activities for oil and gas development for KOP 10 and similar views in the Project Area where existing oil and gas operations are not present or are not noticeable.

## Well Stimulation Impacts

Well stimulation entails enhancing oil or gas production for new wells or restoring or enhancing production for existing wells by increasing the permeability of the subsurface oil-bearing formation. Well stimulation processes primarily consist of hydraulic fracturing treatments and acid well stimulation treatments. Most often, well stimulation is part of the completion of a well when it is initially drilled, and the stimulation is included in the time estimates for initial well development described above. Occasionally, existing wells will be stimulated, in which case, generally, no additional ground disturbance (i.e., clearing or grading to expand well pads or access roads) is required for these treatments. Equipment used for these treatments varies somewhat from that used for construction, but is generally similar in size and appearance. For example, production rigs, which are sometimes used for well stimulation, may be up to about 90 feet in height, while mobile drilling rigs used during the construction phase for well drilling may be up to about 120 feet in height. Well stimulation may also involve more vehicles and equipment at a particular well site than during construction. Equipment used for hydraulic fracturing may include mobile water tanks, truck-mounted blending units, sand storage trailers, truck-mounted pumps, generators, control vans, other vehicles, pipes, hoses, and other equipment. Up to 20 truck-mounted pumps may be present at a well site for a large operation. Acid well stimulation treatments may require a similar amount of equipment and numbers of vehicles, although the types of equipment and vehicles may vary.

Because the equipment, vehicles, and materials used for well stimulation operations would appear similar to those used for construction and drilling activities and would be in place onsite for a short time period (i.e., several days to several weeks), changes in intactness, unity, or vividness in the views from KOPs 1 through 10 would be similar to those described for construction and drilling. For these reasons, aesthetic impacts during well stimulation operations are considered similar to aesthetic impacts for construction of oil and gas development facilities.

## Decommissioning/Abandonment Impacts

Well decommissioning and abandonment entails plugging and abandoning wells once they are no longer productive. Decommissioning is also performed for tanks, valve stations, pipes, sumps, cathodic protections systems, and other ancillary facilities associated with oil and gas production. Well decommissioning and abandonment involves removal, disassembly, and salvage or disposal of pumping units, well cellars, pipelines, and associated infrastructure; plugging the well with concrete and steel plates; and restoration of the well pad. Decommissioning and abandonment of other facilities involves similar removal, disassembly, salvage or disposal of equipment, and site restoration. Equipment used for decommissioning and abandonment varies somewhat from that used for construction, but is generally similar in size and appearance. Typical equipment used

onsite for decommissioning and abandonment may include bulldozers, motor graders, front end loaders, cement and dump trucks, and well workover rigs. Although the work is usually restricted to the existing well pad or facility site, occasionally it requires temporary expansion beyond the existing disturbed area of the well pad or facility site to accommodate equipment.

Because the equipment, vehicles, and materials used for decommissioning and abandonment would appear similar to those used for construction and generally would be in place onsite for a short time period (i.e., several days to several weeks), changes in intactness, unity, or vividness in the views from KOPs 1 through 10 would be similar to those described for construction. For these reasons, aesthetic impacts during decommissioning and abandonment are considered similar to aesthetic impacts during construction of oil and gas development facilities. After the completion of equipment and site restoration, the long-term effect on visual resources would be beneficial.

### Summary of Project Aesthetic Impacts

While the aesthetic impacts of most single wells or associated facilities could be mitigated, the annual addition of as many as approximately 2,700 wells and the associated ancillary facilities could change the landscape in Kern County. Although most future oil and gas activities would occur in Tier 1 and Tier 2, and more than 2,000 wells could also be removed annually from these areas, there is the potential that areas that are currently primarily agricultural or open space and that have a predominantly rural or natural aesthetic character could be converted to a predominantly industrial developed character with the addition of large numbers of highly visible and noticeable construction and exploratory equipment, materials, vehicles, and construction activities including well stimulation, and decommissioning/abandonment. While less visible, visible facilities during routine operations including well pads, pumping facilities, storage tanks, access roads, and ancillary facilities could also intensify in these areas. The addition of large amounts of new industrial elements in areas where they currently do not occur or are a minor element in the landscape could substantially reduce the intactness, unity, and vividness of existing views of the landscape throughout the Project Area. Accordingly, the overall aesthetic effects of oil and gas development for this Project could be significant.

## Mitigation Measures

**MM 4.1-1** The Applicant shall use existing roads whenever possible. If use of existing roads is not feasible, construction of new roads should be routed to minimize the amount of disturbance without impeding existing surface use.

**MM 4.1-2** All derricks, boilers, and other drilling equipment used to drill, repair, clean out, deepen or redrill any well with oil, gas, or other hydrocarbon shall be removed from the drill site within 90 days after completion of production tests or after abandonment of any well. Earthen sumps used in drilling shall be filled within 90 days after any well has been placed in production (unless such sumps are to be used within six months for the drilling of another well), and any sump used in productions shall be filled after its abandonment and restored to a uniform grade within ninety days.

**MM 4.1-3** Sumps and ponds shall be permitted only to the extent authorized by the Central Valley Regional Water Quality Control Board (via waiver, Waste Discharge Requirements, or other form of authorized written documentation) and shall comply with all applicable legal requirements and mitigation measures for sumps serving as storage, percolation or evaporation ponds for produced water.

**MM 4.1-4** Oil or gas tanks located within 200 feet of any sensitive receptor shall be partially screened from public view by shrubs, trees or solid screen fencing. Similarly, pump sites (including multiple well pump sites) within 500 feet of any dwelling must be surrounded by a fence, at least 6 feet in height, constructed of dark-colored chain-link with wood or metal slates, dark green or brown fabric material, or other more visually restrictive fencing material. The height of all pumping units shall not exceed 80 feet, and shall be painted in accordance with the Kern County Zoning Ordinance.

**MM 4.1-5** Project signage is limited to directional, warning, safety, security and identification signs in connection with oil, gas, or other hydrocarbon drilling and development operations in accordance with Chapter 19.84.135 of the Kern County Zoning Ordinance. For any signage necessary for wayfinding, safety, or security, the Applicant shall use the minimum necessary to adequately communicate the required information.

### Level of Significance After Mitigation

With mitigation, impacts would be reduced; however, since some oil and gas activities would continue to produce visible changes to the existing environment, aesthetic impacts would remain significant and unavoidable after mitigation.

## Impact 4.1-4: Create a New Source of Substantial Light or Glare That Would Adversely Affect Day or Nighttime Views in the Area

Sources of light and glare may be short-term or long-term. Short-term lighting is most often associated with temporary activities occurring during nighttime hours, such as providing safety, security, or temporary visibility for construction, farming, processing, or similar intermittent or temporary activities. Short-term glare may occur from temporary facilities supporting construction or other activities, such as areas for storage of materials or equipment, construction staging areas, and vehicle parking areas. Long-term sources of light or glare are most often associated with providing safety, security, or visibility for established development and operations. Impacts resulting from introducing new sources of substantial light or glare into the landscape were assessed. Because of the high number of variables, light and glare are not measured quantitatively but, instead, are assessed qualitatively in this visual assessment.

Impacts on aesthetic resources due to construction, operation, well stimulation, or decommissioning/abandonment of oil and gas development facilities would result from activities

that create a new source of substantial light or glare that would adversely affect day or nighttime views in the vicinity of the activities. Currently, outdoor lighting associated with oil and gas development facilities is exempt from the County's regulations for promoting light intensity and glare and reducing light spillover and upward projection of light. Introducing new sources of substantial light or glare where it may affect viewers with high visual sensitivity (i.e., people with high interest and concern for the visual quality of the landscape and changes to it, such as residents from the vicinity of their homes or people engaging in recreation or leisure activities) is of particular concern. However, due to the County's interest in protecting views of the night sky, promoting energy conservation and a reduction in the generation of greenhouse gases by reducing excessive or unwanted outdoor lighting, and encouraging a less light-oriented nighttime environment, introducing new sources of substantial light and glare is of concern for all viewers throughout all Tiers and Subareas during all phases of oil and gas development.

## Construction Impacts

Aesthetic impacts of introducing new sources of substantial light and glare may result from any of the various activities described for construction impacts under Impact 4.1-3, described above. Most construction activities would primarily occur during daytime hours. Construction activities that are likely to occur at night and require artificial illumination would include drilling activities, vehicle and equipment activities supporting drilling, and safety and security lighting for areas such as construction yards, work areas, vehicle and equipment parking areas, and staging and laydown areas. The primary purposes of nighttime lighting would be to protect the safety of the construction workers and the security of equipment, materials, and vehicles. Once drilling operations begin, they typically run continuously, 24 hours a day, due to the complexity of drilling and the hazards associated with leaving a well unattended during the drilling process. The length of time required for drilling, and thus the time that drilling operations would require nighttime lighting, would vary depending on the depth of the well being drilled. Drilling may require from less than 24 hours up to 60 days, depending on the depth of the formation. Average well depths are similar in the Western and Eastern Subareas and substantially deeper in the Central Subarea. Thus, nighttime operations are more likely to occur over longer periods in the Central Subarea than in the Western and Eastern Subareas.

Construction activities generally occur during daytime hours, and may generate glare from construction equipment, materials, and vehicles. Impacts from glare would be dependent upon the location of the sun and orientation of the construction equipment and vehicles relative to viewers. Substantial glare would primarily result from reflectance of sunlight off of glass, polished metal surfaces, and smooth or light-colored finishes on construction vehicles, equipment, and materials.

Figures AES-C1 – AES-C10 (Appendix G) show views of construction activities for KOPs 1-10 that would include drilling rigs, grading activities, trailers, vehicles, laydown areas, and other work areas that may introduce new sources of substantial light and glare that would adversely affect day or nighttime views in the vicinity of the activities. For each of these KOPs, the greatest sources of glare during construction would be from light-colored vehicles and equipment such as those visible in the vicinity of each of the drilling rigs in the views. The greatest sources of new

lighting would be associated with drilling rigs and safety and security lighting for various facilities.

### Eastern Subarea

Figures AES-C1 and AES-C2 (Appendix G) show existing and potential views for KOPs 1 and 2 with construction activities for expanding oil and gas development in the area north of Panorama Park in north Bakersfield where there is extensive existing oil and gas development. With the exception of the immediate foreground that includes the river, the area within the view from these KOPs is of Tier 1 lands. These KOPs are representative of other views in the Project Area where there is existing extensive oil and gas development. Because of the extensive existing oil and gas development with numerous glare-producing elements in KOP 1 (Appendix G, Figure AES-C1), the addition of new elements during construction would not introduce new sources of substantial glare in the view. Figure AES-C2 (Appendix G) shows nighttime views of existing and potential conditions for KOP 2 with construction activities for expanding oil and gas development for the same location as KOP 1. Because of the numerous and varied lights throughout this view, the addition of new lighting during construction would not create a new source of substantial light or glare that would adversely affect day or nighttime views in the vicinity of the activities. For these reasons, aesthetic impacts of creating a new source of substantial light or glare that would adversely affect day or nighttime views in the area for construction activities for oil and gas development for KOPs 1 and 2 would be less than significant.

Figure AES-C3 (Appendix G) shows existing and potential views for KOP 3 with construction activities for expanding oil and gas development in an agricultural area where there are some existing oil and gas facilities. The area within the view from KOP 3 is of Tier 2 lands. This KOP is representative of similar agricultural areas in the Project Area where construction activities for oil and gas development may occur with some existing oil and gas development in the view. For this KOP, the primary sources of light and glare during construction would be associated with nighttime lighting of drilling rigs and safety and security lighting for construction yards, work areas, vehicle and equipment parking areas, and staging and laydown areas. Because existing facilities in the area would be lighted at night, the addition of new, temporary lighting for construction would not introduce a new source of substantial light and glare for construction facilities. For these reasons, aesthetic impacts of creating a new source of substantial light or glare that would adversely affect day or nighttime views in the area for construction activities for oil and gas development for KOP 3 would be less than significant.

Figure AES-C4 (Appendix G) shows existing and potential views for KOP 4 with construction activities for expanding oil and gas development in an agricultural area where existing oil and gas facilities are either not present or so distant that they are not noticeable. The area within the view from KOP 4 is of Tier 2 lands. This KOP is representative of similar areas in the Project Area where construction activities for oil and gas development may occur without existing oil and gas development noticeable in the view. For this KOP, the primary sources of light and glare during construction would be associated with nighttime lighting of drilling rigs and safety and security lighting for construction yards, work areas, vehicle and equipment parking areas, and staging and laydown areas. Because there are very few existing facilities in the area that would be lighted at

night, the addition of new, temporary lighting for tall drilling rigs would introduce a new source of substantial light and glare during construction. For these reasons, aesthetic impacts of creating a new source of substantial light or glare that would adversely affect day or nighttime views in the area for construction activities for oil and gas development for KOP 4 would be significant.

Figure AES-C5 (Appendix G) shows existing and potential views for KOP 5 with construction activities occurring in an area that does not contain existing oil and gas operation activities. The area within the view from this KOP is a mix of Tier 3 and Tier 4 lands, with Tier 1 land immediately to the north. This KOP is representative of similar areas in the Project Area where construction activities for oil and gas development may occur without existing oil and gas development in the view. For this KOP, the primary sources of light and glare during construction would be associated with nighttime lighting of drilling rigs and safety and security lighting for construction yards, work areas, vehicle and equipment parking areas, and staging and laydown areas. Because there are very few existing facilities in the area that would be lighted at night, the addition of new, temporary lighting for tall drilling rigs would introduce a new source of substantial light and glare during construction. For these reasons, aesthetic impacts of creating a new source of substantial light or glare that would adversely affect day or nighttime views in the area for construction activities for oil and gas development for KOP 5 would be significant in the Tier 3 and Tier 4 areas.

### Central Subarea

Figure AES-C7 (Appendix G) shows existing and potential views for KOP 7 with construction activities for expanding oil and gas development in a residential area where there are some existing oil and gas facilities. The view for KOP 7 is of Tier 4 land. This KOP is representative of similar areas in the Project Area where construction activities for oil and gas development may occur in close proximity to residences with some existing oil and gas development in the view. For this KOP, the primary sources of light and glare during construction would be associated with nighttime lighting of drilling rigs and safety and security lighting. Because there are no other tall, brightly-lit elements in the vicinity and there are residences in close proximity, the addition of new, temporary lighting for the tall drilling rig and safety and security lighting would introduce a new source of light and glare that would be substantial during construction. For these reasons, aesthetic impacts of creating a new source of substantial light or glare that would adversely affect day or nighttime views in the area for construction activities for oil and gas development for KOP 7 would be significant.

Figure AES-C8 (Appendix G) shows existing and potential views for KOP 8 with construction activities for expanding oil and gas development in an agricultural area where there are some existing oil and gas facilities. The area within the view from KOP 8 is of Tier 2 lands. This KOP is representative of similar agricultural areas in the Project Area where construction activities for oil and gas development may occur with some existing oil and gas development in the view. For this KOP, the primary sources of light and glare during construction would be associated with nighttime lighting of drilling rigs and safety and security lighting for construction yards, work areas, vehicle and equipment parking areas, and staging and laydown areas. Because there are few existing facilities in the area that would be brightly lighted at night, the addition of new,

temporary lighting for tall drilling rigs would introduce a new source of substantial light and glare during construction. In addition, this KOP is within the Central Subarea where wells are likely to be relatively deep, drilling periods may last for a long period of time, and drilling rigs would be brightly lighted continuously during drilling periods. For these reasons, aesthetic impacts of creating a new source of substantial light or glare that would adversely affect day or nighttime views in the area for construction activities for oil and gas development for KOP 8 would be significant.

### Western Subarea

Figure AES-C6 (Appendix G) shows existing and potential views for KOP 6 with construction activities for expanding oil and gas development in an agricultural area where existing oil and gas facilities are either not present or so distant that they are not noticeable. The area within the view from KOP 6 is of Tier 2 lands. This KOP is representative of similar areas in the Project Area where construction activities for oil and gas development may occur without existing oil and gas development noticeable in the view. For this KOP, the primary sources of light and glare during construction would be associated with nighttime lighting of drilling rigs and safety and security lighting for construction yards, work areas, vehicle and equipment parking areas, and staging and laydown areas. Because there are very few existing facilities in the area that would be lighted at night, the addition of new, temporary lighting for tall drilling rigs would introduce a new source of substantial light and glare during construction. However, views from this KOP primarily would be by sensitive viewers visiting the preserve during daylight hours and very few people would have nighttime views of drilling rigs or other construction facilities from this location. For these reasons, aesthetic impacts of creating a new source of substantial light or glare that would adversely affect day or nighttime views in the area for construction activities for oil and gas development for KOP 6 would be less than significant.

Figure AES-C9 (Appendix G) shows existing and potential views for KOP 9 with construction activities for expanding oil and gas development in an agricultural grazing area with some existing oil and gas facilities present. The area within the view from KOP 9 is of Tier 1 and Tier 2 lands. This KOP is representative of similar agricultural areas in the Project Area where construction activities for oil and gas development may occur with some existing oil and gas development in the view. For this KOP, the primary sources of light and glare during construction would be associated with nighttime lighting of drilling rigs and safety and security lighting for construction yards, work areas, vehicle and equipment parking areas, and staging and laydown areas. Because there are very few existing facilities in the area that would be lighted at night, the addition of new, temporary bright lighting for tall drilling rigs would introduce a new source of substantial light and glare during construction. For these reasons, aesthetic impacts of creating a new source of substantial light or glare that would adversely affect day or nighttime views in the area for construction activities for oil and gas development for KOP 9 would be significant.

Figure AES-C10 (Appendix G) shows existing and potential views for KOP 10 with construction activities for expanding oil and gas development in an area with agricultural, recreation, and industrial uses land where existing oil and gas facilities are either not present or not noticeable. The area within the view from KOP 10 is of Tier 2 lands. This KOP is representative of similar

areas in the Project Area where construction activities for oil and gas development may occur without existing oil and gas development noticeable in the view. For this KOP, the primary sources of light and glare during construction would be associated with nighttime lighting of drilling rigs and safety and security lighting for construction yards, work areas, vehicle and equipment parking areas, and staging and laydown areas. Because existing facilities in the area would be lighted at night, the addition of new, temporary lighting for construction would not introduce a new source of substantial light and glare for construction facilities. For these reasons, aesthetic impacts of creating a new source of substantial light or glare that would adversely affect day or nighttime views in the area for construction activities for oil and gas development for KOP 10 would be less than significant.

## Operation Impacts

Aesthetic impacts of introducing new sources of substantial light and glare may result from any of the various activities and elements described for operation impacts under Impact 4.1-3, discussed above. Operation activities and elements that are likely to create new sources of substantial light that would adversely affect nighttime views in the area include nighttime safety and security lighting of storage tank facilities and nighttime flaring of natural gas as a byproduct of production. Flaring would be intermittent and only occur for limited periods in a few locations. Typically, pumping units would not have nighttime lighting during operation except during brief periods of maintenance. Safety and security lighting reflecting off the surfaces of large or tall storage tanks or other facilities, tall light standards with exposed bulbs, or light sources that cast light widely or upward may be visible across a broad area. Where new lighted facilities are sited near other existing similarly lighted facilities of other structures, aesthetic impacts may be less severe than when they are located in areas with few existing light sources.

Operation activities or elements that are likely to create new sources of substantial glare that would adversely affect daytime views in the area include elements such as pipes, pumping units, tanks, and other facilities with polished metal surfaces or smooth or light-colored finishes. Impacts from glare would primarily result from reflectance of sunlight off of highly reflective surfaces and be dependent upon the location of the sun and orientation of the operation elements relative to viewers. Aesthetic impacts due to substantial glare during operation of oil and gas development facilities are most likely to occur in areas that have very few or no noticeable existing oil and gas or other facilities in the area.

Figures AES-O1 through AES-O10 (Appendix G) show existing and potential views of operation activities and elements for KOPs 1 to 10, including pumping units, storage tanks, pipes, and other facilities, that may introduce new sources of substantial light or glare that would adversely affect day or nighttime views in the vicinity of the activities. For each of these KOPs, the greatest sources of new light during operation would be associated with safety and security lighting for various facilities and the greatest sources of glare during operation would be from light-colored and polished metal finishes on pipes, tanks, and pumping units.

### Eastern Subarea

Figures AES-O1 and AES-O2 (Appendix G) show existing and potential views for KOPs 1 and 2 with operation activities for expanding oil and gas development in the area north of Panorama Park in north Bakersfield where there is extensive existing oil and gas development. With the exception of the immediate foreground that includes the river, the area within the view from this KOP is of Tier 1 lands. This KOP is representative of other views in the Project Area where there is existing extensive oil and gas development. Because of the extensive existing oil and gas development with numerous glare-producing elements in KOP 1 (Appendix G, Figure AES-O1), the addition of new elements, such as large light-colored tanks, during operation will not introduce new sources of substantial glare in the view. Figure AES-O2 (Appendix G) shows nighttime views of existing and potential conditions for KOP 2 with operation activities for expanding oil and gas development for the same location as KOP 1. Because of the numerous and varied lights throughout this view, the addition of new lighting during operation would not create a new source of substantial light in the area. For these reasons, aesthetic impacts of creating a new source of substantial light or glare that would adversely affect day or nighttime views in the area for operation activities for oil and gas development for KOPs 1 and 2 would be less than significant.

Figure AES-O3 (Appendix G) shows existing and potential views for KOP 3 with operation activities for expanding oil and gas development in an agricultural area where there are some existing oil and gas facilities. The area within the view from KOP 3 is of Tier 2 lands. This KOP is representative of similar agricultural areas in the Project Area where operation activities for oil and gas development may occur with some existing oil and gas development in the view. For this KOP, the primary sources of light and glare during construction would be associated with nighttime safety and security lighting for the large storage tanks. Because existing storage tank facilities in the area would be lighted at night, the new storage tanks and the addition of new lighting for these facilities would not introduce a new source of substantial light or glare in the area. For these reasons, aesthetic impacts of creating a new source of substantial light or glare that would adversely affect day or nighttime views in the area for operation activities for oil and gas development for KOP 3 would be less than significant.

Figure AES-O4 (Appendix G) shows existing and potential views for KOP 4 with operation activities for expanding oil and gas development in an agricultural area where existing oil and gas facilities are either not present or so distant that they are not noticeable. The area within the view from KOP 4 is of Tier 2 lands. This KOP is representative of similar areas in the Project Area where operation activities for oil and gas development may occur without existing oil and gas development noticeable in the view. Because the new elements in the view would not be noticeable due to their distance and these elements would not be brightly lighted during operation, aesthetic impacts of creating a new source of substantial light or glare that would adversely affect day or nighttime views in the area for operation activities for oil and gas development for KOP 4 would be less than significant.

Figure AES-O5 (Appendix G) shows existing and potential views for KOP 5 with operation activities occurring in an area that does not contain existing oil and gas operation activities. The

area within the view from this KOP is a mix of Tier 3 and Tier 4 lands, with Tier 1 land immediately to the north. This KOP is representative of similar areas in the Project Area where operation activities for oil and gas development may occur without existing oil and gas development in the view. For this KOP, the primary sources of glare during operation would be light-colored tanks, metal pipes with highly reflective surfaces, galvanized poles and fences, and metallic-colored pumping units. The primary sources of light during operation would be nighttime safety and security lighting for the storage tanks associated. Because there are very few existing facilities in the area that would produce glare or be lighted at night, the addition of the tanks and other glare-producing facilities and the lighting for the tanks would introduce new sources of substantial light and glare during operation. For these reasons, aesthetic impacts of creating a new source of substantial light or glare that would adversely affect day or nighttime views in the area for operation activities for oil and gas development for KOP 5 could be significant.

## Central Subarea

Figure AES-O7 (Appendix G) shows existing and potential views for KOP 7 with operation activities for expanding oil and gas development in a residential area where there are some existing oil and gas facilities. The view for KOP 7 is of Tier 4 land. This KOP is representative of similar areas in the Project Area where operation activities for oil and gas development may occur in close proximity to residences with some existing oil and gas development in the view. Because the drilling unit would be partially screened it is unlikely to produce substantial glare and there would not be any continuous nighttime lighting during operation of this facility. Although the galvanized finish on the chain link screening fence would produce some glare, it would not be substantial. For these reasons, aesthetic impacts of creating a new source of substantial light or glare that would adversely affect day or nighttime views in the area for operation activities for oil and gas development for KOP 7 would be less than significant.

Figure AES-O8 (Appendix G) shows existing and potential views for KOP 8 with operation activities for expanding oil and gas development in an agricultural area where there are some existing oil and gas facilities. The area within the view from KOP 8 is of Tier 2 lands. This KOP is representative of similar agricultural areas in the Project Area where operation activities for oil and gas development may occur with some existing oil and gas development in the view. For this KOP, the primary sources of light during operation would be associated with nighttime safety and security lighting for the storage tanks. Because there are few existing facilities in the area that would be brightly lighted at night, the addition of new lighting for the storage tanks would introduce a new source of substantial light during operation. In addition, the light-colored tanks and reflective finishes of metal pipes and some elements of the pumping units would produce new sources of glare. For these reasons, aesthetic impacts of creating a new source of substantial light or glare that would adversely affect day or nighttime views in the area for operation activities for oil and gas development for KOP 8 could be significant.

### Western Subarea

Figure AES-O6 (Appendix G) shows existing and potential views for KOP 6 with operation activities for expanding oil and gas development in an agricultural area where existing oil and gas facilities are either not present or so distant that they are not noticeable. The area within the view from KOP 6 is of Tier 2 lands. This KOP is representative of similar areas in the Project Area where operation activities for oil and gas development may occur without existing oil and gas development noticeable in the view. Because the new elements in the view would not typically be lighted during operation and sources of glare would be minimal due to the distance of the facilities from this KOP, aesthetic impacts of creating a new source of substantial light or glare that would adversely affect day or nighttime views in the area for operation activities for oil and gas development for KOP 6 would be less than significant.

Figure AES-O9 shows existing and potential views for KOP 9 with operation activities for expanding oil and gas development in an agricultural grazing area with some existing oil and gas facilities present. The area within the view from KOP 9 is of Tier 1 and Tier 2 lands. This KOP is representative of similar agricultural areas in the Project Area where operation activities for oil and gas development may occur with some existing oil and gas development in the view. The oil and gas facilities in the existing view are somewhat distant and would not be substantial sources of light or glare. For this KOP, the primary sources of light during operation would be associated with nighttime safety and security lighting for the storage tanks. Because there are few existing facilities in the area that would be brightly lighted at night, the addition of new lighting for the storage tanks would introduce a new source of substantial light during operation. In addition, the light-colored tanks and reflective finishes of metal pipes and some elements of the pumping units would produce new sources of glare. For these reasons, aesthetic impacts of creating a new source of substantial light or glare that would adversely affect day or nighttime views in the area for operation activities for oil and gas development for KOP 9 would be significant within Tier 2 lands.

Figure AES-O10 (Appendix G) shows existing and potential views for KOP 10 with operation activities for expanding oil and gas development in an area with agricultural, recreation, and industrial uses land where existing oil and gas facilities are either not present or not noticeable. The area within the view from KOP 10 is of Tier 2 lands. This KOP is representative of similar areas in the Project Area where operation activities for oil and gas development may occur without existing oil and gas development noticeable in the view. Because the new elements in the view typically would not be lighted during operation and sources of glare would be minimal, aesthetic impacts of creating a new source of substantial light or glare that would adversely affect day or nighttime views in the area for operation activities for oil and gas development for KOP 10 would be less than significant.

## Well Stimulation Impacts

Because the equipment, vehicles, and materials used for well stimulation would appear similar to those used for construction and drilling, the new sources of substantial light and glare in the views from KOPs 1 through 10 would be temporary and similar to those described for

construction. For these reasons, aesthetic impacts of creating a new source of substantial light or glare that would adversely affect day or nighttime views in the area for oil and gas development during well stimulation are considered similar to aesthetic impacts for construction of oil and gas development facilities.

### Decommissioning/Abandonment Impacts

Because the equipment, vehicles, and materials used for decommissioning and abandonment would appear similar to those used for construction, the new sources of substantial light and glare in the views from KOPs 1 through 10 would be similar to those described for construction. For these reasons, aesthetic impacts of creating a new source of substantial light or glare that would adversely affect day or nighttime views in the area for oil and gas development during decommissioning and abandonment are considered similar to aesthetic impacts for construction of oil and gas development facilities.

### Mitigation Measures

**MM 4.1.6** Permanent nighttime lighting that will be installed for facilities operations will only be lighting required for safety or security. During operations when the lighting is in use, lighting for safety and security will be shielded and oriented downward, bare bulbs will be fully screened from view from sensitive viewing receptors such as residences, and on-demand lighting and/or timers will be used to minimize visual impacts of lighting. In doing so, the Applicant shall comply with the standards in the amended Chapter 19.81 – Outdoor Lighting "Dark Sky Ordinance."

### Level of Significance After Mitigation

Impacts would be significant and unavoidable.

## 4.1.5 Cumulative Setting, Impacts, and Mitigation Measures

## Cumulative Setting

The geographic scope for cumulative impacts to aesthetic and visual resources includes the area within 6 miles of the external Project Area, as well as areas (e.g., incorporated cities) within the overall Project Area. While projects in a larger area may affect some of the same aesthetic impacts as the Project, by focusing on reasonably foreseeable implementation of land use plan implementation activities that may occur in and within 6 miles of the Project Area, the analysis of cumulative impacts includes those aesthetic resources that are also impacted by the Project.

### Impact 4.1-5: Contribute to Cumulative Aesthetic Impacts

The plans evaluated in this cumulative analysis are described in Section 3.7, Cumulative Plans and Projections. Implementation of these plans, and any projects undertaken pursuant to these plans would be required to comply with the goals, policies, and implementation measures of

applicable federal and local laws and land use standards imposed by the respective jurisdictions within with each related project is located. This includes the possibility of being required to undergo environmental review, in compliance with the requirements of the CEQA and/or the National Environmental Policy Act. Should potential impacts to public services be identified, appropriate mitigation would be prescribed.

Kern County is a growing community, and the cities within Kern County are likewise planning for continued growth. While the Project will continue to allow, with more stringent mitigation measures as well as expanded substantive and procedural Ordinance mandates, the County's 100+-year industry of oil and gas production activities, this industry does have a visible presence on the landscape and, in combination with the implementation of other reasonably foreseeable plans, will continue to result in visible changes within Kern County. Visible changes to the landscape will occur even with implementation of the mitigation measures and other goals, policies, implementation policies, and mitigation measures for these other General Plans and regional plans, and some may view these visual changes as adverse aesthetic impacts.

Accordingly, cumulative impacts to aesthetic impacts are considered significant, and the Project's incremental contribution to this cumulative impact is considered cumulatively considerable.

## Mitigation Measures

Implement MM 4.1.1 through 4.1.6, as described above. No additional feasible mitigation measures exist to avoid or reduce significant adverse cumulative impacts to aesthetics to a less than significant level.

## Level of Significance After Mitigation

Impacts would be significant and unavoidable.

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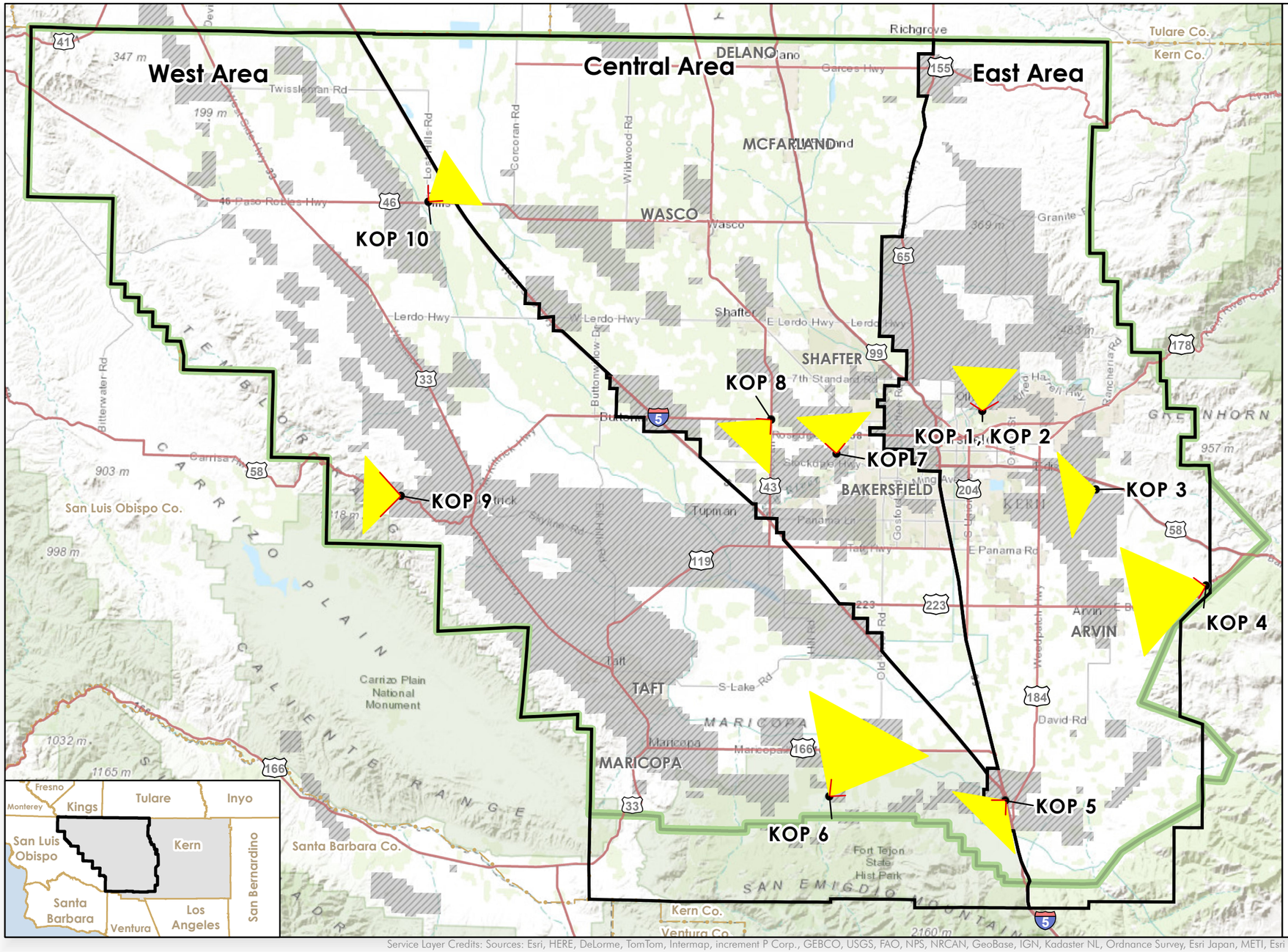


Legend

- County Boundary
- Highways
- Valley Floor HCP
- Zoning Amendment Project Area and Sub Areas (Jan 2015)
- Oil and Gas Field Administrative Boundaries
- Photo Location and Viewcone (approximate)

| KOP No. | Location | View Orientation (average compass reading for panorama) |
|---|---|---|
| KOP 1 | Panorama Park, Bakersfield | N (350$^0$) |
| KOP 2 | Panorama Park, Bakersfield, Night | N (350$^0$) |
| KOP 3 | Comanche Rd., south of SR 58 | W (246$^0$) |
| KOP 4 | Hwy 223, east of Arvin | W (260$^0$) |
| KOP 5 | SR 99 and I-5 junction, west side of SR 99 | SW (220$^0$) |
| KOP 6 | Wind Wolves Preserve – Spring Wildflowers Trailhead (south of SR 166) | NE (50$^0$) |
| KOP 7 | Sunnybank Ave., west of Renfro Rd. | N (350$^0$) |
| KOP 8 | SR 58 (Lokern Rd.) at SR 43 (Enos Rd.) intersection | SW (220$^0$) |
| KOP 9 | SR 58 west of McKittrick | W (270$^0$) |
| KOP 10 | Lost Hills County Park | NE (50$^0$) |

Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
Data Sources: ESRI 2010, esps.kerndsa.com; California Dept of Conservation, Division of Oil, Gas and Geothermal Resources, 2010

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Miles

Figure 4.1-1

Photo Locations




View looking north from Panorama Park in north Bakersfield toward the existing oil and gas development fields. This KOP represe nts day-time views for park visitors.




Night-time view looking north from Panorama Park in north Bakersfield toward the existing oil and gas development fields. This KOP represents night-time views for park visitors.

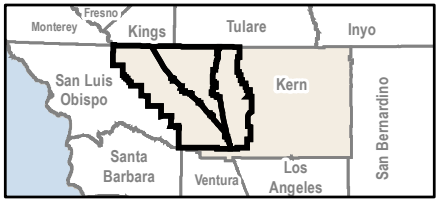


Figure 4.1-2
Existing Views for KOP 1 and KOP 2

Photo Locations




View looking west from Comanche Road south of SR 58 in the eastern part of the Project Boundary Area. This KOP represents typi cal views of agricultural lands with some scattered oil and gas facilities.




View looking west from an overlook along Highway 223 east of the community of Arvin in the eastern portion of the Project Boundary Area. This KOP represents views for motorists and others traveling westbound on Highway 223 and descending into the San Joaquin Valley through the foothills of the southern Sierra Nevada.

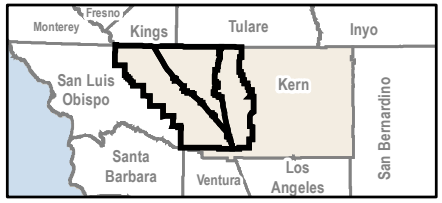


Figure 4.1-3
Existing Views for KOP 3 and KOP 4

Photo Locations




View looking southwest near the junction of SR 99 and I-5 in the southern portion of the Project Boundary Area. This KOP is lo cated on a frontage road adjacent to and just west of SR 99 and represents views for motorists and others travelling southbound on SR 99 and I-5.




View looking northeast from the Spring Wildflowers Trailhead in the Wind Wolves Preserve in the southern portion of the Proje ct Boundary Area. This KOP represents views across the southern San Joaquin Valley for visitors to the open space preserve.

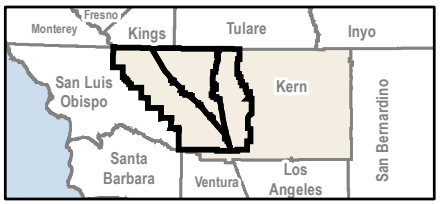


Figure 4.1-4
Existing Views for KOP 5 and KOP 6

Photo Locations




View looking north from Sunnybank Avenue, west of Renfro Road, in the central portion of the Project Boundary Area west of theCity of Bakersfield. This KOP represents views within predominantly residential areas where oil and gas facilities occur in close proximity to residences.




View looking southwest from the intersection of SR 58 (Lokern Road) and SR 43 (Enos Road) in the central portion of the Proje ct Boundary Area west of the City of Bakersfield. This KOP represents typical views of agricultural lands with scattered rural residences and some oil and gas facilities.

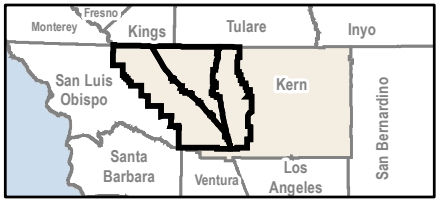


Figure 4.1-5
Existing Views for KOP 7 and KOP 8

Photo Locations




View looking west along SR 58 in the western portion of the Project Boundary Area. This KOP represents views for motorists and others travelling westbound on SR 58 toward the Carrizo Plain and Central Coast region in San Luis Obispo County.




View looking northeast from Lost Hills County Park near the edge of the small community of Lost Hills in the northwestern portion of the Project Boundary Area. This KOP represents typical views of open lands within this general area.

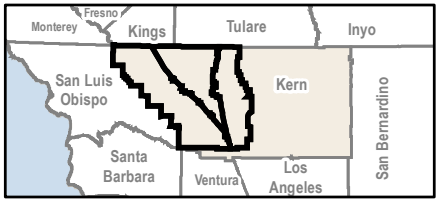


Figure 4.1-6
Existing Views for KOP 9 and KOP 10

Photo Locations

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Section 4.2

# Agricultural and Forest Resources

Section 4.2

# Agricultural and Forest Resources

## 4.2.1 Introduction

This section describes the affected environment and regulatory setting for agricultural and forestry resources. This section also describes the impacts to agricultural and forestry resources that would result from implementation of the Amendment to Chapter 19.98 (Oil and Gas Production) and related ordinance amendments to the Kern County Zoning Ordinance, and future development of oil and gas resources pursuant to the Amended Ordinance (Project), and mitigation measures that would reduce these impacts, if necessary.

This section is based on the Farmland Conversion Study California Environmental Quality Act (CEQA) Analysis prepared by Ecology and Environment, Inc., and presented in Appendix H of this Environmental Impact Report (EIR).

## 4.2.2 Environmental Setting

Kern County is California's third largest county, encompassing 8,202 square miles at the southern end of the Central Valley. The 3,700-square-mile Project Area is predominantly located in the western portion of the County in the San Joaquin Valley bounded by Kings and Tulare counties to the north, Santa Barbara and San Luis Obispo counties to the west, the Tehachapi Mountains and the Sierra Nevada Mountains to east, and the northern boundary of the Los Padres National Forest to the south.

## Regional

Kern County has a long history of agricultural operations and contains approximately 1,373 square miles of harvested agricultural land and 2,317 square miles of range land. Agriculture in Kern County makes a significant contribution to the economy of the state. According to the Kern County Agricultural Crop Report, in 2012, agriculture in Kern County accounted for a gross value of $6 billion (Table 4.2-1). According to the U.S. Department of Agriculture (USDA) 2012 Census of Agriculture, in Kern County in 2012, the average farm size was 1,202 acres (USDA 2012).

**Table 4.2-1: Agricultural Product Values for Kern County in 2012**

| Product | Total Value |
|---|---|
| Fruit and Nut Crops | $3,650,049,000 |
| Seed Crops | $7,742,000 |
| Field Crops | $539,370,000 |
| Vegetable Crops | $714,490,000 |

**Table 4.2-1: Agricultural Product Values for Kern County in 2012**

| Product | Total Value |
|---|---|
| Nursery Crops | $100,824,100 |
| Industrial and Wood Crops | $15,717,000 |
| Livestock and Poultry | $395,078,000 |
| Livestock and Poultry Products | $732,385,000 |
| Apiary Products | $56,707,000 |
| **TOTAL** | **$6,212,362,100** |

The top agricultural commodities in the County in 2012 were grapes, almonds, milk, citrus, and pistachios, which together had a gross value of more than $4 billion (Table 4.2-2). The majority of Kern County's agricultural production is located in the San Joaquin Valley within the Project Area.

**Table 4.2-2: Top Twenty Commodities and Value of Products Sold in Kern County, 2012**

| Rank | Commodity | Value |
|---|---|---|
| 1 | Grapes, All | $1,498,987,000 |
| 2 | Almonds, Including By-Products | $821,857,000 |
| 3 | Milk, Market & Manufacturing | $690,062,000 |
| 4 | Citrus, Fresh & Processing | $620,350,000 |
| 5 | Pistachios | $486,213,000 |
| 6 | Cattle & Calves | $382,913,000 |
| 7 | Carrots, Fresh & Processing | $350,439,000 |
| 8 | Hay, Alfalfa | $213,466,000 |
| 9 | Cotton, Including Processed Cottonseed | $147,637,000 |
| 10 | Potatoes, Fresh & Processing | $85,102,000 |
| 11 | Silage & Forage | $75,149,000 |
| 12 | Pomegranates, Fresh & Processing | $58,781,000 |
| 13 | Nursery, Fruit and Nut Trees & Vines | $57,555,000 |
| 14 | Apiary Products | $56,707,000 |
| 15 | Tomatoes, Fresh & Processing | $53,657,000 |
| 16 | Eggs & Egg Product | $40,343,000 |
| 17 | Bell Peppers, Fresh & Processing | $40,143,000 |
| 18 | Wheat | $35,294,000 |
| 19 | Nursery, Roses | $33,346,000 |

**Table 4.2-2: Top Twenty Commodities and Value of Products Sold in Kern County, 2012**

| Rank | Commodity | Value |
|---|---|---|
| 20 | Onions, Fresh & Dehydrated | $28,350,000 |

Table 4.2-3 displays a breakdown of crop types within the Project Area, grouped into general categories and by Subarea. In the Project Area, orchards and vineyards comprise the majority of general crop types (approximately 52%), followed by row crops (approximately 38%).

**Table 4.2-3: General Categories of Crop Types Within the Project Area, 2012**

| Crop Type | Western Subarea | Central Subarea | Eastern Subarea |
|---|---|---|---|
| Orchard/Vineyard | 50% | 59% | 48% |
| Pasture/Sod | <1% | <1% | 1% |
| Row Crops | 34% | 37% | 43% |
| Uncultivated | 16% | 4% | 8% |

# Local

The Project Area (shown on Figure 3-1) encompasses 2,362,734 acres and is generally bounded on the north and west by the Kern County line, on the south by the San Emigdio Mountains, and on the east by the Greenhorn Mountains. The Western Subarea extends from the western boundary of the County to Interstate 5; the Central Subarea lies between Interstate 5 and State Highway 99 north to Bakersfield and then generally following State Highway 65 to the northern county line (with some exceptions); the Eastern Subarea extends from this eastern boundary of the Central subarea to the foothills of the Greenhorn Mountains.

Zoning within the Project Area is a combination of: Exclusive Agriculture (A), Limited Agriculture (A-1); Estate (E), Low-Density Residential (R-1), Medium-Density Residential (R-2), High-Density Residential (R-3) Mobile home Park (MP); Commercial Office (CO), Neighborhood Commercial (C-1), General Commercial (C-2), Highway Commercial (CH); Light Industrial (M-1), Medium Industrial (M-2), Heavy Industrial (M-3), and Special Purpose Districts including Recreation-Forestry (RF), Open Space (OS), Natural Resource (NR), Drilling Island (DI), Floodplain Primary (FPP), Special Planning (SP) and Platted Lands (PL). Table 4.2-4 provides the number of acres of lands zoned as either A or A-1 in each subarea.

**Table 4.2-4: Acreages of Lands Zoned for Agricultural Use in the Project Area - (2014)**

| Zone | Western Subarea | Central Subarea | Eastern Subarea | Project Area Total |
|---|---|---|---|---|
| Exclusive Agriculture (A) | 954,885 | 556,520 | 480,923 | 1,992,327 |
| Limited Agriculture (A-1) | 105,364 | 8,144 | 27,552 | 141,060 |
| **TOTAL** | **1,060,248** | **564,664** | **508,475** | **2,133,387** |

According to the most recent report available from the California Department of Conservation (DOC 2012), in the Project Area, there are 582,856 acres of Prime Farmland, 210,957 acres of Farmland of Statewide Importance, and 86,512 acres of Unique Farmland as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program (FMMP) of the California Resources Agency (Table 4.2-5). Figure 4.2-1 depicts the FMMP mapping categories within the Project Area and Subareas.

**Table 4.2-5: Acreages of FMMP Agricultural Land in the Project Area**

| FMMP Mapping Category | Western Subarea | Central Subarea | Eastern Subarea | Project Area Total |
|---|---|---|---|---|
| Prime Farmland | 188,558 | 286,511 | 107,786 | 582,856 |
| Farmland of Statewide Importance | 55,308 | 115,701 | 39,949 | 210,957 |
| Unique Farmland | 34,288 | 29,032 | 23,192 | 86,512 |
| **FARMLAND SUBTOTAL** | **278,154** | **431,244** | **170,927** | **880,326** |
| Confined Animal Agriculture | 1,047 | 5,159 | 1,256 | 7,462 |
| Grazing Land | 585,011 | 58,655 | 338,500 | 982,166 |
| **TOTAL** | **864,212** | **495,059** | **510,683** | **1,869,954** |

Source: DOC 2012
Note: acres may not total exactly, due to rounding.

Not all of the Prime Farmland, Farmland of Statewide Importance, and Unique Farmland (collectively referred to in this section as "Farmland") are actively farmed. Geographic Information System (GIS) analysis of annual actively farmed land from records spanning from 2005 to 2014 provides a ten-year average of the acreage of land in the Project Area that has been farmed for five out of the last ten years, which averages 91.5% of the total amount of Farmland.

Kern County's agricultural areas are facing increasing pressure to convert productive farmland to housing, industrial, and commercial development. During 2013, the County approved amendments that re-designated 1,165 net acres of agricultural lands to non-agricultural use. The

total loss of agricultural lands in the unincorporated area of the County from 1998 to 2013 was 16,273 acres. The net average annual conversion rate over the 15-year period was 1,085 acres. However, the majority of converted agricultural lands during this period have been used as a solid waste buffer and continue to be farmed.

The Kern Council of Governments (COG) projects that Kern County's population will grow from its 2010 Census population of 839,600 to more than 1,441,000 million in 2040 (Kern COG 2014). This growth in population could increase the amount of agricultural land conversion to non-agricultural uses in Kern County even further.

## Agricultural Preserves and Williamson Act Land Use Contracts

An agriculture preserve defines the physical boundary of an area within which Kern County could enter into agricultural contracts with landowners, such as Williamson Act contracts (described below), to ensure agricultural lands remain used for agricultural purposes. The boundary of an agricultural preserve is designated by resolution of the County's Board of Supervisors. Agriculture preserves must generally be at least 100 acres in size. The Project Area includes a total of 17 agricultural preserves (Preserve Nos. 1- 14, 17, 18 and 19) (Figure 4.2-2).

The Williamson Act (officially the California Land Conservation Act of 1965) is a California law that provides property tax relief to owners of farmland and open-space land in exchange for a ten-year agreement that the land would not be developed or otherwise converted to another use. The purposes of the Williamson Act are to protect agricultural resources, to preserve open space, and to promote efficient development patterns. Lands under a Williamson Act contract are taxed at a rate based on the actual use of the land for agricultural purposes, as opposed to its unrestricted market value. The landowner commits the parcel to a 10-year period wherein no conversion out of agricultural use is permitted. The contracts are automatically renewed each year unless a notice of non-renewal is filed by the landowner with the County Clerk. Non-renewal or immediate cancellation does not change the zoning of the property. As of 2013, it is estimated that 16 million of the state's 30 million acres of farm and ranch land are currently protected under the Williamson Act (DOC 2013).

Soil quality is not the only factor in qualifying for Williamson Act protection. For example, lesser quality soils support grazing and livestock production and these land uses meet Williamson Act objectives. A provision of the Williamson Act is that land use compatibility of agricultural lands is determined by the local government (see Section 4.2.3, Regulatory Setting).

A Farmland Security Zone (FSZ) is an area created within an agricultural preserve upon request by a landowner or group of landowners. FSZs function similarly to Williamson Act contracts; however, the length of the contract is 20 years rather than 10 years. As with land covered by a Williamson Act Contract, FSZs offer landowners a significant property tax reduction.

The California Land Conservation Act 2012 Status Report (DOC 2013) presents statewide statistics for Williamson Act and Farmland Security Zone contracts, broken down by county. The most recent report available covers the years 2010 and 2011. According to this report, Kern

County was fourth in the state in new Williamson Act enrollments in both 2010 and 2011, with 2,400 and 2,113 acres, respectively. Kern County was ranked first in the state in Nonrenewal Initiations in 2010, and third in 2011, totaling 12,339 acres for those two years (DOC 2013). Section 4.2.3, Regulatory Setting, provides additional information about the Williamson Act.

The locations and acreages of Williamson Act and Farmland Security Zone contract lands within the Project Area are shown in Table 4.2-6. There are 1,136,193 acres of land within the Project Area that are within Williamson Act or Farmland Security Zone Act renewal parcels.

**Table 4.2-6: Acreages of Williamson Act and Farmland Security Zone Contracts in the Project Area – County Jurisdiction (2011)**

| Contract Category | Western Subarea | Central Subarea | Eastern Subarea | Project Area Total |
|---|---|---|---|---|
| Williamson Act | 371,488 | 305,206 | 321,221 | 997,916 |
| Farmland Security Zone Contracts | 101,154 | 33,278 | 3,845 | 138,277 |
| **TOTAL** | **472,642** | **338,484** | **325,066** | **1,136,193** |

## Forest Lands and Timberlands

Public Resources Code Section 12220 (g) defines "forest land" as "land that can support 10% native tree cover of any species, including hardwoods, under natural conditions, and that allows for management of one or more forest resources, including timber, aesthetics, fish and wildlife, biodiversity, water quality, recreation, and other public benefits."

Public Resources Code Section 12220 (l) defines "woodlands" as "forest lands composed mostly of hardwood species such as oak."

Government Code Section 51104 (f) defines "timberland" as "privately owned land, or land acquired for State forest purposes, which is devoted to and used for growing and harvesting timber, or for growing and harvesting timber and compatible uses, and which is capable of growing an average annual volume of wood fiber of at least 15 cubic feet per acre."

The Project Area does not support woodlands or forest lands. According to the California Department of Forestry and Fire Protection's Fire and Resource Assessment Program, there are no Timberland Production Zones in Kern County (CAL FIRE 2010). Therefore, forest and timberlands are not analyzed in this section.

# 4.2.3 Regulatory Setting

# Federal

## Farmland Protection Policy Act (7 U.S.C. Section 4201)

The purpose of the Farmland Protection Policy Act (FPPA) is to minimize the extent to which federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses. The FPPA additionally directs federal programs to be compatible with state and local policies for the protection of farmlands. Congress passed the Agriculture and Food Act of 1981 (Public Law 97-98) containing the FPPA—Subtitle I of Title XV, Section 1539-1549. The final rules and regulations were published in the Federal Register on June 17, 1994.

The FPPA is intended to minimize the impact federal programs have on the unnecessary and irreversible conversion of farmland to nonagricultural uses. It assures that, to the extent possible, federal programs are administered to be compatible with state, local units of government, and private programs and policies to protect farmland. Federal agencies are required to develop and review their policies and procedures to implement the FPPA every two years. The FPPA does not authorize the federal government to regulate the use of private or nonfederal land or, in any way, affect the property rights of owners.

For the purpose of FPPA, farmland includes prime farmland, unique farmland, and land of statewide or local importance. Farmland subject to FPPA requirements does not have to be currently used for cropland. It can be forest land, pastureland, cropland, or other land, but not water or urban built-up land.

Projects are subject to FPPA requirements if they may irreversibly convert farmland (directly or indirectly) to nonagricultural use and are completed by a federal agency or with assistance from a federal agency.

# State

## California Department of Conservation, Division of Land Resource Protection – Farmland Mapping and Monitoring Program

The DOC applies the Natural Resources Conservation Service (NRCS) soil classifications to identify agricultural lands, and these agricultural designations are used in planning for the present and future of California's agricultural land resources. The DOC has a minimum mapping unit of 10 acres, with parcels that are smaller than 10 acres being absorbed into the surrounding classifications.

## Farmland Mapping and Monitoring Program

The list below provides a comprehensive description of all the categories mapped by the DOC (DOC 2015). Collectively, lands classified as Prime Farmland, Farmland of Statewide Importance, and Unique Farmland are referred to as Farmland (DOC 2004).

- **Prime Farmland (P):** Irrigated land with the best combination of physical and chemical features able to sustain long term production of agricultural crops. This land has the soil quality, growing season, and moisture supply needed to produce sustained high yields. Land must have been irrigated for production of irrigated crops at some time during the four years prior to the mapping date.
- **Farmland of Statewide Importance (S):** Irrigated land similar to Prime Farmland that has a good combination of physical and chemical characteristics for the production of agricultural crops. This land has minor shortcomings, such as greater slopes or less ability to store soil moisture than Prime Farmland. Land must have been irrigated for production of irrigated crops at some time during the four years prior to the mapping date.
- **Unique Farmland (U):** Lesser quality soils used for the production of the state's leading agricultural crops. This land is usually irrigated, but may include non-irrigated orchards or vineyards as found in some climatic zones in California. Land must have been cropped at some time during the four years prior to the mapping date.
- **Farmland of Local Importance (L):** Although counties may choose to define Farmland of Local Importance within their jurisdictions, the Board of Supervisors determined that there will be no Farmland of Local Importance for Kern County.
- **Confined Animal Agriculture (C):** Although counties typically include Confined Animal Agriculture in the Farmland of Local Importance category, Kern County defines Confined Animal Agriculture as a separate FMMP category.
- **Grazing Land (G):** Land on which the existing vegetation is suited to the grazing of livestock. This category is used only in California and was developed in cooperation with the California Cattlemen's Association, University of California Cooperative Extension, and other groups interested in the extent of grazing activities.
- **Urban and Built-up Land.** Land occupied by structures with a building density of at least 1 unit to 1.5 acres, or approximately six structures to a 10-acre parcel. This land is used for residential, industrial, commercial, institutional, public administrative purposes, railroad and other transportation yards, cemeteries, airports, golf courses, sanitary landfills, sewage treatment, water control structures, and other developed purposes.
- **Other Land.** Land not included in any other mapping category. Common examples include low density rural developments; brush, timber, wetland, and riparian areas not suitable for livestock grazing; confined livestock, poultry or aquaculture facilities; strip mines and borrow pits; and water bodies smaller than 40 acres. Vacant and non-agricultural land surrounded on all sides by urban development and greater than 40 acres is mapped as Other Land.

## California Land Conservation Act (Williamson Act)

The California Land Conservation Act of 1965, commonly referred to as the Williamson Act, is promulgated in California Government Code Section 51200-51297.4 and, therefore, is applicable only to specific land parcels within the state of California. The Williamson Act

enables local governments to enter into contracts with private landowners for the purpose of restricting specific parcels of land to agricultural or compatible uses in return for reduced property tax assessments. Private land within locally designated agricultural preserve areas is eligible for enrollment under Williamson Act contracts. The Williamson Act program is administered by the DOC, in conjunction with local governments, which administer the individual contract arrangements with landowners. The landowner commits the parcel to a 10-year period wherein no conversion out of agricultural use is permitted. Each year the contract automatically renews unless a notice of non-renewal or cancellation is filed. In return, the land is taxed at a rate based on the actual use of the land for agricultural purposes, as opposed to its unrestricted market value. An application for immediate cancellation can also be requested by the landowner, provided that the proposed immediate cancellation application is consistent with the cancellation criteria stated in the California Land Conservation Act and those adopted by the affected county or city. Non-renewal or immediate cancellation does not change the zoning of the property. Participation in the Williamson Act program is dependent on county adoption and implementation of the program and is voluntary for landowners.

The Williamson Act states that a board or council by resolution shall adopt rules governing the administration of agricultural preserves. The rules of each agricultural preserve specify the uses allowed. Generally, any commercial agricultural use will be permitted within any agricultural preserve. In addition, local governments may identify compatible uses permitted with a use permit (California Code 2014).

California Government Code Section 51238 states that boards of supervisors may impose conditions on lands or land uses to be placed within preserves to permit and encourage compatible uses in conformity with Section 51238.1. The Kern County Agricultural Preserve Standard Uniform Rules specify that oil and gas drilling and production in accordance with the provisions of Chapter 19.98 of the Ordinance Code of Kern County are compatible uses in agricultural preserves.

Further, California Government Code Section 51238.1 allows a board or council to allow as compatible any use that without conditions or mitigations would otherwise be considered incompatible. However, this may occur only if that use meets the following conditions:

- The use will not significantly compromise the long-term productive agricultural capability of the subject contracted parcel or parcels on other contracted lands in agricultural preserves.
- The use will not significantly displace or impair current or reasonably foreseeable agricultural operations on the subject contracted parcel or parcels or on other contracted lands in agricultural preserves. Uses that significantly displace agricultural operations on the subject contracted parcel or parcels may be deemed compatible if they relate directly to the production of commercial agricultural products on the subject contracted parcel or parcels or neighboring lands, including activities such as harvesting, processing, or shipping.
- The use will not result in the significant removal of adjacent contracted land from agricultural or open-space use.

A board or council may approve uses on nonprime land, which, because of offsite or onsite impacts, would not comply with the first two criteria, provided that the use is approved pursuant to a conditional use permit that sets forth findings required by California Government Code Section 51238.1(c).

### Farmland Security Zone Act

The Farmland Security Zone Act is similar to the Williamson Act and was passed by the California State Legislature in 1999 to ensure that long-term farmland preservation is part of public policy. Farmland Security Zone Act contracts are sometimes referred to as "Super Williamson Act Contracts." Under the provisions of this act, a landowner already under a Williamson Act contract can apply for Farmland Security Zone status by entering into a contract with the County. Farmland Security Zone classification automatically renews each year for an additional 20 years. In return for a further 35% reduction in the taxable value of land and growing improvements (in addition to Williamson Act tax benefits), the owner of the property promises not to develop the property into nonagricultural uses.

## Local

### Kern County General Plan

The Project Area is located within the Kern County General Plan (KCGP) area and, therefore, would be subject to applicable policies and measures of the KCGP. The Land Use, Conservation, and Open Space Element of the KCGP includes goals, policies, and implementation measures related to agricultural and forestry resources that apply to the Project, as described below.

The KCGP states that agriculture is vital to the future of Kern County and sets the goals of protecting important agricultural lands for future use and preventing the conversion of prime agricultural lands to other uses (e.g., industrial or residential uses). The KCGP includes three designations for agricultural land:

**8.1, Intensive Agriculture** (minimum parcel size: 20 acres, gross), land that is devoted to the production of irrigated crops or having the potential for such use.

**8.2, Resource Reserve** (minimum parcel size: 80 acres, gross), areas with mixed natural resource characteristics, including rangeland.

**8.3, Extensive Agriculture** (minimum parcel size: 20 acres, gross, except lands subject to a Williamson Act contract/Farmland Security Zone contract, in which case the minimum parcel size shall be 80 acres, gross), devoted to uses involving large amounts of land with relatively low value-per-acre yields, such as livestock grazing, dryland farming, and woodland uses.

Petroleum exploration and extraction are allowable uses in all three agricultural designations.

The policies and implementation measures in the KCGP for Agriculture and Forest Resources applicable to the proposed Project are outlined below. The KCGP contains additional policies, goals, and implementation measures that are more general in nature and not specific to development such as the Project. Therefore, these measures are not listed below, but, as stated in Chapter 2, Introduction, all policies, goals, and implementation measures in the KCGP are incorporated by reference.

## Chapter 1. Land Use, Conservation, and Open Space Element

### 1.4. Public Facilities and Services

#### Goals

**Goal 5.** Ensure that adequate supplies of quality (appropriate for intended use) water are available to residential, industrial, and agricultural users within Kern County.

### 1.9. Resource

#### Goals

**Goal 1.** To contain new development within an area large enough to meet generous projections of foreseeable need, but in locations which will not impair the economic strength derived from the petroleum, agriculture, rangeland, or mineral resources, or diminish the other amenities which exist in the County.

**Goal 2.** Protect areas of important mineral, petroleum, and agricultural resource potential for future use.

**Goal 5.** Conserve prime agriculture lands from premature conversion.

#### Policies

**Policy 1.** Appropriate resource uses of all types will be encouraged as desirable and consistent interim uses in undeveloped portions of the County regardless of General Plan designation.

**Policy 2.** In areas with a resource designation on the General Plan map, only industrial activities which directly and obviously relate to the exploration, production, and transportation of the particular resource will be considered to be consistent with the General Plan.

**Policy 5.** Areas of low intensity agriculture use (Map Code 8.2 (Resource Reserve), Map Code 8.3 (Extensive Agriculture), and Map Code 8.5 (Resource Management)) should be of an economically viable size in order to participate in the state Williamson Act Program/Farmland Security Zone Contract.

**Policy 7.** Areas designated for agricultural use, which include Class I and II and other enhanced agricultural soils with surface delivery water systems, should be protected from incompatible residential, commercial, and industrial subdivision and development activities.

**Policy 11.** Minimize the alteration of natural drainage areas. Require development plans to include necessary mitigation to stabilize runoff and silt deposition through utilization of grading and flood protection ordinances.

**Policy 12.** Areas identified by the Natural Resource Conservation Service (formerly Soil Conservation Service) as having high range-site value should be conserved for Extensive Agriculture uses or as Resource Reserve, if located within a County water district.

**Policy 15.** Agriculture and other resource uses will be considered a consistent use in areas designated for Mineral and Petroleum Resource uses on the General Plan.

**Policy 21.** The County shall encourage qualifying agricultural lands to participate in the Williamson Act program or Farmland Security Zone program.

### Implementation Measures

**Implementation Measure B.** Areas designated as Resource Reserve (Map Code 8.2), Extensive Agriculture (Map Code 8.3), Resource Management (Map Code 8.5) that are under Williamson Act Contracts or Farmland Security Zone Contracts will have a minimum parcel size of 80 acres until such time as a contract is expired or is cancelled, at which time the minimum parcel size will become 20 acres.

**Implementation Measure C.** The County Planning Department will seek review and comment from the County Engineering, Surveying, and Permit Services Department on the implementation of the National Pollution Discharge Elimination System for all discretionary projects.

**Implementation Measure F.** Prime agricultural lands, according to the Kern County Interim-Important Farmland map produced by the Department of Conservation, which have Class I or II soils and a surface delivery water system shall be conserved through the use of agricultural zoning with minimum parcel size provisions.

**Implementation Measure G.** Property placed under the Williamson Act/Farmland Security Zone Contract must be in a Resource designation.

**Implementation Measure K.** Protect oilfields and mineral extraction areas through the use of appropriate implementing Zone Districts: A (Exclusive Agriculture), DI (Drilling Island), NR (Natural Resource), or PE (Petroleum Extraction).

## Metropolitan Bakersfield General Plan

The MBGP, a joint effort between the Kern County Planning Department and the City of Bakersfield Planning Division, was last adopted on December 11, 2007. The MBGP includes both city and unincorporated County lands. The MBGP describes the community's physical development as well as its economic, social and environmental goals and is currently undergoing an update. The Project Area includes a total of 152,040 acres of unincorporated County lands that are covered under the MBGP (7.41%). Project-related development on unincorporated lands

within the MBGP Planning Area would be subject to the following applicable policies and implementation measures of the MBGP, with respect to agricultural and forestry resources.

## Chapter V. Conservation Element

### C. Soils and Agriculture

#### Goals

**Goal 1.** Provide for the planned management, conservation, and wise utilization of agricultural land in the Planning Area.

**Goal 2.** Promote soil conservation and minimize development of prime agricultural land as defined by the following criteria:

- Capability Class I and/or II irrigated soils.
- 80-100 Storie Index rating.
- Gross crop return of $200 or more per acre per year.
- Annual carrying capacity of 1 animal unit per acre per year.

**Goal 3.** Establish urban development patterns and practices that promote soil conservation and that protect areas of agricultural production of food and fiber crops, and nursery products.

#### Policies

**Policy 1.** Determine the extent and location of all prime agricultural land within the study area (I-1).

**Policy 2.** Review projects that propose subdividing or urbanizing prime agricultural land to ascertain how continued commercial agricultural production in the Project vicinity will be affected (I-2).

**Policy 4.** Monitor the amount of prime agricultural land taken out of production for urban uses or added within the plan area (I-3).

**Policy 7.** Land use patterns, grading, and landscaping practices shall be designed to prevent soil erosion while retaining natural watercourses when possible (I-4).

**Policy 12.** Prohibit premature removal of ground cover in advance of development and require measures to prevent soil erosion during and immediately after construction (I-4).

#### Implementation Measures

**Implementation Measure 2.** Evaluate discretionary projects for their impact on agricultural resources.

**Implementation Measure 3.** Document urban expansion and changes in the amount of agricultural land for purposes of determining cumulative impacts to prime agricultural land.

## Kern County Specific Plans

Kern County has adopted 24 Specific Plans for properties within the Project Area. These Specific Plans are intended to be an amplification of the goals and policies of the KCGP and are, therefore, consistent therewith. As depicted in Figure 4.10-3, less than 8% of the Project Area is located wholly or partially within adopted Specific Plan areas. Future oil and gas exploration and production activities that would be authorized under the proposed Amendment to Chapter 19.98 (Oil & Gas Production) of the Kern County Zoning Ordinance that would be located within the boundary of an adopted Specific Plan would be regulated according to County zoning, with the exception of the Specific Plans identified as Tier 5.

## Kern County Zoning Ordinance

The Kern County Zoning Ordinance designates two agricultural zones:

**(A) Exclusive Agriculture:** the purpose is to designate areas suitable for agricultural uses and to prevent the encroachment of incompatible uses onto agricultural lands and the premature conversion of such lands to nonagricultural uses. Uses in the A District are primarily limited to agricultural uses and other activities compatible with agricultural uses.

**(A-1) Limited Agriculture District:** the purpose is to designate areas suitable for a combination of estate-type residential development, agricultural uses, and other compatible uses.

Chapters 19.12 and 19.14 currently include as permitted uses in the A and A-1 zones:

- Cogeneration facility or steam generators, primarily intended for steam production, used for production of oil and gas, excluding coal fired.
- Oil or gas exploration and production pursuant to Chapter 19.98 of this title, including the temporary installation of commercial coaches as accessory to this activity, not to exceed a two- (2-) year period.
- Nonhazardous oil production and/or oily waste disposal facility.
- Nonhazardous oilfield waste treatment or recycling.
- Coal-fired cogeneration facility or steam generators, primarily intended for production of oil or gas (with a conditional use permit).

## Williamson Act Standard Uniform Rules

Kern County has adopted a set of Agricultural Preserve Standard Uniform Rules that identify land uses that are considered compatible uses within agricultural preserves established under the Williamson Act. These rules are designed to restrict the uses of land enrolled in a Williamson Act contract to agriculture or other compatible uses. The Agricultural Preserve Standard Uniform Rules identify five classes of agricultural uses such as crop cultivation, grazing

operations, commercial wind farms, livestock breeding, dairies, and uses that are incidental to agricultural uses allowed within the Agricultural Preserves. The rules also include 19 classes of compatible uses that include, but are not limited to, oil and gas drilling and production in accordance with Chapter 19.98 of the Ordinance Code of Kern County, as well as the erection of gas, electric, communications, water, and other similar public utilities.

## 4.2.4 Impacts and Mitigation Measures

# Methodology

The evaluation of possible impacts to agricultural resources included the review of the Kern County General Land Use Plan and zoning information, the MBGP, and the most current DOC, Division of Land Resource Protection, Important Farmland data, and Kern County's Williamson Act data. Agricultural land conversion associated with oil and gas exploration and production operational activities related to the Project were predicted based on the anticipated land disturbance associated with anticipated oil and gas development described in Appendix F, and compared to the significance thresholds. The methodology used to evaluate potential agricultural conversion is described in detail in Appendix H.

# Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist state that a project would normally be considered to have a significant impact if it would:

- Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use;

- Conflict with existing zoning for agricultural use or a Williamson Act Contract;

- Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)), timberland (as defined in Public Resources Code Section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104(g));

- Result in the loss of forest land or conversion of forest land to non-forest use;

- Involve other changes in the existing environment which, because of their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use; or

- Result in the cancellation of an open space contract made pursuant to the California Land Conservation Act of 1965 or Farmland Security Zone Contract for any parcel of 100 or more acres (Section 15206(b)(3) Public Resources Code).

# Project Impacts

Direct impacts on agricultural and forestry resources are the immediate effects of a project. These impacts would include: conversion of agricultural or timberland to non-agricultural or timber use; interference with agricultural or timber operations; and disturbance or damage to crops or timber trees from dust, or accidental releases of hazardous materials. Indirect impacts are caused by or would result from a project, but occur later in time or farther in distance than direct impacts. These impacts might include effects from erosion or sedimentation onto agricultural land. Other indirect effects which would impact agriculture along with other uses and resources, such as introduction of invasive exotic species, or increased competition for water resources, are addressed in the chapters on these topics.

## Impact 4.2-1: Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland) to Non-Agricultural Use

Oil and gas exploration and production activities that would be authorized through implementation of the proposed Project could result in land disturbance throughout the Project Area, as described in Chapter 3, Project Description. As shown in Table 4.2-7, approximately 364,724 acres of the Core Areas are located within mapped FMMP lands, as shown for each Subarea. The majority of these Core Area FMMP lands are located within Tier 2 (93%) (Appendix H).

**Table 4.2-7: Acreages of FMMP Agricultural Land in Core Areas and Tiers**

| Core Area or Tier | Western Subarea | Central Subarea | Eastern Subarea | Core Area Total |
|---|---|---|---|---|
| **FMMP Lands in Core Areas** | | | | |
| Core Areas | 125,204 | 143,821 | 95,698 | 364,724 |
| Non-Core Areas | 152,959 | 287,423 | 75,229 | 515,611 |
| Total FMMP land | 278,163 | 431,244 | 170,927 | 880,335 |
| **FMMP Lands in Tiers** | | | | |
| Tier 1 | 0 | 0 | 0 | 0 |
| Tier 2 | 276,758 | 394,373 | 157,842 | 336,235 |
| Tiers 3-5[1] | N/A | N/A | N/A | N/A |

Source: see Appendix H
Note:
[1] FMMP designated lands were mapped, in limited instances, on lands within Tiers 3, 4 and 5. However, these designations occurred on lands that did not contain agricultural uses, nor did these designations occur on lands with an agricultural zone classification. Therefore, these are not considered further in this analysis.

Assessment of potential impacts to agricultural and forestry resources focused on proposed exploration and production activities within areas identified as Tier 2 within the Project Area and land use disturbance associated with those activities.

To estimate potential land use disturbance associated with the proposed oil and gas exploration and production activities, "land use disturbance factors" were developed for each new oil and gas production well (see Appendix F). The disturbance factors included disturbance associated with all oil and gas facilities as identified in Chapter 3, Project Description, including, but not limited to, well pads, access roads, transmission lines, collection and distribution pipelines, drilling and operational sumps, storage tanks, administrative buildings, steam generators, etc.

The estimated annual land disturbance associated with future oil and gas exploration and production activities within the Project Area is presented in Table 4.2-8. To provide a conservative analysis, it is assumed that all land disturbed by oil and gas activities within Tier 2 areas would be Farmlands, although, in fact, not all land within Tier 2 is in that category. Therefore, the proposed Project could result in the conversion of 298 acres of Farmlands annually, with 148 acres of conversion occurring in the Western Subarea, 60 acres occurring in the Central Subarea, and 90 acres in the Eastern Subarea.

**Table 4.2-8: Annual Projected Agricultural Conversion**

| Subarea | Disturbance Factor (acres) | Anticipated New Producing Wells in Tier 2 | Disturbance (acres) |
|---|---|---|---|
| Western | 2.0 | 74 | 148 |
| Central | 3.0 | 20 | 60 |
| Eastern | 1.20 | 75 | 90 |
| | **TOTAL** | **169** | **298** |

Source: see Appendix H
Note: New Producing Well = Oil and Gas, Dry Gas, Dry Hole and Liquid Petroleum Wells, as explained further in Chapter 3, Project Description.

These estimated Tier 2 Farmland disturbance areas from the Project would impact approximately 0.04% of the 828,973 acres of FMMP lands in Tier 2 annually (Table 4.2-9).

**Table 4.2-9: Acreages of FMMP Agricultural Land in Tier 2**

| FMMP Mapping Category | Western Subarea | Central Subarea | Eastern Subarea | Tier 2 Total |
|---|---|---|---|---|
| Prime Farmland | 187,440 | 252,890 | 100,116 | 540,446 |
| Farmland of Statewide Importance | 55,147 | 112,894 | 35,550 | 203,591 |
| Unique Farmland | 34,170 | 28,589 | 22,176 | 84,935 |
| **TOTAL** | **276,758** | **394,373** | **157,842** | **828,973** |

Source: see Appendix H
Note: Acres may not total exactly, due to rounding

Given the estimated acreage of agricultural land converted annually (Table 4.2-8), the projected amount of FMMP farmland that could be converted between the years 2015 and 2040 in Tier 2 is a total of 7,450 acres (Table 4.2-10). Using this conservative approach, it is estimated that 0.9% of FMMP farmlands in Tier 2 would be impacted by the Project from 2015 to 2040.

**Table 4.2-10: Maximum Conversion of FMMP Farmland in Tier 2 (2015 to 2040)**

| FMMP Mapping Category | Western Subarea | Central Subarea | Eastern Subarea | Project Area Total |
|---|---|---|---|---|
| Prime Farmland | 2,514 | 978 | 1,430 | 4,922 |
| Farmland of Statewide Importance | 744 | 429 | 507 | 1,680 |
| Unique Farmland | 442 | 93 | 313 | 848 |
| **TOTAL** | **3,700** | **1,500** | **2,250** | **7,450** |

Source: see Appendix H

The acreage of actively farmed land changes from year to year, and it is not possible to accurately project 25 years into the future. For this analysis, the acreage of land that has been farmed for at least five of the past ten years (2005-2014) was determined. This provided a basis for estimating the percentage of converted Important Farmland that would require mitigation over the 25-year period.

If the rate of active farming (farmed for five of the last 10 years) on Prime Farmland, Farmland of Statewide Importance, and Unique Farmland were to continue at its current rates, then in 25 years, the conversion of actively-farmed FMMP farmland would be approximately 3,386 acres in the Western Subarea (91.5%), 1,389 acres in the Central Subarea (92.6%), and 2,092 acres in the Eastern Subarea (93.0%) (Appendix H, Table 13).

A review of crop data over the past ten years suggests that there is a high degree of annual variability among crop types grown from one year to the next. For the purposes of this impact analysis, the percent of generalized crop types (Table 4.2-3) was used to estimate impacts of oil and gas development on different crop types into the future. There would be a loss of different generalized crop types proportional to the overall acreage loss. Projected from the current conditions, within 25 years, approximately 52% of converted farmland would be orchards and vineyards, 38% would be row crops, less than 1% would be pasture or sod, and the remainder would be uncultivated.

The worst-case projection of 7,450 acres between 2015 and 2040 represents less than 1% of the total acreage of Farmland (828,973 acres) in Tier 2 (Table 4.2-9). Nonetheless, based on the importance of agricultural lands in Kern County and the San Joaquin Valley, this impact is considered significant.

## Mitigation Measures

**MM 4.2-1** For future oil and gas exploration and extraction activities that are: 1) on land designated Prime, Farmland of Statewide Importance or Unique Farmland; and 2) that have been actively farmed 5 years or more out of the last 10 years, agricultural land mitigation is required at a ratio of 1:1. The 1:1 ratio is applied to actual ground disturbance area for oil and gas activities (inclusive of temporary construction and permanent operational impact areas), but excludes non-farmed existing areas such as roads, and tank and maintenance areas, and lands for which agricultural mitigation has previously been provided at a 1:1 ratio. Prior to ground disturbing activity, the Applicant shall submit to the County written evidence of completion of one or more of the following measures to achieve this 1:1 mitigation ratio:

a. Funding and/or purchasing agricultural conservation easements or similar instrument acceptable to the County (to be managed and maintained by an appropriate entity).

b. Purchasing of credits for conservation of agricultural lands from an established agricultural farmland mitigation bank or an equivalent agricultural farmland preservation program managed by the County.

c. Restoring agricultural lands to productive use through the removal of legacy oil and gas production equipment, including well abandonment and removal of surface equipment.

d. Participating in any agricultural land mitigation program adopted by Kern County that provides equal or more effective mitigation than the measures listed above.

Mitigation lands shall meet the definition of Prime Farmland, Farmland of Statewide Importance, and/or Unique Farmland, and be of similar or higher agricultural quality as the lands, as established by the California Department of Conservation. Completion of the selected measure or, with the Kern County Planning and Community Development Director's approval, a combination of measures, are to occur on qualifying land in Kern County. If qualifying lands cannot be found in Kern County, upon written application to the County, the mitigation lands may be located within the San Joaquin Valley (San Joaquin, Stanislaus, Merced, Fresno, Madera, Kings, Tulare, or Kern County) or outside the San Joaquin Valley with written evidence that the same or equivalent crops can be produced on the mitigation land.

## Level of Significance After Mitigation

Impacts would be less than significant with mitigation.

## Impact 4.2-2: Conflict with Existing Zoning for Agricultural Use or a Williamson Act Contract

Chapters 19.12 and 19.14 of the Kern County Zoning Ordinance currently include as permitted uses in the A and A-1 zones: steam generators, primarily intended for steam production, used for production of oil and gas; oil or gas exploration and production pursuant to Chapter 19.98; nonhazardous oil production and/or oily waste disposal facility; nonhazardous oilfield waste treatment or recycling; and coal-fired cogeneration facilities or steam generators, primarily intended for production of oil or gas (with a conditional use permit)

Under the proposed Zoning Ordinance Amendment, every oil and gas development in Tiers 2 and 3 would undergo an oil and gas conformity review process. The process would begin with the Applicant submitting an Oil and Gas Conformity Review application, a site plan, and evidence of notification of the surface owner (if different from the mineral owner). The Kern County Planning and Community Development Department would conduct a review of the submitted application. When the application is complete, the County would transmit a copy of the Kern County Oil and Gas Conformity Review issuance to California Department of Conservation Division of Oil, Gas, and Geothermal Resources (DOGGR), the mineral owner (if different from the operator), and the surface owner. Upon receipt of the Kern County Oil and Gas Conformity Review issuance, and any other necessary state or federal permits, the Applicant would be able to begin construction. During the construction and operations of the oil and gas activity, the Applicant would be responsible for complying with the issued Oil and Gas Conformity Review and site plan, and all applicable development standards as outlined in Chapter 19.98 of the Kern County Zoning Ordinance.

The Kern County Agricultural Preserve Standard Uniform Rules identify uses allowed within the Agricultural Preserves that have been established under the Williamson Act. The rules include 19 classes of compatible uses that include, but are not limited to oil and gas drilling and production activities, in accordance with Chapter 19.98.

Therefore, there would be no conflict with existing zoning for agricultural use or a Williamson Act Contract from implementation of the proposed Project, and the Project would not cause any significant impact with respect to Williamson Act contracts.

### Mitigation Measures

No mitigation measures are required.

### Level of Significance

Impacts would be less than significant.

## Impact 4.2-3: Conflict with Existing Zoning For, or Cause Rezoning of, Forest Land or Timberland

Future oil and gas exploration and production activities that would be authorized under the Project would not conflict with existing zoning for, or cause rezoning of forest land or timberland because there are not forest or timberlands in the Project Area. No impact is identified for this issue.

### Mitigation Measures

No mitigation measures are required.

### Level of Significance

The Project would result in no impacts to zoning for forest land or timberland.

## Impact 4.2-4: Result in the Loss of Forest Land or Conversion of Forest Land to Non-Forest Use

Future oil and gas exploration and production activities authorized under the proposed Project would not result in the loss of forest land or conversion of forest land to non-forest use because there is no forest land or timberland in the Project Area. No impact is identified for this issue.

### Mitigation Measures

No mitigation measures are required.

### Level of Significance

The Project would result in no impacts to forest land or the conversion of forest land to non-forest use.

## Impact 4.2-5: Involve Other Changes in the Existing Environment which, Because of Their Location or Nature, Could Result in Conversion of Farmland to Non-Agricultural Use or Conversion of Forest Land to Non-forest Use

Future oil and gas exploration and production activities that would be authorized under the proposed Project would involve drilling of approximately 2,700 new oil or gas wells, annually, and also other ancillary facilities, including pipelines, electrical distribution lines, temporary pits, percolation ponds, sumps, and central processing facilities.

Although Kern County Zoning considers oil and gas and agriculture as compatible land uses, certain agricultural practices and portions of the oil and gas production cycle, if conducted in close proximity, would not be compatible and would have direct impacts. Fragmentation of farmland into smaller field sizes could make it difficult for farmers to operate certain types of equipment that are necessary to their planting, production, and harvest operations, or to viably produce certain types of crops. Oil and gas development within agricultural lands could also

disrupt irrigation or field drainage systems (see Figure 4.2-3). Truck traffic could generate dust which could harm the photosynthetic processes of plants and potentially cause localized damage to fruit, vegetables, and greens. Row crops could most readily be adjusted to farm plot size and configuration, but removal of orchard trees or supported vines that take years to reach productive maturity may not be as adaptable to changes and, therefore, this impact is considered significant.

Clearing and grading involved with construction of access roads and well pad construction would disturb the agricultural soil and potentially mix topsoil and subsoil, and create dust. Use of heavy equipment, including trucks, and tanks used during oil and gas production activities would result in soil compaction beneath roads leading to well pad areas.

Temporary pits and sumps that collect non-hazardous drilling fluids, wellbore cuttings, drilling wastes, crude oil, or produced water, may increase the risk of exposure of agricultural soils to potentially hazardous chemicals and materials. Drilling pits and sumps are subject to requirements to prevent potential impacts to groundwater, under the State Water Resources Control Board's (SWRCB's) Statewide General Order (No. 2003-0003-DWQ) for low-threat discharges to land or Waste Discharge Requirements issued by the Central Valley Regional Water Quality Control Board (CVRWQCB). In most cases, drilling sumps are not permitted on agricultural lands and a closed-loop system is used instead. Produced water impoundments are also regulated by the state and generally will not be permitted on agricultural lands. Produced water that contains concentrations of constituents that exceed water quality objectives must be constructed in locations where site characteristics and containment structures isolate wastes from waters of the state (see Section 4.9, Hydrology and Water Quality, for further details). Nevertheless, there could be a potential for spills during the process of removing operations fluids from sumps and, therefore, significant impacts.

Indirect impacts of oil and gas activities on adjacent FMMP land could include dust from truck traffic, soil erosion from graded areas and sedimentation onto agricultural land, and accidental releases of hazardous materials.

## Mitigation Measures

**MM 4.2-2** To protect crops and structures adjacent to oil and gas activities on active agricultural lands, each Applicant/operator shall comply with the following mitigation measures set forth in other chapters of this Environmental Impact Report:

a. Surface water runoff and drainage on the well pads shall be mitigated as described in mitigation measures for Hydrology and Water Quality.

b. A Spill Prevention Countermeasure and Contingency Plan or Division of Oil Gas and Geothermal Resources Assembly Bill 1960 spill plan, as applicable, shall be prepared for the site and oil and chemical spills treated in accordance with the Division of Oil Gas and Geothermal Resources Senate Bill 4

Regulations for the site to protect adjacent farmland, as described in Mitigation Measure for Hazards.

c. Speed limits for oil and gas trucks shall be posted on unpaved roads to reduce dust generation; in the absence of signage, speed limits shall be limited to 25 miles per hour (or an alternate, more stringent dust suppression standard as adopted by the San Joaquin Valley Air Pollution Control District), and Applicants shall attest that employees have been trained in the appropriate speed limits.

d. Unpaved roads shall be watered or otherwise treated for dust suppression and control as described in Mitigation Measure for Air Quality.

e. Vehicle tracking control shall be installed where unpaved roads intersect with paved roads, to prevent tracking of mud, dust, and weed seeds off site. This shall consist of a 50-foot length of a 3 inch-thick layer of gravel one inch or larger in diameter (or an alternate, more stringent dust suppression technique as approved by the San Joaquin Valley Air Pollution Control District).

f. Stormwater control shall be required at construction sites during well drilling, reworking, and/or decommissioning as described in mitigation measures for Hydrology.

g. Hazardous materials shall be stored within secondary containment as described in mitigation measures for Hazards.

h. Overhead electrical or communication lines shall be shown on the Site Plan, and shall be aligned to the greatest extent feasible with existing access roads and the minimum distance between the access road and the well installation or other oil and gas facility, parallel to tree or row crops, described further in mitigation measures for Public Utilities. If the use of existing roads is not feasible, lines shall be routed to minimize surface disturbance and minimize the impacts to surface activity

i. Underground pipelines serving the Project shall be shown on the Site Plan with locations marked and recorded with USAA, and periodically inspected and maintained as described in mitigation measures for Hazards.

### Level of Significance After Mitigation

Impacts would be less than significant with mitigation.

## Impact 4.2-6: Result in the Cancellation of an Open Space Contract Made Pursuant to the California Land Conservation Act of 1965 or Farmland Security Zone Contract for Any Parcel of 100 or More Acres

Approximately 997,916 acres of the Project Area are currently subject to the Williamson Act, and 138,277 acres are contracted under the Farmland Security Act. Approximately 3,500 of the

over 9,000 contracts are for parcels 100 acres or more in size. Kern County has determined that oil and gas activities are a compatible use with Williamson Act contracted lands and lands contracted under the Farmland Security Act. For this reason, cancellation of Williamson Act or Farmland Security Zone Contracts would not be anticipated as the result of oil and gas activities authorized under the proposed Amendment to Chapter 19.98 (Oil and Gas Production) of the Kern County Zoning Ordinance and there would be no impact.

### Mitigation Measures

No mitigation measures are required.

### Level of Significance

No impacts relating to cancellation of a Williamson Act or Farmland Security Zone contract would occur.

## 4.2.5 Cumulative Setting, Impacts, and Mitigation Measures

## Cumulative Setting

The geographic scope for cumulative impacts to agricultural and forest resources encompasses the whole of Kern County. As agricultural land statistics and characteristics are typically collected at the County level, cumulative impacts to agricultural and forest land should be evaluated within the context of Kern County.

Impacts that were evaluated to have no impact are not discussed in the cumulative analysis.

### Impact 4.2-7: Cumulative Impacts to Agricultural or Forest Resources

The plans evaluated in this cumulative analysis are described in Section 3.8, Cumulative Projects. Implementation of these plans and any projects associated with these plans would be required to comply with the goals, policies, and implementation measures of applicable federal and local laws and land use standards imposed by the respective jurisdictions within which each related project is located.

With respect to agricultural farmland conversion, from 1998 to 2013, in Kern County, the average annual agricultural lands conversion rate has been 1,085 acres.

Under the worst-case scenario, 298 acres of Prime Farmland, Farmland of Statewide Importance, or Unique Farmland could be converted annually from the implementation of the proposed Project. This 298 acres of converted Farmland would combine with other losses throughout the County to result in a significant cumulative impact on agriculture.

Population growth is expected to continue in the County, and conversion of agricultural land to non-agricultural use can also be expected to occur from the need for additional residential development and infrastructure to accommodate the growth in the County.

The 2014 Kern COG Regional Transportation Plan (RTP)/Sustainable Communities Strategy (SCS) forecasts the addition of 577,100 people and the conversion of 24 square miles, less than 2% of Farmland and 1/10th the conversion compared to the previous 22 years (Kern COG 2014). Implementation of the Kern COG RTP/SCS would result in a reduction in the rate of Farmland conversion due to policies to concentrate new development in existing urban areas and potential impacts would be mitigated. Nonetheless, due to the importance of the region's agricultural resources, the impacts related to the Project's incremental contribution to the cumulative farmland conversion would be considered cumulatively considerable.

Because there are other factors, such as commodity pricing in the global market and water pricing and availability, that influence the feasibility of ongoing agricultural operations in Kern County, there may be a cumulative significant loss in agricultural resources in Kern County for reasons that are outside the jurisdiction and control of the County. The Kern County General Plan also forecast a net loss of 80,854 acres of Prime and Important Farmland and 55,000 acres of grazing lands in Kern County based on land use conversions consistent on existing land use plans, which would further reduce Kern County's agricultural lands.

## Mitigation Measures

Implement MM 4.2-1 and MM 4.2-2, as described above.

## Level of Significance After Mitigation

Project impacts would be significant and unavoidable.

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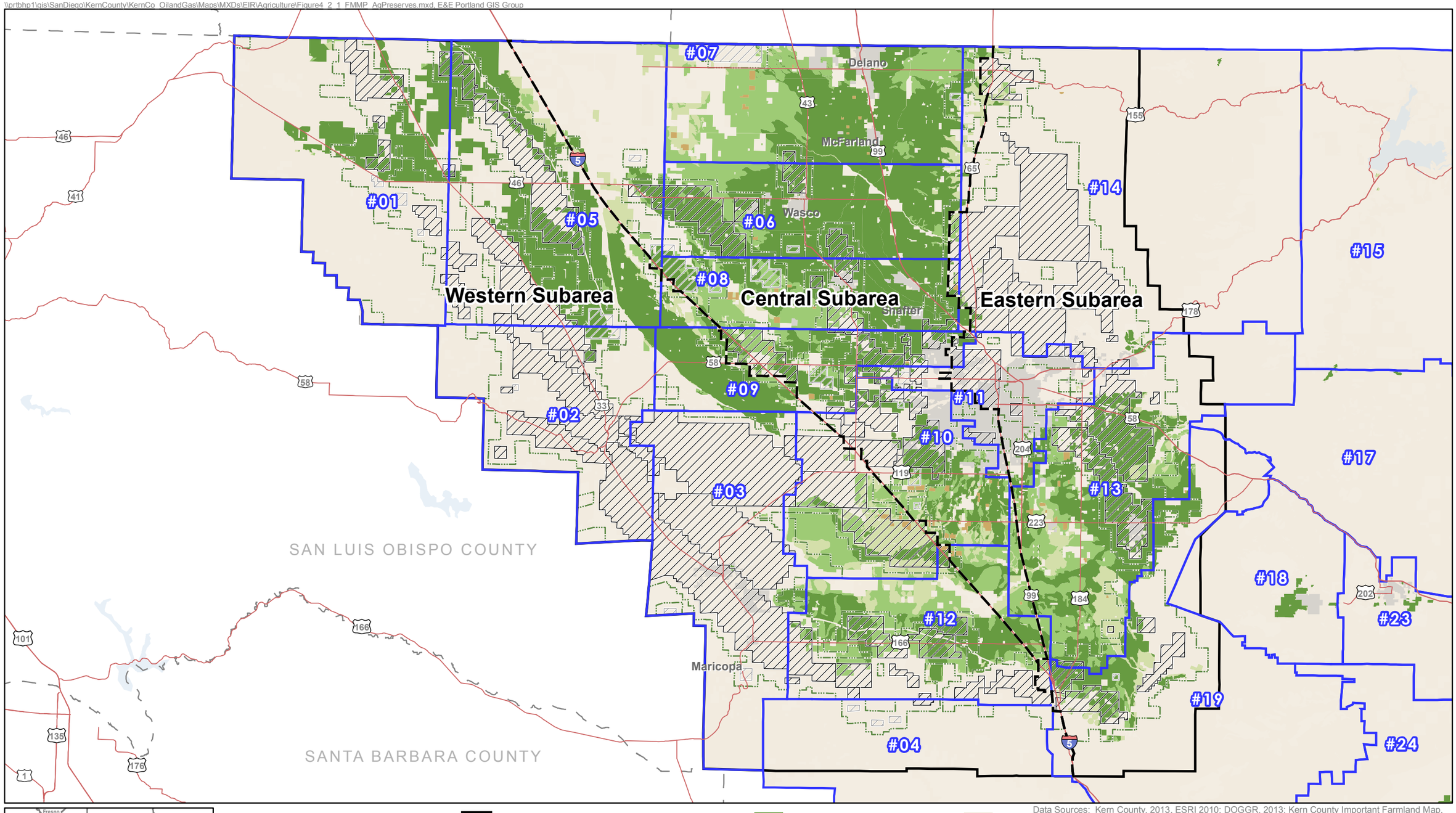


Data Sources: Kern County, 2013, ESRI 2010; DOGGR, 2013; Kern County Important Farmland Map, California Department of Conservation, Division of Land Resources Protection, 2010

**Figure 4.2-1**
**Farmland Mapping and Monitoring Program Classifications in the Project Area**

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#02
#03
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#06
#07
#08
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#10
#11
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#13
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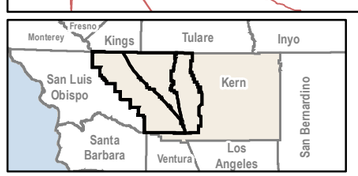
#17
#18
#19
#23
#24

Western Subarea
Central Subarea
Eastern Subarea

Delano
McFarland
Wasco
Shafter
Maricopa

SAN LUIS OBISPO COUNTY
SANTA BARBARA COUNTY




0 10
Miles

Project Area
Subarea
Core Area

DOGGR Administrative Well Field Boundaries
DOGGR Administrative Well Field Boundaries (Abd)
Agricultural Preserve

Nonrenewal Williamson Act Lands
- Farmland security zone
- Non prime farmlands
- Prime farmlands
- Mixed use

Williamson Act Lands
- Farmland security zone
- Non prime farmlands
- Prime farmlands
- Mixed use

- Kern County
- City Limits
- Highways
- County Boundary

Data Sources: Kern County, 2013, ESRI 2010; DOGGR, 2013; Willamson Act Lands, Planning Department, 2011

**Figure 4.2-2**
**Williamson Act Lands in the Project Area**

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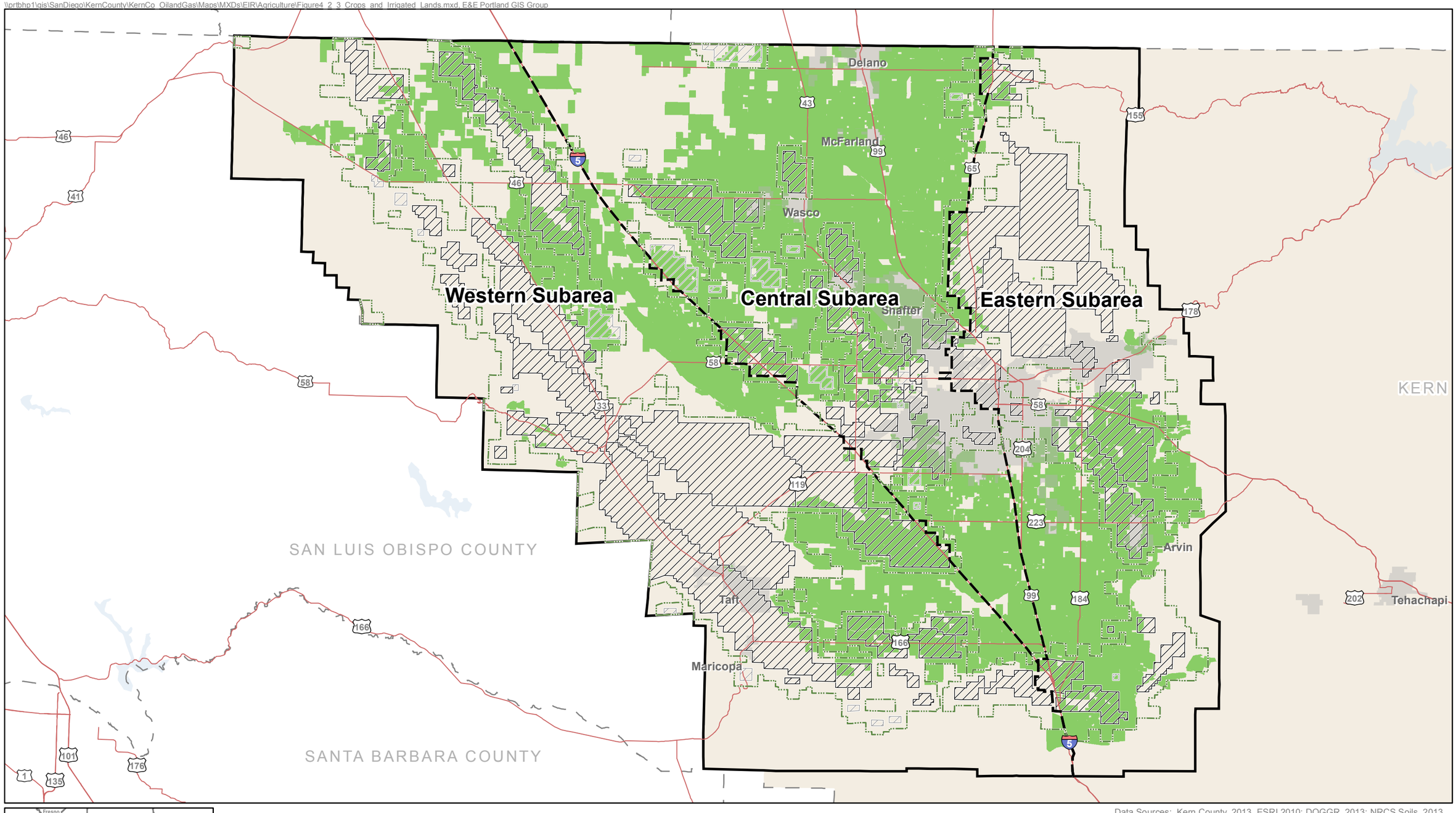
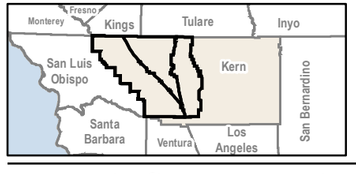



N

0 10
Miles

Project Area
Subarea
Core Area
DOGGR Administrative Well Field Boundaries
DOGGR Administrative Well Field Boundaries (Abd)
2013 Irrigated Croplands
Kern County
City Limits
Highways
County Boundary

Data Sources: Kern County, 2013, ESRI 2010; DOGGR, 2013; NRCS Soils, 2013

**Figure D-3**
**2013 Irrigated Farmland in the Project Area**

Section 4.3

# Air Quality

Section 4.3

# Air Quality

## 4.3.1 Introduction

This section of the Environmental Impact Report (EIR) describes the affected environment and regulatory setting for air quality. It also describes air quality impacts that would result from implementation of the Amendment to Chapter 19.98 (Oil and Gas Production) and related chapters of the Kern County Zoning Ordinance (Project), and mitigation measures that would reduce these impacts.

Potential impacts on the environment and human health due to emissions affecting air quality during implementation of the Project are discussed using applicable thresholds where indicated. Mitigation measures that would reduce impacts, where applicable, are also discussed.

## 4.3.2 Environmental Setting

The Project Area encompasses 3,700 square miles and generally includes most of the San Joaquin Valley (SJV) Floor or western portion of Kern County. The SJV Floor is within the southern end of the San Joaquin Valley Air Basin (SJVAB), which is made up of all or portions of eight counties in California's Central Valley. These counties include Fresno, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare counties, as well as the SJV portion of Kern County. The western portion of Kern County, where the Project is located is regulated by the San Joaquin Air Pollution Control District (SJVAPCD).

Air pollution in the SJVAB can be attributed to both human-related (anthropogenic) and natural (non-anthropogenic) activities that produce emissions. Air pollution from significant anthropogenic activities in the SJVAB includes a variety of industrial-based sources as well as on- and off-road mobile sources. Activities that tend to increase mobile activity include increases in population, increases in traffic (including automobiles, trucks, aircraft, and rail), urban sprawl (which increases commuter driving distances), and general local land management practices as they pertain to modes of commuter transportation (SJVAPCD 2015a). Air pollution is also transported into the SJVAB from a variety of sources, including northern California and Asia (Faloona et al. 2015).

## Meteorological Conditions

The SJVAB is the southern half of California's Central Valley and is 250 miles long and bordered by mountains on three sides. The SJV is bordered by the Sierra Nevada Mountains in the east (8,000 to 14,491 feet in elevation), the Coast Ranges in the west (averaging 3,000 feet in elevation), and the Tehachapi mountains in the south (6,000 to 7,981 feet in elevation). There is a slight downward elevation gradient from Bakersfield in the southeast end (elevation 408 feet) to sea level at the northwest end where the valley opens to the San Francisco Bay at the Carquinez

Straits. At its northern end is the Sacramento Valley, which comprises the northern half of California's Central Valley. The bowl shaped topography inhibits movement of pollutants out of the valley.

The overall climate in the SJVAB is warm and semi-arid. The San Joaquin Valley is in a Mediterranean Climate Zone. Mediterranean Climate Zones occur on the west coast of continents at 30 to 40 degrees latitude and are influenced by a subtropical high-pressure area most of the year. Mediterranean climates are characterized by sparse rainfall, which occurs mainly in the winter. There is only one wet season during the year and 90% of the precipitation falls during October through April. Snow in the valley is infrequent and thunderstorms seldom occur. Summers are hot and dry. Summertime maximum temperatures often exceed 100°F in the valley.

The subtropical high-pressure area is strongest during spring, summer, and fall and produces subsiding air, which can result in temperature inversions in the valley. Air temperature in the lowest layer of the atmosphere typically decreases with altitude. A reversal of this atmospheric state, where the air temperature increases with height, is termed an inversion. The height of the base of the inversion is known as the "mixing height." This is the level to which pollutants can mix vertically. Mixing of air is minimized above the inversion base. The inversion base represents an abrupt density change where little air movement occurs. A temperature inversion can act like a lid, inhibiting vertical mixing of the air mass near the land surface, resulting in trapping of air pollutants below the inversion. Most of the surrounding mountains are above the normal height of summer inversions (1,500 to 3,000 feet). Concentration levels of air pollutants are directly related to inversion layers due to the limitation of vertical mixing. Inversion layers enhance the formation of ozone and limit dispersion of directly emitted pollutants like particulate matter and carbon monoxide (SJVAPCD 2015).

Winter-time high pressure events can often last many weeks with surface temperature often lowering into the 30°F range. During these events, fog can be present and inversions are extremely strong. These winter-time inversions can inhibit vertical mixing of pollutants to a few hundred feet (SJVAPCD 2015a)

The transport and dispersion of air pollutants in ambient air are influenced by many complex factors. The primary factors are wind, topological boundaries, and atmospheric stability. During the summer, wind speed and direction data indicate that summer wind usually originates at the north end of SJV and flows in a south-southeasterly direction through the valley and the Tehachapi pass, into the Mojave Desert. During the winter months, the SJV experiences light, variable winds, less than 10 miles per hour (mph).

# Topography

Air pollution is directly related to a region's topographic features. The SJVAB is approximately 250 miles long, an average of 35 miles wide, and is the second largest air basin in the state. The SJVAB is defined by the Sierra Nevada mountains in the east (8,000 to 14,000 feet in elevation), the Coast Ranges in the west (averaging 3,000 feet in elevation), and the Tehachapi Mountains in the south (6,000 to 8,000 feet in elevation). The valley is basically flat with a slight downward

gradient to the northwest, and opens to the sea at the Carquinez Straits where the San Joaquin-Sacramento Delta empties into San Francisco Bay.

## Wind Patterns

The SJVAB's topography has a dominating effect on wind patterns. Winds tend to blow somewhat parallel to the valley and mountain range orientation. In spring and early summer, thermal low-pressure systems develop over the interior basins east of the Sierra Nevada mountain range, and the Pacific High (high pressure system that develops over the central Pacific Ocean near the Hawaiian Islands) moves northward. These developments and the topography produce the high incidence of relatively strong northwesterly winds in the spring and early summer (SJVAPCD 2013a).

Wind speed and direction data indicate that during the summer, winds usually originate at the north end of the SJVAB and flow in a south-southeasterly direction through the Tehachapi Pass into the Southeast Desert Air Basin. Wind speed and direction data indicate that during the winter, winds occasionally originate from the south end of the SJVAB and flow in a north-northwesterly direction. Also, during winter, the SJVAB experiences light, variable winds, typically less than 10 mph. Low wind speeds, combined with low inversion layers in the winter, create a climate conducive to high carbon monoxide (CO) and inhalable particulates concentrations (SJVAPCD 2013a).

For the southernmost portion of the SJVAB, steady winds are typical in the mountainous area that characterizes this portion, and quickly disperse air pollutants.

## Temperature

The vertical rise and mixing of air pollutants is limited by the presence of persistent temperature inversions. Inversions may be either ground level or elevated. Ground-level inversions occur frequently during early fall and winter (i.e., October through January). High concentrations of primary pollutants, which are those emitted directly into the atmosphere (e.g., CO), may be found at these times. Elevated inversions act as a lid over the basin and limit vertical mixing, resulting in severe air stagnation. Elevated inversions contribute to the occurrence of high levels of ozone during the summer months.

In winter, storm systems moving in from the Pacific Ocean bring a maritime influence to the SJV. The Sierra Nevada mountain range prevents the cold, continental air masses from influencing the valley. Temperatures below freezing are unusual. In the southern portion of the SJVAB, average high temperatures in the winter are in the 60s, but highs in the 30s and 40s can occur with persistent fog and low cloudiness. In summer, high temperatures often exceed 100 degrees, with averages in the mid/high 90s in the southern SJVAB. Summer low temperatures average in the mid-50s in the southern basin (Western Regional Climate Center 2014).

# Precipitation

Precipitation in the SJVAB is strongly influenced by the position of the semi-permanent subtropical high-pressure area located off the Pacific Coast (the Pacific High). In the winter, this high-pressure system moves southward, allowing Pacific storms to move through the SJVAB. The majority of the precipitation in the valley is winter rain produced by these storms. Snowstorms, hailstorms, and ice storms occur infrequently in the valley, and severe occurrences are very rare.

Precipitation on the SJVAB floor and in the Sierra Nevada decreases from north to south. This decrease is primarily because the Pacific storm track often passes through the northern part of the state while the southern part of the state remains protected by the Pacific High. For example, the northern portion of the SJVAB (Manteca and Stockton areas) receives approximately 20 inches of rain per year; the central portion of the basin (Fresno area) receives approximately 10 inches of rain per year; and the southern portion of the basin (Bakersfield area) receives less than 6 inches of rain per year. The Tejon Pass area receives about 12 inches of rain per year (SJVAPCD 2013a).

# Existing Air Quality

The United States Environmental Protection Agency (EPA) and the California Air Resources Board (CARB) have established health-based ambient air quality standards for several different pollutants. The EPA sets National Ambient Air Quality Standards (NAAQS) for the following seven pollutants for ozone ($O_3$), CO, nitrogen dioxide ($NO_2$), respirable particulate matter ($PM_{10}$), fine particulate matter ($PM_{2.5}$), sulfur dioxide ($SO_2$) and lead (Pb). These seven pollutants are commonly referred to as "criteria pollutants." Primary standards provide public health protection, including protecting the health of "sensitive" populations, such as asthmatics, children, and the elderly. Secondary standards provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

In addition, CARB has established California Ambient Air Quality Standards (CAAQS) standards for these pollutants, as well as for sulfate ($SO_4$), visibility reducing particles, hydrogen sulfide ($H_2S$), and vinyl chloride. California standards are generally stricter than national standards. The National Ambient Air Quality Standards and the CAAQS are shown in Table 4.3-1.

**Table 4.3-1: National and California Ambient Air Quality Standards**

| Pollutant | Averaging Time | California Standards[2, 5] | National Standards[1, 5] | |
|---|---|---|---|---|
| | | | Primary[3] | Secondary[4] |
| Ozone ($O_3$) | 1-Hour | 0.09 ppm (180 µg/m$^3$) | ---[6] | --- |
| | 8-Hour | 0.070 ppm (137 µg/m$^3$) | 0.075 ppm (147 µg/m$^3$) | Same as Primary Standard |
| Carbon monoxide (CO) | 1-Hour | 20 ppm (23 mg/m$^3$) | 35 ppm (40 mg/m$^3$) | --- |
| | 8-Hour | 9.0 ppm (10 mg/m$^3$) | 9 ppm (10 mg/m$^3$) | --- |

**Table 4.3-1: National and California Ambient Air Quality Standards**

| Pollutant | Averaging Time | California Standards[2, 5] | National Standards[1, 5] | |
|---|---|---|---|---|
| | | | Primary[3] | Secondary[4] |
| Nitrogen dioxide ($NO_2$) | 1-Hour | 0.18 ppm (339 µg/m$^3$) | 100 ppb (188 µg/m$^3$) | --- |
| | Annual Mean | 0.030 ppm (57 µg/m$^3$) | 0.053 ppm (100 µg/m$^3$) | Same as Primary Standard |
| Sulfur dioxide ($SO_2$)[7] | 1-Hour | 0.25 ppm (655 µg/m$^3$) | 75 ppb (196 µg/m$^3$) | --- |
| | 3-Hour | --- | --- | 0.5 ppm (1,300 µg/m$^3$) |
| | 24-Hour | 0.04 ppm (105 µg/m$^3$) | --- | --- |
| Respirable Particulate Matter ($PM_{10}$)[8] | 24-Hour | 50 µg/m$^3$ | 150 µg/m$^3$ | Same as Primary Standard |
| | Annual Mean | 20 µg/m$^3$ | --- | --- |
| Fine Particulate Matter ($PM_{2.5}$)[8] | 24-Hour | --- | 35 µg/m$^3$ | Same as Primary Standard |
| | Annual Mean | 12 µg/m$^3$ | 12.0 µg/m$^3$ | 15 µg/m$^3$ |
| Lead (Pb) | 30-day Average | 1.5 µg/m$^3$ | | |
| | Rolling 3-month Average | | 0.15 µg/m$^3$ | Same as Primary Standard |
| Hydrogen sulfide ($H_2S$) | 1-Hour | 0.03 ppm (42 µg/m$^3$) | No Federal Standards | |
| Sulfates ($SO_4$) | 24-Hour | 25 µg/m$^3$ | | |
| Visibility reducing particles | 8-Hour | See Note 9 | | |
| Vinyl chloride[10] | 24-Hour | 0.01 ppm (26 µg/m$^3$) | | |

Sources: EPA 2014a; California Environmental Protection Agency Air Resources Board 2014.
Key:
ppb = parts per billion
ppm = parts per million
µg/m$^3$ = micrograms per cubic meter
mg/m$^3$ = milligrams per cubic meter
Notes:
[1] NAAQS (other than ozone, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth-highest 8-hour concentration in a year, averaged over 3 years, is equal to or less than the standard. For $PM_{10}$, the 24-hour standard is not to be exceeded more than once per year on average over 3 years. The 24-hour standard is attained when the 3-year average of the weighted annual mean at each monitor within an area does not exceed 150 µg/m$^3$. For $PM_{2.5}$, the 24-hour standard is attained when 98% of the daily concentrations, averaged over 3 years, do not exceed 35 µg/m$^3$. The annual standard is attained when the 3-year average of the weighted annual mean at single or multiple community-oriented monitors does not exceed 12 µg/m$^3$.
[2] CAAQS for ozone, CO (except 8-hour Lake Tahoe), $SO_2$ (1- and 24-hour), $NO_2$, $PM_{10}$ and visibility reducing particles, are values that are not to be exceeded. All others are not to be equaled or exceeded.
[3] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.

**Table 4.3-1: National and California Ambient Air Quality Standards**

| Pollutant | Averaging Time | California Standards[2, 5] | National Standards[1, 5] | |
|---|---|---|---|---|
| | | | Primary[3] | Secondary[4] |

[4] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse impacts of a pollutant.
[5] Concentration expressed first in units in which it was promulgated. Parts per million in this table refers to ppm by volume or micromoles of pollutant per mole of gas.
[6] The federal 1-hour ozone standard was revoked for most areas of the United States, including all of California on June 15, 2005.
[7] Final rule signed June 2, 2010. The 1971 annual and 24-hour $SO_2$ standards were revoked in that same rulemaking.
[8] On December 14, 2012, the national annual $PM_{2.5}$ primary standard was lowered from 15 µg/m$^3$ to 12 µg/m$^3$. Existing national 24-hour $PM_{2.5}$ standards (primary and secondary) were retained at 35 µg/m$^3$, as was the annual secondary standard of 15 µg/m$^3$. The existing 24-hour $PM_{10}$ standards (primary and secondary) of 150 µg/m$^3$also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.
[9] In 1989, CARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.
[10] The California Air Resources Board has identified lead and vinyl chloride as “toxic air contaminants” with no threshold level of exposure for adverse health impacts determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

Table 4.3-2 summarizes the federal and state attainment status for the SJVAB, as of 2014, based on the NAAQS and CAAQS, respectively.

**Table 4.3-2: Attainment Status for the San Joaquin Valley APCD**

| Pollutant | Designation/Classification | |
|---|---|---|
| | Federal | State |
| Ozone | Nonattainment/Extreme[(1),(2)] | Nonattainment/Severe |
| $PM_{10}$ | Attainment[(3)] | Nonattainment |
| $PM_{2.5}$ | Nonattainment[(4)] | Nonattainment |
| Carbon monoxide (CO) | Unclassifiable/Attainment | Attainment/Unclassified |
| Nitrogen dioxide ($NO_2$) | Unclassifiable/Attainment | Attainment |
| Sulfur dioxide ($SO_2$) | Attainment/Unclassified | Attainment |
| Lead (Pb) | Unclassifiable/Attainment | Attainment |
| Hydrogen sulfide ($H_2S$) | No Federal Standard | Unclassified |
| Sulfates ($SO_4$) | No Federal Standard | Attainment |
| Visibility reducing particulate | No Federal Standard | Unclassified |
| Vinyl chloride | No Federal Standard | Attainment |

Source: SJVAPCD 2015b
Notes:
[1] Even though the EPA, revoked the federal 1-hour ozone standard, including associated designations and classifications in 2005, EPA had previously classified the SJVAB as extreme nonattainment for this standard. EPA approved the 2004 Extreme Ozone Attainment Demonstration Plan on March 8, 2010. Many applicable requirements for extreme 1-hour ozone nonattainment areas continue to apply to the SJVAB.
[2] Though the San Joaquin Valley was initially classified as serious nonattainment for the 1997 8-hour ozone standard, EPA approved reclassification to extreme nonattainment in the Federal Register on May 5, 2010.

**Table 4.3-2: Attainment Status for the San Joaquin Valley APCD**

| Pollutant | Designation/Classification | |
|---|---|---|
| | Federal | State |

[3] On September 25, 2008, EPA redesignated the San Joaquin Valley to attainment for the $PM_{10}$ standard and approved the $PM_{10}$ Maintenance Plan.
[4] The San Joaquin Valley is designated nonattainment for the 1997 $PM_{2.5}$ standard. EPA designated the San Joaquin Valley as nonattainment for the 2006 PM2.5 standard on November 13, 2009.

On May 2014, the SJVAPCD formally requested that the EPA determine that the San Joaquin Valley has attained the federal 1-hour ozone standard based on the fact that the San Joaquin Valley has been meeting the 1-hour ozone standard based on the "expected exceedance days" test over the 2011-2013 three-year period air monitoring data.

Since 1992, the SJVAPCD air quality management strategies have focused on the 1-hour ozone standard, trying to achieve the emissions reductions needed to demonstrate attainment by developing and implementing attainment plans, adopting over 500 stringent rules, and supplementing its regulatory programs with a voluntary incentive program.

# Ambient Air Quality

The SJVAPCD, CARB, National Park Service, and Santa Rosa Rancheria in Lemoore operate an extensive network of air monitoring stations in the San Joaquin Valley. The monitoring station network provides air quality monitoring data, including real-time meteorological data and ambient pollutant levels, as well as historical data. The network in the SJVAB consists of 36 monitoring stations, nine of which are located in western Kern County within the Project Area (SJVAPCD 2014). Table 4.3-3 presents the measured ambient pollutant concentrations and the exceedances of state and federal standards that have occurred at the above-mentioned monitoring stations from 2010 through 2012, the most recent years for which data are available.

**Table 4.3-3: Ambient Air Quality In Kern County – California And National Standards**

| CARB Air Monitoring Station | Number of Days Exceeding CAAQS | | | Maximum 24-Hour Concentration State (ppm or µg/m$^3$) | | | Number of Days Exceeding NAAQS | | | Maximum 24-Hour Concentration National (ppm) or µg/m$^3$ | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2010 | 2011 | 2012 | 2010 | 2011 | 2012 | 2010 | 2011 | 2012 | 2010 | 2011 | 2012 |
| 1-Hour Ozone ($O_3$) | | | | | | | | | | | | |
| Arvin-Bear Mountain Boulevard | 36 | * | * | 0.140 | * | * | 2 | * | * | 0.140 | * | * |
| Arvin-Di Giorgio | 17 | 21 | 31 | 0.123 | 0.113 | 0.122 | 0 | 0 | 0 | 0.123 | 0.113 | 0.122 |
| Bakersfield 5558 California Ave. | 8 | 5 | 9 | 0.109 | 0.107 | 0.102 | 0 | 0 | 0 | 0.109 | 0.107 | 0.102 |
| Bakersfield Municipal Airport | * | * | 33 | * | * | 0.120 | * | * | 0 | * | * | 0.120 |
| Edison | 39 | 25 | 22 | 0.125 | 0.118 | 0.118 | 1 | 0 | 0 | 0.125 | 0.118 | 0.118 |
| Maricopa Stanislaus St. | 2 | 10 | 1 | 0.099 | 0.114 | 0.097 | 0 | 0 | 0 | 0.099 | 0.114 | 0.097 |
| Oildale 3311 Manor St. | 5 | 4 | 3 | 0.104 | 0.102 | 0.099 | 0 | 0 | 0 | 0.104 | 0.102 | 0.099 |
| Shafter Walker St. | 8 | 1 | 5 | 0.106 | 0.097 | 0.103 | 0 | 0 | 0 | 0.106 | 0.097 | 0.103 |
| 8-Hour Ozone ($O_3$) | | | | | | | | | | | | |
| Arvin-Bear Mountain Boulevard | 90 | * | * | 0.108 | * | * | 66 | * | * | 0.107 | * | * |
| Arvin-Di Giorgio | 56 | 50 | 85 | 0.098 | 0.097 | 0.101 | 28 | 36 | 53 | 0.097 | 0.097 | 0.101 |
| Bakersfield 5558 California Ave. | 48 | 51 | 83 | 0.098 | 0.094 | 0.096 | 28 | 25 | 56 | 0.097 | 0.094 | 0.095 |
| Bakersfield Municipal Airport | * | * | 75 | * | * | 0.108 | * | * | 61 | * | * | 0.107 |
| Edison | 74 | 74 | 79 | 0.102 | 0.097 | 0.094 | 47 | 47 | 47 | 0.102 | 0.097 | 0.094 |
| Maricopa Stanislaus St. | 32 | 81 | 63 | 0.088 | 0.105 | 0.093 | 12 | 49 | 24 | 0.087 | 0.105 | 0.093 |
| Oildale 3311 Manor St. | 50 | 54 | 78 | 0.097 | 0.095 | 0.092 | 30 | 29 | 46 | 0.097 | 0.095 | 0.092 |
| Shafter Walker St. | 41 | 43 | 64 | 0.095 | 0.087 | 0.090 | 22 | 18 | 30 | 0.095 | 0.086 | 0.090 |
| Carbon Monoxide (CO) | | | | | | | | | | | | |
| Bakersfield-Golden State Highway | 0 | 0 | 0 | 1.46 | * | * | 0 | 0 | 0 | 1.34 | * | * |
| $NO_2$ | | | | | | | | | | | | |
| Arvin-Bear Mountain Boulevard | 0 | * | * | 32 | * | * | 0 | * | * | 32.0 | * | * |
| Bakersfield 5558 California Ave. | 0 | 0 | 0 | 79 | 64 | 64 | 0 | 0 | 0 | 79.0 | 64.0 | 64.0 |
| Bakersfield-Golden State Highway | 0 | 0 | 0 | 33 | * | * | 0 | 0 | 0 | 33.0 | * | * |
| Bakersfield Municipal Airport | * | * | 0 | * | * | 65 | * | * | 0 | * | * | 65.0 |

**Table 4.3-3: Ambient Air Quality In Kern County – California And National Standards**

| CARB Air Monitoring Station | Number of Days Exceeding CAAQS | | | Maximum 24-Hour Concentration State (ppm or µg/m$^3$) | | | Number of Days Exceeding NAAQS | | | Maximum 24-Hour Concentration National (ppm) or µg/m$^3$ | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2010 | 2011 | 2012 | 2010 | 2011 | 2012 | 2010 | 2011 | 2012 | 2010 | 2011 | 2012 |
| Edison | 0 | 0 | 0 | 48 | 42 | 47 | 0 | 0 | 0 | 48.0 | 42.0 | 47.0 |
| Shafter Walker St. | 0 | 0 | 0 | 74 | 54 | 52 | 0 | 0 | 0 | 74.0 | 54.0 | 52.0 |
| SOx (sulfur oxides) No data. | | | | | | | | | | | | |
| $PM_{10}$ | | | | | | | | | | | | |
| Bakersfield 5558 California Ave. | 67 | 113 | 55 | 238.0 | 154.0 | 125.8 | 0 | 0 | 0 | 86.0 | 97.4 | 99.6 |
| Bakersfield-Golden State Highway | 0 | * | * | 38.1 | * | * | 0 | * | * | 37.6 | * | * |
| Oildale 3311 Manor St. | 11 | 16 | 12 | 89.4 | 105.5 | 94.7 | 0 | 0 | 0 | 88.6 | 100.2 | 91.1 |
| $PM_{2.5}$ | | | | | | | | | | | | |
| Bakersfield 5558 California Ave. | ** | ** | ** | 112.0 | 82.8 | 86.5 | 26 | 30 | 22 | 92.2 | 80.3 | 86.5 |
| Bakersfield 410 E Planz Road | ** | ** | ** | 107.8 | 45.9 | 52.5 | 9 | 7 | 7 | 107.8 | 45.9 | 52.5 |
| Lebec-Beartrap Road | * | * | * | 22.0 | 27.3 | 28.8 | * | * | * | * | * | * |

Source: CARB 2013b. Top 4 Measurements and Days Above the Standard

Notes:

* Insufficient data.

** No standard.

# Criteria Air Pollutants and Health Effects

The following is a general description of the criteria air pollutants that are hazardous to human health and are regulated by federal and state ambient air quality standards or criteria for outdoor concentrations.

## Ozone ($O_3$)

In the presence of ultraviolet radiation, nitrogen oxides ($NO_X$) and volatile organic compounds (VOCs)/reactive organic gases (ROG) go through a number of complex chemical reactions to form ozone. Ozone was monitored at the Mojave, Lancaster, and Victorville monitoring stations for the years 2009 to 2011. Table 4.3-3 also includes the maximum hourly concentration and the number of days above the federal and State standards. As shown in Table 4.3-3, ozone continues to be above the State 1-hour and both the federal and State 8-hour ozone standards in many places in Kern County. The SJVAPCD attainment status for ozone is currently severe nonattainment for State 1-hour ozone; nonattainment/extreme for the federal 8-hour ozone; and, nonattainment for State 8-hour ozone.

While ozone in the upper atmosphere protects the earth from harmful ultraviolet radiation, high concentrations of ground-level ozone can adversely affect the human respiratory system. Many respiratory ailments, as well as cardiovascular disease, are aggravated by exposure to high ozone levels. ozone also damages natural ecosystems, such as forests and foothill communities; agricultural crops; and some man-made materials, such as rubber, paint, and plastic. High levels of ozone may negatively affect immune systems, making people more susceptible to respiratory illnesses, including bronchitis and pneumonia. ozone also accelerates aging and exacerbates pre-existing asthma and bronchitis and, in cases with high concentrations, can lead to the development of asthma in active children. Active people, both children and adults, appear to be more at risk from ozone exposure than those with a low level of activity. Additionally, the elderly and those with respiratory disease are also considered sensitive populations for ozone.

People who work or play outdoors are at a greater risk for harmful health effects from ozone. Children and adolescents are also at greater risk because they are more likely than adults to spend time engaged in vigorous activities. Research indicates that children under 12 years of age spend nearly twice as much time outdoors daily than adults. Teenagers spend at least twice as much time as adults in active sports and outdoor activities. Also, children inhale more air per pound of body weight than adults, and they breathe more rapidly than adults. Children are less likely than adults to notice their own symptoms and avoid harmful exposures.

Ozone is an oxidant that is comparable to household bleach, which can kill living cells (such as germs or human skin cells) upon contact. Ozone can damage the respiratory tract, causing inflammation and irritation, and it can induce symptoms such as coughing, chest tightness, shortness of breath, and worsening of asthmatic symptoms. Ozone in sufficient doses increases the permeability of lung cells, rendering them more susceptible to toxins and microorganisms. Exposure to levels of ozone above the current ambient air quality standard can lead to lung inflammation and

lung tissue damage and a reduction in the amount of air inhaled into the lungs. Recent evidence has, for the first time, linked the onset of asthma to exposure to elevated ozone levels in exercising children. Elevated ozone concentrations also reduce crop and timber yields, damage native plants, and damage materials such as rubber, paints, fabric, and plastics (American Lung Association 2015).

## Carbon Monoxide (CO)

CO is a colorless, odorless gas produced by incomplete combustion of carbon-containing fuels (e.g., gasoline, diesel fuel, and biomass). CO is primarily a byproduct of motor vehicle exhaust, which contributes more than two-thirds of all CO emissions nationwide. In cities, automobile exhaust can cause as much as 95% of all CO emissions. These emissions can result in high concentrations of CO, particularly in local areas with heavy traffic congestion. Other sources of CO emissions include industrial processes and fuel combustion in sources such as boilers and incinerators. Despite an overall downward trend in concentrations and emissions of CO, some metropolitan areas still experience high levels of CO.

CO is essentially inert to plants and materials but can have significant effects on human health. CO enters the bloodstream and binds more readily to hemoglobin than oxygen, reducing the oxygen-carrying capacity of blood, thus reducing oxygen delivery to organs and tissues. The health threat from CO is most serious for those who suffer from cardiovascular disease. Healthy individuals are also affected, but only at higher levels of exposure. CO in the bloodstream reduces the blood's capacity for carrying oxygen to the heart, brain, and other parts of the body. Exposure to CO can cause chest pain in heart patients, headaches, and reduced mental alertness. At high concentrations, CO can cause heart difficulties in people with chronic diseases, and can impair mental abilities. Exposure to elevated CO levels is associated with visual impairment, reduced work capacity, reduced manual dexterity, poor learning ability, difficulty performing complex tasks, and in prolonged, enclosed exposure, death.

The adverse health effects associated with exposure to ambient and indoor concentrations of CO are related to concentration of carboxyhemoglobin (COHb) in the blood. Health effects observed may include early onset of cardiovascular disease, behavioral impairment, decreased exercise performance of young healthy men, reduced birth weight, Sudden Infant Death Syndrome, and increased daily mortality rate. Most of the studies evaluating adverse health effects of CO on the central nervous system examine high-level poisoning. Such poisoning results in symptoms ranging from common flu and cold symptoms (shortness of breath on mild exertion, mild headaches, and nausea) to unconsciousness and death. It has been reported that there is an association between daily death rate and exposure to ambient CO in Los Angeles County, where it is postulated that a concentration of 20.2 parts per million (ppm) (the highest daily concentration recorded during a 4-year period) contributed to 11 out of 159 deaths. Additional studies conducted in Los Angeles and in Sao Paulo, Brazil, also suggest a relationship between daily death rates and CO concentrations.

Table 4.3-3 summarizes the CO data collected for 2010 the Bakersfield-Golden State Highway monitoring station. The SJVAPCD attainment status for CO is unclassified/attainment for federal standards and unclassified for State standards

## Nitrogen Dioxide ($NO_2$) and Oxides of Nitrogen ($NO_x$)

$NO_2$ is a reddish brown, highly reactive gas that is formed in the ambient air through the oxidation of nitric oxide. $NO_X$, the generic term for a group of highly reactive gases that contain nitrogen and oxygen in varying amounts, plays a major role in the formation of ozone, particulate matter (PM), and acid rain. $NO_X$ emissions result from high-temperature combustion processes such as vehicle exhaust emissions and power plants. Home heaters and gas stoves can also produce substantial amounts of $NO_2$ in indoor settings. The majority of the $NO_X$ emitted from combustion sources is in the form of nitrogen oxide (NO), while the balance is mainly $NO_2$. NO is oxidized by ozone in the atmosphere to $NO_2$ but some level of photochemical activity is needed for this conversion.

$NO_X$ reacts with other pollutants to form, ground-level ozone, nitrate particles, acid aerosols, as well as $NO_2$, which cause respiratory problems. $NO_X$ and the pollutants formed from $NO_X$ can be transported over long distances, following the patterns of prevailing winds. Therefore controlling $NO_X$ is often most effective if done from a regional perspective, rather than focusing on the nearest sources.

Current scientific evidence links short-term $NO_2$ exposures, ranging from 30 minutes to 24 hours, with adverse respiratory effects including airway inflammation in healthy people and increased respiratory symptoms in people with asthma. Also, studies show a connection between breathing elevated short-term $NO_2$ concentrations, and increased visits to emergency departments and hospital admissions for respiratory issues, especially asthma (EPA 2014b). Nitrogen oxides are ozone precursors that combine with ROGs to form ozone. See the "Ozone ($O_3$)" section above for a discussion of the health effects of ozone.

Direct inhalation of $NO_X$ can also cause a wide range of health effects. $NO_X$ can irritate the lungs, cause lung damage, and lower resistance to respiratory infections such as influenza. Short-term exposures (e.g., less than 3 hours) to low levels of $NO_2$ (a subset of $NO_X$) may lead to changes in airway responsiveness and lung function in individuals with preexisting respiratory illnesses. These exposures may also increase respiratory illnesses in children. Long-term exposures to $NO_2$ may lead to increased susceptibility to respiratory infection and may cause irreversible alterations in lung structure. Other health effects associated with $NO_X$ are an increase in the incidence of chronic bronchitis and lung irritation. Chronic exposure to $NO_2$ may lead to eye and mucus membrane aggravation, along with pulmonary dysfunction. $NO_X$ can cause fading of textile dyes and additives, deterioration of cotton and nylon, and corrosion of metals due to production of particulate nitrates. Airborne $NO_X$ can also impair visibility. $NO_X$ is a major component of acid deposition in California. $NO_X$ may affect both terrestrial and aquatic ecosystems. $NO_X$ in the air is a potentially significant contributor to a number of environmental effects such as acid rain and eutrophication in coastal waters. Eutrophication occurs when a body of water suffers an increase in nutrients that reduce the amount of oxygen in the water, producing an environment that is destructive to fish and other animal life.

$NO_2$ is toxic to various animals as well as to humans. Its toxicity relates to its ability to combine with water to form nitric acid in the eye, lung, mucus membranes, and skin. Studies of the health impacts

of $NO_2$ include experimental studies on animals, controlled laboratory studies on humans, and observational studies. In animals, long-term exposure to $NO_2$ increases susceptibility to respiratory infections, lowering their resistance to diseases such as pneumonia and influenza. Laboratory studies show susceptible humans, such as asthmatics, exposed to high concentrations of $NO_2$ can suffer lung irritation and, potentially, lung damage. Epidemiological studies have also shown associations between $NO_2$ concentrations and daily mortality from respiratory and cardiovascular causes, and with hospital admissions for respiratory conditions.

Nitrogen oxides contribute to a wide range of environmental effects directly and when combined with other precursors in acid rain and ozone. Increased nitrogen inputs to terrestrial and wetland systems can lead to changes in plant species composition and diversity. Similarly, direct nitrogen inputs to aquatic ecosystems, such as those found in estuarine and coastal waters, can lead to eutrophication (a condition that promotes excessive algae growth, which can lead to a severe depletion of dissolved oxygen and increased levels of toxins harmful to aquatic life). Nitrogen, alone or in acid rain, also can acidify soils and surface waters. Acidification of soils causes the loss of essential plant nutrients and increased levels of soluble aluminum that are toxic to plants. Acidification of surface waters creates conditions of low pH and levels of aluminum that are toxic to fish and other aquatic organisms. Nitrogen oxides also contribute to visibility impairment.

Table 4.3-3 summarizes $NO_X$ data collected from the Arvin-Bear Mountain Boulevard, Bakersfield 5558 California Avenue, Bakersfield Golden State Highway, Bakersfield Municipal Airport, Edison and Shafter Walker Street monitoring stations between 2010 and 2012. As indicated in the table, there have been no exceedances of the State standards and no data are available to determine exceedances under federal standards. The SJVAPCD attainment status for $NO_2$ is attainment/unclassified for federal and attainment for State standards.

## Particulate Matter ($PM_{10}$ and $PM_{2.5}$)

PM pollution consists of very small aerosol and solid particles suspended in the air. PM is a mixture of materials that can include acids (such as nitrates and sulfates), organic chemicals, smoke, soot, dust, salt, acids, metals, and allergens (such as fragments of pollen or mold spores). PM also forms when gases emitted from motor vehicles and industrial sources undergo chemical reactions in the atmosphere. The EPA currently regulates two types of PM emissions: $PM_{10}$ and $PM_{2.5}$. $PM_{10}$ refers to particles less than or equal to 10 microns in diameter and $PM_{2.5}$ refers to particles less than or equal to 2.5 microns in diameter.

### Respirable Particulate Matter ($PM_{10}$)

$PM_{10}$ can be emitted directly or it can be formed many miles downwind from emission sources when various precursor pollutants interact in the atmosphere. Gaseous emissions of pollutants like $NO_X$, sulfur oxides ($SO_X$), VOC, and ammonia, given the right meteorological conditions, can form PM in the form of nitrates ($NO_3$), $SO_4$, and organic particles. These pollutants are known as secondary particulates, because they are not directly emitted, but are formed through complex chemical reactions in the atmosphere.

Table 4.3-3 summarizes the ambient $PM_{10}$ data collected from the Bakersfield 5558 California Avenue, Bakersfield Golden State Highway, Mojave 923 Poole Street, Oildale 3311 Manor Street, Canebrake, and Ridgecrest monitoring stations near the Project site and includes the maximum 24-hour and annual arithmetic average concentrations and the number of days above the federal and State standards. The SJVAPCD attainment status for the federal $PM_{10}$ standards is attainment and the State $PM_{10}$ standard is nonattainment/severe.

### Fine Particulate Matter ($PM_{2.5}$)

Table 4.3-3 summarizes the ambient fine PM data collected for the years 2010 to 2012 from the Arvin Bear Mountain Boulevard, Arvin Di Giorgio, Bakersfield 5558 California Avenue, Bakersfield 410 E. Planz Road, Mojave 923 Poole Street, Ridgecrest, and Lebec-Beartrap Road monitoring stations located near the Project site. The SJVAPCD is in nonattainment for the federal and State $PM_{2.5}$ standards.

The size of particles is directly linked to their potential for causing health problems. $PM_{10}$ pose the greatest problems because they can get deep into lungs and the bloodstream. Being even smaller, $PM_{2.5}$ will travel further into the lungs. Exposure to such particles can affect both lungs and heart. Numerous scientific studies have linked particle pollution exposure to a variety of problems, including (EPA 2014c):

- Premature death in people with heart or lung disease;
- Nonfatal heart attacks;
- Irregular heartbeat;
- Aggravated asthma;
- Decreased lung function; and
- Increased respiratory symptoms, such as irritation of the airways, coughing or difficulty breathing.

## Sulfur Dioxide ($SO_2$)

$SO_2$ is typically emitted as a result of the combustion of a fuel containing sulfur. $SO_2$ is a colorless, irritating gas with a "rotten egg" smell formed primarily by the combustion of sulfur-containing fossil fuels. Fuels, such as natural gas, contain very little sulfur and consequently have very low $SO_2$ emissions when combusted. By contrast, fuels high in sulfur content, such as coal or heavy fuel oils, can emit very large amounts of $SO_2$ when combusted. Sources of $SO_2$ emissions come from every economic sector and include a wide variety of fuels, and other gases, liquids, and solids.

Current scientific evidence links short-term exposures to $SO_2$, ranging from 5 minutes to 24 hours, with an array of adverse respiratory effects including bronchoconstriction and increased asthma symptoms. These effects are particularly important for asthmatics at elevated ventilation rates (e.g., while exercising or playing; EPA 2015a). $SO_X$ can also react with other compounds in the

atmosphere to form small particles. These particles penetrate deeply into sensitive parts of the lungs and can cause or worsen respiratory disease, such as emphysema and bronchitis, and can aggravate existing heart disease, leading to increased hospital admissions and premature death. High concentrations of $SO_2$ can result in temporary breathing impairment for asthmatic children and adults who are active outdoors. Short-term exposures of asthmatic individuals to elevated $SO_2$ levels during moderate activity may result in breathing difficulties that can be accompanied by symptoms such as wheezing, chest tightness, or shortness of breath. Other effects that have been associated with longer-term exposures to high concentrations of $SO_2$, in conjunction with high levels of PM, include aggravation of existing cardiovascular disease, respiratory illness, and alterations in the lungs' defenses. $SO_2$ also is a major precursor to $PM_{2.5}$, which is a significant health concern, and is a primary contributor to poor visibility. (See also health effects under "Particulate Matter ($PM_{10}$ and $PM_{2.5}$)," above.)

Exposure to high concentrations of $SO_2$ for short periods of time can constrict the bronchi and increase mucous flow, making breathing difficult. Additional health effects of $SO_2$ are listed below.

- $SO_2$ can immediately irritate the lung and throat at concentrations greater than 6 ppm in many people.
- $SO_2$ can impair the respiratory system's defenses against foreign particles and bacteria, when exposed to concentrations less than 6 ppm for longer time periods.
- $SO_2$ can enhance the harmful effects of ozone. (Combinations of the two gases at concentrations occasionally found in the ambient air appear to increase airway resistance to breathing.)
- $SO_2$ tends to have more toxic effects when acidic pollutants, liquid or solid aerosols, and particulates are also present. (In the 1950s and 1960s, thousands of excess deaths occurred in areas where $SO_2$ concentrations exceeded 1 ppm for a few days and other pollutants were also high.) Effects are more pronounced among mouth breathers, e.g., people who are exercising or who have head colds. These effects are listed below.
  - $SO_2$ concentrations can result in health problems, such as episodes of bronchitis requiring hospitalization associated with lower-level acid concentrations.
  - $SO_2$ concentrations have been linked to self-reported respiratory conditions, such as chronic cough and difficult breathing, associated with acid aerosol concentrations. (Asthmatic individuals are especially susceptible to these effects. The elderly and those with chronic respiratory conditions may also be affected at lower concentrations than the general population.)
  - Increased respiratory tract infections have been associated with longer-term, lower-level exposures to $SO_2$ and acid aerosols.
  - $SO_2$ concentrations are also known to result in subjective symptoms, such as headaches and nausea, in the absence of pathological abnormalities, due to long-term exposure.

- $SO_2$ easily injures many plant species and varieties, both native and cultivated. Some of the most sensitive plants include various commercially valuable pines, legumes, red and black oaks, white ash, alfalfa and blackberry. The effects include:
  - Visible injury to the most sensitive plants at exposures as low as 0.12 ppm for 8 hours;
  - Visible injury to many other plant types of intermediate sensitivity at exposures of 0.30 ppm for 8 hours; and
- Positive benefits from low levels, in a very few species growing on sulfur deficient soils.
- Increases in $SO_2$ concentrations accelerate the corrosion of metals, probably through the formation of acids. ($SO_2$ is a major precursor to acidic deposition.) $SO_2$ may also damage stone and masonry, paint, various fibers, paper, leather, and electrical components.
- Increased $SO_2$ also contributes to impaired visibility. Particulate sulfate, much of which is derived from $SO_2$ emissions, is a major component of the complex total suspended particulate mixture.

As shown in Table 4.3-2, the SJVAPCD is designated attainment or unclassified for all $SO_2$ State and federal ambient air quality standards, respectively. Due to the restrictions for the use of high sulfur fuels, reduction in gasoline and diesel sulfur contents and reduction in $SO_2$ emissions from other industrial sources, such as refineries, $SO_2$ pollution is no longer a major air quality concern in most of California, including the Project site.

## Lead (Pb)

Lead in the atmosphere occurs as PM. Main sources of lead emissions include leaded gasoline, battery manufacture, paint, ink, ceramics, ammunition, and secondary lead smelters. Prior to 1978, mobile emissions were the primary source of atmospheric lead. After the phase-out of leaded gasoline between 1978 and 1987, secondary lead smelters, battery recycling, and manufacturing facilities became lead emission sources of greater concern. Current federal standards for lead have no attainment designation, but areas lacking an attainment designation are treated as being in attainment of the standard. The SJVAPCD is designated as attainment for State standards and lead is no longer monitored in the ambient air of the SJVAPCD.

Exposure to lead occurs mainly through inhalation of air and ingestion of lead in food, water, soil, or dust. It accumulates in the blood, bones, and soft tissues and can adversely affect the kidneys, liver, nervous system, and other organs. Excessive exposure to lead may cause neurological impairments such as seizures, mental retardation, and behavioral disorders. Even at low doses, lead exposure is associated with damage to the nervous systems of fetuses and young children, resulting in learning deficits, and lowered IQ. Recent studies also show that lead may be a factor in high blood pressure and subsequent heart disease. Lead can also be deposited on the leaves of plants, presenting a hazard to grazing animals and humans through ingestion.

## Reactive Organic Gases and Volatile Organic Compounds

Hydrocarbons are organic gases that are formed solely of hydrogen and carbon. There are several subsets of organic gases, including ROGs and VOCs. ROGs are a set of organic gases based on State rules and regulations. VOCs are similar to ROGs in that they include all organic gases except those exempted by federal law. The list of compounds excluded from the definition of VOC is provided by the SJVAPCD in SJVAPCD Rule 1020, Section 3.53. VOCs are emitted from incomplete combustion of hydrocarbons or other carbon-based fuels. Combustion engine exhaust, oil refineries, and oil-fueled power plants are the primary sources of hydrocarbons. Another source of hydrocarbons is evaporation from petroleum fuels, solvents, dry cleaning solutions, and paint.

The primary health effects of hydrocarbons result from the formation of ozone and its related health effects (see ozone health effects discussion above). High levels of hydrocarbons in the atmosphere can interfere with oxygen intake by reducing the amount of available oxygen through displacement. There are no separate federal or CAAQS for VOC. Carcinogenic forms of VOC are considered toxic air contaminants (TACs). An example is benzene, which is a carcinogen. The health effects of individual carcinogenic VOCs are described below under the heading "Toxic Air Contaminants."

## Sulfates ($SO_4^{2-}$)

Sulfates ($SO_4^{2-}$) are particulate products of combustion of sulfur-containing fossil fuels. When SO or $SO_2$ are exposed to oxygen they precipitate out into sulfates ($SO_3$ or $SO_4$). Sulfates are the fully oxidized ionic form of sulfur. Sulfates occur in combination with metal and/or hydrogen ions. In California, emissions of sulfur compounds occur primarily from the combustion of petroleum-derived fuels (that is, gasoline and diesel fuel) that contain sulfur. This sulfur is oxidized to $SO_2$ during the combustion process and is subsequently converted to sulfate compounds in the atmosphere. The conversion of $SO_2$ to sulfates takes place relatively rapidly and completely in urban areas of California due to regional meteorological features.

CARB's sulfates standard is designed to prevent aggravation of respiratory symptoms. Effects of sulfate exposure at levels above the standard include a decrease in ventilatory function, aggravation of asthmatic symptoms, and an increased risk of cardiopulmonary disease. Sulfates are particularly effective in degrading visibility, and, because they are usually acidic, can harm ecosystems and damage materials and property.

## Hydrogen Sulfide ($H_2S$)

Hydrogen sulfide ($H_2S$) is a colorless gas with the odor of rotten eggs. It is formed during bacterial decomposition of sulfur-containing organic substances. Also, it can be present in sewer gas and some natural gas, and can be emitted as the result of geothermal energy exploitation. In Kern County, $H_2S$ is associated with geothermal activity, oil and gas production, refining, sewage treatment plants, and confined animal feeding operations.

Exposure to low concentrations of $H_2S$ may irritate the eyes, nose, and throat. It may also cause difficulty in breathing for some asthmatics. Exposure to higher concentrations (above 100 ppm) of

$H_2S$ can cause olfactory fatigue, respiratory paralysis, and death. Brief exposures to high concentrations of $H_2S$, greater than 500 ppm, can cause a loss of consciousness. In most cases, the person appears to regain consciousness without any other effects. However, in many individuals, there may be permanent or long-term effects such as headaches, poor attention span, poor memory, and poor motor function. No health effects have been found in humans exposed to typical environmental concentrations of $H_2S$, 0.00011 to 0.00033 ppm. Deaths due to inhaling large amounts of $H_2S$ have been reported in a variety of different work settings, including sewers, animal processing plants, waste dumps, sludge plants, oil and gas well drilling sites, and tanks and cesspools. Current federal standards for $H_2S$ have no attainment designation and the SJVAPCD is designated as unclassified for State standards.

## Visibility Reducing Particulates

Visibility reducing particles are a mixture of suspended PM consisting of dry solid fragments, solid cores with liquid coatings, and small droplets of liquid. These particles vary greatly in shape, size and chemical composition, and can be made up of many different materials such as metals, soot, soil, dust, and salt.

This standard is a measure of visibility. The CARB does not yet have a measurement method that is accurate or precise enough to designate areas in the state as being in attainment or nonattainment. Thus, the entire state is unclassified.

## Vinyl Chloride

Vinyl chloride monomer is a sweet smelling, colorless gas at ambient temperature. Landfills, publicly owned treatment works, and polyvinyl chloride (PVC) production are the major identified sources of vinyl chloride emissions in California. PVC can be fabricated into several products, such as pipes, pipefittings, and plastics. In humans, epidemiological studies of occupationally exposed workers have linked vinyl chloride exposure to development of liver angiosarcoma, which is a rare cancer, and have suggested a relationship between exposure and cancers of the lung and brain. There are currently no adopted ambient air standards for vinyl chloride.

Acute exposure of humans to high levels of vinyl chloride via inhalation has resulted in effects on the central nervous system, such as dizziness, drowsiness, headaches, and giddiness.

Vinyl chloride is reported to be slightly irritating to the eyes and respiratory tract in humans. Acute exposure to extremely high levels of vinyl chloride has caused loss of consciousness, irritation to the lungs and kidneys, and inhibition of blood clotting in humans and cardiac arrhythmias in animals.

Tests involving acute exposure of mice to vinyl chloride have shown a high acute toxicity from inhalation exposure to the substance. Long-term exposure to vinyl chloride concentrations has been linked with chronic health effects:

- Liver damage may result in humans from chronic exposure to vinyl chloride, through both inhalation and oral exposure.

- A small percentage of individuals occupationally exposed to high levels of vinyl chloride in air have developed a set of symptoms termed "vinyl chloride disease," which is characterized by Raynaud's phenomenon (fingers blanch and numbness and discomfort are experienced upon exposure to the cold), changes in the bones at the end of the fingers, joint and muscle pain, and scleroderma-like skin changes (thickening of the skin, decreased elasticity, and slight edema).
- Central nervous system effects (including dizziness, drowsiness, fatigue, headache, visual and/or hearing disturbances, memory loss, and sleep disturbances) as well as peripheral nervous system symptoms (peripheral neuropathy, tingling, numbness, weakness, and pain in fingers) have also been reported in workers exposed to vinyl chloride.

Several reproductive/developmental health effects from vinyl chloride exposure have been identified:

- Several case reports suggest that male sexual performance may be affected by vinyl chloride. However, these studies are limited by lack of quantitative exposure information and possible co-occurring exposure to other chemicals.
- Several epidemiological studies have reported an association between vinyl chloride exposure in pregnant women and an increased incidence of birth defects, while other studies have not reported similar findings.
- Epidemiological studies have suggested an association between men occupationally exposed to vinyl chloride and miscarriages in their wives' pregnancies, although other studies have not supported these findings.

Long-term exposure to vinyl chloride has also been identified as a cancer risk:

- Inhaled vinyl chloride has been shown to increase the risk of a rare form of liver cancer (angiosarcoma of the liver) in humans.
- Animal studies have shown that vinyl chloride, via inhalation, increases the incidence of angiosarcoma of the liver and cancer of the liver.

## Toxic Air Contaminants (TACs)

Hazardous air pollutants (HAPs) is a term used by the federal Clean Air Act (CAA) that includes a variety of pollutants generated or emitted by industrial production activities. Called TACs under California law (see Health and Safety Code §§ 39650 et seq.), 10 pollutants have been identified through ambient air quality data as posing the most substantial health risk in California. Direct exposure to all of these pollutants has been shown to cause cancer, birth defects, damage to brain and nervous system and respiratory disorders. CARB provides emission inventories for TACs for only the larger air basins in the state.

Emissions from the top 10 TACs in the SJVAB are presented in the following table. Similar to the criteria pollutants, TACs are emitted from stationary sources, area-wide sources, mobile sources, and natural sources.

**Table 4.3-4: 2009 TAC Emissions in San Joaquin Valley Air Basin (tons per year)**

| Toxic Air Contaminant | Fresno | Kern (SJV) | Kings | Madera | Merced | San Joaquin | Stanislaus | Tulare | Total SJVAB |
|---|---|---|---|---|---|---|---|---|---|
| Acetaldehyde | 320 | 360 | 136 | 82 | 143 | 258 | 155 | 148 | 1,603 |
| Benzene | 288 | 645 | 71 | 77 | 91 | 227 | 137 | 144 | 1,680 |
| 1,3-Butadiene | 113 | 58 | 36 | 31 | 24 | 52 | 42 | 158 | 515 |
| Carbon Tetrachloride | <0.01 | <0.01 | 0 | 0 | 0 | 0 | 0 | 0 | 0.01 |
| Hexavalent Chromium | 0.04 | 0.03 | <0.01 | <0.01 | <0.01 | 0.03 | <0.01 | <0.01 | 0.12 |
| para-Dichlorobenzene | 37 | 30 | 6 | 6 | 10 | 28 | 21 | 17 | 156 |
| Formaldehyde | 688 | 1,301 | 365 | 196 | 302 | 565 | 334 | 315 | 4,065 |
| Methylene Chloride | 126 | 65 | 14 | 15 | 26 | 74 | 58 | 43 | 423 |
| Perchloroethylene | 170 | 96 | 22 | 25 | 36 | 117 | 89 | 62 | 617 |
| Diesel particulate matter | 1,159 | 1,640 | 319 | 273 | 658 | 993 | 531 | 500 | 6,073 |

Source: CARB 2009

The primary sources of benzene in the state include mobile sources (87%) and stationary sources (12%). Forty-six percent of hexavalent chromium emissions are from stationary sources such as electrical generation, aircraft and parts manufacturing, and fabricated metal produce manufacturing. The majority of 1,3-butadiene emissions are generated from incomplete combustion of gasoline and diesel fuels. Fifty-three percent of 1,3-butadiene emissions are from mobile sources and 21% are from area sources such as agricultural waste burning and open burning. Emissions of carbon tetrachloride are all produced by stationary sources such as chemical and allied produce manufacturers and petroleum refineries. Most of the emissions of para-dichlorobenzene are from consumer products such as non-aerosol insect repellents and solid/gel air fresheners. Eighty-two percent of formaldehyde emissions in California are from mobile sources, while 48% of methylene chloride emissions are from paint removers/strippers, automotive brake cleaners, and other consumer products. Perchloroethylene is produced primarily from stationary sources such as dry cleaning plants and manufacture of aircraft parts and fabricated metal parts. Emissions of DPM are from mobile sources (98%) and stationary sources (1%). Para-dichlorobenzene and perchloroethylene are not relevant to oil and gas operations or energy generation in Kern County, since- as described above- both substances are commonly used in other industries; therefore, they are not discussed further in this section.

TACs do not have ambient air quality standards. Since no safe levels of TACs can be determined, there are no air quality standards for TACs. Instead, TAC impacts are evaluated by calculating the health risks associated with a given exposure. The requirements of the Air Toxic "Hot Spots" Information and Assessment Act apply to facilities that use, produce, or emit toxic chemicals. Facilities that are subject to the toxic emission inventory requirements of the Act must prepare and submit toxic emission inventory plans and reports, and periodically update those reports. Of the Kern County portion of the SJVAB, no facility in SJVAPCD has reported cancer risk exceeding 10 in 1 million or a hazard index over 1.0, and, therefore, are not considered significant by the standards of the Hot Spots program in the SJVAPCD.

## Health Effects and Risks of Toxic Air Contaminants

### Acetaldehyde

Acetaldehyde is classified as a federal hazardous air pollutant and as a California TAC. Acetaldehyde is both directly emitted into the atmosphere and formed in the atmosphere from photochemical oxidation. Sources include combustion processes such as exhaust from mobile sources and fuel combustion from stationary internal combustion engines, boilers, and process heaters. In California, photochemical oxidation is the largest source of acetaldehyde concentrations in the ambient air. According to CARB 2009, approximately 85% of the emissions of acetaldehyde in the SJVAB are from mobile sources — primarily diesel-fueled. Area-wide sources, such as residential wood combustion, account for approximately 10%. However in general, acetaldehyde concentrations are higher indoors than outdoors, due in part to the abundance of combustion sources, such as cigarettes, fireplaces, and woodstoves.

The primary acute effect of inhalation exposure to acetaldehyde is irritation of the eyes, skin, and respiratory tract in humans. At higher exposure levels, erythema, coughing, pulmonary edema, and necrosis may also occur. Acute inhalation of acetaldehyde resulted in a depressed respiratory rate and elevated blood pressure in experimental animals. Tests involving acute exposure of rats, rabbits, and hamsters have demonstrated acetaldehyde to have low acute toxicity from inhalation and moderate acute toxicity from oral or dermal exposure.

### Benzene

Benzene is highly carcinogenic and occurs throughout California. Benzene also has non-cancer–related health effects. The primary sources of benzene emissions in the SJVAB are mobile sources (approximately 67%) and stationary sources (approximately 32%). The mobile source emissions are primarily gasoline-fueled.

Brief inhalation exposure to high concentrations can cause central nervous system depression. Acute effects include central nervous system symptoms of nausea, tremors, drowsiness, dizziness, headache, intoxication, and unconsciousness. Neurological symptoms of inhalation exposure to benzene include drowsiness, dizziness, headaches, and unconsciousness in humans. Ingestion of large amounts of benzene may result in vomiting, dizziness, and convulsions in humans. Exposure to

benzene in liquid and vapor form may irritate the skin, eyes, and upper respiratory tract in humans. Redness and blisters may result from dermal exposure to benzene.

Chronic inhalation of certain levels of benzene causes blood disorders in humans; specifically, benzene affects bone marrow (the tissues that produce blood cells). Aplastic anemia, excessive bleeding, and damage to the immune system (by changes in blood levels of antibodies and loss of white blood cells) may develop. Increased incidence of leukemia (cancer of the tissues that form white blood cells) has been observed in humans who have been occupationally exposed to benzene.

## 1,3-Butadiene (vinyl ethylene)

1,3-butadiene has been identified as a carcinogen in California. The majority of 1,3-butadiene emissions come from incomplete combustion of petroleum-based fuels. Mobile sources account for 48% of total SJVAB emissions. Area sources, such as agricultural waste burning, open burning associated with forest management, and woodstoves and fireplaces, contribute to approximately 27%. Since the majority of 1,3-butadiene emissions are from incomplete combustion of gasoline and diesel fuels, CARB's 1990 adopted low emission vehicle/Clean Fuels regulations and the 1996 Phase II reformulated gasoline regulations are expected to continue to reduce 1,3-butadiene emissions from cars and light-duty trucks as the fleet turns over and new low-emission vehicles are introduced into the fleet.

At very high levels, butadiene vapors cause neurological effects, such as blurred vision, fatigue, headache, and vertigo. Dermal exposure of humans to 1,3-butadiene causes a sensation of cold, followed by a burning sensation, which may lead to frostbite.

One epidemiological study reported that chronic (long-term) exposure to 1,3-butadiene by inhalation resulted in an increase in cardiovascular diseases, such as rheumatic and arteriosclerotic heart diseases, while other human studies have reported effects on the blood. A large epidemiological study of synthetic rubber industry workers demonstrated a consistent association between 1,3-butadiene exposure and occurrence of leukemia. Several epidemiological studies of workers in styrene-butadiene rubber factories have shown an increased incidence of respiratory, bladder, stomach, and lymphato-hematopoietic cancers. However, these studies are not sufficient to determine a causal association between 1,3-butadiene exposure and cancer, due to possible exposure to other chemicals and other confounding factors.

## Carbon Tetrachloride (tetrachloromethane)

Carbon tetrachloride is a central nervous system depressant, which the EPA has classified as a Group B2, a probable human carcinogen. The primary sources of carbon tetrachloride in California include chemical and allied product manufacturers and petroleum refineries. Unlike many of the other TACs, carbon tetrachloride is emitted primarily by sources other than motor vehicles, and there are virtually no emissions within the SJVAB or California.

Acute inhalation and oral exposures to high levels of carbon tetrachloride have been observed primarily to damage the liver (swollen, tender liver, changes in enzyme levels, and jaundice) and

kidneys (nephritis, nephrosis, proteinurea) of humans. Depression of the central nervous system has also been reported. Symptoms of acute exposure in humans include headache, weakness, lethargy, nausea, and vomiting. Delayed pulmonary edema (fluid in lungs) has been observed in humans who have been exposed to high levels of carbon tetrachloride by inhalation and ingestion, but this is believed to be due to injury to the kidney rather than direct action of carbon tetrachloride on the lung. Chronic inhalation or oral exposure to carbon tetrachloride produces liver and kidney damage in humans and animals.

## Chromium, Hexavalent

Hexavalent chromium emissions come mainly from electric generation, aircraft and parts manufacturing, and fabricated metal produce manufacturing. In California, hexavalent chromium has been identified as a carcinogen. Epidemiological evidence suggests that exposure to inhaled hexavalent chromium may result in lung cancer.

The respiratory tract is the major target organ for chromium (VI) following inhalation exposure in humans. Other effects noted from acute inhalation exposure to very high concentrations of chromium (VI) include gastrointestinal and neurological effects, while dermal exposure causes skin burns in humans. Chronic inhalation exposure to chromium (VI) in humans results in effects on the respiratory tract, with perforations and ulcerations of the septum, bronchitis, decreased pulmonary function, pneumonia, asthma, and nasal itching and soreness reported. Chronic human exposure to high levels of chromium (VI) by inhalation or oral exposure may produce effects on the liver, kidney, gastrointestinal and immune systems, and possibly the blood.

## para-Dichlorobenzene

In California, para-dichlorobenzene has been identified as a carcinogen. In addition to the carcinogenic impact, long-term inhalation exposure may affect the liver, skin, and central nervous system in humans. Para-dichlorobenzene is a chlorinated aromatic hydrocarbon (NPIC 2010). It was first registered for use in the United States in 1942, and it is sometimes called 1,4-dichlorobenzene. It is a fumigant insecticide and repellent. Para-dichlorobenzene turns directly from a solid into a gas, a process called sublimation.

The primary sources of para-dichlorobenzene include consumer products such as non-aerosol insect repellents and solid/gel air fresheners. These sources contribute to 97% of SJVAB para-dichlorobenzene emissions.

People who have been exposed to para-dichlorobenzene have experienced nausea, vomiting, dizziness, fatigue, and headaches. Para-dichlorobenzene vapor can also irritate the eyes and nasal passages. It may also cause kidney and liver damage in pets.

## Formaldehyde

Formaldehyde is both directly emitted into the atmosphere and formed in the atmosphere as a result of photochemical oxidation. Photochemical oxidation is the largest source of formaldehyde

concentrations in California ambient air. Directly emitted formaldehyde is a product of incomplete combustion. One of the primary sources of formaldehyde is vehicular exhaust. In fact approximately 76% of the formaldehyde emissions in the SJVAB are from mobile sources, of which the source is predominantly diesel-fueled. Formaldehyde is also used in resins, fumigants, and soil disinfectants, and it can be found in many consumer products as an antimicrobial agent.

The major toxic effects caused by acute formaldehyde exposure via inhalation are eye, nose, and throat irritation and effects on the nasal cavity. Other effects seen from exposure to high levels of formaldehyde in humans are coughing, wheezing, chest pains, and bronchitis. Chronic exposure to formaldehyde by inhalation in humans has been associated with respiratory symptoms and irritation of the eye, nose, and throat. Animal studies have reported effects on the nasal respiratory epithelium and lesions in the respiratory system from chronic inhalation exposure to formaldehyde.

Occupational studies have noted statistically significant associations between exposure to formaldehyde and increased incidence of lung and nasopharyngeal cancer. This evidence is considered to be "limited," rather than "sufficient," due to possible exposure to other agents that may have contributed to the excess cancers. EPA considers formaldehyde to be a probable human carcinogen and has ranked it in the EPA's Group B1. In California, formaldehyde has been identified as a carcinogen.

## Methylene Chloride (Dichloromethane)

In California, methylene chloride has been identified as a carcinogen. In addition, chronic exposure can lead to bone marrow, hepatic, and renal toxicity. Methylene chloride is used as a solvent, a blowing and cleaning agent in the manufacture of polyurethane foam and plastic fabrication, and as a solvent in paint stripping operations. Approximately 80% of the SJVAB emissions of methylene chloride are from paint removers/strippers, automotive brake cleaners, and other consumer products. The statewide trend for methylene chloride shows that by comparing the statewide average methylene chloride concentration for 1990-1992 to that for 2005-2007 the result is a 77% decrease in both concentration and health risk.

Case studies of methylene chloride poisoning during paint stripping operations have demonstrated that inhalation exposure to extremely high levels of methylene chloride can be fatal to humans. Acute inhalation exposure to high levels of methylene chloride in humans has affected the central nervous system including decreased visual, auditory, and psychomotor functions, but these effects are reversible once exposure ceases. Methylene chloride also irritates the nose and throat at high concentrations. The major effects from chronic inhalation exposure to methylene chloride in humans are effects on the central nervous system, such as headaches, dizziness, nausea, and memory loss. In addition, chronic exposure can lead to bone marrow, hepatic, and renal toxicity. EPA considers methylene chloride to be a probable human carcinogen and has ranked it in EPA's Group B2. The State of California considers methylene chloride to be a carcinogen.

## Perchloroethylene (tetrachloroethylene)

In California, perchloroethylene (PERC) has been identified as a carcinogen. PERC vapors are irritating to the eyes and respiratory tract. Following chronic exposure, workers have shown signs of liver toxicity as well as kidney dysfunction and neurological disorders.

PERC is used as a solvent, primarily in dry cleaning operations. PERC is also used in degreasing operations, paints and coatings, adhesives, aerosols, specialty chemical production, printing inks, silicones, rug shampoos, and laboratory solvents. In the SJVAB, approximately 65% of the emissions of perchloroethylene are from such stationary sources as dry cleaning plants and manufacturers of aircraft parts and fabricated metal parts. Areawide sources contribute approximately 35%. In comparing the statewide perchloroethylene concentration for 1990-1992 to that for 2005-2007 the result is an 84% decrease in both concentration and health risk.

Breathing PERC for short periods of time can adversely affect the human nervous system. Effects range from dizziness, fatigue, headaches, and sweating to incoordination and unconsciousness. Contact with PERC liquid or vapor irritates the skin, eyes, nose, and throat. These effects are not likely to occur at levels of PERC that are normally found in the environment (EPA 1994).

Breathing PERC over longer periods of time can cause liver and kidney damage in humans. Workers exposed repeatedly to large amounts of PERC in air can also experience memory loss and confusion. Laboratory studies show that PERC causes kidney and liver damage and cancer in animals exposed repeatedly by inhalation and by mouth. Repeat exposure to large amounts of PERC in air may likewise cause cancer in humans.

## Diesel Particulate Matter

Diesel exhaust and many individual substances contained in it (including arsenic, benzene, formaldehyde, and nickel) have the potential to contribute to mutations in cells that can lead to cancer. More than 40 diesel exhaust components are listed by the State and federal government as TACs or hazardous air pollutants, respectively. In California, particulate emissions from diesel-fueled engines has been identified as a carcinogen (17 California Code of Regulations (CCR) § 93000). Most researchers believe that diesel exhaust particles contribute the majority of the risk because the particles in the exhaust carry many harmful organics and metals.

Diesel particulate matter (DPM) is emitted from both mobile and stationary sources. In the SJVAB, on-road diesel-fueled vehicles contribute approximately 61% of the total, with an additional 38% attributed to other diesel-fueled mobile sources such as construction and agricultural equipment.

Long-term exposure to diesel exhaust particles poses the highest cancer risk of any TAC evaluated by the California Office of Environmental Health Hazard Assessment (OEHHA). CARB estimates that about 70% of the cancer risk that the average Californian faces from breathing TACs stems from diesel exhaust particles.

In its comprehensive assessment of diesel exhaust, OEHHA analyzed more than 30 studies of people who worked around diesel equipment, including truck drivers, railroad workers, and equipment operators. The studies showed these workers were more likely than workers who were not exposed to diesel emissions to develop lung cancer. These studies provide strong evidence that long-term occupational exposure to diesel exhaust increases the risk of lung cancer. Using information from OEHHA's assessment, CARB estimates that diesel-particle levels measured in California's air in 2000 could cause 540 "excess" cancers (beyond what would occur if there were no diesel particles in the air) in a population of 1 million people over a 70-year lifetime (OEHHA 2002).

Other researchers and scientific organizations, including the National Institute for Occupational Safety and Health, have calculated similar cancer risks from diesel exhaust as those calculated by OEHHA and CARB.

Exposure to diesel exhaust can have immediate health effects. Diesel exhaust can irritate the eyes, nose, throat and lungs, and it can cause coughs, headaches, lightheadedness, and nausea. In studies with human volunteers, diesel exhaust particles made people with allergies more susceptible to the materials to which they are allergic, such as dust and pollen. Exposure to diesel exhaust also causes inflammation in the lungs, which may aggravate chronic respiratory symptoms and increase the frequency or intensity of asthma attacks.

Diesel engines are a major source of fine-particle pollution. The elderly and people with emphysema, asthma, and chronic heart and lung disease are especially sensitive to fine-particle pollution.

Numerous studies have linked elevated particle levels in the air to increased hospital admissions, emergency room visits, asthma attacks, and premature deaths among people suffering from respiratory problems. Because children's lungs and respiratory systems are still developing, they are also more susceptible than healthy adults to fine particles. Exposure to fine particles is associated with increased frequency of childhood illnesses and can reduce lung function in children. In California, diesel exhaust particles have been identified as carcinogens.

## Polycyclic Aromatic Hydrocarbons (PAHs)

The term polycyclic aromatic hydrocarbons (PAHs) refers to a group of several hundred chemically related, environmentally persistent organic compounds of various structures and varied toxicity. Most of them are formed by a process of thermal decomposition (pyrolysis) and subsequent recombination (pyrosynthesis) of organic molecules. PAHs enter the environment through various routes and are usually found as a mixture containing two or more of these compounds, e.g., soot. They have been shown to cause carcinogenic and mutagenic effects and are potent immunosuppressants. Effects have been documented on immune system development. They are by-products of natural gas combustion.

## Valley Fever

Valley Fever or coccidioidomycosis is one of the most studied and oldest known fungal infections. Coccidioidomycosis was first discovered in the early 1890s in Domingo Ezcurra, an Argentinean

soldier, and in 1900 was established as a fungal disease. After an outbreak in the 1930s in the San Joaquin Valley of California, this disease was given its nickname "San Joaquin Valley Fever," often shortened further to "Valley Fever" (Los Angeles County Department of Health Services, Public Health 2004).

Valley Fever is primarily a disease of the lungs caused by inhalation of spores of the *Coccidioides immitis* fungus. The *Coccidioides* fungus resides in the soil in southwestern United States, northern Mexico, and parts of Central and South America. When weather and moisture conditions are favorable, the fungus "blooms" and forms many tiny spores that lie dormant in the soil. The spores are found in the top few inches of soil, become airborne when the soil is disturbed by wind, vehicles, excavation, or other ground-moving activities, and are subsequently inhaled into the lungs. After the fungal spores have settled in the lungs, they change into a multicellular structure called a spherule. Fungal growth in the lungs occurs as the spherule grows and bursts, releasing endospores, which then develop into more spherules.

Infection occurs when the spores of the fungus become airborne and are inhaled. The fungal spores become airborne when contaminated soil is disturbed by human activities, such as construction and agricultural activities, and natural phenomenon, such as wind storms, dust storms, and earthquakes.

Valley Fever symptoms generally occur within two to three weeks of exposure. Approximately 60% of Valley Fever cases are mild and display flu-like symptoms or no symptoms at all. The remainder developed flu-like symptoms (fatigue, cough, chest pain, fever, rash, headache, and joint aches) that can last for a month and tiredness that can sometimes last for longer than a few weeks. In some cases, painful red bumps may develop. A small percentage of infected persons (<1%) can develop disseminated disease that spreads outside the lungs to the brain, bone, and skin. Without proper treatment, Valley Fever can lead to severe pneumonia, meningitis, and even death. Symptoms may appear between one to four weeks after exposure.

One important fact to mention is that these symptoms are not unique to Valley Fever and may be caused by other illnesses as well. Identifying and confirming this disease requires specific laboratory tests such as: (1) microscopic identification of the fungal spherules in the infected tissue, sputum, or body fluid sample; (2) growing a culture of *Coccidioides immitis* from a tissue specimen, sputum, or body fluid; (3) detection of antibodies (serological tests specifically for Valley Fever) against the fungus in blood serum or other body fluids; and (4) administering the Valley Fever skin test (called coccidioidin or spherulin), which indicates prior exposure to the fungus

Valley Fever is not contagious and therefore cannot be passed from person to person. Most of those who are infected will recover without treatment within six months and will have a life-long immunity to the fungal spores. In severe cases, such as patients with rapid and extensive primary illness, those who are at risk for dissemination of disease, and those who have disseminated disease, antifungal drug therapy is used. Only 1% to 2% of those exposed who seek medical attention will develop a disease that disseminates (spreads) to other parts of the body other than the lungs. Table 4.3-5 presents the various infection classifications and normal diagnostic spread as noted in recent research.

**Table 4.3-5: Range of Valley Fever Cases**

| Infection Classification | Percent of Total Diagnosed Cases |
|---|---|
| Asymptomatic infections | 60 |
| Infections that resolve spontaneously (with lifelong immunity) | 35 |
| Chronic disease or disease disseminated throughout the body | Up to 5 |
| Meningeal infection (affecting brain and/or spinal cord and requiring lifetime treatment) | 0.15–0.75 |

Source: Hector 2005.

Factors that affect the susceptibility to coccidioidal dissemination are race, sex, pregnancy, age, and immunosuppression. According to data gathered by the Kern County Health Department, Hispanic/Latino-Americans are 3.4 times more likely than whites to develop coccidioidal dissemination, African-Americans are 13.7 times more likely, and Filipinos are 175.5 times more likely. Regarding the number of deaths attributed to the disease, compared to whites, the number of Hispanic/Latino is five times greater; African Americans, 23.3 times greater; and Filipinos, 191.4 times greater. In addition, residents new to the San Joaquin Valley are at a higher risk of infection due primarily to low immunity to this particular fungus (see also KCPHS 2014).

## Asbestos

Asbestos is the name given to a number of naturally occurring fibrous silicate minerals that have been mined for their useful properties such as thermal insulation, chemical and thermal stability, and high tensile strength. The three most common types of asbestos are chrysotile, amosite, and crocidolite. Ultramafic, serpentinized rock is closely associated with asbestos and is chemically composed of the following list of minerals:

- Antigorite; $(Mg, Fe)_3Si_2O_5(OH)_4$;
- Clinochrysotile; $Mg_3Si_2O_5(OH)_4$;
- Lizardite; $Mg_3Si_2O_5(OH)_4$;
- Orthrochrysotile; $Mg_3Si_2O_5(OH)_4$; and
- Parachrsotile; $(Mg, Fe)_3Si_2O_5(OH)_4$.

These minerals have essentially the same chemistry but different structures. Chysotile minerals are more likely to form serpentinite asbestos; however, serpentinite is uncommon to sedimentary soil found in the proposed Project Area.

Asbestos can adversely affect humans only in its fibrous form, and these fibers must be broken and dispersed into the air and then inhaled. During geological processes (e.g., fault movement), the asbestos mineral can be crushed, causing it to become airborne. It also enters the air or water from the breakdown of natural deposits. Constant exposure to asbestos at high levels on a regular basis

may cause cancer in humans. The two most common forms of cancer are lung cancer and mesothelioma, a rare cancer of the lining that covers the lungs and stomach.

Chrysotile, also known as white asbestos, is the most common type of asbestos found in buildings. Chrysotile makes up approximately 90% to 95% of all asbestos contained in buildings in the United States. Project construction sometimes requires the demolition of existing buildings where construction occurs. Buildings often include materials containing asbestos. Most demolitions and many renovations are subject to an asbestos inspection prior to start of activity. The demolition, renovation, or removal of asbestos-containing building materials is subject to the limitations of the National Emissions Standards for Hazardous Air Pollutants (NESHAP) regulations as listed in the Code of Federal Regulations requiring notification, inspection, and compliance with local air district regulations. The SJVAPCD requires compliance with NESHAP and has adopted Rule 4002.

In addition, asbestos is also found in a natural state. Exposure and disturbance of rock and soil that naturally contains asbestos can result in the release of fibers to the air and consequent exposure to the public. Asbestos most commonly occurs in ultramafic rock that has undergone partial or complete alteration to serpentine rock (serpentinite) and often contains chrysotile asbestos. In addition, another form of asbestos, tremolite, can be found associated with ultramafic rock, particularly near faults. Sources of asbestos emissions include unpaved roads or driveways surfaced with ultramafic rock, construction activities in ultramafic rock deposits, or rock quarrying activities where ultramafic rock is present.

To address some of the health concerns associated with exposure to asbestos from these activities, CARB has adopted two Airborne Toxic Control Measures (ATCMs). CARB has an ATCM for construction, grading, quarrying, and surface mining operations requiring the implementation of mitigation measures to minimize emissions of asbestos-laden dust. This ATCM applies to road construction and maintenance, construction and grading operations, and quarries and surface mines when the activity occurs in an area where naturally occurring asbestos (NOA) is likely to be found. Areas are subject to the regulation if they are identified on maps published by the California Department of Conservation as ultramafic rock units or if the Air Pollution Control Officer (APCO) or owner/operator has knowledge of the presence of ultramafic rock, serpentine, or NOA on the site. The ATCM also applies if ultramafic rock, serpentine, or asbestos is discovered during any operation or activity.

In addition, CARB has an ATCM for surfacing applications. This ATCM applies to any person who produces, sells, supplies, offers for sale or supply, uses, applies, or transports any: (1) aggregate material extracted from property where any portion of the property is located in a geographic ultramafic rock unit; or (2) aggregate material extracted from property that is not located in a geographic ultramafic rock unit, if:

- The material has been evaluated at the request of the APCO and determined to be ultramafic rock or serpentine.

- Material tested at the request of the APCO is determined to have an asbestos content of 0.25% or greater or is determined by the owner/operator of a facility to be ultramafic rock or serpentine.

- The material has an asbestos content of 0.25% or greater.

The ATCM prohibits a person from using, applying, selling, supplying, or offering for sale or supply any restricted material for surfacing unless it has been tested and determined to have an asbestos content that is less than 0.25%.

## Carbon Dioxide

Carbon dioxide, along with several other compounds, is considered a greenhouse gas (GHG) that is contributing to climate change. Discussion of carbon dioxide and other greenhouse gases is included in Section 4.7, Greenhouse Gas Emissions and Global Climate Change.

## Sensitive and Worker Receptors

Some land uses are considered more sensitive to air pollution than others due to the types of population groups or activities involved. Land uses that can be considered sensitive receptors include residential communities, schools, playgrounds, childcare centers, athletic facilities, long-term health care facilities, rehabilitation centers, convalescent centers, and retirement homes. Sensitive individuals with compromised immune systems, such as children and the elderly, may be exposed to emissions from the construction and operation of the Project. Worker receptors refer to employees and locations where people work. Impacts on sensitive receptors are of particular concern, because they are the people most vulnerable to the effects of air pollution.

## Odorous Compounds

Odor refers to the perception or sensation experienced when one or more volatilized chemical compounds come in contact with receptors on the olfactory nerves. Odorant refers to any volatile chemical in the air that is part of the perception of odor by a human. The difference in sensory and physical responses experienced by individuals is responsible for the significant variability in the individual sensitivity to the quality and intensity of an odorant.

Several compounds associated with the oil and gas industry can produce odors that can be determined to be nuisances. Sulfur compounds, found in oil and gas, have very low odor threshold levels. For instance, $H_2S$ can be detected by humans at concentrations from 0.5 parts per billion (ppb) (detected by 2% of the population), to 40 ppb, qualified as annoying by 50% of the population. These levels are significantly lower than concentrations that could affect human health (2 ppm [2,000 ppb] can cause headaches and increased airway resistance in asthmatics; inhalation of more than 600 ppm can be instantly lethal and inhalation of over 100 ppm can be lethal if exposed to for more than 60 minutes [ERPG-3]).

Many volatile compounds found in oil and gas (ethane and longer chain hydrocarbons) typically have petroleum or gasoline odor with various odor thresholds.

Natural gas contains mostly methane (which is odorless), thus it has to be odorized as dictated by law, before being placed into a distribution pipeline. The various odorizing compounds that are used for odorization (e.g. methyl mercaptan or ethyl mercaptan), contain sulfur compounds having a very low odor threshold and can produce odors if released into the atmosphere.

Because of the location of most oil and gas production activities in rural areas, odors may accumulate with agricultural odorous compounds, which are typically produced by insecticides, chemical fertilizers, and compost, particularly manure. A large number of odorous compounds are released from agricultural and dairy activities, including notably ammonia ($NH_3$) and $H_2S$.

## Baseline Emissions Inventory

### Criteria Air Pollutants

Table 4.3-6 summarizes the CARB inventories for criteria air pollutant emissions from anthropogenic (i.e., not natural) sources in California, the San Joaquin Valley and Kern County for 2012, defined by the applicant as baseline year for the Project air quality impact analysis.

**Table 4.3-6: Criteria Air Pollutant Emissions Inventory – Year 2012**

| California Emissions Inventory (tons/day) | | | | | | |
|---|---|---|---|---|---|---|
| **Source Category** | **NOx** | **ROG** | **CO** | **SOx** | **$PM_{10}$** | **$PM_{2.5}$** |
| Stationary Source | 283.6 | 384.1 | 259.7 | 51.8 | 122.8 | 61.7 |
| Areawide Source | 75.1 | 608.8 | 970.7 | 6.1 | 1,213.0 | 271.0 |
| Onroad Mobile | 1,024 | 403.5 | 3,937.6 | 5.38 | 77.6 | 43.1 |
| Other Mobile | 723.5 | 342.2 | 2,204.4 | 41.8 | 46.3 | 42.3 |
| Total for State | 2,106 | 1,739 | 7372 | 105 | 1,460 | 418 |
| **San Joaquin Valley Emissions Inventory (tons/day)** | | | | | | |
| Stationary Source | 36.4 | 94.2 | 25.7 | 7.9 | 14.0 | 8.8 |
| Areawide Source | 13.3 | 176.2 | 186.8 | 1.3 | 250.2 | 54.0 |
| Onroad Mobile | 177.9 | 48.5 | 437.7 | 0.7 | 10.8 | 6.7 |
| Other Mobile | 97.6 | 39.0 | 252.5 | 0.5 | 6.6 | 6.1 |
| Total for SJV | 325.2 | 357.9 | 902.6 | 10.4 | 281.6 | 75.6 |
| **Kern County Emissions Inventory (tons/day)** | | | | | | |
| Stationary Source | 9.6 | 44.0 | 11.6 | 2.2 | 5.0 | 4.0 |
| Areawide Source | 1.5 | 21.8 | 9.0 | 0.03 | 35.0 | 6.5 |
| Onroad Mobile | 48.6 | 9.4 | 81.9 | 0.2 | 2.7 | 1.8 |
| Other Mobile | 12.6 | 5.1 | 49.6 | 0.1 | 0.7 | 0.7 |
| Total for Kern County | 72.3 | 80.3 | 152.1 | 2.5 | 43.4 | 13.0 |

Source: Vector Environmental 2015

## Toxic Air Contaminants

Table 4.3-7 summarizes the most recent California Toxics Inventory data in the SJVAB.

**Table 4.3-7: San Joaquin Valley Toxic Emissions Inventory – 2010**

| Pollutant | Emissions by Source Category (Tons/Year)[1] | | | | |
|---|---|---|---|---|---|
| | Stationary Source | Area Source | Mobile Source | Other Sources | All Total |
| Diesel Particulate | 268.0 | 1.9 | 1,898.6 | 351.9 | 2520.3 |
| Formaldehyde | 401.2 | 254.5 | 786.6 | 875.7 | 2318.0 |
| Benzene | 239.4 | 11.8 | 456.4 | 313.6 | 1021.2 |
| Acetaldehyde | 81.2 | 2,678.7 | 344.7 | 12,956.6 | 16,061.2 |
| 1,3-Butadiene | 2.0 | 116.7 | 92.2 | 224.2 | 435.1 |
| Perchloroethylene | 305.0 | 143.0 | 0.0 | 0.0 | 448.0 |
| Acrolein | 6.1 | 80.8 | 32.2 | 34.0 | 153.0 |
| Methylene Chloride | 77.3 | 169.9 | 0.0 | 0.0 | 247.2 |
| PAHs | 40.1 | 19.3 | 88.1 | 90.7 | 238.2 |
| p-Dichlorobenzene | 4.7 | 125.7 | 0.0 | 0.0 | 130.3 |
| Manganese | 46.7 | 167.3 | 3.0 | 1.2 | 217.9 |
| Styrene | 26.2 | 25.6 | 23.5 | 10.5 | 95.8 |
| Nickel | 0.8 | 0.0 | 0.0 | 0.0 | 0.8 |
| Chromium | 4.1 | 27.9 | 2.2 | 0.2 | 34.4 |
| Trichloroethylene | 8.7 | 37.2 | 0.0 | 0.0 | 45.8 |
| Lead | 1.2 | 26.1 | 0.3 | 1.2 | 28.7 |
| Vinyl Chloride | 7.4 | 0.0 | 0.0 | 0.0 | 7.4 |
| Acrylonitrile | 7.3 | 0.0 | 0.0 | 0.0 | 7.3 |
| Arsenic | 1.9 | 2.9 | 0.03 | 0.4 | 5.2 |
| Cadmium | 0.4 | 2.9 | 0.04 | 0.1 | 3.4 |
| Mercury | 0.2 | 2.1 | 0.01 | 0.01 | 2.2 |
| Ethylene Oxide | 0.2 | 0.0 | 0.0 | 0.0 | 0.2 |
| Chloroform | 1.8 | 0.0 | 0.0 | 0.0 | 1.8 |
| Ethylene Dichloride | 0.1 | 0.0 | 0.0 | 0.0 | 0.1 |
| Beryllium | 0.03 | 0.0 | 0.0 | 0.0 | 0.03 |
| Carbon Tetrachloride | 0.02 | 0.0 | 0.0 | 0.0 | 0.02 |
| Dioxins/Benzofurans | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Chromium-VI | 0.2 | 0.0 | 0.0 | 0.01 | 0.2 |

**Table 4.3-7: San Joaquin Valley Toxic Emissions Inventory – 2010**

| Pollutant | Emissions by Source Category (Tons/Year)[1] | | | | |
|---|---|---|---|---|---|
| | Stationary Source | Area Source | Mobile Source | Other Sources | All Total |

Source: CARB 2013a
Note:
(1) Emissions have been rounded up to the nearest decimal value.

## 4.3.3 Regulatory Setting

Air quality in the Project Area is addressed through the efforts of various federal, state, regional, and local government agencies. The agencies primarily responsible for improving the air quality within the County include the EPA, CARB, SJVAPCD, and the Kern Council of Governments (COG). These agencies work jointly, as well as individually, to improve air quality through legislation, regulations, planning, policy-making, education, and a variety of programs. The agencies primarily responsible for improving the air quality within Kern County are discussed below, along with their individual responsibilities.

# Federal

The principal air quality regulatory mechanism on the federal level is the CAA as amended in 1990 and in particular, the NAAQS established by the EPA pursuant to the CAA. These standards identify levels of air quality for "criteria" pollutants that are considered the maximum levels of ambient (background) air considered safe, with an adequate margin of safety, to protect the public health and welfare. The criteria pollutants include ozone, CO, $NO_2$, $PM_{10}$, $PM_{2.5}$, $SO_2$, which is a form of $SO_X$, and Pb. The EPA also has regulatory and enforcement jurisdiction over emission sources beyond state waters (outer continental shelf), and those that are under the exclusive authority of the federal government, such as aircraft, locomotives, and interstate trucking. The EPA's primary role at the State level is to oversee the State air quality programs. The EPA sets federal vehicle and stationary source emission standards and oversees approval of all State Implementation Plans (SIP), as well as providing research and guidance in air pollution programs. The SIP is a state-level document that identifies all air pollution control programs within California that are designed to help the State meet the NAAQS.

Attainment defines the status of a given airshed with regard to NAAQS requirements. Airsheds not meeting these standards are classified as "nonattainment."

### Title V and Extreme Designation

Title V of the federal CAA, as amended in 1990, creates an operating permits program for facilities classified as major emission sources. Major emission sources are those that emit pollutants above the major source threshold applicable to the location of the emission source. In general, major source thresholds are 100 tons per year for any criteria pollutant. However, this will vary depending upon the attainment status of the source's location. In an ozone extreme nonattainment area, such as the

Project Area, sources that emit more than 10 tons per year of $NO_X$ and ROG are classified as major sources for Title V permitting. This results in more businesses having to comply with Title V permitting requirements under the Extreme nonattainment designation.

Title V does not impose any new air pollution standards, require installation of any new controls on the affected facilities, or require reductions in emissions. Title V enhances public and EPA participation in the permitting process and requires additional record keeping and reporting by businesses, which results in significant administrative requirements.

## EPA Emission Standards

The EPA establishes and maintains emission standards of performance of new stationary sources under CAA Section 111(b), as the New Source Performance Standards (NSPS; 40 CFR 60). Categories of existing stationary sources can also be retroactively controlled under CAA Section 111(d).

Categories of sources that cause HAP emissions are controlled through separate standards under CAA Section 112: National Emission Standards for Hazardous Air Pollutants (NESHAP). These standards are specifically designed to reduce the potency, persistence, or potential bioaccumulation of toxic air pollutants. The emission standards for HAPs under CAA Section 112 prevent adverse health risks and carcinogenic effects from targeted types of facilities.

## New Source Performance Standards (NSPS) for the Oil and Gas Sector

The following Subparts of NSPS (40 CFR 60) are applicable to the Project:

- **NSPS Subpart OOOO:** Crude Oil and Natural Gas Production, Transmission, and Distribution, including the Oil and Natural Gas Sector for Fractured Wells (drilled after August 23, 2011). This Rule requires control of VOC and $SO_2$ from each natural gas well completion to implement measures such as reduced emission completions (RECs), or the use of completion combustion devices to control flowback emissions (Section 60.5375). Companies must provide notifications of natural gas well completions. Because NSPS Subpart OOOO addressed natural gas well completions, EPA is also researching techniques available to reduce emissions from oil well completions.
- **NSPS Subpart KKK:** Equipment Leaks of VOC from Onshore Natural Gas Processing Plants.
- **NSPS Subpart LLL:** $SO_2$ Emissions from Onshore Natural Gas Processing.
- **NSPS Subpart III:** Stationary Compression Ignition.
- **NSPS Subpart JJJ:** Spark Ignition Internal Combustion Engines.
- **NSPS Subpart KKKK:** Stationary Combustion Turbines.

### National Emission Standards for Hazardous Air Pollutants (NESHAPs)

The following Subparts of NESHAP (40 CFR 61 and 63) are applicable to the Project:

- **NESHAP Subpart V (40 CFR 61):** Equipment Leaks and Fugitive Emissions.
- **NESHAP Subpart H (40 CFR 63):** Hazardous Organic Pollutant Equipment Leaks.
- **NESHAP Subpart HH (40 CFR 63):** Oil and Gas Natural Production.
- **NESHAP Subpart HHH (40 CFR 63):** Natural Gas Transmission and Storage.
- **NESHAP Subpart YYYY (40 CFR 63):** Stationary Combustion Turbines.
- **NESHAP Subpart ZZZZ (40 CFR 63):** Reciprocating Internal Combustion Engines**.**

### EPA Natural Gas STAR Program

This voluntary program encourages oil and natural gas companies to adopt cost-effective technologies and practices to improve operational efficiency and prevent emissions from methane. The Natural Gas STAR program defines protocols for methane control at natural gas production facilities, resulting in concomitant reductions of other organic compounds (EPA 2015a).

As of January 14, 2015, EPA announced an additional strategy for a series of steps it plans to take to address methane and smog-forming VOC emissions from the oil and gas industry (EPA 2015b). The steps include building on commonsense standards for VOC emissions to help avoid anticipated increase in methane emissions from new sources; reducing additional pollution in areas with ozone problems by issuing Control Techniques Guidelines that provide an analysis of the available, cost-effective technologies for controlling VOC emissions from covered oil and gas sources; and providing additional support for industry actions to reduce methane emissions including several voluntary efforts to address these sources that already are underway, including EPA's plans to expand the successful Natural Gas STAR Program by launching a new partnership in collaboration with key stakeholders later in 2015.

## State

### California Air Resources Board

The CARB, a department of the California Environmental Protection Agency, oversees air quality planning and control throughout California by administering the SIP. Its primary responsibility lies in ensuring implementation of the 1989 California Clean Air Act (CCAA), responding to the federal CAA requirements and regulating emissions from motor vehicles sold in California. It also sets fuel specifications to further reduce vehicular emissions.

The CCAA establishes a legal mandate to achieve many of the CAAQS by the earliest practical date. These standards apply to the same criteria pollutants as the federal CAA, and also include sulfate, visibility reducing particulates, H2S and vinyl chloride. They are also more stringent than the federal standards.

The CARB is also responsible for regulations pertaining to TACs. The "Tanner Act," enacted in 1983, directed CARB to identify toxic air contaminants and to adopt ATCMs to "reduce, avoid, or eliminate the emissions of a toxic air contaminant." To date, CARB has formally identified 21 TACs and has adopted 26 ATCMs (see CARB 2015). The Air Toxics "Hot Spots" Information and Assessment Act (Assembly Bill [AB] 2588; Health & Safety Code §§ 44300 et seq.) was enacted in 1987 as a means to establish a formal air toxics emission inventory risk quantification program. AB 2588, as amended, establishes a process that requires stationary sources to report the type and quantities of certain substances their facilities routinely release into their air basin. Each air pollution control district ranks the data into high, intermediate, and low priority categories. When considering the ranking, the potency, toxicity, quantity, volume and proximity of the facility to receptors are given consideration by an air district. AB 2588 was amended in 1992 by Senate Bill (SB) 1731, and further modified by AB 564 in 1996. The goal of the Air Toxics "Hot Spots" Act, as amended, is to collect emission data indicative of routine predictable releases of toxic substances to the air, to identify facilities having localized impacts, to evaluate health risks from exposure to the emissions, to notify nearby residents of significant risks, and, reduce risk below the determined level of significance (CARB 2014a).

The CARB also has on-road and off-road engine emission reduction programs that indirectly affect the Project's emissions through the phasing in of cleaner on-road and off-road equipment engines. Additionally, the CARB has a Portable Equipment Registration Program (PERP) that allows owners or operators of portable engines and associated equipment to register their units under a statewide portable program to operate their equipment, which must meet specified program emission requirements, throughout California without having to obtain individual permits from local air districts.

The State has also enacted an ATCM for the reduction of DPM and criteria pollutant emissions from in-use off-road diesel-fueled vehicles (CCR Title 13, Article 4.8, Chapter 9, Section 2449). This regulation provides target emission rates for PM and NOx emissions from owners of fleets of diesel-fueled off-road vehicles and applies to equipment fleets of three specific sizes and the target emission rates are reduced over time (CARB 2007).

## Regulation of Air Pollution Transport between Air Basins

The CCAA directs CARB to assess the contribution of ozone and ozone precursors in upwind basins or regions to ozone concentrations that violate the state ozone standard in downwind basins or regions. The movement of ozone and ozone precursors between basins or regions is referred to as "transport." In addition, the CCAA directs CARB to establish mitigation requirements for upwind districts commensurate with their contributions to the air quality problems in downwind basins or regions.

Over the last decade, CARB has published several transport reports that include technical assessments of transport relationships between air basins and regions in California. Along with these technical assessments, the reports have included mitigation requirements to ensure that upwind areas do their part to limit the effects of transport on their downwind neighbors. CARB originally

established mitigation requirements in 1990, which are contained in Title 17, CCR, Sections 70600 and 70601. These regulations were amended in 1993 and more recently in 2003. The most recent amendments added two new requirements for upwind districts. These amendments require upwind districts to: (1) consult with their downwind neighbors and adopt "all feasible measures" for ozone precursors; and (2) amend their "no net increase" thresholds for permitting so that they are equivalent to those of their downwind neighbors. The amendments clarify that upwind districts are required to comply with the mitigation requirements, even if they attain the state ozone standard in their own district, unless the mitigation measures are not needed in the downwind district.

According to SVVAPCD, air pollution transported from the San Francisco Bay and Sacramento areas account for approximately 27% of the total emissions in the northern portion of the SJVAPCD (San Joaquin, Stanislaus, and Merced counties). In the Central region (Fresno, Madera and Kings counties), the percentage drops to 11%, and in the south valley (the Valley portion of Kern and Tulare counties), transported air pollution accounts for only 7% of the total problem.

The Mojave Desert Air Basin (MDAB) includes the desert portions of Los Angeles, Kern, San Bernardino, and Riverside counties. Most of this area is commonly referred to as the "high desert," because elevations range from approximately 2,000 to 5,000 feet above sea level. The MDAB is characterized by extreme temperature fluctuations, strong seasonal winds, and clear skies. While the Project limits do not extend into the Kern County portion of the MDAB, studies in the Southern San Joaquin Valley, South Coast Air Basin, and other airsheds have included intensive ozone and meteorological measurements, tracer studies, and development of transport models (CARB 2009a). The issue of ozone transport in the Kern County area has been studied for over 30 years (WZI 1994). A recent study recognized the significant ozone transport from the San Joaquin Valley into the Mojave Desert area through the Tehachapi Pass (Sonoma Technology 2006).

The topography and climate of southern California combine to make the South Coast Air Basin an area with a high potential for air pollution, which constrains efforts to achieve clean air. During the summer months, a warm air mass frequently descends over the cool, moist marine layer produced by the interaction between the ocean's surface and the lowest layer of the atmosphere. The warm upper layer forms a cap over the cool marine layer and inhibits the pollutants in the marine layer from dispersing upward. In addition, light winds during the summer further limit ventilation. Furthermore, sunlight triggers the photochemical reactions which produce ozone, and this region experiences more days of sunlight than many other major urban areas in the nation (South Coast Air Quality Management District 2006). Transboundary ozone transport form Asia and its impact on air quality in the SJVAB is being further studied and increases in ozone levels due to transport have been confirmed (SJVAPCD 2013c).

# Local

## San Joaquin Valley Air Pollution Control District

State law assigns much of the authority to regulate stationary, indirect, and area sources to local air pollution control and air quality management districts. The SJVAPCD has primary responsibility for

regulating stationary sources of air pollution situated within its jurisdictional boundaries. To this end, the SJVAPCD implements air quality programs required by State and federal mandates, enforces rules and regulations based on air pollution laws, and educates businesses and residents about their role in protecting air quality. The SJVAPCD is responsible for regulating stationary, indirect, and area sources of air pollution in the SJVAB. The eight counties that comprise the SJVAPCD are divided into three regions: the Northern Region (Merced, San Joaquin, and Stanislaus counties), the Central Region (Madera, Fresno, and Kings counties), and the Southern Region (Tulare County and San Joaquin Valley portion of Kern County).

The San Joaquin Valley (or portions thereof) is designated as nonattainment with respect to federal air quality standards for ozone and $PM_{2.5}$. It also has a maintenance plan for $PM_{10}$ in the Valley and for CO for the urbanized/metropolitan areas of Kern, Fresno, Stanislaus, and San Joaquin counties.

The SJVAPCD is responsible for managing and permitting existing, new, and modified sources of air emissions within its boundaries and also established the following rules and regulations to ensure compliance with local, State, and federal air quality regulations:

## Rules and Regulations

The following SJVAPCD Rules and Regulations apply to the oil and gas production industry and its ancillary facilities.

### Regulation I (General Provisions)

**Regulation I (General Provisions)** is a series of rules that establish the basic framework for interacting with the SJVAPCD including enforcement procedures, inspections, and source sampling requirements, and regulatory accountability.

### Regulation II (Permits)

**Rule 2010 (Permits Required)** requires any person constructing, altering, replacing, or operating any source operation which emits, may emit, or may reduce emissions to obtain an Authority to Construct or a Permit to Operate.

**Rule 2092 (Standards for Permits to Operate)** defines the conditions which must be met in order for an APCO to issue a Permit to Operate.

**Rule 2201 (New and Modified Stationary Source Review Rule)** provides for the review of new and modified Stationary Sources of air pollution and to provide mechanisms including emission offsets by which Authorities to Construct such sources may be granted, without interfering with the attainment or maintenance of Ambient Air Quality Standards; and ensure that no net increase in emissions above specified thresholds from new and modified Stationary Sources of all nonattainment pollutants and their precursors occur.

**Rule 2250 (Permit-Exempt Equipment Registration)** is essentially an SJVAPCD rule designed to provide the SJVAPCD with oversight of equipment that would otherwise not require an air permit.

According to the SJVAPCD's Permit-Exempt Equipment Registration – Frequently Asked Questions document, "PEER is necessary to enforce the requirements of certain District prohibitory rules in which the emissions equipment is exempt from permitting requirements" (SJVAPCD 2008). Section 4.5 of Rule 2250 states that the District shall issue the Permit-Exempt Equipment Registration (PEER) within 90 days of receipt of a completed application. Section 4.7 - 4.8 specify that a PEER unit is neither transferable between locations or owners without an application for transfer. See Rule 3155 for information on fees relating to PEER units. Additionally, Rules 4702, 4307, and 4622 define different types of PEER units.

**Rule 2280 (Portable Equipment Registration)** provides the administrative requirements for permitting portable emissions units for operation in participating districts throughout the state of California, starting in Section 4.0 - 4.13. To register portable equipment, an application must be submitted to the district in which operation will first occur. The Applicant shall provide the administering district with all necessary emissions and engineering data in order to demonstrate compliance with Section 5 of this rule. Section 4.4 states that prior to issuing a permit for portable registration, the SJVAPCD will conduct an onsite inspection of the unit. There are several notification and reporting rules associated with portable equipment. Namely, Section 6.1 states that if a portable emissions unit remains at a location for more than 24 hours, the SJVAPCD must be notified within two calendar days, and Section 6.2 states that within 30 days after the end of every calendar quarter, the SJVAPCD must be provided with the level of activity (hours of operation) for the previous quarter, unless the equipment is a rental. Finally, Section 8.0 provides emissions limitation and minimum distance requirements of 1,000 feet from kindergarden-12th grade schools.

**Rule 2410 (Prevention of Signification Deterioration)** - Rule 2410 is triggered when obtaining construction permits for a new major stationary source and/or major modification to existing major stationary sources located in areas classified as "in attainment" or in areas that are unclassifiable for any criteria pollutant. The most important of the "Requirements" in Section 4.0 is that of 4.1 requiring that a PSD permit be obtained prior to beginning any construction of a new major stationary source or a major modification to an existing major stationary source. Lastly, the SJVAPCD must follow the public notice requirements of Rule 2201 prior to issuing a federal PSD permit.

**Rule 2520 (Federally Mandated Operating Permits)** applies to major sources of criteria pollutants and/or toxics, stationary sources with the potential to emit 100 tons per year or more of any air contaminant, sources required by Title V to obtain acid rain permits, sources required by the PSD program to have a preconstruction review, solid waste incinerators subject to Sections 111 or 129 of the CAA and any source in a source category designated by the EPA.

**Rule 2540 (Acid Rain Program)** incorporates the Acid Rain Standards from Part 72, Title 40 CFR and is applicable to all stationary sources subject to Part 72, Title 40, CFR.

**Rule 2550 (Federally Mandated Preconstruction Review for Major Sources of Air Toxics)** applies to applications to construct or reconstruct a major air toxics source with Authority to Construct issued on or after June 28, 1998. Section 5.0 requires the application of toxic best

available control technology (TBACT) to new major air toxic sources and sources with the potential to emit in excess of a major air toxic source threshold. Section 6.1 requires an application for authority to construct for major air toxic sources subject to the requirements of SJVAPCD Rule 2201.

### Regulation III (Fees)

Regulation III sets the fees associated with owning and operating facilities, activities, and equipment that have the potential to emit air pollutants in the San Joaquin Valley.

### Regulation IV (Prohibitions)

**Rule 4001 (New Source Performance Standards)** applies to all new sources of air pollution and modifications of existing sources of air pollution within the source categories for which EPA has adopted standards. Section 4.0, Requirements, lists all of the provisions of 40 CFR Part 60 that are incorporated into the New Source Performance Standard.

**Rule 4002 (National Emission Standards for Hazardous Air Pollutants).** In the event that any portion of an existing building will be renovated, partially demolished or removed, the Project will be subject to SJVAPCD Rule 4002. Prior to any demolition activity, an asbestos survey of existing structures on the Project site may be required to identify the presence of any asbestos-containing building material (ACBM). Any identified ACBM having the potential for disturbance must be removed by a certified asbestos contractor in accordance with California Occupational Safety and Health Administration (Cal/OSHA) requirements.

**Rule 4101 (Visible Emissions)** prohibits the emission of visible air contaminants into the atmosphere and applies to any source operation with the potential to emit air contaminants. Section 4.0 - 4.12 list the following exemptions: fires set by a permitted public officer (such as those for the instruction of fighting fire), orchard or citrus grove heater which produces less than one gram per minute unconsumed solid carbonaceous matter, hazard reduction burning, aircraft distribution of agricultural aids over lands devoted to agriculture, open outdoor fires used for cooking and/or recreation, emissions from equipment used for the instruction/certification of individuals in visible emissions, wet plumes where the presence of uncombined water is the only reason for the failure of an emission to meet rule limitations, emissions from maritime vessels using steam boilers during emergency boiler shutdowns for safety reasons, the use of an obscurant for the purpose of training military personnel and the testing of military equipment by the U.S. Department of Defense, and emissions specifically exempt from Regulation VIII. Section 5.0 - 5.2 requires that there be no discharge from a single source of emission for a period or periods aggregating more than 3 minutes in any one hour which is as dark or darker than a designated Ringelmann No. 1 rating by the U.S. Bureau of Mines, or of opacity that can obscure an observers view equal to or greater than the Ringelmann No. 1 rating.

**Rule 4102 (Nuisance)** applies to any source operation that emits or may emit air contaminants or other materials. In the event that the Project or construction of the Project creates a public nuisance, it could be in violation and be subject to SJVAPCD enforcement action.

**Rule 4201 (Particulate Matter Concentration)** sets a standard maximum of 0.1 grain per cubic foot of gas at dry standard conditions for PM emissions. This rule applies to any source operation that emits dust, fumes, or total suspended PM.

**Rule 4202 (Particulate Matter – Emission Rate)** establishes allowable emissions rates for PM. This rule requires any source operation that may emit particulate matter emissions to meet the standards set forth in the table "Allowable Emission Rate Base on Process Weight Rate."

**Rule 4301 (Fuel Burning Equipment)** was created to limit the emission of air contaminants from fuel burning equipment. This rule applies to any fuel burning equipment except air pollution control equipment which is exempted in Section 4.0 of this rule. This rule requires in Section 5.0 that combustion contaminants discharged into the atmosphere do not exceed 0.1 grain per cubic foot of gas calculated to 12% $CO_2$ at dry standard conditions. The rule also requires the building, installation and expansion of non-mobile fuel burning equipment not to exceed 200 pounds/hour of sulfur compounds, 140 pounds/hour of $N_2O$, or 10 pounds/hour of combustion contaminants as defined in rule 1020 (definitions) and derived from the fuel. Finally, Section 6.0 specifies the test methods that can be used to determine compliance.

**Rule 4304 (Equipment Tuning Procedures for Boilers, Steam Generators, and Process Heaters)** applies to any boiler, steam generator, or process heater that requires tuning pursuant to SJVAPCD regulations or permit conditions. Attachments to this rule detail tuning requirements for different types of boilers, steam generators, and process heaters: Mechanical Draft (4304-A) and Natural and Induced Draft (4304-B).

**Rule 4305 (Boilers, Steam Generators, and Process Heaters – Phase 2)** limits the emissions of $NO_x$ and CO emissions from boilers, steam generators, and process heaters. This rule applies to any gaseous fuel or liquid fuel fired boiler, steam generator, or process heater with a heat input rating greater than 5 Million Metric British Thermal Units per hour (MMBtu/hr). Exemptions to the rule are solid fuel fired units, dryers, kilns and smelters, unfired or fired waste recovery boilers that are used to recover or augment heat from the exhaust of combustion turbines or internal combustion engines, and exemptions from the requirements when using fuel other than Public Utilities Commission quality natural gas during curtailments and for units that operate exclusively from November to February for less than 500 hours total. Amongst the requirements in Sections 5.0, the most commonly referenced is the $NO_x$ emission limits table in Section 5.1.1, setting the following limitations: For all units, except box or cabin type units and vertical cylindrical process heaters operated on gaseous fuel 30 ppmv or 0.036 lb/MMBtu or operated on liquid fuel 40 parts per million volume (ppmv) or 0.052 lb/MMBtu. For box or cabin type units, and vertical cylindrical process heaters operated on gaseous fuel, 147 ppmv or 0.18 lb/MMBtu or operated on liquid fuel, 155 ppmv or 0.2 lb/MMBtu. Units operated on a combination of gaseous and liquid fuel shall use a heat input weighted average of the previous limits. Additionally, all units subject to this rule shall not exceed 400 ppmv of CO emissions.

**Rule 4306 (Boilers, Steam Generators, and Process Heaters – Phase 3)** limits emissions of $NO_X$ and CO from boilers, steam generators, and process heaters and "build on" the rules set forth in Rule

4305. As with Rule 4305, this rule applies to any gaseous fuel or liquid fired boiler, steam generator, or process heater with a total rated heat input greater than 5 MMBtu. Section 5.0 sets forth extensive $NO_X$ and CO limits, in addition to monitoring provisions in Section 5.4 – 5.4.5. Additionally, there are compliance testing guidelines in Section 6, most often requiring a source test to demonstrate compliance annually.

**Rule 4307 (Boilers, Steam Generators, and Process Heaters 2.0 MMBtu/hr to 5.0 MMBtu/hr**) limits the emissions of $NO_X$, CO, $SO_2$, and $PM_{10}$ from gaseous or liquid fuel fired boilers, steam generators or process heaters with a total rated heat input of 2.0 MMBtu /hr up to and including 5.0 MMBtu/hr. $NO_X$ and CO limits are set forth in Section 5.0 - 5.6.5 in which details on $PM_{10}$ control requirements, start up and shut down requirements, monitoring provisions and more are provided.

**Rule 4308 (Boilers, Steam Generators, and Process Heaters 0.075 MMBtu/hr to less than 2.0 MMBtu/hr)** limits $NO_X$ and CO from boilers, steam generators, process heaters and water heaters with heat inputs greater than or equal to 0.075 MMBtu/hr to less than 2.0 MMBtu/hr. Exemptions from this rule are units installed in manufactured homes, recreational vehicles, and hot water pressure washers. Tables 1 and 2 in Section 5.0 provide emissions limits while administrative requirements, such as source testing and certification for retrofits, are in Section 6.0.

**Rule 4311 (Flares)** limits VOC, $NO_x$ and $SO_x$ from the operation of flares. Exempted flares are those operated in municipal solid waste landfills subject to the requirements of Rule 4642, flares subject to the requirements of 40 CFR Subpart WWWW or Cc, and stationary sources with the potential to emit less than 10 tons per year of VOC and $NO_x$ (record keeping requirements do apply for stationary sources however). Section 5.0 sets forth requirements such as automatic ignition systems and flow-sensing ignition systems in given circumstances, as well as provides emission standards for VOC and $NO_x$ from ground level enclosed flares. Note that Section 5.9 specifically addresses petroleum refinery $SO_2$ performance targets requiring the minimization of $SO_2$ flare emissions to less than 1.50 tons per million barrels of crude processing capacity and on and after January 1, 2017, this limit drops to 0.50 tons per million barrels of crude processing capacity, calculated as an average over one calendar year. Administrative requirements in Section 6.0 primarily require compliance demonstration, flare reporting, annual monitoring, flare minimization plans for petroleum refinery flares with a capacity greater than or equal to 5.0 MMBtu/hr, vent gas composition monitoring, pilot purge gas monitoring, water seal monitoring, video monitoring and general monitoring.

**Rule 4320 (Advanced Emission Reduction Options for Boilers, Steam Generators, and Process Heaters Greater than 5.0 MMBtu/hr)** limits $NO_X$, CO, $SO_2$ and $PM_{10}$ emissions from boilers, steam generators, and process heaters with a total heat input greater than 5 MMBtu/hr. Section 4.0 provides several exemptions like solid fuel fired units, dryers and glass melting furnaces, kilns and smelters where the products of combustion come into direct contact with the material to be heated, and unfired or fired heat recovery boilers that are used to recover or augment heat from the exhaust of combustion turbines or internal combustion engines. The requirements in Section 5.0 detail compliance deadlines, emissions limits, annual fees, particulate matter requirements, startup and

shutdown requirements, monitoring provisions and compliance determination. Under Section 6.0 (Administrative Requirements) are details on compliance testing and emissions control plans (ECP).

**Rule 4351 (Boilers, Steam Generators, and Process Heaters – Phase 1)** limits $NO_X$ emissions from boilers, steam generators, and process heaters to levels consistent with reasonably available control technology (RACT). This rule applies to a boiler, steam generator, or process heater with a rated heat input greater than 5 MMBtu/hr that is fired with gaseous and/or liquid fuels and is included in a major $NO_X$ source. (Note: this rule does not apply to any unit located west of Interstate Highway 5 located in Fresno, Kern or Kings Counties.) Section 5.1 details $NO_X$ emission limits for any unit with a heat input equal to or greater than 9 billion Btu per year, as well as $NO_X$ compliance alternatives and compliance schedules.

**Rule 4352 (Solid Fuel-Fired Boilers, Steam Generators, and Process Heaters)** limits the emissions of $NO_X$ and CO from any solid fuel fired boiler, steam generator and/or process heater. Section 4.0, exemptions, states that except for complying with record keeping requirements, this rule does not apply to any stationary source with a potential to emit less than 10 tons per year of $NO_X$ or VOC. Emissions limits are provided in Table 1 of Section 5.0

**Rule 4401 (Steam Enhanced Crude Oil Production Wells)** limits VOC emissions from steam-enhanced crude oil production wells and applies to any steam-enhanced cruel oil production well and any associated VOC collection and control system. Section 4.0 lists seven exemptions given certain circumstances. Section 5.0, Requirements, lists well venting requirements, determination of compliance with the Leak Standards, operating, inspection and re-inspection and leak repair requirements. Additionally, the Administrative Requirements of Section 6.0 requires that all operators maintain records for five years with further detail on the record required. This section also required annual Compliance Source Testing, test methods, an inspection log, employee training, and operator management plan.

**Rule 4402 (Crude Oil Production Sumps)** limits VOC emissions from sumps and applies to all first, second, and third stage sumps at facilities producing, gathering, separating, processing, and/or storing crude oil in an oilfield. This rule prohibits first stage sumps as of January 1, 2013, and requires a flexible floating cover or rigid floating cover equipped with closure device between the sump wall and the cover edge for all second and third stage sumps. Section 6.0 also contains administrative requirements.

**Rule 4404 (Heavy Oil Test Station – Kern County)** limits VOC emissions from the operation of heavy oil test stations by imposing emissions control requirements.

**Rule 4405 (Oxides of Nitrogen Emissions from Existing Steam Generators used in Thermally Enhanced Oil Recovery – Central and Western Kern County Fields)** limits $NO_X$ emissions from oil field steam generators by setting forth $NO_X$ emissions limits and alternate emission limits in Section 4.0 and 5.0. This rule applies to existing steam generators used in thermally enhanced oil recovery in the Central and Western Kern County Fields.

**Rule 4406 (Sulfur Compounds from Oilfield Steam Generators – Kern County)** limits the emissions of sulfur from oilfield operations in Kern County but does not apply to cogeneration facilities. After July 1, 1984, emissions are limited to 0.11 pounds of sulfur per MMBtu of heat input. In addition to exempting cogeneration, this rule has a small producer exemption in Section 8.0.

**Rule 4407 (In-Situ Combustion Well Vents)** implements federally enforceable emission limits for in-situ combustion well vents and applies to crude oil production where production has been enhanced by in-situ combustion. The rule requires that no person operate an in-situ combustion well unless the vent is connected to an emissions control device which abates 85% by weight of entering VOC gases and vapor or fuel burning equipment or a smokeless flare. All components of a collection and control system shall be maintained in good repair and the total number of leaks in a collection and control system shall not exceed 2% of the components in that system.

**Rule 4408 (Glycol Dehydration Systems)** limits VOC emissions from any glycol dehydration system with a glycol dehydration vent that is subject to permitting requirements pursuant to Regulation II (Permits). The requirements of this rule do not apply if a glycol dehydration system is permitted to operate less than 200 hours per year, or is permitted to dehydrate less than 5 million standard cubic feet of gas per year. This rule requires controlling vents using a system that directs all vapors to a vapor recovery system, a fuel gas system or a sales gas system or a system in which VOC emissions are combusted by a flare, incinerator, reboiler, or thermal oxidizer or any other emissions control system that controls glycol dehydration emissions by at least 95%. There are several administrative requirements in Section 6.0 worth noting, loosely: glycol dehydration vent testing, vent emission testing, emission control system testing, and the utilization of the gas research institute's GLYCalc™ software.

**Rule 4409 (Components at Light Crude Oil Production Facilities, Natural Gas Production Facilities, and Natural Gas Processing Facilities)** limits VOC emissions from leaking components at light crude oil production facilities, natural gas production facilities, and natural gas processing facilities. This rule applies to components containing or contacting VOC streams at the above-mentioned facilities. Section 3.0 has a number of definitions, while Section 4.0 details exemptions. This rule provides operating requirements, details, SJVAPCD inspections, leak standards, repair periods, component control technology replacement/retrofit, and component identification requirements.

**Rule 4601 (Architectural Coatings)** limits VOCs from architectural coatings. This rule specifies architectural coatings storage, clean up and labeling requirements and is applicable to any person who supplies, sells, offers for sale, applies, or solicits the application of any architectural coating or who manufactures, blends or repackages any architectural coating for use within the SJVAPCD. Aerosol coating products, architectural coatings from outside of the SJVAPCD, and the majority of architectural coating containers with a volume of one liter or less are exempt. VOC contents, restrictions, directions for thinning, and a table of standards are all supplied in the Requirements Section 5.0.

**Rule 4623 (Storage of Organic Liquids)** limits VOC emissions from the storage of organic liquids. This rule applies to any tank with a capacity of 1,100 gallons or greater in which any organic liquid is placed, held, or stored. Table 1 provides General VOC Control System Requirements and Table 2 provides Small Producer VOC Control System Requirements for Crude Oil Storage Tanks. This rule provides specification for pressure-vacuum relief valves and external floating roof tanks in Section 5.2 - 5.3, as well as guidance for welded tanks with primary metallic-shoe type seals, tanks with primary resilient toroid seals and much more guidance based on seal type in the latter portion of Section 5.0. Additionally, Section 5.6 provides specification for vapor recovery systems and Section 5.7.5.4 provides tank degassing requirements. There are many administrative requirements ranging from inspections to gravity testing to record keeping in Section 6.0.

**Rule 4624 (Transfer of Organic Liquid)** limits VOC emissions from the transfer of organic liquids and applies to organic liquid transfer facilities as defined within the rule. This rule requires that VOC emissions from Class 1 organic liquid transfer facilities not exceed 0.08 pounds per 1,000 gallons of liquid transferred. Additionally, Class 2 organic liquid transfer facilities shall prevent the release to the atmosphere of at least 95% by weight of the VOC displaced during organic liquid transfers. Section 5.0 also sets forth delivery, transfer, construction and leak inspection requirements. Several record keeping requirements are detailed in Section 6.0 in addition to compliance testing.

**Rule 4625 (Wastewater Separators)** limits the emission of VOCs from wastewater separators, including air floatation units as defined in this rule, during the separation of crude oil and water after custody transfer by requiring vapor loss control devices, recordkeeping, inspection, and test methods.

**Rule 4641 (Cutback, Slow Cure, and Emulsified Asphalt, Paving, and Maintenance Operations)** limits VOC emissions by restricting the application and manufacturing of certain types of asphalt for paving and maintenance operations. This rule applies to the manufacture and use of cutback asphalt, slow cure asphalt and emulsified asphalt for paving and maintenance operations. Section 5.0 requires that a person shall not manufacture for sale nor use any of the following for penetrating prime coat, tack coat, dust palliative, or other paving and maintenance operations: rapid cure cutback asphalt, medium cure cutback asphalt, slow cure asphalt which contains more than 0.5% of organic compounds which evaporate at 500 degrees Fahrenheit or lower, or emulsified asphalt containing organic compounds in excess of 3% by volume which evaporate at 500 degrees Fahrenheit or lower.

**Rule 4642 (Solid Waste Disposal Sites).** The purpose of this rule is to reduce VOC emissions from any solid waste disposal site which has a gas collection system and/or control device in operation, or undergoing maintenance or repair. In addition to several exemptions, this rule provides regulatory guidance on gas collection systems at solid waste disposal sites, control devices, emission controls during excavation of solid waste and emission control during maintenance.

**Rule 4651 (Soil Decontamination Operations)** limits the emissions of VOCs from soil that has been contaminated with a VOC-containing liquid and applies to operations involving the excavation, transportation, handling, decontamination, and disposal of contaminated soil. Exempt from this rule is the excavation, handling, transportation, and decontamination of less than one cubic yard of

contaminated soil per occurrence, operations related to the accidental spillage of 5 gallons or less of VOC-containing liquid per occurrence, contaminated soil exposed for the sole purpose of sampling and soil contaminated solely by a known VOC-containing liquid or petroleum liquid that has an initial boiling point of 320 degrees Fahrenheit. Rule requirements in Section 5.0 span written notices, monitoring, handling, storage, transportation and decontamination.

**Rule 4661 (Organic Solvents)** limits the emission of VOCs from the use of organic solvents while specifying reduction, monitoring, reporting and disposal requirements. This rule applies to any source operation that uses organic solvents unless the source operation is exempted under Section 4.0.

**Rule 4662 (Organic Solvent Degreasing Operations).** The purpose of this rule is to limit VOCs and hazardous air pollutant emissions from organic solvent degreasing operations and to provide the administrative requirements for recording and measuring emissions. This rule applies to all organic solvent degreasing operations. Section 4.0 sets forth exemptions to the rule. Section 5.0 details the rule's requirements such as cold cleaner requirements, cold cleaner VOC emission control system requirements, general operating requirements for degreasers that are not cold cleaners, open-top vapor degreaser requirements, conveyorized degreasers that are not cold cleaner. Also important are the recordkeeping requirements of Section 6.1 such as waste disposal records and VOC emission control system records.

**Rule 4663 (Organic Solvent Cleaning, Storage and Disposal)** limits the emission of VOCs from organic solvent cleaning and from the storage and disposal of solvents and waste solvent materials. This rule is applicable to any organic solvent cleaning performed outside a degreaser during the production, repair, maintenance, or services of parts, products, tools, machinery, equipment, or in general work areas at stationary sources. This rule also applies to the storage and disposal of all solvents and waste solvent materials at stationary sources.

**Rule 4701 (Internal Combustion Engines – Phase 1)** limits the emission of $NO_X$, CO, and VOCs from internal combustion engines. The rule applies to any internal combustion engine rated greater than 50 brake horsepower (bhp) that requires a permit to operate except for those exempted in Section 4.0.

**Rule 4702 (Internal Combustion Engines)** limits the emissions of $NO_X$ CO, VOC and $SO_X$ from internal combustion engines. The rule applies to any internal combustion engine rate at 25 bhp or greater.

**Rule 4703 (Stationary Gas Turbines)** limits $NO_X$ emissions from stationary gas turbine systems and applies to all stationary gas turbine systems, which are subject to district permitting requirements, and with ratings equal to or greater than 0.3 megawatt (MW) or a maximum heat input rating of more than 3,000,000 Btu per hour, except as provided in Section 4.0 of this rule.

**Rule 4801 (Sulfur Compounds)** limits the emissions of sulfur compounds. This rule applies to any discharge to the atmosphere of sulfur compounds, which exist as a liquid or a gas at standard

conditions. This rule has no exemptions, and requires that a person shall not discharge sulfur compounds in concentrations exceeding 0.2% by volume calculated as $SO_2$ on a dry basis averaged over 15 consecutive minutes. Additionally, EPA Method 8 and CARB method 1-100 must be used to determine such emissions.

### Regulation V (Procedure Before the Hearing Board)

**Regulation V (Procedure Before the Hearing Board)** establishes the procedures in which a owner/operator can approach the Hearing Board in order to file petitions for variances from regulations.

### Regulation VI (Air Pollution Emergency Contingency Plan)

**Regulation VI (Air Pollution Emergency Contingency Plan)** establishes a plan of action to be taken to prevent air pollutant concentration from reaching levels which could endanger the public health or to abate such concentrations should they occur.

### Regulation VII (Toxic Air Pollutants)

**Rule 7050 (Asbestos - Containing Material for Surfacing Applications).** The purpose of this rule is to control airborne emissions of asbestos containing rock. Compliance schedule, recordkeeping, and test methods are specified. This rule incorporates provisions of the CCR Section 93106.

### Regulation VIII (Fugitive $PM_{10}$ Prohibitions)

**Regulation VIII (Fugitive $PM_{10}$ Prohibitions)** is a series of rules to reduce ambient concentrations of fine particulate matter ($PM_{10}$) by requiring actions to prevent, reduce or mitigate anthropogenic fugitive dust emissions.

**Rule 8021 (Construction, Demolition Excavation, Extraction, and Other Earthmoving Activities)** limits fugitive dust emissions from construction, demolition, excavation, extraction, and other earthmoving activities and applies to any construction, demolition, excavation, extraction, and other earthmoving activities, including, but not limited to, land clearing, grubbing, scraping, travel onsite, and travel on access roads to and from the site.

**Rule 8031 (Bulk Materials)** limits fugitive dust emissions from the outdoor handling, storage, and transport of bulk materials and applies to the outdoor handling, storage, and transport of any bulk material.

**Rule 8041 (Carryout and Trackout**) prevents or limits fugitive dust emissions from carryout and trackout and applies to all sites that are subject to any of the following rules where carryout or trackout has occurred or may occur on paved public roads or the paved shoulders of a paved public road.

**Rule 8051 (Open Areas)** limits fugitive dust emissions from open areas and applies to any open area having 0.5 acre or more within urban areas, or 3.0 acres or more within rural areas; and contains at least 1,000 square feet of disturbed surface area.

**Rule 8061 (Paved and Unpaved Roads)** limits fugitive dust emissions from paved and unpaved roads by implementing control measures and design criteria.

**Rule 8071 (Unpaved Vehicle/Equipment Traffic Areas**) limits fugitive dust emissions from unpaved vehicle and equipment traffic areas.

### Regulation IX (Mobile and Indirect Sources)

**Rule 9410 (Employer Based Trip Reduction)** reduces vehicle miles traveled (VMT) from private vehicles used by employees to commute to and from their worksites to reduce emissions of $NO_x$, VOC and PM.

**Rule 9510 (Indirect Source Review)**. Indirect sources are land uses that attract or generate motor vehicles trips. Indirect source emissions contain many pollutants, principally $PM_{10}$, ROG, and $NO_x$. The San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) first implemented this requirement in the adopted 2003 $PM_{10}$ Plan to develop and implement an Indirect Source Rule (ISR) by July 2004, with implementation to begin in 2005. Senate Bill 709 (SB 709) (Florez 2003) as well required the SJVUAPCD to adopt by regulation a schedule of fees to be assessed on area-wide and indirect sources of emissions. After public hearings the Air District adopted Rule 9510 December 15, 2005, and it became effective in 2006.

The purpose of Rule 9510 is to reduce emissions of $NO_x$ and $PM_{10}$ from new development projects. The District determined that reducing one precursor $NO_x$, would reduce the cumulative impact on ozone form new development to less than significant levels. Sufficient ROG was obtained from other control measures to enable the District to predict attainment without additional ROG controls. The rule applies to development projects that seek to gain a discretionary approval for projects that, upon full buildout, will include any one of the following: 50 residential units; 2,000 square feet of commercial space; 25,000 square feet of light industrial space; 20,000 square feet of medical or recreational space; 39,000 square feet of general office space; 100,000 square feet of heavy industrial space; 9,000 square feet of educational space; 10,000 square feet of government space; or 9,000 square feet of any land use not identified above. Several sources are exempt from the rule, including transportation projects, transit projects, reconstruction projects that result from a natural disaster, and development projects whose primary source of emissions are subject to district Rules 2201 and 2010, which address stationary sources. Any development project that has a mitigated baseline of less than 2 tons per year for each of $NO_x$ and $PM_{10}$ is exempted from the mitigation requirements of the rule as well as Oil and Gas activities. Developers are encouraged to reduce as much air pollution as possible through onsite mitigation, or incorporating air-friendly designs and practices into the Project. Some examples include; bike paths and sidewalks, traditional street design; medium- to high-density residential developments; locating near bus stops and bike paths; locating near different land use zones, such as commercial; and increasing energy efficiency. If these practices do not completely meet the required reductions then, under the rule, new development projects are required to mitigate the remainder of their emissions by contributing to a mitigation fund that would be used to pay for the most cost-effective projects to reduce emissions. Examples of such projects include retirement and crushing of gross polluting cars, replacement of older diesel engines,

and diesel-powered vehicles and programs that would encourage the replacement of gas-powered lawn mowers with electric lawn mowers.

The ISR requires developers to reduce 20% of construction-exhaust $NO_x$, 45% of construction-exhaust $PM_{10}$, 33% of operational $NO_X$ over 10 years and 50% of operational $PM_{10}$ over 10 years. The district estimates that the potential reductions from this program in 2010 at 11.5 tons per day, or 4,197.5 tons per year, of $PM_{10}$ and 4.1 tons per day, or 1,496.5 tons per year, of $NO_x$.

## Emission Reduction Agreements

The implementation, as mitigation, of a Development Mitigation Contract or Voluntary Emission Reduction Agreement (VERA) to reduce criteria pollutants of $NO_X$, ROGs, and $PM_{10}$ net incremental emissions generated by a project has been incorporated into development projects in Kern County since 2008. They are not a "voluntary" agreement with the San Joaquin Valley Air Quality Control District but are mandated by enforceable mitigation measures and are therefore called Development Mitigation Contracts (DMC). The emission reductions required by a DMC are implemented within the SJVAB in quantities sufficient to fully mitigate the Project's air quality impacts such that development of the Project could be considered to result in no net increase in the designated criteria pollutant emissions over the criteria pollutant emissions that would otherwise exist without the development of the Project, all to be verified by the SJVAPCD. Thus, the DMC results in greater reductions than would otherwise occur under the District's ISR, since the ISR does not require ROG reductions and the ISR only requires a percentage of reductions rather than full reductions of $NO_X$ and $PM_{10}$ resulting from Project construction and operations. When adopting the ISR and the subsequent VERA/DMC programs, the District acknowledges that as ROG is a precursor to ozone, the reductions are not required in the ISR. In the VERA/DMC, the reductions are achieved by increasing the NOx and $PM_{10}$ tonnage for project levels (SJVAPCD 2005b). As the actual amount of ROG reductions achieved from $NO_x$ and $PM_{10}$ reductions is not absolutely certain, Project emissions are still considered significant and unavoidable; however all feasible and reasonable mitigation has been required to reduce criteria pollutants as close to "no net increase" as scientifically possible. This approach has been found legally sufficient by court rulings in the following cases; California Building Industry Assn. v. San Joaquin Valley APCD, Fresno County Case No. 06 CECG 02100 DS13. National Association of Home Builders v. San Joaquin Valley Unified Air Pollution Control District; Federal District Court, Eastern District of California, Case No. 1:07-CV-00820-LJO-DLB; and Center for Biological Diversity et al v Kern County, Fifth Appellate District, Case No. F061908.

## Local Control Measures

The SJVAPCD requires all local governments within its eight-county jurisdiction to adopt resolutions as part of the Ozone Attainment Demonstration Plan (OADP) that must be approved by EPA. The resolutions describe the reasonably available control measures that each jurisdiction will implement to reduce ozone-causing emissions into the air from transportation sources. Local jurisdictions are also required to adopt best available control technology measures to reduce particle emissions as part of the $PM_{10}$ Area Attainment Demonstration Plan. This process is coordinated and assisted by regional transportation planning agencies, such as the Kern COG.

The Kern County Board of Supervisors adopted a resolution on March 12, 2002, that committed the County to implementing several measures to reduce ozone-causing emissions. Among the measures are cost incentives for road contractors to minimize land closures, transit-oriented land use planning, and measures to encourage County employees and other motorists to restrict driving on days with high ozone levels as well as continuing efforts to convert County vehicles to low-emission compressed natural gas and gasoline/electric hybrid engines. Many of these measures have been incorporated as general plan policies.

The Kern County Board of Supervisors adopted a resolution on January 7, 2003, that committed the committed the County to implementing several measures aimed at reducing $PM_{10}$ emissions from County roadways. Among the measures are plans to determine the feasibility of paving the County's unpaved roads, which are lightly traveled; paving the shoulders of the most heavily traveled paved County roads as funding allows; and purchasing two $PM_{10}$-compliant street sweepers as funding allows. The resolution also committed the County to imposing tougher rules for cancelling road improvements on large rural parcels; requiring public and private access roads for new commercial and industrial development to be paved; evaluating the adverse air quality impacts of new development and, where appropriate, requiring mitigation measures; implementing policies that require developers to control and abate dust during grading and construction operations; and to receive a permit for expansion or a significantly altered use, requiring unpaved parking and storage areas of commercial and agricultural operations in County areas to be paved. These measures are being implemented through the Kern County Land Division Ordinance, Zoning Ordinance, and in the approved General Plan.

## Air Quality Plans

The SJVAPCD has developed plans to attain State and federal standards for ozone and particulate matter. The District's air quality plans include emissions inventories to identify the sources and quantities of air pollutants, to evaluate how well different control methods have worked, and to demonstrate how air pollution will be reduced. The plans also use computer modeling to estimate future levels of pollution and make sure that the Valley will meet air quality goals. The SJVAPCD's attainment plans are subject to approval by the SJVAPCD's Governing Board. At the time of this writing, the following attainment plans were in effect.

The adopted plans include emissions inventories, projected changes in population, vehicles, fuels and equipment, and associated emissions. The plans then identify existing rules and additional proposed measures required to reduce emissions to the ambient air quality standards. These rules and proposed measures include requirements to obtain permits to construct and operate, and rules regulating the allowable emissions from various activities or classes of equipment.

## One-Hour Ozone Plan

CARB submitted the 2004 Extreme Ozone Attainment Demonstration Plan to the EPA on November 15, 2004. The plan was amended by the District in 2008. Effective June 15, 2005, the EPA revoked the federal 1-hour ozone ambient air quality standard, finding that the 8-hour ozone standard was more health protective and adopted anti-backsliding provisions to preserve existing 1-hour ozone

control measure and emissions reductions obligations; this delayed EPA action on the District's 2004 Plan until 2010. The SJVAPCD implemented the 2004 plan's control measures and emissions reductions strategies, and the Valley must still attain the revoked standard before it can rescind the CAA Section 185 fees collected under Rule 3170.

In 2012, the EPA withdrew its 2010 approval of the SJVAPCD's 2004 Plan required submittal of a new plan for the revoked 1-hour standard that includes the following:

- A Rate of Progress (ROP) demonstration;
- Contingency measures for ROP and for attainment;
- An attainment demonstration;
- A demonstration for Reasonably Available Control Measures (RACM);
- A demonstration for clean fuels/clean technologies are in place for boilers; and
- A VMT offset demonstration;

The SJVAPCD's Governing Board adopted the 2013 Plan for the Revoked 1-Hour Ozone Standard in September 2013, thereby fulfilling air quality planning requirements under the federal CAA for the revoked 1-Hour ozone standard. The District Governing Board also requested EPA to set 2017 as the attainment date for the revoked 1-hour ozone NAAQS, adopted in 1979.

## Eight-Hour Ozone Plan

The SJVAPCD's Governing Board adopted the 2007 Ozone Plan on April 30, 2007. This far-reaching plan, with innovative measures and a "dual path" strategy, assures expeditious attainment of the federal 8-hour ozone standard as set by the EPA in 1997. The plan projects that the Valley will achieve the 8-hour ozone standard for all areas of the SJVAB no later than 2023 and calls for a 75% reduction in ozone-forming $NO_x$ emissions. Regulatory measures for mobile and stationary sources are projected to reduce $NO_x$ emissions by 61% by 2023; incentives and the deployment of advanced technologies are project to reduce $NO_x$ emissions 14% by 2023 (SJVAPCD 2007).

CARB approved the plan on June 14, 2007. The EPA approved the 2007 Ozone Plan effective April 30, 2012. It is expected that the plan addressing EPA's 2008 revised 8-hour ozone standard will be due to the EPA in 2015.

## $PM_{10}$ Maintenance Plan

Based on $PM_{10}$ measurements from 2003-2006, the EPA found that the SJVAB has reached federal $PM_{10}$ standards. On September 21, 2007, the SJVAPCD adopted the 2007 $PM_{10}$ Maintenance Plan and Request for Redesignation. This plan demonstrates that the Valley will continue to meet the $PM_{10}$ standard. The EPA approved the document and on September 25, 2008, the SJVAB was re-designated to attainment for $PM_{10}$ NAAQS.

## 2008 $PM_{2.5}$ Plan

The Valley is designated nonattainment for federal $PM_{2.5}$ standards. The EPA set their first $PM_{2.5}$ standards in 1997, and they strengthened the 24-hour standard in 2006. Building upon the strategy used in the 2007 Ozone Plan, the SJVAPCD agreed to additional control measures to reduce directly produced $PM_{2.5}$. The SJVAPCD's Governing Board adopted the 2008 $PM_{2.5}$ Plan on April 30, 2008. The plan estimates that the SJVAB will reach the $PM_{2.5}$ standard by 2014. The CARB approved the Plan on May 22, 2008. The EPA approved most provisions of the 2008 $PM_{2.5}$ Plan effective January 9, 2012.

## 2012 $PM_{2.5}$ Plan

The SJVAPCD adopted the 2012 $PM_{2.5}$ Plan on December 20, 2012. The plan demonstrates that the SJVAB will achieved the 2006 24-hour $PM_{2.5}$ NAAQS of 35 $\mu g/m_3$ by 2019. The CARB approved the SJVAPCDs 2012 $PM_{2.5}$ Plan in January 2013.

## Air Quality Conformity Determination for Transportation Plans and Programs

The CAA amendments of 1990 require a finding to be made stating that any project, program, or plan subject to approval by a metropolitan planning organization conforms to air plans for attainment of air quality standards. Kern COG is designated the Regional Transportation Planning Agency and Metropolitan Planning Organization for Kern County. In that capacity, Kern COG models air quality projections on population projections in conjunction with current general plan designations and estimated vehicle miles as well as the current Regional Transportation Plan (RTP) and the federal transportation plan for Kern County finalized in June 19, 2014. Kern County is contained within two air basins: SJVAB and the Mojave Desert Air Basin. Each air basin has its own plans and pollutant budgets. Kern COG makes conformity findings for each air basin (COG 2014a, 2014b). The Federal Transportation Improvement Program (FTIP) for the Kern County region is a six-year schedule of multimodal transportation improvements, and the RTP is a long-range, 26-year transportation plan and sustainability.

The Conformity Analysis for the 2015 FTIP and 2014 RTP was adopted by Kern COG June 19, 2014, and approved by the Federal Highway Administration and the Federal Transit Administration on December 15, 2014. The regional emissions analysis was conducted for the years 2014, 2017, 2018, 2020, 2023, 2025, 2032, 2035, and 2040 for each applicable pollutant. The conformity findings conclude that the FTIP and RTP result in emissions that are less than the emission budgets of baseline emissions or approved trading mechanisms for transportation conformity purposes for CO, VOC, $NO_X$, $PM_{10}$ and $PM_{2.5}$ (COG 2014a).

## Guide for Assessing and Mitigating Air Quality Impacts/Air Quality Thresholds of Significance

In August 1998, the SJVAPCD adopted its Guide for Assessing and Mitigating Air Quality Impacts (GAMAQI) to provide lead agencies, consultants, and project applicants with uniform procedures for addressing air quality in environmental documents. The District subsequently revised its GAMAQI

document in January 2002 (SJVAPCD 2002). In 2012, the SJVAPCD began the process to update its GAMAQI document. The update was intended to codify long-standing district practices, provide updated data, revise recommended significance thresholds, and provide additional technical guidance. The May 2012 Draft GAMAQI is more environmentally protective than the January 2002 GAMAQI. In March 2015, the SJVAPCD again updated the GAMAQI. This document utilizes the significance thresholds recommended in its most recently March 2015 Final GAMAQI (SJVAPCD 2015a).

In December 2006, the Kern County Planning and Community Development Department (KCPCDD) issued its own Guidelines for Preparing an Air Quality Assessment for Use in Environmental Impact Reports (Kern County Air Quality Assessment Guidelines). The document provided specific guidance for County-prepared EIRs, including air quality issues to be considered, analytical approaches and resources, a significance threshold for $PM_{10}$ (which was not reflected in the January 2002 GAMAQI, but is included in the March 2015 Final GAMAQI), and a cumulative impact analysis methodology (KCPCDD 2006). This analysis also utilizes the analytical approach and issues recommended in the KCPCDD's Guidelines.

## Criteria Pollutant Emissions

Table 4.3-8 presents the SJVAPCD's criteria pollutant emissions significance thresholds for construction and Project operation, based on the District's Final March 2015 GAMAQI. As seen in Table 4.3-8, the SJVAPCD recommends that emissions from permitted sources and activities be evaluated separately from non-permitted sources and activities.

**Table 4.3-8: Criteria Pollutant Emissions Significance Thresholds (tons per year, or tpy)**

| Pollutant/ Precursor | Construction Emissions | Operational Emissions | |
|---|---|---|---|
| | | Permitted Sources and Activities | Non-Permitted Sources and Activities |
| ROG | 10 | 10 | 10 |
| NOx | 10 | 10 | 10 |
| $PM_{10}$ | 15 | 15 | 15 |
| $PM_{2.5}$ | 15 | 15 | 15 |
| CO | 100 | 100 | 100 |
| $SO_X$ | 27 | 27 | 27 |

Source: SJVAPCD 2015a, Section 8.3

As indicated in the 2015 GAMAQI, permitted sources and activities are subject to SJVAPCD Regulation II (Permits), notably Rule 2201 (New and Modified Stationary Source Review) and Rule 2301 (Emission Reduction Credit Banking). Rule 2201 requires that any emission increases from new permitted stationary sources are mitigated by emission offsets. In most cases, permitted

stationary source emissions, therefore, will be reduced or mitigated to below the SJVAPCD's recommended significance thresholds (SJVAPCD 2015a, Section 8.2.1.).

## Criteria Pollutant Modeling

The SJVAPCD's 2015 GAMAQI states that a project should be considered to have a significant impact if its emissions would cause or contribute to a violation of any CAAQS or NAAQS (SJVAPCD 2015a, Section 8.4.). Accordingly, this analysis utilizes applicable CAAQS or NAAQS to establish thresholds of significance for pollutants subject to a standard for which the SJVAB is designated attainment or unclassified. For pollutants subject to a standard for which the SJVAB is designated non-attainment, this analysis utilizes the EPA's Significant Impact Levels, as shown in Table 4.3-9.

**Table 4.3-9: Criteria Pollutant Ambient Concentration Significance Thresholds**

| Pollutant | Averaging Period | EPA Significant Impact Levels[a] ($\mu g/m^3$) | Applicable Ambient Air Quality Standards[b] ($\mu g/m^3$) | Significance Threshold ($\mu g/m^3$) |
|---|---|---|---|---|
| $NO_2$ | 1 hour | 7.5 | 339 (California)<br>188.7 (Federal) | 339 (California)[c]<br>188.7 (Federal)[c] |
| | Annual | 1 | 57 (California)<br>100 (Federal) | 57[c] |
| $PM_{10}$ | 24 hours | 5 | 50 (California)<br>150 (Federal) | increase > 5[d] |
| | Annual | 1 | 20 (California) | increase > 1[d] |
| $PM_{2.5}$ | 24 hours | 1.2 | 35 (Federal) | increase > 1.2[d] |
| | Annual | 0.3 | 12 (California, Federal) | increase > 0.3[d] |
| CO | 1 hour | 2,000 | 23,000 (California)<br>40,000 (Federal) | 23,000[c] |
| | 8 hours | 500 | 10,000 (California, Federal) | 10,000[c] |
| $SO_2$ | 1 hour | 7.8 | 655 (California)<br>196 (Federal) | 655 (California)[c]<br>196 (Federal)[c] |
| | 3 hours | 25 | 1,300 (Federal) | 1,300[c] |
| | 24 hours | 5 | 105 (California) | 105[c] |

Notes:
a. Source: SJVAPCD 2013b
b. Source: Table 3-1; CARB 2013d.
c. Since the SJVAB is designated unclassifiable or attainment for California and federal $NO_2$, CO, and $SO_2$ standards, the significance thresholds are based on the most restrictive applicable ambient air quality standards. Because the federal one-hour $NO_2$ and $SO_2$ standards have different forms than California one-hour $NO_2$ and $SO_2$ standards, significance thresholds are based on both California and federal one-hour $NO_2$ and $SO_2$ ambient standards.
d. Since the SJVAB is designated nonattainment for California $PM_{10}$ standards, and nonattainment for California and federal $PM_{2.5}$ standards, significance thresholds are based on EPA Significant Impact Levels.

## Odors

The SJVAPCD recommends that lead agencies assess odor significance based on a review of District complaint records. For a project locating near an existing source of odors, the impact is potentially significant when the project site is at least as close as any other site that has already experienced significant odor problems related to the odor source. Significant odor problems are defined as:

- More than one confirmed complaint per year averaged over a three year period; or
- Three unconfirmed complaints per year averaged over a three-year period.

A complaint is deemed unconfirmed if the odor/air contaminant release could not be detected, or the source/facility cannot be determined.

The Kern County Air Quality Assessment Guidelines recommend dispersion modeling of maximum 24–hour average concentrations of odorous compounds at the Project boundary and within a 6 mile limit to determine ambient concentrations at nearby sensitive receptors (e.g., residences and schools), including approved, but not constructed sensitive receptors. Ambient concentrations at such receptors should be compared to odor thresholds and California Environmental Quality Act (CEQA) impact thresholds to determine potential odor impacts.

## Air Toxic Program

In the context of toxic air contaminants, to meet the requirements of federal and State law, the SJVAPCD has created an Integrated Air Toxic Program. This program serves as a tool for implementation of the requirements outlined in Title III of the 1990 CAA Amendments and the TAC-related requirements of state law and District regulations. The goals of SJVAPCD risk management efforts are to: (1) minimize increases in toxic emissions associated with new and modified sources of air pollution; and (2) ensure that new and modified sources of air pollution do not pose unacceptable health risks at nearby residences and businesses.

In order to achieve these goals, the SJVAPCD reviews the risk associated with each permitting action where there is an increase in emissions of TACs. SJVAPCD staff, as part of the engineering evaluation for these projects, performs this risk management review. The risk management review is performed concurrently with other project review functions necessary to process permit applications with the SJVAPCD.

Under the Agency's risk management policy, TBACT must be applied to all units that, based on their potential emissions may pose greater than de minimis risks. Facilities that pose health risks above SJVAPCD action levels are required to submit plans to reduce their risk. Action levels for risk were established in the SJVAPCD's Board-Approved Health Risk Reduction Strategy. The action level for cancer risk was 10 cases per 1 million exposed persons, based on the maximum exposure beyond facility boundaries at a residence or business. Following recent changes to the state Health Risk Assessment Guidelines (discussed in Impact 4.3-4), the SJVAPCD changed its cancer risk action level to 20 per 1 million in a policy dated May 28, 2015 (APR-1906 "Framework for Performing Health Risk Assessments"). The action level for non-cancer risk is a hazard index of 1.0

at any point beyond the facility boundary where a person could reasonably experience exposure to such risk.

## SJVAPCD Health-Risk Reduction Strategy (HRRS)

In 2010, the SJVAPCD Governing Board adopted the Risk-Based Strategy, which focuses on measures that address the pollutants for which the Valley is working toward attainment: ozone and fine-particulate matter. This strategy is also gaining widespread support by the EPA and the scientific community. In May 2013, the SJVAPCD renamed its Risk-Based Strategy as the Health-Risk Reduction Strategy (HRRS).

Driven by a rapidly expanding body of scientific research, there is now a growing recognition within the scientific community that from an exposure perspective, the NAAQS metrics for progress are a necessary but increasingly insufficient measure of total public health risk associated with air pollutants. In particular, control strategies for sources of $PM_{2.5}$ and ozone do not necessarily account for qualitative differences in the nature of their emissions. For $PM_{2.5}$, toxicity has been shown to vary depending on particle size, chemical species, and surface area. In the case of ozone, differences in the relative potency of ozone precursors, VOCs in particular, is not captured by a strict, mass-based approach to precursor controls. Thus, while the NAAQS and SIP process is motivated by public health, the process set forward under the CAA does not guarantee that the public health benefits of control strategies will be maximized.

The HRRS applies to regulatory, incentive, and outreach strategies and recognizes that risk to the public is not always proportional to the mass rate of emissions based on factors such as:

- Ultrafine particles versus coarse particles ;
- Toxicity/carcinogens ;
- Intake fraction/deposition fraction ;
- $NO_x$ versus VOCs ;
- $NO_x$ versus ammonia reductions; and
- Photochemical reactivity of VOCs.

The HRRS does not establish a new acceptable risk level, delay attainment of mass-based air quality standards, or ask for a change in the form of the mass-based air quality standards. Instead, it describes how to determine the potential risk to public health from a particular project.

## SJVAPCD Policy APR 1905

In Policy APR 1905, the SJVAPCD establishes three (03) stages for Risk Evaluation for all projects resulting in increases in hourly, daily, or annual potential to emit hazardous air pollutants from new and modified sources, except projects specifically exempted in approved SJVAPCD permitting policies. The stages are the following:

**A. Prioritization**

Projects shall be prioritized using the California Air Pollution Control Officers Association (CAPCOA) Facility Prioritization Guidelines. A prioritization score is used for determining the applicability of TBACT to each new and modified emissions units and the need for a detailed health risk assessment.

**B. Health Risk Assessment**

Projects with cumulative increases in prioritization score of greater than one require a Health Risk Assessment using the OEHHA Guidelines.

**C. Calculation of Increase in Permitted Emissions**

Increase is determined as the difference between the baseline and proposed Potential to Emit for the pollutant. APR 1905 specifies that the SJVAPCD policy defining certain small increases of criteria pollutant emissions as zero does not apply to hazardous air pollutants.

## Kern County General Plan

The Project Area is located within the Kern County General Plan (KCGP) area and, therefore, would be subject to applicable policies and measures of the KCGP. The Land Use, Conservation, and Open Space Element, the Safety Element, and the Energy Element of the KCGP include goals, policies, and implementation measures related to air quality that apply to the Project, as described below.

## Chapter 1. Land Use, Conservation, and Open Space Element

### 1.10.2. Air Quality

#### Policies

**Policy 19.** In considering discretionary projects for which an Environmental Impact Report must be prepared pursuant to the California Environmental Quality Act, the appropriate decision making body, as part of its deliberations, will ensure that:

a) All feasible mitigation to reduce significant adverse air quality impacts have been adopted; and

b) The benefits of the proposed Project outweigh any unavoidable significant adverse effects on air quality found to exist after inclusion of all feasible mitigation. This finding shall be made in a statement of overriding considerations and shall be supported by factual evidence to the extent that such a statement is required pursuant to the CEQA.

**Policy 20.** The County shall include fugitive dust control measures as a requirement for discretionary projects and as required by the adopted rules and regulations of the San Joaquin Valley Unified Air Pollution Control District and the Kern County Air Pollution Control District on ministerial permits.

**Policy 21**. The County shall support air districts' efforts to reduce $PM_{10}$ and $PM_{2.5}$ emissions.

**Policy 22**. Kern County shall continue to work with the San Joaquin Valley Unified Air Pollution Control District and the Kern County Air Pollution Control District toward air quality attainment with federal, State, and local standards.

**Policy 23.** The County shall continue to implement the local government control measures in coordination with the Kern Council of Governments and the San Joaquin Valley Unified Air Pollution Control District.

### Implementation Measures

**Implementation Measure F.** All discretionary permits shall be referred to the appropriate air district for review and comment.

**Implementation Measure G.** Discretionary development projects involving the use of tractor trailer rigs shall incorporate diesel exhaust reduction strategies including, but not limited to:

- Minimizing idling time.
- Electrical overnight plug-ins.

**Implementation Measure H.** Discretionary projects may use one or more of the following to reduce air quality effects:

- Pave dirt roads within the development.
- Pave outside storage areas.
- Provide additional low Volatile Organic Compounds (VOC) producing trees on landscape plans.
- Use of alternative fuel fleet vehicles or hybrid vehicles.
- Use of emission control devices on diesel equipment.
- Develop residential neighborhoods without fireplaces or with the use of Environmental Protection Agency certified, low emission natural gas fireplaces.
- Provide bicycle lockers and shower facilities onsite.
- Increasing the amount of landscaping beyond what is required in the Zoning Ordinance (Chapter 19.86).
- The use and development of park and ride facilities in outlying areas.
- Other strategies that may be recommended by the local Air Pollution Control Districts.

## Chapter 4. Safety Element

### 4.2. General Policies and Implementation Measure, which Apply to more than One Safety

### Constraint

### Policies

**Policy 1.** That the County's program of identification, mapping, and evaluating the geologic, fire, flood safety hazard areas, and significant concentrations of hydrogen sulfide in oilfield areas, presently under way by various County departments, be continued.

## Chapter 5. Energy Element

### 5.3.1. Urban/Residential Development in Petroleum Resource Areas

### Policies

**Policy 8.** Reduce the public's exposure to fires, explosions, blowouts, and other hazards associated with the accidental release of crude oil, natural gas, or hydrogen sulfide gas by ensuring that discretionary development projects have adequate separation from oil and natural gas production land uses.

### 5.3.6. Environmental Impacts of Petroleum Development

### Policies

**Policy 4.** The County should encourage the use of clean-burning technologies in petroleum production.

**Policy 5.** The County should encourage air pollution control policies which apply the burden equally to local and upwind sources and to all classes of air polluters.

## Metropolitan Bakersfield General Plan

The Metropolitan Bakersfield General Plan (MBGP), a joint effort between the Kern County Planning Department and the City of Bakersfield Planning Division, was last adopted on December 11, 2007. The MBGP includes both city and unincorporated County lands. The MBGP describes the community's physical development as well as its economic, social and environmental goals and is currently undergoing an update. The Project Area includes a total of 152,040 acres of unincorporated County lands that are covered under the MBGP (7.41%). Project-related development on unincorporated lands within the MBGP Planning Area would be subject to the following applicable policies and implementation measures of the MBGP, with respect to air quality.

# Chapter V. Conservation Element

## B. Mineral Resources

### Goals

**Goal 4.** Protect land, water, air quality and visual resources from environmental damage resulting from mineral and energy resource development.

### Policies

**Policy 15.** Require petroleum production sites in urban areas which are subject to discretionary permits, to install peripheral landscaping to help reduce the noise, dust and visual impacts to adjacent sensitive receptors and public ways (I-4).

## E. Air Quality

### Goals

**Goal 1.** Promote air quality that is compatible with health, well-being, and enjoyment of life by controlling point sources and minimizing vehicular trips to reduce air pollutants.

**Goal 2.** Continue working toward attainment of Federal, State and Local standards as enforced by the San Joaquin Valley Unified Air Pollution Control District.

**Goal 3.** Reduce the amount of vehicular emissions in the Planning Area.

### Policies

**Policy 1.** Comply with and promote San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) control measures regarding Reactive Organic Gases (ROG). Such measures are focused on: (a) steam driven well vents, (b) Pseudo-cyclic wells, (c) natural gas processing plant fugitives, (d) heavy oil test stations, (e) light oil production fugitives, (f) refinery pumps and compressors, and (g) vehicle inspection and maintenance (I-1).

**Policy 2.** Encourage land uses and land use practices which do not contribute significantly to air quality degradation (I-1).

**Policy 3.** Require dust abatement measures during significant grading and construction operations (I-1).

**Policy 5.** Consider the location of sensitive receptors such as schools, hospitals, and housing developments when locating industrial uses to minimize the impact of industrial sources of air pollution (I-1).

### Kern County Specific Plans

Kern County has adopted 24 Specific Plans for properties within the Project Area. These Specific Plans are intended to be an amplification of the goals and policies of the KCGP and are, therefore, consistent therewith. As depicted in Figure 4.10-3, less than 8% of the Project Area is located wholly or partially within adopted Specific Plan areas. Future oil and gas exploration and production activities that would be authorized under the proposed Amendment to Chapter 19.98 (Oil & Gas Production) of the Kern County Zoning Ordinance that would be located within the boundary of an adopted Specific Plan would be regulated according to County zoning, with the exception of the Specific Plans identified as Tier 5.

## 4.3.4 Impacts and Mitigation Measures

# Methodology

This section discusses the methodologies used to conduct the evaluation of air quality impacts for the Project, including guidelines for preparing environmental documents under CEQA and technical methods employed in the evaluation. The air quality significance criteria were developed considering the CEQA significance criteria developed by the local air quality districts in the Project Area which is the SJVAPCD, approved CEQA air quality checklists, and considering other federal criteria.

The baseline for purposes of this analysis is considered to be the physical environmental conditions existing as of the beginning of environmental analysis (2012) according to KCPCDD, which have determined that the level of activity occurring during 2012 is representative of the Project's baseline conditions. The change in the environment caused by the Project results from oil and gas production and processing activities conducted between 2015 and 2035.

# Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist state that a project would have a significant air quality impact if it would:

- Conflict with or obstruct implementation of the applicable air quality plan;
- Violate any air quality standard as adopted in (c)i or (c)ii, or established by EPA or air district or contribute substantially to an existing or projected air quality violation;
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in nonattainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors). Specifically, implementation of the project would have a significant impact on air quality if it would exceed any of the following adopted thresholds:

| | | |
|---|---|---|
| Operational and Area/Construction Sources | Reactive organic gases (ROG) | 10 tons per year |
| | Oxides of nitrogen ($NO_x$) | 10 tons per year |

| | | |
|---|---|---|
| | Particulate matter ($PM_{10}$) | 15 tons per year |
| Stationary Sources (as Determined by District Rules) | Severe nonattainment | 25 tons per year |
| | Extreme nonattainment | 10 tons per year |

- Expose sensitive receptors to substantial pollutant concentrations; and
- Create objectionable odors affecting a substantial number of people.

# Project Impacts

## Impact 4.3-1: Conflict with or Obstruct Implementation of the Applicable Air Quality Plan

APCD and air quality management district (AQMD) have the primary responsibility for controlling emissions from sources other than locomotives, motor vehicles and other specified statewide sources (such as consumer products), which are the responsibility of CARB or the EPA. Air districts adopt and enforce rules and regulations to ensure that emissions comply with national, state, and local emission standards, and will not interfere with the attainment and maintenance of the state and federal ambient air quality standards. The Project is located within the administrative boundaries of the SJVAPCD, which has jurisdiction over air quality in the SJVAB.

Future oil and gas exploration and production activities that would be authorized under the Project would result in emissions from stationary sources such as boilers, cogeneration plants, process heaters, reciprocating internal combustion engines, steam generators, production tanks, thermally enhanced oil recovery wells, and volatile organic compounds destruction devices (VOCDD) (flares), and non-permitted sources (small equipment, well-related maintenance and treating operations, routine business travels). Air pollutants would also be emitted during Project construction (off-road construction equipment, on-road vehicles, fugitive particulate matter from material movement, asphalt paving, and use of architectural coatings).

### Consistency with Applicable Air Quality Plans

The SJVAPCD has developed plans to attain state and federal standards for ozone and PM. The District's air quality plans include emissions inventories to identify the sources and quantities of air pollutant emissions, evaluate how well different control methods have worked, and demonstrate how air pollution will be reduced. The plans also use computer modeling to estimate future levels of pollution to ensure that the Valley will meet air quality goals. As of March 2015, the following attainment/maintenance plans are in effect, as detailed in Section 4.3.3, Regulatory Setting, above.

#### One-Hour Ozone Plan

CARB submitted the SJVAPCD's 2004 Extreme Ozone Attainment Demonstration Plan to the EPA on November 15, 2004. The plan was amended by the District in 2008. Effective June 15, 2005 the EPA revoked the federal 1-hour ozone ambient air quality standard, finding that the 8-hour ozone standard was more health protective. Under federal anti-backsliding provisions, the District has

continued to implement the 2004 plan's control measures and emissions reductions strategies. The District developed a new plan for EPA's revoked 1-hour ozone standard, which was adopted by the District's Governing Board on September 19, 2013.

**Eight-Hour Ozone Plan**

The SJVAPCD adopted the 2007 Ozone Plan on April 30, 2007. This far-reaching plan, with innovative measures and a "dual path" strategy, assures expeditious attainment of the federal 8-hour ozone standard established by the EPA in 1997. The plan projects that the Valley will achieve the 8-hour ozone standard for all areas of the SJVAB no later than 2023. The CARB approved the plan on June 14, 2007. EPA approved the 2007 Ozone Plan effective April 30, 2012. It is expected that the plan addressing the more stringent 8-hour ozone standard enacted by EPA in 2008 will be due to EPA in 2015.

**$PM_{10}$ Maintenance Plan**

Based on $PM_{10}$ measurements from 2003-2006, the EPA found that the SJVAB has achieved the federal $PM_{10}$ NAAQS. On September 21, 2007, the District's Governing Board adopted the 2007 $PM_{10}$ Maintenance Plan and Request for Redesignation. This plan demonstrates that the Valley will continue to meet the $PM_{10}$ standard. The EPA approved the document and effective December 12, 2008, the SJVAB was redesignated to attainment for the $PM_{10}$ NAAQS.

**2008 PM2.5 Plan**

The Valley is designated nonattainment for federal $PM_{2.5}$ standards. The EPA established its first $PM_{2.5}$ standards in 1997. The EPA strengthened the 24-hour standard in 2006 and the annual standard in 2013. Building upon the strategy used in the 2007 Ozone Plan, the District agreed to additional control measures to reduce directly produced $PM_{2.5}$. The District's Governing Board adopted the 2008 $PM_{2.5}$ Plan on April 30, 2008. The plan demonstrates that the SJVAB will achieve the 1997 annual $PM_{2.5}$ NAAQS of 15 $\mu g/m^3$ by 2014. The CARB approved the Plan on May 22, 2008. The EPA approved most provisions of the 2008 $PM_{2.5}$ Plan effective January 9, 2012.

**2012 $PM_{2.5}$ Plan**

The SJVAPCD adopted the 2012 $PM_{2.5}$ Plan on December 20, 2012. The plan demonstrates that the SJVAB will achieve the 2006 24-hour $PM_{2.5}$ NAAQS of 35 $\mu g/m^3$ by 2019. The CARB approved the Plan on January 24, 2013. The SJVAPCD will need to revise its $PM_{2.5}$ strategy in the future to address attainment of the 2013 annual standard.

These plans include emissions inventories, projected changes in population, vehicles, fuels and equipment, and the consequent changes in the associated emission levels. The plans then identify existing rules and additional proposed measures required to reduce emissions and ensure compliance with the ambient air quality standards. These rules and proposed measures include requirements to obtain permits to construct and operate, and rules regulating the allowable emissions from various activities or classes of equipment.

## Consistency with SJVAPCD Applicable Permits Required

SJVAPCD Rule 2010 (Permits Required) requires that an Authority to Construct permit and a Permit to Operate be obtained prior to constructing, altering, replacing, or operating any device that emits or may emit air contaminants. Since the Project would require construction of various stationary source devices in Kern County, Authority to Construct permits and Permits to Operate would be required.

SJVAPCD Rule 2410 (Prevention of Significant Deterioration) requires that pre-construction permits be obtained for new major stationary sources and major modifications to existing major stationary sources in areas classified as attainment or unclassifiable for any criteria pollutant. A stationary source or a modification is considered major if the net emissions increase equals or exceeds 40 tons per year VOC, 40 tons per year $NO_X$, 15 tons per year $PM_{10}$, 10 tons per year $PM_{2.5}$, 100 tons per year CO, or 40 tons per year $SO_2$. Stationary source emissions increases associated with the Project may exceed these thresholds, depending on the type of facility and new equipment to be built. Therefore, a PSD pre-construction permit may be required for the new oil and gas facilities of the Project.

## Consistency with SJVAPCD Applicable Rules

Oil and gas activities that would be authorized under this Project would result in emissions from stationary sources (boilers, cogeneration plants, process heaters, reciprocating internal combustion engines, steam generators, production tanks, thermally enhanced oil recovery wells, and VOCDD (flares), storage tanks, loading and unloading racks, and fugitive emissions), and non-permitted sources (trucks, automobile work trips, and onsite vehicles). Air pollutants would be emitted during construction activities (off-road construction equipment, on-road vehicles, fugitive particulate matter from material movement) and operational activities (employee and contractor commute and the transport of material, onsite travel to conduct day-to-day field operations, vehicle trips to perform maintenance). Following is a list of the SJVAPCD rules that could potentially apply to construction and operation activities that would be authorized under this Project.

Future oil and gas exploration and production activities that would be authorized under this Project would be required to comply with the relevant provisions of the following rules:

- Rule 2010 (Permits Required)
- Rule 2020 (Exemptions)
- Rule 2070 (Standards for Granting Applications)
- Rule 2201 (New and Modified New Source Review)
- Rule 2250 (Permit-Exempt Equipment Registration)
- Rule 2280 (Portable Equipment Registration)
- Rule 2410 (Prevention of Signification Deterioration)
- Rule 2520 (Federally Mandated Operating Permits)

- Rule 2540 (Acid Rain Program)
- Rule 2550 (Federally Mandated Preconstruction Review for Major Sources of Air Toxics)
- Rule 3135 (Dust Control Plan Fee)
- Rule 4001 (New Source Performance Standards)
- Rule 4002 (National Emission Standards for Hazardous Air Pollutants)
- Rule 4101 (Visible Emissions)
- Rule 4102 (Nuisance)
- Rule 4201 (Particulate Matter Concentration)
- Rule 4202 (Particulate Matter Emission Rate)
- Rule 4301 (Fuel Burning Equipment)
- Rule 4304 (Equipment Tuning Procedures for Boilers, Steam Generators, and Process Heaters)
- Rule 4305 (Boilers, Steam Generators and Process Heaters, Phase 2)
- Rule 4306 (Boilers, Steam Generators and Process Heaters, Phase 3)
- Rule 4307 (Boilers, Steam Generators, and Process Heaters 2.0 MMBtu/hr to 5.0 MMBtu/hr)
- Rule 4308 (Boilers, Steam Generators, and Process Heaters 0.075 MMBtu/hr to less than 2.0 MMBtu/hr)
- Rule 4311 (Flares)
- Rule 4320 (Advanced Emission Reduction Options for Boilers, Steam Generators, and Process
- Heaters Greater than 5.0 MMBtu/hr)
- Rule 4351 (Boilers, Steam Generators and Process Heaters, Phase 1)
- Rule 4352 (Solid Fuel Fired Boilers, Steam Generators, and Process Heaters)
- Rule 4401 (Steam Enhanced Crude Oil Production Wells)
- Rule 4402 (Crude Oil Production Sumps)
- Rule 4404 (Heavy Oil Test Station – Kern County)
- Rule 4405 (Oxides of Nitrogen Emissions from Existing Steam Generators used in Thermally Enhanced Oil Recovery – Central and Western Kern County Fields)
- Rule 4406 (Sulfur Compounds from Oil-Field Steam Generators – Kern County)
- Rule 4407 (In-Situ Combustion Well Vents)
- Rule 4408 (Glycol Dehydration Systems)

- Rule 4409 (Components at Light Crude Oil Production Facilities, Natural Gas Production Facilities, and Natural Gas Processing Facilities)
- Rule 4455 (Components at Petroleum Refineries, Gas Liquids Processing Facilities and Chemical Plants)
- Rule 4601 (Architectural Coatings)
- Rule 4612 (Motor Vehicle and Mobile Equipment Coating Operations)
- Rule 4621 (Gasoline Transfer into Stationary Storage Containers, Delivery Vessels, and Bulk Plants)
- Rule 4623 (Storage of Organic Liquids)
- Rule 4624 (Transfer of Organic Liquid)
- Rule 4625 (Wastewater Separators)
- Rule 4641 (Cutback, Slow Cure, and Emulsified Asphalt, Paving and Maintenance Operations)
- Rule 4642 (Solid Waste Disposal Sites)
- Rule 4651 (Soil Decontamination Operations)
- Rule 4661 (Organic Solvents)
- Rule 4662 (Organic Solvent Degreasing Operations)
- Rule 4663 (Organic Solvent Cleaning, Storage and Disposal)
- Rule 4701 (Internal Combustion Engines – Phase 1)
- Rule 4702 (Internal Combustion Engines)
- Rule 4703 (Stationary Gas Turbines)
- Rule 7050 (Asbestos - Containing Material for Surfacing Applications).
- Rule 4801 (Sulfur Compounds)
- Rule 8011 (General Requirements)
- Rule 8021 (Construction, Demolition, Excavation, Extraction, and Other Earthmoving Activities)
- Rule 8031 (Bulk Materials)
- Rule 8041 (Carryout and Trackout)
- Rule 8051 (Open Areas)
- Rule 8061 (Paved and Unpaved Roads)
- Rule 8071 (Unpaved Vehicle/Equipment Traffic Areas)

- Rule 9510 (Indirect Source Review)

**Consistency with Applicable Indirect Source Review**

On December 15, 2005, the SJVAPCD Governing Board adopted Rule 9510 (Indirect Source Review, or ISR). The District's ISR rule is intended to reduce $NO_x$ and $PM_{10}$ emissions from new development projects. Rule 9510 requires developers of specified development projects to submit applications and reduce emissions through onsite mitigation, offsite SJVAPCD-administered projects, or a combination of the two.

Rule 9510 exempts development projects for facilities with primary functions that are subject to District Rule 2201 (New and Modified Stationary Source Review Rule) or 2010 (Permits Required). The list of specific projects exempted under Rule 9510 includes "Gas Processing and Production" (Section 4.4.3.9). The oil and gas activities authorized under this Project involve construction of gas wells and gas processing facilities, and would be subject to Rules 2010 and 2201. Therefore, the Project is exempt from Rule 9510 under Section 4.4.3, more specifically under Section 4.4.3.9 (SJVAPCD 2005a).

**Permitted Source Emissions**

Emission increases associated with activities under the Project's permitted sources would come from boilers, cogeneration plants, process heaters, reciprocating internal combustion engines, steam generators, production tanks, thermally enhanced oil recovery wells, and VOCDD (flares). These sources would be subject to SJVAPCD prohibitory rules, notably Rule 4455 (Components at Petroleum Refineries, Gas Liquids Processing Facilities, and Chemical Plants) and Rule 4623 (Storage of Organic Liquids). Emissions from new permitted sources would also be required to be mitigated by emission offsets under Rule 2201 (New and Modified Stationary Source Review). Therefore, permitted source emissions would be consistent with the SJVAPCD's adopted regulatory program to attain state and federal ozone and particulate matter standards.

**Non-Permitted Source/Activity Emissions**

Non-permitted sources and activities would be subject to the following federal and state regulatory programs, which are incorporated within the attainment plans for state and federal ozone and particulate matter standards:

Heavy-duty engine and on-road vehicle standards enacted by CARB and the EPA (California standards codified at 13 CCR Section 1956.8).

Light and medium on-road vehicle standards enacted by CARB (starting at 13 CCR Section 1900).

Non-permitted source/activity emissions were calculated using CARB's EMFAC2011 (January 2013) emissions model, which reflects adopted California on-road vehicle emission standards, and CARB'S OFFROAD2011 model to generate fleet average emission factors for off-road mobile sources and portable equipment operated within the SJVAB. Fugitive dust emissions were calculated using predictive emission factors recommended by the EPA in AP42, Fifth Edition. Therefore, non-

permitted source/activities would be consistent with adopted regulatory programs incorporated within the SJVAPCD's ozone and particulate matter attainment plans.

**Consistency with Kern County General Plan**

Future oil and gas exploration and production activities that would be authorized under the Project would be required to comply with the policies and measures of the KCGP as discussed in greater detail in Section 4.10, Land Use and Planning.

**Consistency with the Metropolitan Bakersfield General Plan**

Future oil and gas exploration and production activities that would be authorized under the Project would have to comply with the Metropolitan Bakersfield General Plan policies which are applicable to County land, as discussed in greater detail in Section 4.10, Land Use and Planning.

Oil and gas activities that would be authorized under the Project could conflict with or obstruct implementation of the applicable air quality plan or potentially be inconsistent with the General Plan measures and therefore could be significant.

## Mitigation Measures

**MM 4.3-1** Consistent with the requirements of the San Joaquin Valley Air Pollution Control District Regulation II-Permits, the Applicant shall obtain an Authority to Construct permit and a Permit to Operate for any facility or equipment requiring a permit from the San Joaquin Valley Air Pollution Control District, such as stationary sources required to obtain permits pursuant to District Rule 2010. All emissions increases from permitted equipment shall comply with District Rule 2201.

**MM 4.3-2** The Applicant shall develop and implement a Fugitive Dust Control Plan in compliance with San Joaquin Valley Air Pollution Control District fugitive dust suppression regulations to further reduce emissions, during construction, of particulate matter that is 10 microns or less and 2.5 microns or less in diameter. The Fugitive Dust Control Plan shall include:

a. Name(s), address(es), and phone number(s) of person(s) responsible for the preparation, submission, and implementation of the plan.

b. Description and location of operation(s).

c. Listing of all fugitive dust emissions sources included in the operation.

d. The following dust control measures shall be implemented:

    1. All onsite unpaved roads shall be effectively stabilized using water or chemical soil stabilizers that can be determined to be as efficient as or more efficient for fugitive dust control than California Air Resources Board approved soil stabilizers, and that shall not increase any other environmental impacts including loss of vegetation.

2. All material excavated or graded will be sufficiently watered to prevent excessive dust. Watering will occur as needed with complete coverage of disturbed areas. The excavated soil piles will be watered as needed to limit dust emissions to less than 20% opacity or covered with temporary coverings.
3. Construction activities that occur on unpaved surfaces will be discontinued during windy conditions when winds exceed 25 miles per hour and those activities cause visible dust plumes. Construction activities may continue if dust suppression measures are used to minimize visible dust plumes.
4. Track-out debris onto public paved roads shall not extend 50 feet or more from an active operation and track-out shall be removed or isolated such as behind a locked gate at the conclusion of each workday.
5. All hauling materials should be moist while being loaded into dump trucks.
6. All haul trucks hauling soil, sand, and other loose materials on public roads shall be covered (e.g., with tarps or other enclosures that would reduce fugitive dust emissions).
7. Soil loads should be kept below 6 inches or the freeboard of the truck.
8. Drop heights should be minimized when loaders dump soil into trucks.
9. Gate seals should be tight on dump trucks.
10. Traffic speeds on unpaved roads shall be limited to 25 miles per hour.
11. All grading activities shall be suspended when visible dust emissions exceed 20%.
12. Other fugitive dust control measures as necessary to comply with San Joaquin Valley Air Pollution Control District Rules and Regulations.
13. Disturbed areas should be minimized.
14. Disturbed areas should be re-vegetated as soon as possible after disturbance if area is no longer needed for oil and gas activities.

**MM 4.3-3** All off-road construction diesel engines not registered under California Air Resources Board's Statewide Portable Equipment Registration Program, which have a rating of 50 horsepower or more, shall meet, at a minimum, the Tier 3 California Emission Standards for Off-road Compression-Ignition Engines as specified in California Code of Regulations, Title 13, section 2423(b)(1) unless that such engine is not available for a particular item of equipment. In the event a Tier 3 engine is not available for any off-road engine larger than 100 horsepower, that engine shall be equipped with retrofit controls that would provide nitrogen oxides and particulate matter emissions that are equivalent to Tier 3 engine.

a. All equipment shall be turned off when not in use. Engine idling of all equipment shall be limited to five minutes, except under exemptions specified in California Code of Regulations Title 13 Section 2449(d)(2)(A).

b. All equipment engines shall be maintained in good operating condition and in proper tune per manufacturers' specifications.

**MM 4.3-4** To further reduce emissions of oxides of nitrogen from on-road heavy-duty diesel haul vehicles:

a. 2007 engines or pre-2007 engines shall comply with California Air Resources Board retrofit requirements set forth in California Code of Regulations Title 13 Section 2025.

b. All on-road construction vehicles, except those meeting the 2007/California Air Resources Board-certified Level 3 diesel emissions controls, shall meet all applicable California on-road emission standards and shall be licensed in the State of California. This does not apply to worker personal vehicles.

c. All on-road construction vehicles shall be properly tuned and maintained in accordance with the manufacturers' specifications.

## Level of Significance After Mitigation

Impacts would be less than significant with mitigation

## Impact 4.3-2: Violate Any Air Quality Standard as Adopted in (c)i or (c)ii, or Established by EPA or Air District or Contribute Substantially to an Existing or Projected Air Quality Violation

As stated above, the SJVAPCD's 2015 GAMAQI states that a project should be considered to have a significant impact if its emissions would cause or contribute to a violation of any California or NAAQS (SJVAPCD 2015a, Section 8.4.) In order to evaluate whether the oil and gas activities that would be authorized under the Project would result in a violation of an air quality standard, the Kern County CEQA checklist uses SJVUAPCD thresholds of:

| | | |
|---|---|---|
| Operational and Area/Construction Sources | Reactive organic gases (ROG) | 10 tons per year |
| | Oxides of nitrogen ($NO_x$) | 10 tons per year |
| | Particulate matter ($PM_{10}$) | 15 tons per year |
| Stationary Sources (as Determined by District Rules) | Severe nonattainment | 25 tons per year |
| | Extreme nonattainment | 10 tons per year |

If the levels of ROG, $NO_x$ or $PM_{10}$ are exceeded, then Project generated emissions would be considered to have a considerable net increase. However, since the San Joaquin Valley is in

nonattainment also for $PM_{2.5}$ and ozone, then levels of CO and $PM_{2.5}$ will be evaluated against the San Joaquin Valley Criteria Pollutant thresholds listed in Table 4.3-10.

**Table 4.3-10: SJVAPCD Criteria Pollutant Emissions Significance Thresholds (tons per year, or tpy)**

| Pollutant/ Precursor | Construction Emissions | Operational Emissions | |
|---|---|---|---|
| | | Permitted Sources and Activities | Non-Permitted Sources and Activities |
| ROG | 10 | 10 | 10 |
| NOx | 10 | 10 | 10 |
| $PM_{10}$ | 15 | 15 | 15 |
| $PM_{2.5}$ | 15 | 15 | 15 |
| CO | 100 | 100 | 100 |
| $SO_X$ | 27 | 27 | 27 |

Source: SJVAPCD 2015b, Section 8.3

The thresholds of significance for ROG, $NO_x$ and $PM_{10}$ presented in the table are equivalent to the Kern County CEQA Implementation Document and Kern County Environmental Checklist standards listed above; the table provides also standards for criteria pollutants such as $PM_{2.5}$, CO, and $SO_x$, which were not listed among the Kern County CEQA Implementation Document and Kern County Environmental Checklist standards. Therefore, emissions generated by the project were evaluated against the SJVAPCD Air Quality Thresholds of Significance for Criteria Pollutants. For this analysis, if these thresholds are exceeded then the Project would be considered to have significant impacts.

Source data and emissions associated with the Project were determined based on the Air Quality Technical Report prepared by Vector Environmental, Inc. (Vector; Vector 2015a). Air quality impacts associated with the Project are separated by construction and operational emissions. The emissions tables derived from the data provided by Vector are presented in Appendix I.

The air analysis conducted by Vector to support this evaluation uses a baseline level of 43,028 wells that were operating in 2012 and an assumed number of 82,136 wells operating in 2035. The assumed number of new wells constructed spans from 3,966 in 2015 to 4,083 in 2035. The number of wells projected to be built every year exceeds the number of wells that are projected to be authorized under this Project and therefore these estimates are considered conservative. Kern County does not anticipate authorizing more than 3,647 new well permits in a single year. Therefore, the final total emissions from the Project will be calculated by scaling down the emissions calculated using the assumed number of new wells to the emissions corresponding to the authorized number of new wells per year, that is 3,647 wells each year (Table 4.3-32D).

## Construction Emissions

To estimate emissions associated with construction activities associated with the proposed Project, each activity was estimated separately for:

- Construction of new facilities for crude oil and natural gas production and processing, such as crude oil dehydration facilities and new steam generator plants;
- Construction of permit exempt equipment and small production settings; and
- Construction activity related to wells.

The following table provides the data sources and assumptions used to estimated construction emissions. A list of equipment used during construction is presented as Appendix K.

**Table 4.3-11: Data Sources and Assumptions for the Construction Air Impact Analysis**

| Activity | Data Source/Assumption |
|---|---|
| **Construction of Permitted Equipment (New Facilities)** | |
| Baseline | The number of emission units constructed during the baseline year (2012) was determined from the number of SJVAPCD Authority to Construct (ATC) permits for new equipment converted to equipment Permits to Operate (PTO). |
| Future activities | In order to determine the number of new units expected to be required for the 2035 Project build-out, the change in needed capacity was determined by assuming that the capacity will grow at the same rate as the number of active wells. Project equipment needed for 2035 was forecast using the difference between the number of active wells in 2012 and the number of active wells forecast for 2035. The number of additional units for each equipment category was determined by dividing the change in capacity by the average capacity of the equipment. |
| Emission Factors | Emission factors for on-road mobile sources were derived using EMFAC2011. The model was used to generate Kern County fleet average emission factors by vehicle weight class and year. Emission factors for off-road mobile sources and portable equipment were derived using OFFROAD2011. The model was used to generate fleet average emission factors for the off-road mobile source and portable equipment fleet located in the San Joaquin Valley. Factors were generated by equipment type, horsepower category and fuel type for 2012 and annually for the period 2015 through 2035. |
| Required Equipment and Timing | For oilfield facilities, the time required to complete construction usually depends on the number of new emission units to be installed and the size of the emission units. When detailed construction information was lacking, the type of equipment to be built and the Project acreage was used to generate lists of equipment and activities likely required for the construction Project. |
| Vehicle Trips | Using the available data, the number of vehicle trips required for the construction of a given type of facility (emission unit) were determined for each source category (i.e., tanks, boilers, engines). |
| Average Trip Length | The offsite travel distance per vehicle trip was calculated as the average travel distance to the oil and gas planning zone (Subarea). The onsite travel distance per vehicle trip was calculated as the average onsite distance between facilities. |

**Table 4.3-11: Data Sources and Assumptions for the Construction Air Impact Analysis**

| Activity | Data Source/Assumption |
|---|---|
| Fugitive Dust | Fugitive dust emissions were calculated using EPA predictive emission factor equations (EPA AP42, Chapter-13). |
| **Construction Related to Wells** | |
| Baseline | The number of wells constructed, reworked, and abandoned in the baseline year 2012 were determined from preliminary well counts provided by the DOGGR Distict-4 Office. The number of wells that underwent hydraulic stimulation during 2012 was determined from records obtained from "Frac-Focus." |
| New Well Activities | The information used for evaluating well construction activities was obtained from detailed records compiled during the construction of ten new oil and gas production wells in 2010 and 2011. Detailed activity lists of the onroad mobile sources, offroad mobile sources, and portable equipment used for each construction phase were maintained. The data were compiled during the construction of wells having an average depth of about 10,000 feet. Consequently, to use data for evaluating activities which depend on well depth (such as drilling) the data was adjusted to enable its use for evaluating activities required for construction of wells having other depths. |
| Onroad and Offroad Sources | The list of the onroad mobile sources, offroad mobile sources, and portable equipment used for each construction phase was obtained from the records compiled during the construction of 10 new oil and gas production wells, having an average depth of about 10,000 feet, in 2010 and 2011. Onroad activities for construction include worker commute and delivery of equipment and materials. Offroad activities for construction include site preparation, pre-drilling survey, drilling, completion, stimulation, installation of flow lines, installation of pumping unit, installation of electrical systems, well rework, and well abandonment. |
| Well Stimulation | Hydraulic stimulation information was derived from data obtained from the DOGGR, EPA publications, and fundamental engineering principles. Four categories of well depths were evaluated, namely 5,000, 10,000, 15,000, and 20,000 feet and greater. Each well was evaluated according to its depth. The activity predicted for hydraulic stimulation includes the vehicles and equipment required. The number of vehicles primarily depends upon the surface injection pressure, mass of proppant and injection volumes. The equipment likely to be used for the stimulation job was determined based on the wells that underwent hydraulic stimulation during the baseline year. Each well completed in future years was assumed to undergo initial hydraulic stimulation. Emissions from stimulation jobs conducted during rework should be added to the emissions predicted for rework. Emissions were calculated using the OFFROAD2011 fleet average emission factors. |
| Decommissioning Emissions | Well abandonment involves plugging by placing cement in the well-bore or casing at certain specified intervals. The capacity of a rig used for plugging and abandonment was assumed to be comparable to those used for drilling and completions. Since historic information on the equipment used for well abandonment was not available, the vehicle and equipment list used for routine well maintenance was used for calculating emissions from well abandonment. Emissions were calculated using the OFFROAD2011 fleet average emission factors. |

**Table 4.3-11: Data Sources and Assumptions for the Construction Air Impact Analysis**

| Activity | Data Source/Assumption |
|---|---|
| Engines | The horsepower required for both the hoist system and the mud circulation system depends on the depth of the rig. For the activities of well drilling, well completions, and well rework, the number and average horsepower rating of the engines used by the rig hoist and mud circulation systems were estimated from the data reported by the drilling industry for the 2012 U.S. fleet. Engine type and horsepower for well abandonment was determined from information provided by a manufacturer of these types of rigs and provide of well pulling services ("Stewart and Stevens"). |
| Ancillary Equipment | Ancillary equipment may include diesel engines to power the mud filtration system, small generator sets to power utility systems and other miscellaneous equipment, and offroad mobile sources such as cranes for setting up the rig structure and mast. The list of ancillary equipment included in the drilling operation was obtained from the construction records of 10 wells in 2010 and 2011. |
| Duration | The number of days required to complete drilling, completion, rework, and abandonments depends on the well depth, and was estimated by interpolating data reported in DOGGR well records. Durations of other tasks required for completing a specific phase of a construction activity were obtained from the records of the construction of 10 wells in 2010 and 2011. |

**Construction of New Facilities**

As the number of active wells increases over time more substantial construction activities, such as those required for building new emission units, may be required. New facilities that could be constructed under this Project include crude oil and natural gas production and processing plants, such as crude oil dehydration facilities and new steam generator plants. Equipment that was assumed would be built included boilers, process heaters, internal combustion engines, steam generators, production tanks, and flaring facilities.

The number of emission units constructed during the baseline year (2012) was determined from the number of SJVAPCD Authority to Construct (ATC) permits for new equipment converted to Permits to Operate (PTO) during the year. Facility construction activity occurring during 2012 was determined from a list of equipment provided by the SJVAPCD. The equipment is listed below in Table-4.3-11a.

**Table-4.3-11a: Baseline Equipment Constructed in Kern County During 2012**

| Permitted Equipment | Total Acreage | | Capacity | | Count |
|---|---|---|---|---|---|
| | | | Rating | Units | |
| Boilers | <0.01 | (0.01) | 10 | MMBtu/Hr | 0.1 |
| Cogeneration | 0.20 | (0.50) | 33 | MW | 0.4 |
| Process Heaters | <0.01 | (0.01) | 8 | MMBtu/Hr | 0.4 |
| IC Engines | 0.02 | (0.01) | 671 | BHP*Hr | 1.5 |
| Steam Generators | 0.27 | (0.08) | 65 | MMBtu/Hr | 2.4 |
| Tanks Settings | 0.15 | (0.04) | 3,400 | BBL Capacity | 3.7 |
| TEOR Systems | 0.25 | (0.50) | 74 | System | 0.5 |
| VOCDD (Flare) | 0.05 | (0.01) | 346 | MMBtu/Hr | 0.5 |

Notes:
Acreage numbers in parenthesis are estimates of the footprint (acres) per emission unit.
Estimates include the area required for access of equipment.

In order to determine the number of new units expected to be required for the 2035 Project build-out, the change in needed capacity was determined by assuming that capacity will grow at the same rate as the number of active wells. The number of new emission units required to provide additional processing capacity for the change in the number of active wells from 2012 to 2035 was calculated for each source category (tanks, boilers, engines, etc.) as follows. First, the total processing capacity of the equipment included in each source category was determined from the 2012 annual emission inventory for Title V oil and gas production sources which was obtained from the SJVAPCD. The Title V operators account for approximately 90% of the active crude oil wells in Kern County. To account for smaller non-Title V producers, the capacity was increased by 10%.

The increased processing capacity required for Project build out was then determined by prorating the baseline processing capacity using the ratio of the change in active well counts between 2012 and 2035. The average capacity of the baseline equipment included in each source category was then determined. Finally, the number of new emission units within a given source category required for Project build out was determined by dividing the change in processing capacity (2012 to 2035) for each source category by the average capacity of the baseline equipment.

The results of the forecasts for new emissions units are summarized below in Table-4.3-11b.

**Table-4.3-11b: Forecast of Additional Equipment Needed for 2035 Project Build-Out**

| Permitted Equipment | Kern County Baseline | | Required Acreage for New Systems | Count | | | |
|---|---|---|---|---|---|---|---|
| | Total Capacity | Units | | Kern County | Western Subarea | Central Subarea | Eastern Subarea |
| Boilers | 122.22 | MMBtu/Hr | 0.05 | 6 | 3 | 0 | 3 |
| Cogeneration | 2,046.12 | MW | 21.95 | 54 | 20 | 0 | 34 |
| Process Heaters | 667.24 | MMBtu/Hr | 0.24 | 43 | 25 | 17 | 1 |
| IC Engines | 239,045.18 | BHP*Hr | 1.17 | 102 | 84 | 0 | 18 |
| Steam Generators | 38,120.94 | MMBtu/Hr | 30.07 | 262 | 173 | 0 | 89 |
| Production Tanks | 2,993,043.30 | BBL Capacity | 23.21 | 405 | 170 | 27 | 208 |
| TEOR Systems | 30,495.30 | System | 0.28 | 78 | 20 | 0 | 58 |
| VOCDD (Flare) | 45,555.21 | MMBtu/Hr | 1,63 | 40 | 15 | 12 | 13 |

Equipment assumed to be used during construction of new facilities includes graders, tractors/loaders/backhoes, concrete/industrial saws, rubber-tired bulldozers, cranes, forklifts, cement and mortar mixers, pavers, rollers, and air compressors. Emissions estimate were calculated based on the usage hours, horse powers and load factors of the above equipment required to perform site preparation, grading, building construction, paving, and architectural coating.

Emissions from vehicle trips for construction activity were calculated by determining the number of vehicle trips required for construction of each source category (i.e., tanks, boilers, engines, etc.) as determined by the tasks to be completed for installation of new emissions units and the time to complete those tasks, as described above. The average travel distance to each Subarea was used to estimate the offsite travel distance per vehicle trip. The average onsite distance between facilities was used to calculate onsite travel distance per vehicle trip. The trip distances per Subarea are listed in Table 4.3-11c.

**Table-4.3-11c: Trip Distances for Assessing Onroad Vehicle Miles Traveled for Construction**

| Activity | Western Subarea | Central Subarea | Eastern Subarea |
|---|---|---|---|
| Offsite Travel[1] | 42.74 | 20.11 | 13.87 |
| Onsite Travel[2] | 0.21 | 1.15 | 0.40 |

Note:
1. Average distance from the intersection of Coffee Road and Rosedale Highway to the wells contained with the planning zone
2. The average distance is estimated by dividing the total onsite distance required to travel to the equipment (permit-units) locations divided by the total number of permit units. Travel on unpaved roads accounts for 90% of the total onsite travel.

The analysis of emissions generated in the construction of new facilities takes into account baseline and future activities. Onroad and offroad emission factors associated with construction were estimated using two models: EMFAC2011 for onroad emission factors and OFFROAD 2011 for offroad emission factors. Total emissions were calculated using the CalEEMod model.

Total emissions resulting from the construction of new facility equipment during a Project year (i.e., any year between 2015 and 2035), and the construction of facilities over the Project period (2015 - 2035) are summarized below in Tables 4.3-12 and 4.3-13. These tables show the type of equipment that would be built, the annual average number of new equipment that would be built, the total (onroad, offroad, and all portable equipment) emissions generated by the construction of the equipment, and the SJVAPCD construction emissions thresholds.

**Table 4.3-12: Kern County Facility Construction Emissions during a Single Year (Tons/Year)**

| Equipment to be Built | Average Number of Equipment to be Built Annually | ROG | NOx | CO | $SO_2$ | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|---|---|---|---|
| Boiler | 3 | 6 | 53 | 31 | 0 | 4 | 3 |
| Process Heater | 13 | 25 | 201 | 120 | 0 | 15 | 13 |
| Internal Combustion Engine (RICE) | 55 | 90 | 844 | 501 | 1 | 61 | 55 |
| Steam Generators | 155 | 279 | 2,406 | 1,441 | 2 | 177 | 157 |
| Production Tanks | 259 | 502 | 4,014 | 2,391 | 3 | 293 | 261 |
| VOCDD (Flare) | 19 | 38 | 300 | 179 | 0 | 22 | 20 |
| **TOTAL** | | **940** | **7,818** | **4,662** | **6** | **572** | **509** |
| SJVAPCD Construction Emissions Threshold | | 10 | 10 | 100 | 27 | 15 | 15 |

**Table 4.3-13: Total Kern County Facility Construction Emissions over the Project Period (2015 – 2035) (Tons/Year)**

| Equipment to be Built | Number of Equipment to be Built | ROG | NOx | CO | $SO_2$ | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|---|---|---|---|
| Boiler | 72 | 116.9 | 1,103.7 | 649.0 | 0.9 | 79.0 | 71.5 |
| Process Heater | 273 | 527.9 | 4,227.4 | 2,513.0 | 3.5 | 307.9 | 275.0 |
| Internal Combustion Engine (RICE) | 1,145 | 1,894.9 | 17,727.2 | 10,512.5 | 14.6 | 1,286.6 | 1,152.3 |
| Steam Generators | 3,261 | 5,867.1 | 50,525.3 | 30,257.5 | 42.1 | 3,718.9 | 3,294.8 |

**Table 4.3-13: Total Kern County Facility Construction Emissions over the Project Period (2015 – 2035) (Tons/Year)**

| Equipment to be Built | Number of Equipment to be Built | ROG | NOx | CO | $SO_2$ | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|---|---|---|---|
| Production Tanks | 5,442 | 10,538.8 | 84,287.0 | 50,210.8 | 69.6 | 6,153.2 | 5,484.5 |
| VOCDD (Flare) | 407 | 788.5 | 6,304.5 | 3,763.3 | 5.2 | 461.7 | 410.6 |
| | **TOTAL** | **19,734.1** | **164,175.2** | **97,905.9** | **136.0** | **12,007.3** | **10,688.8** |

Total Project emission resulting from the construction of new facilities on an annual basis would exceed the SJVAPCD Criteria Pollutant Emissions Significance Thresholds except $SO_2$. However, constructing of new facilities would be subjected to the District's air permitting process (Rule 2201), which would ensure that all emissions would have to be fully offset. Therefore, there would be no net increase in these emissions.

**Construction of Permit Exempt Equipment and Small Production Settings**

Permit-exempt equipment and small production settings consist mainly of pressure vessels and piping components, and typically occupy less than ½ acre. Future production activities would entail the construction of these types of small production settings. The new equipment would have a small footprint and would require simple construction activity. Small production settings would be constructed on an as-needed basis over time and would be distributed throughout the oilfield. No information is available on the number and location of permit-exempt equipment and small production settings that would be constructed or installed during the Project years 2015 – 2035. Due lack of data and because missions from construction of permit exempt equipment and small production settings are known to be small in quantity, they were assumed to be equivalent to be 5% of the construction emissions for permitted equipment.

Total estimated emissions resulting from the construction of new Permit Exempt Equipment and Small Production Settings during a Project year (i.e., any year between 2015 and 2035) are summarized below in Table 4.3-14.

**Table 4.3-14: Total Estimated Emissions from Construction of Permit Exempt Equipment and Small Production Settings**

| | Emissions (Tons/Year) | | | | | |
|---|---|---|---|---|---|---|
| | **ROG** | **$NO_x$** | **CO** | **$SO_2$** | **$PM_{10}$** | **$PM_{2.5}$** |
| **TOTAL** | **47** | **391** | **233** | **0.32** | **29** | **25** |
| SJVAPCD Construction Emissions Threshold | 10 | 10 | 100 | 27 | 15 | 15 |

This emissions listed in table indicate that the emissions of all criteria pollutants except $SO_2$ associated with construction activities related to Permit Exempt Equipment and Small Production Settings would exceed the SJVAPCD Construction Emissions Threshold. These types of construction activities do not require air permits and therefore these emissions would not be offset.

**Construction Related to Wells**

The construction activities related to wells include well drilling, rework of wells, well stimulation and well abandonment. The emissions of criteria pollutants associated with each of these activities are presented in the Tables 4.3-15 through 4.3-18 below. As discussed above, the air analysis used the baseline level of wells that were operating in 2012 and an assumed number of wells of 82,136 operating in in 2035. The number of new wells projected to be built in 2035 (4,083) exceeds the number of wells that are projected to be authorized under this Project and therefore these estimates are considered conservative. This EIR will not authorize Kern County permitting any more than 3,647 new well permits in a single year. The total emissions will be adjusted (Table 4.3-32D) to account for the smaller number of wells authorized, compared to the number of wells used in the calculations.

The well count numbers for drilling, rework, well stimulation, and well abandonment for the baseline year 2012 were determined using preliminary information obtained from the California Division of Oil, Gas and Geothermal Resources (DOGGR) District-4 Field Office. The petroleum industry provided projected well counts during the Project period 2015 through 2035.

**Table 4.3-15: Estimated Annual Emissions Associated with Drilling of Wells in 2012 and 2035**

| Year | Subarea | Well Count | Criteria Emissions (tons per year) | | | | | | Emission Factors (lbs. per year per well) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | $NO_X$ | VOC | CO | $SO_X$ | $PM_{10}$ | $PM_{2.5}$ | $NO_X$ | VOC | CO | $SO_X$ | $PM_{10}$ | $PM_{2.5}$ |
| 2012 | Western | 2,549 | 6,345.35 | 1,067.97 | 4,369.40 | 6.25 | 381.34 | 248.92 | 4,978.70 | 837.95 | 3,428.32 | 4.90 | 299.21 | 195.31 |
| | Central | 47 | 468.30 | 155.63 | 357.55 | 0.43 | 24.54 | 16.01 | 19,927.84 | 6,622.71 | 15,215.01 | 18.43 | 1,044.06 | 681.29 |
| | Eastern | 796 | 1,563.05 | 103.48 | 1,133.80 | 1.45 | 99.63 | 63.65 | 3,927.25 | 260.00 | 2,848.73 | 3.63 | 250.33 | 159.93 |
| | TOTALS | 3,392 | 8,376.70 | 1,327.09 | 5,860.75 | 8.13 | 505.51 | 328.58 | 4,939.09 | 782.48 | 3,455.63 | 4.79 | 298.06 | 193.74 |
| 2035 | Western | 2,623 | 1,908.99 | 894.68 | 4,279.01 | 6.44 | 188.04 | 68.12 | 1,455.57 | 682.18 | 3,262.68 | 4.91 | 143.38 | 51.94 |
| | Central | 140 | 688.94 | 430.90 | 1,052.13 | 1.28 | 39.22 | 16.56 | 9,841.97 | 6,155.77 | 15,030.48 | 18.35 | 560.29 | 236.54 |
| | Eastern | 1,320 | 664.17 | 87.58 | 1,851.62 | 2.41 | 78.63 | 25.89 | 1,006.31 | 132.69 | 2,805.49 | 3.65 | 119.14 | 39.23 |
| | TOTALS | 4,083 | 3,262.09 | 1,413.16 | 7,182.77 | 10.14 | 305.89 | 110.57 | 1,597.89 | 692.22 | 3,518.38 | 4.97 | 149.84 | 54.16 |

**Table 4.3-16: Estimated Annual Emissions Associated with Rework of Wells in 2012 and 2035**

| Year | Subarea | Well Count | Criteria Emissions (tons per year) | | | | | | Emission Factors (lbs. per year per well) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | $NO_X$ | VOC | CO | $SO_X$ | $PM_{10}$ | $PM_{2.5}$ | $NO_X$ | VOC | CO | $SO_X$ | $PM_{10}$ | $PM_{2.5}$ |
| 2012 | Western | 1,298 | 904.23 | 52.35 | 564.67 | 0.89 | 54.26 | 37.57 | 1,393.26 | 80.66 | 870.07 | 1.36 | 83.61 | 57.88 |
| | Central | 33 | 87.48 | 4.25 | 66.02 | 0.08 | 4.77 | 3.02 | 5,301.78 | 257.75 | 4,001.07 | 4.88 | 289.05 | 182.85 |
| | Eastern | 613 | 268.97 | 16.02 | 177.43 | 0.24 | 17.75 | 11.67 | 877.55 | 52.25 | 578.89 | 0.79 | 57.90 | 38.06 |
| | TOTALS | 1,944 | 1,260.67 | 72.62 | 808.12 | 1.21 | 76.78 | 52.25 | 1,296.99 | 74.71 | 831.40 | 1.24 | 78.99 | 53.76 |
| 2035 | Western | 1,880 | 377.17 | 31.03 | 760.01 | 1.29 | 33.96 | 13.35 | 401.24 | 33.01 | 808.53 | 1.37 | 36.13 | 14.20 |
| | Central | 107 | 140.44 | 7.54 | 212.89 | 0.26 | 8.56 | 3.43 | 2,624.97 | 141.03 | 3,979.25 | 4.91 | 159.94 | 64.07 |
| | Eastern | 1,890 | 223.52 | 20.34 | 530.46 | 0.75 | 24.69 | 8.35 | 236.53 | 21.53 | 561.34 | 0.80 | 26.12 | 8.83 |
| | TOTALS | 3,877 | 741.13 | 58.91 | 1,503.37 | 2.30 | 67.21 | 25.13 | 382.32 | 30.39 | 775.53 | 1.19 | 34.67 | 12.96 |

**Table 4.3-17: Estimated Annual Emissions Associated with Well Stimulation in 2012 and 2035**

| Year | Subarea | Well Count | Criteria Emissions (tons per year) | | | | | | Emission Factors (lbs. per year per well) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | $NO_X$ | VOC | CO | $SO_X$ | $PM_{10}$ | $PM_{2.5}$ | $NO_X$ | VOC | CO | $SO_X$ | $PM_{10}$ | $PM_{2.5}$ |
| 2012 | Western | 414 | 69.44 | 3.48 | 37.89 | 0.09 | 15.46 | 3.61 | 335.44 | 16.82 | 183.06 | 0.43 | 74.68 | 17.46 |
| | Central | 28 | 4.21 | 0.18 | 3.10 | 0.01 | 0.95 | 0.20 | 300.87 | 12.88 | 221.33 | 0.37 | 67.96 | 14.58 |
| | Eastern | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | TOTALS | 442 | 73.65 | 3.66 | 40.99 | 0.09 | 16.41 | 3.82 | 333.25 | 16.57 | 185.49 | 0.43 | 74.26 | 17.28 |
| 2035 | Western | 1,233 | 62.19 | 4.38 | 88.71 | 0.27 | 40.24 | 5.43 | 100.87 | 7.10 | 143.89 | 0.43 | 65.27 | 8.80 |
| | Central | 171 | 10.59 | 0.59 | 17.40 | 0.03 | 5.18 | 0.67 | 123.83 | 6.84 | 203.49 | 0.37 | 60.61 | 7.81 |
| | Eastern | 41 | 1.58 | 0.10 | 2.68 | 0.00 | 0.27 | 0.05 | 77.08 | 4.73 | 130.62 | 0.24 | 13.30 | 2.45 |
| | TOTALS | 1,445 | 74.35 | 5.06 | 108.79 | 0.30 | 45.70 | 6.14 | 102.91 | 7.00 | 150.57 | 0.42 | 63.25 | 8.50 |

**Table 4.3-18: Estimated Annual Emissions Associated with Well Abandonment in 2012 and 2035**

| Year | Subarea | Well Count | Criteria Emissions (tons per year) | | | | | | Emission Factors (lbs. per year per well) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | $NO_X$ | VOC | CO | $SO_X$ | $PM_{10}$ | $PM_{2.5}$ | $NO_X$ | VOC | CO | $SO_X$ | $PM_{10}$ | $PM_{2.5}$ |
| 2012 | Western | 1880 | 279.79 | 25.90 | 194.51 | 0.24 | 22.07 | 17.54 | 297.65 | 27.55 | 206.92 | 0.25 | 23.48 | 18.66 |
| | Central | 9 | 1.81 | 0.17 | 1.29 | 0.00 | 0.20 | 0.12 | 402.39 | 37.16 | 285.81 | 0.35 | 44.91 | 26.07 |
| | Eastern | 215 | 30.62 | 2.83 | 21.25 | 0.03 | 2.40 | 1.92 | 284.80 | 26.31 | 197.68 | 0.24 | 22.31 | 17.84 |
| | TOTALS | 2,104 | 312.22 | 28.90 | 217.04 | 0.26 | 24.67 | 19.58 | 296.79 | 27.47 | 206.32 | 0.25 | 23.45 | 18.61 |
| 2035 | Western | 2534 | 98.10 | 9.52 | 259.95 | 0.32 | 7.70 | 3.37 | 77.43 | 7.52 | 205.17 | 0.25 | 6.08 | 2.66 |
| | Central | 126 | 6.92 | 0.66 | 17.68 | 0.02 | 1.40 | 0.33 | 109.78 | 10.48 | 280.67 | 0.35 | 22.22 | 5.19 |
| | Eastern | 1040 | 38.54 | 3.74 | 101.59 | 0.13 | 2.95 | 1.32 | 74.11 | 7.19 | 195.36 | 0.24 | 5.67 | 2.54 |
| | TOTALS | 3,700 | 143.56 | 13.92 | 379.22 | 0.47 | 12.05 | 5.01 | 77.60 | 7.52 | 204.98 | 0.25 | 6.51 | 2.71 |

Table 4.3-19 presents the total of all annual construction-related emissions.

**Table 4.3-19: Total Annual Estimated Emissions from Well Construction**

| Year | Subarea | Criteria Emissions (tons per year) | | | | | |
|---|---|---|---|---|---|---|---|
| | | $NO_X$ | VOC | CO | $SO_X$ | $PM_{10}$ | $PM_{2.5}$ |
| 2012 | Western | 7,598.80 | 1,149.70 | 5,166.48 | 7.46 | 473.13 | 307.64 |
| | Central | 561.81 | 160.23 | 427.96 | 0.52 | 30.46 | 19.35 |
| | Eastern | 1,862.63 | 122.33 | 1,332.48 | 1.71 | 119.78 | 77.24 |
| | **TOTALS** | **10,023.24** | **1,432.26** | **6,926.91** | **9.70** | **623.37** | **404.22** |
| 2035 | Western | 2,446.44 | 939.60 | 5,387.69 | 8.32 | 269.95 | 90.27 |
| | Central | 846.88 | 439.69 | 1,300.10 | 1.60 | 54.36 | 20.98 |
| | Eastern | 927.81 | 111.75 | 2,486.35 | 3.30 | 106.54 | 35.61 |
| | **TOTALS** | **4,221.13** | **1,491.05** | **9,174.14** | **13.22** | **430.85** | **146.85** |
| SJVAPCD Construction Emissions Threshold | | 10 | 10 | 100 | 27 | 15 | 15 |

The above tables indicate that the emissions associated with well construction activities would exceed SJVAPCD Construction Emissions Threshold. Since the San Joaquin Valley Project region is nonattainment for $PM_{10}$, $PM_{2.5}$, and ozone, well construction related criteria pollutant emissions would result in considerable net increase of the criteria pollutants $NO_X$, VOC, CO, $PM_{10}$ and $PM_{2.5}$ and would be significant impact. Well construction activities do not require air permits and therefore these emissions would not be offset.

**Summary of Construction Emissions**

In summary, emissions from the new facility and well construction at a Project level would result in emissions levels that would exceed SJVAPCD Construction Emissions Threshold. Only the new facility construction emissions would be required to be off-set because it would be a condition of the SJVAPCD air permit. Although offset all permitted construction emissions that are above baseline would be offset, other equipment and activities are exempt. In addition, well construction emissions have no offset requirements. Since these emissions exceed the SJVAPCD Construction Emissions Threshold and would not be offset, they would result in a cumulatively considerable net increase of criteria pollutants for which the Project region is nonattainment and therefore the construction impacts would be significant.

## Operational Emissions

Operational emissions sources include emissions from oil and gas production facilities which are stationary permitted sources, emissions from permit-exempt sources, such as small pumps and generators, and emissions from mobile sources, such as vehicles. The analysis that follows is consistent with the recommendations of the SJVAPCD's March 2015 Guidance for Assessing and Mitigating Air Quality Impacts that operational criteria pollutant emissions associated with

permitted sources and activities be evaluated separately from non-permitted sources and activities (SJVAPCD 2015a, Section 8.3.3).

**Permitted Stationary Equipment**

Oil and gas activities that would be authorized under the Project would result in the operations of several types of stationary permitted emission sources, such as boilers, cogeneration plants, process heaters, reciprocating internal combustion engines, steam generators, production tanks, thermally enhanced oil recovery wells, and VOCDD (flares). The SJVAPCD air permit program requires the application of District Rule 2201 (New Source Review) which mandates that new permitted stationary equipment include BACT and that all criteria pollutant emissions be offset to below thresholds of significance established by the District. BACT represents the most stringent control technique or limitation that has been achieved in current technology for the same class of source. In addition, more effective control technique must be used where possible. Emissions offsets may be provided by emissions reductions, or may be obtained by purchasing emissions reduction credits from another party. Therefore, the net impact of offsetting is a reduction of emission at the regional scale.

For the evaluation of emissions that would be generated from this Project, emissions from permitted stationary equipment used for crude oil and natural gas production in Kern County were determined from the 2012 emission inventories obtained from the Air District for oil and gas production companies subject to Title V permit requirements (Table 4.3-20). The permitted emission sources evaluated in this analysis includes the following:

- Boiler;
- Process Heater;
- Internal Combustion Engine (RICE);
- Steam Generators;
- Production Tanks;
- Thermally Enhanced Oil Recovery Wells (TEOR Wells);
- VOCDD (Flare);
- Fugitive $PM_{10;}$ and
- Fugitive VOC.

Since the Title V oil and gas production sources account for approximately 90% of the active wells in the County and more than 95% of the total oil production in the County, it was assumed that they also account for 90% to 95% of the emissions from equipment used by the oil and gas sector. To account for the remaining emissions from small oil and gas operators, not subject to Title V permit requirements, emissions were increased by 10%.

**Table 4.3-20: Estimated Change in Operational Emissions For Stationary Source Equipment**

| Change in Equip. Emissions | Change in Capacity | Capacity Units | Kern County Change in Emissions from Stationary Source Equipment | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | $NO_x$ TPY | VOC TPY | CO TPY | $SO_x$ TPY | $PM_{10}$ TPY | $PM_{2.5}$ TPY |
| Boiler | 587.77 | MMBtu/Hr | 0.84 | 0.09 | 0.15 | 0.01 | 0.19 | 0.19 |
| Cogeneration | 28,212.55 | MW | 841.01 | 198.43 | 1,175.38 | 83.62 | 229.30 | 229.30 |
| Fugitive Emissions | 38,199.00 | Wells | 0.00 | 152.93 | 0.00 | 0.00 | 4.67 | 4.67 |
| Process Heater | 2,431.72 | MMBtu/Hr | 2.78 | 0.55 | 0.82 | 0.14 | 0.85 | 0.85 |
| IC Engine (RICE) | 915,973.95 | BHP*Hr | 115.66 | 33.81 | 495.64 | 0.10 | 1.28 | 1.28 |
| Steam Generators | 214,084.08 | MMBtu/Hr | 283.03 | 138.78 | 161.13 | 108.56 | 372.67 | 372.67 |
| Production Tanks | 25,491,168.27 | BBL Capacity | 0.74 | 379.62 | 4.05 | 1.33 | 0.08 | 0.08 |
| TEOR Wells | 319,648.57 | TEOR Wells | 9.36 | 830.42 | 7.28 | 13.69 | 0.94 | 0.94 |
| VOCDD (Flare) | 161,850.76 | MMBtu/Hr | 35.30 | 39.59 | 131.33 | 6.49 | 6.83 | 6.83 |
| Total Emissions Title-v O&G Sources | | | 1,288.72 | 1,774.22 | 1,975.77 | 213.94 | 616.81 | 616.81 |
| Total Emissions Small O&G Sources (+10%) | | | 128.87 | 177.42 | 197.58 | 21.39 | 61.68 | 61.68 |
| Total Emissions All O&G Sources (TPY) | | | 1,417.59 | 1,951.65 | 2,173.34 | 235.33 | 678.49 | 678.49 |
| SJVAPCD Operational Emissions Threshold (TPY) | | | 10 | 10 | 100 | 27 | 15 | 15 |
| Total Emissions All O&G Sources (TPD) | | | 3.87 | 5.33 | 5.94 | 0.64 | 1.85 | 1.85 |

Source: Vector 2015

The increase in capacity required for future production was assumed to be proportional to the increase in the number of active wells. The number of new emission units was estimated from the change in capacity and the average size of the emission unit.

Project emissions would exceed the SJVAPCD Operational Emissions and therefore would represent a potentially significant impact. The annual contribution of $PM_{10}$ and $PM_{2.5}$ would be almost 30 times the threshold. The emissions of ozone precursors ($NO_x$, ROG, and CO) would exceed their respective thresholds: $NO_X$ would be almost 50 times the threshold, VOC more than 170 times the threshold, and CO more than eight times the threshold. However, all emissions increases from permitted equipment plus the 10% allowance from non-permitted equipment would be required to be fully offset pursuant to District Rule 2201. Offsets for emissions of $NO_X$ and VOC would be required at a ratio of 1 to 1.5. Other criteria pollutants are assumed to be offset at a ratio of 1 to 1. Therefore, there would be no net increase in these emissions.

**Permit Exempt Equipment**

District Rule 2020 exempts equipment or activities that emit less than 2.0 lb/day or 75 lb/year of each air contaminant, and for some special categories of equipment. Most crude oil and natural gas production wells emit less than 2.0 lb/day and as such are permit exempt pursuant to Rule 2020. However, at a Project level, the combined emissions from permit exempt equipment at wells could results in significant impacts because oil and gas wells operations generate fugitive VOC emissions from well head piping components and from downstream equipment, the latter being normally accounted for on District permits. Fugitive VOC emissions from wells are subject to leak detection and repair (LDAR) requirements pursuant to District Rule 4409 and Rule 4401.

Fugitive VOC emissions from the wells were estimated based on the total number of active and idle wells in Kern County (Table 4.3-21), and were determined using weight fraction of VOC for light oil and heavy oil obtained from the U.S. Department of Interior, Users Guide for 2014 Gulfwide Offshore Activities Data System (Bureau of Ocean Energy Management 2014), and EPA approved average leak rate equations for a 2,000 ppmv leak. The calculation procedures include the recommendations contained in District Policy APR2015. The uncontrolled and the controlled fugitive VOC emissions from the wells, on a County-wide basis are summarized below. The number of idle wells is the same for every Project year 2015 – 2035, and was calculated as the average of the number of idle wells reported to DOGGR from 1999 through 2014.

**Table 4.3-21: Uncontrolled and Controlled Fugitive Volatile Organic Emissions**

| Year | Subarea | Active wells | Idle wells | Fugitive VOC (tpy) |
|---|---|---|---|---|
| 2012 | Western | 27,873 | 7,661 | 2,059 |
| | Central | 413 | 114 | 68 |
| | Eastern | 14,742 | 4,052 | 121 |
| | Totals | 43,028 | 11,827 | 2,247 |

**Table 4.3-21: Uncontrolled and Controlled Fugitive Volatile Organic Emissions**

| Year | Subarea | Active wells | Idle wells | Fugitive VOC (tpy) |
|---|---|---|---|---|
| 2035 | Western | 37,205 | 6,254 | 2,511 |
| | Central | 1,321 | 222 | 199 |
| | Eastern | 31,511 | 5,297 | 236 |
| | Totals | 70,037 | 11,773 | 2,946 |
| SJVAPCD Threshold* | | | | 10 |

Note: *The SJVAPCD threshold is set for ROG. The Kern County CEQA Implementation Document (June 2004) states the equivalence of ROG and VOC

The VOC fugitive emissions from permit exempt equipment would exceed the SJVAPCD threshold for ROG of 10 tons per year. ROG, which is an ozone precursor, is a criteria pollutant for which the Project region is nonattainment. Therefore the VOC fugitive emissions would have a significant impact.

**Mobile Sources**

Mobile emissions sources include onroad sources of emission, such as gasoline fueled light duty autos and heavy-duty diesel trucks; offroad sources, such as trucks and tractors, and portable equipment, such as accumulators, generators, pumps, etc. Emissions are generated from three operational activities: routine business travel, routine well operations (and facility inspections), and routine well maintenance. Routine business travel includes employee and contractor commute and the transport of material needed for daily business; emissions are generated by onroad sources and fugitive dust. Routine well operations include onsite travel on paved and unpaved oilfield roads to conduct daily field operations; emissions are generated by onroad sources and fugitive dust. Routine well maintenance includes travel and use of equipment to conduct maintenance and treatment activities;

The analysis of emissions generated by mobile sources include emissions and fugitive dust generated by onroad sources during routine business travel and routine well operations; and by onroad, offroad and portable equipment sources during routine well maintenance. Emission factors for the onroad mobile sources were calculated using the EMFAC2011 model; emission factors for offroad sources and portable equipment were calculated using the OFFROAD2011 model. Final emissions were calculated combining the emission factors with activity data obtained from industry or from well records obtained from DOGGR. The assumptions and factors associated with each of these types of mobile sources are discussed in detail below.

**Routine Business Travel**

This activity includes employee and contractor commute and the transport of material needed for conducting day-to-day business. Gasoline fueled light duty autos (LDA) were assumed for daily commute and general business activities, and heavy-duty diesel trucks (T7-Single) were assumed for the transport of material and supplies. The number of vehicle trips per year depends on the number of petroleum industry employees and the average vehicle occupancy.

The number of people employed by the petroleum industry during the baseline year was obtained from the U.S. Bureau of Labor Statistics (BLS). The 2012 baseline employment was allocated to the individual planning zones based on the percentages of the active wells included in each Subarea during 2012. Employment in future Project years in was assumed proportional to the number of active wells.

SJVAPCD Rule 9410 (Ride Sharing) requires that companies with more than 100 employees reporting to the same location participate in a ride sharing program, and estimates the average vehicle occupancy expected to be achieved.

Emissions generated by routine business travel are estimated in Table 4.3-22. Truck trips required for the transportation of freight and miscellaneous supplies were calculated using "truck trip generation equations" derived from the report *Truck Trip Generation Study, City of Fontana, August 2003*. The vehicle miles traveled per trip was determined based on a weighted average travel distance to the wells in the Subareas. Fugitive dust emissions resulting from onroad travel were calculated using the EPA AP42 procedure.

**Table 4.3-22: Estimated Annual Criteria Pollutant Emission Generated by Routine Business Travel ( Tons per year)**

| Year | $NO_X$ | ROG | CO | $SO_X$ | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|---|---|---|
| 2012 | 93.1 | 26.2 | 258.7 | 0.5 | 14.8 | 5.8 |
| 2035 | 28.5 | 11.1 | 121.3 | 0.8 | 21.2 | 7.2 |

**Routine Well Operations**

Emissions generated by routine well operations are estimated in Table 4.3-23. This activity includes onsite travel on paved and unpaved oilfield roads to conduct day-to-day field operations. Offsite travel on paved public roads to reach the oilfield destination is accounted for in "Routine Business Travel."

Oilfield production facilities and wells are routinely inspected to ensure proper operation. Light duty, gasoline fueled trucks are assumed to provide transportation for these types of operational activities. Chemical treatment of wells to prevent corrosion and scale formation may also be conducted using light duty gasoline fueled trucks as well as heavy duty diesel fueled trucks required for delivery of chemicals.

The number of annual trips for the day-to-day management of wells was calculated assuming that the wells are inspected on a weekly basis, and that an oilfield operator manages 200 wells with one trip.

Actively producing crude oil and natural gas wells are normally treated to prevent corrosion and scale formation. Treatment is usually handled by an oilfield service companies. Onsite travel for well treatment to prevent corrosion and scale formation depends on the type of treatment provided to the well. 180 well site visits per year for treatment were assumed for each well. The

trips to the well site are about evenly distributed between light duty truck trips and heavy duty trucks trips. Onsite vehicle miles traveled per trip was estimated for two cases: travel to permitted equipment; and travel to well site locations.

Emissions generated by activities related to inspection of facility equipment are estimated in Table 4.3-24. Facilities were assumed to be inspected every other workday. The number of facilities was increased by 10% to account for non-permitted sources. The average trip length for the inspection and operation of permitted equipment included within a Subarea was calculated based on the equipment locations within the Subarea. The average trip length for well surveillance and treating was determined from the average travel distance between the wells. Onsite travel was assumed to occur for 90% on unpaved oilfield roads.

**Routine Well Maintenance (Pulling)**

Emissions generated by routine well maintenance are estimated in Table 4.3-25. Well maintenance (or well workover or pulling) includes routine activities conducted on downhole equipment to maintain the well in proper operating conditions. It entails onroad and offroad mobile sources and portable equipment.

Well pulling counts were estimated to be equal to 50% of the total active oil and gas production wells, based on data provided by one operating company and discussions with other company representatives.

The number of vehicle trips depends on the number of days required for maintenance, which, in turn, depends on the well depth. The well depth and the number of days required to complete the activity is also needed to calculate the total number of operating hours and the emissions resulting from the use of offroad mobile sources and portable equipment required. The number of days required for conducting well maintenance was determined from data provided by one operating company. The equipment required for conducting well maintenance activities was obtained from one oilfield production company (Vector 2015).

Fugitive dust emissions from onsite travel were estimated assuming that 90% of the onsite travel occurred on unpaved oilfield roads.

**Total Mobile Sources Emissions**

The total emissions generated by mobile sources including routine business travel, well operations, facility inspection and well maintenance are calculated in Table 4.3-26.

**Table 4.3-23: Estimated Annual Emission Generated by Routine Well Operations**

| Year | Subarea | Well Count | Criteria Emissions (tons per year) | | | | | | Emission Factors (lbs. per year per well) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | $NO_X$ | VOC | CO | $SO_X$ | $PM_{10}$ | $PM_{2.5}$ | $NO_X$ | VOC | CO | $SO_X$ | $PM_{10}$ | $PM_{2.5}$ |
| 2012 | Western | 27,873 | 54.05 | 1,594.54 | 207.54 | 0.07 | 127.68 | 13.48 | 3.88 | 114.41 | 14.89 | 0.00 | 9.16 | 0.97 |
| | Central | 413 | 1.09 | 53.76 | 3.36 | 0.00 | 8.62 | 0.88 | 5.28 | 260.33 | 16.27 | 0.01 | 41.73 | 4.27 |
| | Eastern | 14,742 | 29.17 | 116.15 | 110.07 | 0.04 | 62.67 | 6.66 | 3.96 | 15.76 | 14.93 | 0.01 | 8.50 | 0.90 |
| | **TOTALS** | **43,028** | **84.31** | **1,764.44** | **320.97** | **0.11** | **198.97** | **21.02** | **3.92** | **82.01** | **14.92** | **0.01** | **9.25** | **0.98** |
| 2035 | Western | 37,205 | 53.47 | 2,094.43 | 90.99 | 0.13 | 169.72 | 17.36 | 2.87 | 112.59 | 4.89 | 0.01 | 9.12 | 0.93 |
| | Central | 1321 | 2.01 | 170.67 | 3.39 | 0.01 | 27.52 | 2.78 | 3.04 | 258.39 | 5.13 | 0.01 | 41.66 | 4.21 |
| | Eastern | 43,609 | 62.88 | 303.68 | 106.84 | 0.16 | 184.53 | 18.91 | 2.88 | 13.93 | 4.90 | 0.01 | 8.46 | 0.87 |
| | **TOTALS** | **82,135** | **118.35** | **2568.77** | **201.22** | **0.30** | **381.77** | **39.05** | **2.88** | **62.55** | **4.90** | **0.01** | **9.30** | **0.95** |

**Table 4.3-24: Estimated Annual Emission Generated by Facility Inspection**

| Year | Subarea | Criteria Emissions (tons per year) | | | | | |
|---|---|---|---|---|---|---|---|
| | | $NO_X$ | VOC | CO | $SO_X$ | $PM_{10}$ | $PM_{2.5}$ |
| 2012 | Western | 0.32 | 0.30 | 3.57 | 0.01 | 120.05 | 12.09 |
| | Central | 0.02 | 0.01 | 0.17 | 0.00 | 5.82 | 0.59 |
| | Eastern | 0.10 | 0.09 | 1.12 | 0.00 | 38.42 | 3.87 |
| | **TOTALS** | **0.44** | **0.41** | **4.86** | **0.01** | **164.29** | **16.54** |
| 2035 | Western | 0.14 | 0.10 | 1.39 | 0.01 | 169.88 | 17.10 |
| | Central | 0.01 | 0.01 | 0.14 | 0.00 | 17.45 | 1.76 |
| | Eastern | 0.07 | 0.04 | 0.64 | 0.00 | 79.80 | 8.03 |
| | **TOTALS** | **0.22** | **0.15** | **2.17** | **0.01** | **267.14** | **26.89** |

**Table 4.3-25: Estimated Annual Emission Generated by Routine Well Maintenance**

| Year | Subarea | Well Count | Criteria Emissions (tons per year) | | | | | | Emission Factors (lbs. per year per well) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | $NO_X$ | VOC | CO | $SO_X$ | $PM_{10}$ | $PM_{2.5}$ | $NO_X$ | VOC | CO | $SO_X$ | $PM_{10}$ | $PM_{2.5}$ |
| 2012 | Western | 13,932 | 1,012.71 | 90.83 | 667.00 | 0.86 | 115.47 | 68.10 | 145.38 | 13.04 | 95.75 | 0.12 | 16.58 | 9.78 |
| | Central | 202 | 20.78 | 1.83 | 13.91 | 0.02 | 4.54 | 1.56 | 205.79 | 18.11 | 137.76 | 0.19 | 44.91 | 15.42 |
| | Eastern | 7,367 | 528.02 | 47.03 | 343.60 | 0.45 | 58.66 | 35.24 | 143.35 | 12.77 | 93.28 | 0.12 | 15.92 | 9.57 |
| | **TOTALS** | **21,501** | **1,561.51** | **139.69** | **1,024.51** | **1.33** | **178.66** | **104.89** | **145.25** | **12.99** | **95.30** | **0.12** | **16.62** | **9.76** |
| 2035 | Western | 18,603 | 364.33 | 35.86 | 882.58 | 1.16 | 73.87 | 17.04 | 39.17 | 3.85 | 94.89 | 0.12 | 7.94 | 1.83 |
| | Central | 660 | 19.40 | 1.84 | 44.14 | 0.06 | 11.09 | 1.65 | 58.79 | 5.58 | 133.75 | 0.19 | 33.59 | 5.00 |
| | Eastern | 21,803 | 417.80 | 41.18 | 1,002.99 | 1.36 | 81.23 | 19.30 | 38.33 | 3.78 | 92.01 | 0.12 | 7.45 | 1.77 |
| | **TOTALS** | **41,066** | **801.54** | **78.88** | **1,929.71** | **2.58** | **166.19** | **37.99** | **39.04** | **3.84** | **93.98** | **0.13** | **8.09** | **1.85** |

**Table 4.3-26: Estimated Annual Emission Generated by Mobile Sources**

| Year | Activity | Criteria Pollutant Emissions (tons per year) | | | | | |
|---|---|---|---|---|---|---|---|
| | | $NO_X$ | VOC | CO | $SO_X$ | $PM_{10}$ | $PM_{2.5}$ |
| 2012 | Routine Business Travel | 93.10 | 26.20 | 258.70 | 0.50 | 14.80 | 5.80 |
| | Routine Well Operations | 84.31 | 1,764.44 | 320.97 | 0.11 | 198.97 | 21.02 |
| | Routine Well Maintenance | 1,561.51 | 139.69 | 1,024.51 | 1.33 | 178.66 | 104.89 |
| | Facility Inspection | 0.44 | 0.41 | 4.86 | 0.01 | 164.29 | 16.54 |
| | **TOTALS** | **1,739.36** | **1,930.74** | **1,609.05** | **1.94** | **556.72** | **148.25** |
| 2035 | Routine Business Travel | 28.50 | 11.10 | 121.30 | 0.80 | 21.20 | 7.20 |
| | Routine Well Operations | 118.35 | 2,568.77 | 201.22 | 0.30 | 381.77 | 39.05 |
| | Routine Well Maintenance | 801.54 | 78.88 | 1,929.71 | 2.58 | 166.19 | 37.99 |
| | Facility Inspection | 0.22 | 0.15 | 2.17 | 0.01 | 267.14 | 26.89 |
| | **TOTALS** | **948.61** | **2,658.90** | **2,254.40** | **3.69** | **836.30** | **111.13** |
| SJVAPCD Operational Emissions Threshold (TPY) | | 10 | 10 | 100 | 27 | 15 | 15 |

The total annual emissions of all criteria pollutants from mobile sources associated with business travel, well operations, facility inspection, and well maintenance do not require air permits and, therefore, would not be offset. Table 4.3-26 indicates that in 2035 these emissions would exceed SJVAPCD Operational Emissions Thresholds with the exception of $SO_X$. Since the San Joaquin Valley Project region is in nonattainment for $PM_{10}$, $PM_{2.5}$, and ozone, criteria pollutant emissions from mobile sources operational activities emissions would result in considerable net increase of the criteria pollutants $NO_X$, VOC, CO, $PM_{10}$ and $PM_{2.5}$ and would be a significant impact.

**Summary of Operational Emissions**

In summary, emissions from permitted stationary sources, permit-exempt equipment, and mobile sources at a Project level would result in emissions levels that would exceed SJVAPCD Operational Emissions Threshold. Only the permitted stationary sources would be required to be off-set because it is a condition of SJVAPCD air permit. Since the remaining emissions would exceed the SJVAPCD Construction Emissions Threshold and would not be offset, operational emission would result in considerable net increase of the criteria pollutants $NO_X$, VOC, CO, $PM_{10}$ and $PM_{2.5}$ and would be significant impact.

## Criteria Pollutant Modeling

Ambient air quality modeling results for $NO_2$, $SO_2$, and CO, $PM_{10}$ and $PM_{2.5}$ is sometimes warranted for large stationary sources near potentially sensitive receptors. Since the Project consists of Zoning Code Amendments that will regulate a broad range of oil and gas activities located throughout the Project Area, and excludes the types of large stationary sources (e.g., new and expanded cogeneration plants) that could warrant ambient air quality modelling, this modelling was not required to evaluate the potential significance of Project-related air emissions. TAC modelling to assess health risks was completed as described below, and the toxicity of criteria pollutants more generally is discussed above.

**Visibility**

A visibility screening analysis for each Class I area located within 100 kilometers of the Project was not conducted as the Project is not expected to generate large individual plumes that may be visible at a distance.

**Carbon Monoxide "Hot Spots"**

The Kern County Air Quality Assessment Guidelines require preparation of a CO "Hot Spots" analysis for projects meeting the following criteria:

- The proposed Project impacts an intersection or roadway identified at Level of Service (LOS) E or worse;
- The proposed Project will add signalization and/or channelization to an intersection; and
- Sensitive receptors, such as residences, schools, hospitals, etc., are located in the vicinity of the impacted intersection or proposed signalization.

A CO "Hot Spots" analysis is not appropriate as the Project does not meet the above criteria.

In summary, emissions from construction and operational activities would violate applicable air quality standards at a Project level, specifically the SJVAPCD Construction and Operational Emissions Thresholds, respectively. Only certain permitted portions of these emissions would be required to be offset under SJVAPCD regulations. The non-permitted portion of the emissions is not required to be offset and is in exceedance of SJVAPCD regulations. Therefore, Project-related impacts to air quality would be significant before mitigation.

## Total Project Emissions

Table 4.3-27 presents the annual total estimated emissions from both construction and operational activities (permitted, non-permitted, and permit exempt equipment) for the Project, including:

- Construction of permitted equipment;
- Operation of permitted equipment;
- Construction of permitted-exempt equipment and small production settings;
- Well abandonment;
- Drilling;
- Stimulation;
- Rework;
- Maintenance;
- Operation;
- Fugitive VOC from well heads;
- Routine business travel; and
- Facility inspection.

The annual emissions from operation of permitted equipment have been calculated by dividing the projected change in the permitted equipment emissions at Project build out in 2035 by the number of Project years from 2015 to 2035 (i.e., 21 years).

**Table 4.3-27: Total Estimated Emissions from the Project in Tons per Year**

| Year | $NO_X$ | ROG | CO | $SO_2$ | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|---|---|---|
| 2012 | 21,834 | 10,864 | 16,307 | 413 | 2,593 | 1,899 |
| 2015 | 22,763 | 11,362 | 17,674 | 426 | 2,720 | 1,944 |
| 2016 | 22,281 | 11,551 | 17,823 | 437 | 2,747 | 1,953 |
| 2017 | 21,862 | 11,718 | 18,000 | 449 | 2,778 | 1,966 |
| 2018 | 20,732 | 11,841 | 18,181 | 460 | 2,769 | 1,940 |

**Table 4.3-27: Total Estimated Emissions from the Project in Tons per Year**

| Year | $NO_X$ | ROG | CO | $SO_2$ | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|---|---|---|
| 2019 | 19,871 | 11,972 | 18,369 | 472 | 2,775 | 1,931 |
| 2020 | 18,916 | 12,131 | 18,568 | 483 | 2,789 | 1,930 |
| 2021 | 18,582 | 12,287 | 18,777 | 494 | 2,818 | 1,945 |
| 2022 | 17,520 | 12,415 | 18,994 | 506 | 2,821 | 1,936 |
| 2023 | 17,208 | 12,566 | 19,176 | 517 | 2,848 | 1,948 |
| 2024 | 16,980 | 12,735 | 19,359 | 528 | 2,881 | 1,968 |
| 2025 | 16,855 | 12,875 | 19,543 | 540 | 2,918 | 1,989 |
| 2026 | 16,162 | 13,004 | 19,738 | 551 | 2,931 | 1,991 |
| 2027 | 16,106 | 13,156 | 19,921 | 563 | 2,977 | 2,016 |
| 2028 | 16,022 | 13,318 | 20,105 | 574 | 3,019 | 2,043 |
| 2029 | 16,027 | 13,447 | 20,278 | 585 | 3,062 | 2,073 |
| 2030 | 16,134 | 13,595 | 20,463 | 597 | 3,113 | 2,108 |
| 2031 | 16,241 | 13,741 | 20,648 | 608 | 3,163 | 2,143 |
| 2032 | 16,345 | 13,898 | 20,827 | 619 | 3,211 | 2,178 |
| 2033 | 16,457 | 14,026 | 21,019 | 631 | 3,261 | 2,213 |
| 2034 | 16,555 | 14,163 | 21,192 | 642 | 3,308 | 2,248 |
| 2035 | 16,658 | 14,300 | 21,373 | 653 | 3,358 | 2,283 |

Table 4.3-28 presents the total estimated emissions from the Project from construction and operation, including equipment and mobile sources, and excluding the permitted emissions requiring offsets under District regulations. Tables 4.3-28 and 4.3-29 include emissions estimates from:

- Construction of permitted-exempt equipment and small production settings;
- Well abandonment;
- Drilling;
- Stimulation;
- Rework;
- Maintenance;
- Operation;
- Fugitive VOC from well heads;
- Routine business travel; and
- Facility inspection.

**Table 4.3-28: Total Estimated Emissions from the Project Non-Permitted Equipment and Activities in Tons per Year**

| Year | NOx | ROG | CO | $SO_2$ | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|---|---|---|
| 2012 | 12,154 | 5,657 | 8,769 | 12 | 1,209 | 578 |
| 2015 | 13,015 | 6,063 | 10,033 | 14 | 1,304 | 591 |
| 2016 | 12,466 | 6,159 | 10,078 | 14 | 1,299 | 567 |
| 2017 | 11,980 | 6,233 | 10,152 | 15 | 1,297 | 548 |
| 2018 | 10,782 | 6,263 | 10,230 | 15 | 1,256 | 490 |
| 2019 | 9,853 | 6,301 | 10,314 | 15 | 1,229 | 448 |
| 2020 | 8,831 | 6,367 | 10,409 | 15 | 1,211 | 415 |
| 2021 | 8,430 | 6,431 | 10,514 | 15 | 1,208 | 398 |
| 2022 | 7,300 | 6,466 | 10,628 | 15 | 1,178 | 356 |
| 2023 | 6,920 | 6,523 | 10,706 | 16 | 1,173 | 336 |
| 2024 | 6,625 | 6,600 | 10,786 | 16 | 1,174 | 324 |
| 2025 | 6,433 | 6,646 | 10,866 | 16 | 1,179 | 313 |
| 2026 | 5,671 | 6,683 | 10,958 | 16 | 1,160 | 282 |
| 2027 | 5,548 | 6,742 | 11,038 | 16 | 1,173 | 275 |
| 2028 | 5,397 | 6,810 | 11,118 | 16 | 1,183 | 269 |
| 2029 | 5,334 | 6,847 | 11,188 | 16 | 1,193 | 267 |
| 2030 | 5,374 | 6,902 | 11,270 | 17 | 1,212 | 270 |
| 2031 | 5,414 | 6,954 | 11,351 | 17 | 1,230 | 273 |
| 2032 | 5,450 | 7,019 | 11,426 | 17 | 1,245 | 275 |
| 2033 | 5,494 | 7,054 | 11,515 | 17 | 1,264 | 278 |
| 2034 | 5,525 | 7,099 | 11,584 | 17 | 1,278 | 281 |
| 2035 | 5,561 | 7,142 | 11,662 | 17 | 1,296 | 283 |

Because the Baseline year of 2012 also included construction of 3,392 new wells and other construction and operational Project activity, Table 4.3-29 shows the incremental new emissions from the Project compared to the Baseline year 2012. Table 4.3-29 presents the total estimated incremental increase in emissions from the same Project non-permitted equipment and activities in tons per year as for Table 4.3-28 above.

For construction activities, all non-permitted emissions estimated for each Project year 2015 – 2035 are included in the table.

For operational activities, for each year only the non-permitted emission associated with activities started in 2015 have been included. In particular:

- The incremental emissions from the activities of routine business travels, routine well operations, and facility inspections have been calculated by determining for each year and for each activity the emissions per active well, and then multiplying the emissions per active well by the number of new active wells compared to the baseline active wells;
- The incremental emissions for fugitive VOC from well heads have been calculated by determining for each year the fugitive VOC per well (including active plus idle wells), and then multiplying the fugitive VOC per well by the new wells (active plus idle) compared to the baseline number of active plus idle wells; and
- The incremental emissions from routine well maintenance have been calculated by determining for each year the emissions per well undergoing maintenance, and then multiplying them by the incremental number of well undergoing maintenance compared to the baseline year.

Therefore, Table 4.3-29 presents the total non-permitted incremental emissions from the Project, excluding the non-permitted emissions from oil and gas production and processing activities initiated before the start of the Project in 2015.

**Table 4.3-29: Total Estimated Incremental Emissions from the Project Non-Permitted Equipment and Activities in Tons per Year**

| Year | NOx | ROG | CO | $SO_2$ | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|---|---|---|
| 2015 | 11,511 | 1,967 | 8,607 | 12 | 760 | 457 |
| 2016 | 11,050 | 2,103 | 8,702 | 12 | 764 | 439 |
| 2017 | 10,670 | 2,236 | 8,811 | 13 | 771 | 427 |
| 2018 | 9,679 | 2,324 | 8,917 | 13 | 745 | 383 |
| 2019 | 8,830 | 2,407 | 9,023 | 13 | 726 | 348 |
| 2020 | 7,907 | 2,506 | 9,132 | 13 | 717 | 321 |
| 2021 | 7,586 | 2,620 | 9,241 | 13 | 724 | 311 |
| 2022 | 6,541 | 2,696 | 9,357 | 13 | 703 | 276 |
| 2023 | 6,248 | 2,794 | 9,446 | 14 | 707 | 262 |
| 2024 | 5,993 | 2,897 | 9,538 | 14 | 714 | 253 |
| 2025 | 5,836 | 2,989 | 9,628 | 14 | 723 | 245 |
| 2026 | 5,102 | 3,060 | 9,729 | 14 | 709 | 218 |
| 2027 | 5,010 | 3,151 | 9,817 | 14 | 722 | 213 |
| 2028 | 4,881 | 3,242 | 9,904 | 14 | 734 | 209 |
| 2029 | 4,835 | 3,319 | 9,981 | 14 | 749 | 208 |
| 2030 | 4,875 | 3,402 | 10,068 | 15 | 768 | 211 |
| 2031 | 4,915 | 3,482 | 10,155 | 15 | 787 | 214 |
| 2032 | 4,952 | 3,564 | 10,235 | 15 | 804 | 217 |
| 2033 | 4,997 | 3,635 | 10,328 | 15 | 823 | 220 |

**Table 4.3-29: Total Estimated Incremental Emissions from the Project Non-Permitted Equipment and Activities in Tons per Year**

| Year | NOx | ROG | CO | $SO_2$ | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|---|---|---|
| 2034 | 5,028 | 3,706 | 10,401 | 15 | 840 | 222 |
| 2035 | 5,064 | 3,775 | 10,481 | 15 | 858 | 225 |

Table 4.3-30 presents the total estimated incremental emissions from the Project non-permitted equipment and activities in tons per year, divided by the projected number of new wells for each year that was used in the calculation of the emissions.

**Table 4.3-30: Total Estimated Incremental Emissions from the Project Non-Permitted Equipment and Activities per New Well in Tons per Year**

| Year | New Projected Wells | NOx | ROG | CO | $SO_2$ | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|---|---|---|---|
| 2015 | 3,966 | 2.90 | 0.50 | 2.17 | 0.003 | 0.19 | 0.12 |
| 2016 | 3,970 | 2.78 | 0.53 | 2.19 | 0.003 | 0.19 | 0.11 |
| 2017 | 3,976 | 2.68 | 0.56 | 2.22 | 0.003 | 0.19 | 0.11 |
| 2018 | 3,982 | 2.43 | 0.58 | 2.24 | 0.003 | 0.19 | 0.10 |
| 2019 | 3,988 | 2.21 | 0.60 | 2.26 | 0.003 | 0.18 | 0.09 |
| 2020 | 3,994 | 1.98 | 0.63 | 2.29 | 0.003 | 0.18 | 0.08 |
| 2021 | 4,000 | 1.90 | 0.66 | 2.31 | 0.003 | 0.18 | 0.08 |
| 2022 | 4,006 | 1.63 | 0.67 | 2.34 | 0.003 | 0.18 | 0.07 |
| 2023 | 4,012 | 1.56 | 0.70 | 2.35 | 0.003 | 0.18 | 0.07 |
| 2024 | 4,018 | 1.49 | 0.72 | 2.37 | 0.003 | 0.18 | 0.06 |
| 2025 | 4,024 | 1.45 | 0.74 | 2.39 | 0.003 | 0.18 | 0.06 |
| 2026 | 4,030 | 1.27 | 0.76 | 2.41 | 0.003 | 0.18 | 0.05 |
| 2027 | 4,036 | 1.24 | 0.78 | 2.43 | 0.004 | 0.18 | 0.05 |
| 2028 | 4,042 | 1.21 | 0.80 | 2.45 | 0.004 | 0.18 | 0.05 |
| 2029 | 4,048 | 1.19 | 0.82 | 2.47 | 0.004 | 0.18 | 0.05 |
| 2030 | 4,054 | 1.20 | 0.84 | 2.48 | 0.004 | 0.19 | 0.05 |
| 2031 | 4,060 | 1.21 | 0.86 | 2.50 | 0.004 | 0.19 | 0.05 |
| 2032 | 4,066 | 1.22 | 0.88 | 2.52 | 0.004 | 0.20 | 0.05 |
| 2033 | 4,071 | 1.23 | 0.89 | 2.54 | 0.004 | 0.20 | 0.05 |
| 2034 | 4,077 | 1.23 | 0.91 | 2.55 | 0.004 | 0.21 | 0.05 |
| 2035 | 4,083 | 1.24 | 0.92 | 2.57 | 0.004 | 0.21 | 0.06 |
| **Average Annual Incremental Emissions per Well** | | **1.68** | **0.73** | **2.38** | **0.003** | **0.19** | **0.07** |

Table 4.3-31 presents the total estimated incremental increase in emissions from the Project non-permitted equipment and activities in tons per year, obtained by multiplying the emissions per well calculated in Table 4.3-30 by the maximum number of new wells that may be authorized, namely 3,647 new wells every year. The bottom line of the table shows the average annual incremental emissions of the Project, obtained by averaging the annual projected incremental emissions over the Project years 2015 – 2035.

**Table 4.3-31: Total Estimated Incremental Emissions from the Project Non-Permitted Equipment and Activities per New Well in Tons per Year**

| Year | New authorized wells | NOx | ROG | CO | $SO_2$ | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|---|---|---|---|
| 2015 | 3,647 | 10,585 | 1,808 | 7,914 | 11 | 699 | 420 |
| 2016 | 3,647 | 10,151 | 1,932 | 7,994 | 11 | 702 | 404 |
| 2017 | 3,647 | 9,787 | 2,051 | 8,082 | 12 | 707 | 391 |
| 2018 | 3,647 | 8,864 | 2,128 | 8,167 | 12 | 682 | 351 |
| 2019 | 3,647 | 8,075 | 2,201 | 8,252 | 12 | 664 | 318 |
| 2020 | 3,647 | 7,220 | 2,288 | 8,338 | 12 | 655 | 293 |
| 2021 | 3,647 | 6,917 | 2,389 | 8,426 | 12 | 660 | 283 |
| 2022 | 3,647 | 5,955 | 2,454 | 8,518 | 12 | 640 | 251 |
| 2023 | 3,647 | 5,679 | 2,540 | 8,587 | 12 | 643 | 238 |
| 2024 | 3,647 | 5,439 | 2,630 | 8,657 | 13 | 648 | 230 |
| 2025 | 3,647 | 5,290 | 2,709 | 8,726 | 13 | 655 | 222 |
| 2026 | 3,647 | 4,617 | 2,769 | 8,804 | 13 | 642 | 197 |
| 2027 | 3,647 | 4,527 | 2,848 | 8,871 | 13 | 653 | 192 |
| 2028 | 3,647 | 4,404 | 2,925 | 8,936 | 13 | 663 | 189 |
| 2029 | 3,647 | 4,356 | 2,990 | 8,992 | 13 | 674 | 188 |
| 2030 | 3,647 | 4,386 | 3,060 | 9,057 | 13 | 691 | 190 |
| 2031 | 3,647 | 4,415 | 3,128 | 9,122 | 13 | 707 | 192 |
| 2032 | 3,647 | 4,442 | 3,197 | 9,180 | 13 | 721 | 195 |
| 2033 | 3,647 | 4,476 | 3,256 | 9,252 | 13 | 737 | 197 |
| 2034 | 3,647 | 4,498 | 3,315 | 9,304 | 14 | 751 | 199 |
| 2035 | 3,647 | 4,523 | 3,372 | 9,362 | 14 | 766 | 201 |
| | **Average Project Annual Incremental Emissions** | **6,124** | **2,666** | **8,692** | **13** | **684** | **254** |

Construction and operations associated with the Project would occur concurrently and have to be considered in total. Total Project emissions continue to be a major emission source as identified in Table 4.3-28, as well as incremental increases in Project emissions as shown in Table 4.3-29. Because the Project's incremental emissions would exceed the SJVAPCD thresholds for all

criteria pollutants except $SO_2$ for which the Project region is nonattainment under an applicable federal or state ambient air quality standard, this impact is considered significant before mitigation.

The implementation, as mitigation, of a DMC or VERA to reduce criteria pollutants of $NO_X$, ROGs, and $PM_{10}$ net incremental emissions generated by a project has been incorporated into development projects in Kern County since 2008. They are not a "voluntary" agreement with the SJVAQCD but are mandated by enforceable mitigation measures and are therefore called DMC. The emission reductions required by a DMC are implemented within the SJVAB in quantities sufficient to fully mitigate the Project's air quality impacts such that development of the Project could be considered to result in no net increase in the designated criteria pollutant emissions over the criteria pollutant emissions that would otherwise exist without the development of the Project, all to be verified by the SJVAPCD. Thus, the DMC results in greater reductions than would otherwise occur under the District's ISR, since the ISR does not require ROG reductions and the ISR only requires a percentage of reductions rather than full reductions of $NO_X$ and $PM_{10}$ resulting from Project construction and operations. When adopting the ISR and the subsequent VERA/DMC programs, the District acknowledges that as ROG is a precursor to ozone, the reductions are not required in the ISR. (Note: In the VERA/DMC, the reductions are achieved by increasing the NOx and $PM_{10}$ tonnage for Project levels; see SJVAPCD 2005b; this and other key SJVAPCD documents are included as Appendix L of this EIR.) As the actual amount of ROG reductions achieved from $NO_x$ and $PM_{10}$ reductions is not absolutely certain, Project emissions are still considered significant and unavoidable; however all feasible and reasonable mitigation has been required to reduce criteria pollutants as close to "no net increase" as scientifically possible. This approach has been found legally sufficient by court rulings in the following cases; *California Building Industry Assn. v. San Joaquin Valley APCD*, Fresno County Case No. 06 CECG 02100 DS13; *National Association of Home Builders v. San Joaquin Valley Unified Air Pollution Control District*, Federal District Court, Eastern District of California, Case No. 1:07-CV-00820-LJO-DLB; and *Center for Biological Diversity et al. v. Kern County*, Fifth Appellate District, Case No. F061908.

The projects that have been required to implement DMCs are residential, commercial and industrial projects. Those projects have one developer and a finite construction to completion schedule. The oil and gas activities in the proposed Project will be implemented by hundreds of individual operators, and impacts will occur every year on a varying basis dependent on how many new wells and new activities occur. The number of new wells and activities covered by this EIR and the new Oil and Gas Conformity Review is a not to exceed of 3647 permits a year. To implement the required mitigation reductions, the mitigation will require an agreement between the Kern County Board of Supervisors and the SJVAPCD Board for an Oil and Gas Emission Reduction Agreement (OG-ERA) or, if that agreement is not completed, an ERA between individual well permittees and the Air District. The OG-ERA agreement will focus on the core requirement that the calculated emissions, that are not otherwise regulated and offset by District stationary source rules, from $NO_x$, ROG and $PM_{10,}$ from Project construction and operations activities shall be mitigated to a level of no net increase. The mitigation will be

required, as discussed below, for new well permits under the Oil and Gas Conformity Review and Minor Activities Permit, when applicable.

The mandated emission reductions will be achieved by a menu of options that range from paying a calculated mitigation fee for use in doing emission reduction projects through a grant-type program, to applicant's changing equipment on existing operations or proposing projects for implementation instead of paying the fee. The first pathway, the mitigation fee, will involve paying a calculated mitigation fee to the County on each permit for implementation of the OG-ERA. The mitigation fee shall be placed in a fund, established by the Board of Supervisors, with an additional administrative fee collected for the SJVAPCD. Expenditure of the mitigation funds shall be for certified air quality reduction projects managed jointly by Kern County and the SJVAPCD. Final determination of air quality reductions achieved shall be under the determination of the SJVAPCD; however, selection of specific projects shall be determined by Kern County in consultation with District. Projects to off-set criteria pollutants under the OG-ERA would be given priority for Kern County valley locations and be implemented on a yearly basis. Multi-year phased projects could also be funded. The fee will be based and tiered to address different configurations of equipment that could be used, as well as other variables such as the depth of the well at standard depths of 3,000, 5,000, and 10,000 feet. An example of such changes to equipment could be adding diesel particle filters or upgrading to cleaner engines that are not currently required. Under a Small Producers Assistance Program being developed by the County for permit implementation, phased payment of the fee will also be offered.

Another mitigation menu option would be for an applicant, instead of paying the fee, to present, at the time of permit application, a proposed emission reduction project with supporting documentation that describes the proposed Project and emission reductions, including a description of the methodology and quantifications of emission reductions for $NO_x$, ROG and/or $PM_{10}$. The proposed emission reduction project package would be reviewed by the SJVAPCD for methodology and verification of the emission reduction tonnage requested, and reviewed by both Kern County and the SJVAPCD for the Project location and structure and timeline for implementation. The reductions will then be used as credits for compliance with the mitigation measure requirements. Examples of emission reduction projects that could be submitted by the applicant in lieu of mitigation fee payments include changes to Applicant-owned fleets and trucks, implementation of van pools or other trip reduction programs that can be quantified and enforced, and paving onsite private access roads.

As an agreement between the SJVAPCD and County, the requirements of the OG-ERA are limited to those impacts resulting from the Project that occur within the SJVAB. However, as areas of the Project are near the border of the SJVAB and the SCAB, some mobile source emissions associated with the Project could occur outside the SJVAB. Although the OG-ERA does not require full offsets of these out of basin emissions, projects under consideration for implementation would result in reductions of potential transport and cross-basin emissions. Other emissions reductions projects that are implemented pursuant to the OG-ERA may also result in additional emissions reductions within the SCAB.

The number of well permits issued annually will vary based on a variety of factors, and can range from 1,800 to 3,647. Air emissions modelling used in this EIR conservatively assumed a higher well count than 3,647 (with a maximum annual well count of 4,083), the Project Description includes a yearly total wells not to exceed 3,647. The estimated incremental emission is provided in Table 4.3-32, which shows the next 21 years of permitting and the emissions each year for an individual well. The emission totals include all Project-related construction and operational activities that are not subject to the District's stationary source permitting and emission offset rules, such as mobile sources like construction equipment, maintenance trucks, employee automobile trips, construction of access roads and well pads, drilling, accessory activities, well operation, and eventual abandonment. Emissions from idled wells are also included. The annual totals also include mandatory emission reductions from existing legal requirements, such as federal and state mandated changes for certain types of engines which will cause $NO_x$ emissions to increase slightly while $PM_{10}$ declines. These Project-related construction and operational emissions that are not required to be offset under District stationary source permitting rules are then averaged for all wells over a 20-year period to illustrate how the OG-ERA will generate totals.

**Table 4.3-32: Total Estimated per Well Emissions for Preliminary Considerations in OG-ERA**

| Year | New Projected Wells | $NO_x$ | ROG | $PM_{10}$ | Per well Projected Emissions | Maximum Authorized Wells | Projected Emissions Scaled to 3,647 Wells |
|---|---|---|---|---|---|---|---|
| 2015 | 3,966 | 2.9 | 0.5 | 0.19 | 3.59 | 3,647 | 3.30 |
| 2016 | 3,970 | 2.78 | 0.53 | 0.19 | 3.50 | 3,647 | 3.22 |
| 2017 | 3,976 | 2.68 | 0.56 | 0.19 | 3.43 | 3,647 | 3.15 |
| 2018 | 3,982 | 2.43 | 0.58 | 0.19 | 3.20 | 3,647 | 2.93 |
| 2019 | 3,988 | 2.21 | 0.6 | 0.18 | 2.99 | 3,647 | 2.73 |
| 2020 | 3,994 | 1.98 | 0.63 | 0.18 | 2.79 | 3,647 | 2.55 |
| 2021 | 4,000 | 1.9 | 0.66 | 0.18 | 2.74 | 3,647 | 2.50 |
| 2022 | 4,006 | 1.63 | 0.67 | 0.18 | 2.48 | 3,647 | 2.26 |
| 2023 | 4,012 | 1.56 | 0.7 | 0.18 | 2.44 | 3,647 | 2.22 |
| 2024 | 4,018 | 1.49 | 0.72 | 0.18 | 2.39 | 3,647 | 2.17 |
| 2025 | 4,024 | 1.45 | 0.74 | 0.18 | 2.37 | 3,647 | 2.15 |
| 2026 | 4,030 | 1.27 | 0.76 | 0.18 | 2.21 | 3,647 | 2.00 |
| 2027 | 4,036 | 1.24 | 0.78 | 0.18 | 2.20 | 3,647 | 1.99 |
| 2028 | 4,042 | 1.21 | 0.8 | 0.18 | 2.19 | 3,647 | 1.98 |
| 2029 | 4,048 | 1.19 | 0.82 | 0.18 | 2.19 | 3,647 | 1.97 |
| 2030 | 4,054 | 1.2 | 0.84 | 0.19 | 2.23 | 3,647 | 2.01 |
| 2031 | 4,060 | 1.21 | 0.86 | 0.19 | 2.26 | 3,647 | 2.03 |
| 2032 | 4,066 | 1.22 | 0.88 | 0.2 | 2.30 | 3,647 | 2.06 |
| 2033 | 4,071 | 1.23 | 0.89 | 0.2 | 2.32 | 3,647 | 2.08 |

**Table 4.3-32: Total Estimated per Well Emissions for Preliminary Considerations in OG-ERA**

| Year | New Projected Wells | $NO_x$ | ROG | $PM_{10}$ | Per well Projected Emissions | Maximum Authorized Wells | Projected Emissions Scaled to 3,647 Wells |
|---|---|---|---|---|---|---|---|
| 2034 | 4,077 | 1.23 | 0.91 | 0.21 | 2.35 | 3,647 | 2.10 |
| 2035 | 4,083 | 1.24 | 0.92 | 0.21 | 2.37 | 3,647 | 2.12 |

Based on current emissions estimates for the average emissions per new well over the next 21 years, the OG-ERA would include provisions to further reduce the proposed Project's emissions by an estimated average total ranging from 2.67 tons per year to less than 1.00 ton based on equipment configuration. Based on that estimated average, amount the OG-ERA will generate between 4,086 tons to 8,279 tons per year of combined ROG, $NO_x$, and $PM_{10}$.

The SJVAPCD 2014 Annual Report on the Indirect Source Review Program shows the cost currently as $6,974 per ton to implement projects. Based on this estimated cost, which will be adjusted for depth of well and equipment configuration, the mitigation fee will be range from $18,603 to $8,000, per well plus an administrative cost to the Air District to be determined which is up to 4%. The estimated amount generated every year for in mitigation fees to fund emission reduction projects ranges from $30 million to $14 million (based on an estimate of 1,800 permits year). The total fees collected by the OG-ERA over 21 years (again using the estimate of 1,800 permits per year) will range from $600 million to $280 million. Emission reductions funded by the OG-ERA mitigation fees will offset the impacts from the new oil and gas activities resulting in a "no net increase" to contributions of designated criteria air emissions in the entire air basin. While the size and scope of such projects has not been implemented in the SJVAPCD, projects have clearly been implemented in full compliance with the ISR, VERA, DMCs. CARB also has an existing program called the Carl Moyer Memorial Air Quality Standards Attainment Program (Carl Moyer Program) (CARB 2014, included as Appendix E of this EIR) which provides grant funding for cleaner than required engines and equipment. Eligible projects include cleaner on-road, off-road, marine, locomotive, law and garden, light duty passenger vehicles being scrapped and agricultural equipment. The Carl Moyer Program has quantified and validated that those reductions can be achieved. Based on these existing programs and the expansion of potential emission reduction projects based on the funding that would be available over a 21-year period, the following are examples of potential projects and costs that will achieve the required emission reductions:

| | |
|---|---|
| Pave 500 miles of unpaved County-maintained roads in Kern County ($1 million a mile) | $310 million |
| Replace and upgrade vehicle fleets for County, cities, and other eligible entities | $50 million |
| Upgrade school buses for public, private, churches, charitable organizations, and other eligible entities | $150 million |
| Replace cars in disadvantaged communities | $120 million |

| | |
|---|---|
| Truck upgrades and replacement for eligible entities | $100 million |
| Fund new and upgraded transit programs | $120 million |

While emission reduction projects will be prioritized in Kern County, future years will involve emission reduction projects in other counties in the SJVAB. While the reductions will offset $NO_x$ and $PM_{10}$ emissions to net zero, actual reduction of ROG remains not possible to certify as 100% reduced to zero. Therefore, this uncertainty and small unknown quantities remaining under CEQA make air quality impacts both project and cumulatively significant and unavoidable. However, all reasonable and feasible mitigation has been required and will reduce the air emissions as close to a "no net increase" from the current emissions over the next 21 years as is scientifically possible to quantify and confirm.

## Mitigation Measures

Implement MM 4.3-1 through MM 4.3-4, as described above.

## Level of Significance After Mitigation

Impacts would be less than significant with mitigation

## Impact 4.3-3: Expose Sensitive Receptors to Substantial Pollutant Concentrations

### Health Risk Assessment

The Health Risk Assessment (HRA) evaluated the potential cancer risk and acute and chronic non-cancer risk from toxic emissions associated with well construction, drilling, completion, and oil and gas processing equipment. The HRA was conducted by the County Application Technical Committee (CATC) (CATC 2015) and is provided in Appendix M of this EIR. A summary is provided below.

The HRA was performed following the OEHHA, Air Toxics Hot Spots Program Risk Assessment Guidelines (OEHHA 2015). As recommended by the guidelines, the CARB Hotspots Analysis and Reporting Program, Version 2 (HARP2) (CARB, 2015) was used to perform a refined health risk assessment for potential future construction and operational emissions. HARP2 includes the following three modules: a dispersion model, an exposure/dose module, and a risk module. The dispersion model incorporates the EPA's AERMOD model and the risk model includes the latest changes made by the State of California to the Risk Assessment inputs.

In general, risk assessments involve four steps:

- Emissions Estimations;
- Exposure Assessments;
- Dose-response Assessments; and

- Potential Health Risk Quantification.

## Emission Estimations

Emission estimates involve identifying and quantifying emissions of potential regulated toxic substances from each source. The OEHHA determines the relative toxicity of chemicals regulated by the State of California and determines whether or not they are carcinogenic or possibly associated with short-term or long-term non-cancer health impacts. Toxic emissions from each source were quantified.

According to the CAA, "hazardous air pollutants" include a variety of pollutants generated or emitted by industrial production activities. HAPs are also referred to as TACs under California law (pursuant to the Tanner Act of 1983, codified at Health and Safety Code Section 39650 et. seq.). The State of California determines the toxicity of each pollutant and assigns each a potency factor. Those factors are built into the HARP2 risk assessment model.

For purposes of this study, all $PM_{2.5}$ from diesel equipment associated with well drilling (including potential dust and mobile equipment) is assumed to be toxic diesel PM. California listed diesel exhaust or DPM as a TAC in 1998. The DPM toxicity number incorporates the cumulative health effects of all of the constituents of diesel exhaust into one risk number. DPM is the only TAC expected emitted from well construction and completion.

The risk from the oil processing equipment is due for approximately 94% to benzene, as well as formaldehyde and PAHs. All three are byproducts of natural gas combustion. Potential health effects from these compounds are summarized here.

## Construction Emissions

For well construction, well drilling and well completion, seven phases of construction were considered. All $PM_{2.5}$ were considered to be toxic DPM. Emissions from the following seven construction phases were assumed to occur simultaneously, although these activities are unlikely to all occur concurrently:

- Land Preparation;
- Drilling Survey;
- Well Drilling;
- Well Completion;
- Well Flowline;
- Pump Unit; and
- Electrical.

Emissions from the drilling of well to depths of 2,000 feet, 5,000 feet, and 10,000 feet were evaluated as emissions sources. According to DOGGR, only 3% of the wells drilled in Kern

County in 2014 were at depths of 10,000 feet or greater. An initial year of 2015 was modeled and the final year of 2035 was modeled. For the 10,000-foot well, the year 2018 was also modeled.

**Table 4.3-33: Estimated Emissions used in the HRA Analysis**

| Depth Feet | Year[1] | Total $PM_{2.5}$[2] pounds | Annual $PM_{2.5}$[3] pounds | Days[4] |
|---|---|---|---|---|
| 10,000 | 2015 | 516.89 | 17.23 | 23 |
| 10,000 | 2018 | 444 | 14.8 | 23 |
| 10,000 | 2035 | 151.83 | 5.06 | 23 |
| 5,000 | 2015 | 171.18 | 5.71 | 8 |
| 5,000 | 2035 | 35.86 | 1.20 | 8 |
| 2,000 | 2015 | 97.12 | 3.24 | 4 |
| 2,000 | 2035 | 20.42 | 0.68 | 4 |

Notes:
[1] 2029-2035 emissions are the same.
[2] From Vector Environmental Spreadsheet titled "DRL_EMISSIONS.xlsx", worksheet "EMF".
[3] Total emissions divided by 30 years per OEHHA's HARP2 exposure duration requirements.
[4] From Vector Spreadsheet titled "DRL_EMISSIONS.xlsx", worksheet "MUD".

## Operational Equipment Emissions

Emissions from operational activities were evaluated separately from construction activities. Two different scenarios were evaluated: oil processing and natural gas.

Emissions from the following operational equipment (as provided by Vector) were analyzed as the operational emissions in the oil processing scenario:

- Two – 1,000 barrel (bbl) aboveground tanks;
- One – 3,000 bbl aboveground tank;
- One 10 MMBtu/hour flare;
- Truck loading rack;
- Fugitive emissions from valves, flanges, and one underground sump; and
- Thermally enhanced oil recovery (TEOR) equipment.

Emissions from the following natural gas combustion equipment were analyzed in the natural gas scenario:

- One new 100 MMBtu/hour flare;
- One – 8 MMBtu/hour process heater;
- One – 10 MMBtu/hour boiler;

- One – 85 MMBtu/hour steam generator; and
- One – 33 MW cogeneration plant.

Potential toxic emissions from each of these devices are summarized in Appendix A of the HRA.

## Exposure Assessment

- The exposure assessment was used to evaluate a receptors potential exposure to emissions through inhalation, ingestion, and dermal exposure. A receptor can be hypothetically exposed to a substance through several different pathways. Typically, the primary environmental exposure pathway in an HRA is direct inhalation of gaseous and particulate air pollutants. However, there is the potential for exposure via non-inhalation pathways due to the deposition of particulate pollutants (diesel particulate matter) in the environment.
- Air dispersion modeling was used to estimate ground-level concentrations. The concentrations are then multiplied by the worst-case potential emission rate for each substance to obtain the corresponding ground-level concentrations. A description of the models and the assumptions used are included in the HRA (Appendix M).
- Three different locations within Kern County were assessed in order to capture various terrains, wind speed, wind direction and other dispersion characteristics within Kern County:
  - Western Subarea – Midway Sunset Oilfield,
  - Central Subarea – No. Shafter Oilfield, and
  - Eastern Subarea – Kern River Oilfield.

## Dose-Response

The dose-response assessment describes the quantitative relationship between a human's exposure to a substance (the dose) and the incidence or occurrence of an adverse health impact (the response). For carcinogens, OEHHA has developed cancer potency factors. A cancer potency factor represents the upper bound probability of developing cancer based on a continuous lifetime exposure. The cancer potency factor does not represent a threshold under which a person would not develop cancer, but instead is used to estimate the probability of developing cancer.

For non-carcinogenic chemicals, OEHHA has developed Recommended Exposure Limits (RELs) for acute and chronic impacts. RELs represent concentration thresholds at which no adverse noncancer health effects are anticipated. For chemicals that are not deemed by the State of California as possible carcinogens, but which may pose either short-term (acute) or other non-cancer long-term (chronic) health effects, a Hazard Index (HI) calculation of potential risk is also required by the air district and the State as part of an HRA.

## Significance Thresholds

SJVAPCD publishes CEQA significance thresholds for potential health risk from proposed projects. Currently, risks from a project that are less than the following regulatory thresholds are considered not to be significant and are, therefore, acceptable:

- Cancer risk equal to or less than 10 in one million;
- Chronic hazard index equal to or less than 1; and
- Acute hazard index equal to or less than 1.

These metrics are generally applied to the maximally exposed individual (MEI). There are separate MEIs for residential exposure (i.e., residential areas) and for worker exposure (i.e., offsite work places).

As discussed above, the HRA was performed using the HARP2 model. The following table provides the estimated cancer risk from construction activities for the three well depths in each Subarea.

As shown, well construction activities in the Western and Central Subareas have the highest potential risk. Risks at locations between the construction activities and the distance indicated in the table would exceed the cancer risk threshold of 10 in on million for a 10,000 deep well, and a 5,000 feet wells in 2015.

**Table 4.3-34: Potential Health Risk from Well Construction, Drilling, and Completion Emissions**

| Well Depth (feet) | Year | Maximum distance from well site and project boundary to 10 in one million calculated risk |
|---|---|---|
| **Western Subarea** | | |
| 10,000 | 2015 | 367 feet |
| 10,000 | 2020 | 232 feet |
| 10,000 | 2029 | 82 feet |
| 50,00 | 2015 | 116 feet |
| 5,000 | 2029 | NA* |
| 2,000 | 2015 | NA |
| 2,000 | 2029/2035 | NA |
| **Central Subarea** | | |
| 10,000 | 2015 | 367 feet |
| 10,000 | 2020 | 232 feet |
| 10,000 | 2029 | 82 feet |
| 5,000 | 2015 | 116 feet |

**Table 4.3-34: Potential Health Risk from Well Construction, Drilling, and Completion Emissions**

| Well Depth (feet) | Year | Maximum distance from well site and project boundary to 10 in one million calculated risk |
|---|---|---|
| 5,000 | 2029 | NA |
| 2,000 | 2015 | NA |
| 2,000 | 2029/2035 | NA |
| **Eastern Subarea** | | |
| 10,000 | 2015 | 296 feet |
| 10,000 | 2019 | 183 feet |
| 10,000 | 2029 | NA |
| 5,000 | 2015 | NA |
| 5,000 | 2029 | NA |
| 2,000 | 2015 | NA |
| 2,000 | 2029/2035 | NA |

Note:
* NA = no offsite risk greater than 10 in one million

Table 4.3-35a and 4.3-35b provide the estimated cancer risks that would be associated with operational activities in each Subarea from natural gas and oil processing equipment, respectively. Table 4.3-35b shows that the cumulative risk from oil processing equipment exceeds the threshold in each Subarea at the distances listed in the table, at distances to 478 to 701 feet from the operational activity, depending on the Subarea of Kern County.

**Table 4.3-35a: Estimated Cancer Risks from Operational Emissions from Natural Gas Processing Equipment**

| Equipment | Risk greater than 10 in one million? |
|---|---|
| 1,000 bhp natural gas ICE | No |
| 100 MMBtu/hr flare | No |
| 85 MMBtu/hour steam generator | No |
| 8 mm Btu/hour boiler | No |
| 33 MW cogen | No |
| TEOR Equipment | No |

**Table 4.3-35b: Estimated Cancer Risks from Operational Emissions from Oil Processing Equipment**

| | Cancer Risk Distance to 10 in one million | | |
|---|---|---|---|
| **Equipment** | **Western Subarea** | **Central Subarea** | **Eastern Subarea** |
| **Cumulative Risk Distances** | 701 feet | 625 feet | 478 feet |

*Oil processing equipment includes: 1,000 bbl oil tank, 1,000 bbl oil tank, 3,000 bbl oil tank, truck loading rack, 30-foot by 30-foot underground sump, 10,000 Btu/hour flare, and Fugitive VOCs. Emissions for gas and oil processing equipment are assumed to be the same between 2015 and 2035. Emissions "credit" for potential future emission reductions was not assumed.

Table 4.3-36 provides the estimated potential acute non-cancer risk impacts that would be associated with the emissions generated by the activities of drilling, oil processing, and gas processing in each Subarea. Acute impact refers to the risk associated with short-term effects of exposure to toxic emissions. The estimated acute risks associated with drilling, oil processing, and gas processing are below the hazard index standard in each Subarea.

**Table 4.3-36: Potential Acute Impacts**

| Equipment | Western Subarea Acute Risk | Central Subarea Acute Risk | Eastern Subarea Acute Risk | Hazard Index Standard | Significant Risk? |
|---|---|---|---|---|---|
| Drilling Emissions | 0.0098 | 0.0098 | 0.0090 | 1.0 | No |
| Oil Processing Emissions | 0.43 | 0.41 | 0.40 | 1.0 | No |
| Gas Processing Emissions | 0.88 | 0.88 | 0.89 | 1.0 | No |

Table 4.3-37 provides the estimated potential chronic non-cancer risk that would be associated with the emissions generated by the activities of drilling, oil processing and gas processing in each Subarea. Chronic impact refers to the risk associated with long-term effects of exposure to toxic emissions. The estimated acute risks associated with drilling, oil processing, and gas processing do not exceed the HI standard in each Subarea.

**Table 4.3-37: Potential Chronic (Non-Cancer Risk)**

| Equipment | Western Subarea Chronic Risk | Central Subarea Chronic Risk | Eastern Subarea Chronic Risk | Hazard Index Standard | Significant Risk? |
|---|---|---|---|---|---|
| Drilling Emissions | 0.0009 | 0.0009 | 0.0008 | 1.0 | No |
| Oil Processing Emissions | 0.063 | 0.63 | 0.60 | 1.0 | No |
| Gas Processing Emissions | 0.034 | 0.034 | 0.030 | 1.0 | No |

## Health Risk Assessment Results

The HRA shows that the potential cancer risk exceeds the current CEQA significance thresholds (as of May 2015), for drilling a 10,000-foot well in any Project year, and for drilling a 5,000-foot well in year 2015, and for operations of the oil processing equipment.

By 2018, due to emission reductions resulting from compliance deadlines occurring from CARB current diesel regulations, the risks associated with drilling a 5,000 foot (or less deep) well would not exceed the 10 in one million ($10 \times 10^{-6}$) threshold. Therefore, the Project would exceed the current 10 in one million CEQA significance threshold for cancer risk if a 10,000-foot well is drilled, and if a 5,000-foot well is drilled for the years 2015 to 2017, assuming that the risk level in years 2016 and 2017 would be the same as in 2015.

The cancer risk from all oil processing equipment would exceed 10 in one million from the fenceline to 478 to 701 feet, depending on the Subarea. The oil processing equipment would require operating permits from the SJVAPCD (except possibly the loading rack for which there may be a Rule 2020 Exemption) and, as such, total risk from the facility would be modeled at that time. Emissions and risk from any future proposed facilities would be required to meet the Air District's risk threshold which is currently 10 in one million. Therefore, impacts would be significant.

### Valley Fever

The *Coccidioides immitis* fungus spores found in soil, which are responsible for transmitting the Valley Fever, can disperse in the air when the soil is disturbed during construction activities, and then can be inhaled into the lungs. Onsite construction workers potentially could be exposed to Valley Fever from fugitive dust generated during construction of the proposed Project, notably during excavation, grading, and other earthmoving activities. Construction activities within the Project Area are subject to SJVAPCD Regulation VIII (Fugitive $PM_{10}$ Prohibition). Regulation VIII is intended to reduce ambient concentrations of $PM_{10}$ by requiring actions to prevent, reduce or mitigate anthropogenic fugitive dust emissions. By reducing fugitive dust emissions, Regulation VIII reduces potential exposure to Valley Fever. Since current long-term residents typically already have been exposed to and have developed immunity to Valley Fever, construction activities are not expected to add significantly to exposure of offsite residents to the fungus

Impacts are potentially significant because cancer risk levels exceed thresholds at locations where receptors are located closer than 200 meters from a well. In addition, the risks associated with exposure to Valley Fever are significant without mitigation.

## Mitigation Measures

**MM 4.3-5** The Site Plan Application shall include a Site Vicinity Figure showing the location of any sensitive receptor(s) within 3,000 feet of the construction site (potential impact area) for the proposed new well or other ancillary facility or equipment (excluding pipelines).

a. If there are no sensitive receptors within this potential impact area, then no construction mitigation measures shall be required.

b. If there are sensitive receptors within the potential impact area, then additional information must be provided showing the setback from the closest edge of the well pad to the property line of the nearest sensitive receptor. The minimum distances shall be as follows:

| Well Depth (Feet) | Minimum Setback Distance from Well Site to Adjacent Property Line of an Existing Sensitive Receptor (Feet) |
|---|---|
| **Western Subarea** | |
| 10,000 | 367 |
| 5,000 | 116 |
| 2,000 | NA |
| **Central Subarea** | |
| 10,000 | 367 |
| 5,000 | 116 |
| 2,000 | NA |
| **Eastern Subarea** | |
| 10,000 | 296 |
| 5,000 | NA |
| 2,000 | NA |

c. If the above setbacks cannot be met, the Applicant shall implement the following risk minimization measures, or other such measures that are demonstrated by the Applicant to achieve a level of risk less than the threshold risk level:

1. Placement of engines in the potential impact area away from the sensitive receptors.
2. Utilize directional drilling to locate rig away further from the sensitive receptor(s).
3. Use of late-model engines, low-emission diesel products, alternative cleaner fuels (e.g., natural gas or liquefied petroleum gas), engine retrofit technology, add-on devices such as diesel particulate filters or oxidation catalyst, and/or other options as such become available to reduce emissions from off-road and other equipment.
4. Utilize electricity line power if available.

5. Shutdown all equipment when not in use, and otherwise minimize engine idling by limiting idling to 15 minutes.
6. Use of automatic rigs.
7. Assist and pay to relocate residents to an area hotel during well construction, drilling, and completion activities.

**MM 4.3-6** Applicants shall include in their Worker Environmental Awareness Program information on how to recognize the symptoms of Valley Fever and to promptly report suspected symptoms of work-related Valley Fever to a supervisor. Workers exposed to fugitive dust shall be provided with the option of using a filter fitted over their nose and mouth, secured by a strap, including training for appropriate mask practices as part of the Worker Environmental Awareness Training Program.

## Level of Significance After Mitigation

Less than significant

## Impact 4.3-4: Create Objectionable Odors Affecting a Substantial Number of People

The GAMAQI recommends an approach for evaluating Project-specific odor impacts based on SJVAPCD complaint records, and a screening level analysis. The Kern County Air Quality Assessment Guidelines recommend application of dispersion modeling. The approach we use in this document is to first assess the odor impacts using the screening level approach as recommended by the SJVAPCD, and applying the more refined analysis recommended in the Kern County Air Quality Assessment Guidelines if the screening level analysis indicate potential concern.

For existing odor sources, the SJVAPCD recommends that odor impacts be considered significant if the source has:

- More than one confirmed complaint per year averaged over a three-year period; or
- Three or more unconfirmed complaints per year averaged over a three-year period.

Because of the large number of variables involved in an odor assessment, the possible number of odor sources, and the subjective nature of the level of nuisance caused by odors, nuisance odors cannot be assessed quantitatively using formulas. Instead, qualitative methodologies are used to determine if potential odors would have a significant impact, taking into consideration Project design elements and proximity to offsite receptors that potentially would be exposed to objectionable odors.

In addition to the analysis of the complaints, the District has produced a list of common types of facilities, along with the distance from the source within which odors could possibly be significant. The list provides a qualitative assessment of a project's potential to adversely affect

offsite receptors. Table 4.3-38 below presents the list of common facilities and the minimum distance from the source below which the odor impacts may be significant. None of the facilities included in the Project are on this list, which is provided for informational purposes only.

**Table 4.3-38: Screening Levels for Potential Odor Sources**

| Type of Facility | Distance |
|---|---|
| Waste Water Treatment Facility | 2 Miles |
| Sanitary Landfill | 1 Mile |
| Transfer Station | 1 Mile |
| Composting Facility | 1 Mile |
| Petroleum Refinery | 2 Miles |
| Asphalt Batch Plant | 1 Mile |
| Chemical Manufacturing | 1 Mile |
| Fiberglass Manufacturing | 1 Mile |
| Painting/Coating Operations | 1 Mile |
| Food Processing Facility | 1 Mile |
| Feed Lot/Dairy | 1 Mile |
| Rendering Plant | 1 Mile |

## Construction

During construction activities, odorous compounds may be present in the exhausts from on-road vehicles and off-road construction equipment. The operations of drilling, completing, and stimulation of wells may also result in the release of odorous compounds.

According to the SJVAPCD, there was only one unconfirmed odor complaint related to construction activities filed over three years. Since the District's threshold for unconfirmed complaints is three or more complaints per year averaged over three years (that is, nine unconfirmed complaints over three years), odor impacts from construction operations are not expected to be significant.

### Operations – Permitted Equipment

The operation of permitted equipment used for crude oil and natural gas production and processing, subject to District Rule 4409 and Federal NSPS, which ensure stringent LDAR requirements. Tanks, loading racks and any other permitted equipment which may potentially release odorous compounds must be controlled by vapor recovery systems, with high VOC destruction efficiency (95% to 99%). The SJVAPCD complaint records for operation of permitted equipment are shown in Table 4.3-39 below:

**Table 4.3-39: Unconfirmed and Confirmed Odor Complaints Filed for Operation of Permitted Equipment**

| Significance of Odor | Odor Complaints Over Three Years | |
|---|---|---|
| | Unconfirmed | Confirmed |
| Activity Complaints | Less than 3 | Less than 2 |
| District Odor Threshold | More than 9 | More than 3 |
| Contribution to Effect | No | No |

Table 4.3-39 shows that less than three unconfirmed complaints and less than two confirmed complaints were filed over a three-year period. Both the number of unconfirmed and confirmed complaints do not exceed the thresholds of significance established by the odor complaints for a given petroleum production or gas processing facility. The above table thus indicates that in general operation of permitted equipment does not result in an appreciable amount of emissions of odorous compounds.

In addition to the complaints analysis, the odor assessment screening tool based on the list of facilities presented in Table 4.3-38 shows that oil and gas production and processing facilities are not included in the list of common facilities that are likely to have potentially significant odor emissions.

**Operations – Non-Permitted Activities**

Non-permitted activities with a potential to release odors consists mainly in on-road travel and well maintenance. During well maintenance, a fluid is normally introduced into the well bore, and the hydraulic pressure exerted by the fluid prevents gas from escaping into the atmosphere.

Diesel-fueled trucks traveling on local roadways would produce exhaust odors that could be considered offensive to some individuals. Although, in general, odors associated with diesel fumes are temporary and disperse rapidly with distance from the source, exposure of receptors to objectionable odor emissions from mobile-sources represent an unavoidable nuisance.

The SJVAPCD complaint record for non-permitted activities is shown in Table 4.3-40 below:

**Table 4.3-40: Significance of Odor Effects from Operational Activities – Non-Permitted Equipment**

| Significance of Odor | Odor Complaints Over Three Years | |
|---|---|---|
| | Unconfirmed | Confirmed |
| Activity Complaints | 1 | 0 |
| District Odor Threshold | More than 9 | More than 3 |
| Contribution to Effect | No | No |

Within the last three years, the SJVAPCD has received one unconfirmed odor complaint related to well maintenance activities, which is below the odor threshold.

Also, emissions from non-permitted activities are not included in the list of activities that are likely to result in a potentially significant effect for odor, as presented in Table 4.3-38 above.

The Project will continue to create odors, but based on past and projected future operations has not resulted in any significant adverse impacts to nearby sensitive receptors.

### Mitigation Measures

**MM 4.3-7** Applicant shall submit an Odor Complaint Management Plan to the County prior to receiving its first Site Plan conformity review approval. The Plan shall include a designated contact for odor complaints, creation of a log for odor complaints, and protocol for handling odor complaints. The Odor log and report files shall be available for public review upon request.

### Level of Significance After Mitigation

Impacts would be significant and unavoidable.

## 4.3.5 Cumulative Setting, Impacts, and Mitigation Measures

## Cumulative Setting

The regional plans and projections evaluated in this cumulative analysis are described in Section 3.7, Cumulative Projects. Implementation of these plans and any projects associated with these plans would be required to comply with the goals, policies, and implementation measures of applicable federal and local laws and land use standards imposed by the respective jurisdictions within with each related project is located. This includes the possibility of being required to undergo environmental review, in compliance with the requirements of CEQA and/or the National Environmental Policy Act (NEPA). Should potential impacts to air quality be identified, appropriate mitigation would be prescribed.

### Impact 4.3-5: Results in a Cumulatively Considerable Net Increase of Any Criteria Pollutant for which the Project Region is Nonattainment Under an Applicable Federal or State Ambient Air Quality Standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)

The current nonattainment status of regional pollutants is determined by past development and present activities. The District's attainment plans are designed to ensure the future attainment of State and federal ambient air quality standards. Consequently, the District's application of thresholds of significance for emission of criteria pollutants determines whether a project's emissions would have a cumulatively considerable contribution of emissions a criteria pollutant

for which the District is non-attainment. If project emissions exceed the thresholds of significance for criteria pollutants the project would be expected to result in a considerable net increase of any criteria pollutant for which the District is in non-attainment under applicable federal or State ambient air quality standards. The San Joaquin Valley is in nonattainment for $PM_{2.5}$, $PM_{10}$, and ozone. Ozone is addressed by examining its precursors which are $NO_X$, VOC, and CO.

Per the SJVAPCD's March 2015 GAMAQI:

> "By its very nature, air pollution is largely a cumulative impact. The nonattainment status of regional pollutants is a result of past and present development. Future attainment of State and Federal ambient air quality standards is a function of successful implementation of the District's attainment plans. Consequently, the District's application of thresholds of significance for criteria pollutants is relevant to the determination of whether a project's individual emissions would have a cumulatively significant impact on air quality.
>
> A lead agency may determine that a project's incremental contribution to a cumulative effect is not cumulatively considerable if the project will comply with the requirements in a previously approved plan or mitigation program, including, but not limited to an air quality attainment or maintenance plan that provides specific requirements that will avoid or substantially lessen the cumulative problem within the geographic area in which the project is located [CCR §15064(h)(1)].
>
> Thus, if project specific emissions would be less than the thresholds of significance for criteria pollutants, as a general matter the project would not be expected to result in a cumulatively considerable net increase of any criteria pollutant for which the District is in non-attainment under applicable federal or State ambient air quality standards." (SJVAPCD 2015a, Section 7.14.)

The SJVAPCD March 2015 Draft GAMAQI also states,

> As discussed in Section 8.3.1 (Basis for Air Quality Thresholds of Significance), the District's thresholds of significance for criteria pollutants are based on District rule 2201 (New Source Review) offset requirements. Furthermore, New Source Review (NSR) is a major component of the District's attainment strategy. NSR provides mechanisms, including emission trade-offs, by which Authorities to Construct such sources may be granted, without interfering with the attainment or maintenance of Ambient Air Quality Standards. District implementation of NSR ensures that there is no net increase in emissions above specified thresholds from new and modified Stationary Sources for all nonattainment pollutants and their precursors. In fact, permitted emissions above offset thresholds equivalent to the District's thresholds of significance for criteria pollutants are mitigated to below the thresholds, and the District's attainment plans show that this level of

> emissions increase will not interfere with attainment or maintenance of ambient air quality standards.
>
> The District's attainment plans demonstrate that project-specific net emissions increase below New Source Review (NSR) offset requirements will not prevent the District from achieving attainment. Consequently, emission impacts from sources permitted consistent with NSR requirements are not individually significant and are not cumulatively significant. (SJVAPCD 2015a, Section 8.8.4.)

The Kern County Air Quality Assessment Guidelines further require the cumulative air quality impact assessment to include assessment of the following issues:

- Consistency with Existing Air Quality Plans. Discuss the Project in relation to Kern COG conformity and Traffic Analysis Zones. Quantify emissions from similar projects and evaluate consistency with the applicable attainment plan.
- Localized Impacts. Assess the cumulative emissions impact associated with the proposed Project, in conjunction with approved and proposed projects located within a 1- and 6-mile radius of the proposed Project.
- Air Basin Emissions Analysis. Compare emissions from the proposed Project to emissions within the SJVAB and the Kern County portion of the SJVAB.

## Consistency with Existing Air Quality Plans.

The Kern COG 2014 RTP is a 26-year plan to set regional transportation goals, policies, and actions intended to guide development of the planned transportation systems in Kern County (2014a). The Kern COG is a federally designated Metropolitan Planning Organization (MPO) and a state designated Regional Transportation Planning Agency (RTPA).

The implementation of the RTP, in conjunction with the Project, was used to assess cumulative effects that could impact consistency with applicable attainment plans. The Program EIR for the RTP analyzed potential impacts of the multiple modes of transportation including:

- Transit/Rail/High Speed Rail;
- Operational Improvements – High-Occupancy Vehicle (HOV) Lanes/Ramp Metering;
- Pedestrian Complete Streets and Bicycle Improvements;
- Local Streets and Roads;
- Major Highway Improvements; and
- Freight Rail.

A complete list of these projects, the Constrained Program of Projects, is available in the RTP. The RTP's air quality modeling forecast showed that by 2040 the $NO_X$ precursor component to $PM_{2.5}$ would increase unless actions were taken. As a result, the plan focused on new strategies

such as improving transit, bike, walk, and housing options to achieve and maintain the federal air quality standards and the new state climate change goals. Planned improvements in the RTP have undergone air quality conformity analyses to ensure that they would comply with state and federal air quality rules. As a result, it was determined that implementation of RTP would not delay attainment of federal air quality standards in the SIPs for air quality.

In contrast, the construction and operational activities of oil and gas activities that would be authorized under this Project would result in an increase of criteria pollutants ($NO_x$, VOC, CO, $PM_{10}$ and $PM_{2.5}$) in excess of the recommended criteria pollutant significance threshold adopted by the SJVAPCD Board.

Both the RTP and the Project would be consistent the applicable air quality plans.

## Localized Impacts

Efforts to reduce emissions in the Kern Region that have been conducted since the early 1990s at the national, state, regional, and local entities since the early 1990s are presented in Table 4.3-41. The agency involved are the EPA, U.S. Department of Energy, Federal Highways Administration, Federal Transit Administration, CARB, California Department of Transportation, California Energy Commission, SJVAPCD, Eastern Kern APCD, and Kern COG and its local member agencies.

**Table 4.3-41: Programs Designed to Reduce Air Pollutant Emissions**

| Level | Program |
|---|---|
| National | Corporate Average Fuel Economy (CAFÉ) Standards<br>Fuel Pricing<br>Locomotive Idling Reduction<br>Locomotive Replacement or Repowering<br>Transportation Construction Equipment Reductions |
| State | AB 118 – Air Quality Improvement Program<br>AB 2766 – Motor Vehicle Fee Program<br>CalStart<br>Cap and Trade Program<br>Clean Diesel<br>Clean Vehicle Rebate Project<br>High-Occupancy Vehicle Facilities<br>Incident management/Kern 511 Traveler Information<br>Inspection & Maintenance Programs<br>Moyer Program<br>Park-and-Ride Facilities<br>Shifting/Separation Freight Movements<br>Signal Synchronization and Roadway Intersection Improvements |
| Regional | CalVans Vanpool Program<br>Commute Kern TDM Programs/Incentives<br>Diesel Engine Retrofits Incentive Program<br>Drive Clean Rebate Program<br>IdleAIR Idling Reduction Facilities<br>Project Clean Air (PCA) |

**Table 4.3-41: Programs Designed to Reduce Air Pollutant Emissions**

| Level | Program |
|---|---|
| | REMOVE II Programs<br>Retirement/Replacement of Heavy-Duty Trucks Incentives Program<br>Rule 8061 (SJVAPCD) Unpaved Road Dust Mitigation<br>Rule 9310 (SJVAPCD) School Bus Fleets: Retirement/Replacement of Buses<br>Rule 9410 (SJVAPCD) Employer-Based Trips Reduction (eTRIP)<br>Rule 9510 (SJVAPCD) Indirect Source Review: Infill Incentive Zone Transportation Impact Fee Land Use Strategies.<br>Valley Clean Air Now (CAN) |
| Local | Bicycle/Pedestrian Projects and Programs<br>GET Online Trip Planner Transit Marketing, Information, and Amenities<br>New/Expanded/Increased Transit Services<br>Road Paving & Street Sweeping |

The construction and operational activities of oil and gas activities that would be authorized under this Project would result in a considerable net increase of the following criteria pollutants $NO_x$, VOC, CO, $PM_{10}$ and $PM_{2.5}$, in excess of the recommended criteria pollutant significance threshold adopted by the SJVAPCD Board.

Emissions associated with the implementation of the Project would not be counterbalanced by the above efforts to reduce emissions undertaken at the State and local levels, as well as the air quality improvement goals stated in the 2014 RTP. Therefore, the contribution of Project-related impacts to air quality would be cumulatively considerable.

## Air Basin Emissions Analysis

Operational emissions for the proposed Project were compared to emissions of the entire SJVAB and the Kern County portion of the SJVAB, to assess the Project's contribution to cumulative air quality impacts. The SJVAB and Kern County emissions analyses utilize data from the CARB's California Emissions Projection Analysis Model (CEPAM). CEPAM (CARB 2013c) reflects emission projections to the year 2035 by summary category based on a 2012 base year. Forecasts reflect both anticipated growth and controls, as updated by CARB. The emissions analysis is presented in Table 4.3-42.

**Table 4.3-42: Comparison of 2035 Emission Projections – Proposed Project, Kern County, and San Joaquin Valley Air Basin**

| Emissions Source | Emissions (Tons/Year) | | | | |
|---|---|---|---|---|---|
| | $NO_X$ | CO | $SO_2$ | $PM_{10}$ | $PM_{2.5}$ |
| **Project Emissions** | | | | | |
| Permitted operation | 3,279.85 | 5,048.92 | 629.53 | 1,490.73 | 1,490.73 |
| Permitted Construction | 410.44 | 244.77 | 0.34 | 30.02 | 26.72 |
| Non-permitted | 5,169.75 | 11,428.56 | 16.89 | 1,267.14 | 257.93 |

**Table 4.3-42: Comparison of 2035 Emission Projections – Proposed Project, Kern County, and San Joaquin Valley Air Basin**

| Emissions Source | Emissions (Tons/Year) | | | | |
|---|---|---|---|---|---|
| | $NO_X$ | CO | $SO_2$ | $PM_{10}$ | $PM_{2.5}$ |
| Total Operational Project Emissions | 8,860.04 | 16,722.25 | 646.76 | 2,787.89 | 1,775.38 |
| **Kern County and San Joaquin Valley Air Basin Emissions** | | | | | |
| San Joaquin Valley Air Basin | 60,151.27 | 389,879.13 | 5,382.66 | 114,641.39 | 38,758.26 |
| Kern County Portion of SJVAB | 12,671.34 | 42,887.14 | 668.32 | 14,641.98 | 4,389.49 |
| **Analytical Results** | | | | | |
| Kern County Percent of SJVAB | 21.07% | 11.00% | 12.42% | 12.77% | 11.33% |
| Proposed Project Percent of SJVAB | 14.73% | 4.29% | 12.02% | 2.43% | 4.58% |
| Proposed Project Percent of Kern County Portion of SJVAB | 69.92% | 38.99% | 96.77% | 19.04% | 40.45% |

As can be seen in Table 4.3-42, emissions sources in Kern County contribute between 11% and 21% of criteria pollutant emissions in the SJVAB. The Project would contribute between two and 14% of these pollutants in the SJVAB or between 19% and 97% of Kern County's contribution. This analysis indicates that most $SO_2$ emissions in Kern County would originate from oil and gas activities and the majority of $NO_X$ emissions. Therefore, the proposed Project would have a cumulatively considerable contribution of criteria pollutant ($NO_X$, $PM_{10}$, $PM_{2.5}$, CO and $SO_2$) emissions to the Kern County portion of the SJVAB.

## Mitigation Measures

Implement MM 4.3-1 through MM 4.3-4, as described above.

**MM 4.3-8** For Project facilities or equipment that are not required to offset emissions under a District rule as described in MM 4.3-1, and for Project vehicle and other mobile source emissions, the County will enter into emission reduction agreement with the San Joaquin Valley Air Pollution Control District, pursuant to which the Applicant shall pay fees to fully offset Project emissions of oxides of nitrogen, reactive organic gases, and particulate matter of 10 microns or less in diameter (including as applicable mitigating for reactive organic gases by additive reductions of particulate matter of 10 microns or less in diameter) (collectively, "designated criteria emissions") to avoid any net increase in these pollutants. The air quality mitigation fee shall be paid to the County as part of the Site Plan review and approval process, and shall be used to reduce designated criteria emissions to fully offset Project emissions that are not otherwise required to be fully offset by District permit rules and regulations.

As an alternative to paying the fee, an Applicant may reduce emissions for one or more designated criteria emissions through actual reductions in air emissions

from other Applicant sources, as submitted to the County and validated by the District. This Project offset requirement shall be enforced by the County and verified by San Joaquin Valley Air Pollution Control District. If a voluntary emission reduction agreement is not executed by the County and San Joaquin Valley Air Pollution Control District, then each Applicant must mitigate for the full amount of designated criteria pollutants as verified by the San Joaquin Valley Air Pollution Control District, with evidence of such District-verified offsets presented as part of the Site Plan Conformity Review application documentation.

Examples of feasible air emission reduction activities that may be funded by air quality fees paid by Applicant or proposed and implemented by the Applicant under the emission reduction agreement include, but are not limited to, the following:

a. Replacing or retrofitting diesel-powered stationary equipment such as motors on generators, pumps and wells with electric or other lower-emission engines that are not subject to Title V reductions.

b. Replacing or retrofitting diesel-powered school, transit, municipal and other community mobile sources such as buses, car fleets, and maintenance equipment, with electric or other lower-emission engines.

c. Reducing emissions from public infrastructure sources such as water and wastewater treatment and conveyance facilities, and reducing water-related emissions through water conservation and reclamation.

Funding lower-emission equipment and processes for local businesses, schools, non-profit and religious institutions, hospitals, city and county facilities.

### Level of Significance After Mitigation

Impacts would be significant and unavoidable.

## Feasible and Reasonable Mitigation Analysis

In August 2013, the Kern County Planning Department published a Notice of Preparation/Initial Study for this Draft EIR. Comments were received during the public scoping period that followed this announcement, including certain suggested mitigation for potential Project impacts.

Each of the suggested mitigation measures identified during the scoping period and in other sources that were known to the Kern County Planning Department were evaluated to determine if: (1) the suggestions were applicable to the Project; (2) the suggestions addressed at least one significant impact associated with the Project; (3) an equivalent or more effective mitigation measure was already identified in the Draft EIR; (4) the applicable impact would remain significant and unavoidable with the suggested mitigation; and (5) the suggested mitigation would be feasible as defined by CEQA.

Suggested mitigation measures were considered only for those areas in which Project impacts were determined to exceed applicable significance thresholds. If significance thresholds were not exceeded, suggested mitigation measures were not considered because the suggested measures would not address an impact as defined by CEQA. If significance thresholds were exceeded, suggested mitigation measures were considered and compared with the mitigation measures identified in the Draft EIR. If the Draft EIR did not contain equivalent or more effective mitigation, suggested mitigation measures were assessed to determine whether they would be feasible under CEQA. Infeasible measures were not included in the Draft EIR.

CEQA Section 15364 defines feasible to mean "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors."

| **Suggested Mitigation Measure** | **Result of Evaluation** |
|---|---|
| Require oil and gas projects to generate their own clean electricity during production using photovoltaic (PV) solar, direct line power, or both, to eliminate all needs for operational power diesel generator onsite. | Increasing use of renewable energy is considered in an Alternative to this EIR. While operational emissions during production activities are low on a per well basis, emissions of $NO_x$, ROGs and $PM_{10}$ are required to be fully offset under the Air Quality Mitigation Measures. Producers can achieve this no net increase requirement by using solar PV or other available technologies, and thereby reduce what would be otherwise required as a fee under the OG-ERA to achieve no net increase in $NO_x$, ROG and $PM_{10}$ emissions. |
| There should be a percent limit on the amount of time they can flare gas. | Flare emissions have been included in the calculation of Project air emissions, and the Air Quality Mitigation Measures require no net increase in $NO_x$, ROGs and $PM_{10}$ emissions. Most flares are used for emergency management. Requiring a percent limit on the amount of time gas can be flared would impede the flare's emergency response capability. |

Section 4.4

# Biological Resources

Section 4.4

# Biological Resources

## 4.4.1 Introduction

This section describes the affected environment and regulatory setting for biological resources, identifies and analyzes environmental impacts for the Amendment to Chapter 19.98 (Oil and Gas Production) of the Kern County Zoning Ordinance (Project), and identifies measures to reduce or avoid significant impacts anticipated from Project construction and operation. In some cases, compliance with existing laws and regulations would reduce or avoid certain impacts that might otherwise occur with the implementation of the Project. Implementation of the Project would result in temporary disturbance and permanent impacts to biological resources. Impacts are measured by analyzing the potential disturbance acreage that could occur in the Project Area, broken out by subarea and tier as further described in this section. Species habitat modeling was completed to analyze potential impacts to certain species in the Project Area by the projected annual level of disturbance over 25 years.

The information and analysis that is presented in this section has been derived from published literature, federal and state databases, and site-specific investigations within the Project Area and adjacent locations. The sources of information used in this analysis are listed in the references section below.

Kern County will utilize the Data Basin website to display biological resource information along with other special data within the Project Area. The Data Basin website is a science-based mapping and analysis platform that supports learning, research, and sustainable environmental stewardship (www.databasin.org). Figures 4.4-A to 4.4-C characterize how the information is displayed on the website.

## 4.4.2 Environmental Setting

Kern County is California's third largest county, encompassing 8,202 square miles at the southern end of the Central Valley. The 3,700-square-mile Project Area is predominantly located in the western portion of the County in the San Joaquin Valley, bounded by Kings and Tulare Counties to the north; Santa Barbara and San Luis Obispo Counties to the west; the Tehachapi Mountains and the Sierra Nevadas to east; and the northern boundary of the Los Padres National Forest to the south.

The Project Area encompasses portions of the San Joaquin Valley Floor and portions of the adjoining foothills of Kern County. It is bordered by the Coast Range Mountains to the west, the Sierra Nevada to the east, and the Transverse Range to the south. The topography of the Project Area is mostly flat and almost all of the land occurs at elevations below 2,000 feet; a small portion in the southern Project Area extends above 2,000 feet into the Tehachapi Mountains.

Elevations within the Project Area range from a low of 206 feet above mean sea level (AMSL) 12 miles west of Delano, California (to the north), to a maximum elevation of 6,005 feet AMSL in the Transverse Range to the south. The Project Area is located within a semi-arid region, which relies on rainfall, groundwater, and several sources of indigenous and imported surface water such as the Kern River, the Friant-Kern Canal, and the California Aqueduct. Most rainfall occurs in the winter and spring, and averages 7 to 8 inches per year on the valley floor and 9 to 12 inches in bordering mountain ranges.

According to the U.S. Department of Agriculture (USDA) Soil Conservation Service, 415 specific soils types occur within the Project Area. Predominant major soil types found in the southern San Joaquin Valley consist of Copus-Lokern, Garces-Millox, Bakersfield-Oldriver, Guijarral-Cerini-Excelsior, Kimberlina-Granoso-Vineland, Premier-Wheelridge, and Calfax-Excelsior-Fages (USDA 2009).

Bakersfield is the largest metropolitan center in the Project Area, which also includes the communities of Taft, Delano, Shafter, Arvin, McFarland, Maricopa, and Wasco. Major and minor roadways bisect the County and serve as primary connectors for the movement of commerce and public travel through the region. Interstate 5 (I-5) is the most prominent roadway and runs north-south through the Project Area. The daily traffic load for I-5 through Kern County (County Line at Lebec to the Kings County line) is estimated to be 800,000 vehicles (AARoads 2012). Other significant north-south traffic occurs along California Highway 99 and Highway 33 (east and west of I-5, respectively). A number of smaller frequently travelled east-to-west routes serve the area and include State Route 58 between Atascadero and Barstow, and State Route 46 between Bakersfield and Paso Robles.

The Project Area occurs in the Tulare Lake hydrologic region with exception of a small area along its western perimeter that occurs in the Central Coast hydrologic region. Rivers within the Tulare Lake region include the Kings, Kaweah, Tule, and Kern Rivers with origins on the western slope of the Sierra Nevada, draining into the San Joaquin Valley Floor. This basin is now hydrologically closed, having no outlet to the Pacific Ocean. Portions of the Project Area are categorized by the Federal Emergency Management Agency as a 100-year flood zone. Project Area hydrology and flood issues are discussed in Section 4.9, Hydrology and Water Quality.

# Subareas

To facilitate detailed analysis, the Project Area as defined in Chapter 3, Project Description, and shown in Figure 3-2 was divided into three subareas: the Western, Central, and Eastern. In general, the three subareas are divided along the major transportation corridors, including I-5 and State Route 99. Subarea boundaries were adjusted to account for locations where the oilfield administrative boundaries that have been identified by the California Department of Conservation, Division of Oil, Gas and Geothermal Resources (DOGGR) are located on both sides of a freeway or highway.

# Land Use Tiers

Oil and gas production in Kern County varies in intensity, depending on historic uses, surrounding land uses and zoning designation, and quality of other potential land uses (e.g., agricultural land). As part of this project-level Environmental Impact Report [EIR] process, both Core and non-Core areas within the overall Project Area were further categorized based on existing and zoned land uses. The Project Area was divided into five Tier Areas (Figure 3-4), as described in Chapter 3, Project Description:

## Tier 1

Tier 1 is defined as the area in which current oil and gas activity is the primary land use. The well and activity densities preclude almost all other uses. According to DOGGR well information, 87% of all active oil and gas wells within the Project Area in 2014 were located within Tier 1 Areas.

The Tier 1 Areas were developed through the use of a well location database and oilfield Administrative Boundary GIS shape files for District 4 obtained from DOGGR. Tier 1 areas generally include all quarter-quarter Sections (40 acres) that contained a minimum of four wells.

Tier 1 does not include sensitive land uses, such as schools, daycare centers, hospitals, cemeteries, etc. It should also be noted that the quarter-quarter Sections that contained Important Farmlands, as identified by the Department of Conservation's (DOC's) Farmland Mapping and Monitoring Program for Kern County, are included in Tier 2, rather than Tier 1, as described below.

## Tier 2

Tier 2 includes all lands within the following agricultural Zone Districts that are not within Tier 1:

- All land that is zoned Exclusive Agriculture (A); and
- All land that is zoned Limited Agriculture (A-1).

Tier 2 also includes the following Important Farmlands identified by the DOC Farmland Mapping and Monitoring Program for Kern County 2012, which is the most recent available data:

- Prime Farmland;
- Farmland of Statewide Importance;
- Unique Farmland; and
- Confined Animal Agriculture.

## Tier 3

Tier 3 is defined as Zone Districts where historic drilling activity has been or could have been approved as "Unrestricted" or "Ministerial" under the existing Zoning Ordinance, and those areas that are not categorized as Tiers 1 or 2. These Zone Districts include:

- Natural Resource (NR);
- Recreation Forestry (RF);
- Light Industrial (M-1);
- Medium Industrial (M-2);
- Heavy Industrial (M-3);
- Floodplain Primary (FPP);
- Drilling Island (DI); and
- Zone districts that have a Petroleum Extraction (PE) combining district.

## Tier 4

Tier 4 consists of all Zone Districts where oil or gas exploration and production activities are currently or proposed to be allowed with a Conditional Use Permit (CUP). These Zone Districts include:

- Estate District (E);
- Low-density Residential (R-1);
- Medium-density Residential (R-2);
- High-density Residential (R-3);
- Commercial Office (CO);
- Neighborhood Commercial (C-1);
- General Commercial (C-2);
- Highway Commercial (CH);
- Platted Lands (PL); and
- Mobile Home Park (MP).

Authorized oil and gas activities in Tier 4 are subject to approval of a CUP in accordance with 19.104 of this Title. The Open Space (OS) zone district includes those areas where oil or gas exploration and production activities are prohibited, but ancillary facilities are an allowable use.

### Tier 5

Tier 5 are areas including current and future Specific Plan boundaries either adopted with a Special Plan Zone District or which include specific provisions for oil and gas operations. Oil or gas exploration and production activities would be allowed with a CUP or as permitted by the regulations contained within the adopted Specific Plan(s) in Tier 5 areas.

## Habitats and Vegetation

This section describes the natural vegetation community types, non-native vegetation coverage, and developed and agricultural land uses in the southern San Joaquin Valley. Land cover types that are natural communities are based on the List of California Terrestrial Natural Communities Recognized by the California Department of Fish and Wildlife Natural Diversity Database (CNDDB) and descriptions from Holland (1986). The primary sources for spatial mapping include the University of California Santa Barbara Biogeography Lab California Gap Analysis Project and the Classification and Assessment with Landsat of Visible Ecological Groupings (CALVEG) analysis and mapping system maintained by the U.S. Forest Service Region 5 Ecology Group for California and other Pacific states. The purpose of the CALVEG system is to classify California vegetation communities for use in statewide resource planning considerations. The CALVEG database currently maps 213 vegetation communities occurring in nine regions with enhanced image resolution. The descriptions of major resource areas are largely based on CALVEG data, and agricultural information was updated from 2014 aerial maps provided by Kern County Planning and Community Development Department (KCPCDD).

There are 28 types of vegetation cover occurring within the Project Area according to the US Forest Services' CALVEG breakdown (Figure 4.4-1).

Annual Grass is the most abundant cover type in the Eastern and Western Subareas, covering 736,282 acres of the total Project Area (Table 4.4-1).

**Table 4.4-1: Vegetation Cover Types by Tier and Subarea**

| Vegetation Type Description | Acres of Vegetation Cover by Tier | | | | | Acres of Vegetation by Subarea |
|---|---|---|---|---|---|---|
| | Tier 1 | Tier 2 | Tier 3 | Tier 4 | Tier 5 | |
| **Eastern Subarea** | | | | | | |
| Annual Grass | 31,719.53 | 257,527.30 | 3,771.06 | 4,644.33 | 27.69 | 297,689.93 |
| Alkali Desert Scrub | 4,211.54 | 3,559.32 | 570.54 | 86.35 | 4.66 | 8,432.43 |
| Barren | 131.79 | 512.78 | 137.97 | 0 | 2.63 | 785.20 |
| Blue Oak-Foothill Pine | - | 601.15 | - | 0.21 | - | 601.37 |
| Blue Oak Woodland | - | 6,383.14 | - | 171.40 | - | 6,554.55 |
| Chamise-Redshank Chaparral | - | - | - | - | - | - |
| Cropland | - | 15.68 | - | - | - | 15.69 |

**Table 4.4-1: Vegetation Cover Types by Tier and Subarea**

| Vegetation Type Description | Acres of Vegetation Cover by Tier | | | | | Acres of Vegetation by Subarea |
|---|---|---|---|---|---|---|
| | Tier 1 | Tier 2 | Tier 3 | Tier 4 | Tier 5 | |
| Coastal Scrub | - | - | - | - | - | - |
| Deciduous Orchard | 159.37 | 66,466.75 | 302.30 | 296.06 | 738.41 | 67,962.91 |
| Desert Riparian | - | - | - | - | - | - |
| Desert Wash | - | 3.89 | - | - | - | 3.89 |
| Fresh Emergent Wetland | - | 5.14 | - | - | - | 5.14 |
| Irrigated Row and Field Crops | 3,045.59 | 123,405.51 | 2,234.37 | 2,107.89 | 333.82 | 131,127.20 |
| Juniper | - | - | - | - | - | - |
| Lacustrine | 80.25 | 1,424.34 | 168.41 | 21.45 | 2.11 | 1,696.59 |
| Mixed Chaparral | - | 1,143.03 | 3.36 | 368.59 | - | 1,515.00 |
| Montane Chaparral | - | - | - | - | - | - |
| Montane Hardwood-Conifer | - | - | - | - | - | - |
| Montane Hardwood | - | 692.77 | - | - | - | 692.77 |
| Montane Riparian | - | 9.85 | - | - | - | 9.86 |
| Perennial Grass | - | 3.99 | - | - | - | 3.99 |
| Pinyon-Juniper | - | - | - | - | - | - |
| Riverine | 26.67 | 238.30 | 187.47 | 12.15 | 0.27 | 464.89 |
| Sagebrush | - | - | - | - | - | - |
| Urban | 1,143.12 | 2,319.87 | 3,976.09 | 10,885.36 | 630.63 | 1,8955.09 |
| Valley Oak Woodland | - | 3,205.30 | - | 17.42 | - | 3,222.74 |
| Valley Foothill Riparian | 0.08 | 250.71 | 7.32 | 2.57 | - | 260.70 |
| Wet Meadow | - | 20.33 | - | - | - | 20.33 |
| **Central Subarea** | | | | | | |
| Annual Grass | 34.06 | 37,446.68 | 7.79 | 1,176.63 | - | 38,665.18 |
| Alkali Desert Scrub | 2,050.72 | 7,776.93 | 423.97 | 39.41 | - | 10,291.05 |
| Barren | - | 1,326.50 | 8.05 | 76.83 | - | 1,411.39 |
| Blue Oak-Foothill Pine | - | - | - | - | - | - |
| Blue Oak Woodland | - | - | - | - | - | - |
| Chamise-Redshank Chaparral | - | - | - | - | - | - |
| Cropland | - | 263.57 | - | - | - | 263.58 |
| Coastal Scrub | - | - | - | - | - | - |

**Table 4.4-1: Vegetation Cover Types by Tier and Subarea**

| Vegetation Type Description | Acres of Vegetation Cover by Tier | | | | | Acres of Vegetation by Subarea |
|---|---|---|---|---|---|---|
| | Tier 1 | Tier 2 | Tier 3 | Tier 4 | Tier 5 | |
| Deciduous Orchard | 2.21 | 122,227.43 | 104.13 | 212.45 | - | 122,546.24 |
| Desert Riparian | - | - | - | - | - | - |
| Desert Wash | - | - | - | - | - | - |
| Fresh Emergent Wetland | - | 3,258.72 | - | 15.02 | - | 3,273.74 |
| Irrigated Row and Field Crops | 847.69 | 340,940.33 | 1,691.10 | 4,895.43 | - | 3,48374.57 |
| Juniper | - | - | - | - | - | - |
| Lacustrine | 6.96 | 5,557.03 | 8.02 | 326.81 | - | 5,898.84 |
| Mixed Chaparral | - | - | - | - | - | - |
| Montane Chaparral | - | - | - | - | - | - |
| Montane Hardwood-Conifer | - | - | - | - | - | - |
| Montane Hardwood | - | - | - | - | - | - |
| Montane Riparian | - | - | - | - | - | - |
| Perennial Grass | - | 839.44 | 11.56 | 620.88 | - | 1,471.90 |
| Pinyon-Juniper | - | - | - | - | - | - |
| Riverine | 0.33 | 719.29 | 2.21 | 10.32 | - | 732.18 |
| Sagebrush | - | - | - | - | - | - |
| Urban | 59.88 | 2,488.75 | 544.10 | 3,035.00 | - | 6,127.75 |
| Valley Oak Woodland | - | 39.96 | - | - | - | 39.97 |
| Valley Foothill Riparian | - | 96.21 | - | 0.15 | - | 96.36 |
| Wet Meadow | - | 90.53 | - | 3.73 | - | 94.27 |
| **Western Subarea** | | | | | | |
| Annual Grass | 43,313.50 | 355,533.00 | 340.16 | 740.24 | 0.49 | 399,927.42 |
| Alkali Desert Scrub | 96,084.11 | 57,092.31 | 1,090.75 | 828.80 | 37.43 | 155,133.44 |
| Barren | 11,929.23 | 5,619.03 | 156.94 | 12.71 | - | 17,717.92 |
| Blue Oak-Foothill Pine | - | 49.31 | - | - | - | 49.31 |
| Blue Oak Woodland | - | 4,350.20 | - | - | - | 4,350.20 |
| Chamise-Redshank Chaparral | - | 1,137.43 | - | - | - | 1,137.43 |
| Cropland | 3,156.54 | 132,589.63 | 1.12 | 17.99 | - | 135,765.29 |
| Coastal Scrub | 0.03 | 3,164.56 | 7.20 | - | - | 3,171.79 |
| Deciduous Orchard | 22.22 | 14,908.67 | - | 31.76 | - | 14,962.66 |

**Table 4.4-1: Vegetation Cover Types by Tier and Subarea**

| Vegetation Type Description | Acres of Vegetation Cover by Tier | | | | | Acres of Vegetation by Subarea |
|---|---|---|---|---|---|---|
| | Tier 1 | Tier 2 | Tier 3 | Tier 4 | Tier 5 | |
| Desert Riparian | - | 6.01 | - | - | - | 6.01 |
| Desert Wash | - | - | - | - | - | - |
| Fresh Emergent Wetland | - | 626.44 | - | - | - | 626.45 |
| Irrigated Row and Field Crops | 684.20 | 186,550.87 | 164.90 | 600.12 | 732.59 | 188,732.69 |
| Juniper | - | 2,261.41 | - | 445.11 | - | 2,706.53 |
| Lacustrine | 827.15 | 2,502.01 | 3.12 | 9.15 | - | 3,341.45 |
| Mixed Chaparral | - | 9,641.01 | - | 159.23 | - | 9,800.25 |
| Montane Chaparral | - | 60.93 | - | - | - | 60.94 |
| Montane Hardwood-Conifer | - | 20.35 | - | - | - | 20.36 |
| Montane Hardwood | - | 336.13 | - | - | - | 336.13 |
| Montane Riparian | - | - | - | - | - | - |
| Perennial Grass | - | - | - | - | - | - |
| Pinyon-Juniper | - | 3,799.38 | - | - | - | 3,799.39 |
| Riverine | 379.65 | 671.03 | 15.05 | 5.35 | - | 1,071.10 |
| Sagebrush | - | 2,455.23 | - | 6.62 | - | 2,461.85 |
| Urban | 6,825.79 | 8,709.99 | 264.15 | 1,268.70 | 1.21 | 17,069.87 |
| Valley Oak Woodland | - | 1,400.64 | - | - | - | 1,400.65 |
| Valley Foothill Riparian | 4.44 | 114.52 | - | - | - | 118.97 |
| Wet Meadow | - | 41.38 | - | - | - | 41.39 |

Natural habitats that historically occurred in the Project Area have been significantly modified by agricultural and urban development; mineral development; local, regional and state infrastructure improvements; and livestock grazing and other land uses, primarily during the twentieth century. By 1979, nearly all the valley floor and many of the flatter upland areas were urbanized or converted to cultivated agriculture, and less than 5% of the these areas remained uncultivated (United States Fish and Wildlife Service [USFWS] 1998). Historically, wetlands were extensive in the Buena Vista Lake watershed, which is located in the south-central Project Area, and surrounded the lake for many square miles. Corridors of wetland habitat were associated with the Kern River, Poso Creek, and several other north-flowing drainages from the Tehachapi Mountains. Slow-moving sloughs that occurred in the center of the valley supported freshwater, emergent wetlands. Almost all of the historical wetland habitats in the Project Area have been converted to agricultural uses or affected by subsequent land use changes, and primarily occur in

riparian areas associated with Kern River and Poso Creek or emergent wetlands supported by ponds and other artificial impoundments.

The modification of natural habitats within the Project Area and the southern San Joaquin Valley affected several plant and animal species in the region, many of which have subsequently been listed as threatened or endangered under state and federal law. In the late 1980s and early 1990s, local, state, and federal agencies and other regional stakeholders began to consider approaches for conserving certain species and their habitats in the valley floor region. In 1989, the USFWS, California Department of Fish and Wildlife (CDFW), U.S. Department of the Interior, Bureau of Land Management (BLM), California Energy Commission (CEC), DOGGR, and Kern County signed a memorandum of understanding in an effort to develop a Recovery Plan for Upland Species of the San Joaquin Valley (SJV Recovery Plan), a federal Habitat Conservation Plan (HCP), and to support related state species permitting for the Kern County portion of the valley floor up to 2,000 feet in elevation. As discussed below, several Valley Floor Habitat Conservation Plan (VFHCP) drafts have been considered, but not yet finalized or approved by the agencies.

In 1998, the USFWS published an ecosystem-oriented the SJV Recovery Plan for 34 special status species in the greater San Joaquin Valley, including the Project Area in Kern County. Federal recovery plans provide guidance for managing land and resources in a manner that fosters the recovery and continued survival of threatened, endangered and other covered species. The SJV Recovery Plan focuses on the conservation of certain "umbrella" species (i.e., a species whose presence can be considered to indicate habitat potential for other species, because the umbrella species has more sensitivities to environmental pressures (e.g., San Joaquin kit fox) and "keystone" species (i.e., a species whose influence on other species is disproportionately large relative to its population size (e.g., giant kangaroo rat and, to a lesser extent, the Fresno, short-nosed, and Tipton kangaroo rats) (scientific names for all organisms are provided in Tables 4.4-26 and 4.4-36). This is because conservation measures for umbrella and keystone species most broadly benefit other species in the region. In general, the SJV Recovery Plan seeks to protect land in large blocks to minimize edge effects, increase the likelihood that ecosystem functions will remain intact, and facilitate management. The SJV Recovery Plan further recommends that blocks of conservation lands should also be connected to allow for movement of organisms between blocks (USFWS 1998, 2010a).

The SJV Recovery Plan generally divides the southern San Joaquin Valley into three primary land cover types: agriculture, urban, and "natural" lands (USFWS 1998; Figure 4.4-2). The natural lands category encompasses locations where resource extraction activities occur, including extensive oil and gas production and exploration. Livestock grazing is also an important activity in the natural land areas. The distribution of agriculture, urban, and natural lands within the Project Area is shown on Figure 4.4-2.

# Land Cover Types

Each Subarea (i.e., Western, Central, and Eastern; Figure 4.4-2), has varying percentages of the three land cover types (Table 4.4-2). About 1,146,410 acres of the Project Area are natural lands, which are located primarily in the Western Subarea and to lesser extent in the Eastern Subarea.

These lands also include oil and gas fields that account for almost all of the oil and gas production in the County. Agricultural lands account for 1,099,263 acres of the Project Area, and 83% of the Central Subarea. About 90,842 acres of the County consist of urban and developed lands, about half of which is located within the Eastern Subarea.

**Table 4.4-2: Agriculture, Urban, and Natural Land Acreage within the Project Area and by Subarea**

| | Natural Lands | Agricultural Lands | Urban/ Developed | Totals |
|---|---|---|---|---|
| **Western Subarea** | | | | |
| Acres | 724,990 | 343,091 | 22,048 | 1,090,129 |
| % of Subarea | 67% | 31% | 2% | - |
| % of Project Area | 31% | 15% | 1% | - |
| **Central Subarea** | | | | |
| Acres | 82,540 | 536,187 | 25,400 | 644,127 |
| % of Subarea | 13% | 83% | 4% | - |
| % of Project Area | 4% | 23% | 1% | - |
| **Eastern Subarea** | | | | |
| Acres | 338,880 | 219,985 | 43,394 | 602,259 |
| % of Subarea | 56% | 37% | 7% | - |
| % of Project Area | 15% | 9% | 2% | - |
| **TOTAL** | **1,146,410** | **1,099,263** | **90,842** | **2,336,515** |

Source: FS 2014

## Agricultural Lands

Agricultural land uses have reduced habitat values for most animal and plant species for over a century. Large mammals are known to use agriculture land as habitat connectivity corridors, including coyote (scientific names for all species are provided in Tables 4.4-26 and 4.4-36) and San Joaquin kit fox. Bird species, such as American kestrel and red-tailed hawk, hunt small mammals and insects of these areas. Irrigated pasture lands provide foraging habitat for raptors, such as Swainson's hawk and American kestrel. Crops provide cover and food for mammals, such as California ground squirrels, desert cottontail, and black-tailed jackrabbit. As discussed below, water conveyance facilities associated with agriculture in the Project Area also provide wildlife habitat. The state-owned California aqueduct and federal Friant-Kern canal rights-of-way (ROWs) contain undeveloped lands that provide habitat corridors for terrestrial wildlife.

Canals, ditches, and ponds convey and store agricultural water, control flooding, and support habitats throughout the Project Area. Agricultural tail ponds and ditches are present in all but the far eastern and western portions of the southern San Joaquin Valley. The ponds are predominantly excavated in upland areas and are used to store agricultural runoff or for irrigation.

These ponds are usually steep-sided (often earthen), and often have low oxygen levels and high levels of certain chemical constituents related to agricultural use, and can sometimes support vegetation, such as cattails, and certain birds and terrestrial animals, such as red-winged blackbirds, American bullfrogs, and California ground squirrels.

### Urban and Developed Lands

Urban and developed land-cover types in the southern San Joaquin Valley include airports, landfills, highways, commercial and industrial areas, golf courses, residential, commercial, industrial, educational facilities, public facilities, natural resources, and mineral development activities. Bakersfield is Kern County's largest population center, and other urban development occurs in the Lost Hills, McKittrick, Taft, Maricopa, Delano, McFarland, Wasco, Shafter, Rosedale, Oildale, Lamont, and Arvin communities. Developed lands do not provide substantial wildlife habitat, but a few occurrences of protected or sensitive species, such as the San Joaquin kit fox, have been documented, primarily in unpaved and fallow parcels interspersed in developed areas (USFWS 1998; Bjurlin et al. 2005).

### Natural Lands

**Natural Lands.** The predominant uses in the natural land portion of the Project Area include livestock grazing, an historical use for over a century, mineral extraction, and oil and gas production. The majority of Tier 1 oil and gas exploration and development areas are located in the natural lands portion of the Project Area. Grazing, an historical use for over a century, can maintain habitat values for some species, although certain species may be negatively affected by livestock impacts to drainages, ponds, and similar resources. The general extent and location of agricultural, developed, and natural lands are depicted on Figure 4.4-2.

## Wildlife Refuges and Protected Habitat Areas

Several permanently preserved conservation lands are located within the Project Area. Some preserves were created under the terms of existing HCPs for oil and gas activities, and others are managed by federal, state, local, or private organizations. Preserved lands within the Project Area include the following:

- The Coles Levee Ecosystem Preserve HCP conserved 6,059 acres under an existing oil and gas HCP to the east of the Elk Hills Oil Field (EHOF) and south of the Kern Water Bank in the Western Subarea;

- The Kern Water Bank HCP, which will permanently preserve 10,349 acres for habitat purposes in the Central and Western Subareas;

- The Freeport-McMoRan Oil & Gas HCP conserved 1,519 acres under an oil and gas HCP in the Western Subarea;

- The EHOF conservation area, which consists of 8,028 gross acres and 7,878 net acres of undisturbed habitat, of which a minimum of 7,075 acres undisturbed acres must be preserved under a Section 7 permit and agreements with state and federal agencies in conjunction with the sale of former Naval Petroleum Reserve properties in the Western Subarea;

- The LINN Energy Enos conservation lands, 400 acres of conservation lands held in the Poso Creek oilfield within the Eastern Subarea;

- The LINN Energy Lokern-Buena Vista Valley conservation lands are 2,895 acres of conservation lands held in the Western Subarea;

- The Lokern-Buena Vista BLM Areas of Critical Environmental Concern located to the north of the Elk Hills and east of the Cymric-McKittrick oilfields in the Western Subarea;

- The Kern National Wildlife Refuge, 11,249 acres located 18 miles west of the city of Delano in the Central Subarea;

- The Hart Park Ecological Reserve, 500 acres managed by the CDFW in three separate parcels located north of Bakersfield in the Eastern Subarea;

- The Buttonwillow Ecological Reserve, 1,391 acres managed by CDFW northeast of Buttonwillow in the Central Subarea;

- The Lokern Ecological Reserve, 4,000 acres in the Semitropic Ridge area and the 295 acres Sand Ridge Wildflower preserve east of Bakersfield managed by the Center for Natural Land Management in the Central and Eastern Subareas;

- The Semitropic Ecological Reserve, 4,800 acres adjacent to 3,100 acres of land that is managed by the Center for Natural Lands Management and the Kern National Wildlife Refuge in the Central Subarea;

- The Tule Elk State Reserve, 987 acres adjacent to the Kern Water Bank and the EHOF managed by the California Department of Parks and Recreation in the Western Subarea (California Department of Parks and Recreation 2013);

- A portion of the 97,000 acre Windwolves (Wildlands Conservancy) Preserve located along the southwest border of the Project Area; and

- A portion of the conservation land subject to the Tejon Ranch Conservation and Land Use Agreement along the south-central and southeast borders of the Project Area.

## Designated Critical Habitat

As identified in Table 4.4-3 and shown in Figure 4.4-3, critical habitat has been designated by the USFWS for the Buena Vista lake shrew (one location in the central Project Area just east of I-5),

the California condor (south and east of I-5 in the far southern Project Area and north of Bakersfield along the Eastern Subarea boundary), the California red-legged frog (in the far northwest corner of the western Project Area), and the California tiger salamander (northwest corner of the Western Subarea).

**Table 4.4-3: USFWS Designated Critical Habitat in the Project Area (acres)**

| | Tier 1 | Tier 2 | Tier 3 | Tier 4 | Tier 5 | State | Other Areas | Grand Total |
|---|---|---|---|---|---|---|---|---|
| **Western Subarea** | | | | | | | | |
| California condor | - | 4,232.52 | 95.01 | 76.77 | 0.49 | - | 278.97 | 4,683.76 |
| California red-legged frog | - | 2,894.25 | - | - | - | 33.50 | - | 2,927.75 |
| California tiger salamander | - | 1,484.77 | - | - | - | | 10.06 | 1,494.83 |
| **Central Subarea** | | | | | | | | |
| Buena Vista Lake ornate shrew | - | 82.44 | - | - | - | - | 1.94 | 84.39 |
| **Eastern Subarea** | | | | | | | | |
| California condor | 452.66 | 71,694.00 | 135.04 | 148.96 | 319.99 | 276.83 | 284.01 | 73,311.50 |
| **TOTAL** | **452.66** | **80,387.99** | **230.06** | **225.73** | **320.48** | **310.33** | **574.98** | **82,502.24** |

# Sensitive Natural Communities

Based on an analysis by the Conservation Biology Institute, CALVEG database, and reported occurrences (CDFW 2015a), 15 sensitive natural communities occur with the Project Area: Alkali Seep, Coastal and Valley Freshwater Marsh, Desert Scrub, Desert Wash, Great Valley Cottonwood Riparian Forest, Great Valley Mesquite Scrub, Mixed Chaparral, Montane Hardwood, Native Valley Foothill Riparian, Stabilized Interior Dunes, Valley Needlegrass Grassland, Valley Oak/Oak Woodland, Valley Sacaton Grassland, Valley Saltbush Scrub, and Valley Sink Scrub. In addition, the USFWS has identified a San Joaquin Valley Vernal Pool Region and the Carrizo Vernal Pool Region in the Vernal Pool Recovery Plan (USFWS 2004) that include lands that extend into the Project Area.

Sensitive natural communities are ranked according to their degree of imperilment (as measured by rarity, trends, and threats), which follows NatureServe's Heritage Methodology, in which all alliances are listed with a G (global) and S (state) rank. Sensitive natural communities consist of groups with a global and/or state ranking of 3 or higher:

- G1/S1 Critically Imperiled - Critically imperiled because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation or extinction. Typically 5 or fewer occurrences or less than 1,000 remaining individuals.

- G2/S2 Imperiled - Imperiled because of rarity or because of some factor(s) making it very vulnerable to extirpation or extinction. Typically 6 to 20 occurrences or between 1,000 and 3,000 remaining individuals.

- G3/S3 Vulnerable - Vulnerable either because rare and uncommon, or found only in a restricted range (even if abundant at some locations), or because of other factors making it vulnerable to extirpation or extinction. Typically 21 to 100 occurrences or between 3,000 and 10,000 remaining individuals.

A conservative approach was used to identify the location and acreages of each sensitive natural community in the Project Area. The approach used available data from the CNDDB, CALVEG, CDFW, and USFWS. Because each data source delineated the extent of each community differently, this caused some potential overlap of the sensitive natural communities. To address the habitat overlaps and the uncertainty of changing land use conditions, sensitive communities with multiple data sources have been assigned an aggregated total of acres to represent the total land area covered by the available data sources listed above to eliminate double counting where habitat overlaps. The locations of sensitive natural communities in the Project Area are shown in Figure 4.4-4. Sensitive Natural Communities are shown in greater detail in each Subarea in Figure 4.4-5 for the Western Subarea, Figure 4.4-6 for the Central Subarea, and Figure 4.4-7 for the Eastern Subarea. The Sensitive Natural Communities tables (Tables 4.4-4 through 4.4-18) provide the actual acreages and the aggregated acres.

The following sections summarize the status of sensitive natural communities in the Project Area.

## Alkali Seep

Alkali Seep is represented by low-growing perennial herbs, usually forming relatively complete cover, growing throughout the year in areas with mild winters. This vegetation type is present in permanently moist or wet alkaline seeps, often associated with alkali meadows. It is dominated by alkali saltgrass, spiny naiad, boraxweed, pondweed, ribbon weed, ditch-grass, and horned pondweed (Holland 1986 code 45320). Alkali Seep occurs scattered throughout the desert regions of California (Holland 1986). Alkali Seep habitat may occur within the Project Area where natural seeps or springs persist. The extent of Alkali Seep habitat is not well quantified, but is generally sporadic and tends to occur in small patches. Less than 7 acres total have been identified in the CNDDB within the Project Area. Alkali Seep can be found in areas where perched water or a high water table exists (e.g., lowlands or former lakebeds, the base of alluvial fans and/or foothill drainages, or along seismic or geologic rifts). The only portion of the Project Area with Alkali Seep habitat is the Central Area, Tier 2, comprised of 69.40 acres (CDFW 2015a).

## Coastal and Valley Freshwater Marsh

Coastal and Valley Freshwater Marsh is represented by perennial, emergent monocots from 12 to 15 feet tall, often forming completely closed canopies. This vegetation type is present on quiet sites permanently flooded by fresh water (rather than brackish, alkaline, or variable water) where

prolonged saturation permits accumulation of deep, peaty soils. It is dominated by cattails and Scirpus species (Holland 1986 code 52410). Coastal and Valley Freshwater Marsh occurs along the coast and in coastal valleys near river mouths and around the margins of lakes and springs. The most extensive presence is in the upper portion of the Sacramento-San Joaquin River Delta; however, it is common in the Sacramento and San Joaquin Valleys in river oxbows and other areas on the floodplain. Coastal and Valley Freshwater Marsh is also occasional along the Colorado River on the California-Arizona border (Holland 1986). Table 4.4-4 lists the Coastal and Valley Freshwater Marsh acreages within the Project Area.

**Table 4.4-4: Acres of Coastal and Valley Freshwater Marsh Sensitive Natural Community by Tier and Project Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Grand Total |
|---|---|---|---|---|
| Tier 1 | 9.70 | 2.55 | 140.86 | 153.11 |
| Tier 2 | 1,259.95 | 5,274.82 | 2,396.70 | 8,931.47 |
| Tier 3 | - | 3.48 | 56.43 | 59.91 |
| Tier 4 | 7.29 | 102.79 | 8.09 | 118.16 |
| Tier 5 | 0.95 | - | - | 0.95 |
| **TOTAL** | **1,277.88** | **5,383.63** | **2,602.08** | **9,263.59** |

Source: CBI 2015

## Desert Scrub

Desert Scrub communities are typically characterized by open, scattered assemblages of broadleaved evergreen or deciduous microphyll shrubs rarely exceeding 10 feet in height. Canopy cover is generally less than 50%, often with bare ground between plants (CDFG 1988). Desert Scrub, the most widespread habitat in the California deserts, is generally found below 4,000 feet, but may occur 1,000 feet higher on south-facing slopes (CDFG 1988). Desert Scrub natural communities are found in California throughout the Mojave and Sonoran Deserts at suitable elevations. Creosotebush is often considered a dominant of Desert Scrub habitats but its dominance is usually due to its tall stature rather than density (CDFG 1988). Desert Scrub habitats generally have low species diversity (CDFG 1988); however, many plant species are found in the habitat. These species include catclaw acacia, desert agave, coastal bladderpod, white brittlebush, burrobush, white bursage, barrel and hedgehog cactus, branched pencil and teddybear cholla, Palmer's coldenia, Wiggins croton, desert globemallow, jojoba, littleleaf krameria, ocotillo, beavertail pricklypear, Douglas and rubber rabbitbrush, desert sand verbena, desert senna, squaw waterweed, Anderson's wolfberry, and Mojave yucca (CDFG 1988). Forbs and grasses may include triangle evening primrose, galleta, big galleta, galletagrass, and spanishneedles (CDFG 1988). Table 4.4-5 lists the acreages of Desert Scrub habitat within the Project Area.

**Table 4.4-5: Acres of Desert Scrub Sensitive Natural Community by Tier and Project Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Grand Total |
|---|---|---|---|---|
| Tier 1 | 62.56 | - | -- | 62.56 |
| Tier 2 | 44.90 | - | 2.45 | 47.35 |
| Tier 3 | - | - | - | - |
| Tier 4 | - | - | - | - |
| Tier 5 | - | - | - | - |
| **TOTAL** | **107.47** | **-** | **2.45** | **109.92** |

Source: CBI 2015

## Desert Wash

Desert Wash communities are characterized by the presence of arborescent, often spiny, shrubs generally associated with intermittent streams or drier bajadas. The height of wash vegetation usually is proportional to the size of the arroyo (CDFG 1988). Desert Wash habitats in the south exhibit a more diverse vertical structure than those in the north. The composition of desert wash plant assemblages depends on variables such as latitude, elevation, and precipitation. Generally, washes in the south are more diverse in plant species composition and vertical structure than washes to the north. Canopy species typically found in washes include blue paloverde, littleleaf paloverde, desert ironwood, smoketree, catclaw acacia, mesquite, screwbean mesquite, and tamarisk (CDFG 1988). Plants of the subcanopy include desert broom, crucillo, Anderson's wolfberry, arrowweed, and desert willow (CDFG 1988), as well as small individuals belonging to the dominant canopy species. Ground cover plants include white brittlebush, Opuntia, snakeweed, goldenbush, saltbush, bursage, and desert lavender (CDFG 1988), as well as a variety of forbs and grasses. Table 4.4-6 lists the acreages of Desert Wash habitat within the Project Area.

**Table 4.4-6: Acres of Desert Wash Sensitive Natural Community by Tier and Project Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Grand Total |
|---|---|---|---|---|
| Tier 1 | 1,391.51 | - | 85.57 | 1,477.09 |
| Tier 2 | 1,734.89 | 2.93 | 328.22 | 2,066.04 |
| Tier 3 | - | - | 41.91 | 41.91 |
| Tier 4 | - | - | 1.68 | 1.68 |
| Tier 5 | - | - | - | - |
| **TOTAL** | **3,126.40** | **2.93** | **457.38** | **3,586.72** |

Source: CBI 2015

## Great Valley Cottonwood Riparian Forest

Great Valley Cottonwood Riparian Forest is represented by a dense, broad-leafed, winter-deciduous riparian forest dominated by Fremont cottonwood and black willow. The understory is dense, with abundant vegetative reproduction of canopy dominants. California wild grape is the most conspicuous liana. Scattered seedlings and saplings of shade-tolerant species such as California box elder or Oregon ash may be found, but frequent flooding prevents their reaching into the canopy. This vegetation type is present on fine-grained alluvial soils near perennial or nearly-perennial streams that provide subsurface irrigation even when the channel is dry. These sites are inundated yearly during spring, resulting in annual input of nutrients, soil, and new germination sites (Holland 1986 code 61410). Great Valley Cottonwood Riparian Forest historically occurs along the major low-gradient (depositional) streams throughout the Great Valley. The distribution of this vegetation type occurs in scattered, isolated remnants or young stands because of flood control, water diversion, agricultural development, and urban expansion (Holland 1986). Table 4.4-7 lists the acreages of Great Valley Cottonwood Riparian Forest habitat within the Project Area.

**Table 4.4-7: Acres of Great Valley Cottonwood Riparian Forest Sensitive Natural Community by Tier and Project Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Grand Total |
|---|---|---|---|---|
| Tier 1 | - | - | 255.69 | 255.69 |
| Tier 2 | 105.06 | 759.15 | 715.98 | 1,580.19 |
| Tier 3 | - | 2.17 | 109.83 | 112.00 |
| Tier 4 | - | 0.31 | 6.92 | 7.23 |
| Tier 5 | - | - | - | - |
| **TOTAL** | **105.06** | **761.62** | **1,088.43** | **1,955.12** |

Source: CBI 2015

## Great Valley Mesquite Scrub

Great Valley Mesquite Scrub is represented by open woodlands or savannas dominated by honey mesquite and allscale. The understory is grassy in good rainfall years, though usually dominated by introduced annuals. Perennial cover is usually low, with honey mesquite densities as low as two to three plants per acre. This vegetation type is present on sandy loams of alluvial origin, often with wind-modified micro-topography and high water table (Holland 1986 code 63420). Great Valley Mesquite Scrub historically occurred in the southern San Joaquin Valley from Bakersfield to the Inner South Coast Range at Tupman and Buena Vista Lake. Table 4.4-8 lists the acreages of Great Valley Mesquite Scrub habitat within the Project Area.

**Table 4.4-8: Acres of Great Valley Mesquite Scrub Sensitive Natural Community by Tier and Project Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Grand Total |
|---|---|---|---|---|
| Tier 1 | - | 1,558.48 | 436.43 | 1,994.91 |
| Tier 2 | - | 1,221.03 | 1,438.18 | 2,659.22 |
| Tier 3 | - | 29.94 | 261.22 | 291.15 |
| Tier 4 | - | 11.49 | 36.59 | 48.09 |
| Tier 5 | - | - | - | - |
| **TOTAL** | **-** | **2,820.94** | **2,172.42** | **4,993.37** |

Source: CBI 2015

## Interior Dunes

Interior Dunes are represented by an open, primarily perennial, winter- and spring-growing herbaceous community with a scattering of low shrubs or coast live oak. Shrubs are typically less than waist-high and contribute less than 10% of cover. Dominant species may include California croton, California matchweed, telegraphweed, naked buckwheat, Contra Costa wallflower, and Antioch Dunes evening primrose (Holland 1986 code 23000). Interior Dunes are historically narrowly restricted to the mouth of the Sacramento-San Joaquin Delta, and have been reduced by agricultural development and sand quarrying (Holland 1986). Table 4.4-9 lists the acreages of Interior Dunes habitat within the Project Area.

**Table 4.4-9: Acres of Stabilized Interior Dunes Sensitive Natural Community by Tier and Project Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Grand Total |
|---|---|---|---|---|
| Tier 1 | - | - | - | - |
| Tier 2 | - | - | 240.58 | 240.58 |
| Tier 3 | - | - | - | - |
| Tier 4 | - | - | 9.26 | 9.26 |
| Tier 5 | - | - | - | - |
| **TOTAL** | **-** | **-** | **249.83** | **249.83** |

Source: CBI 2015

## Mixed Chaparral

Mixed Chaparral is a structurally homogeneous brushland type dominated by shrubs with thick, stiff, heavily cutinized evergreen leaves. Shrub height and crown cover vary considerably with precipitation regime, aspect, age since last burn, and soil type (CDFG 1988). At maturity,

cismontane Mixed Chaparral typically is a dense, nearly impenetrable thicket with greater than 80% absolute shrub cover. Considerable leaf litter and standing dead material may accumulate in stands that have not burned for several decades.

Mixed Chaparral is a floristically rich type that supports approximately 240 species of woody plants (CDFG 1988). Composition changes between northern and southern California and with precipitation regime, aspect, and soil type. Dominant species in cismontane Mixed Chaparral include scrub oak, chaparral oak, and several species of ceanothus and manzanita. Individual sites may support pure stands of these shrubs or diverse mixtures of several species. Commonly associated shrubs include chamise, birchleaf mountain mahogany, silk-tassel, toyon, yerba-santa, California buckeye, poison-oak, sumac, California buckthorn, hollyleaf cherry, Montana chaparral-pea, and California fremontia. Some of these species may be locally dominant. Shrubs such as Jepson, coyote, and dwarf ceanothus and serpentine manzanita are local serpentine endemics (CDFG 1988). Shrub live oak, desert ceanothus, and desert bitterbrush are examples of shrubs found in Mixed Chaparral only on transmontane slopes (CDFG 1988). Many species found in cismontane stands are also common on desert-facing slopes. Examples include bigberry manzanita, chamise, birchleaf mountain mahogany, California fremontia, and several species of ceanothus. Table 4.4-10 lists the acreages of Mixed Chaparral habitat within the Project Area.

**Table 4.4-10: Acres of Mixed Chaparral Sensitive Natural Community by Tier and Project Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Grand Total |
|---|---|---|---|---|
| Tier 1 | 263.77 | - | - | 263.77 |
| Tier 2 | 10,437.60 | - | 1,159.91 | 11,597.51 |
| Tier 3 | - | - | 3.37 | 3.37 |
| Tier 4 | 159.26 | - | 368.64 | 527.90 |
| Tier 5 | - | - | - | - |
| **TOTAL** | **10,860.63** | **-** | **1,531.91** | **12,392.55** |

Source: CBI 2015

## Montane Hardwood-Conifer

Montane Hardwood-Conifer habitat includes both conifers and hardwoods (CDFG 1988), often as a closed forest. To be considered Montane Hardwood-Conifer, at least one-third of the trees must be conifer and at least one-third must be broad-leaved (CDFG 1988). The habitat often occurs in a mosaic-like pattern with small pure stands of conifers interspersed with small stands of broad-leaved trees (CDFG 1988). This diverse habitat consists of a broad spectrum of mixed, vigorously growing conifer and hardwood species. Typically, conifers to 200 feet in height form the upper canopy and broad-leaved trees 30 to 100 feet in height comprise the lower canopy (CDFG 1988). Most of the broad-leaved trees are sclerophyllous evergreen, but winter-deciduous species also occur (CDFG 1988). Relatively little understory occurs under the dense, bilayered canopy.

Common associates with the montane hardwood-conifer natural community are ponderosa pine, Douglas-fir, incense-cedar, California black oak, tan oak, Pacific madrone, Oregon white oak, and other localized species. Species composition varies substantially among different geographic areas. In the southern Sierra Nevada, common associates include California black oak, black cottonwood, canyon live oak, Jeffrey pine, Douglas-fir, ponderosa pine, sugar pine, incense-cedar, and localized areas of giant sequoia (CDFG 1988). In the central coast, common associates include coast live oak, big leaf maple, Pacific madrone, tanoak, canyon live oak, Coulter pine, coastal redwood and, to a lesser extent, California black oak and ponderosa pine. In the northern central coast, Douglas-fir is found; while in the southern areas, bigcone Douglas-fir occurs. In the Tehachapi, transverse and peninsular ranges of Southern California, common associates include canyon live oak, Pacific madrone, and coast live oak (CDFG 1988). Table 4.4-11 lists the acreages of Montane Hardwood habitat within the Project Area.

**Table 4.4-11: Acres of Montane Hardwood Sensitive Natural Community by Tier and Project Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Grand Total |
|---|---|---|---|---|
| Tier 1 | - | - | - | - |
| Tier 2 | 108.84 | - | 83.83 | 192.67 |
| Tier 3 | - | - | - | - |
| Tier 4 | - | - | - | - |
| Tier 5 | - | - | - | - |
| **TOTAL** | **108.84** | **-** | **83.83** | **192.67** |

Source: CBI 2015

## Native Valley Foothill Riparian

Native Valley Foothill Riparian communities are generally characterized with a canopy cover of 20 to 80% and an average canopy height of 98 feet in a mature riparian forest. Most trees are winter deciduous. There is a subcanopy tree layer and an understory shrub layer. Lianas frequently provide 30 to 50% of the ground cover and festoon trees to heights of 65 to 98 feet. Herbaceous vegetation constitutes about one percent of the cover, except in openings where tall forbs and shade-tolerant grasses occur (CDFG 1988). Generally, the understory is impenetrable and includes fallen limbs and other debris. Dominant species in the canopy layer are cottonwood, California sycamore and valley oak. Subcanopy trees are white alder, boxelder, and Oregon ash. Typical understory shrub layer plants include wild grape, wild rose, California blackberry, blue elderberry, poison oak, buttonbrush, and willows. The herbaceous layer consists of sedges, rushes, grasses, miner's lettuce, Douglas sagewort, poison-hemlock, and hoary nettle.

Valley-foothill riparian habitats are found in valleys bordered by sloping alluvial fans, slightly dissected terraces, lower foothills, and coastal plains. They are generally associated with low velocity flows, flood plains, and gentle topography. Valley-foothill riparian habitats occur in the

Central Valley and the lower foothills of the Cascade, Sierra Nevada and Coast Ranges. They are also found in lower slopes at the bases of the Peninsular and Transverse ranges. A few lower elevation locations are on the desert side of the southern California mountains. Table 4.4-12 lists the acreages of Native Valley Foothill Riparian habitat within the Project Area.

**Table 4.4-12: Acres of Native Valley Foothill Riparian Sensitive Natural Community by Tier and Project Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Grand Total |
|---|---|---|---|---|
| Tier 1 | 15.20 | - | 116.65 | 131.85 |
| Tier 2 | 480.99 | 249.86 | 583.46 | 1,314.31 |
| Tier 3 | - | 1.97 | 23.49 | 25.47 |
| Tier 4 | 0.86 | 1.98 | 3.44 | 6.29 |
| Tier 5 | - | - | - | - |
| **TOTAL** | **497.05** | **253.82** | **727.04** | **1,477.90** |

Source: CBI 2015

## Valley Needlegrass Grassland

Valley Needlegrass Grassland is represented by mid-height (to 2 feet) grassland dominated by perennial bunchgrasses such as purple needlegrass. Native and introduced annuals occur among the perennials, often actually exceeding the bunchgrasses in cover. This vegetation type is present usually on fine-textured (often clay) soils, moist or even waterlogged during winter, but very dry in summer (Holland 1986 Code 42110). Valley Needlegrass Grassland was formerly extensive around the Sacramento, San Joaquin, and Salinas Valleys, as well as the Los Angeles Basin, but is now much reduced (Holland 1986). Reported occurrence data (CDFW 2014) includes 327 acres (<0.0001% of the Project Area) of Valley Needlegrass Grassland within the Project Area. Table 4.4-13 lists the acreages of Valley Needlegrass Grassland habitat within the Project Area.

**Table 4.4-13: Acres of Valley Needlegrass Grassland Sensitive Natural Community by Tier and Project Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Grand Total |
|---|---|---|---|---|
| Tier 1 | - | - | - | - |
| Tier 2 | - | - | 326.60 | 326.60 |
| Tier 3 | - | - | - | - |
| Tier 4 | - | - | - | - |
| Tier 5 | - | - | - | - |
| **TOTAL** | **-** | **-** | **326.60** | **326.60** |

Source: CBI 2015

## Valley Oak Woodland

Valley Oak Woodland is characterized by valley, coast live, black, and blue, oaks; California sycamore; California coffeeberry; and other tree and shrub species. Several special-status species identified within the Project Area utilize Valley Oak Woodland habitats including slender salamanders, bats, and nesting raptors (Holland 1986 code 71130). The CNDDB (CDFW 2014) indicates that Valley Oak Woodland no longer exists within the Project Area. The CALVEG (2015) database, however, indicates that 5,354 acres (0.2% of the Project Area) occur in the Project Area. CALVEG results reflect a more detailed vegetation community analysis process, which identifies individual Valley oak trees and mixed or small monotypic stands of Valley Oak Woodland in isolated locations on privately held lands mainly in the southern foothill portions of the Project Area. Table 4.4-14 lists the acreages of Valley Oak Woodland habitat within the Project Area.

**Table 4.4-14: Acres of Valley Oak Woodland Sensitive Natural Community by Tier and Project Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Grand Total |
|---|---|---|---|---|
| Tier 1 | - | - | - | - |
| Tier 2 | 5,823.71 | 39.97 | 9,589.12 | 15,452.81 |
| Tier 3 | - | - | - | - |
| Tier 4 | - | - | 188.85 | 188.85 |
| Tier 5 | - | - | - | - |
| **TOTAL** | **5,823.71** | **39.97** | **9,777.97** | **15,641.65** |

Source: CBI 2015

## Valley Sacaton Grassland

Valley Sacaton Grassland is represented by up to 3-foot tall tussock-forming grassland dominated by alkali Sacaton. This vegetation type is present on fine-textured, poorly drained, usually alkaline soils. Most sites have seasonally high water tables or are overflowed during winter flooding (Holland 1986 Code: 42120). Valley Sacaton Grassland was formerly extensive in the Tulare Lake Basin and along the San Joaquin Valley north to Stanislaus and Contra Costa Counties, but has been much reduced (Holland 1986). Reported occurrence data (CDFW 2014) includes 327 acres (<0.0001% of the Project Area) of Valley Sacaton Scrub within the Project Area. Table 4.4-15 lists the acreages of Valley Sacaton Grassland habitat within the Project Area.

**Table 4.4-15: Acres of Valley Sacaton Grassland Sensitive Natural Community by Tier and Project Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Grand Total |
|---|---|---|---|---|
| Tier 1 | - | - | - | - |
| Tier 2 | 80.69 | - | - | 80.69 |
| Tier 3 | - | - | - | - |
| Tier 4 | - | - | - | - |
| Tier 5 | - | - | - | - |
| **TOTAL** | **80.69** | **-** | **-** | **80.69** |

Source: CBI 2015

## Valley Saltbush Scrub

Valley Saltbush Scrub is dominated by woody shrubs and may vary in density and composition based on soil, drainage, slope, elevation, etc. Valley Saltbush Scrub is represented by open, gray or blue-green chenopod scrubs (10 to 40% cover), usually over a low herbaceous annual understory. It is dominated by common saltbush, arrowscale saltbush, spiny saltbush, alkali heath, cheesebush, and Bakersfield cactus (Holland 1986 Code: 36220). This vegetation type is present typically on sandy to loamy soils without surface alkalinity; largely on rolling, dissected alluvial fans with low relief. Valley Saltbush Scrub is known to historically occur from the Southern and southwestern San Joaquin Valley and the Carrizo Plains of San Luis Obispo County. Reported occurrence data (CDFW 2014) includes 19,572 acres (0.008% of the Project Area) of Valley Saltbush Scrub within the Project Area. Table 4.4-16 lists the acreages of Valley Saltbush Scrub habitat within the Project Area.

**Table 4.4-16: Acres of Valley Saltbush Scrub Sensitive Natural Community by Tier and Project Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Grand Total |
|---|---|---|---|---|
| Tier 1 | 355.06 | - | - | 355.06 |
| Tier 2 | 5,447.14 | 7,708.76 | 1,481.19 | 14,637.09 |
| Tier 3 | 2.55 | 113.40 | - | 115.94 |
| Tier 4 | 71.32 | 137.73 | 0.20 | 209.24 |
| Tier 5 | - | - | - | - |
| **TOTAL** | **5,876.07** | **7,959.88** | **1,481.38** | **15,317.34** |

Source: CBI 2015

## Valley Sink Scrub

Valley Sink Scrub is lowland scrub habitat dominated by specialized, highly alkali-tolerant succulents with little or no associated understory vegetation (Holland 1986 Code: 36210). Other salt-tolerant plants such as saltgrass, Jared's peppergrass and a number of special-status plants may occur within these sink areas. Reported occurrence data (CDFW 2014) includes 20,652 acres (0.009% of the Project Area) of Valley Sink Scrub within the Project Area. Table 4.4-17 lists the acreages of Valley Sink Scrub habitat within the Project Area.

**Table 4.4-17: Acres of Valley Sink Scrub Sensitive Natural Community by Tier and Project Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Grand Total |
|---|---|---|---|---|
| Tier 1 | - | - | - | - |
| Tier 2 | 2,675.59 | 10,457.96 | - | 13,133.55 |
| Tier 3 | 4.25 | - | - | 4.25 |
| Tier 4 | - | 19.33 | - | 19.33 |
| Tier 5 | - | - | - | - |
| **TOTAL** | **2,679.84** | **10,477.29** | **-** | **13,157.13** |

Source: CBI 2015

## Vernal Pool Complex

The Vernal Pool Recovery Plan (USFWS 2004) identifies two vernal pool regions that extend into the Project Area: the San Joaquin Valley and Carrizo Vernal Pool Regions. The plan also identifies "Core Areas" for recovery planning. None of the Core Areas in the plan include Project Area lands. Vernal pools occurring with these regions are generally classified as Northern Claypan Vernal Pools or are assigned to an undefined category. Although records of Northern Claypan Vernal Pools are not present in the CNDDB, the Vernal Pool Recovery Plan and other sources indicate that Northern Claypan Vernal Pools could occur in the Project Area, primarily within agricultural lands, where cultivation generally reduces or eliminates vernal pool occurrences. Table 4.4-18 lists the acreages of Vernal Pool Complex habitat within the Project Area.

**Table 4.4-18: Acres of Vernal Pool Sensitive Natural Community by Tier and Project Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Grand Total |
|---|---|---|---|---|
| Tier 1 | - | - | - | - |
| Tier 2 | 76.00 | 3,482.20 | 462.27 | 4,020.47 |
| Tier 3 | - | - | 0.50 | 0.50 |
| Tier 4 | - | 1,523.17 | - | 1,523.17 |
| Tier 5 | - | | - | - |
| **TOTAL** | **76.00** | **5,005.37** | **462.77** | **5,544.14** |

Source: CBI 2015

Table 4.4-19 summarizes the acreage of each sensitive natural community that occurs in Tiers 1 through 5 in each Project Subarea.

**Table 4.4-19: Sensitive Natural Community Summary**

| Community | Subarea | Tier 1 | Tier 2 | Tier 3 | Tier 4 | Tier 5 | Total |
|---|---|---|---|---|---|---|---|
| Alkali Seep | Central | - | 69.40 | - | - | - | 69.40 |
| | Eastern | - | - | - | - | - | - |
| | Western | - | - | - | - | - | - |
| | **Total** | **-** | **69.40** | **-** | **-** | **-** | **69.40** |
| Coastal and Valley Freshwater Marsh | Central | 2.55 | 5,274.82 | 3.48 | 102.79 | - | 5,383.63 |
| | Eastern | 140.86 | 2,396.70 | 56.43 | 8.09 | - | 2,602.08 |
| | Western | 9.70 | 1,259.95 | | 7.29 | 0.95 | 1,277.88 |
| | **Total** | **153.11** | **8,931.47** | **59.91** | **118.16** | **0.95** | **9,263.59** |
| Desert Scrub | Central | 0 | 0 | 0 | 0 | 0 | 0 |
| | Eastern | 0 | 2.45 | 0 | 0 | 0 | 2.45 |
| | Western | 62.56 | 44.90 | 0 | 0 | 0 | 107.46 |
| | **Total** | **62.56** | **47.35** | **0** | **0** | **0** | **109.91** |
| Desert Wash | Central | 0 | 2.93 | 0 | 0 | 0 | 2.93 |
| | Eastern | 85.57 | 328.22 | 41.91 | 1.68 | 0 | 457.38 |
| | Western | 1,391.51 | 1,734.89 | 0 | 0 | 0 | 3,126.41 |
| | **Total** | **1,477.09** | **2,066.04** | **41.91** | **1.68** | **0** | **3,586.72** |
| Great Valley Cottonwood Riparian Forest | Central | 0 | 759.15 | 2.17 | 0.31 | 0 | 761.63 |
| | Eastern | 255.69 | 715.98 | 109.83 | 6.92 | 0 | 1,088.42 |
| | Western | 0 | 105.06 | 0 | 0 | 0 | 105.06 |
| | **Total** | **255.69** | **1,580.19** | **112.00** | **7.23** | **0** | **1,955.11** |

**Table 4.4-19: Sensitive Natural Community Summary**

| Community | Subarea | Tier 1 | Tier 2 | Tier 3 | Tier 4 | Tier 5 | Total |
|---|---|---|---|---|---|---|---|
| Great Valley Mesquite Scrub | Central | 1,558.48 | 1,221.03 | 29.94 | 11.49 | 0 | 2,820.94 |
| | Eastern | 0 | 0 | 0 | 0 | 0 | |
| | Western | 436.43 | 1,438.18 | 261.22 | 36.59 | 0 | 2,172.42 |
| | **Total** | **1,994.91** | **2,659.21** | **291.16** | **48.08** | **0** | **4,993.36** |
| Mixed Chaparral | Central | 0 | 0 | 0 | 0 | 0 | 0 |
| | Eastern | 0 | 1,159.91 | 3.37 | 368.64 | 0 | 1,531.92 |
| | Western | 263.77 | 10,437.60 | 0 | 159.26 | 0 | 10,860.63 |
| | **Total** | **263.77** | **11,597.51** | **3.37** | **527.90** | **0** | **12,392.55** |
| Montane Hardwood | Central | 0 | 0 | 0 | 0 | 0 | 0 |
| | Eastern | 0 | 83.83 | 0 | 0 | 0 | 83.83 |
| | Western | 0 | 108.84 | 0 | 0 | 0 | 108.84 |
| | **Total** | **0** | 192.67 | 0 | 0 | 0 | 192.67 |
| Native Valley Foothill Riparian | Central | 0 | 249.86 | 1.97 | 1.98 | 0 | 253.81 |
| | Eastern | 116.65 | 583.46 | 23.49 | 3.44 | 0 | 727.04 |
| | Western | 15.20 | 480.99 | | 0.86 | 0 | 497.05 |
| | **Total** | **131.85** | **1,314.31** | **25.46** | **6.28** | **0** | **1,477.90** |
| Stabilized Interior Dunes | Central | 0 | 0 | 0 | 0 | 0 | 0 |
| | Eastern | 0 | 240.58 | 0 | 9.26 | 0 | 249.84 |
| | Western | 0 | 0 | 0 | 0 | 0 | 0 |
| | **Total** | **0** | **240.58** | **0** | **9.26** | **0** | **249.84** |
| Valley Needlegrass Grassland | Central | 0 | 0 | 0 | 0 | 0 | 0 |
| | Eastern | 0 | 326.60 | 0 | 0 | 0 | 326.60 |
| | Western | 0 | 0 | 0 | 0 | 0 | |
| | **Total** | **0** | **326.60** | **0** | **0** | **0** | **326.60** |
| Valley Oak Woodland | Central | 0 | 39.97 | 0 | 0 | 0 | 39.97 |
| | Eastern | 0 | 9,589.12 | 0 | 188.85 | 0 | 9,777.97 |
| | Western | 0 | 5,823.71 | 0 | 0 | 0 | 5,823.71 |
| | **Total** | **0** | **15,452.80** | **0** | **188.85** | **0** | **15,641.65** |
| Valley Sacaton Grassland | Central | 0 | 0 | 0 | 0 | 0 | 0 |
| | Eastern | 0 | 0 | 0 | 0 | 0 | 0 |
| | Western | 0 | 80.69 | 0 | 0 | 0 | 80.69 |
| | **Total** | **0** | **80.69** | **0** | **0** | **0** | **80.69** |
| Valley Saltbush | Central | 0 | 7,708.76 | 113.40 | 137.73 | 0 | 7,959.89 |
| | Eastern | 0 | 1,481.19 | 0 | 0.20 | 0 | 1,481.39 |

**Table 4.4-19: Sensitive Natural Community Summary**

| Community | Subarea | Tier 1 | Tier 2 | Tier 3 | Tier 4 | Tier 5 | Total |
|---|---|---|---|---|---|---|---|
| Scrub | Western | 355.06 | 5,447.14 | 2.55 | 71.32 | 0 | 5,876.07 |
| | **Total** | **355.06** | **14,637.09** | **115.95** | **209.25** | **0** | **15,317.35** |
| Valley Sink Scrub | Central | 0 | 10,457.96 | 0 | 19.33 | 0 | 10,477.29 |
| | Eastern | 0 | 0 | 0 | 0 | 0 | 0 |
| | Western | 0 | 2,675.59 | 4.25 | 0 | 0 | 2,679.84 |
| | **Total** | **0** | **13,133.55** | **4.25** | **19.33** | **0** | **13,157.13** |
| Vernal Pools | Central | 0 | 3,482.20 | 0 | 1,523.17 | 0 | 5,005.37 |
| | Eastern | 0 | 462.27 | 0.50 | 0 | 0 | 462.77 |
| | Western | 0 | 76.00 | 0 | 0 | 0 | 76.00 |
| | **Total** | **0** | **4,020.47** | **0.50** | **1,523.17** | **0** | **5,544.14** |
| **GRAND TOTAL** | | **3,302.52** | **74,611.16** | **654.51** | **2,659.19** | **0.95** | **81,228.32** |

Source: CBI 2015

# Wetlands and Waters

The acreage and length of perennial, seasonal, and ephemeral drainages; wetlands; artificial ponds; ditches and other conveyance facilities within the Project Area was estimated for each Subarea by using the National Hydrology Dataset (NHD) and the National Wetlands Inventory (NWI; Figure 4.4-8). The acreage of wetlands and similar water features, and the length of linear watercourses within each Subarea were estimated from the NHD and NWI data (Table 4.4-20). Figure 4.4-8 shows that largely ephemeral streams flow generally east in the Western Subarea and west in the Eastern Subarea to the valley floor. Flows from the southern mountains move north towards the valley. A small portion of the far Western Subarea drains to the Carrizo Valley to the east.

**Table 4.4-20: Summary of NWI Wetlands in each Subarea (acres)**

| Subarea | Tier 1 | Tier 2 | Tier 3 | Tier 4 | Tier 5 | Total |
|---|---|---|---|---|---|---|
| **Western Subarea** | | | | | | |
| Freshwater Emergent Wetland | 9.7 | 1,098.3 | - | 7.3 | 0.9 | 1,116.2 |
| Freshwater Forested/Shrub Wetland | 7.1 | 511.3 | - | - | - | 518.4 |
| Freshwater Pond | 416.4 | 668.3 | 0.3 | 10.8 | 0.3 | 1,096.1 |
| Lake | 302.7 | 1,399.4 | - | 0.7 | - | 1,702.8 |
| Other | 109.2 | 899.9 | 0.4 | 2.3 | - | 1,011.8 |
| Riverine | 61.1 | 448.7 | 0.7 | - | - | 510.6 |
| **Central Subarea** | | | | | | |
| Freshwater Emergent Wetland | - | 3,884.8 | 3.5 | 102.0 | - | 3,990.3 |
| Freshwater Forested/Shrub Wetland | - | 206.4 | 2.0 | 1.5 | - | 209.8 |
| Freshwater Pond | 0.3 | 906.7 | 3.2 | 5.1 | - | 915.3 |
| Lake | - | 4,474.2 | - | 103.0 | - | 4,577.2 |
| Other | - | 1,076.4 | - | 4.9 | - | 1,081.2 |
| Riverine | 0.3 | 659.0 | 1.4 | 3.3 | - | 664.0 |
| **Eastern Subarea** | | | | | | |
| Freshwater Emergent Wetland | 50.2 | 342.9 | 27.2 | 8.1 | - | 428.5 |
| Freshwater Forested/Shrub Wetland | 95.3 | 509.7 | 18.2 | 1.5 | - | 624.7 |
| Freshwater Pond | 44.6 | 395.9 | 24.5 | 13.1 | 2.2 | 480.3 |

**Table 4.4-20: Summary of NWI Wetlands in each Subarea (acres)**

| Subarea | Tier 1 | Tier 2 | Tier 3 | Tier 4 | Tier 5 | Total |
|---|---|---|---|---|---|---|
| Lake | - | 725.8 | 110.2 | 0.0 | - | 836.0 |
| Other | 25.7 | 232.5 | 17.0 | 15.4 | 0.9 | 291.5 |
| Riverine | 43.6 | 377.9 | 130.9 | 9.4 | 2.5 | 564.2 |
| **Project Total** | | | | | | |
| Freshwater Emergent Wetland | 59.9 | 5,326.0 | 30.7 | 117.4 | 0.9 | 5,535.0 |
| Freshwater Forested/Shrub Wetland | 102.4 | 1,227.3 | 20.2 | 3.0 | - | 1,352.9 |
| Freshwater Pond | 461.4 | 1,970.9 | 28.0 | 29.0 | 2.5 | 2,491.8 |
| Lake | 302.7 | 6,599.4 | 110.2 | 103.7 | - | 7,116.0 |
| Other | 134.8 | 2,208.8 | 17.4 | 22.5 | 0.9 | 2,384.5 |
| Riverine | 105.0 | 1,485.6 | 132.9 | 12.7 | 2.5 | 1,738.8 |

The acreage of wetland features in the NWI dataset is summarized from each Subarea in Table 4.4-20. This analysis is conservative in approach, because the NWI dataset includes artificial ponds and drains used for agricultural, oil and gas operations, mining, and other industrial activities in one or more category of wetlands.

The length of watercourses in the NHD is summarized for each Subarea in Table 4.4-21. This analysis is conservative because the NHD includes artificial ditches, channels, and other constructed linear facilities used in agricultural, oil and gas operations, mining and other industrial activities in one or more category of watercourse. The Central Subarea, for example, has been heavily altered for agriculture, but has over 3.4 million linear feet of canals and ditches compared with just 1.9 million linear feet of natural drainages (streams). Natural watercourses account for the preponderance of all linear water features in the Western and Eastern Subareas where agriculture, and related water conveyance facilities, account for a proportionately smaller share of the land uses.

**Table 4.4-21: NHD Watercourses in Each Subarea (linear feet)**

| NHD Watercourse | Tier 1 | Tier 2 | Tier 3 | Tier 4 | Tier 5 | Total |
|---|---|---|---|---|---|---|
| **Eastern Subarea** | | | | | | |
| Canal/Ditch | 19,888.83 | 339,245.70 | 7,942.22 | 15,212.33 | 7,844.16 | 390,133.2 |
| Stream/River Intermittent | 507,755.07 | 6,130,488.44 | 47,100.75 | 95,016.70 | 0 | 6,780,361.0 |
| Stream/River Perennial | 24,111.35 | 255,997.76 | 21,988.63 | 17,094.94 | 0 | 319,192.7 |
| **Central Subarea** | | | | | | |
| Canal/Ditch | 3,813.23 | 2,692,772.97 | 166.89 | 21,079.35 | 0 | 2,717,832.4 |
| Stream/River Intermittent | 1,342.79 | 1,645,067.05 | 2,915.76 | 14,834. 32 | 0 | 1,664,159.9 |
| Stream/River Perennial | 0 | 56,885.6 | 0 | 0 | 0 | 56,885.6 |
| **Western Subarea** | | | | | | |
| Canal/Ditch | 54,573.33 | 3,297,052.01 | 0 | 0 | 0 | 3,361,356.9 |
| Stream/River Intermittent | 3,534,047.29 | 8,871,929.12 | 38,526.88 | 113,867.44 | 0 | 12,558,370.7 |
| Stream/River Perennial | 6,271.47 | 138,488.25 | 0 | 821.96 | 0 | 145,581.7 |
| **Project Area** | | | | | | |
| Canal/Ditch | 78,275.39 | 6,329,070.68 | 10,808.64 | 43,323.71 | 7,844.16 | 6,469,322.57 |
| Stream/River Intermittent | 4,043,145.15 | 16,647,484.61 | 88,543.39 | 223,718.46 | 0 | 21,002,891.61 |

**Table 4.4-21: NHD Watercourses in Each Subarea (linear feet)**

| NHD Watercourse | Tier 1 | Tier 2 | Tier 3 | Tier 4 | Tier 5 | Total |
|---|---|---|---|---|---|---|
| Stream/River Perennial | 30,382.81 | 451,371.61 | 21,988.63 | 17,916.90 | 0 | 521,659.95 |

Many waters in the Project Area have been determined by federal agencies to be non-navigable and to not have a hydrological connection with federally jurisdictional navigable waters. Very few watercourses in the Project Area are navigable at any time, and surface waters in most Kern County valley floor locations do not flow to or connect with waters that eventually drain into the Sacramento Delta to the north. However, the extent to which wetlands and waters in the Project Area are subject to federal jurisdiction is subject to considerable uncertainty. The U.S. Environmental Protection Agency (EPA) has recently adopted new regulations for defining federally jurisdictional wetlands and waters; however, these regulations may be challenged or set aside by Congressional action (see Section 4.4.3, Regulatory Setting). The project evaluated in this EIR does not include, nor does this EIR provide California Environmental Quality Act (CEQA) coverage for, any dredge or fill activities in federally jurisdictional wetlands and waters.

# Methods

## Literature Review

For the purposes of this analysis, "'special-status species" are defined herein to include those plant and animal species listed as threatened or endangered by the state or federal resources agencies; those for which critical habitat has been designated or proposed; those listed as Species of Special Concern (SSC) or Fully Protected in California; and, because agencies often consider them in environmental review documents, those that appear on Non-Government Organization "watch lists." A list of species with potential to occur in the Project Area was compiled based on results of literature and database searches. In addition to other sources listed in the references section below, information was obtained from:

- CNDDB (CDFW 2014, 2015a);
- California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants (CNPS 2014);
- SJV Recovery Plan (USFWS 1998);
- Vernal Pool Recovery Plan (USFWS 2004),
- The federal endangered and threatened species list (USFWS 2013a);
- VertNet© records (VertNet 2015);

- The Jepson Herbarium, University of California, Berkeley; and
- California Resources Corporation (formerly Occidental Petroleum of Elk Hills) survey data.

Special status species that could occur within the Project Area were identified and grouped into three categories.

**Category 1** species include plants and animals that are known or likely to occur in the Project Area and for which one of four types of habitat suitability modeling data was available and used to quantify and analyze potential Project impacts by subarea and tier based on conservative assumptions regarding the level of future Project-related activities. The models and analytical approaches used to analyze Category 1 species are discussed in more detail below. Nine plant and 28 wildlife species are included in Category 1 and evaluated using modeling data (see Tables 4.4-26 and 4.4-36 and Impact 4.4-1).

**Category 2** species include plants and animals that are known or likely to occur in the Project Area for which modeling data was not available to quantify and analyze potential Project impacts. Impacts to Category 2 species were evaluated by identifying the subareas and tiers where these species could occur and by considering the level of potential new disturbance in each location based on conservative assumptions regarding the level of future Project-related activities. A total of 31 plant and 19 wildlife Category 2 species are included in Category 2 (see Tables 4.4-26 and 4.4-36 and Impact 4.4-1).

**Category 3** species were identified during the literature review or by local experts as potentially occurring in the vicinity of the Project Area, and for which suitable habitat is present. As discussed below (see Tables 4.4-26 and 4.4-36), Category 3 species may also be present in the Project Area. Category 3 plant and wildlife species were not further analyzed in the EIR because they lack official status as a State of California or a federally threatened or endangered species (e.g., a California Rare Plant Rank [CRPR] Rank 4 species). A total of 53 plants and 24 wildlife species were included in Category 3 and not further analyzed in this EIR (see Tables 4.4-26 and 4.4-36 and Impact 4.4-1).

## Category 1 Species Analysis Approach

Potential impacts to all Category 1 species were evaluated by using habitat suitability models that were previously prepared for other HCPs, other permit purposes, or by the Project Applicant's biologists (Quad Knopf, Inc. [QK]) within the Project Area. All of the available models were reviewed by biologists retained by the County for the pruposes of preparing this EIR to determine if the model methodologies were appropriate for inclusion in the impact analysis. In certain cases, the County-retained biologists determined that model data did not provide useful information about the applicable species, and the models were not used in the analysis.

The 9 plant and 28 wildlife species models that were used in this EIR include three different modeling approaches using various environmental parameters to produce maps and acreage

estimates depicting habitat suitability for each species within the Project Area. Six plant and 25 wildlife models were obtained from information prepared by URS for drafts versions of the Lokern Habitat Conservation Plan (LHCP) proposed by the Chevron North America Exploration and Production Company, a division of Chevron U.S.A. Inc. (Chevron) (URS 2014). Three plant and two wildlife models were obtained from information prepared by ICF International, Inc. (ICF) for the revised Metropolitan Bakersfield Habitat Conservation Plan (MBHCP) (ICF 1994). One wildlife model (Tehachapi slender salamander) was obtained from information prepared by QK on behalf of the Project Applicant. Except for the QK model, the URS and ICF models generally include the Project Area below approximately 2,000 feet, which accounts for all existing Tier 1 locations and the vast majority of Project Area land in a DOGGR administrative oilfield boundary area. Habitat suitability modeling has been used to estimate potential species distribution and impacts in larger landscapes. The model results identify potentially suitable habitat for each modeled species and not actual species distribution in the Project Area. A summary level of discussion of the modeling methods utilized by URS, ICF and QK are provided below.

## URS Modeling Analysis

The URS models use two analytical approches: (1) a statistical-based model(SBM) using the MaxEnt methodology (URS 2014), and (2) a habitat suitability-based approach.

The SBM or MaxEnt methodology is a statistically based model that predicts the areas of high or low suitability for a species in a given geographic area. MaxEnt models use the correlation between locations or occurrences where a species has been found and environmental parameters (such as soil, landform, and climate data) to produce an estimate of the species potential distribution. For each of the MaxEnt models used in this EIR, 75% of available occurrence data for a species were randomly selected to train and create the model. The remaining 25% were reserved during model creation for use in model verification, which tests the model's accuracy following training. Five replications of each model were run, and each replication used a different set of randomized training and verification points.

MaxEnt models produce a "grid" indicating the predicted suitability of habitat conditions for the modeled species. The size of the grid is dictated by the grid size of the model input parameters, which must all have the same grid size. The MaxEnt models used in this EIR have a grid size of 2,461 feet by 2,461 feet (750 meters by 750 meters), which is the maximum resolution of the climactic data used for model building. Statistical metrics were analyzed to determine whether each model has sufficient predictive power to be used in the analysis. A primary indicator of model fitness provided by the MaxEnt output is called the "Area Under the Curve" (AUC) metric. The AUC provides a measure of the model's predictive power versus randomly assigned suitability indices. The theoretical maximum of the AUC value approaches 1, while a value of 0.5 indicates the results are no better than random (no predictive power). AUC values above 0.7 are considered to have reasonable to good predictive power, and all of the SBM models used in this EIR were determined to meet or exceed the 0.7 AUC criterion.

Other models developed by URS used a habitat suitability model (HSM) approach for species that could not be modeled with a statistically-valid MaxEnt results. The URS HSM analysis identifies the types of habitats used by each species and estimates the suitability of those habitat types based on scientific literature, regulatory agency guidelines and habitat suitability on data obtained from the California Wildlife Habitat Relationships (CWHR) program (URS 2014). Using land use and vegetation community mapping, the HSM method identifies suitable habitat within the currently known range of a species and provides details on the type of habitat present (breeding vs. foraging) and the relative values of the habitat type (e.g., high, moderate, low, and not suitable). The HSM is a tool for assessing the suitability of habitat for a given species based on known affinities with vegetation communities, environmental parameters and expert opinions from literature sources. The HSM model results primarily identify portions of the Project Area that, under the model assumptions, could provide high, moderate, low or no habitat for foraging and/or breeding activity.

## ICF Modeling Analysis

A habitat modeling analysis for some of the special-status species known to occur in the San Joaquin Valley portion of Kern County was conducted by ICF (1994) for the revised MBHCP. The ICF model output generally identifies higher-value habitat suitability for foraging, breeding, nesting habitat, or plant growth. The results were classified into primary and secondary habitat for each species. Model input parameters include landcover type, soil series data, elevation range, and species occurrence information from literature and the CNDDB. As discusssed below, the ICF model results generally identify habitats that are similar to the high quality URS model results and do not identify lower to moderate quality habitats in the Project Area. ICF models were used to analyze the least Bell's vireo, recurved larkspur, rose flowered larkspur.

## QK Modeling Analysis

The QK model methodology was used for the Tehachapi slender salamander, adobe sunburst and San Joaquin pocket mouse. The QK model methodology was similar to the ICF model approach. Species habitat suitability was identified based on: (1) vegetation community affinities; (2) known range within the Project Area; (3) elevation range; and (4) soil type affinities. Data sources included the USDA's EVEG data fields, CWHR classifications for the Project Area, and other authoritative sources, including The Jepson Manual; CalFlora; data compiled by CDFW, and USFWS, and data in support of the Freeport McMoRan Oil & Gas (formerly Nuevo Energy Company/Torch Operting Company [Nuevo-Torch]) and the proposed California Resources Corporation (formerly Occidental Petroleum Corporation) Elk Hills HCP (EHHCP).

As discussed above, both the SBM and HSM URS models provided estimates of Project Area habitat suitability ranging from poor to ideal (SBM models) or low to high (HSM models). The URS model results were grouped into two categories: (1) "high" quality habitats and (2) "low to moderate" quality habitat. The ICF and QK models identified areas of habitat suitability that generally conform with the URS "high" quality habitat suitability category. As a result, the ICF and QK models do not generate estimates of "low to moderate" quality habitats in the Project Area. As discussed in the species descriptions below, the total acreage of the predicted "high"

quality or "low to moderate" habitat by tier and subarea for the URS SBM and URS HSM models, and the "high" quality habitat predicted by the ICF and QK models, are summarized for each species in a table and shown on a map of the Project Area by tier and subarea. The maps are included in Appendix N. Tables 4.4-22 through 4.4-25 identify the URS SBM, URS HSM, ICF, and QK habitat suitability prediction outputs, and the URS SBM and URS HSM outputs that were grouped into either the "high" quality or "low to moderate" quality habitat categories for analysis purposes.

**Table 4.4-22: URS Lokern Habitat Conservation Plan HSM Category Groupings**

| HSM Output Results | Map and Data Table Categories |
|---|---|
| High Breed, High Forage | Moderate/High Breed, Moderate/High Forage Habitat |
| High Breed, Moderate Forage | |
| High Foraging | |
| Moderate Breed, High Forage | |
| Low Breed, Low Forage | Low/Moderate Breed, Low/Moderate Foraging Habitat |
| Low Breed, Moderate Forage | |
| Low Foraging | |
| Moderate Breed, Moderate Forage | |
| Moderate Foraging | |

Source: Chevron 2014

**Table 4.4-23: URS Lokern Habitat Conservation Plan MaxEnt SBM Category Groupings**

| SBM Output Result | Map and Data Table Presentation Categories |
|---|---|
| Ideal | Ideal and High Quality Habitat |
| High | |
| Moderate | Poor/Low/Moderate Quality Habitat |
| Low | |
| Poor | |

Source: Chevron 2014

**Table 4.4-24: QK HSM Category Groupings**

| Modeling Output Result | Table and Map Category |
|---|---|
| High | High Quality Habitat |

Source: QK 2014

**Table 4.4-25: ICF Bakersfield HCP Habitat Suitability Model Habitat Type Groupings HSM Category Groupings**

| Modeling Output Result | Map Category |
|---|---|
| Species preferred habitat types | High Quality Habitat |
| Natural Resource Conservation Service mapped soil types | |

Source: ICF 2015

# Plant and Wildlife Species Summary

This section summaries the special-status plant and wildlife species that may potentially occur in the Project Area grouped by Category 1 (species analyzed using model data), Category 2 (species analyzed without model data), and Category 3 (species considered but not further analyzed because they either do not occur in the region or they are not considered to be a sensitive species within the Project Area). In addition, species considered on "watch lists" were included in Category 3 unless the review of their distribution and status indicated that the portion of the species' distribution within the Project Area warranted further consideration of Project impacts.

A total of 93 special-status plant species were identified in the literature search as potentially occurring within the Project Area (Table 4.4-26). Of these, 53 species were considered to be Category 3 species because they were absent from the Project Area or not considered to be a sensitive species within the Project Area. Forty species were included in Category 1 (9 species) and Category 2 (31 species), of which five are federally listed as threatened or endangered, and two are state-listed only (one threatened and one endangered). Thirty-two of the 40 plant species retained are ranked as CRPR Rank 1B or 2B species, and are not federally or state listed.

A total of 73 special-status wildlife species were identified during the initial species review for the Project Area (Table 4.4-36). Of these, 24 species were considered to be Category 3 species because they were absent from the Project Area, not considered to be a sensitive species within the Project Area, or on "watch lists" unless the review of their distribution and status indicated that the portion of the species' distribution within the Project Area warranted further consideration of Project impacts. Of the 49 species retained, 13 are federally listed and 12 are state-listed.

## Special Status Plant Species

Special-status plant species are defined herein as those that are listed as threatened and/or endangered by the USFWS or CDFW; designated as SSC or locally significant by CDFW; fully protected under state law; or species that meet the definition of rare or endangered under CEQA Sections 15380(b) and (d). The status and known distributions of special-status plant species in the Project Area were evaluated based on a review of available literature, and from federal and state databases, including the CNDDB. Data collected from previous conservation-related studies

and projects within the Project Area were also reviewed. No critical habitat has been designated by the USFWS for any plant species in the Project Area. Data sources included:

- Plant species listed as threatened or endangered under the federal Endangered Species Act (ESA) (Wildlife, 50 CFR § 17.11 and Errata; Plants, 50 CFR §17.12 and Errata, 2002).
- Plant species that are candidates for listing under ESA (Wildlife and Plants, 50 CFR §17.3 Proposed and Final Rules, 1999).
- SJV Recovery Plan (USFWS 1998).
- Plant species listed as rare, threatened, or endangered under California Endangered Species Act (CESA) (Wildlife, CCR Title 14, Section 670.5, 1971 as amended; Plants, CCR Title 14, Section 670.2, 1978 as amended).
- CNPS's Inventory of Rare and Endangered Plants (CNPS 2014).
- CNDDB (CDFW 2014, 2015a).
- California Special Vascular Plants, Bryophytes, and Lichens List (CDFW 2015b).
- Kern County VFHCP (Garcia and Associates 2010).
- MBHCP and EIR (City of Bakersfield and County of Kern 1994).
- University of California, Berkeley, The Jepson Online Interchange California Floristics, online herbarium resource (University of California, Berkeley 2014).
- Draft Chevron LHCP.
- Draft California Resources Corporation EHHCP.
- Freeport McMoRan Oil & Gas HCP.
- A list of all Category 1, Category 2, and Category 3 plants considered in the analysis is provided in Table 4.4-26.

**Table 4.4-26: Special Status Plant Species with Potential to Occur in the Project Area**

| Species | Status (Fed/State/CNPS) | Habitat | Potential to Occur in Project Area |
|---|---|---|---|
| **Category 1 Plant Species** | | | |
| Bakersfield cactus *(Opuntia treleasei)* | E/E/1B | Chenopod scrub, cismontane woodlands, and valley and foothill grasslands at elevations between 350 and 4,800 feet (CNPS 2014). | Yes, in all Tiers and in all Subareas. |
| California jewelflower *(Caulanthus californicus)* | E/E/1B.1 | Chenopod scrub, pinyon and juniper woodlands, and grasslands at elevations from 200 to 3,300 feet (CNPS 2014). | Yes, in Tiers 2 and 4 of all Subareas. |
| Heartscale *(Atriplex cordulata var. cordulata)* | -/-/1B.2 | Chenopod scrub, meadows and seeps, and grasslands on sandy/saline or alkaline soils at elevations to 1,900 feet. | Yes, in all Tiers and in all Subareas. |
| Kern County larkspur (Rose-flowered larkspur) *(Delphinium purpusii)* | -/-/1B.3 | Rocky and carbonate soils in chaparral, cismontane woodland, and pinyon and juniper woodlands. The species usually occurs at elevations from 950 to 4,500 feet and is only known from east of the San Joaquin Valley. | Yes, in Tiers 2 and 3 of the Eastern Subarea. |
| Kern mallow *(Eremalche kernensis)* | E/-/1B.1 | Chenopod scrub and grasslands at elevations from 200 to 4,300 feet (CNPS 2014). | Yes, in Tiers 1, 2, and 3 in all Subareas. |
| Lost Hills crownscale *(Atriplex coronata S. Watson var. vallicola)* | -/-/1B.2 | Chenopod scrub, grassland habitat, and vernal pool habitats at elevations from 150 to 2,500 feet. | Yes, in Tiers 1, 2 and 4 of the Western and Central Subareas. |
| Recurved larkspur *(Delphinium recurvatum)* | -/-/1B.2 | Alkaline soils of chenopod scrub, cismontane woodlands, and grassland habitats at elevations to 2,600 feet. Fairly widespread throughout the San Joaquin Valley, Carrizo Plain, Mojave Desert, and Coast Ranges. | Yes, in Tiers 1, 2, and 4 in all Subareas. |
| San Joaquin adobe sunburst *(Pseudobahia peirsonii)* | T/E/1B.1 | North- to northeast-facing small hills, or Mima mounds, associated with the upland portions of vernal pool habitats (USFWS 2004). All known wild occurrences are associated with Cibo clay, Porterville clay, Centerville clay, and Mt. Olive clay. Elevations ranging from 300 to 2,600 feet; all occurrences are from the Eastern Subarea and north and east of the Project Area. | Yes, in Tiers 2 of the Eastern Subarea. |
| San Joaquin woolly-threads *(Monolopia congdonii)* | E/-/1B.2 | Chenopod scrub and valley and foothill grasslands at elevations from 150 to 2,700 feet (CNPS 2014). | Yes, in Tiers 1, 2 and 3 in all Subareas. |

**Table 4.4-26: Special Status Plant Species with Potential to Occur in the Project Area**

| Species | Status (Fed/State/CNPS) | Habitat | Potential to Occur in Project Area |
|---|---|---|---|
| **Category 2 Plant Species** | | | |
| Alkali mariposa lily *(Calochortus striatus)* | -/-/1B.2 | Chaparral, chenopod scrub, Mojave Desert scrub, and meadows and seeps in alkaline and mesic soils at elevations between 200 and 5,300 feet. | Yes, in Tier 2 of the Central and Western Subareas. |
| Bakersfield smallscale *(Atriplex tularensis)* | -/-/1A | Chenopod scrub habitats at elevations from 290 to 660 feet on alkaline soils and shores of dry lakes. | Yes, in Tiers 1, 2, 3, and 4 of all Subareas. |
| Calico monkeyflower *(Mimulus pictus)* | -/-/1B.2 | Occurs in broad-leafed upland forests and cismontane woodlands at elevations from 1,400 to 4,100 feet in the western Sierra Nevada and Tehachapi Mountains. | Yes, in Tiers 2 and 4 of the Eastern Subarea. |
| California satintail *(Imperata brevifolia)* | -/-/2B.1 | Mesic areas of chaparral, coastal scrub, Mojave Desert, meadow and seep, and riparian scrub habitats at elevations from 600 to 4,000 feet. Widespread but apparently uncommon with many herbarium specimens from historic collections with very little habitat information. Only one collection from Project Area; most likely to occur in riparian scrub. | Yes, in Tiers 1, 2, 3, and 4 of the Eastern Subarea. |
| California tortula moss (California screw-moss) *(Tortula californica)* | -/-/1B.2 | Chenopod scrub and valley and foothill grassland habitats on dry, sandy soils at elevations from 30 to 4,800 feet. One record from the vicinity of Bakersfield and all others in southern California. | Yes, in Tier 3 of the Eastern Subarea. |
| Comanche Point layia *(Layia leucopappa)* | -/-/1B.1 | Chenopod scrub and valley and foothill grassland habitats at elevations from 300 to 1,200 feet; in Project Area, known from southeastern San Joaquin Valley and Tehachapi Mountains. | Yes, in Tier 2 of the Western and Eastern Subareas. |
| Coulter's goldfields *(Lasthenia glabrata ssp. coulteri)* | -/-/1B.1 | Marshes and swamps, playas, and vernal pools at elevations from 0 to 3,700 feet. In the Project Area, may occur throughout the San Joaquin Valley and lower elevations of the Sierra Nevada and Tehachapi Mountains. | Yes, in Tier 2 of the Western Subarea. |
| Deltoid bract saltbush (Subtle orache) *(Atriplex subtilis)* | -/-/1B.2 | Grasslands, often in the vicinity of vernal pools at elevations from 130 to 330 feet in alkaline soils. In the Project Area, lower elevation San Joaquin Valley intact alkali sink areas. | Yes, in Tiers 1, 2, 3, and 4 of the Central and Western Subareas. |

**Table 4.4-26: Special Status Plant Species with Potential to Occur in the Project Area**

| Species | Status (Fed/State/CNPS) | Habitat | Potential to Occur in Project Area |
|---|---|---|---|
| Diamond-petaled California poppy *(Eschscholzia rhombipetala)* | -/-/1B.1 | Grassland habitats in alkaline and clay soils at elevations from 30 to 3,300 feet. Most of the populations reported have been on hillsides, but community associations varied widely among the sites. In the region of the Project Area, only known from the Temblor Range and to the west in San Luis Obispo County. | Yes, in Tiers 1, 2, and 4 of the Western Subarea. |
| Erect-stem saltbush (Earlimart orache) *(Atriplex cordulata var. erecticaulis)* | -/-/1B.2 | Low-lying, sparsely-vegetated grasslands and on mounds between vernal pools on saline or alkaline soils at elevations from 130 to 350 feet. In the Project Area, only known from a few occurrences in the far northern, central San Joaquin Valley. All other known populations are to the north of the Project Area. | Yes, in Tier 2 of the Central Subarea. |
| Hall's tarplant *(Deinandra halliana)* | -/-/1B.1 | Chenopod scrub, cismontane woodland, and grassland habitats at elevations from 850 to 3,150 feet. | Yes, in Tiers 1 and 2 of the Western Subarea. |
| Hispid bird's-beak *(Chloropyron molle ssp. hispidum)* | -/-/1B.1 | Alkaline meadows and seeps, playas, and grassland habitats at elevations to 510 feet. Only known from a few populations in the southern portion of the Central Subarea and southeastern portion of the Eastern Subarea, the remainder of collections are from disjunct areas to the north of the Project Area. | Yes, in Tier 1 of the Central and Eastern Subarea. |
| Horn's milk-vetch *(Astragalus hornii var. hornii)* | -/-/1B.1 | Meadows, seeps, and playas along lake margins on alkaline soils at elevations from 190 to 2,800 feet. | Yes, in Tier 2 of the Central Subarea. |
| Jared's pepper-grass *(Lepidium jaredii ssp. jaredii)* | -/-/1B.2 | Valley and foothill grassland habitats at elevations from 1,000 to 3,300 feet. In the Project Area, only known from the far northwestern corner of the Western Subarea; also known from west of the Project Area. | Yes, in Tier 2 of the Western Subarea. |
| Kings gold *(Tropidocarpum californicum)* | -/-/1B.1 | Known from a small number of populations in chenopod scrub at elevations of approximately 200 feet. Recently described with little known about ecological requirements. | Yes, in Tiers 1, 2, 3, and 4 of the Eastern and Western Subareas. |

**Table 4.4-26: Special Status Plant Species with Potential to Occur in the Project Area**

| Species | Status (Fed/State/CNPS) | Habitat | Potential to Occur in Project Area |
|---|---|---|---|
| Lemmon's jewelflower *(Caulanthus lemmonii)* | -/-/1B.2 | Pinyon and juniper woodlands and grassland habitats at elevations from 250 to 4,000 feet; only known from above the San Joaquin Valley floor in the Project Area and vicinity. | Yes, in Tier 2 of the Western Subarea. |
| Lesser saltscale *(Atriplex minuscula)* | -/-/1B.1 | Chenopod scrub habitat, playas, and grasslands on alkaline, sandy soils, and often in association with slough systems and river floodplains. It is found only in microhabitats that are not inundated year-round. This species occurs at elevations to 650 feet. | Yes, in Tier 2 of the Central Subarea. |
| Mason's neststraw *(Stylocline masonii)* | -/-/1B.1 | Chenopod scrub and pinyon and juniper woodlands in sandy soils at elevations from 300 to 4,000 feet. Although very few populations known from Project Area, species is known from a wide variety of habitat types in the region. | Yes, in Tiers 2 and 4 of the Western and Eastern Subareas |
| Munz's tidy-tips *(Layia munzii)* | -/-/1B.2 | Chenopod scrub and valley and foothill grassland habitats at elevations from 150 to 2,100 feet in alkaline clay. | Yes, in Tier 2 of the Western and Central Subareas. |
| Oil neststraw *(Stylocline citroleum)* | -/-/1B.1 | Chenopod scrub, coastal scrub, and valley and foothill grassland habitats with clay or sandy soils. It is known to grow on land that has been developed for oil production (USFWS 1998). The oil nestraw is located at elevations from 190 to 1,000 feet. | Yes, in Tiers 1 and 2 of the Western Subarea. |
| Pale-yellow layia *(Layia heterotricha)* | -/-/1B.1 | Cismontane woodlands, pinion and juniper woodlands, and valley and foothill grasslands on alkaline soils or clay. It grows at elevations from 850 to 5,000 feet. | Yes, in Tier 2 of the Western and Eastern Subareas. |
| Piute Mountains navarretia *(Navarretia setiloba)* | -/-/1B.1 | Cismontane woodland, pinyon-juniper woodland, and valley and foothill grasslands in clay or gravelly loam soils between 800 and 7,000 feet in elevation (CNPS 2014). | Yes, in Tier 2 of the Eastern and Western Subareas. |
| Round-leaved filaree *(California macrophylla)* | -/-/1B.1 | Cismontane woodland and grassland habitats in open areas at elevations to 4,000 feet in clay soils. Widespread through many habitat types in California; known from the middle elevations within the Project Area. | Yes, in Tier 2 of the Eastern and Western Subareas. |

**Table 4.4-26: Special Status Plant Species with Potential to Occur in the Project Area**

| Species | Status (Fed/State/CNPS) | Habitat | Potential to Occur in Project Area |
|---|---|---|---|
| Shevock's golden aster *(Heterotheca shevockii)* | -/-/1B.3 | Chaparral and cismontane woodlands in crevices and shallow sand at elevations from 750 to 3,000 feet. Only known from the vicinity of the Kern River and surrounding drainages east of Bakersfield. | Yes, in Tiers 1, 2, 3, and 4 of the Eastern Subarea. |
| Showy golden madia *(Madia radiata)* | -/-/1B.1 | Cismontane woodlands and valley and foothill grasslands at elevations to 4,000 feet; known from the far northwestern portion of the Western Subarea; all other populations are west and north of Kern County. | Yes, in Tier 2 of the Western Subarea. |
| Slough thistle *(Cirsium crassicaule)* | -/-/1B.1 | Chenopod scrub, in marshes and swamps, and riparian scrub at elevations to 350 feet in the San Joaquin Valley floor. | Yes, in Tier 1 and 2 of the Central and Western Subareas. |
| Spiny-sepaled button-celery *(Eryngium spinosepalum)* | -/-/1B.2 | Valley and foothill grasslands within vernal pools and depressions at elevations from 260 to 900 feet. Known occurrences in the Project Area are in the north and northeastern portions of the Eastern Subarea, with one historic location from the northern Central Subarea. | Yes, in Tier 2 of the Eastern Subarea. |
| Striped adobe-lily *(Fritillaria striata)* | -/T/1B.1 | This species occurs at elevations from 440 to 3,750 feet in cismontane woodlands and grassland habitats, and appears to be restricted to some of the heavy clay (adobe) soils that are found along the eastern side of the San Joaquin Valley and lower foothills. | Yes, in Tier 2 of the Eastern Subarea. |
| Tejon poppy *(Eschscholzia lemmonii ssp. kernensis)* | -/-/1B.1 | Chenopod scrub and grassland habitats on adobe clay soils between 528 and 2,000 feet in elevation (University of California, Berkeley 2013). | Yes, in Tiers 1 and 2 of the Western and Eastern Subareas. |
| Temblor buckwheat *(Eriogonum temblorense)* | -/-/1B.2 | Valley and foothill grasslands at elevations from 950 to 3,300 feet on clay or sandstone. Only known from far western portion of Western Subarea in Temblor Range. | Yes, in Tier 1 of the Western Subarea. |
| Vasek's clarkia *(Clarkia tembloriensis ssp. Calientensis)* | -/-/1B.1 | This species occurs in grassland habitat at elevations from 850 to 1,700 feet. Known from only three occurrences along Caliente Creek in the eastern portion of the East subarea. | Yes, in Tier 2 of the Eastern Subarea. |

**Table 4.4-26: Special Status Plant Species with Potential to Occur in the Project Area**

| Species | Status (Fed/State/CNPS) | Habitat | Potential to Occur in Project Area |
|---|---|---|---|
| **Category 3 Plant Species** | | | |
| Adobe navarretia *(Navarretia nigelliformis ssp. nigelliformis)* | -/-/4.2 | Vernal pools, clay depressions, and sometimes serpentine soil in valley and vernally mesic foothill grasslands. This species is limited to clay and adobe soils that occur between 300 and 3,300 feet in elevation within the Project Area. | Very low potential to occur in Project Area. |
| Adobe yampah *(Perideridia pringlei)* | -/-/4.3 | Chaparral, cismontane woodland, coastal scrub, and pinyon and juniper woodland habitats on grassy slopes and serpentine outcrops at elevations from 950 to 5,900 feet. | Very low potential to occur in Project Area. |
| Brittlescale *(Atriplex depressa)* | -/-/1B.2 | Chenopod scrub, meadows and seeps, playas, annual grasslands, and vernal pool habitats consisting of alkaline, clay soils at elevations from 3 to 1,050 feet. | Very unlikely to occur in Project Area. |
| California androsace *(Androsace elongata ssp. acuta)* | -/-/4.2 | Dry grassy slopes between 500 to 4,000 feet in elevation (Baldwin et al. 2012). | Yes, there is a low potential for this species to occur in the Project Area. Fairly common outside of the Project Area. |
| Chaparral ragwort *(Senecio aphanactis)* | -/-/2B.2 | Chaparral, cismontane woodland, and coastal scrub habitats on alkaline soils at elevations of 49 to 2,625 feet. | Not expected |
| Cottony buckwheat *(Eriogonum gossypinum)* | -/-/4.2 | Chenopod scrub and grassland habitats at elevations from 300 to 1,640 feet (CNPS 2014). | Yes, in Tiers 1 and 2 of the Western and Eastern Subareas. |
| Crownscale *(Atriplex coronata var. coronata)* | -/-/4.2 | Chenopod scrub, grassland habitat, and vernal pool habitats at elevations from 150 to 2,500 feet. | Yes, in Tiers 1 and 2 of the Western and Central Subareas. |
| Cuyama gilia *(Gilia latiflora ssp. cuyamensis)* | -/-/4.3 | Pinyon and juniper woodland habitats on sandy flats and lower river valleys at elevations from 1,950 to 6,600 feet (CNPS 2014; Baldwin et al. 2012). | Much more common outside of Project Area; very low potential for occurrence in an area of impact |
| Delicate bluecup *(Githopsis tenella)* | -/-/1B.3 | Chaparral and cismontane woodland in mesic sandy loam soils at elevations from 3,600 to 6,300 feet. | Not expected |

**Table 4.4-26: Special Status Plant Species with Potential to Occur in the Project Area**

| Species | Status (Fed/State/CNPS) | Habitat | Potential to Occur in Project Area |
|---|---|---|---|
| Douglas' fiddleneck *(Amsinckia douglasiana)* | -/-/4.2 | Cismontane woodland and grassland habitats at elevations from 30 to 5,150 feet. | Relatively common outside of Project Area. |
| Ferris' goldfields *(Lasthenia ferrisiae)* | -/-/4.2 | Occurs in vernal pool habitats on alkaline or clay soil at elevations from 30 to 2,100 feet. | Yes, in Tier 4 of the Western Subarea. |
| Forked fiddleneck *(Amsinckia furcata)* | -/-/4.2 | Cismontane woodland and valley and foothill grassland habitats at elevations from 150 to 3,300 feet. | Relatively common outside of Project Area; very low potential for occurrence in an area of impact. |
| Gairdner's yampah *(Perideridia gairdneri ssp. gairdneri)* | -/-/4.2 | Vernal pool habitats at elevations from to 2,000 feet. | Not expected |
| Golden goodmania *(Goodmania luteola)* | -/-/4.2 | Mojavean desert scrub, meadows and seeps, playas, and valley and foothill grassland communities on alkaline or clay soils at elevations from to 7,250 feet. | Relatively common |
| Golden violet (*Viola purpurea* ssp. *aurea)* | -/-/2B.2 | Sandy soils in Great Basin scrub and pinyon and juniper woodland communities at elevations from 3,280 to 8,200 feet. | Not expected |
| Greenhorn fritillary *(Fritillaria brandegeei)* | -/-/1B.3 | Lower montane coniferous forest in granitic sandy loam soils at elevations from 4,642 to 6,890 feet. | Not expected |
| Grey-leaved violet *(Viola pinetorum var. grisea)* | -/-/1B.3 | Meadows and seeps, subalpine coniferous forests, and upper montane coniferous forests at elevations from 4,900 to 11,200 feet. | Not expected |
| Hoover's Woollystar (Hoover's Eriastrum)*(Eriastrum hooveri)* | DL/-/4.2 | Hoover's eriastrum occurs in chenopod scrub, pinyon and juniper woodlands, and grassland habitats at elevations from 160 to 3,000 feet on both north- and south-facing slopes and on ridge tops. | Yes, in Tiers 1, 2, 3 and 4 of all subareas. |
| Indian Valley spineflower *(Aristocapsa insignis)* | -/-/1B.2 | Cismontane woodland in sandy soils at elevations from 984 to 1,968 feet. | Not expected |
| Keck's checkerbloom *(Sidalcea keckii)* | E/-/1B.1 | Cismontane woodland and grassland habitats and is found in serpentine and clay substrates at elevations between 245 and 2,130 feet. | Not expected |

**Table 4.4-26: Special Status Plant Species with Potential to Occur in the Project Area**

| Species | Status (Fed/State/CNPS) | Habitat | Potential to Occur in Project Area |
|---|---|---|---|
| Kern Canyon clarkia *(Clarkia xantiana* ssp. *parviflora)* | -/-/4.2 | Dry slopes in the Kern River drainage within the southern Sierra Nevada between 2,950 and 4,950 feet in elevation. | Not expected |
| La Panza mariposa lily *(Calochortus simulans)* | -/-/1B.3 | Sandy granitic, and sometimes serpentinite, soils in chaparral, cismontane woodland, lower montane coniferous forest, and valley and foothill grasslands. It usually occurs at elevations from 1,200 to 3,600 feet (CNPS 2014). | Not expected |
| Large-flowered nemacladus *(Nemacladus secundiflorus var. secundiflorus)* | -/-/4.3 | Chaparral and annual grassland in open dry gravelly areas at elevations from 650 to 6,550 feet. | Not expected |
| Madera leptosiphon *(Leptosiphon serrulatus)* | -/-/1B.2 | Chaparral, cismontane woodlands, and lower montane coniferous forests at elevations from 900 to 4,300 feet. | Not expected, very small amount of potential habitat. |
| Marsh claytonia *(Claytonia palustris)* | -/-/4.3 | Meadows and seeps, marshes and swamps, upper montane coniferous forest along springs and stream banks at elevations from 3,280 to 8,200 feet. | Not expected |
| Mexican mosquito fern *(Azolla microphylla)* | -/-/4.2 | Occurs in pools and slow water areas in marshes and swamps at elevations to 4,400 feet. | More common outside of Project Area; perennially wet portions of Kern River provide the only likely habitat. |
| Mojave Indian paintbrush *(Castilleja plagiotoma)* | -/-/4.3 | Great Basin scrub, Joshua tree woodland, lower montane coniferous forest, and pinyon and juniper woodlands at elevations between 950 and 8,200 feet. | Relatively common outside of Project Area, low numbers in the Project Area. |
| Mt. Pinos larkspur *(Delphinium parryi* ssp. *purpureum)* | -/-/4.3 | Dry chaparral, Mojavean desert scrub, and pinion and juniper woodlands at elevations from 1,800 to 7,000 feet. | Not expected, more common outside of Project Area. |
| Mt. Pinos onion *(Allium howellii* var. *clokeyi)* | -/-/1B.3 | Open slopes in sagebrush scrub at elevations from 4,200 to 6,100 feet (University of California, Berkeley 2013). | Yes, in Tier 2 of the Western and Eastern Subareas. |
| Munz's iris *(Iris munzii)* | -/-/1B.3 | Cismontane woodland at elevations from 1,000 to 2,650 feet. | Not expected |
| New York Mountains cryptantha *(Cryptantha tumulosa)* | -/-/4.3 | Mojavean desert scrub and pinyon and juniper woodlands on gravelly, clay, granitic, or carbonate soils at elevations from 3,000 to 7,000 feet. | Not expected |

**Table 4.4-26: Special Status Plant Species with Potential to Occur in the Project Area**

| Species | Status (Fed/State/CNPS) | Habitat | Potential to Occur in Project Area |
|---|---|---|---|
| Nine Mile Canyon phacelia (*Phacelia novenmillensis*) | -/-/1B.2 | Dry disturbed banks, granitic or metamorphic soils of upper slopes on east-facing canyons at elevations from 5,100 to 7,000 feet. | Not expected |
| Onyx Peak bedstraw (*Galium angustifolium* ssp. *onycense*) | -/-/1B.3 | Cismontane woodland and pinyon and juniper woodlands in rocky soils at elevations from 2,800 to 7,600 feet. | Yes, in Tier 2 of the Western Subarea. |
| Oval-leaved snapdragon *(Antirrhinum ovatum)* | -/-/4.2 | Heavy adobe clay soils (e.g., clay or gypsum) and often in alkaline soils, on gentle open slopes at elevations from 650 to 3,300 feet. | Yes, in Tier 2 of the Western Subarea. |
| Paniculate tarplant *(Deinandra paniculata)* | -/-/4.2 | Coastal scrub, grasslands, and vernal pool habitats in mesic and sometimes sandy substrates at elevations from 80 to 3,100 feet. | Not expected |
| Panoche pepper-grass *(Lepidium jaredii ssp. album)* | -/-/1B.2 | Valley and foothill grassland habitats, along washes and alluvial fans, at elevations from 600 to 900 feet. | Not expected |
| Potbellied spineflower *(Chorizanthe ventricosa)* | -/-/4.3 | Cismontane woodland and annual grassland on serpentine outcrops at elevations from 200 to 4,100 feet. | Not expected |
| Salinas milk-vetch *(Astragalus macrodon)* | -/-/4.3 | Chaparral, cismontane woodland, and grassland habitats on sandstone, shale or serpentine alluvium at elevations from 800 to 3,200 feet. | Yes, in Tier 2 of the Western Subarea. |
| San Jacinto Valley crownscale *(Atriplex coronata var. notatior)* | E/-/1B.1 | Playas, annual grassland, and vernal pools on alkaline soils at elevations from 400 to 1,700 feet. | Not expected |
| San Joaquin bluecurls *(Trichostema ovatum)* | -/-/4.2 | Chenopod scrub and valley and foothill grasslands at elevations from 200 to 1,100 feet. | Yes, in Tier 2 and 3 of the Central and Eastern Subareas. |
| Short-bracted bird's-beak *(Cordylanthus rigidus ssp. brevibracteatus)* | -/-/4.3 | Chaparral, lower montane coniferous forest, pinyon and juniper woodlands, and upper montane coniferous forests in open and granitic areas. The short-bracted bird's-beak is known to occur at elevations from 2,000 to 8,500 feet. | Not expected |
| Sierra Canyon gooseberry (Aromatic canyon gooseberry) *(Ribes menziesii var. ixoderme)* | -/-/1B.2 | Chaparral, Cismontane woodlands at elevations from 2,000 to 3,800 feet. | Not expected |

**Table 4.4-26: Special Status Plant Species with Potential to Occur in the Project Area**

| Species | Status (Fed/State/CNPS) | Habitat | Potential to Occur in Project Area |
|---|---|---|---|
| Sierra Nevada monkeyflower *(Erythranthe sierrae)* | -/-/4.2 | Dry meadows and seeps and in vernally wet depressions, swales, and streambanks in openings of cismontane woodlands and lower montane coniferous forests at elevations from 600 to 7,500 feet (CNPS 2014). | Not expected |
| Silky lupine *(Lupinus elatus)* | -/-/4.3 | Dry areas of lower montane coniferous forests and upper montane coniferous forests at elevations from 4,900 to 9,850 feet. | Relatively common |
| Slender clarkia (*Clarkia exilis*) | -/-/4.3 | Cismontane woodlands and grows at elevations from 390 to 3,300 feet. | Yes, in Tier 2 of the Eastern Subarea. |
| Small flowered morning glory *(Convolvulus simulans)* | -/-/4.2 | Chaparral, coastal scrub, and grassland habitats at elevations from 100 to 2,300 feet. | Yes, in Tier 2 of the Eastern Subarea. |
| Stinkbells *(Fritillaria agrestis)* | -/-/4.2 | Chaparral, cismontane woodland, pinyon juniper and grassland habitats sometimes in serpentine soils at elevations from 300 to 5,100 feet. | Relatively common, minor occurrence |
| Streambank spring beauty *(Claytonia parviflora ssp. grandiflora)* | -/-/4.2 | Pine/blue oak woodlands in the Sierra Nevada Foothills at elevations from 800 to 4,000 feet (CNPS 2014). It is typically found in uplands and valleys with gentle to steep slopes where soils tend to be shallow, infertile, and moderately to excessively-drained with extensive rock fragments that may cover the ground surface. | Not expected |
| Sylvan microseris *(Microseris sylvatica)* | -/-/4.2 | Chaparral, cismontane woodland, pinyon and juniper woodlands, and grassland habitats. | Yes, in Tier 2 of the Eastern Subarea. |
| Tehachapi buckwheat *(Eriogonum callistum)* | -/-/1B.1 | Chaparral habitats on rocky and limestone areas at elevations from 4,600 to 4,900 feet (CNPS 2014). | Not expected |
| Tehachapi monardella *(Monardella linoides ssp. oblonga)* | -/-/1B.3 | Upper and lower montane coniferous forest, and pinyon and juniper woodlands at elevations from 2,900 to 8,200 feet. | Not expected |
| Tracy's eriastrum *(Eriastrum tracyi)* | -/CR/3.2 | This species occurs in chaparral and cismontane woodland habitats. It usually occurs at elevations from 1,000 to 5,500 feet (CNPS 2014). | Yes, in Tier 2 of the Western Subarea. |

**Table 4.4-26: Special Status Plant Species with Potential to Occur in the Project Area**

| Species | Status (Fed/State/CNPS) | Habitat | Potential to Occur in Project Area |
|---|---|---|---|
| White pygmy-poppy *(Canbya candida)* | -/-/4.2 | Joshua tree woodland, Mojavean desert scrub, and pinyon and juniper woodland habitats. The species usually occurs at elevations from 1,900 to 4,800 feet (CNPS 2014). | Not expected |

**Status abbreviations:**
**Federal and State Listing Code**
E = Federal or State-listed Endangered
T = Federal or State-listed Threatened
DL = Delisted

**California Rare Plant Ranks (formerly known as CNPS Lists)**
1A: Plants Presumed Extirpated in California and Either Rare or Extinct Elsewhere
1B: Plants Rare, Threatened, or Endangered in California and Elsewhere
2A: Plants Presumed Extirpated in California, But Common Elsewhere
2B: Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere
3: Plants About Which More Information is Needed - A Review List
4: Plants of Limited Distribution - A Watch List
Threat Ranks
0.1-Seriously threatened in California (over 80% of occurrences threatened / high degree and immediacy of threat)
0.2-Moderately threatened in California (20-80% occurrences threatened / moderate degree and immediacy of threat)
0.3-Not very threatened in California (less than 20% of occurrences threatened / low degree and immediacy of threat or no current threats known)

Additional information is provided for all Category 1 and Category 2 plants below. The Category 1 plant modeled suitable habitat maps are provided in Appendix N.

## Category 1 Plant Species

### Bakersfield Cactus (*Opuntia basilaris* var. *treleasei*)

The Bakersfield cactus is federally and state endangered and has a CRPR of 1B.1 (CNPS 2014). It is included in the SJV Recovery Plan (USFWS 1998) and in the MBHCP (ICF 1994). This species occurs in chenopod scrub, cismontane woodlands, and valley and foothill grasslands at elevations between 350 and 4,800 feet (CNPS 2014). The Bakersfield cactus is a perennial stem succulent with showy magenta flowers. It blooms between April to May (CNPS 2014).

The Bakersfield cactus is endemic to the southeastern San Joaquin Valley, and historically ranged from immediately north of Bakersfield to Wheeler Ridge. One-third of Bakersfield cactus locations have been eliminated, largely due to its habitat being converted to agricultural and urban uses (USFWS 1998). Remaining Bakersfield cactus populations are fragmented and generally occur on small parcels. There is an ongoing effort to increase the number of Bakersfield cactus populations by relocating plants from existing populations into areas where the species had been previously extirpated.

Habitat modeling data were available for this species and the URS SBM model produced results that have good predictive power. The primary environmental factors for this species' habitat included winter mean temperature (most important), followed by ruggedness, summer mean temperature, soil type, and aspect (northing).

Areas characterized as having the potential to provide habitat for the Bakersfield cactus are shown by the URS SBM model to occur in the West and Eastern Subareas. The western extent of the species' range, however, extends only as far as the extreme southeastern corner of the Western Subarea (CNPS 2014). The habitat that is identified north of Maricopa Flat is outside of the range of this species, and should be discounted. Table 4.4-27 summarizes the modeled Bakersfield Cactus habitat, both high and low to moderate quality acreage, by tier and subarea. The locations of modeled suitable habitat for this species in the Project Area are shown on Figure 4.4-1 in Appendix N.

**Table 4.4-27: Modeled Bakersfield Cactus High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| **High Quality Modeled Habitat** | | | | |
| Tier 1 | - | - | 3,030 | 3,030 |
| Tier 2 | 1,042 | - | 16,403 | 17,445 |
| Tier 3 | - | - | 1,577 | 1,577 |
| Tier 4 | - | - | 3,469 | 3,469 |
| Tier 5 | - | - | - | - |
| TOTAL | **1,042** | **-** | **24,480** | **25,521** |
| **Poor to Moderate Quality Modeled Habitat** | | | | |
| Tier 1 | 163,037 | 3,002 | 37,488 | 203,528 |
| Tier 2 | 717,860 | 522,011 | 427,152 | 1,667,023 |
| Tier 3 | 2,043 | 2,801 | 9,460 | 14,304 |
| Tier 4 | 3,505 | 10,372 | 11,120 | 24,997 |
| Tier 5 | 771.74 | - | 1,740.23 | 2,512 |
| **TOTAL** | **887,218** | **538,186** | **486,960** | **1,912,364** |

Source: Chevron 2014

## California Jewel Flower (*Caulanthus californicus*)

The California jewelflower has a CRPR of 1B.1 (CNPS 2014). It is included in the SJV Recovery Plan (USFWS 1998). It is an annual herb that can grow from 4 inches to more than 20 inches tall, with erect or spreading branched stems. The rounded or oval, toothed leaves are up to 4 inches long and clasp the stem, mainly around its lower portion. The inflorescence produces several

rounded flowers, often only along one side of the stem. Each flower has pouched sepals that are dark purple when new and turn light green to white as the flower opens. The frilly petals inside are nearly white with purple veining. This species occurs in chenopod scrub, pinyon and juniper woodlands, and grasslands at elevations from 200 to 3,300 feet (CNPS 2014). This species primarily grows in subalkaline and sandy loam soils on 0% to 25% slopes. At most, California jewelflower sites are dense in herbaceous cover. Native plant species such as annual fescue, clovers, red maids, and goldfields comprise a high proportion of the vegetation. This species is also associated with the burrow systems of giant kangaroo rats, specifically on the Carrizo Plain (USFWS 1998). This species blooms from February to May (CNPS 2014).

The historical range of the California jewelflower is based on specimens collected between 1880 and 1973. Nearly half of the collection sites were on the San Joaquin Valley floor in Fresno, Kern, and Tulare Counties. Several other collections came from the Carrizo Plain in San Luis Obispo County and the Cuyama Valley in Santa Barbara and Ventura Counties. Three collections occurred in the Sierra Nevada foothills at the eastern margin of the San Joaquin Valley in Kern County. The remainder of the collections occurred in the foothills west of the San Joaquin Valley in Fresno, Kern, and Kings Counties (USFWS 1998). As of 1986, all natural occurrences of the California jewelflower on the San Joaquin and Cuyama Valley floors had been extirpated. There are multiple presumed extant occurrences in Kern, Santa Barbara, San Luis Obispo, Fresno, and Kings Counties (USFWS 2013b). Two populations were introduced in the Los Padres National Forest in 1995. Although these records still appear in the CNDDB, both populations have failed and are no longer extant (USFWS 2013b).

The URS SBM model for this species produced results that have good predictive power. The primary environmental factors affecting the habitat suitability for this species included soil type (most important) followed by aspect (northing), elevation, ruggedness, and summer high temperature. As shown on Figure 4.4-2 in Appendix N, habitat values for the species generally range from poor to low throughout the Project Area, with relatively minor variability among each subarea.

The results of the analysis predict highly restricted areas of moderate to ideal habitat quality. The largest of these areas, and the only area to contain ideal and high quality habitat, occurs in the far eastern portion of the Eastern Subarea to the north of Highway 178 in the foothills of the Greenhorn Mountains. Table 4.4-28 summarizes modeled California jewelflower high quality and poor to moderate quality habitat acreage by tier and subarea.

**Table 4.4-28: Modeled California Jewel Flower High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| **High Quality Modeled Habitat** | | | | |
| Tier 1 | - | - | - | - |
| Tier 2 | - | - | 182 | 182 |
| Tier 3 | - | - | 599 | 599 |

**Table 4.4-28: Modeled California Jewel Flower High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| Tier 4 | - | - | 2 | 2 |
| Tier 5 | - | - | - | - |
| TOTAL | - | - | **783** | **783** |
| **Poor to Moderate Quality Modeled Habitat** | | | | |
| Tier 1 | 163,037 | 3,002 | 40,518 | 206,557 |
| Tier 2 | 718,902 | 522,011 | 443,374 | 1,684,287 |
| Tier 3 | 2,043 | 2,801 | 10,438 | 15,282 |
| Tier 4 | 3,505 | 10,372 | 14,587 | 28,465 |
| Tier 5 | 771.74 | - | 1,740.23 | 2,512 |
| **TOTAL** | **888,260** | **538,186** | **510,657** | **1,937,103** |

Source: Chevron 2014

## Heartscale (Atriplex cordulata var. cordulata)

The heartscale has a CRPR of 1B.2 (CNPS 2014). The heartscale is an annual herb with an erect stem between 4 and 59 inches tall. It has oval scaly-gray heart-shaped basal leaves that are no longer than 0.6 inch. This plant has male and female inflorescences, which are small hard clusters of flowers. The reddish brown seeds are about 0.1 inch wide. This species occurs in chenopod scrub, meadows and seeps, and grasslands on sandy/saline or alkaline soils at elevations to 1,900 feet. It blooms from April to October (CNPS 2014).

This species is endemic to the southern Sacramento Valley and San Joaquin Valley. The Kern County VFHCP recognized populations of the heartscale in the vicinity of Allensworth Ecological Reserve, Semitropic-Kern National Wildlife Refuge, Lokern Ecological Reserve, west of the Buena Vista Lake bed, and in areas from Maricopa to Taft (Garcia and Associates 2010).

The URS SBM model for this species produced results that have good predictive power. Environmental characteristics that were strongly correlated with this species included soil type (most important), followed by elevation, summer high temperature, precipitation of wettest month, and precipitation of driest month. The results of the analysis predict that the majority of the Project Area consists of low quality habitat for the heartscale. A small area of moderate to ideal quality habitat is predicted within the Western Subarea of the Project Area between Elk Hills, Buena Vista Valley, and the Buena Vista Lake Bed. Areas of high to moderate quality habitat are predicted within the Western Subarea near the southern tip of the Temblor Mountain Range and north of Elk Hills. Areas of high to moderate quality habitat are also predicted within the Central Subarea east of I-5. No high quality habitat is predicted to occur within the Eastern Subarea. Table 4.4-29 summarizes modeled heartscale high quality and poor to moderate quality

habitat acreage by tier and subarea. The locations of modeled suitable habitat for this species in the Project Area are shown on Figure 4.4-3 in Appendix N.

**Table 4.4-29: Modeled Heartscale High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| **High Quality Modeled Habitat** | | | | |
| Tier 1 | 12,405 | 0 | - | 12,405 |
| Tier 2 | 16,535 | 1,284 | - | 17,819 |
| Tier 3 | 43 | 257 | - | 300 |
| Tier 4 | 559 | - | - | 559 |
| Tier 5 | - | - | - | - |
| **TOTAL** | **29,541** | **1,541** | **-** | **31,082** |
| **Poor to Moderate Quality Modeled Habitat** | | | | |
| Tier 1 | 150,633 | 3,002 | 40,518 | 194,152 |
| Tier 2 | 701,042 | 520,727 | 443,556 | 1,665,325 |
| Tier 3 | 2,001 | 2,544 | 11,037 | 15,581 |
| Tier 4 | 2,947 | 10,372 | 14,589 | 27,908 |
| Tier 5 | 771.74 | - | 1,740.23 | 2,512 |
| **TOTAL** | **857,394** | **536,644** | **511,440** | **1,905,478** |

Source: Chevron 2014

## Kern County Larkspur (Rose-Flowered Larkspur) (*Delphinium purpusii*)

The Kern County larkspur has a CRPR of 1B.3 (CNPS 2014). The rose- flowered larkspur is a perennial herb that is an endemic to California. Its flower is generally pink to a deep rose-pink and its height ranges from 10 inches to 50 inches (University of California, Berkeley 2013). Its blooming period is from April to May (CNPS 2014). This species occurs on rocky and carbonate soils in chaparral, cismontane woodland, and pinyon and juniper woodlands. The species usually occurs at elevations from 950 to 4,500 feet (CNPS 2014). The threats to this species are unknown (CNPS 2014).

The Kern County larkspur is known to occur in Kern and Tulare Counties (CNPS 2014). This species ranges from the foothills east of the City of Bakersfield to north throughout the foothills and mid-elevations of the Sierra Nevada (CNPS 2014). The northernmost population of the rose-flowered larkspur is located east of the City of Exeter in Tulare County (CNPS 2014).

The ICF model was used to analyze this species. The results of the analyses predict that the majority of the Project Area lacks high quality predicted habitat. Areas containing suitable habitat

are predicted to occur within the foothills of the San Emigdio Mountains located in the southern part of the Western Subarea and within the foothills of the Greenhorn Mountains located in the Eastern Subarea. As explained in Table 4.4-25, the ICF model does not provide acreage estimates for low to moderate quality habitat. Table 4.4-30 provides modeled Kern County larkspur high quality modeled habitat acreage by tier and subarea. The locations of modeled suitable habitat for this species in the Project Area are shown on Figure 4.4-4 in Appendix N.

**Table 4.4-30: Modeled Kern County Larkspur High Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| Tier 1 | 51 | | | 51 |
| Tier 2 | 6,225 | | 10,266 | 16,491 |
| Tier 3 | | | 591 | 591 |
| Tier 4 | 145 | | 3 | 148 |
| Tier 5 | | | | |
| **TOTAL** | **6,421** | | **10,860** | **17,281** |

Sources: ICF 2015; QK 2014

## Kern Mallow (Eremalche kernensis (Eremalche parryi ssp. Kernensis))

The Kern mallow is listed as federally endangered and has a CRPR of 1B.1 (CNPS 2014). This species is included in the SJV Recovery Plan (USFWS 1998). This taxon has undergone several changes in taxonomic identification and nomenclature. Based on the most recent 5-year status review, the USFWS has retained the name *Eremalche kernensis*, unless further biosystematics investigation shows otherwise (USFWS 2013c). Confusion regarding the identification and the taxonomic status of *E. kernensis* has centered on flower color, gender, and range (USFWS 1998). While the use of *E. parryi* ssp. *kernensis* has gained acceptance (University of California, Berkeley 2013), the USFWS suggests that further investigation into the classification is necessary. A combination of gender, flower color, and other floral characteristics are now considered diagnostic for identification of *Eremalche kernensis* (USFWS 2013c).

The Kern mallow is an herbaceous annual plant that can have a single stem or multiple stems. Stem lengths at flowering may range from less than 1 inch to nearly 20 inches. Its central stem is erect and its lateral stem(s) trail along the ground. Its flowers have five petals, and its wheel-shaped fruits are divided into single-seeded segments. The Kern mallow occurs in chenopod scrub and grasslands at elevations from 200 to 4,300 feet (CNPS 2014). It grows on dry open sandy to clay soils, eroded hillsides and alkali flats (CNPS 2014; Baldwin et al. 2012). Associated herbs include red brome, red-stemmed filaree, woolly goldfields, and white Sierran layia. The Kern mallow usually grows in areas where shrub cover is less than 25% and herbaceous cover is variable (USFWS 1998). The blooming period of this species is from March to May (CNPS 2014).

The SJV Recovery Plan initially recognized populations of pink-flowered plants thought to be Kern mallow in Buena Vista Valley, Elk Hills, Lost Hills, McKittrick Hills, Stockdale, the Temblor Range (all in Kern County), Corcoran (Kings County), Cuyama Valley (Santa Barbara County), and Pixley (Tulare County). However, Andreasen, Cypher, and Baldwin (2002) found that many previous records of the Kern mallow in the San Joaquin Valley were likely misidentified and were actually white mallow (*Eremalche exilis*), which is morphologically similar to, and more common than, Kern mallow (USFWS 2013c). As such, the known range of Kern mallow was previously reduced to a narrow band along Lokern Road in western Kern County (USFWS 1998).

URS SBM data was available for this species and had good predictive power. Table 4.4-31 summarizes modeled Kern mallow high quality and poor to moderate quality habitat acreage by tier and subarea. The locations of modeled suitable habitat for this species in the Project Area are shown on Figure 4.4-5 in Appendix N.

**Table 4.4-31: Modeled Kern Mallow High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| **High Quality Modeled Habitat** | | | | |
| Tier 1 | 14,509 | - | - | 14,509 |
| Tier 2 | 43,394 | 3,453 | - | 46,846 |
| Tier 3 | 21 | - | - | 21 |
| Tier 4 | 277 | 22 | - | 299 |
| Tier 5 | - | - | - | - |
| **TOTAL** | **58,201** | **3,475** | **-** | **61,676** |
| **Poor to Moderate Quality Modeled Habitat** | | | | |
| Tier 1 | 148,528 | 3,002 | 40,518 | 192,048 |
| Tier 2 | 675,508 | 518,558 | 443,556 | 1,637,622 |
| Tier 3 | 2,022 | 2,801 | 11,037 | 15,860 |
| Tier 4 | 3,228 | 10,350 | 14,589 | 28,167 |
| Tier 5 | 771.74 | - | 1,740.23 | 2,512 |
| **TOTAL** | **830,059** | **534,711** | **511,440** | **1,876,209** |

Source: Chevron 2014

## Lost Hills Crownscale (Atriplex coronata S. Watson var. vallicola)

The Lost Hills crownscale has a CRPR of 1B.2 (CNPS 2014). The Lost Hills crownscale is an annual herb with short stems that has few branches and alternate, egg-shaped leaves with entire margins. Its individual flowers are inconspicuous because they are tiny and have no petals. Male and female flowers are mixed in small clusters on the upper leaf axils. The fruiting bracts are

broadly triangular, irregularly toothed, and may or may not have tubercles (warty projections). Each pair of bracts encloses a flattened, dark brown seed. The Lost Hills crownscale occurs in chenopod scrub, grassland habitat, and vernal pool habitats at elevations from 150 to 2,500 feet. The Lost Hills crownscale typically grows in the dried beds of alkaline pools within scrub or annual grassland communities, but one population in southern Kern County occurs on exposed slopes rich in gypsum. The associated species most frequently reported with the Lost Hills crownscale are spiny saltbush, common saltbush, seepweed, red brome, and annual fescue (USFWS 1998). This species blooms from April to August.

The Lost Hills crownscale is historically known to occur in Kern, Fresno, Kings, Tulare, Merced, and San Luis Obispo Counties. Two relatively large occurrence regions remain today. One region overlaps the Kern-Kings County boundary near the community of Lost Hills; and the second region occurs on the Carrizo Plain in San Luis Obispo County. Much smaller populations are known from the Kerman Ecological Reserve in Fresno County, near Lokern-McKittrick in Kern County, and southwestern Merced County. Extant Valley floor populations range in elevation from 160 to 300 feet, but populations on the Carrizo Plain and south of McKittrick range in elevation from 1,300 to 2,000 feet (USFWS 1998). Much of the Valley floor habitat, including that containing historical occurrences, has been destroyed by agricultural development.

There are multiple occurrences of Lost Hills crownscale located within the Project Area. Fifteen occurrences have been documented since 1990, and 56 occurrences were documented prior to 1990 or were from an unknown year (CDFW 2014; University of California, Berkeley 2013). These occurrences are located within the Central and Western Subareas. The most recent records of the Lost Hills crownscale within the Central Subarea are located in proximity to the Kern National Wildlife Refuge. The most recent records within the Western Subarea are located near the foothills of Temblor Range and Elk Hills and just west of the California Aqueduct. The records in the northern part of the Project Area are from the Lost Hills and Kern Wildlife Refuge Area.

URS SBM modeling data was available for this species. The results of the analysis predict that the majority of the eastern and southern side of the San Joaquin Valley consists of poor quality habitat.

The SBM model for this species produced results that have good predictive power. The primary environmental factors related to habitat for this species included soil type (most important), followed by aspect (easting), winter low temperature, precipitation of wettest month, and summer high temperature. Table 4.4-32 summarizes modeled Lost Hills crownscale high quality and poor to moderate quality habitat acreage by tier and subarea. The locations of modeled suitable habitat for this species in the Project Area are shown on Figure 4.4-6 in Appendix N.

**Table 4.4-32: Modeled Lost Hills Crownscale High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| **High Quality Modeled Habitat** | | | | |
| Tier 1 | 13,045 | - | - | 13,045 |
| Tier 2 | 4,341 | 1,758 | - | 6,099 |
| Tier 3 | - | - | - | - |
| Tier 4 | 146 | 15 | - | 161 |
| Tier 5 | - | - | - | - |
| **TOTAL** | **17,532** | **1,774** | **-** | **19,306** |
| **Poor to Moderate Quality Modeled Habitat** | | | | |
| Tier 1 | 149,992 | 3,002 | 40,518 | 193,512 |
| Tier 2 | 714,561 | 520,252 | 443,556 | 1,678,369 |
| Tier 3 | 2,043 | 2,801 | 11,037 | 15,881 |
| Tier 4 | 3,360 | 10,356 | 14,589 | 28,305 |
| Tier 5 | 771.74 | - | 1,740.23 | 2,512 |
| **TOTAL** | **870,728** | **536,412** | **511,440** | **1,918,580** |

Source: Chevron 2014

## Recurved Larkspur (Delphinium recurvatum)

The recurved larkspur has a CRPR of 1B.2 (CNPS 2014). The recurved larkspur is a perennial herb up to about 19 inches tall. It has deeply lobed leaves, many of which are basal. The leaves located further up the dark purple stem are much smaller. Its flowers are generally blue, with its sepals and lower petals darker than its upper petals. Its sepals are usually curved back, the trait which gives the plant its name. This species occurs in chenopod, cismontane woodlands, and grassland habitats at elevations to 2,600 feet. The blooming period of this species is from March to June (CNPS 2014). The recurved larkspur is endemic to California and is historically known to occur in California's Great Valley, ranging from Butte County to Kern County. Most of the known occurrences of this species are in Kern, Tulare, and San Luis Obispo Counties.

ICF modeling data was available for this species. The results of the analysis predict that the highest concentration of habitat for the recurved larkspur occurs within the Western Subarea of the Project, in Sunflower Valley, from Antelope Valley south to Elk Hills, in Buena Vista Valley, and north of the Buena Vista Lake Bed. A few areas of predicted habitat are also scattered throughout the Central Subarea along I-5, and near Highway 46 in the north. There is also predicted habitat in the Eastern Subarea located mostly along the southern end of the Greenhorn Mountains. The ICF model does not provide acreage estimates for low to moderate

quality habitat. Table 4.4-33 summarizes modeled recurved larkspur high quality modeled habitat acreage by tier and subarea. The locations of modeled suitable habitat for this species in the Project Area are shown on Figure 4.4-7 in Appendix N.

**Table 4.4-33: Modeled Recurved Larkspur High Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| Tier 1 | 22,167 | 1,834 | - | 24,001 |
| Tier 2 | 93,654 | 21,113 | 61 | 114,827 |
| Tier 3 | 159 | 223 | 3 | 386 |
| Tier 4 | 384 | 1,320 | - | 1,703 |
| Tier 5 | - | - | - | - |
| **TOTAL** | **116,363** | **24,491** | **64** | **140,918** |

Source: ICF 2015

## San Joaquin adobe sunburst (*Pseudobahia peirsonii*)

The San Joaquin adobe sunburst is listed as federally threatened and state endangered, and has a CRPR of 1B.1 (CNPS 2014). It is included in the Draft Recovery Plan for Southern Sierra Foothills Plants. This species is an annual herb growing 7.8 to 27.5 inches tall. It has a thin coating of woolly hairs. Its leaves are up to 2.3 inches long, and are generally divided into a few leaflets which are subdivided into lobed segments. Its inflorescence is a solitary flower head lined with about eight phyllaries that are fused at the base, making the involucre a rounded cup with pointed lobes. There are about eight golden ray florets. At the center of the head are yellow disc florets. This species occurs in cismontane woodlands and grasslands at elevations from 450 to 2,600 feet (CNPS 2014). Associated grasses and forbs include non-native species such as wild oats, foxtail chess, soft brome, foxtail barley, and red-stemmed filaree, and such native species as fiddleneck and blow-wives. The optimum habitat for the San Joaquin adobe sunburst consist of the north- to northeast-facing small hills, or Mima mounds, associated with the upland portions of vernal pool habitats (USFWS 2007a). All known wild occurrences are associated with Cibo clay, Porterville clay, Centerville clay, and Mt. Olive clay. The blooming period of this species is from March to April (CNPS 2014).

The historical distribution of the San Joaquin adobe sunburst is not known because when the species was first described in 1949, extensive areas of habitat for this species in the lower San Joaquin Valley were already being converted to agriculture (USFWS 2007a). Currently, three major population concentrations of the San Joaquin adobe sunburst now include areas east of Fresno in Fresno County, west of Lake Success in Tulare County, and northeast of Bakersfield in Kern County (USFWS 2007a).

QK modeling data was available for this species. Results of the analysis predict that habitat for the San Joaquin adobe sunburst occurs within the Eastern Subarea in the Tehachapi Mountains

and Greenhorn Mountains and northeast of Bakersfield. The QK model does not provide low to moderate quality habitat acreage estimates. Table 4.4-34 summarizes modeled San Joaquin adobe sunburst high quality habitat acreage by tier and subarea. The locations of modeled suitable habitat for this species in the Project Area are shown on Figure 4.4-8 in Appendix N.

**Table 4.4-34: Modeled San Joaquin Adobe Sunburst High Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| Tier 1 | - | - | 29,592 | 29,592 |
| Tier 2 | - | 1,636 | 199,581 | 201,217 |
| Tier 3 | - | - | 3,401 | 3,401 |
| Tier 4 | - | - | 974 | 974 |
| Tier 5 | - | - | - | - |
| **TOTAL** | **-** | **1,636** | **233,548** | **235,184** |

Source: QK 2014

## San Joaquin Woolly-Threads (*Monolopia congdonii*)

The San Joaquin woolly-threads is federally endangered and has a CRPR of 1B.2 (CNPS 2014). It is included in the SJV Recovery Plan (USFWS 1998). The San Joaquin woolly-threads stands about 3 inches high and has long, trailing stems that are covered with hairs (USFWS 1998). This species occurs in chenopod scrub and valley and foothill grasslands at elevations from 150 to 2,700 feet (CNPS 2014). The blooming period of this species is from February to May (CNPS 2014).

According to the SJV Recovery Plan, the historical range of the San Joaquin woolly-threads included Fresno, Kings, Kern, San Benito, San Luis Obispo, and Santa Barbara Counties (USFWS 1998). There are extant or presumed extant occurrences located within Kern County near Lost Hills and in the Bakersfield vicinity (USFWS 2010a). The largest metapopulation of this species is currently located within the Project Area in the Carrizo Plain Natural Area (USFWS 1998).

URS SBM modeling data was available for this species and produced results that have good predictive power. The primary environmental factors related to habitat for San Joaquin woolly-threads included soil type (most important), followed by summer high temperature, winter low temperature, mean diurnal temperature range, and elevation. Table 4.4-35 summarizes modeled San Joaquin woolly-threads high quality and poor to moderate quality habitat acreage by tier and subarea. The locations of modeled suitable habitat for this species in the Project Area are shown on Figure 4.4-9 in Appendix N.

**Table 4.4-35: Modeled San Joaquin Woolly-threads High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| **High Quality Modeled Habitat** | | | | |
| Tier 1 | 499 | 59 | - | 557 |
| Tier 2 | 997 | 428 | 625 | 2,050 |
| Tier 3 | 0 | 11 | 377 | 388 |
| Tier 4 | 13 | - | 104 | 117 |
| Tier 5 | - | - | - | - |
| **TOTAL** | **1,509** | **497** | **1,106** | **3,112** |
| **Poor to Moderate Quality Modeled Habitat** | | | | |
| Tier 1 | 162,539 | 2,943 | 40,518 | 206,000 |
| Tier 2 | 717,905 | 521,583 | 442,931 | 1,682,419 |
| Tier 3 | 2,043 | 2,790 | 10,660 | 15,493 |
| Tier 4 | 3,493 | 10,372 | 14,485 | 28,349 |
| Tier 5 | 771.74 | - | 1,740.23 | 2,512 |
| **TOTAL** | **886,751** | **537,688** | **510,333** | **1,934,773** |

Source: Chevron 2014

## Category 2 Plant Species

### Alkali Mariposa Lily (*Calochortus striatus*)

The alkali Mariposa lily has a CRPR of 1B.2 (CNPS 2014). It is a perennial bulbiferous herb with an erect stem 0.4 to 2.0 inches tall. Its flowers have three rounded petals which may be slightly toothed. Each petal is 0.8 to 1.2 inches long and varies from light to very dark pink or purplish with darker pink or purple veining or mottling. The cup of the flower is somewhat hairy with anthers bright to dull pink; its pollen is pink. Each flower has pointed sepals around its base. The alkali mariposa lily occurs in chaparral, chenopod scrub, Mojave Desert scrub, and meadows and seeps in alkaline and mesic soils at elevations between 200 and 5,300 feet. It blooms between April and June (CNPS 2014). In California, it occurs in the Sierra Nevada foothills and western Mojave Desert, including Kern, Inyo, Tulare, Los Angeles, and San Bernardino Counties (CNPS 2014). As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## Bakersfield Smallscale *(Atriplex tularensis)*

The Bakersfield smallscale is listed as a state endangered species and has a CRPR of 1A (CNPS 2014). This species is included in the SJV Recovery Plan (USFWS 1998). The Bakersfield smallscale is an annual herb, reddish-green or grayish in color, growing up to 31 inches tall. The leaves are up to 1.2 inches long and oval to lance-shaped. Leaves and stem branches are white, scaly, and tough. Both male and female flowers are small, in hard clusters, and occur in leaf axils throughout the plant. The fruits are enclosed in diamond-shaped bracts that are smooth on the surface but toothed on the margin. The Bakersfield smallscale occurs in chenopod scrub habitats at elevations from 290 to 660 feet on alkaline soils and shores of dry lakes (CNPS 2014; Baldwin et al. 2012). The Bakersfield smallscale is typically associated with species such as alkali heath, glasswort, scratchgrass, and saltgrass (USFWS 1998). The blooming period of this species is from June to October (CNPS 2014). Historically, the Bakersfield smallscale was restricted to a small area of south-central Kern County between Greenfield and Mettler with collection localities near Greenfield, Adobe Station, Adobe Road, and Highway 223 (USFWS 1998). As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## Calico Monkeyflower *(Mimulus pictus)*

The calico monkeyflower has a CRPR of 1B.2 (CNPS 2014). The calico monkeyflower is an annual herb that is a native endemic to California. Its flowers are generally white to red, or maroon to purple (University of California, Berkeley 2013). The calico monkeyflower can grow to about 15 inches tall. This species occurs in broad-leafed upland forests and cismontane woodlands at elevations from 1,400 to 4,100 feet (CNPS 2014). This species is usually found in grantic and disturbed areas and often in bare, sunny or shrubby areas. It blooms from March to May (CNPS 2014). The primary threat to the calico monkeyflower is grazing (CNPS 2014). It historically occurred in the southern Sierra Nevada foothills and the Tehachapi Mountains. This species is known to occur in Kern and Tulare Counties. As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## California satintail (*Imperata brevifolia*)

The California satintail has a CRPR of 2B.1 (CNPS 2014). It is a perennial grass that grows from a hard rhizome to nearly 5 feet tall. The flat leaves are up to 20 inches long and 0.6 inches wide. The inflorescence is a narrow, cylindrical white plume between 4 and 12 inches in length. It is compacted with silky white hairs and dotted with dark speckles, which are orange-brown anthers and purplish-brown stigmas of the spikelets. The California satintail occurs in chaparral, coastal scrub, Mojave Desert, meadow and seep, and riparian scrub habitats at elevations from 600 to 4,000 feet. The blooming period of this species is September to May (CNPS 2014). The California satintail historically ranged from California to Baja California, Arizona, Nevada, Utah New Mexico, and Texas. In California, it is known to occur in the San Joaquin Valley, south Coast Range, San Gabriel Mountains, San Bernardino Mountains, and the Mojave Desert (Baldwin et al. 2012). As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## California Tortula Moss (California Screw-Moss) (*Tortula californica*)

The California tortula moss has a CRPR of 1B.2 (CNPS 2014), and is considered a sensitive species by the BLM. This species occurs in chenopod scrub and valley and foothill grassland habitats on dry, sandy soils at elevations from 30 to 4,800 feet. The California tortula moss is a small non-vascular, herbaceous plant. It forms cushions on dry, bare soils and rocks. The leaves of this species are generally broad with a narrow base and green in color. The sporophyte is usually reddish to brown in coloring. Blooming occurs seasonally after heavy rains. The California tortula moss is endemic to California and historically occurred in Kern, Los Angeles, Monterey, Modoc, Riverside, Santa Barbara, and Ventura Counties. There are no known threats listed for this species (CNPS 2014). As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## Comanche Point Layia (*Layia leucopappa*)

The Comanche Point layia has a CRPR of 1B.1 (CNPS 2014) and is included in the SJV Recovery Plan (USFWS 1998). This species is an annual and can grow 3 to 24 inches tall (University of California, Berkeley 2013). This species is glandular and not strongly scented. Its stem is straw-colored, and its leaves are oblanceolate and lobed. Its flowers are white and range between 0.3 and 0.6 inches in length (University of California, Berkeley 2013). The Comanche Point layia occurs in chenopod scrub and valley and foothill grassland habitats at elevations from 300 to 1,200 feet. It blooms between March and April (CNPS 2014). The Comanche Point layia is threatened by agriculture, urban development, and grazing (USFWS 1998).

Historically, this species occurred in three general areas of the extreme southern San Joaquin Valley and the adjacent hills to the east, including the Comanche and Tejon Hills, the area between Edison and Bena, and the valley floor near the southern end of Kern Lake (USFWS 1998). The current distribution of the Comanche Point layia remains in the Comanche and Tejon Hills, but it has not been observed in the Edison-Bena area or on the valley floor since 1935 (CDFW 2014). The population of the Comanche Point layia on the Valley floor has likely been eliminated by agricultural development, and its overall population is declining. As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## Coulter's Goldfields (*Lasthenia glabrata* ssp. *coulteri*)

The Coulter's goldfields has a CRPR of 1B.1 (CNPS 2014). This is an annual herb that grows to less than 2 feet tall. Its leaves are linear, smooth edged, without hairs, and can be 1.5 to 6 inches long. Its inflorescences are heads with many disk flowers, and 7 to 15 orange-yellow ray flowers; the heads contain 10 to 14 fused bracts (phyllaries) without hairs (University of California, Berkeley 2013). The fruit is an oblong to oblanceolate, gray and smooth achene, which is less than 0.3 inches long with wart-like hairs (University of California, Berkeley 2013). It occurs in marshes and swamps, playas, and vernal pools at elevations to 3,700 feet. The blooming period of this species is February to June (CNPS 2014). The Coulter's goldfields historically occurred in California in the Tehachapi Mountains, outer south Coast Range, south coast, the north Channel Islands (Santa Rosa Island), Peninsular Ranges, and the western Mojave Desert (Baldwin et al. 2012). As

discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## Deltoid Bract Saltbush (Subtle Orache) (*Atriplex subtilis*)

The subtle orache has a CRPR of 1B.2 (CNPS 2014). This species is an annual herb with upright stems which are often reddish-purple. The subtle orache has leaves that are only 0.08 to 0.16 inches long. It primarily has opposite leaves and branches. Its inconspicuous male and female flowers are hidden in the leaf axils. It occurs in grassland habitat, often in the vicinity of vernal pools at elevations from 130 to 330 feet. The blooming period of this species is from June to October (CNPS 2014). The subtle orache is endemic to California and is historically known to occur in the San Joaquin and Sacramento Valleys, including in Butte, Merced, Madera, Stanislaus, Kings, Fresno, Tulare, and Kern Counties (CNPS 2014). As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## Diamond-Petaled California Poppy (*Eschscholzia rhombipetala*)

The diamond-petaled California poppy has a CRPR of 1B.1 (CNPS 2014) and is included in the SJV Recovery Plan (USFWS 1998). The diamond-petaled California poppy, in comparison to Lemon's poppy and Tejon poppy, may have erect or nodding buds. Its flowers are small and yellow, and the bases of its leaves are fleshy (Hoover 1970; Clark 1993). The fruits of diamond-petaled California poppy are conspicuous because they are 1.5 to 3 inches long, which may nearly equal the height of the plants (Hoover 1970). The Diamond-petaled California poppy is distinguished from other poppy species that occur in the same general area, by leaf position and seed characteristics (Clark 1993). This species occurs in grassland habitats in alkaline and clay soils at elevations from 30 to 3,300 feet. Most of the populations reported have been on hillsides, but community associations varied widely among the sites. This species blooms from March to April (CNPS 2014).

The diamond-petaled California poppy was known historically from seven sites in the inner Coastal Ranges, including Corral Hollow in Alameda County, Antelope Valley near the town of Sites in Colusa County, Antioch and the hills south of Byron in Contra Costa County, La Panza and Yeguas Creek in San Luis Obispo County, and Del Puerto Canyon in Stanislaus County (USFWS 1998). Hoover (1970) mentioned that the species occurred in San Joaquin County, but no specimens remain to document this report.

Currently, at least two extant populations of the diamond-petaled California poppy are known. The first was discovered in 1992 on a privately owned portion of the northern Carrizo Plain in San Luis Obispo County, and the second was discovered in 1997 on Lawrence Livermore National Laboratory property in Alameda County. The latter is believed to be the occurrence reported historically as Corral Hollow. As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

### Erect-Stem Saltbush (Earlimart Orache) (*Atriplex cordulata* var. *erecticaulis*)

The Earlimart orache has a CRPR of 1B.2 (CNPS 2014). The Earlimart orache is an annual plant, similar in appearance to the heartscale. However, the Earlimart orache is more widely branching and differs in several details of its reproductive structures. This species grows in low-lying, sparsely-vegetated grasslands and on mounds between vernal pools on saline or alkaline soils at elevations from 130 to 350 feet (CNPS 2014). The blooming period of this species is from August to November (CNPS 2014). The Earlimart orache is endemic to California and is known to historically occur within the San Joaquin Valley in Tulare, Kern, and Kings Counties in uncultivated areas (CNPS 2014). As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

### Hall's tarplant (*Deinandra halliana*)

The Hall's tarplant has a CRPR of 1B.1 (CNPS 2014). The Hall's tarplant is an annual herb with a hollow stem that ranges in height from 0.5 to 4.0 feet in height. The leaf edges are entire or serrate with glabrous faces. The flowers are deep yellow in coloration. This species occurs in chenopod scrub, cismontane woodland, and grassland habitats at elevations from 850 to 3,150 feet. The blooming period of the Hall's tarplant is April to May (CNPS 2014). This species is historically known to occur in the San Joaquin Valley and inner south Coastal Range including Fresno, Monterey, San Benito, and San Luis Obispo Counties. As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

### Hispid Bird's-Beak (*Chloropyron molle* ssp. *hispidum*)

The hispid bird's-beak has a CRPR of 1B.1 (CNPS 2014). The hispid bird's-beak is an annual hemiparasitic herb with stems branching near its base. The species is grayish or purplish green and coated in long, sometimes bristly and glandular, whitish hairs. Its woolly inflorescence is a spike of club-shaped white flowers enclosed in densely hairy sepals. It occurs in alkaline meadows and seeps, playas, and grassland habitats at elevations to 510 feet. The blooming period of this species is from June to September (CNPS 2014). The hispid bird's-beak is endemic to California and historically known to occur in the Sacramento and San Joaquin Valleys (Baldwin et al. 2012); however, it has been extirpated from much of the lower San Joaquin Valley (CNPS 2014). As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

### Horn's Milk-Vetch (*Astragalus hornii* var. *hornii*)

The Horn's milk-vetch has a CRPR of 1B.1 (CNPS 2014). It is an annual herb with widely branched stems between 11 and 47 inches tall. Its leaves are 0.5 to 5.1 inches long, and are often reflexed. Its flower petals are white to pale lilac, ovate with spreading hairs. The Horn's milk-vetch occurs in meadows, seeps, and playas along lake margins on alkaline soils at elevations from 190 to 2,800 feet. The blooming period of this species is May to October (CNPS 2014). The Horn's milk-vetch historically occurred in west-central Nevada and in California in the south San Joaquin Valley, South Coast, western Traverse Ranges, and along the west edge of the Mojave

Desert (Baldwin et al. 2012). It is known from Kern, Inyo, San Bernardino, and Tulare Counties (CNPS 2014). As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## Jared's Pepper-Grass (*Lepidium jaredii* ssp. *jaredii*)

The Jared's pepper-grass has a CRPR of 1B.2 (CNPS 2014) and is included in the SJV Recovery Plan (USFWS 1998). The Jared's pepper-grass is an annual plant that ranges between 4 and 28 inches tall and has branched stems. Its leaves are narrow and sometimes serrated. Tiny white flowers are located on the top of each branch. This species occurs in valley and foothill grassland habitats at elevations from 1,000 to 3,300 feet. Its blooming period is from March to May.

The Jared's pepper-grass historically ranged from Kern to San Luis Obispo Counties. Occurrences are known from near Soda Lake on the Carrizo Plain in San Luis Obispo County and from near Devil's Den in Kern County (USFWS 1998). The Jared's pepper-grass is threatened by solar energy development and possibly by grazing and trampling (CNPS 2014; USFWS 1998). As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## Kings Gold (Tropidocarpum californicum)

The Kings gold has a CRPR of 1B.1 (CNPS 2014). It occurs in chenopod scrub at elevations to 250 feet and blooms during March. The Kings gold is a perennial herb that is native to California. Its stems are prostrate to erect and its flowers are oblong, with spoon-shaped petals. The flowers are yellow in color with an occasional purple tint (University of California, Berkeley 2013).

The Kings gold is historically known to occur in the San Joaquin Valley in Kings and northern Kern Counties (CNPS 2014). The historical range of this species overlaps the northern boundary of the Project Area. The current distribution of the Kings gold is limited to two populations in Kern County within the I-5 corridor to the north and south of Kern National Wildlife Refuge (CNPS 2014). The primary threat to this species is development (CNPS 2014). The population of the Kings gold on the Valley floor has likely been eliminated by agricultural developments and its overall population is declining (CNPS 2014). As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## Lemmon's Jewelflower (*Caulanthus lemmonii*)

The Lemmon's jewelflower has a CRPR of 1B.2 (CNPS 2014). It is an annual herb with a glabrous stem that is 8 to 32 inches long. The plant has an erect stem and is oblanceolate, with coarsely dentate leaves. Its flower petals are white with dark purple veins. The Lemmon's jewelflower occurs in pinyon and juniper woodlands and grassland habitats at elevations from 250 to 4,000 feet. The blooming period of this species is from March to May (CNPS 2014). The Lemmon's jewelflower is endemic to California and historically occurs in the southwestern part of the San Joaquin Valley; southeast of San Francisco Bay Area; east of Outer South Coastal Ranges; and within South Coastal Ranges including Alameda, Merced, Monterey, Santa Barbara,

San Benito, San Joaquin, Stanislaus, Ventura, Fresno, Kings, and Kern Counties (Baldwin et al. 2012). As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## Lesser Saltscale (*Atriplex minuscula*)

The lesser saltscale has a CRPR of 1B.1 (CNPS 2014) and is included in the SJV Recovery Plan (USFWS 1998). It is an annual herb with many upright, reddish stems and spreading, brittle branches. Its leaves are egg-shaped, white and scaly below, and green above with smooth margins. Its typical leaf arrangement is opposite on the upper branches and alternate on the lower branches. Both flower genders occur in the leaf axils with the male flowers on the upper part of the stem and female flowers near the base of the stem. This species occurs in chenopod scrub habitat, playas, and grasslands on alkaline, sandy soils, and often in association with slough systems and river floodplains. It is found only in microhabitats that are not inundated year-round. This species occurs at elevations from 50 to 650 feet. The lesser saltscale grows with other halophytes (plants which grow in salty or alkaline soils), including alkali sacaton, brittlescale, heartscale, and seepweed (USFWS 1998). The blooming period of the lesser saltscale is from May to October (CNPS 2014).

The lesser saltscale was historically collected only at Goshen (Tulare County) and El Nido (Merced County); however, it is unknown if the species remains extant at these locations. Recently, the lesser saltscale was discovered at five new localities in the San Joaquin and Sacramento Valleys. The southernmost occurrence was from Kern County, near the intersection of I-5 and State Highway 58, and the northernmost occurrence was from the Gray Lodge Wildlife Area in Butte County. The remaining reports were from the Kerman Ecological Reserve in Fresno County, San Luis Island in Merced County, and along the Fresno River in Madera County. As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## Mason's Neststraw (*Stylocline masonii*)

The Mason's neststraw has a CRPR of 1B.1 (CNPS 2014) and is classified by the BLM as a sensitive species. This species is endemic to California, and occurs in chenopod scrub and pinyon and juniper woodlands at elevations from 300 to 4,000 feet. The Mason's neststraw is often located on sandy soil, and it blooms between March and May. This species is an annual herb that grows at ground-level and reaches about 4 inches tall. It has small white flowers, small leaves that are radial along the stem, and a narrow stem that is covered with small, white hairs. Due to its small size and nondescript flower size and color, this species is inconspicuous. It only flowers during wet years, for only two to four weeks at a time. This can make it difficult to detect and identify. The Mason's neststraw is threatened by development and habitat disturbance (CNPS 2014).

The Mason's neststraw is historically known to occur in scattered locations between Kern, Monterey, San Luis Obispo, and Los Angeles Counties (CNPS 2014). Historical occurrences of the Mason's neststraw are known from the Project Area (CNPS 2014). Some occurrences were

recorded in 1989 along Rosedale Highway, but the exact locations of these occurrences are unknown (CNPS 2014). As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## Munz's Tidy-Tips (*Layia munzii*)

The Munz's tidy-tips has a CRPR of 1B.2 (CNPS 2014), is classified by the BLM as a sensitive species, and is included in the SJV Recovery Plan (USFWS 1998). The Munz's tidy-tips occur in chenopod scrub and valley and foothill grassland habitats at elevations from 150 to 2,100 feet. The Munz's tidy-tips typically grows on alkaline clay soils, and its blooming period is from March to April. The Munz's tidy-tips has a stem that can either trail or grow upright with very thin leaves (USFWS 1998). Its flowers are yellow with white tips.

Historically, the Munz's tidy-tips were widespread in the western San Joaquin Valley and inner Coastal Ranges south of Fresno. Currently, the Munz's tidy-tips remains on the Carrizo Plain, ranging from the area southeast of Soda Lake to California Valley in San Luis Obispo County (CSUS 2006). This species has also been observed in Kern County in the vicinity of Lost Hills, Comanche Point, and the Kern Lake Bed during the late 1980s (CDFW 2014). The Munz's tidy-tips is potentially threatened by agricultural conversion, commercial development, and cattle grazing, but no detrimental effects have been observed to date (USFWS 1998). As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## Oil Neststraw (Stylocline citroleum)

The oil neststraw has a CRPR of 1B.1 (CNPS 2014) and is included in the SJV Recovery Plan (USFWS 1998). This species is an annual herb that grows at ground level and reaches only about 5 inches tall. It has round flower heads with many florets, and a narrow stem that is covered with woolly hairs. Due to its small size, its nondescript color, and its tendency to grow close to the ground, this species is inconspicuous and difficult to detect and identify. In fact, the oil neststraw is most effectively identified using a microscope. This species is endemic to California and occurs in chenopod scrub, coastal scrub, and valley and foothill grassland habitats with clay or sandy soils. It is known to grow on land that has been developed for oil production (USFWS 1998). The oil neststraw is located at elevations from 190 to 1,000 feet, and its blooming period is from March to April.

The oil neststraw range encompasses portions of Kern County and coastal San Diego County (USFWS 1998). Multiple populations of the oil neststraw were known historically from Kern County in the vicinities of Bakersfield, McKittrick, and Taft, and in San Diego County (USFWS 1998). The oil neststraw is currently known to occur in Elk Hills and the nearby Coles Levee Ecosystem Preserve in western Kern County (USFWS 1998). The oil neststraw is potentially threatened by energy development and urbanization (CNPS 2014). As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## Pale-Yellow Layia (*Layia heterotricha*)

The pale-yellow layia has a CRPR of 1B.1 (CNPS 2014) and is considered a sensitive species by the BLM and the United States Forest Service (USFS). This species stands 9 inches tall and has pale yellow to white flowers. It occurs in cismontane woodlands, pinion and juniper woodlands, and valley and foothill grasslands on alkaline soils or clay. It grows at elevations from 850 to 5,000 feet and blooms from March to June (CNPS 2014).

The pale-yellow layia historically occurred in the San Joaquin Valley, southern Sierra Nevada foothills, Tehachapi Mountains, Inner and Outer South Coastal Ranges, and Western Transverse Range (Baldwin et al. 2012). This species is threatened by agricultural conversion, construction, grazing, non-native plants, and vehicles (CNPS 2014). Other potential threats include road maintenance and wind energy development (CNPS 2014). As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## Piute Mountains Navarretia (*Navarretia setiloba*)

The Piute Mountains navarretia has a CRPR of 1B.1 (CNPS 2014). This species is an annual plant that is generally prickly. Its stem is usually erect and glaborous and hairy. The plant is usually from 4 to 8 inches tall. Its leaves are placed alternately and are simple with linear lobes. Its flowers are purple to light pink. The Piute Mountains navarretia occurs in cismontane woodland, pinyon-juniper woodland, and valley and foothill grasslands in clay or gravelly loam soils between 800 and 7,000 feet in elevation (CNPS 2014). The blooming period of this species is from April to July (CNPS 2014).

The Piute Mountains navarretia historically occurred in Los Angeles, Kern, and Tulare Counties (CNPS 2014). It is believed that the populations of Piute Mountains navarretia on the Valley floor have mostly been extirpated by conversion of habitat to agriculture. As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## Round-Leaved Filaree (*California macrophylla*)

The round-leaved filaree has a CRPR of 1B.1 (CNPS 2014). The round- leaved filaree is an annual herb with a stem that is less than 2 inches tall, forming a patch of slightly lobed, somewhat kidney-shaped to rounded leaves on long slender petioles. Its inflorescence is an umbel of white flowers with petals around 0.4 inches long. Its petals are often tinted pinkish or purple. Its fruit has a fuzzy base and a long narrow style which may reach 2 inches long. This species occurs in cismontane woodland and grassland habitats in open areas at elevations from 30 to 4,000 feet. The blooming period of this species is from March to May (CNPS 2014).

Historically, the round-leaved filaree ranged from southern Oregon through California into northern Mexico (QK 2014). In California, it is known from scattered occurrences in the Great Valley, southern North Coast Ranges, San Francisco Bay Area, South Coast Ranges, Channel Islands, Transverse Ranges, and Peninsular Ranges (Baldwin et al. 2012). As discussed in Impact

4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## Shevock's Golden Aster (*Heterotheca shevockii*)

The Shevock's golden-aster has a CRPR of 1B.1 (CNPS 2014). It is a perennial herb that grows 11 to 51 inches tall, and often has many erect stems. Its stems are hairy to bristly. Its lance-shaped leaves are up to 2.5 inches long and 0.6 inch wide. Its inflorescence contains 3 to 70 flower heads borne on hairy glandular peduncles. Each head contains up to 18 yellow ray florets, each up to 0.4 inch long, and many disc florets at its center. Shevock's golden-aster occurs in chaparral and cismontane woodlands in crevices and shallow sand at elevations from 750 to 3,000 feet. The blooming period of this species is from August to November (CNPS 2014). The Shevock's golden aster is endemic to California and is known only from Kern County. Historical occurrences were recorded in the lower Kern River Canyon within the Greenhorn Mountains. As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## Showy Golden Madia (*Madia radiata*)

The showy golden madia has a CRPR of 1B.1 (CNPS 2014), and is considered by the BLM to be a sensitive species. The showy golden madia is an annual herb with a yellow stem that ranges between 4 and 36 inches tall. Its inflorescence has radiant flowers that are golden yellow. This species occurs in cismontane woodlands and valley and foothill grasslands at elevations from 80 to 4,000 feet. It blooms from March through May. The showy golden madia is threatened by grazing and non-native plants (CNPS 2014).

The showy golden madia historically ranged from the western San Joaquin Valley to the eastern San Francisco Bay Area and Inner South Coastal Ranges (Baldwin et al. 2012). Populations likely still exist in Fresno, Kern, San Benito, Santa Clara, San Luis Obispo, and Stanislaus Counties (CNPS 2014). The showy golden madia is likely extirpated from Contra Costa, Kings, Monterey, Santa Barbara, and San Joaquin Counties (CNPS 2014). As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## Slough Thistle (Cirsium crassicaule)

The slough thistle has a CRPR of 1B.1 (CNPS 2014). It is an annual or perennial herb known to reach 10 feet tall. Its thick stem is hollow and may be nearly 4 inches wide at the base. It is coated in hairs and cobwebby fibers. The woolly spiny leaves are deeply cut into many lobes. The lobes are often lined with teeth. The longest leaves near the base of the plant may be up to 27 inches long. Its inflorescence is a cluster of several flower heads, each up to 1.2 inches long. Its head is lined with spiny phyllaries and filled with pale pink or occasionally white flowers. The slough thistle occurs in chenopod scrub, in marshes and swamps, and riparian scrub at elevations from 10 to 350 feet. The blooming period of this species is from May to August (CNPS 2014). This species is endemic to California and is historically known to occur in the San Joaquin Valley in Kings, San Joaquin, and Kern Counties (CNPS 2014). As discussed in Impact

4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## Spiny-Sepaled Button-Celery (*Eryngium spinosepalum*)

The spiny-sepaled button-celery has a CRPR of 1B.2 (CNPS 2014). The blooming period of this species is from April to May (CNPS 2014). The spiny-sepaled button-celery occurs in valley and foothill grasslands within vernal pools and depressions at elevations from 260 to 900 feet (CNPS 2014). This species grows to 30 inches tall and its leaves are lance-shaped with sharp edges. The spiny-sepaled button-celery has a distinctive inflorescence due to its array of spherical flower heads that are edged with points and bracts. The heads bloom in white petals.

Historically, the spiny-sepaled button-celery is known to occur in the San Joaquin Valley and southern Sierra Nevada foothills (CNPS 2014). The range of this species includes Contra Costa, Fresno, Kern, Madera, Merced, San Luis Obispo, Stanislaus, Tulare, and Tuolumne Counties. The range of the spiny-sepaled button-celery within Kern County is mostly restricted to the northern half of the Project Area northeast of Bakersfield and at the northern tip of the Carrizo Plain (CNPS 2014). This species is threatened by development, grazing, road maintenance, hydrological alterations, and agriculture (CNPS 2014). As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## Striped Adobe-Lily (*Fritillaria striata*)

The striped adobe-lily is listed as state threatened and has a CRPR of 1B.1 (CNPS 2014). The striped adobe-lily is included in the *Draft Recovery Plan for Southern Sierra Foothills Plants*. This plant is 10 to 16 inches tall and has pairs of long oval-shaped leaves about 2.3 to 2.7 inches long. Its nodding flower is a bell-shaped, fragrant bloom with six light pink petals each striped with darker pink. The tips roll back. In the darker center of the flower is greenish-yellow nectar surrounded by yellow anthers. This species occurs at elevations from 440 to 3,750 feet in cismontane woodlands and grassland habitats (CNPS 2014), and appears to be restricted to some of the heavy clay (adobe) soils that are found along the eastern side of the San Joaquin Valley and in some of the foothills. The blooming period of this species is from February to April (CNPS 2014) and flowering is positively correlated with elevation, exposure, and soil moisture levels.

The common species found associated with striped adobe-lily include the wild oat, purple brodiaea, fiddleneck, and blow wives. In those grassland sites where the habitat quality has been substantially degraded, the species is often associated with "weedy" non-natives such as groundsel, filaree, and chickweed. In the higher elevation occurrences in the foothills, the species is associated with widely scattered blue oak trees. Common herbaceous associates in this setting include the popcorn flower, soap plant, lomatium, and red brome.

Historically, the striped adobe-lily was known from several locations in the San Joaquin Valley in Kern and Tulare Counties. Most of these historical valley populations have been extirpated by

urbanization and agricultural development. Twelve extant populations were described in the Striped Adobe Lily Species Management Plan. The Draft Kern County VFHCP recognized three extant populations of the striped adobe-lily, including one in Tulare County and two in Kern County (Garcia and Associates 2010). As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## Tejon Poppy (Eschscholzia lemmonii ssp. kernensis)

The Tejon poppy has a CRPR of 1B.1 (CNPS 2014). Conservation guidelines are described for this species in the SJV Recovery Plan (USFWS 1998). The Tejon poppy reaches a maximum height of 12 inches. Its deeply-divided leaves are mostly clustered at the base of the plant. Each flowering stem is taller than its leaves and bears a single erect, hairless bud that develops into a showy, orange flower. The Tejon poppy lacks a rim-like appendage below the flower, unlike other poppies. The fruit is elongated and contains many tiny, rough seeds. It occurs on chenopod scrub and grassland habitats on adobe clay soils between 800 and 2,000 feet in elevation (CNPS 2015). Details of the life history are not known, but Tejon poppy populations are conspicuous only in years of above-average precipitation. The blooming period of the Tejon poppy is from March to May (CNPS 2014). Association of the Tejon poppy with Kern brodiaea, sunset lupine, and Comanche Point layia is known from occurrences near Comanche Point.

The Tejon poppy distribution is restricted to Kern County. Based on literature reports and collections, this species occurred historically in six areas in the low hills that surround the southern tip of the San Joaquin Valley. In Tejon Hills, it occurred between Chanac and Tejon Canyons. Other historical locations are located near Dry Bog Knoll in Adobe Canyon, mesas east of Bakersfield, Comanche Point, Elk Hills, Pleito Hills, and Maricopa (USFWS 1998). As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## Temblor Buckwheat (Eriogonum temblorense)

The Temblor buckwheat has a CRPR of 1B.2 (CNPS 2014), is included in the SJV Recovery Plan (USFWS 1998), and is considered by the BLM to be a sensitive species. This species occurs in valley and foothill grasslands at elevations from 950 to 3,300 feet, and blooms from April to September. The Temblor buckwheat ranges in height from 4 to 30 inches. Its leaves are located at the base of the plant and are covered with hairs. White flowers are located within a cup-like structure that emerges from the tips of the branches. The threats to this species have not been evaluated at the historical locations, and are unknown. It is anticipated that this species might be potentially threatened by energy development (CNPS 2014) and cattle trampling (USFWS 1998).

The historical distribution of the Temblor buckwheat is based on multiple collections, which are restricted to eight areas of the inner Coast Ranges, including Chico Martinez Canyon and the Shale Hills in Kern County; Indian Valley, Parkfield Grade, and Stone Canyon in Monterey County; and Polonio Pass, Cottonwood Pass, and the Shandon area in San Luis Obispo County. The historical occurrences have not been revisited in recent years, but are believed to be extant.

Another center of occurrence was discovered on the Elkhorn Plain in 1995 (USFWS 1998). The historical database shows multiple historical occurrences of the Temblor buckwheat from Chico Martinez Canyon and Shale Hills, which are located within the Project Area (CNPS 2014). As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

### Vasek's Clarkia (Clarkia temblorienssis ssp. Calientensis)

The Vasek's clarkia has a CRPR of 1B.1 (CNPS 2014), is considered sensitive by the BLM, and is included in the SJV Recovery Plan (USFWS 1998). The Vasek's clarkia can grow up to 30 inches tall and has alternate, grayish-green, lance-shaped leaves. Its flowers have four lavender-pink petals with narrow bases and diamond-shaped tips. This species occurs in grassland habitat at elevations from 850 to 1,700 feet. The blooming period of this species is in April (CNPS 2014).

The Vasek's clarkia is endemic to the Caliente Hills of Kern County, which are southeast of Bakersfield. Its known historical distribution is limited to the type locality where this species was first collected in 1967. This species has not been observed at this location since 1982, despite repeated searches. Two other occurrences were, however, discovered in 1982 to the west of the type locality (USFWS 1998). As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## Special Status Wildlife

Special-status wildlife species are defined herein as those that are listed as threatened and/or endangered by the USFWS or CDFW; designated as SSC or locally significant by CDFW; fully protected under state law; or species that meet the definition of rare or endangered under CEQA Sections 15380(b) and (d). Special status is also extended to birds protected under the Migratory Bird Treaty Act (MBTA). The status and known distributions of special-status wildlife species in the Project Area were evaluated based on a review of available literature, and from federal and state databases, including the CNDDB.

Data collected from previous conservation-related studies and projects within the Project Area were also reviewed. Data sources included:

- Wildlife species listed as threatened or endangered under ESA (Wildlife, 50 CFR § 17.11 and Errata; Plants, 50 CFR §17.12 and Errata, 2002).
- Wildlife species that are candidates for listing under ESA (Wildlife and Plants, 50 CFR §17.3 Proposed and Final Rules, 1999).
- SJV Recovery Plan (USFWS 1998).
- Wildlife species listed as rare, threatened, or endangered under CESA (Wildlife, CCR Title 14, Section 670.5, 1971 as amended; Plants, CCR Title 14, Section 670.2, 1978 as amended).

- CNDDB (CDFW 2014, 2015a).
- California Special Animals (CDFW 2015b).
- Kern County VFHCP (Garcia and Associates 2010).
- MBHCP and EIR (City of Bakersfield and County of Kern 1994).
- Draft Chevron LHCP.
- Draft California Resources Corporation EHHCP.
- Freeport McMoRan Oil & Gas HCP.

A list of all Category 1, Category 2 and Category 3 wildlife considered in the analysis is provided in Table 4.4-36.

**Table 4.4-36: Special-Status Wildlife Species with Potential to Occur in the Project Area**

| Species | Status (Fed/State) | Habitat | Potential to Occur in Project Area |
|---|---|---|---|
| **Category 1 Wildlife Species** | | | |
| **Amphibians** | | | |
| Tehachapi slender salamander *(Batrachoseps stebbinsi)* | -/T | This species inhabits north-facing, moist canyons and ravines in oak and mixed woodlands in arid to semi-arid locations (California Herps 2014). It is found under rocks, logs, bark, and other debris in moist areas, especially in areas with a lot of leaf-litter, often near talus slopes at elevations from 2,000 to 4,600 feet. | Yes, in Tier 1 of the Eastern Subarea. |
| Western spadefoot *(Spea hammondii)* | -/CSC | Occupies various habitats, including grassland, chaparral and oak-pine woodlands. Requires vernal pools for breeding and egg-laying. Occurs throughout the greater San Joaquin Valley, including associated foothills (California Herps 2014). | Yes, in Tier 2 of all subareas. |
| **Reptiles** | | | |
| Blunt-nosed leopard lizard *(Gambelia sila)* | E/E, SFP | Sparsely vegetated, arid habitats of saltbush scrub, alkali sinks, non-native grasslands, Ephedra scrub, and washes ranging in elevations from 90 to 2,600 feet. | Yes, in Tiers 1, 2, 3, and 4 of all subareas. |
| Coast horned lizard *(Phrynosoma coronatum)* | -/CSC | Occurs in relatively open areas of coastal sage scrub, annual grassland, chaparral, oak woodland, riparian woodland, and pine forest habitat on sandy soil, often in association with harvester ants. | Yes, in portions of Tiers 1, 2, 3, and 4 of all subareas. |

**Table 4.4-36: Special-Status Wildlife Species with Potential to Occur in the Project Area**

| Species | Status (Fed/State) | Habitat | Potential to Occur in Project Area |
|---|---|---|---|
| San Joaquin coachwhip *(Masticophis flagellum ruddocki)* | -/CSC | Open, dry, treeless areas, including grasslands and saltbush scrub habitat to 3,000 feet in elevation (Jennings and Hayes 1994). This species takes refuge in rodent burrows, under shaded vegetation, and under surface objects such as woody debris, rocks, and boards. | Yes, in Tiers 1, 2, and 4 of the Western and Central Subareas. |
| Silvery legless lizard *(Anniella pulchra pulchra)* | -/CSC | Burrows in sandy or loose loamy soil and leaf litter of high moisture content under sparse vegetation, particularly in coastal dune and oak woodland habitats. | Yes, in Tiers, 2 and 3 of all subareas. |
| Western pond turtle *(Actinemys marmorata)* | -/CSC | Inhabits vegetated ponds, lakes, and watercourses including rivers, streams, creeks, and canals with basking substrates such as logs, rocks, and exposed banks. | Yes, in Tiers 1, 2, and 3 of all subareas. |
| **Birds** | | | |
| Burrowing owl *(Athene cunicularia)* | -/CSC | Resident throughout southern California. Occurs in open grassland, desert, and scrubland habitats with widely spaced vegetation. Dependent upon burrowing mammals, especially California ground squirrel, for nesting. Forages on insects and small reptiles or mammals. Permanent resident in southern California. | Yes, in Tiers 1, 2, 3, 4, and 5 of all subareas. |
| Golden eagle (*Aquila chrysaetos*) | -/WL, CFP | Resident throughout southern California. Forages in open terrain in deserts, mountains, foothill slopes, and valleys throughout southern California. Nests on cliffs or large trees, and also on artificial structures or rarely, the ground. | Yes, in Tiers 1, 2, and 3 of the Western Subarea. |
| Grasshopper sparrow *(Ammodramus savannarum)* | -/CSC | The species occurs in dense grasslands on rolling hills, lowland plains, valleys, and on hillsides on lower mountain slopes. It favors native grasslands mixed with forbs and scattered shrubs and is loosely colonial while nesting (CDFW 2014). | Yes, in all Tiers in the Western and Eastern Subareas. |
| Least Bell's vireo *(Vireo bellii pusillus)* | E/E | Requires a dense shrub layer 1.5 to 9 feet aboveground in riparian willow scrub habitat, but will use non-riparian habitat as well. Largely absent above 1,640 feet in elevation. Nests occur primarily in willow. Much of historically suitable habitat within the Project Area has been degraded and only known from one location at Windwolves Preserve in the far southern portion of the Western Subarea. | Yes, within Tiers 1 and 2 of the Western and Eastern Subareas. |

**Table 4.4-36: Special-Status Wildlife Species with Potential to Occur in the Project Area**

| Species | Status (Fed/State) | Habitat | Potential to Occur in Project Area |
|---|---|---|---|
| Le Conte's thrasher *(Toxostoma lecontei)* | -/CSC | This species is generally found in open desert scrub, alkali desert scrub, and desert succulent scrub. Nesting habitat mainly consists of taller, bushier shrubs. The Le Conte's thrasher is most commonly associated with sandy and alkaline soils (USWFS 1998). Found to 3,800 feet in elevation. | Yes, in Tiers 1, 2, and 4 of all subareas. |
| Lesser sandhill crane *(Grus canadensis canadensis)* | -/CSC | This species winters near annual and perennial grassland habitats, croplands, and open emergent wetlands in the San Joaquin and Imperial Valleys, and up to Sacramento Valley. Foraging habitat for the lesser sandhill crane consists of shortgrass plains, grain fields, and open wetlands (Grinnell and Miller 1944). It most commonly uses moist sites; however, dry plains farther from water are also utilized. | Yes, in Tiers 1, 2, 3, and 4 of the Western and Central Subareas. |
| Mountain plover *(Charadrius montanus)* | C/CSC | This species inhabits open, arid, sparsely vegetated shortgrass plains and fields, plowed fields, rolling hills, and deserts. This species prefers non-sandy soils with at least 30% bare ground, and favors prairie dog towns, areas heavily grazed by domestic livestock, bare ground areas near artificial watering structures, and recently fallowed or tilled crop fields. Blue grama (*Bouteloua gracilis*) and buffalograss (*Buchloe dactyloides*) communities can provide habitat for this species (Knopf and Rupert 1995). | Yes, in Tiers 1 and 2 of the Western and Central Subareas. |
| Northern harrier *(Circus cyaneus)* | -/CSC | Ground nester in variety of habitats, including wet meadows, lightly grazed pastures, old fields, freshwater and brackish marshes, dry upland prairies, mesic grasslands, drained marshlands, croplands, and riparian woodland. | Yes, in Tiers 1 and 2 of the Western Subarea. |
| Swainson's hawk *(Buteo swainsoni)* | -/T | Breeds throughout California in mixed agricultural or savannah landscapes with fields and scattered trees. Vagrant in coastal southern California. Occurs in Los Angeles County mountains. | Yes, in Tiers 1 and 2 of the Western and Central Subareas. |
| Tricolored blackbird *(Agelaius tricolor)* | -/E | Breeds and forages in fresh-water marshes of cattails, tule and sedges; and willows and blackberries. In southern California, occurs from Santa Barbara to San Diego Counties. | Yes, the Tiers 1, 2, and 3 of all subareas. |
| Yellow-headed blackbird *(Xanthocephalus xanthocephalus)* | -/CSC | The species is found in freshwater marshes during the summer amongst cattails, tule, and bulrush. During migration and over the winter months, it is found in open, cultivated lands, in cropfields, and in pastures (Dotzour 2002). | Yes, in Tiers 2 of the Western and Eastern Subarea. |

**Table 4.4-36: Special-Status Wildlife Species with Potential to Occur in the Project Area**

| Species | Status (Fed/State) | Habitat | Potential to Occur in Project Area |
|---|---|---|---|
| **Mammals** | | | |
| American badger *(Taxidea taxus)* | -/CSC | This species occurs primarily in large grass and sagebrush meadows and valleys with friable soil; however, badgers are also found in forest glades and meadows, marshes, brushy areas, hot deserts, and mountain meadows. In California, the American badger occurs from high alpine meadows to sea level (or below in Death Valley). | Yes, in Tiers 1, 2, and 4 of all subareas. |
| Buena Vista Lake shrew *(Sorex ornatus relictus)* | E/- | This species inhabits riparian and wetland vegetation communities with an abundance of leaf litter and dense herbaceous cover (Williams and Harpster 2001). | Yes, in Tiers 1, 2, and 4 of the Western and Central Subareas. |
| Giant kangaroo rat *(Dipodomys ingens)* | E/E | This species inhabits grasslands and shrub communities on a variety of soil types and on slopes up to about 22% and 2,900 feet above sea level (USFWS 1998). | Yes, in all Tiers of all Subareas. |
| San Joaquin antelope squirrel *(Ammospermophilus nelsoni)* | -/T | This species inhabits relatively arid annual grassland and shrubland communities. The San Joaquin antelope squirrel is restricted to desert and shrubland habitats. | Yes, in Tiers 1, 2, 3, and 4 of all subareas. |
| San Joaquin kit fox *(Vulpes macrotis mutica)* | E/T | The San Joaquin kit fox occupies a variety of habitats, including grasslands, scrublands, oak woodlands, alkali sink scrubland, vernal pool areas, and alkali meadow communities as well as extensively modified habitats, such as oilfields and wind turbine facilities (USFWS 1998). They are present, but generally less abundant, in other highly modified landscapes, such as agricultural row crops, irrigated pastures, orchards, vineyards, and grazed annual grasslands. | Yes, in Tiers 1, 2, 3, 4 and 5 of all subareas. |
| San Joaquin pocket mouse *(Perognathus inornatus)* | -/CSC | The species' habitat is generally characterized as open and sandy areas with grasses and forbs. This species can usually be found between 1,000 to 2,000 feet elevation. Likely to be present in many habitat types found within the Project Area. | Yes, in Tiers 1, 2, 3, and 4 of all subareas. |

**Table 4.4-36: Special-Status Wildlife Species with Potential to Occur in the Project Area**

| Species | Status (Fed/State) | Habitat | Potential to Occur in Project Area |
|---|---|---|---|
| Short-nosed kangaroo rat *(Dipodomys nitratoides brevinasus)* | -/CSC | This species inhabits arid grasslands and shrublands with low, gently-sloping hills and friable soils, particularly those along the western half of the Central Valley ranging from Merced County south to the foothills of the Tehachapi Mountains. They are known to inhabit alkaline soils around Soda Lake on the Carrizo Plain; however, they are also known to occur on less saline soils elsewhere. They are generally found on lighter, powdery soils near sandy bottoms and banks of arroyos and other sandy areas (USFWS 1998). | Yes, in Tier 1, 2, 3, and 4 of all subareas. |
| Tipton kangaroo rat *(Dipodomys nitratoides nitratoides)* | E/E | This species inhabits arid-land communities occupying the valley floor of the Tulare Basin in level or nearly level terrain. It occupies alluvial fan and floodplain soils ranging from fine sands to clay-sized particles. Generally, woody shrubs of one or more species are sparsely scattered over occupied terrain with scant-to-moderate ground cover of grasses and forbs. | Yes, in Tiers 1, 2, 3, and 4 of all subareas. |
| Tulare grasshopper mouse *(Onychomys torridus tularensis)* | BLMS -/CSC | This species is known to occur within arid shrubland and grassland habitats including blue oak woodlands, alkali sink and mesquite vegetation (USFWS 1998). | Yes, in Tiers 1, 2, and 4 of the Western and Eastern Subareas. |
| Western mastiff bat (Greater western mastiff bat) *(Eumops perotis californicus)* | -/CSC | Range extends from California to west Texas and into Mexico, occupying a wide range of habitat from desert scrub to mixed montane forest. Roosting occurs on cliffs with crevices or exfoliating rock slabs. | Yes, in Tiers 1 and 2 of the Western Subarea. |
| **Category 2 Wildlife Species** | | | |
| **Invertebrates** | | | |
| Kern primrose sphinx moth *(Euproserpinus euterpe)* | T/- | This species is associated with sandy washes consisting of coarse to fine textured, decomposed granite soil, and dominant vegetation that includes red-stemmed stork's beak (*Erodium cicutarium*), baby blue-eyes (*Nemophila menziesii*), rabbit brush (*Chyysothamnus nausseosus*), gold fields (*Lasthenia chrysostoma*), and brome grass (*Bromus arenarius*). | Yes, within Tiers 1, 2, 3, and 4 of the Western Subarea. |
| Longhorn fairy shrimp *(Branchinecta longiantenna)* | E/- | The species typically occurs in large, turbid pools and can occur in vernal pools of different landforms, geologic formations, and soil types. Known from the Western Subarea within the Carrizo Vernal Pool Regions. | Yes, in Tiers 1, 2, 3, and 4 of the Central and Western Subareas |

**Table 4.4-36: Special-Status Wildlife Species with Potential to Occur in the Project Area**

| Species | Status (Fed/State) | Habitat | Potential to Occur in Project Area |
|---|---|---|---|
| Vernal pool fairy shrimp *(Branchinecta lynchi)* | T/- | Vernal pools with clear to tea-colored water, typically in grass or mud-bottomed swales in unplowed grasslands (Eriksen and Belk 1999), but has been found to occur in pools ranging from small, clear, sandstone rock pools to large, turbid, alkaline, grassland valley floor pools. | Yes, in Tier 2 of the Central and Eastern Subareas. |
| **Fishes** | | | |
| Kern brook lamprey *(Entosphenus hubbsi)* | -/CSC | The Kern brook lamprey tends to occupy slow backwaters of foothill streams and is commonly associated with sand, gravel, and rubble substrates. | Yes, within waterbodies in Tiers 1 and 2 of the Eastern Subarea. |
| **Amphibians** | | | |
| California red-legged frog *(Rana draytonii)* | T/- | The species occurs in quiet pools of streams, marshes, and sometimes ponds. It is found mainly near ponds in humid forests, woodlands, grasslands, coastal scrub, and streamsides with plant cover and most often occurs in lowlands or foothills and in woods adjacent to streams. Breeding habitat consists of permanent or ephemeral water sources such as lakes, ponds, reservoirs, slow streams, marshes, bogs, and swamps. This species is usually found at elevations to 5,000 feet. | Yes, within Tier 2 of the Western Subarea. |
| California tiger salamander *(Ambystoma californiense)* | E/T | The USFWS has identified critical habitat for the California tiger salamander in the northwest corner of the Project Area within the Temblor Range. Grasslands and low foothill regions where lowland aquatic sites are available for breeding. This species also requires nearby upland terrestrial habitat for aestivation that contains small mammal burrows (particularly California ground squirrel burrows) or crevices that provide refugia. The California tiger salamander occurs at elevations to 3,200 feet (Jennings and Hayes 1994). | Yes, within Tier 2 of the Western Subarea. |
| Kern Canyon slender salamander *(Batrachoseps simatus)* | -/T | The species occurs only in the lower Kern River Canyon in chaparral, cismontane woodland, riparian scrub, and riparian woodland communities. It prefers north facing slopes and is found under vegetative liter such as downed pine, oak, and chaparral scrub logs as well as under rocks (California Herps 2014). The species' elevation ranges from 1,400 feet up to 4,000 feet at Erskine Creek. | Yes, within Tiers 2 and 3 of the Eastern Subarea. |

**Table 4.4-36: Special-Status Wildlife Species with Potential to Occur in the Project Area**

| Species | Status (Fed/State) | Habitat | Potential to Occur in Project Area |
|---|---|---|---|
| Yellow-blotched salamander (*Ensatina eschscholtzii croceator)* | -/CSC | This species is found in evergreen and deciduous forests, under rocks, logs, and other surface debris, especially bark that has peeled off and fallen beside decaying logs. | Yes, in Tier 2 of the Eastern Subarea. |
| **Reptiles** | | | |
| Bakersfield legless lizard *(Annielle grinnelli)* | -/- | Burrows in sandy or loose loamy soil and leaf litter of high moisture content under sparse vegetation, particularly in coastal dune and oak woodland habitats. | Yes, in Tiers 1, 2, 3, and 4 of all Subareas. |
| Temblor legless lizard *(Anniella alexanderae)* | -/- | Burrows in sandy or loose loamy soil and leaf litter of high moisture content under sparse vegetation, particularly in coastal dune and oak woodland habitats. | Yes, in Tiers 1, 2, 3, and 4 of all Subareas. |
| **Birds** | | | |
| Bald eagle *(Haliaeetus leucocephalus)* | D/E, SFP | During winter, may forage in non-urbanized portions of Project component areas. This species is occasionally present as a local winter migrant at a few localities in Kern County. It most frequently uses perches that are open and easily approached, such as large, stoutly limbed trees, snags, or broken-topped trees. | Yes, in Tiers 1 and 2 of the Eastern Subarea. |
| California condor *(Gymnogyps californianus)* | E/E, SFP | Roosts on large trees, snags, or isolated rock outcrops or cliffs. Nests where there is minimal disturbance, typically cliffs or shallow caves with no nesting material. Requires vast remote areas for foraging, including grasslands and oak savannas. Feeds on carrion of large mammals. Condors may fly 150 miles a day in search of food. | Yes, in Tiers 1 and 2 of the Eastern and Western Subareas. |
| Fulvous whistling-duck (*Dendrocygna bicolor)* | -/CSC | It inhabits and nests in marshlands, wet meadows, rice fields, flooded agricultural areas, and lagoons. This species prefers to nest in dense wetlands, shallow lacustrine and quiet riverine waters. | Yes, within Tier 2 of the Central and Western Subareas. |
| Loggerhead shrike *(Lanius ludovicianus)* | -/CSC | Relatively common in suitable habitat within the Project Area. Suitable habitat for nesting and foraging present throughout Project component areas. Nests in dense shrubs. Hunts in grassland, scrubland, or open woodland, preferring open areas bordered by trees and brush. | Yes, in Tiers 1, 2, and 4 of the Western and Eastern Subareas. |

**Table 4.4-36: Special-Status Wildlife Species with Potential to Occur in the Project Area**

| Species | Status (Fed/State) | Habitat | Potential to Occur in Project Area |
|---|---|---|---|
| Long-eared owl *(Asio otus)* | -/CSC | This species inhabits conifer, oak, riparian, pinyon-juniper, and desert woodlands that are either open or are adjacent to grasslands, meadows, or shrublands from sea level up to 6,550 feet in elevation. Nesting and roosting habitat require dense wooded areas with openings for hunting, windrows, caves and/or cracks in rock canyons. | Yes, in Tier 1 of the Eastern Subarea. |
| Short-eared owl *(Asio flammeus)* | -/CSC | In the Project Area, this species is likely to winter in marsh and seep, meadow and seep, valley and foothill grassland, and wetland habitats. May also forage in irrigated alfalfa fields. It requires tall grasses for daytime seclusion. | Yes, in all Tiers of the Central and Western Subareas |
| Western snowy plover *(Charadrius alexandrinus nivosus)* | T/- | In the Project Area, this ground nesting bird may inhabit barren to sparsely vegetated sand beaches, levees and flats at salt-evaporation ponds, river bars, along alkaline or saline lakes, reservoirs, and ponds. | Yes, in Tier 2 of the Central and Western Subareas. |
| White-tailed kite *(Elanus leucurus)* | -/SFP | Occurs in grasslands, savannah, oak woodlands, and mixed agricultural areas. Nesting typically near water in large trees. Permanent resident in southern California. | Yes, in Tiers 1, 2, 3, and 4 of all subareas. |
| **Mammals** | | | |
| Pallid bat *(Antrozous pallidus)* | -/CSC | Inhabits a variety of habitats. Associated with oak woodlands. Roosting occurs singly or in groups in a wide range of crevice types. | Yes, in Tiers 1, 2, 3, and 4 of the Western Subarea and in Tiers 2, 3, and 4 of the Eastern Subarea. |
| Ringtail *(Bassariscus astutus)* | -/CSC, CFP | The ringtail prefers to live in rocky habitats associated with water. These areas can include riparian canyons, caves, and mine shafts. | Yes, in Tiers 1, 2, 3, and 4 of the Western and Eastern Subareas. |
| Townsend's big-eared bat *(Corynorhinus townsendii)* | -/C | Townsend's big-eared bats occur in a variety of habitats throughout California, but they are most commonly associated with desert scrub, mixed conifer forest, and pinon-juniper or pine forest habitat. | Yes, in Tiers 1, 2, 3, and 4 of all subareas. |
| **Category 3 Wildlife Species** | | | |
| **Invertebrates** | | | |
| Conservancy fairy shrimp *(Branchinecta conservatio)* | E/- | The species typically occurs in large, highly turbid pools, and it can occur in vernal pools of different landforms, geologic formations, and soil types. | Not expected |

**Table 4.4-36: Special-Status Wildlife Species with Potential to Occur in the Project Area**

| Species | Status (Fed/State) | Habitat | Potential to Occur in Project Area |
|---|---|---|---|
| Hopping's blister beetle *(Lytta hoppingi)* | -/- | There is no published information on habitat or floral visitation records for Hopping's blister beetle. | Not expected |
| Kern shoulderband *(Helminthoglypta callistoderma)* | -/- | There is no published information on habitat or floral visitation records for Kern shoulderband. | Not expected |
| Moestan blister beetle *(Lytta moesta)* | -/- | There is no published information on habitat or floral visitation records for this species. | Yes, in Tier 2 of the Western and Eastern Subareas. |
| Morrison's blister beetle *(Lytta morrisoni)* | -/- | There is no published information on habitat for this species available. | Not expected |
| San Emigdio blue butterfly *(Plebulina emigdionis)* | -/- | The San Emigdio butterfly occupies desert canyons and is found along riverbeds. | Yes, in Tier 1 of the Western Subarea. |
| Valley elderberry longhorn beetle *(Desmocerus californicus dimorphus)* | T/- | Riparian habitat only in the vicinity of their host plant, the elderberry. | Not expected |
| Zavortink's protodufourea bee *(Protodufourea zavortinki)* | -/- | There is no information on species habitat preferences published. | Yes, in Tier 4 of the Western Subarea. |
| **Fishes** | | | |
| Delta smelt *(Hypomesus transpacificus)* | T/T | The delta smelt moves into tidal freshwater habitats to spawn from late winter to spring. Most of the spawning of this species occurs in Suisun Marsh and the Napa River. | Not expected |
| **Amphibians** | | | |
| Foothill yellow-legged frog *(Rana boylii)* | -/SSC | This species prefers partly-shaded shallow streams with a rocky substrate in a variety of habitats such as chaparral, cismontane woodland, coastal scrub, Klamath/North coast flowing waters, lower montane coniferous forests, meadow and seep, riparian forest, riparian woodland, and Sacramento and San Joaquin flowing waters (CDFW 2014). | Not expected |

**Table 4.4-36: Special-Status Wildlife Species with Potential to Occur in the Project Area**

| Species | Status (Fed/State) | Habitat | Potential to Occur in Project Area |
|---|---|---|---|
| Northern leopard frog *(Lithobates pipiens)* | -/SSC | This species requires a mosaic of habitats to meet the requirements of all of its life stages. It breeds in a variety of aquatic habitats that includes slow-moving or still water along streams and rivers, wetlands, permanent or temporary pools, beaver ponds, and human-constructed habitats such as earthen stock tanks and borrow pits. | Not expected |
| **Reptiles** | | | |
| Giant garter snake *(Thamnophis gigas)* | FT/CT | This species is found in marshes, sloughs, drainage canals, and irrigation ditches, especially around rice fields, and occasionally in slow-moving creeks from sea level to 400 feet. It prefers locations with vegetation close to the water for basking (California Herps 2014). | Not expected |
| San Bernardino ringneck snake *(Diadophis punctatus modestus)* | -/- | The San Bernardino ringneck snake is found primarily in canyons and foothills, and sometimes in sand dunes. They are secretive, and often take refuge under rocks, dead leaves, and downed woody debris. | Yes, in Tiers 1 and 2 of the Eastern Subarea. |
| **Birds** | | | |
| Black-crowned night heron *(Nycticorax nycticorax)* | -/- | The black-crowned night-heron is a fairly common, yearlong resident in lowlands and foothills throughout most of California. Feeds along the margins of lacustrine, large riverine, and fresh and saline emergent habitats and, rarely, on kelp beds in marine subtidal habitats. Nests and roosts in dense-foliaged trees and dense emergent wetlands. | Yes, in Tier 2 of the Western Subarea. |
| California horned lark *(Eremophila alpestris actia)* | -/WL | It is found in open areas dominated by sparse low herbaceous vegetation or widely scattered low shrubs. California horned larks nest in on the ground often next to grass tufts, clods of earth, or manure (NatureServe Explorer 2015). | Yes, in Tiers 1 and 2 in all subareas. |
| Great egret *(Ardea alba)* | -/- | Requires groves of trees suitable for nesting and roosting, relatively isolated from human activities, near aquatic foraging areas. Feeds in shallow water and along shores of estuaries, lakes, ditches, and slow-moving streams, in salt ponds and mudflats, and in irrigated croplands and pastures. | Yes, in Tier 2 of the Western and Eastern Subareas. |
| Merlin *(Falco columbarius)* | -/WL | Inhabits coastlines, open grasslands, savannahs, woodlands, lakes, wetlands, edges, and land in early successional stages. It ranges from annual grasslands to ponderosa pine and montane hardwood-conifer habitats (Zeiner et al. 1988-1990). | Yes, in Tier 2 and 4 of the Western and Eastern Subareas. |

**Table 4.4-36: Special-Status Wildlife Species with Potential to Occur in the Project Area**

| Species | Status (Fed/State) | Habitat | Potential to Occur in Project Area |
|---|---|---|---|
| Prairie falcon *(Falco mexicanus)* | -/WL | Prairie falcons inhabit grasslands, shrub-steppe, deserts, and other open areas of the west up to about 10,000 feet elevation, but they also reside in cultivated fields, lakeshores, and desert scrub during the winter (Cornell 2015a). In the Sierra Nevada, prairie falcons range above timberline in late summer, but at lower elevations during the winter, such as in the San Joaquin Valley. During the breeding season, prairie falcons are commonly found in the foothills and mountains which provide cliffs and escarpments suitable for nest sites. The prairie falcon generally nests on cliffs and prefers cliffs with sheltered ledges, loose debris, or gravel that overlook treeless country for hunting. The species also nests on power pole structures. In the San Joaquin Valley, most prairie falcon nests have northern exposures; no south-facing ledges have been documented. | Yes, in all Tiers and in all Subareas. |
| Snowy egret *(Egretta thula)* | -/- | During the breeding season, snowy egrets feed in estuaries, saltmarshes, tidal channels, shallow bays, and mangroves. They winter in mangroves, saltwater lagoons, freshwater swamps, grassy ponds, and temporary pools, and forage on beaches, shallow reefs, and wet fields. | Yes, in Tier 2 of the Western and Eastern Subareas. |
| Southwestern willow flycatcher *(Empidonax traillii extimus)* | E/E | Nests in riparian vegetation, willows, and coast live oak. Feeds on insects. | Yes, in Tier 2 of the Western Subarea. |
| Western yellow-billed cuckoo *(Coccyzus americanus occidentalis)* | C/E | Inhabits large tracts of riparian woodland with unbroken canopy and dense understory. Nests in trees typically with vertical branching. | Not expected |
| White-faced ibis (*Plegadis chihi*) | -/WL | This species inhabits fresh and saltwater marshes containing many rushes and sedges which are used to nest on, obtaining nesting materials, and for finding food. It is also found around ponds, rivers and in flooded pastures and agricultural fields. White-faced ibis occurs from near sea level to 14,100 feet elevation. (Gumbleton 2007) | Yes, in Tier 2 of the Western Subarea. |

**Table 4.4-36: Special-Status Wildlife Species with Potential to Occur in the Project Area**

| Species | Status (Fed/State) | Habitat | Potential to Occur in Project Area |
|---|---|---|---|
| **Mammals** | | | |
| Dulzura pocket mouse *(Chaetodipus californicus femoralis)* | -/CSC | This species can occur in a wide variety of habitats, including montane hardwood, valley foothill hardwood-conifer forest, valley foothill hardwood, annual grassland, sagebrush, chamise-redshank and montane chaparral, and coastal scrub (Erickson and Patten 1999). This species is mostly abundant from areas where grassland and chaparral co-occur. | Not expected |
| Hoary bat *(Lasiurus cinereus)* | -/- | May be found at any location in California, although distribution is patchy in southeastern deserts. Prefers open habitats or habitat mosaics, with access to trees for cover and open areas or habitat edges for feeding. Generally roosts in dense foliage of medium to large trees. (Anderson 2002) | Yes, in Tier 2 of the Western and Eastern Subareas. |

**Status explanations:**
**Federal**
DL = Delisted
E = Endangered
T = Threatened
BLMS = Bureau of Land Managament (BLM) Sensitive

**State**
E = Endangered
T = Threatened
SFP = California Department of Fish and Wildlife Designated (State) Fully Protected
CSC = California Department of Fish and Wildlife Species of Special Concern
WL = watch list

Additional information is provided for all Category 1 and Category 2 wildlife species below. The Category 1 wildlife species modeled suitable habitat maps are provided in Appendix N.

## Category 1 Wildlife Species

### Tehachapi Slender Salamander *(Batrachoseps stebbinsi)*

The Tehachapi slender salamander is a state threatened species. The Tehachapi slender salamander is red to brown in coloration with light beige, tan, or black patches and blotches along its back (California Herps 2014). This species is described in the Tehachapi Uplands Multiple Species Habitat Conservation Plan (TUMSHCP). The Tehachapi slender salamander is has been found in habitat in a few isolated localities in the Piute and Tehachapi Mountains of Kern County, and possibly in Los Angeles County. This species inhabits north-facing, moist canyons and ravines, in oak and mixed woodlands in arid to semi-arid locations (California Herps 2014). It is found under rocks, logs, bark, and other debris in moist areas, especially in areas with a lot of leaf-litter, often near talus slopes at elevations from 2,000 to 4,600 feet.

The Tehachapi slender salamander is found only in Kern County. It is known from scattered populations in the Caliente Creek drainage at the juncture of the Sierra Nevada and the Tehachapi Mountains, and in isolated canyons on the northern slopes of the Tehachapi Mountains from Tejon Canyon to Fort Tejon (California Herps 2014). One specimen was collected in 1957 near Tehachapi Pass, but none have been found in that area since then (California Herps 2014). Additionally, the historical database shows one occurrence recorded in 1979 near Elderberry Springs at Tejon Ranch (CDFW 2014).

Modeled suitable habitat data for this species was prepared by QK. The QK model does not provide acreage estimates for low to moderate quality habitat. Table 4.4-37 summarizes modeled Tehachapi slender salamander high quality modeled habitat acreage by tier and subarea. The locations of modeled suitable habitat for this species in the Project Area are shown on Figure 4.4-10 in Appendix N.

**Table 4.4-37: Tehachapi Slender Salamander Acres of High Quality Habitat**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| Tier 1 | - | - | - | - |
| Tier 2 | - | - | 8,282 | 8,282 |
| Tier 3 | - | - | - | - |
| Tier 4 | - | - | 103 | 103 |
| Tier 5 | - | - | - | - |
| **TOTAL** | **-** | **-** | **8,385** | **8,385** |

Source: QK 2014

## Western Spadefoot *(Spea hammondii)*

The western spadefoot is a California SSC. The western spadefoot inhabits sandy or gravelly soils within alluvial fans, alkali flats, grasslands, sandy washes, river floodplains, coastal sage scrub, woodlands, foothills, and mountains. This species will generally occur in grasslands; however, populations can persist for a few years in orchard or vineyard habitats. It requires water for breeding, which occurs during periods of rainfall between October and May. The primary threats to the western spadefoot are land conversion, which eliminates rain pools, as well as predation of larvae by introduced predators such as bullfrogs and mosquito fish. Adult western spadefoots usually feed on insects, worms, and other invertebrates. Tadpoles will consume planktonic organisms and algae, but will be mostly carnivorous. Additionally, loss of individuals and burrows during ground disturbance associated with construction activities and vehicle movement as well as introduction of pollutants to aquatic zones may negatively impact this species. This species generally occurs from sea level to 4,500 feet.

In California, the western spadefoot ranges throughout the Central Valley, and throughout the Coastal Ranges and the coastal lowlands from San Francisco Bay southward to Mexico (Jennings and Hayes 1994). The western spadefoot has been extirpated throughout most of the lowlands of

southern California (USFWS 1998) and from many historical locations within the Central Valley (Jennings and Hayes 1994). Since 1996, 44 new occurrences were reported from the San Joaquin Valley and seven from within the Project Area (CDFW 2014).

URS SBM modeling data was available for this species and produced results that have good predictive power. The primary environmental factors affecting habitat for this species included soil type (most important), followed by annual precipitation, mean diurnal temperature range, elevation, and winter low temperature. Table 4.4-38 summarizes modeled Western spadefoot high quality and poor to moderate quality habitat acreage by tier and subarea. The locations of modeled suitable habitat for this species in the Project Area are shown on Figure 4.4-11 in Appendix N.

**Table 4.4-38: Modeled Western Spadefoot High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| **High Quality Modeled Habitat** | | | | |
| Tier 1 | - | - | - | - |
| Tier 2 | 167 | - | - | 167 |
| Tier 3 | - | - | - | - |
| Tier 4 | - | - | - | - |
| Tier 5 | - | - | - | - |
| **TOTAL** | **167** | **-** | **-** | **167** |
| **Poor to Moderate Quality Modeled Habitat** | | | | |
| Tier 1 | 163,037 | 3,002 | 40,518 | 206,557 |
| Tier 2 | 718,735 | 522,011 | 443,556 | 1,684,302 |
| Tier 3 | 2,043 | 2,801 | 11,037 | 15,881 |
| Tier 4 | 3,505 | 10,372 | 14,589 | 28,466 |
| Tier 5 | 771.74 | - | 1,740.23 | 2,512 |
| **TOTAL** | **888,094** | **538,186** | **511,440** | **1,937,719** |

Source: Chevron 2014

## Blunt-Nosed Leopard Lizard *(Gambelia sila)*

The blunt-nosed leopard lizard is listed as a federal and state endangered species, and is a state fully protected species. It is included in the SJV Recovery Plan (USFWS 1998). This species is characterized by a short blunt snout. It is grayish yellow above with dark spots arranged in rows, and has distinct pale cross-bands along on its body. It has a distinct head and is relatively large in comparison to other lizard species in its range. Young individuals and breeding females develop reddish-orange spots on their bodies that aid in identification of the species. Breeding males generally have a broader head and display a pink to salmon color on their throat and chest and sometimes over their entire body (USFWS 1998). Blunt-nosed leopard lizards are

typically associated with sparsely vegetated, arid habitats of saltbush scrub, alkali sinks, non-native grasslands, *Ephedra* scrub, and washes ranging in elevations from 90 to 2,600 feet.

The current distribution of the blunt-nosed leopard lizard is restricted to scattered sites in the southern San Joaquin Valley, Carrizo Plain, Elkhorn Plain, and southeastern Cuyama Valley, roughly corresponding to the western half of Kern County, the eastern boundary of San Luis Obispo and Kings Counties, the western boundary of Fresno County, and extreme southwestern Tulare County. This species persists in only 15% of its original range (Germano and Williams 1992). These lizards are now rare and localized within habitats throughout their current range.

URS SBM modeling data was used to analyze this species and had good predictive power. The primary environmental factors affecting habitat for this species included winter low temperature (most important), followed by soil type, ruggedness, annual precipitation, and slope. Table 4.4-39 summarizes modeled blunt nosed leopard lizard high quality and poor to moderate quality habitat acreage by tier and subarea. The locations of modeled suitable habitat for this species in the Project Area are shown on Figure 4.4-12 in Appendix N.

**Table 4.4-39: Modeled Blunt Nosed Leopard Lizard High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| **High Quality Modeled Habitat** | | | | |
| Tier 1 | 86,447 | - | - | 86,447 |
| Tier 2 | 133,559 | 12,230 | 2,444 | 148,233 |
| Tier 3 | 1,051 | 15 | - | 1,066 |
| Tier 4 | 1,354 | 187 | - | 1,542 |
| Tier 5 | 0.16 | - | 126.38 | 127 |
| **TOTAL** | **222,412** | **12,432** | **2,570** | **237,414** |
| **Poor to Moderate Quality Modeled Habitat** | | | | |
| Tier 1 | 76,590 | 3,002 | 40,518 | 120,110 |
| Tier 2 | 585,343 | 509,781 | 441,112 | 1,536,236 |
| Tier 3 | 993 | 2,786 | 11,037 | 14,815 |
| Tier 4 | 2,151 | 10,185 | 14,589 | 26,925 |
| Tier 5 | 771.58 | - | 1,613.85 | 2,385 |
| **TOTAL** | **665,848** | **525,754** | **508,870** | **1,700,472** |

Source: Chevron 2014

## Coast Horned Lizard (*Phrynosoma coronatum*)

The coast horned lizard (Blainville's horned lizard or California horned lizard) is a California SSC. It is described as a flat-bodied lizard with a wide oval- shaped body, scattered enlarged pointed scales on the upper body and tail, and a large crown of horns or spines on the head. The two center horns are the longest, and each side of the body has two rows of pointed fringe scales (USFWS 1998). Each side of the throat has two to three rows of enlarged pointed scales as well (USFWS 1998). The coast horned lizard can be reddish, brown, yellow, or gray with dark blotches on the back and large dark spots on the sides of the neck. The belly is cream, beige, or yellow, usually with dark spots, and the belly scales are smooth. This species typically inhabits grasslands, woodlands, forests, washes and low vegetation areas with loose sandy soil from sea level to 8,000 feet.

The coast horned lizard is found primarily in coastal areas of the southwestern coast of the United States and the Baja Peninsula of northwestern Mexico. The species was historically found from the Shasta Reservoir and San Francisco Bay, the Transverse Ranges of Kern and Santa Barbara Counties, south along the coast and inland valleys to the tip of the Baja Peninsula, Mexico.

URS SBM modeling data was available for this species and had good predictive power. The primary environmental factors affecting habitat for this species included soil type (most important), followed by water availability, ruggedness, precipitation of wettest month, and slope. Table 4.4-40 summarizes modeled Coast horned lizard high quality and poor to moderate quality habitat acreage by tier and subarea. The locations of modeled suitable habitat for this species in the Project Area are shown on Figure 4.4-13 in Appendix N.

**Table 4.4-40: Modeled Coast Horned Lizard High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| **High Quality Modeled Habitat** | | | | |
| Tier 1 | 411 | 0 | - | 411 |
| Tier 2 | 6,941 | 82,358 | - | 89,299 |
| Tier 3 | 7 | 456 | - | 463 |
| Tier 4 | 49 | 1,683 | - | 1,731 |
| Tier 5 | - | - | - | - |
| **TOTAL** | **7,408** | **84,497** | **-** | **91,904** |
| **Poor to Moderate Quality Modeled Habitat** | | | | |
| Tier 1 | 162,627 | 3,002 | 40,518 | 206,146 |
| Tier 2 | 711,961 | 439,653 | 443,556 | 1,595,170 |
| Tier 3 | 2,036 | 2,345 | 11,037 | 15,418 |

**Table 4.4-40: Modeled Coast Horned Lizard High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| Tier 4 | 3,457 | 8,689 | 14,589 | 26,735 |
| Tier 5 | 771.74 | - | 1,740.23 | 2,512 |
| **TOTAL** | **880,853** | **453,689** | **511,440** | **1,845,981** |

Source: Chevron 2014

## San Joaquin Coachwhip (Masticophis flagellum ruddocki)

The San Joaquin whipsnake is a California SSC. This species is around 43 inches in length, is slender in girth, and has a large head in comparison to the size of its body. The San Joaquin whipsnake occurs in open, dry, treeless areas, including grasslands and saltbush scrub habitat between 60 and 3,000 feet in elevation (Jennings and Hayes 1994). This species takes refuge in rodent burrows, under shaded vegetation, and under surface objects such as woody debris, rocks, and boards.

The San Joaquin whipsnake historically ranged from Arbuckle in the Sacramento Valley in Colusa County southward to the Grapevine in Kern County and westward into the inner South Coastal Ranges. Currently, the population is declining throughout its range (USFWS 1994). The primary threats to the species are land use changes and urban development resulting in the loss of food sources and the mammal burrows used for refuge. Individuals may also be impacted or lost as a result of ground disturbing activities related to other human development projects. Based on the habitat requirements of the San Joaquin whipsnake, the land use conversion practices associated with oil and gas production will likely result in conditions that are incompatible with this species (Jennings and Hayes 1994).

URS SBM modeling data was available for this species and had good predictive power. The primary environmental factors affecting habitat for this species included soil type (most important), followed by ruggedness, precipitation of wettest month, aspect (easting), and elevation. Table 4.4-41 summarizes modeled San Joaquin Coachwhip high quality and poor to moderate quality habitat acreage by tier and subarea. Modeling results showed the Western Subarea has the highest acreages of poor to moderate quality habitat in all Tiers. Poor to moderate habitat for the Central Subarea only occurs in Tier 2. The Eastern Subarea has poor to moderate quality habitat in all Tiers. The locations of modeled suitable habitat for this species in the Project Area are shown on Figure 4.4-14 in Appendix N.

**Table 4.4-41: Modeled San Joaquin Coachwhip High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| **High Quality Modeled Habitat** | | | | |
| Tier 1 | 61,376 | - | 449 | 61,826 |
| Tier 2 | 71,742 | 3,521 | 1,957 | 77,221 |
| Tier 3 | 970 | - | 36 | 1,006 |
| Tier 4 | 1,573 | - | 20 | 1,593 |
| Tier 5 | 0.16 | - | 247.15 | 247 |
| **TOTAL** | **135,662** | **3,521** | **2,709** | **141,892** |
| **Poor to Moderate Quality Modeled Habitat** | | | | |
| Tier 1 | 101,661 | 3,002 | 40,069 | 144,732 |
| Tier 2 | 647,160 | 518,490 | 441,598 | 1,607,248 |
| Tier 3 | 1,073 | 2,801 | 11,001 | 14,875 |
| Tier 4 | 1,933 | 10,372 | 14,569 | 26,874 |
| Tier 5 | 771.58 | - | 1,493.08 | 2,265 |
| **TOTAL** | **752,598** | **534,665** | **508,730** | **1,795,993** |

Source: Chevron 2014

## Silvery Legless Lizard (*Anniella pulchra pulchra*)

In September 2013, the *Anniella* species was split into five species based on the four newly described lineages, identifying four new species and giving a new common name to the species now known as *Anniella pulchra* (California Herps 2014). The silvery legless lizard is a California SSC and the statuses of the four newly described species have not yet been determined. Two of the newly described species, the Temblor legless lizard and the Bakersfield legless lizard, are known to have a range within the Project and are described below. Because little is still known about these new species, they are considered as special-status here due to the status of silvery legless lizard as a California SSC. It is further assumed that, based on Papenfuss and Parham (2013), all legless lizards expected to occur within the Project Area would be one of the three described here. However, given the extremely limited distribution information available for the two newly described species, all three species are discussed together. As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

The silvery legless lizard can be mistaken for a snake because of its elongated body and complete lack of limbs. However, silvery legless lizards lack external ear openings and have unreduced eyes with moveable lids (QK 2014). The species' snout to vent length is 3.5 to 6.7 inches and their total length is around 7.9 inches. The silvery legless lizards are typically found in moist warm loose soil with plant cover in sparsely vegetated areas of beach dunes,

chaparral, pine-oak woodlands, desert scrub, sandy washes, and stream terraces with sycamores, cottonwoods, or oaks where leaf litter accumulates. Individuals may also be found under surface objects such as rocks, boards, driftwood, and logs.

Historically, the silvery legless lizards ranged from the southern edge of the San Joaquin River in northern Contra Costa County south to northwestern Baja California Del Norte. This species occurs in scattered locations in the San Joaquin Valley and along the southern Sierra Nevada Mountains including the Tehachapi Mountains, the edge of the deserts in Walker Pass, Morongo Valley, Whitewater, and the east slope of the Peninsular Ranges. It also occurs in the western Mojave Desert near Lancaster in the Antelope Valley.

URS SBM modeling data was available for the silvery legless lizard, had good predictive power, and included all three species of legless lizard. The primary environmental factors affecting habitat for this species included soil type (most important), followed by precipitation of driest month, precipitation of wettest month, water availability, and slope. Table 4.4-42 summarizes modeled silvery legless lizard high quality and poor to moderate quality habitat acreage by tier and subarea. The locations of modeled suitable habitat for this species in the Project Area are shown on Figure 4.4-15 in Appendix N.

**Table 4.4-42: Modeled Silvery Legless Lizard High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| **High Quality Modeled Habitat** | | | | |
| Tier 1 | 2,113 | 149 | 1,458 | 3,720 |
| Tier 2 | 6,853 | 3,105 | 8,555 | 18,513 |
| Tier 3 | 4 | 71 | 1,854 | 1,930 |
| Tier 4 | 70 | 1,321 | 539 | 1,930 |
| Tier 5 | - | - | - | - |
| **TOTAL** | **9,041** | **4,647** | **12,405** | **26,093** |
| **Poor to Moderate Quality Modeled Habitat** | | | | |
| Tier 1 | 160,925 | 2,853 | 39,060 | 202,838 |
| Tier 2 | 712,049 | 518,906 | 435,001 | 1,665,956 |
| Tier 3 | 2,039 | 2,730 | 9,182 | 13,951 |
| Tier 4 | 3,435 | 9,050 | 14,050 | 26,536 |
| Tier 5 | 771.74 | - | 1,740.23 | 2,512 |
| **TOTAL** | **879,219** | **533,539** | **499,034** | **1,911,792** |

Source: Chevron 2014

## Western Pond Turtle (*Actinemys marmorata*)

The Western pond turtle is a California SSC, and is under review by the USFWS for protection under the ESA. Adult western pond turtles measure about 7 inches in length and weigh around 2 pounds. This species has a dark brown to black carapace, and a black and yellow plastron. The species inhabits vegetated ponds, lakes, and watercourses including rivers, streams, creeks, and canals with basking substrates such as logs, rocks, and exposed banks.

The Western pond turtle is historically found from British Columbia to northern Baja California. The turtle's known range is now considerably decreased. The northwestern subspecies ranges from southern British Columbia south to central California, while the southwestern subspecies tends to be more coastal, and ranges northward from northern Mexico to the San Francisco Peninsula. The two subspecies intergraded in the Central Valley, from north of Sacramento to Kern County. Threats to the species include agriculture and grazing, predation, loss of habitat, disease and collection. Individuals may also be impacted or lost as a result of ground disturbing activities, which can destroy nests, and water diversion projects.

URS SBM modeling data as available for this species and had good predictive power. The primary environmental factors affecting habitat for this species included soil type (most important), followed by water availability, summer mean temperature, ruggedness, and aspect (northing). Table 4.4-43 summarizes modeled Western Pond turtle high quality and poor to moderate quality habitat acreage by tier and subarea. The locations of modeled suitable habitat for this species in the Project Area are shown on Figure 4.4-16 in Appendix N.

**Table 4.4-43: Modeled Western Pond Turtle High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| **High Quality Modeled Habitat** | | | | |
| Tier 1 | 1,573 | 91 | 1,018 | 2,681 |
| Tier 2 | 2,715 | 191 | 2,660 | 5,566 |
| Tier 3 | 0 | 5 | 1,419 | 1,424 |
| Tier 4 | 14 | - | 335 | 349 |
| Tier 5 | - | - | - | - |
| **TOTAL** | **4,302** | **286** | **5,432** | **10,021** |

**Table 4.4-43: Modeled Western Pond Turtle High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| **Poor to Moderate Quality Modeled Habitat** | | | | |
| Tier 1 | 161,465 | 2,911 | 39,500 | 203,876 |
| Tier 2 | 716,187 | 521,820 | 440,896 | 1,678,902 |
| Tier 3 | 2,043 | 2,796 | 9,617 | 14,457 |
| Tier 4 | 3,492 | 10,372 | 14,254 | 28,117 |
| Tier 5 | 771.74 | - | 1,740.23 | 2,512 |
| **TOTAL** | **883,958** | **537,899** | **506,007** | **1,927,864** |

Source: Chevron 2014

## Burrowing Owl (Athene cunicularia)

The burrowing owl (western burrowing owl) is a California SSC and is protected by the MBTA. The burrowing owl's body is generally brown with speckles of white. The owl's breast is a lighter color brown while its face is encircled in white, with tinges of sandy brown feathers. Its wings are about the same size as its body; its legs are featherless, and it has round yellow eyes. The burrowing owl occupies grasslands, deserts, sagebrush scrub, agricultural areas (including pastures and untilled margins of cropland), earthen levees and berms, coastal uplands, and urban vacant lots; as well as the margins of airports, golf courses, and roads. It selects sites that support short vegetation, even bare soil, presumably because this landscape increases visibility. This species is opportunistic and known to utilize abandoned or unused pipes. The burrowing owl nests and roosts in abandoned burrows dug by small mammals such as ground squirrels, but will sometimes occupy abandoned badger, tortoise, or kit fox dens.

The range of the burrowing owl in California extends through the lowlands south and west from north central California to Mexico, with small, scattered populations occurring in the Great Basin and the desert regions of the state. Burrowing owls are absent from the coast north of Sonoma County and from high mountain areas such as the Sierra Nevada and the ranges extending east from Santa Barbara to San Bernardino. Burrowing owl populations have been greatly reduced or extirpated from many areas. They have also apparently disappeared from the Coachella Valley. The remaining major population densities of the burrowing owls in California are in the Central and Imperial Valleys.

The burrowing owl is a Category 1 wildlife species. URS SBM modeling data was used to analyze this species and had good predictive power. The primary environmental factors affecting habitat for this species included soil type (most important), elevation, maximum temperature of the warmest month, mean diurnal temperature range, and aspect (easting). Table 4.4-44 summarizes modeled burrowing owl high quality and poor to moderate quality habitat acreage by tier and subarea. The locations of modeled suitable habitat for this species in the Project Area are shown on Figure 4.4-17 in Appendix N.

**Table 4.4-44: Modeled Western Burrowing Owl High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| **High Quality Modeled Habitat** | | | | |
| Tier 1 | 34,264 | 2,082 | 2,325 | 38,671 |
| Tier 2 | 133,577 | 35,169 | 8,126 | 176,872 |
| Tier 3 | 811 | 473 | 1,637 | 2,921 |
| Tier 4 | 1,152 | 1,930 | 2,406 | 5,488 |
| Tier 5 | 730.78 | - | 817.12 | 1,548 |
| **TOTAL** | **170,534** | **39,655** | **15,312** | **225,501** |
| **Poor to Moderate Quality Modeled Habitat** | | | | |
| Tier 1 | 128,773 | 920 | 38,193 | 167,886 |
| Tier 2 | 585,325 | 486,842 | 435,430 | 1,507,597 |
| Tier 3 | 1,233 | 2,328 | 9,399 | 12,960 |
| Tier 4 | 2,354 | 8,441 | 12,183 | 22,978 |
| Tier 5 | 40.96 | - | 923.10 | 964 |
| **TOTAL** | **717,726** | **498,531** | **496,128** | **1,712,385** |

Source: Chevron 2014

## Golden Eagle (*Aquila chrysaetos*)

The golden eagle is listed as a state fully protected species and is protected by the Bald and Golden Eagle Protection Act, the MBTA, and the Lacey Act. The golden eagle is brown in color and about 35 inches in height with a wingspan of around 6 feet. It ranges from elevations between sea level and 11,500 feet, and occurs primarily in rolling foothills, mountain areas, sage-juniper flats, and deserts (Grinnell and Miller 1944). The golden eagle needs open terrain for hunting, and soars between 100 and 300 feet above the ground in search of prey. Rugged, open habitats with canyons and escarpments are used most frequently for nesting. It maintains alternative nest sites, and also reuses old nests. Its nests are large platforms, often 10 feet wide and 3 feet high, that are composed of sticks, twigs, and greenery. The golden eagle breeds from late January through August, with breeding peaking in March through July.

The golden eagle is a common permanent resident and migrant throughout California. The majority of the Project Area is classified as winter range for the golden eagle, but natural lands that are located at the eastern, western, and southern boundaries are classified as yearlong range and may be used for nesting (Zeiner et al. 1988-1990). The primary threats to the golden eagle includes loss of foraging areas, loss of nesting habitat, pesticide poisoning, lead poisoning, and collision with man-made structures such as wind turbines.

URS SBM modeling data was available for this species and indicates that low quality nesting habitat occurs within the portions of the Project Area located below 2,000 feet. Only a very

restricted portion of the southern Eastern Subarea adjacent to the Tejon Hills contains potential nesting habitat. Golden eagles prefer cliffs for building their nests, but will use large trees on occasion. The lack of cliffs throughout the Valley greatly reduces the likelihood of the golden eagle nesting within the Project Area. Given its mostly flat landscape, the Project Area provides foraging habitat for this species. The golden eagle may actively hunt during the winter months within the Project Area, but because it is an aerial hunter this species would likely spend most of its time in flight.

The URS SBM model for golden eagle had strong predictive power and the primary environmental conditions for determining nesting habitat suitability were primarily soil type, followed by precipitation of driest month, ruggedness, water availability, and summer high temperature. Table 4.4-45 summarizes modeled golden eagle high quality and poor to moderate quality habitat acreage by tier and subarea. The locations of modeled suitable habitat for this species in the Project Area are shown on Figure 4.4-18 in Appendix N.

**Table 4.4-45: Modeled Golden Eagle High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| **High Quality Modeled Habitat** | | | | |
| Tier 1 | - | - | - | - |
| Tier 2 | - | - | - | - |
| Tier 3 | - | - | - | - |
| Tier 4 | - | - | - | - |
| Tier 5 | - | - | - | - |
| **TOTAL** | - | - | - | - |
| **Poor to Moderate Quality Modeled Habitat** | | | | |
| Tier 1 | 163,037 | 3,002 | 40,518 | 206,557 |
| Tier 2 | 718,902 | 522,011 | 443,556 | 1,684,469 |
| Tier 3 | 2,043 | 2,801 | 11,037 | 15,881 |
| Tier 4 | 3,505 | 10,372 | 14,589 | 28,466 |
| Tier 5 | 771.74 | - | 1,740.23 | 2,512 |
| **TOTAL** | **888,260** | **538,186** | **511,440** | **1,937,885** |

Source: Chevron 2014

## Grasshopper Sparrow (*Ammodramus savannarum*)

The grasshopper sparrow is a California SSC and is protected under the MBTA. It is a medium-sized sparrow with brown-grey streaked upperparts and buff to white under parts. This species has pinkish feet and legs and a grey cone shaped beak. It has a clutch of three to six eggs that are laid on or near the ground. The species occurs in dense grasslands on rolling hills, lowland plains,

valleys, and on hillsides on lower mountain slopes. It favors native grasslands mixed with forbs and scattered shrubs and is loosely colonial while nesting (CDFW 2014).

Agriculture and urbanization have greatly reduced the number of the grasshopper sparrows in the Central Valley, but research indicates it still breeds locally, primarily at the edges and in low foothills, but also very sparingly on the Valley floor (Shuford and Gardali 2008). The grasshopper sparrow occurs in California primarily as a summer resident form March to September; the breeding season extends from mid-March to August (Shuford and Gardali 2008). It winters along the southern half of the United States and Mexico. There are no occurrences of the grasshopper sparrow documented within the Project Area (CDFW 2014; VertNet 2015).

URS HSM habitat modeling data was available for this species. Table 4.4-46 summarizes modeled grasshopper sparrow high quality and poor to moderate quality habitat acreage by tier and subarea. The locations of modeled suitable habitat for this species in the Project Area are shown on Figure 4.4-19 in Appendix N.

**Table 4.4-46: Modeled Grasshopper Sparrow High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| **High Quality Modeled Habitat** | | | | |
| Tier 1 | 19,340 | - | 1,636 | 20,976 |
| Tier 2 | 259,921 | - | 78,400 | 338,321 |
| Tier 3 | 126 | - | 1,313 | 1,439 |
| Tier 4 | 514 | - | 394 | 908 |
| Tier 5 | 0.34 | - | 10.69 | 11 |
| **TOTAL** | **279,901** | **-** | **81,754** | **361,654** |
| **Poor to Moderate Quality Modeled Habitat** | | | | |
| Tier 1 | 102,388 | - | 177 | 102,565 |
| Tier 2 | 222,919 | - | 19,587 | 242,506 |
| Tier 3 | 1,157 | - | - | 1,157 |
| Tier 4 | 789 | - | 30 | 819 |
| Tier 5 | - | - | 101.67 | 102 |
| **TOTAL** | **327,253** | **-** | **19,896** | **347,149** |

Source: Chevron 2014

## Least Bell's Vireo (*Vireo bellii pusillus*)

The least Bell's vireo is a federally listed endangered species. Potential threats to the least Bell's vireo include agricultural conversion, urbanization, and exotic plant invasion, as well as, energy development, grazing, mining, and vehicles (USFWS 2006). Oil and gas extraction and conveyance continue to threaten least Bell's vireo. Impacts of oil and gas development on the

least Bell's vireo include the loss of habitat, reduction in habitat quality, destruction of individuals or populations, and habitat fragmentation.

ICF model habitat suitability results were used to analyze this species. The results indicate that the species has a higher potential to occur in the Eastern Subarea. The ICF model for the species does not include estimates of poor to moderate habitat. Table 4.4-47 summarizes the modeled least Bell's vireo high quality habitat acreage by tier and subarea. The locations of modeled suitable habitat for this species in the Project Area are shown on Figure 4.4-20 in Appendix N.

**Table 4.4-47: Modeled Least Bell's Vireo Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| Tier 1 | 57 | - | 323 | 380 |
| Tier 2 | 614 | 1,488 | 1,115 | 3,217 |
| Tier 3 | - | 2 | 450 | 452 |
| Tier 4 | - | 19 | 24 | 44 |
| Tier 5 | - | - | - | - |
| **TOTAL** | **671** | **1,510** | 1,913 | **4,094** |

Source: ICF 2015

## Le Conte's Thrasher (*Toxostoma lecontei*)

The Le Conte's thrasher is listed as a state SSC and is protected by the MBTA. It is a medium sized song bird with a long, nearly black 4.7-inch long tail. This species has a distinctly de-curved 1-inch long black bill. The Le Conte's thrasher has a plain grayish or sandy colored body without wing bars or spots. The eye is dark and lacks a distinct stripe above the eye. The dark tail contrasts sharply with the much paler body. This species is generally found in open desert scrub, alkali desert scrub, and desert succulent scrub. Nesting habitat mainly consists of taller, bushier shrubs. The Le Conte's thrasher is most commonly associated with sandy and alkaline soils (USWFS 1998). Most Le Conte's thrashers are found between average mean sea level and 3,800 feet in elevation.

The Le Conte's thrasher historically occurs in two separate geographic areas including the Colorado and Mojave deserts down into Baja California and the southern San Joaquin Valley. The current distribution of the Le Conte's thrasher in the San Joaquin Valley is likely determined by the presence, structure, and vigor of saltbush, the size of habitat fragments, and the proximity to other saltbush areas (USFWS 1998). The current population of the Le Conte's thrasher in the San Joaquin Valley appears to be isolated geographically from other populations, residing only in the southern San Joaquin Valley and adjacent Cuyama Valley and Carrizo Plain (USFWS 1998). There are five known populations and one potentially extant population in Kern County, including the McKittrick-Maricopa Area, Lost Hills, Kettleman Hills, Carrizo and Elkhorn Plains, Cuyama Valley, and the Panoche Mountains (USWFS 1998).

Le Conte's thrasher is a Category 1 wildlife species. URS SBM habitat modeling data was available for this species and produced results that have very good predictive power. The primary environmental factors affecting habitat for this species included soil type (most important), aspect (easting), ruggedness, precipitation of driest month, and precipitation of wettest month. Table 4.4-48 summarizes modeled Le Conte's thrasher high quality and poor to moderate quality habitat acreage by tier and subarea. The locations of modeled suitable habitat for this species in the Project Area are shown on Figure 4.4-21 in Appendix N.

**Table 4.4-48: Modeled Le Conte's Thrasher High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| **High Quality Modeled Habitat** | | | | |
| Tier 1 | 40,562 | - | - | 40,562 |
| Tier 2 | 28,569 | 1,318 | - | 29,886 |
| Tier 3 | 753 | - | - | 753 |
| Tier 4 | 846 | - | - | 846 |
| Tier 5 | - | - | - | - |
| **TOTAL** | **70,729** | **1,318** | **-** | **72,047** |
| **Poor to Moderate Quality Modeled Habitat** | | | | |
| Tier 1 | 122,476 | 3,002 | 40,518 | 165,996 |
| Tier 2 | 690,334 | 520,693 | 443,556 | 1,654,582 |
| Tier 3 | 1,291 | 2,801 | 11,037 | 15,128 |
| Tier 4 | 2,660 | 10,372 | 14,589 | 27,620 |
| Tier 5 | 771.74 | - | 1,740.23 | 2,512 |
| **TOTAL** | **817,531** | **536,868** | **511,440** | **1,865,839** |

Source: Chevron 2014

## Lesser Sandhill Crane (Grus canadensis Canadensis)

The lesser sandhill crane is listed as a California SSC and is protected under the MBTA. It is a large tall bird with a long neck, long legs, and broad wings. The lesser sandhill crane is grey in coloration and often has a rusty wash on the upper parts. This species winters near annual and perennial grassland habitats, croplands, and open emergent wetlands in the San Joaquin and Imperial Valleys, and up to the Sacramento Valley. Foraging habitat for the lesser sandhill crane consists of shortgrass plains, grain fields, and open wetlands (Grinnell and Miller 1944). It most commonly uses moist sites; however, dry plains farther from water are also utilized. This species feeds on grasses, forbs, roots, seeds, grains, insects, mice, small birds, snakes, frogs, and crayfish.

The sandhill crane is the most abundant of all cranes. They are distributed throughout North America, extending into Cuba and northeaster Siberia (Johnsgard 1983). The three migratory subspecies are distributed across a broad breeding range in the northern United States and Canada and into eastern Siberia (Johnsgard 1983). The wintering grounds are located in the southern United States and northern Mexico. There are no documented occurrences of lesser sandhill crane recorded within the Project Area (CDFW 2014; VertNet 2015).

URS HSM habitat modeling data was available for this species. The results indicate that suitable habitat does not occur in the Eastern Subarea. Table 4.4-49 summarizes modeled lesser sandhill crane high quality and poor to moderate quality habitat acreage by tier and subarea. The locations of modeled suitable habitat for this species in the Project Area are shown on Figure 4.4-22 in Appendix N.

**Table 4.4-49: Modeled Lesser Sandhill Crane High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| **High Quality Modeled Habitat** | | | | |
| Tier 1 | 4,241 | - | - | 4,241 |
| Tier 2 | 91,244 | 182,267 | - | 273,511 |
| Tier 3 | 66 | 14 | - | 81 |
| Tier 4 | 390 | 1,885 | - | 2,275 |
| Tier 5 | - | - | - | - |
| **TOTAL** | **95,941** | **184,166** | **-** | **280,108** |
| **Poor to Moderate Quality Modeled Habitat** | | | | |
| Tier 1 | 84 | - | - | 84 |
| Tier 2 | 320 | 27,721 | - | 28,041 |
| Tier 3 | 0 | - | - | 0 |
| Tier 4 | 1 | 243 | - | 243 |
| Tier 5 | - | - | - | - |
| **TOTAL** | **405** | **27,963** | **-** | **28,369** |

Source: Chevron 2014

## Mountain Plover (Charadrius montanus)

The mountain plover is a California SSC and is protected by the MBTA. This fairly large upland shorebird is 8 to 9.5 inches tall, has light brown on its back, a sandy-buff breast, pale legs, a black bill and stripe that extends to the eye, a light wing stripe, and a dark tail band. Its distinctive markings during breeding season consist of a dark crown, white forehead and line over the eye, and a paler chest. It loses facial markings in the fall and has a golden brown coloring on the upper chest. This species displays “falling leaf” and “butterfly” aerial displays

that it performs during the breeding season, as well as distraction displays, and bows and calls (Knopf and Rupert 1995).

This species inhabits open, arid, sparsely vegetated shortgrass plains and fields, plowed fields, rolling hills, and deserts. This species prefers non-sandy soils with at least 30% bare ground, and favors prairie dog towns, areas heavily grazed by domestic livestock, bare ground areas near artificial watering structures, and recently fallowed or tilled crop fields. Blue grama (*Bouteloua gracilis*) and buffalograss (*Buchloe dactyloides*) communities can provide habitat for this species (Knopf and Rupert 1995). The diet of the mountain plover consists primarily of grasshoppers and crickets, beetles, ants, flies, and other insects and invertebrates. The mountain plover does not breed in California, but 70% of the total population winters in the state (QK 2014). The major wintering areas in California are in the Sacramento, San Joaquin, and Imperial Valleys with smaller numbers wintering in western Mojave Desert (Antelope Valley and Harper Lake); San Jacinto, Santa Maria, and Salinas Valleys; the Carrizo Plain; Seal Beach; Tijuana River Valley; and the Lower Colorado River Valley. In the Sacramento and San Joaquin Valleys, valley sink scrub and non-native grasslands, as well as agricultural lands, are used for overwintering. Although this species is widely distributed throughout its range, it is considered rare or uncommon even in high quality habitat.

URS SBM habitat modeling data are available for this species and has good predictive power. The primary environmental factors affecting habitat for this species included soil type (most important), followed by ruggedness, winter low temperature, aspect (northing), and summer mean temperature. Table 4.4-50 summarizes modeled mountain plover high quality and poor to moderate quality habitat acreage by tier and subarea. The locations of modeled suitable habitat for this species in the Project Area are shown on Figure 4.4-23 in Appendix N.

**Table 4.4-50: Modeled Mountain Plover High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| **High Quality Modeled Habitat** | | | | |
| Tier 1 | - | - | - | - |
| Tier 2 | 3,446 | 22,506 | - | 25,952 |
| Tier 3 | - | - | - | - |
| Tier 4 | - | 206 | - | 206 |
| Tier 5 | - | - | - | - |
| **TOTAL** | **3,446** | **22,712** | **-** | **26,158** |
| **Poor to Moderate Quality Modeled Habitat** | | | | |
| Tier 1 | 163,037 | 3,002 | 40,518 | 206,557 |
| Tier 2 | 715,456 | 499,505 | 443,556 | 1,658,517 |
| Tier 3 | 2,043 | 2,801 | 11,037 | 15,881 |

**Table 4.4-50: Modeled Mountain Plover High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| Tier 4 | 3,505 | 10,166 | 14,589 | 28,261 |
| Tier 5 | 771.74 | - | 1,740.23 | 2,512 |
| **TOTAL** | **884,814** | **515,474** | **511,440** | **1,911,728** |

Source: Chevron 2014

## Northern Harrier (*Circus cyaneus*)

The northern harrier is a California SSC and is protected by the MBTA. It is a slender, medium-sized raptor with long, fairly broad wings and a long, rounded tail. It has a flat, owl-like face and a small, sharply hooked bill. Harriers often fly with their wings held in a dihedral, or V-shape above the horizontal. There is a visible white rump patch that is obvious in flight. Males are gray above and whitish below with black wingtips, a dark trailing edge to the wing, and a black-banded tail. Females and young are brown, with black bands on the tail. Adult females have whitish undersides with brown streaks, whereas the young are buffy in color with less streaking. This species occurs in a variety of habitats throughout California and forages in open wetlands, wet pastures, fallow fields, dry uplands, prairies, agricultural lands, and desert shrub-steppe utilizing open uplands including agricultural lands adjacent to foraging habitat for nesting.

The northern harrier historically ranges in North America from northern Alaska and Canada south to mid- and lower latitudes of the United States and northern Baja California (Shuford and Gardali 2008). In California, the current range of the northern harrier includes coastal areas, the Central Valley, northeastern California, and the Sierra Nevada region up to 3,600 feet.

URS SBM habitat modeling data was available for this species and has good predictive power. The top environmental conditions for determining nesting habitat suitability were soil type, followed by water availability, ruggedness, slope, and aspect (easting). Table 4.4-51 summarizes modeled Northern harrier high quality and poor to moderate quality habitat acreage by tier and subarea. The locations of modeled suitable habitat for this species in the Project Area are shown on Figure 4.4-24 in Appendix N.

**Table 4.4-51: Modeled Northern Harrier High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| **High Quality Modeled Habitat** | | | | |
| Tier 1 | 172 | - | - | 172 |
| Tier 2 | 19,734 | 2,754 | - | 22,488 |

**Table 4.4-51: Modeled Northern Harrier High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| Tier 3 | - | - | - | - |
| Tier 4 | - | - | - | - |
| Tier 5 | - | - | - | - |
| **TOTAL** | **19,906** | **2,754** | **-** | **22,659** |
| **Poor to Moderate Quality Modeled Habitat** | | | | |
| Tier 1 | 162,866 | 3,002 | 40,518 | 206,386 |
| Tier 2 | 699,168 | 519,257 | 443,556 | 1,661,981 |
| Tier 3 | 2,043 | 2,801 | 11,037 | 15,881 |
| Tier 4 | 3,505 | 10,372 | 14,589 | 28,466 |
| Tier 5 | 771.74 | - | 1,740.23 | 2,512 |
| **TOTAL** | **868,355** | **535,432** | **511,440** | **1,915,226** |

Source: Chevron 2014

## Swainson's Hawk (*Buteo swainsoni*)

The Swainson's hawk is listed as a state threatened species and is protected by the MBTA. The habitat of the Swainson's hawk consists of open and semi-open country including deserts, grasslands, and prairies, in both its breeding and wintering ranges. It favors wild prairie, hayfields, and pastures over wheat fields and alfalfa fields. The Swainson's hawk breeds in stands with few trees that are located in juniper-sage flats, riparian areas, and oak savannahs in the Central Valley (QK 2014). It nests on a platform of sticks, bark, and fresh leaves in trees, bushes, or utility poles from 4 to 100 feet above the ground. Breeding occurs between late March and late August, with peak activity occurring during late May through July. The Swainson's hawk is mostly white underneath with a dark red bib along its chin and upper chest. The throat and face both have a white patch, and the tips of the feathers are distinctly tipped with black. Swainson's hawks forage in grasslands, grain and alfalfa fields, and livestock pastures. They eat mice, gophers, ground squirrels, rabbits, large arthropods, amphibians, reptiles, and birds (QK 2014; Dunkle 1977). They typically soar in search of prey, but may also walk on the ground to catch prey, or catch insects and bats in flight. Competitors for food include the northern harrier, red-tailed hawk, white-tailed kite, burrowing owl, and golden eagle (QK 2014).

The Swainson's hawk is a common breeding residents and migrants in the Central Valley, Klamath Basin, Northeastern Plateau, Lassen County, and Mojave Desert. Migrating individuals move south through the southern and central interior of California in September and October, and move north during March through May (Grinnell and Miller 1944). Some individuals migrate as far south as South America, passing in large flocks over Central America (QK 2014). The

current summer distribution of the Swainson's hawk in California is mainly confined to the Sacramento Valley, the northern half of the San Joaquin Valley and Northeastern Plateau of Lassen and Modoc Counties.

URS SBM habitat modeling data are available for this species and has strong predictive power. The primary environmental conditions for determining nesting habitat suitability were primarily elevation, followed by water availability, soil type, annual precipitation, and winter low temperature. The results indicate that high quality suitable habitat does not occur within the portions of the Project Area below about 2,000 feet included in the URS analysis. Table 4.4-52 summarizes modeled Swainson's hawk high quality and poor to moderate quality habitat acreage by tier and subarea. The locations of modeled suitable habitat for this species in the Project Area are shown on Figure 4.4-25 in Appendix N.

**Table 4.4-52: Modeled Swainson's Hawk High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| **High Quality Modeled Habitat** | | | | |
| Tier 1 | - | - | - | - |
| Tier 2 | - | - | - | - |
| Tier 3 | - | - | - | - |
| Tier 4 | - | - | - | - |
| Tier 5 | - | - | - | - |
| **TOTAL** | - | - | - | - |
| **Poor to Moderate Quality Modeled Habitat** | | | | |
| Tier 1 | 163,037 | 3,002 | 40,518 | 206,557 |
| Tier 2 | 718,902 | 522,011 | 443,556 | 1,684,469 |
| Tier 3 | 2,043 | 2,801 | 11,037 | 15,881 |
| Tier 4 | 3,505 | 10,372 | 14,589 | 28,466 |
| Tier 5 | 771.74 | - | 1,740.23 | 2,512 |
| **TOTAL** | **888,260** | **538,186** | **511,440** | **1,937,885** |

Source: Chevron 2014

## Tricolored Blackbird (*Agelaius tricolor*)

The tricolored blackbird is listed as a California endangered species and is protected under the MBTA. It is identifiable from other red-winged blackbirds by its red shoulder patch with a bright white bar. Tricolored blackbirds inhabit emergent vegetation associated with wetlands and marshlands. This species will also use habitats such as seasonal ponds and pools, flood-irrigated agricultural lands (rice and hay fields), pastures and holding ponds associated with dairies and

feedlots, and scrub and saltbush habitat for foraging. With the decline of wetland habitat, multi-year drought, and agriculture development and practices incompatible with species' survival, the tricolored blackbird population has drastically declined (Shuford and Gardali 2008).

The tricolored blackbird's known historical breeding range in California includes the Sacramento and San Joaquin Valleys, the foothills of the Sierra Nevada south to Kern County, the coastal slope from Sonoma County south to the Mexican border, and sporadically on the Modoc Plateau (Grinnell and Miller 1944).

URS SBM habitat modeling data was available for this species. This species may likely coexist fairly well with oil and gas production. The tricolored blackbird relies heavily on wetland habitats, which should be mostly avoided by activities associated with oil and gas production. Table 4.4-53 summarizes modeled tricolored blackbird high quality and poor to moderate quality habitat acreage by tier and subarea. The locations of modeled suitable habitat for this species in the Project Area are shown on Figure 4.4-26 in Appendix N.

**Table 4.4-53: Modeled Tricolored Blackbird High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| **High Quality Modeled Habitat** | | | | |
| Tier 1 | 1,583 | 37 | 86 | 1,706 |
| Tier 2 | 15,819 | 781 | 2,072 | 18,672 |
| Tier 3 | - | 5 | 324 | 329 |
| Tier 4 | - | - | 28 | 28 |
| Tier 5 | - | - | 3.07 | 3 |
| **TOTAL** | **17,402** | **823** | **2,514** | **20,738** |
| **Poor to Moderate Quality Modeled Habitat** | | | | |
| Tier 1 | 161,454 | 2,965 | 40,432 | 204,852 |
| Tier 2 | 703,083 | 521,229 | 441,483 | 1,665,796 |
| Tier 3 | 2,043 | 2,796 | 10,713 | 15,552 |
| Tier 4 | 3,505 | 10,372 | 14,561 | 28,438 |
| Tier 5 | 771.74 | - | 1,737.15 | 2,509 |
| **TOTAL** | **870,859** | **537,363** | **508,926** | **1,917,147** |

Source: Chevron 2014

## Yellow-Headed Blackbird(Xanthocephalus xanthocephalus)

The yellow-headed blackbird is listed as a state watch-listed species and is protected by the MBTA. The yellow-headed blackbird is a medium size bird with a pointed bill. The adult male is mainly black with a yellow head and breast; they sometimes have a white wing patch which is only visible during flight. The adult female is mainly brown with a dull yellow throat and breast. The species is found in freshwater marshes during the summer amongst cattails, tule, and bulrush. During migration and over the winter months, it is found in open, cultivated lands, in cropfields, and in pastures (Dotzour 2002).

The breeding range of the yellow-headed blackbird stretches through the western and central United States, and the most easterly point of its distribution is the Great Lakes in Canada. During winter, this species is found in the southern United States in Arizona, New Mexico, and Texas, as well as in Mexico (USFWS 1998). In California, the yellow-headed blackbird breeds east of the Cascade Range and the Sierra Nevada's in the Imperial and Colorado River Valleys, in the Central Valley, and at selected locations in the Coast Ranges west of the Central Valley (Zeiner, et al. eds. 1988-1990).

URS HSM habitat modeling data was available for this species. The results of the analysis predict high quality breeding and foraging habitat to mostly occur within the northwest corner of the Central Subarea. Moderate foraging habitat is shown within the cultivated fields and pastures throughout all three subareas. There is low foraging habitat predicted to occur within the Temblor Range within the Western Subarea and within much of the Eastern Subarea. Breeding habitat for this species is characterized by areas with deep water and dense vegetation, such as occur in freshwater emergent wetland. Foraging habitat is characterized by fields and agricultural areas such as freshwater emergent wetland, cropland, and irrigated row and crop fields. Table 4.4-54 summarizes modeled yellow blackbird high quality and poor to moderate quality habitat acreage by tier and subarea. The locations of modeled suitable habitat for this species in the Project Area are shown on Figure 4.4-27 in Appendix N.

**Table 4.4-54: Modeled Yellow Blackbird High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| **High Quality Modeled Habitat** | | | | |
| Tier 1 | 10 | - | 50 | 60 |
| Tier 2 | 1,058 | 5,097 | 313 | 6,468 |
| Tier 3 | - | 3 | 27 | 31 |
| Tier 4 | 5 | 111 | 6 | 121 |
| Tier 5 | 0.95 | - | - | 1 |
| **TOTAL** | **1,074** | **5,211** | **396** | **6,681** |

**Table 4.4-54: Modeled Yellow Blackbird High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| **Poor to Moderate Quality Modeled Habitat** | | | | |
| Tier 1 | 22,831 | 393 | 35,013 | 58,237 |
| Tier 2 | 445,369 | 423,829 | 345,233 | 1,214,431 |
| Tier 3 | 430 | 2,088 | 7,296 | 9,814 |
| Tier 4 | 1,584 | 7,806 | 6,443 | 15,833 |
| Tier 5 | 589.72 | - | 1,190.92 | 1,781 |
| **TOTAL** | **470,803** | **434,115** | **395,177** | **1,300,095** |

Source: Chevron 2014

## American Badger (*Taxidea taxus*)

The American badger is a California SSC. It has long brown or black fur with white stripes on its cheeks; one of the stripes extends from the nose to the back of the head. The American badger has a flat body with short legs, a triangular face, and a long pointed nose. America badgers utilize dens and burrows for sleeping, hunting, storing food, and breeding. Their diet consists primarily of small mammals like ground squirrels, rats, gophers, and mice. This species occurs primarily in large grass and sagebrush meadows and valleys with friable soil; however, badgers are also found in forest glades and meadows, marshes, brushy areas, hot deserts, and mountain meadows. In California, the American badger occurs from high alpine meadows to sea level (or below in Death Valley). Habitat loss, vehicular accidents, farming operations, and indiscriminate shootings are the most common threats to this species.

The range of the American badger includes areas from the west coast of the United States to Texas, Oklahoma, Missouri, Illinois, Ohio, Michigan, and Indiana (CDFG 1986). According to the Kern County VFHCP, the American badger was historically quite widespread in the San Joaquin Valley, but the conversion of natural lands to other uses has reduced the distribution of this species substantially (Garcia and Associates 2010). Current data indicate that the American badger is still distributed throughout its range; however, the sightings are not evenly distributed. The greatest number of American badger sightings occurs in the northeastern region of the state along the south coastal area, and a moderate number occur in the southeastern desert areas, on the east side of the southern Sierra Nevada Mountains, and in the southernmost portion of the San Joaquin Valley.

URS HSM habitat modeling data was available for this species. The results of the analysis predict that breeding habitat is patchily distributed within and generally absent from the San Joaquin Valley floor. There is high quality breeding and foraging habitat predicted within all three subareas. The Eastern Subarea has the greatest concentration of higher quality habitat, which is generally predicted to occur in the north along the Greenhorn Mountains. Extensive habitat is

also predicted to occur within the Western Subarea near the Temblor Range and San Emigdio Mountains. Breeding and foraging habitat for this species are both characterized by grassy herbaceous vegetation with soils suitable for digging, such as annual grassland and perennial grassland. Alkali desert scrub provides moderate suitable breeding and foraging habitat (URS 2014). Table 4.4-55 summarizes the modeled American badger habitat high and poor to moderate quality acreage by tier and subarea. The locations of modeled suitable habitat for this species in the Project Area are shown on Figure 4.4-28 in Appendix N.

**Table 4.4-55: Modeled American Badger High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| **High Quality Modeled Habitat** | | | | |
| Tier 1 | 19,362 | 38 | 31,439 | 50,839 |
| Tier 2 | 267,730 | 29,523 | 230,019 | 527,273 |
| Tier 3 | 181 | 105 | 3,777 | 4,063 |
| Tier 4 | 627 | 820 | 1,404 | 2,851 |
| Tier 5 | 0.49 | - | 78.38 | 79 |
| **TOTAL** | **287,901** | **30,486** | **266,717** | **585,104** |
| **Poor to Moderate Quality Modeled Habitat** | | | | |
| Tier 1 | 134,839 | 2,963 | 8,659 | 146,461 |
| Tier 2 | 489,693 | 481,883 | 212,504 | 1,184,080 |
| Tier 3 | 1,734 | 2,656 | 4,726 | 9,116 |
| Tier 4 | 2,376 | 8,735 | 5,958 | 17,069 |
| Tier 5 | 770 | - | 1,133 | 1,903 |
| **TOTAL** | **629,412** | **496,237** | **232,980** | **1,358,629** |

Source: Chevron 2014

## Buena Vista Lake Shrew (*Sorex ornatus relictus*)

The Buena Vista Lake shrew is listed as a federally endangered species. Conservation guidelines are described in the SJV Recovery Plan (USFWS 1998). It is a very small mammal with beadlike eyes and a long pointed nose. This species primarily feeds on invertebrates, particularly insects. This species is found in habitat containing riparian and wetland vegetation communities with an abundance of leaf litter and dense herbaceous cover (Williams and Harpster 2001).

Historically, the Buena Vista Lake shrew inhabited the interconnected network of tule marshes and other permanent and seasonal lakes, wetlands, and sloughs around the historical Tulare, Kern, and Buena Vista Lakes, and presumably throughout the Tulare Basin (Williams and Harpster 2001). Recent surveys for the shrew were conducted at 21 sites, and the shrew was found to be present on eight of them including Goose Lake, Atwell Island, Main Drain Canal,

Chica & Sons Twin Farms South Field Ranch, Lemoore Wetlands Preserve, Coles Levee Ecosystem Preserve, the Kern fan water recharge area, Kern National Wildlife Refuge, and the Kern Lake Preserve (USFWS 2011a).

URS HSM habitat modeling data was available for this species. The extent of the range of this species is generally not well known, but is presumed to be very limited. Modeling analysis results predict an extremely limited extent of breeding, foraging, and primary habitat, but this may be largely due to the lack of data on the species' occurrence records. Habitat is predicted to occur around the Kern National Wildlife Refuge and in very small fragments around the Kern Lake Preserve, Goose Lake Basin, and Tulare Lake Basin. There are fragmented patches of moderate quality breeding and foraging habitats predicted along the western edge of the Central Subarea and eastern edge of the Western Subarea.

Breeding and foraging habitat for this species are both characterized by dense, moist vegetation cover including ground litter and other detritus, and the presence of wetlands, such as occur in valley foothill riparian and freshwater emergent wetland. Alkali desert scrub within close proximity of permanent water provides moderately suitable breeding and foraging habitat (URS 2014). Table 4.4-56 summarizes modeled Buena Vista Lake shrew high quality and poor to moderate quality habitat acreage by tier and subarea. The locations of modeled suitable habitat for this species in the Project Area are shown on Figure 4.4-29 in Appendix N.

**Table 4.4-56: Modeled Buena Vista Lake Shrew High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| **High Quality Modeled Habitat** | | | | |
| Tier 1 | 9 | - | - | 9 |
| Tier 2 | 1,145 | 5,675 | 14 | 6,835 |
| Tier 3 | - | 1 | - | 1 |
| Tier 4 | 4 | 111 | 1 | 116 |
| Tier 5 | 0.95 | - | - | 1 |
| **TOTAL** | **1,159** | **5,787** | **15** | **6,962** |
| **Poor to Moderate Quality Modeled Habitat** | | | | |
| Tier 1 | - | - | - | - |
| Tier 2 | - | - | 57 | 57 |
| Tier 3 | - | - | 22 | 22 |
| Tier 4 | - | - | - | - |
| Tier 5 | - | - | - | - |
| **TOTAL** | **-** | **-** | **79** | **79** |

Source: Chevron 2014

## Giant Kangaroo Rat (*Dipodomys ingens*)

The giant kangaroo rat is listed as a federal and state endangered species. Conservation guidelines are described in the SJV Recovery Plan (USFWS 1998). The giant kangaroo rat is one of the largest of kangaroo rat species. The giant kangaroo rat is buffy tan in coloration and is distinguished from other coexisting kangaroo rats by size and having five toes on the hind limbs (Best 1993). The giant kangaroo rat is an endemic species in the San Joaquin Valley and adjacent areas. This species inhabits grasslands and shrub communities on a variety of soil types and on slopes up to about 22% and 2,900 feet above sea level (USFWS 1998).

Historically, the giant kangaroo rat was found from the base of the Tehachapi Mountains in the south to 10 miles south of Los Banos, Merced County in the north, the Carrizo Plain and San Juan Creek watershed west of the Temblor Range to the west, and the floor of the San Joaquin Valley to the east. Currently, the distribution of the giant kangaroo rat is fragmented into six major geographic units. These include: (1) the Panoche Region in western Fresno and Eastern San Benito Counties; (2) Kettleman Hills in Kings County; (3) San Juan Creek Valley in San Luis Obispo County; (4) western Kern County near Lokern, Elk Hills, and other uplands around McKittrick, Taft, and Maricopa; (5) Carrizo Plain Natural Area in eastern San Luis Obispo County; and (6) Cuyama Valley in Santa Barbara and San Luis Obispo Counties (USFWS 1998).

URS SBM habitat modeling data was used to analyze this species and have strong predictive power. The primary environmental conditions for determining habitat suitability were primarily the minimum temperature of the coldest month and maximum temperature of warmest month, followed by slope, elevation, and soil type. Table 4.4-57 summarizes modeled giant kangaroo rat high quality and poor to moderate quality habitat acreage by tier and subarea. The locations of modeled suitable habitat for this species in the Project Area are shown on Figure 4.4-30 in Appendix N.

**Table 4.4-57: Modeled Giant Kangaroo Rat High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| **High Quality Modeled Habitat** | | | | |
| Tier 1 | 44,594 | - | - | 44,594 |
| Tier 2 | 36,212 | - | - | 36,212 |
| Tier 3 | 124 | - | - | 124 |
| Tier 4 | 397 | - | - | 397 |
| Tier 5 | - | - | - | - |
| **TOTAL** | **81,326** | **-** | **-** | **81,326** |
| **Poor to Moderate Quality Modeled Habitat** | | | | |
| Tier 1 | 118,444 | 3,002 | 40,518 | 161,964 |
| Tier 2 | 682,690 | 522,011 | 443,556 | 1,648,257 |

**Table 4.4-57: Modeled Giant Kangaroo Rat High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| Tier 3 | 1,920 | 2,801 | 11,037 | 15,757 |
| Tier 4 | 3,109 | 10,372 | 14,589 | 28,070 |
| Tier 5 | 771.74 | - | 1,740.23 | 2,512 |
| **TOTAL** | **806,934** | **538,186** | **511,440** | **1,856,559** |

Source: Chevron 2014

## San Joaquin Antelope Squirrel (*Ammospermophilus nelsoni*)

The San Joaquin antelope squirrel is listed as a state threatened species. It is included in the SJV Recovery Plan (USFWS 1998). The San Joaquin antelope squirrel is of a typical ground squirrel shape with small round ears and a streamlined body and short legs. This species inhabits relatively arid annual grassland and shrubland communities. The San Joaquin antelope squirrel is restricted to desert and shrubland habitats. Habitat of the San Joaquin antelope squirrel consists of grasslands with moderate shrub cover, which includes such species as salt bush, ephedra, bladder pod, goldenbush, snakeweed, and others. The squirrels live in small underground familial colonies in sandy, easily excavated soils in grasslands.

Historically, this species inhabited the western and southern portions of the Tulare Basin, San Joaquin Valley, and the contiguous areas to the west in the upper Cuyama Valley and the Carrizo and Elkhorn Plains. More specifically, they were distributed on the floor of the San Joaquin Valley in Kern County and along the eastern edge of the valley north near Tipton, Tulare County (USFWS 1998). The only remaining substantial populations remaining are located near the Lokern and Elk Hills in western Kern County, and the Carrizo and Elkhorn Plains in eastern San Luis Obispo County (USFWS 1998). This species is sometimes observed co-occurring with populations of the giant kangaroo rat.

URS SBM habitat modeling data was used to analyze the San Joaquin antelope squirrel. The species is relatively compatible with oil and gas production activities as long as some measure of vegetation cover and vegetation community connectivity is preserved (30% vegetation within a given area). Existing land use conditions may have altered the habitat to a point where it is no longer compatible with species occurrence.

The URS SBM model has strong predictive power and the primary environmental conditions for determining habitat suitability were primarily soil type and the minimum temperature of the coldest month, followed by ruggedness of terrain, precipitation of driest month, and habitat slope aspect (easting). Table 4.4-58 summarizes modeled San Joaquin antelope squirrel high quality and poor to moderate quality habitat acreage by tier and subarea. The locations of modeled suitable habitat for this species in the Project Area are shown on Figure 4.4-31 in Appendix N.

**Table 4.4-58: Modeled San Joaquin Antelope Squirrel High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| **High Quality Modeled Habitat** | | | | |
| Tier 1 | 84,620 | - | - | 84,620 |
| Tier 2 | 79,674 | 410 | - | 80,084 |
| Tier 3 | 1,073 | - | - | 1,073 |
| Tier 4 | 2,178 | - | - | 2,178 |
| Tier 5 | - | - | - | - |
| **TOTAL** | **167,545** | **410** | **-** | **167,955** |
| **Poor to Moderate Quality Modeled Habitat** | | | | |
| Tier 1 | 78,418 | 3,002 | 40,518 | 121,938 |
| Tier 2 | 639,228 | 521,601 | 443,556 | 1,604,384 |
| Tier 3 | 971 | 2,801 | 11,037 | 14,808 |
| Tier 4 | 1,328 | 10,372 | 14,589 | 26,289 |
| Tier 5 | 771.74 | - | 1,740.23 | 2,512 |
| **TOTAL** | **720,716** | **537,775** | **511,440** | **1,769,931** |

Source: Chevron 2014

## San Joaquin Kit Fox (*Vulpes macrotis mutica*)

The San Joaquin kit fox is listed as a federally endangered and state threatened species. Conservation guidelines are described in the SJV Recovery Plan (USFWS 1998). The San Joaquin kit fox is a small fox with a bushy black-tipped tail. The body is usually a buffy-tan and individuals have long slender legs, and narrow noses. The San Joaquin kit fox occupies a variety of habitats, including grasslands, scrublands, oak woodlands, alkali sink scrubland, vernal pool areas, and alkali meadow communities, as well as extensively modified habitats, such as oilfields and wind turbine facilities (USFWS 1998). They are present, but generally less abundant, in other highly modified landscapes, such as agricultural row crops, irrigated pastures, orchards, vineyards, and grazed annual grasslands.

The San Joaquin kit fox currently only inhabits the San Joaquin Valley and surrounding foothills of the Coast Range, Sierra Nevada and Tehachapi Mountains, and on the Carrizo and Elkhorn Plains. Much of the historical natural vegetative communities within the range of the San Joaquin kit fox have been eliminated and are now represented only by small, isolated and degraded remnants. Accordingly, the San Joaquin kit fox occurs throughout Kern, Tulare, Kings, Fresno, Madera, San Benito, Merced, Stanislaus, San Joaquin, Alameda, and Contra Costa Counties. Three core populations of the San Joaquin kit fox have been identified at the Carrizo Plain Natural Area in San Luis Obispo County, natural lands of western Kern County, and the

Ciervo-Panoche Natural Area of western Fresno and eastern San Benito Counties (USFWS 1998).

URS SBM habitat modeling data was used to analyze this species. The results indicate that the entire valley floor in the Western Subarea between the California Aqueduct and the foothills of the Coast Range is predicted to be habitat for the San Joaquin kit fox. Very little of the Project Area is predicted to be of low quality habitat; the exception being a good majority of the southern portion of the Eastern Subarea from just south of Highway 58 and south along the eastern edge of the Valley to Tejon Ranch in the south. The vast majority of high quality habitat for the San Joaquin kit fox is predicted to occur in the Western Subarea with smaller and more fragmented occurrences in the Central and Eastern Subareas. A narrow belt of predicted low quality habitat extends from the Eastern Subarea west to the California Aqueduct just south of Highway 119.

As discussed above, the SJV Recovery Plan identifies the kit fox as the "umbrella" species for recovery planning because the species occupies habitats used by most of the other species in the plan. The range of the San Joaquin kit fox extends throughout all portions of the Project Area.

The USFWS 5-year review for the species concluded that continued oil and gas activity in western Kern County posed a potential risk to the species, including human disturbance, loss of habitat and den sites, entombment, entrapment in sumps or oil spills, and exposure to contaminants. San Joaquin kit fox appear to tolerate human activities, have frequently been observed around oil and gas facilities and are known to use manmade structures (pipe, culverts, and foundations) as dens, although with some mortality (EPA 2008). The USFWS concluded that these results could show that lower density oilfield development may have minimal effects on kit fox dynamics. The USFWS also indicated that since the most robust kit fox populations currently occur in the oil-producing regions of the San Joaquin Valley, the species persists well with low-density oil development. Moderate to high-density oilfields could, however, contribute to a decrease in carrying capacity for kit fox through habitat loss and changes in remaining habitat characteristics over time (USFWS 2010b).

The URS SBM model for this species has good predictive power and the primary environmental factors affecting habitat for this species included soil type (most important) followed by ruggedness, elevation, minimum temperature of coldest month, and annual precipitation. The results are conservative because the model does not take into account current land use or development. Areas where irrigated agriculture, urban development, and high-density oil and gas development has occurred would be considered unsuitable for this species. Much of the Project Area has been converted to irrigated agriculture or urban areas. In some locations, the San Joaquin kit fox has adapted to urban environments, such as urban Bakersfield, and this species may also be able to maintain populations in agricultural areas, provided there are suitable areas for denning and foraging. Land use conversion to urban or agriculture does not necessarily exclude this species. Table 4.4-59 summarizes modeled San Joaquin kit fox high quality and poor to moderate quality habitat acreage by tier and subarea. The locations of modeled suitable habitat for this species in the Project Area are shown on Figure 4.4-32 in Appendix N.

**Table 4.4-59: Modeled San Joaquin Kit Fox High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| **High Quality Modeled Habitat** | | | | |
| Tier 1 | 132,762 | - | 13,104 | 145,866 |
| Tier 2 | 175,957 | 69,309 | 24,055 | 269,322 |
| Tier 3 | 1,223 | 977 | 5,266 | 7,466 |
| Tier 4 | 2,089 | 1,147 | 4,091 | 7,327 |
| Tier 5 | 0.33 | - | 13.06 | 13 |
| **TOTAL** | **312,032** | **71,434** | **46,529** | **429,994** |
| **Poor to Moderate Quality Modeled Habitat** | | | | |
| Tier 1 | 30,275 | 3,002 | 27,414 | 60,691 |
| Tier 2 | 542,945 | 452,701 | 419,500 | 1,415,147 |
| Tier 3 | 821 | 1,824 | 5,770 | 8,415 |
| Tier 4 | 1,416 | 9,224 | 10,498 | 21,139 |
| Tier 5 | 771.40 | - | 1,727.16 | 2,499 |
| **TOTAL** | **576,229** | **466,752** | **464,911** | **1,507,891** |

Source: Chevron 2014

## San Joaquin pocket mouse (*Perognathus inornatus*)

The San Joaquin pocket mouse is a California SSC. This species is small in size and buffy-tan in coloration with a lighter colored belly. The San Joaquin pocket mouse primarily feeds on seeds, but also eats green vegetation and insects. This species inhabits arid annual grasslands, savannas, washes, and desert shrub associations with sand or finely textured soils throughout the San Joaquin Valley. Its habitat is generally characterized as open and sandy areas with grasses and forbs. This species can usually be found between 1,000 to 2,000 feet elevation. The primary threats and reasons for decline of this species have been identified as agricultural and urban development. Additionally, ground disturbing activities associated with construction may result in the loss of habitat, individuals, and burrows.

QK habitat modeling data was used to analyze this this species. High quality habitat is predicted throughout the Project Area, specifically habitat within the Eastern and Western Subareas in the Greenhorn Mountains, Tejon Hills, Temblor Range, and San Emigdio Mountains. There are a few habitat areas predicted that occur within the Central Subarea located northeast of the junction at I-5 and Highway 46. The QK data does not include poor to moderate quality habitat acreage estimates. Table 4.4-60 summarizes the higher quality modeled habitat for the San Joaquin

pocket mouse. The locations of modeled suitable habitat for this species in the Project Area are shown on Figure 4.4-33 in Appendix N.

**Table 4.4-60: San Joaquin Pocket Mouse Acres of High Quality Habitat**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| Tier 1 | 151,318 | 2,085 | 36,063 | 189,466 |
| Tier 2 | 446,566 | 49,019 | 267,498 | 763,084 |
| Tier 3 | 1,595 | 451 | 4,475 | 6,521 |
| Tier 4 | 2,193 | 1,914 | 4,859 | 8,966 |
| Tier 5 | 37.93 | | 34.99 | 73 |
| **TOTAL** | **601,710** | **53,469** | **312,930** | **968,110** |

Source: QK 2014

## Short-Nosed Kangaroo Rat (Dipodomys nitratoides brevinasus)

The short-nosed kangaroo rat is listed as a California SSC. Conservation guidelines are described in the SJV Recovery Plan (USFWS 1998). The short-nosed kangaroo rat is one of three species of San Joaquin kangaroo rat. The appearance of the short-nosed kangaroo rat is very similar to the Tipton kangaroo rat and the Fresno kangaroo rat. This species inhabits arid grasslands and shrublands with low, gently-sloping hills and friable soils, particularly those along the western half of the Central Valley ranging from Merced County south to the foothills of the Tehachapi Mountains. They are known to inhabit alkaline soils around Soda Lake on the Carrizo Plain; however, they are also known to occur on less saline soils elsewhere. They are generally found on lighter, powdery soils near sandy bottoms and banks of arroyos and other sandy areas (USFWS 1998).

The current distribution of the short-nosed kangaroo rat is relatively unknown. Some trapping surveys have shown small fragmented populations that still exist in the Coalinga area; Fresno County; a few scattered locations in Kettlemen and Lost Hills; Kings and Kern Counties; the Lokern, Elk Hills, San Emigdio, and Wheeler Ridge regions of western Kern County; the Carrizo Plain Natural Area; and the Caliente Mountains at the edge of the Cuyama Valley (USFWS 1998). There has not been a comprehensive study to identify the historical distribution of this species, and threats have been difficult to identify. It is thought that the species has declined due to agricultural development and has possibly been affected by rodenticides to control ground squirrel populations (USFWS 1998). The short-nosed kangaroo rat is separated from the distribution of the Tipton kangaroo rat by the California Aqueduct. The Tipton kangaroo rat occurs to the east of the aqueduct, and the short-nosed kangaroo rat occurs to the west.

URS SBM Habitat modeling data was available for this species and has strong predictive power. The environmental conditions for determining habitat suitability were primarily soil type, annual precipitation, and terrain ruggedness, followed by habitat slope aspect (easting), and

precipitation of wettest month. Table 4.4-61 summarizes modeled short-nosed kangaroo rat high quality and poor to moderate quality habitat acreage by tier and subarea. The locations of modeled suitable habitat for this species in the Project Area are shown on Figure 4.4-34 in Appendix N.

**Table 4.4-61: Modeled Short-Nosed Kangaroo Rat High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| **High Quality Modeled Habitat** | | | | |
| Tier 1 | 19,632 | - | - | 19,632 |
| Tier 2 | 28,984 | - | - | 28,984 |
| Tier 3 | 290 | - | - | 290 |
| Tier 4 | 1,029 | - | - | 1,029 |
| Tier 5 | - | - | - | - |
| **TOTAL** | **49,935** | **-** | **-** | **49,935** |
| **Poor to Moderate Quality Modeled Habitat** | | | | |
| Tier 1 | 143,406 | 3,002 | 40,518 | 186,926 |
| Tier 2 | 689,918 | 522,011 | 443,556 | 1,655,485 |
| Tier 3 | 1,753 | 2,801 | 11,037 | 15,591 |
| Tier 4 | 2,477 | 10,372 | 14,589 | 27,438 |
| Tier 5 | 771.74 | - | 1,740.23 | 2,512 |
| **TOTAL** | **838,326** | **538,186** | **511,440** | **1,887,951** |

Source: Chevron 2014

## Tipton Kangaroo Rat (Dipodomys nitratoides nitratoides)

The Tipton kangaroo rat is listed as a federally and state endangered species. Conservation guidelines are described in the SJV Recovery Plan (USFWS 1998). The Tipton kangaroo rat is one of three subspecies of the San Joaquin kangaroo rat. The Tipton kangaroo rat is slightly larger than the Fresno kangaroo rat, and is smaller than the short-nosed kangaroo rat. This species inhabits arid-land communities occupying the valley floor of the Tulare Basin in level or nearly level terrain. The Tipton kangaroo rat occupies alluvial fan and floodplain soils ranging from fine sands to clay-sized particles. Generally, woody shrubs species density are sparsely scattered over occupied terrain with scant-to-moderate ground cover of grasses and forbs. The Tipton kangaroo rat is typically associated with spinescale saltbush, allscale saltbush, leafcover saltweed, quailbush, iodine bush, alkali goldenbush, mesquite, and seepweed (USFWS 1998).

The historical geographic range of the Tipton kangaroo rat was over 1.7 million acres of arid-land communities occupying the valley floor of the Tulare Basin. Currently, the Tipton kangaroo rat inhabits small, scattered, isolated fragments of remnant habitat. In the southern San

Joaquin Valley, this includes the Kern and Pixley National Wildlife Refuges, and other scattered areas within Kern, Tulare, and Kings Counties (USFWS 2010c).

URS SBM habitat modeling data was used to analyze this species and have strong predictive power. The environmental conditions for determining habitat suitability were primarily precipitation of the wettest month, followed by soil type and annual precipitation. Table 4.4-62 summarizes modeled Tipton kangaroo rat high quality and poor to moderate quality habitat acreage by tier and subarea. The locations of modeled suitable habitat for this species in the Project Area are shown on Figure 4.4-35 in Appendix N.

**Table 4.4-62: Modeled Tipton Kangaroo Rat High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| **High Quality Modeled Habitat** | | | | |
| Tier 1 | 10,481 | 326 | 716 | 11,523 |
| Tier 2 | 46,607 | 145,975 | 4,585 | 197,166 |
| Tier 3 | 156 | 1,413 | 88 | 1,656 |
| Tier 4 | 656 | 4,243 | 246 | 5,145 |
| Tier 5 | 194.61 | - | - | 195 |
| **TOTAL** | **58,094** | **151,956** | **5,635** | **215,686** |
| **Poor to Moderate Quality Modeled Habitat** | | | | |
| Tier 1 | 152,556 | 2,676 | 39,802 | 195,034 |
| Tier 2 | 672,295 | 376,036 | 438,971 | 1,487,302 |
| Tier 3 | 1,887 | 1,388 | 10,949 | 14,225 |
| Tier 4 | 2,850 | 6,129 | 14,343 | 23,321 |
| Tier 5 | 577.13 | - | 1,740.23 | 2,317 |
| **TOTAL** | **830,166** | **386,229** | **505,805** | **1,722,200** |

Source: Chevron 2014

## Tulare Grasshopper Mouse (Onychomys torridus tularensis)

The Tulare grasshopper mouse is a California SSC. Conservation guidelines are described in the SJV Recovery Plan (USFWS 1998). The Tulare grasshopper mouse has a stout body with a club-like tail. Individuals are bicolored with the head and upperbody pale brown to pink and the underbody is white. The tail is usually bicolored with a white tip. The Tulare grasshopper mouse is primarily carnivorous with a diet consisting of small mammals and insects. This species is known to occur within arid shrubland and grassland habitats including blue oak woodlands, alkali sink and mesquite vegetation (USFWS 1998). The Tulare grasshopper mouse is known to occur

in the blue oak woodlands at elevations up to 1,500 feet (USFWS 1998). The primary threats to the species include habitat loss, fragmentation, degradation, and the direct and indirect poisoning by insecticides. Additionally, ground disturbing activities associated with construction may result in the loss of habitat, individuals, and burrows.

Historically, the Tulare grasshopper mouse ranged from western Merced and eastern San Benito Counties east to Madera County and south to the Tehachapi Mountains. Currently, this species is known to occur along the western margin of the Tulare Basin, including western Kern County; Carrizo Plain Natural Area; along the Cuyama Valley side of the Caliente Mountains, San Luis Obispo County; and the Ciervo-Panoche Region, in Fresno and San Benito Counties (USFWS 1998). The Tulare grasshopper mouse is found on the valley floor, ranging from western margins of Merced County south to the Tehachapi Mountains (USFWS 1998).

URS SBM habitat modeling data was available for this species and has good predictive power. The primary environmental factors affecting habitat for this species included soil type (most important), minimum temperature for the coldest month, landscape ruggedness, annual precipitation, and aspect (northing). Table 4.4-63 summarizes modeled Tulare grasshopper mouse high quality and poor to moderate quality habitat acreage by tier and subarea. The locations of modeled suitable habitat for this species in the Project Area are shown on Figure 4.4-36 in Appendix N.

**Table 4.4-63: Modeled Tulare Grasshopper Mouse High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| **High Quality Modeled Habitat** | | | | |
| Tier 1 | 26,535 | - | - | 26,535 |
| Tier 2 | 52,744 | 5,756 | - | 58,500 |
| Tier 3 | 26 | - | - | 26 |
| Tier 4 | 498 | - | - | 498 |
| Tier 5 | - | - | - | - |
| **TOTAL** | **79,803** | **5,756** | **-** | **85,559** |
| **Poor to Moderate Quality Modeled Habitat** | | | | |
| Tier 1 | 136,503 | 3,002 | 40,518 | 180,023 |
| Tier 2 | 666,158 | 516,255 | 443,556 | 1,625,969 |
| Tier 3 | 2,017 | 2,801 | 11,037 | 15,855 |
| Tier 4 | 3,007 | 10,372 | 14,589 | 27,968 |
| Tier 5 | 771.74 | - | 1,740.23 | 2,512 |
| **TOTAL** | **808,457** | **532,430** | **511,440** | **1,852,326** |

Source: Chevron 2014

## Western Mastiff Bat (Greater Western Mastiff Bat) *(Eumops perotis californicus)*

The western mastiff bat is a California SSC. It is one of four molossid species that occurs in California. The western mastiff bat is distinguishable from other species of bats based on its size. It is the largest of bat species that occurs in California. The western mastiff bat is colonial; however, the colony sizes are generally fairly small. This species' diet consists primarily of moths. This species utilizes a wide variety of habitats for foraging and roosting including chaparral, coastal and desert scrub, open areas such as washes and agricultural lands, coniferous and deciduous forests and woodlands where roosting crevices in vertical rocky canyons and cliff-faces, trees, and man-made structures are present. The western mastiff bat can occur in many open, semi-arid to arid habitats, including conifer and deciduous woodlands, coastal scrub, annual and perennial grasslands, palm oases, chaparral, desert scrub, and urban areas.

In California, the Western mastiff bat is known to occur in southeastern San Joaquin Valley, Coastal Ranges from Monterey County southward through southern California, and from the coast eastward to the Colorado Desert. It is known that significant populations of this species occur in many of the Sierra Nevada river drainages, particularly in the central and southern Sierra, i.e., the Stanislaus, Tuolumne, Merced, San Joaquin, Kaweah, Tule, and Kern Rivers. Recent surveys have documented roosts up to 4,600 feet and have documented foraging animals up to greater than 8,900 feet.

URS SBM habitat modeling data was available for this species and has good predictive power. The primary environmental factors affecting habitat for this species included soil type (most important), water availability, elevation, aspect (northing), and aspect (easting). Table 4.4-64 provides modeled western mastiff bat high quality and poor to moderate quality habitat acreage by tier and subarea. The locations of modeled suitable habitat for this species in the Project Area are shown on Figure 4.4-37 in Appendix N.

**Table 4.4-64: Modeled Western Mastiff Bat High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Grand Total |
|---|---|---|---|---|
| **High Quality Modeled Habitat** | | | | |
| Tier 1 | 1,346 | - | 26 | 1,372 |
| Tier 2 | 20,659 | 1,896 | 1,592 | 24,147 |
| Tier 3 | 1 | - | 301 | 303 |
| Tier 4 | 113 | 32 | 17 | 162 |
| Tier 5 | - | - | - | - |
| **TOTAL** | **22,118** | **1,929** | **1,937** | **25,984** |

**Table 4.4-64: Modeled Western Mastiff Bat High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Grand Total |
|---|---|---|---|---|
| **Poor to Moderate Quality Modeled Habitat** | | | | |
| Tier 1 | 161,692 | 3,002 | 40,492 | 205,186 |
| Tier 2 | 698,243 | 520,115 | 441,963 | 1,660,321 |
| Tier 3 | 2,042 | 2,801 | 10,735 | 15,578 |
| Tier 4 | 3,393 | 10,339 | 14,572 | 28,304 |
| Tier 5 | 771.74 | - | 1,740.23 | 2,512 |
| **TOTAL** | **866,142** | **536,257** | **509,503** | **1,911,902** |

Source: Chevron 2014

## Category 2 Wildlife Species

### Kern Primrose Sphinx Moth *(Euproserpinus euterpe)*

The Kern primrose sphinx moth is a federally threatened species. Conservation guidelines are depicted in the Kern Primrose Sphinx Moth Recovery Plan (USFWS 1984). It is a small day-flying moth which lays 0.04-inch light green eggs on various plants in the vicinity of the evening primrose host plants (*Camissonia contorta epilobiodes* or *Camissonia campestris*), which are essential to the survival of the Kern primrose sphinx moth. Larvae emerge from the eggs about a week after oviposition and begin to feed on the flowers and young leaves of the evening primrose. Larvae hatching from eggs laid on other plants are able to wander significant distances to find the host plant. This species is associated with sandy washes consisting of coarse- to fine-textured, decomposed granite soil, and dominant vegetation that includes red-stemmed stork's beak, baby blue-eyes, rabbit brush, gold fields, and brome grass. The adult's flight season occurs from mid-January to the first week of April, with a peak period in mid-February through mid-March, but the timing may vary according to the climatic conditions in the region.

The Kern primrose sphinx moth has a very restricted distribution and is currently known to occur at a privately owned ranch in the northwest portion of the Walker Basin in Kern County (USFWS 2007b). Additionally, six new populations were discovered for the first time at the Carrizo Plain in San Luis Obispo County and five new populations in the Cuyama Valley near New Cuyama and Ventucopa (USFWS 2007b). In addition to known occupied sites, habitat for the Kern primrose sphinx moth occurs on private, unprotected property at several locations in the northwestern section of the Walker Basin. About 75 miles west of the Walker Basin, there is a fairly large number of alluvial fans supporting Mojave sun cup located throughout the Carrizo Plain and the immediate surrounding areas. These areas were determined to be habitat for the Kern primrose sphinx moth (USFWS 2007b). As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## Longhorn Fairy Shrimp (Branchinecta longiantenna)

The longhorn fairy shrimp is listed as a federally endangered species. It is included in the Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (USFWS 2005). It is entirely dependent upon inundated wetlands, such as vernal pools, that form in the cool, wet months of the year. This species occurs in grasslands and clear-water pools, typically in sandstone depressions (Eriksen and Belk 1999). The longhorn fairy shrimp has been found in the same general areas as the conservancy fairy shrimp, vernal pool fairy shrimp, California fairy shrimp, and western spadefoot toad tadpoles at multiple locations (USFWS 2005).

The longhorn fairy shrimp is known to occur in four widely separated populations including the Carrizo Plain near Soda Lake along the border of San Luis Obispo and Kern Counties, in San Luis National Wildlife Refuge in Merced County, in Vasco Caves Preserve in Contra Costa County, and in Brushy Peak Preserve in Alameda County. This species is believed to occur in Kern County (USFWS 2007c). All four known populations are comprised of multiple pools. Additionally, a single specimen of longhorn fairy shrimp was located in a roadside ditch adjacent to Miller Road, 2 miles north of Los Banos in Merced County (USFWS 2007c). As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## Vernal Pool Fairy Shrimp *(Branchinecta lynchi)*

The vernal pool fairy shrimp is listed as a federally threatened species. It is included in the Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (USFWS 2005). It is entirely dependent upon inundated wetlands, such as vernal pools, that form in the cool, wet months of the year. The vernal pool fairy shrimp inhabits vernal pools with clear to tea-colored water, typically in grass or mud-bottomed swales in unplowed grasslands (Eriksen and Belk 1999), but has been found to occur in pools ranging from small, clear, sandstone rock pools to large, turbid, alkaline, grassland valley floor pools.

The vernal pool fairy shrimp is currently found in 28 counties across the Central Valley and Coast Ranges of California, and in Jackson County of southern Oregon. It is distributed more widely than most other fairy shrimp species included in the recovery plan, but it is generally uncommon throughout its range, and it is rarely abundant where it does occur (USFWS 2005). The current distribution of the vernal pool fairy shrimp in the Central Valley and within the Project Area may be similar to its historical distribution in extent, but remaining populations and vernal pool habitat are now considerably more fragmented and isolated than in pre-agricultural times (USFWS 2005). This species occupies a variety of vernal pool habitats and occurs in 11 of the 17 vernal pool regions identified in California (USFWS 2005).

The greatest number of known occurrences of the vernal pool fairy shrimp occur in the Southeastern Sacramento Vernal Pool Region, and in the San Joaquin Valley Vernal Pool Region, part of which occurs in the Central Subarea of the Project Area. The vernal pool fairy shrimp is found at the Grasslands Ecological Area in Merced County, at the Pixley National Wildlife Refuge in Tulare County, and at isolated locations in Kings and Stanislaus Counties. The vernal

pool fairy shrimp has been found at Camp Roberts and in the vicinity of Soda Lake on the Carrizo Plain in San Luis Obispo County (USFWS 2005) and in the Carrizo Vernal Pool Region in Kern County. As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## Kern Brook Lamprey (*Entosphenus hubbsi*)

The Kern brook lamprey is a California SSC and is endemic to California. It is characterized by having an oral disc narrower than its head, and its body coloration consists of gray to brown above, and black specks on the dorsal and caudal fins (Froese and Pauly 2015). The average adult length is 4.5 inches. It is believed that Kern brook lamprey is thinly distributed with isolated subpopulations throughout the San Joaquin Valley watershed, at elevations between 100 to 1,075 feet. The Kern brook lamprey tends to occupy slow backwaters of foothill streams and is commonly associated with sand, gravel, and rubble substrates.

Historical collections of the Kern brook lamprey are known only from the Friant-Kern Canal in Merced County and the Merced River (Froese and Pauly 2015). Recent studies documented seven Kern brook lampreys in Kings River, below the North Fork New River, near Trimmer California (Klamath-Siskiyou Wildlands Center et al. 2003).

Historical database shows only one occurrence of this species located within the Project Area, at the Friant-Kern Canal, east of Delano, which was collected in 1972 (CDFW 2014). The Kern brook lamprey is threatened by habitat loss, degradation, and fragmentation as a result of watershed projects and alterations including damming, channelization, and flow modifications, which ultimately restrict or prohibit phases of the reproductive cycle and/or isolate populations thereby limiting distribution and re-colonization of habitat. As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## California Red-Legged Frog *(Rana draytonii)*

The California red-legged frog is federally threatened and a state SSC. It is a medium-sized frog, 1.75 to 5.25 inches long from snout to vent. It has long legs with dark banding and webbing on the hind feet. Its skin is smooth and reddish-brown or brown, grey, or olive in color with small black flecks and spots on the back and sides (California Herps 2014). The California red-legged frog occupies quiet pools of streams, marshes, and sometimes ponds. It is found mainly near ponds in humid forests, woodlands, grasslands, coastal scrub, and streamsides with plant cover and most often occurs in lowlands or foothills and in woods adjacent to streams. Breeding habitat consists of permanent or ephemeral water sources such as lakes, ponds, reservoirs, slow streams, marshes, bogs, and swamps. This species is usually found at elevations from 0 to 5,000 feet.

The California red-legged frog is endemic to California and northern Baja California. Historically, the California red-legged frog was found along the coast and Coast Ranges from Mendocino County in northern California south to northern Baja California. It was found inland east through the northern Sacramento Valley into the foothills of the Sierra Nevada Mountains,

south to Tulare and possibly Kern Counties. It is believed that this species did occur in the Central Valley due to annual floods. The USFWS has designated critical habitat for this species within the northwest area of Kern County. As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## California Tiger Salamander *(Ambystoma californiense)*

The California tiger salamander is a federal and state threatened species and a state SSC. The California tiger salamander has a small rounded head with a blunt snout. The body's coloration is black with large yellow spots or bars, often along the middle of the back. This species is most commonly found in annual grassland habitat, but can occur in the grassy understory of valley foothill hardwood habitats, and uncommonly along stream courses in valley foothill riparian habitats. This nocturnal, fossorial species breeds in natural ephemeral pools, or ponds, that mimic it. California tiger salamanders require ponds or pools that remain inundated for 10 weeks or more. This species is restricted to grasslands and low foothill regions where lowland aquatic sites are available for breeding. This species also requires nearby upland terrestrial habitat for aestivation that contains small mammal burrows (particularly California ground squirrel burrows) or crevices that provide refugia. The California tiger salamander occurs at elevations from 0 to 3,200 feet (Jennings and Hayes 1994).

This species occurs from areas near Petaluma, Sonoma County, east through the Central Valley to Yolo and Sacramento, south to Tulare County, and from the vicinity of San Francisco Bay south to Santa Barbara County. The USFWS has identified critical habitat for the California tiger salamander in the northwest corner of the Project Area within the Temblor Range. No other habitat for this species is predicted to occur within the rest of the Project Area. As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## Kern Canyon Slender Salamander *(Batrachoseps simatus)*

The Kern Canyon slender salamander is listed as a California threatened species, and considered by the USFWS to be a sensitive species. The Kern Canyon slender salamander is relatively large and robust in comparison to other slender salamanders and has a dark grey to green to brown coloring with light flecks (California Herps 2014). The species occurs only in the lower Kern River Canyon in chaparral, cismontane woodland, riparian scrub, and riparian woodland communities. It prefers north facing slopes and is found under vegetative liter such as downed pine, oak, and chaparral scrub logs as well as under rocks (California Herps 2014). The species' elevation ranges from 1,400 feet up to 4,000 feet at Erskine Creek.

This species is known from a number of locations in the lower Kern River Canyon. This species has been documented to occur in the lower Kern River Canyon from Stork Creek to Erskine Creek (California Herps 2014). These creeks are not located within the Project Area and are not anticipated to be impacted as a result of the Project. The species occurs in isolated colonies. It is probable that this species can occur in many densely wooded canyons in the lower Kern River

Canyon. As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## Yellow-Blotched Salamander (Ensatina eschscholtzii croceator)

The yellow-blotched salamander is a California SSC. This species is described in the TUMSHCP (Dudek 2013). This species has a dark brown to black colored body marked with large yellow or cream-colored blotches, with yellow to orange on the base of the limbs. This species is found in evergreen and deciduous forests, under rocks, logs, and other surface debris, especially bark that has peeled off and fallen beside decaying logs. The yellow-blotched salamander favors north-facing areas, especially near creeks or streams (California Herps 2014). *Ensatina eschoscholzii* is typically treated as a "ring" species consisting of seven subspecies one of which is *croceator* (Moritz et al. 1992). The yellow-blotched salamander is threatened by loss of habitat and degradation. This species is endemic to California and occurs in the lower Kern River Canyon, the Piute Mountains, Breckenridge Mountain, the Tehachapi Mountains, on Mt. Pinos, near Fort Tejon, and near Frazier-Alamo Mountain (California Herps 2014). As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## Bakersfield Legless Lizard *(Annielle grinnelli)*

The Bakersfield legless lizard is differentiated from all other species of *Anniella* in having a higher vertebral count. The Bakersfield legless lizard is restricted to the southern San Joaquin Valley and the east side of the Carrizo Plain, and within the city limits of Bakersfield. During the last 10 years, two of the three known Bakersfield populations were destroyed by housing developments. A protected population is located at the Sand Ridge Preserve. Individuals from the Carrizo Plain are similar in coloration and mitochondrial sequences to the San Joaquin Valley samples, but have a different nuclear genotype (Papenfuss and Parham 2013). As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## Temblor Legless Lizard (*Anniella alexanderae*)

Temblor legless lizard is differentiated from all other species of *Anniella* in having a light grey ventral coloring that is continuous from the lower jaw to the end of the tail. The Temblor legless lizard is known from two sites separated by continuous habitat west of Highway 33. The known sites are in areas of sandy soil at the southeast base of the Temblor Range between McKittrick and Taft on the west side of the southern San Joaquin Valley in Kern County, California. All specimens have been found between Highway 33 and the Temblor Range (Papenfuss and Parham 2013). As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## Bald Eagle (Haliaeetus leucocephalus)

The bald eagle is listed as a state endangered and state fully protected species, and is protected by the MBTA. Though this species was once federally endangered, it was delisted in 2007. The

population of bald eagles has been documented to be stable to increasing (USFWS 2006). The bald eagle is still protected under the Bald and Golden Eagle Protection Act as well as the Lacey Act. Adult bald eagles are typically brown in the body and have a white head and tail. Body length ranges from 28 to 50 inches and a typical wingspan ranges from 6 to 8 feet. The bald eagle is usually found within one mile of large bodies of water. It hunts from perches or soaring flight, but will also wade into shallow water to pursue fish. In flooded fields, it will occasionally prey upon displaced voles, or other small mammals. Groups may feed gregariously, especially on spawning fish. The bald eagle also scavenges for dead fish, water birds, and mammals. It most frequently uses perches that are open and easily approached, such as large, stoutly limbed trees, snags, or broken-topped trees (Zeiner et al. 1988-1990). It is more common at lower elevations, and is not found in the high Sierra Nevada.

Breeding habitat in California for the bald eagle is generally limited to Butte, Lake, Lassen, Modoc, Plumas, Shasta, Siskiyou, and Trinity Counties. About half of the wintering population is in the Klamath Basin. This species is fairly common as a local winter migrant at a few inland waters in southern California including Kern and San Bernardino Counties (Zeiner et al. 1988-1990). No breeding pairs have been recorded within Kern County, and the Project Area is likely only used by winter residents and migrants. As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## California Condor (Gymnogyps californianus)

The condor was listed under the ESA in March 11, 1967 (32 FR 4001). Critical habitat for the California condor was designated September 24, 1976 (41 FR 41914–41916). The vast majority of condor critical habitat is located in higher elevation areas of the Tehachapis, Coastal Range, and Sierra mountain ranges. Condor critical habitat has been designated within the southern portion or immediately adjacent to the Project Area. The condor critical habitat designation, however, predated current regulatory criteria for designating critical habitat, most notably regulations requiring that critical habitat designations be made based on the "primary constituent elements" that are essential for the conservation of the listed species. Instead, the condor critical habitat designation was based on limited occurrence information and township blocks, which resulted in condor critical habitat maps that extend onto the valley floor below the 2,000-foot elevation, particularly in the vicinity of I-5.

The biology and lifecycle of the California condor at the time of the federal listing and designation of critical habitat reflected information largely derived from a period of severe stress for the species. In 1982, the condor population had declined to the point that the USFWS elected to capture and remove all existing condors from the wild for captive breeding in at the Los Angeles Zoo and San Diego Wild Animal Park. Condors were reintroduced into the wild in 1992, and have required constant monitoring to avoid mortality due to lead poisoning ingested from remnants of shot in discarded animal remains. In response, California enacted the Ridley-Tree Condor Conservation Act, which banned the use of lead ammunition within the state range of the California condor effective July 1, 2008. By 2002, a number of condors had been fitted with GPS transmitters that allowed for regular monitoring of condor locations and activities, such as

perching, flying or roosting, and the southern California condor population was 113 birds in 2011.

In 2013, the USFWS approved the TUMSHCP for 141,886 acres of Tejon Ranch, including lands that extend along the northern face of the Tehachapi Mountains to a minimum elevation of 2,000 feet above the valley floor. The 2,000 foot elevation level is also the maximum height used in the draft VFHCP due to the differences in habitat and species occurrence at that elevation threshold. During the preparation of the TUMSHCP, the USFWS conducted extensive analyses of condor occurrence generated by GPS data from released and wild condors over the period of 2002 to 2011. As shown in Figure 4.4-9, condor movement patterns tend to be highly influenced by food availability and nesting/roosting sites. The preponderance of all data points were in the Hopper Mountain and Bitter Creek National Wildlife Refuges and where historical and current nesting and roosting sites (Hopper National Wildlife Refuge) and supplemental feeding stations are located to trap condor for health checkups and transmitter updates. High numbers of location point were also recorded in the Wind Wolves Preserve where supplemental feeding sites have been occasionally established and where Tule elk populations occur, and in the higher elevations of Tejon Ranch primarily associated with foraging and occasional overnight roosting related to hunting and grazing activities on the ranch.

The USFWS data analysis demonstrates that condors are, in almost all cases, topographically constrained to upland areas at the periphery of the Project Area where topography sustains thermal weather patterns for flight. As shown in Figure 4.4-9, for example, there are almost no recorded condor aerial or ground occurrences over the entire decade of 2002 to 2011 in the northern half of the critical habitat area east of I-5 that extends to lower elevations and the valley floor. The overwhelming majority of all aerial or ground occurrences are also limited to locations above 2,000 feet, as indicated by the spatial data mapped along the northern border of the TUMSHCP (which traverses the 2,000-foot elevation level) in Figure 4.4-9. More generally, the data shows that condors do not use, or even fly over, nearly all of the Project Area in the valley floor up to 2,000 feet AMSL.

Generally, California condors use topography and associated thermal weather patterns for flight. This is best illustrated by observations indicating that almost all flights by California condors, whether covering long distances or not, followed routes over the foothills and mountains bordering the southern San Joaquin Valley, but did not pass directly over the flat, highly agricultural floor of the valley. Thus, the usual route for a bird starting from the coastal mountains of Santa Barbara County on its way to foraging grounds in Tulare County was to cross northern Ventura County, pass through the Tehachapi Mountains in southern Kern County (in the vicinity of Tejon Ranch), then turn north to fly closely by Breckenridge Mountain, and enter Tulare County somewhere between the Greenhorn Mountains and Blue Mountain. (USFWS 2013d)

The best available scientific information for the condor demonstrates that Project Area locations above 2,000 feet are significantly more subject to use by the condor for foraging activities. There is no condor nesting or breeding activity anywhere in the Project Area, including locations above 2,000 feet. The current and foreseeable future population of condors do not appear to be limited

by losses of foraging or breeding habitat related to development, including oil and gas activities (USFWS 2013).

When condors are recovered, continued population growth may at some point become limited by available forage, though no definitive scientific analysis of the carrying capacity of condor foraging habitat has been conducted. However, as noted above, nothing in the historical record indicates that condors currently lack adequate food or foraging opportunities. While agricultural conversion to more intensive uses and the corresponding increased human activity has caused speculation about the lack of adequate forage, no impact on the current population has been identified. Further, the availability of appropriate habitat could be restricted by limitations in connectivity of suitable areas for California condor foraging, nesting, and roosting. Once again, no such limitations have been noted aside from natural landscape features, and condors have been observed utilizing areas with roads, housing, gas and oilfields, and similar human features. As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## Fulvous Whistling-Duck (*Dendrocygna bicolor)*

The fulvous whistling-duck is a California SSC and an MBTA protected species. The fulvous whistling-duck is a medium-sized duck with a long neck and long legs. The head, neck, chest, and belly are cinnamon colored. It inhabits and nests in marshlands, wet meadows, rice fields, flooded agricultural areas, and lagoons. This species prefers to nest in dense wetlands, shallow lacustrine and quiet riverine waters. This species can sometimes feed in wet croplands and pastures, if available. The fulvous whistling-duck migrates out of California. The breeding population generally leaves from September to February, and migrates to its wintering grounds in Mexico. This species is threatened by nest predators, which include skunks, raccoons, opossums, and dogs. Other threats include pesticide poisoning and hunting.

There are populations of the fulvous whistling-duck found in Africa, Madagascar, India, Burma, Hawaii, the Caribbean, and throughout tropical America. In California, the fulvous whistling-duck is known to nest irregularly in the Imperial Valley and is uncommon to fairly common (some years only) in the San Joaquin Valley from April to November (Zeiner et al. 1988-1990). The breeding season extends from late April through early August. The winter status of the fulvous whistling-duck is poorly known historically. The establishment of irrigation for agricultural fields in the Los Banos area and the San Joaquin Valley created more habitat than was previously available. The Los Banos area was identified as the “chief breeding ground” and became one of the only locations in California where the species was considered common (Grinnell and Miller 1944). As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## Loggerhead Shrike (*Lanius ludovicianus*)

The loggerhead shrike is a California SSC and is protected by the MBTA. This species is identifiable based on its gray back, white belly, black coloration on the wings, and a black mask around the eyes. The loggerhead shrike has raptor-like habits and has been observed skewering

their kills on thorns, barbed wire, or by wedging their prey into a tight space. This species inhabits shrubland, open woodlands, grasslands, and other open habitats that provide woody or thorny shrubs and branches. Loggerhead shrikes primarily feed on large insects, but may also eat small birds, mammals, amphibians, reptiles, fish, carrion, and various other invertebrates.

Historically, this species was widespread throughout most of California with the exception of the northwest most corner of the state. The northern portion of the San Joaquin Valley is no longer considered to be a part of their present range. In California, the loggerhead shrike is known to breed in the Central Valley, Coastal Ranges, and the southeastern deserts (Zeiner et al. 1988-1990). The wintering range of this species includes the San Joaquin Valley, the south-central and south coasts, and the southeastern deserts (Sauer et al. 1996). As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

### Long-Eared Owl *(Asio otus)*

The long-eared owl is listed as a California SSC and is protected under the MBTA. It is a medium-sized, brownish gray owl with pale patches on the face that give the appearance of white eyebrows, and a white patch below the bill. This species inhabits conifer, oak, riparian, pinyon-juniper, and desert woodlands that are either open or are adjacent to grasslands, meadows, or shrublands from sea level up to 6,550 feet in elevation. Nesting and roosting habitat require dense wooded areas with openings for hunting, windrows, caves and/or cracks in rock canyons.

The breeding range of the long-eared owl is spread throughout California except for the entire floor of the Central Valley and the southern coastal areas. There are, however, limited records suggesting that this owl is a very scarce and irregular breeder in the Central Valley with only a few observations from Yolo, Fresno, and Kern Counties. As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

### Short-Eared Owl (*Asio flammeus*)

The short-eared owl is listed as a California SSC and is protected under the MBTA. It is a medium-sized owl with dark brown mottled upperparts and light buff colored underparts with dark streaks. The head is round and the facial disk is outlined in white with black around the eyes. It has yellow eyes and a black bill. This species occurs in Great Basin grassland, marsh and seep, meadow and seep, valley and foothill grassland, and wetland habitats. It is found in both fresh and saltwater marshes, lowland meadows, and irrigated alfalfa fields. It requires tall grasses for nesting and daytime seclusion. The short-eared owl builds its nest on the ground and produces a clutch of three to 11 eggs.

The breeding range of this species is from the coastal areas in Del Norte and Humboldt Counties, the San Francisco Bay Delta, northeastern Modoc Plateau, the east side of the Sierras from Lake Tahoe south to Inyo County, and the San Joaquin Valley (Zeiner et al. 1988-1990). The short-eared owl generally arrives in California in September or October and leaves in April (Zeiner et

al. 1988-1990). As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## Western Snowy Plover (Charadrius alexandrinus nivosus)

The Western snowy plover is listed as a federally threatened species, State SSC, and is protected by the MBTA. Conservation guidelines are depicted in the *Recovery Plan for the Pacific Coast Population of the Western Snowy Plover* (USFWS 2007d). The Western snowy plover is a small shorebird just over 6 inches in length and weighs 1.2 to 2 ounces. Overall, it has lateral patches of white on the hind neck and breast and dark lateral breast patches, a forehead bar, and eye patches. They have pale gray-brown upperparts, and the bill and legs are blackish (Cornell 2015b). Their diet comprises terrestrial freshwater brackish and marine invertebrates. Rove beetles, long-legged flies and shore flies are the most common invertebrates consumed by this species (Cornell 2015b). This ground nesting bird inhabits barren to sparsely vegetated sand beaches, dry salt flats in lagoons, dredge spoils deposited on beach or dune habitat, levees and flats at salt-evaporation ponds, river bars, along alkaline or saline lakes, reservoirs, and ponds.

The Western snowy plover declined 20% in its breeding population during surveys between the late 1970s and late 1980s (Cornell 2015b). The coastal breeding range of this species runs down the Pacific Coast, up the Gulf of California, down the west coast of Mexico, and along the shores of the Gulf Coast. California inland breeding areas occur at the Salton Sea, Mono Lake, and at isolated sites on the shores of alkali lakes in northeastern California, in the Central Valley, and southeastern deserts (Zeiner et al. 1988-1990). This inland range borders Nevada and extends up to southern Oregon. The species also breeds in northern Utah, Wyoming, Colorado, and Montana and along the southern corner of New Mexico, across northern Texas, and extending up to Kansas Cornell 2015b). It is known to occur from sea level within its coastal range and up to 10,000 feet in elevation when breeding inland. When the birds are inland, some regularly winter at agricultural wastewater ponds in the San Joaquin Valley, California. As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## White-Tailed Kite (*Elanus leucurus*)

The white-tailed kite is listed as a state fully protected species and is protected by the MBTA. The white-tailed kite is found primarily in open grasslands, agricultural areas, wide river valleys, open oak savannas, and desert grasslands, and prefers low to middle elevation habitats (Zeiner et al. 1988-1990). It is a smaller, gull-like bird of prey with mostly white to grey coloring and black shoulders and has a distinctive black band near the tip of the tale. Adults have red eyes and have been known to dangle their feet during flight. It is 15 inches long, and has a wing span of about 38 inches. The nests of this species are usually located in solitary trees, or on the edge of forest stands. Nesting occurs between February through August, and peaks in March through May (Zeiner et al. 1988-1990).

The white-tailed kite ranges throughout the United States and into South America. Currently, the white-tailed kite is found in virtually all lowlands of California west of the Sierra Nevada Mountains and the southeast deserts. It is common in the Central Valley and along the entire California coast (Zeiner et al. 1988-1990). As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## Pallid Bat (Antrozous pallidus)

The pallid bat is a California SSC. The pallid bat is a large light-colored bat with a forearm length of 1.7 to 2.3 inches, with long prominent ears, a blunt snout, and pinkish-brown or gray wing, and tail membranes. Glands located near the scroll-shaped nostrils secrete a distinct skunk-like scent. Pallid bats can be distinguished from other long eared bats by their lighter fur, longer forearm, and lack of lappets (fleshy flaps) that protect them from the base of the ears or large rhinal lumps. The pallid bat inhabits rocky arid deserts and canyon-lands, shrub-steppe grasslands, karst formations up to 6,000 feet in elevation and higher elevation coniferous forests up to 7,000 feet. It is most abundant in xeric ecosystems, including the Great Basin, Mojave, and Sonoran Deserts. Day and night roosts include crevices in rocky outcrops and cliffs, caves, mines, trees, and various human structures such as bridges, barns, porches, bat boxes, and human-occupied as well as vacant buildings.

The pallid bat is distributed from southern British Columbia and Montana to central Mexico, and east to Texas, Oklahoma, and Kansas. An isolated population also occurs on Cuba (WBWG 2005). This species is common in low elevations throughout California except for the high Sierra Nevadas from Shasta to Kern Counties and the northwestern corner of the state from Del Norte and western Siskiyou County to northern Mendocino County (Zeiner et al. 1988-1990). As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## Ringtail (Bassariscus astutus)

The Ringtail is listed as a California SSC and is designated as fully protected by the CDFW. This species is nocturnal and primarily carnivorous. They eat mainly rodents and rabbits, but their diet also includes substantial amounts of birds and eggs, reptiles, invertebrates, fruits, nuts, and some carrion. They forage primarily on the ground, among rocks and in trees usually near water (Harris and Chester 1997). The ringtail likes to use hollow trees, logs, snags, cavities in talus and other rocky areas, and other recesses for cover. Ringtails could potentially occur in riparian habitats, and in brush stands of most forest and shrub habitats, associated with rocky areas no farther than 0.6 mile from permanent water.

The species is widely distributed in Mexico and across southern North America. In the United States it ranges from southern Oregon and California through the southwestern states to Texas (Harris and Chester 1997). In California, the ringtail is a widely distributed, common to uncommon permanent resident. It occurs in various riparian habitats, in brush stands of most forest and shrub habitats, and at low to middle elevations (Zeiner et al. 1988-1990). The species is usually distributed from sea level to 4,600 feet; however, the species is not known to occur in the

lower elevations of the San Joaquin Valley. Limited riparian habitat exists along the Kern River, and a sighting was confirmed in the riverine area of Bakersfield near Mohawk Street in 2012 (SJVC 2012). Apart from the Kern River riparian areas, ringtail suitable habitat is limited to upper elevations in the eastern and western portions of Kern County, except for the higher elevation locations to the south. There are no documented occurrences within the CNDDB (CDFW 2014). As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

## Townsend's Big-Eared Bat (*Corynorhinus townsendii*)

The Townsend's big-eared bat is a candidate for listing in the state of California. The species is found throughout California in all alpine and subalpine habitats, and may be found during any season. This species of bat is medium-sized with very long ears. Their fur is pale gray or brown above and buff colored on the underside. This bat's ears are immense, reaching a length of 38 millimeters. When the ears are laid back they extend to the middle of its body. The face is marked by two large glandular lumps on either side of its nose.

Townsend's bid-eared bats are insectivorous. They tend to emerge late in the day to feed (Gruver and Keinath 2006). Townsend's big eared bats feed on small moths, beetles, or flies and either capture these insects from leaves or catch them directly in the air (Kunz and Martin 1982). Suitable foraging habitat for Townsend's big-eared bats will likely be a heterogeneous mosaic of forested and edge habitats, including riparian zones, which are also used for commuting and drinking (Fellers and Pierson 2002). Areas with substantial beaver activity enhance the quality of foraging habitat by increasing ecosystem productivity (Gruver and Keinath 2006), providing gaps in the forest canopy; providing small, quiet ponds for drinking; and causing an increase in insect activity. In California, both males and females foraged along the edges of riparian vegetation dominated by Douglas-fir, California bay, and willow species, but they also avoided open grasslands both when traveling and foraging (Fellers and Pierson 2002).

These animals are sensitive to light and movement so if they are disturbed during the day, they awake and their ears begin to move as they try to identify the intruder. If the disturbance occurs for more than a few seconds, the entire group will relocate (Gruver and Keinath 2006). Generally, Townsend's big-eared bats are found in the dry uplands throughout the West, but they also occur in mesic coniferous and deciduous forest habitats along the Pacific Coast (Kunz and Martin 1982). Townsend's big-eared bat is unequivocally associated with areas containing caves and cave-analogs for roosting habitat. Beyond the constraint for cavernous roosts, habitat associations become less well defined.

The Townsend's big-eared bat requires spacious cavern-like structures for roosting during all stages of its life cycle. Typically, they use caves and mines, but the species has been noted roosting in large hollows of redwood trees (Fellers and Pierson 2002), in attics and abandoned buildings (Fellers and Pierson 2002), and under bridges (Fellers and Pierson 2002). In coastal California, five of six known maternity colonies were in old buildings; the sixth was in a cave-like feature of a bridge (Fellers and Pierson 2002). During hibernation, these bats commonly change position within a hibernaculum or move to a nearby roost, presumably to find

temperatures that are more suitable. Roost movement in the summer likely occurs for the same reason.

As a group, bats are vulnerable to extirpation or extinction because of their unique life histories, notably their low annual fecundity. Townsend's big-eared bat may be even more susceptible because of its wing morphology, restrictive roosting requirements, sensitivity to disturbance at roost sites, and the ongoing elimination of roosting habitat. This species has declined due to direct killing by people and because of abandonment of roosts caused by disturbance due to explorers and vandals. Townsend's big-eared bats are notoriously sensitive to disturbance at roost sites (Kunz and Martin 1982). Disturbance of roost sites and elimination of roosting habitat through closure of abandoned mines poses a serious threat to the Townsend's big-eared bat in the West. Pesticides and other environmental toxins also affect these bats in two ways: through bioaccumulation and through reduction in prey abundance. As discussed in Impact 4.4-1, potential impacts were evaluated based on the potential occurrence of the species in each Project Area tier and subarea.

# High Elevation Project Locations

As described above, a portion of the Project area extends to areas above 2,000 feet AMSL. The southern border of the Project Area, and potentially a few location points along the eastern border, include lands that are above 2,000 feet AMSL in elevation. Almost all of the Project Area and existing oil and gas fields are situated on the San Joaquin Valley floor or lower uplands that are below 2,000 AMSL. The vegetation and species occurrences in Project Area locations above and below 2,000 feet are significantly different. The southern border of the Project Area includes portions of Tejon Ranch east of I-5, and the Wind Wolves Preserve, privately managed conservation lands west of the interstate. The extreme southwest portion of the Project Area is adjacent to the federal Bittercreek National Wildlife Preserve.

In 2013, the USFWS approved the TUMSHCP for 141,886 acres of Tejon Ranch, including lands that extend along the northern face of the Tehachapi Mountains to a minimum elevation of 2,000 feet above the valley floor. As shown in Figure 4.4-10, the 2,000-foot elevation level marks a generally sharp transition from the agricultural lands, grasslands, and shrub habitats that are characteristic of almost all of the Project Area, to a savanna and woodland landscape.

As documented in the TUMSHCP and the NEPA review prepared for the HCP, several species occur with much greater frequency, and use locations above 2,000 feet more extensively for foraging, breeding, roosting or other life-cycle functions, than at lower elevations. As shown in Table 4.4-65, several of the state or federally protected species covered by the TUMSHCP occur to a much greater extent or only in locations above 2,000 feet than in the rest of the HCP area. Golden eagles breed at higher locations, for example, but not at lower elevations or on the valley floor. Habitat for the least bell's vireo, Tehachapi slender salamander, and striped adobe lily is almost exclusively confined to higher elevations. As discussed above, the California condor occurs almost exclusively in higher elevations in the mountains surrounding the Project Area to the south and east.

**Table 4.4-65: Relative Occurrence of Certain Listed Species in Locations Above and Below 2,000 feet In the Tehachapi Uplands Multiple Species Habitat Conservation Plan Area**

| Species | Status | Habitat Function | Probability of Occurrence Compared with Project Area Below 2,000 feet |
|---|---|---|---|
| California condor | FE/SE/FP | Primary foraging, roosting | Much Higher |
| Golden eagle | SSC/FP | Foraging/ breeding | Much Higher |
| Least Bell's vireo | FE/SE | Breeding/foraging | Much Higher |
| Ringtail | FP | Suitable habitat | Higher |
| Striped adobe lily | ST | Suitable habitat | Much Higher |
| Tehachapi slender salamander | ST | Suitable habitat | Much Higher |

Source: USFWS 2012
Notes:
Federal Status: FE=Listed as Endangered; FT=Listed as Threatened; FC=Federal Candidate
State Status: ST= State Listed as Threatened; SSC= Species of Special Concern; FP=State Fully Protected

Conversely, most of the species addressed in the federal SJV Recovery Plan (USFWS 1998), including the San Joaquin kit fox, the giant kangaroo rat, the Tipton kangaroo rat and the blunt-nosed leopard lizard, typically do not occur, or occur so infrequently in locations above 2,000 feet, that they were not analyzed by the USFWS in the TUMSHCP EIS or included as covered species in the HCP.

# Connectivity and Migration Corridors

Habitat connectivity and wildlife movement corridors that facilitate connectivity are important for biodiversity conservation (Mackey, Watson, and Worboys 2010), maintaining gene flow (Beier and Noss 1998), maintaining ecological processes (Bennett 2003), and reducing species extinction risk (Crooks et al. 2011). Connectivity between blocks of habitat is maintained through a network of corridors defined by plants and wildlife use for movement events on varying scales (e.g., daily foraging, seasonal migration, or dispersal). Wildlife movement corridors and linkage functions include: (1) travel routes for wide-ranging animals, allowing animals to either migrate or come into contact with mates; (2) routes for the propagation of plant species; (3) spatial arrangement for genetic exchange between individuals; (4) areas where populations can move in response to environmental change or natural disasters; and (5) routes by which re-colonization can occur where populations have been locally extirpated (Beier and Loe 1992).

Wildlife connectivity and linkages in the Project Area were discussed and identified in the 1998 SJV Recovery Plan targeting upland species of the San Joaquin Valley. For the San Joaquin kit fox, identification of linkages between core and satellite populations in the greater San Joaquin Valley was further refined in the 2010 5-year review of the kit fox (USFWS 2010b) by evaluating modeling information designed to optimize reserve design for that species. As shown in Figure

4.4-11, the linkages were intended to connect core and satellite kit fox habitat. With San Joaquin kit fox as an umbrella species in the SJV Recovery Plan, the intent was that this reserve design combined with linkage features would benefit other target upland species that co-occur with the kit fox. The proposed linkages in the Project Area are located within two primary areas: (1) within the lower elevation natural lands bordering San Joaquin Valley and (2) along remnant riparian corridors across the middle of the Project Area. The proposed linkages in the natural lands bordering the Project Area are in the northern and southern Eastern Subarea and the southern and northwestern portions of the Western Subarea. Proposed linkages also pass from the Western Subarea to the Eastern Subarea along the Kern River corridor and from the Kern National Wildlife Refuge/Semitropic Ridge vicinity through the Central Subarea to the Eastern Subarea along Poso Creek.

In a separate effort in 2001, a statewide conference was held that considered habitat connectivity and wildlife movement patterns throughout California. Project Area movement corridors identified from the conference are referred to as "potential corridors" in the following analysis (Penrod, Hunter, and Merrifield 2001).

More recently, the California Essential Habitat Connectivity Project (CEHP) (Spencer et al. 2010) used statewide wildlife information from CDFW to identify natural habitat blocks that support native biodiversity (i.e., Natural Landscape Blocks) and to delineate large areas that are considered essential for ecological connectivity between these blocks (i.e., Essential Connectivity Areas). The essential connectivity areas identified in the CEHP for the Project Area are somewhat different, but generally overlap with USFWS San Joaquin kit fox Core, Satellite, and Linkage areas (USFWS 2010b) with the following differences to note:

- Some of the Essential Connectivity Areas identified in the CEHP are also considered Core and Satellite Areas for San Joaquin kit fox in the SJV Recovery Plan;

- Essential Connectivity Areas address habitat connectivity in general on a landscape scale rather than by species;

- The SJV Recovery Plan (USFWS 1998) and the USFWS 5-Year Species Review (USFWS 2010b) include kit fox Core Areas (Carrizo and Western Kern) connecting to linkage lands along the southwestern boundary of the Project Area (Western Subarea). This connection is not shown on the CEHP map between Natural Landscape Blocks and Essential Connectivity Areas.

- In the northwestern portion of the Project Area (Western Subarea), there is less overlap between CEHP Natural Landscape Blocks and Essential Connectivity Areas than the area shown as SJV Recovery Plan linkage lands (which connect Carrizo and Western Kern Core Areas to satellite populations in western Kings County and the Lost Hills area).

- The CEHP shows a potential corridor in the Central Subarea paralleling and to the east of I-5 that was not identified in the earlier USFWS design.

Figure 4.4-11 shows the locations of potential corridors, natural habitat blocks, and essential connectivity areas that have been identified within the Project Area (Chevron 2014).

As shown in Figure 4.4-11, Potential Corridors in the Project subareas are influenced by the location of existing foothill habitats and watercourses. In the Western Subarea, a Potential Corridor is identified that extends through grasslands and grazing lands along the base of the Temblor range to the north. A relatively short Potential Corridor extends through the Western and Central Subareas, between Lost Hills and the Kern National Wildlife Refuge. In the Central Subarea, an Essential Connectivity Area would link the KWB and Lokern Natural Area habitat with the Kern National Wildlife Refuge to the north. An essential connectivity area has also been identified that would connect the Kern National Wildlife Refuge and preserves located in adjacent counties to the north. A potential corridor also has been identified at the northern border of the eastern Project Area in grasslands and rangelands along the Sierra Nevada foothills that would pass through Natural Landscape Blocks and an Essential Connectivity Area.

Two Potential Corridors extend through the Eastern and Central Subareas in a generally east-west direction along the Kern River and Poso Creek. These corridors correspond with the areas where linkages should be promoted, as identified in the SJV Recovery Plan (USFWS 1998).

The Potential Corridors, Essential Connectivity Areas, and Natural Landscape Blocks identified in previous plans within the Project Area have been modified or otherwise affected by existing land uses, including agriculture, urban development, and oil and gas activities. A significant amount of the Essential Connectivity Areas in the Western Subarea include currently operating oil and gas fields, portions of which have been subject to relatively dense levels of development. The Lost Hills – Semitropic Ridge Potential Corridor is impeded by gaps in natural land due to existing agriculture lands and urban development and by existing features that serve as barriers to plant and wildlife movement, including I-5, the Kern River Flood Canal, and the California Aqueduct.

The Carrizo Plain-Western San Joaquin Valley Potential Corridor is affected by existing roads and highways that are the primary barriers to movement, and a choke-point exists at Pleasant Valley in western Fresno County.

The Kern Refuge-Semitropic Ridge Potential Corridor spans 30 miles between the former Buena Vista Lake and the Semitropic Ridge Ecological Reserve. As shown in Figure 4.4-11, the Buttonwillow Ecological Reserve, Kern Water Bank Authority conservation lands, and the Coles Levee Ecological Reserve are included in this Potential Corridor. The most significant barriers to plant and wildlife movement in this Potential Corridor are gaps in natural lands as a result of agricultural development and roads.

There is little remaining natural land connectivity in the central portion of the Project Area, including most of the Central Subarea, and the valley floor portions of the Eastern and Western Subareas where agriculture and urban development are the predominant land uses. Much of the contiguous natural land that occurs on the valley floor extends along riparian corridors. At the southeastern and southwestern borders of the Project Area, an essential connectivity area has been

identified that extends between the foothills of the Temblor Range to the west and the Sierra Nevada Mountains to the east (Spencer et al. 2010). Roads and highways are the primary barriers to movement, along with steep and hilly terrain for the valley floor species that prefer areas of low relief. The San Joaquin kit fox does not generally occur in steep terrain. Studies have found that they are either absent from or less abundant in terrain that exceeds 5% slope (USFWS 2010b).

The Kern River potential corridor runs east-west through an impacted riparian corridor for approximately 30 miles. The riparian habitat within this corridor is considered a remnant of the historic conditions due to water table drawdown and low annual flows in the Kern River. Plant and wildlife movement of certain species in this potential corridor may be impeded by the urban development in the Bakersfield area that affects immediately adjacent land uses and activities within the river bed and bank. The most significant barriers to plant and wildlife movement in this potential corridor are gaps in riparian habitat for riparian-dependent species, density of vegetation for species adapted to more open habitats, and water impoundments, which potentially restrict the movement of terrestrial species across areas that recently have had only intermittent water flow.

The Poso Creek potential corridor primarily runs east-west, and follows remnants of the Poso Creek riparian corridor for approximately 35 miles. The most significant barrier to plant and wildlife movement in this potential corridor is gaps in natural habitat as a result of narrow width from channelization and encroaching agricultural development.

The Highway 43/Garces Highway Potential Corridor includes a series of natural lands that surround State Highway 43 that link the Kern National Wildlife Refuge in the south with relatively undisturbed tracts of land further north. The most significant barriers to plant and wildlife movement in this potential corridor are gaps in natural lands as a result of agricultural development.

In the Eastern Subarea, essential connectivity areas have been identified along the Sierra Nevada foothills extending south to the Tehachapi Mountains. The Southeastern Foothills potential extends for 60 miles between the Tehachapi Range to the south, and the foothills of the Sierra Nevada mountains to the northern Project Area boundary. The most significant barriers to plant and wildlife movement in this potential corridor are roads and urban development.

The 5-year review of the San Joaquin kit fox listing found that the most robust kit fox populations occur in the portions of the Project Area that are most heavily used for oil and production. The USFWS concluded that that kit fox, the SJV Recovery Plan umbrella species, can persist well with low density oil development, but that oil and gas development may have cumulative and long-term effects on kit fox populations that are not fully known (USFWS 2010b). In many cases, the patchiness of oil and gas development maintains habitat between areas of high, low and medium density activity. This development pattern would likely impede wildlife movement to a lesser extent than agriculture or urban development that tends to fully convert habitat within large, contiguous areas for wide ranging species (Fiehler and Cypher 2011). The SJV Recovery Plan indicates that oil and gas production may provide greater opportunities for potential

connectivity and conservation than agricultural land uses (USFWS 1998). More recent studies also suggest that elements of the wildlife community remain relatively intact up to 70% disturbance in oilfield development, with some special-status species persisting provided that at least 30% of the natural landscape is left intact (Fiehler and Cypher 2011).

## 4.4.3 Regulatory Setting

Federal, state, regional, and local biological resource policies and regulations applicable to the proposed Project are identified below.

# Federal

### Federal Endangered Species Act of 1973 (16 U.S.C. 1531 through 1543)

The ESA (16 U.S. Code [U.S.C.] 1531 et seq.) was enacted to provide a means by which endangered and threatened species and the ecosystems on which they depend may be conserved. The ESA and the implementing regulations (50 CFR 17.1 et seq.) include provisions for the protection and management of federally listed threatened or endangered plants and animals and their critical habitats. Generally, the USFWS regulates upland and freshwater species, and the National Marine Fisheries Service (NMFS) oversees provisions for protection of anadromous, marine, and estuarine species. Section 4 of the ESA requires the USFWS and/or NMFS to make determinations on whether any species should be listed as an endangered or threatened species and to designate critical habitat for endangered and threatened species (16 U.S.C. 1533). Critical habitat is defined in the ESA as an area occupied by a listed species with physical or geographical/biological features essential to the species conservation or locations not currently occupied by listed species which are essential to the species conservation. 50 CFR 424.02 Section 9 of the ESA (16 U.S.C. 1538, 50 CFR 17.21402 et seq.) prohibits the unauthorized take of any species that is listed as threatened or endangered under the ESA. Take that is incidental to and not the purpose of the carrying out of otherwise lawful activities may be permitted under Section 7 and Section 10 of the ESA.

Section 7 of the ESA requires federal agencies to consult with the USFWS and/or NMFS and obtain a biological opinion prior to carrying out any federal program or agency action that may adversely affect threatened or endangered species. The ESA Section 7 consultation process and biological opinion includes an evaluation of whether a federal project, including issuance of an incidental take permit (ITP) under ESA Section 10, is likely to jeopardize the continued existence and recovery of any endangered or threatened species or result in the destruction or adverse modification of critical habitat designated for the species. If a proposed federal action would result in take of a listed animal species or adverse modification of designated critical habitat, ESA Section 7 requires the USFWS to provide an incidental take statement that includes reasonable and prudent measures and terms and conditions implementing those measures, to minimize the effects of such take. Compliance by the federal agency and any applicant with the incidental take statement exempts potential take or adverse critical habitat modification resulting from the proposed action from the prohibitions in Section 9 of the ESA.

Section 10 of the ESA provides mechanisms for authorizing otherwise prohibited take through the ITP process for a proposed action that does not involve a discretionary approval by a federal agency. Under Section 10(a) of the ESA, an ITP can be obtained provided the permit applicant submits to the USFWS a conservation plan (often termed an HCP, or a multiple species habitat conservation plan [MSHCP] when addressing more than one species) that satisfies Section 10(a)(2)(A) of the ESA, and provided the USFWS determines that the habitat conservation plan meets the issuance criteria of Section 10(a)(2)(B) of the ESA. Section 10(a)(2)(B) of the ESA requires the following criteria be met before the USFWS may issue an ITP: (1) The taking will be incidental; (2) The applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking; (3) The applicant will ensure that adequate funding for the habitat conservation plan and procedures to deal with unforeseen circumstances will be provided; (4) The taking will not appreciably reduce the likelihood of survival and recovery of the species in the wild; and (5) The applicant will ensure that other measures that the USFWS may require as being necessary or appropriate will be provided.

The USFWS is required to annually identify species that are candidates for federal ESA listing, including species that USFWS records indicate are subject to sufficient biological vulnerability and threats to support a proposal for listing but for which a proposal has not been published due to other listing priorities. The list of candidate species is intended to: (1) notify the public that species face survival threats; (2) provide advance knowledge of potential listings for consideration by environmental planners and developers; (3) provide information that may stimulate and guide conservation efforts; (4) request additional input regarding candidate species; and (5) request information for setting listing priorities (Federal Register 79, No. 234 at 72451, December 5, 2014). The USFWS and other federal agencies, including the BLM, may also informally identify sensitive species or species of concern. These species are not subject to ESA or other federal statutory protection, but are considered by the USFWS and other agencies when evaluating the effects of a potential action or development resource management plans, including recovery plans under the ESA.

## Migratory Bird Treaty Act (16 U.S.C. 703 through 712)

The MBTA (16 U.S.C. 703–712) includes provisions for the protection of migratory birds and prohibits the non-permitted take of most migratory birds. Take under the MBTA is defined as to "pursue, hunt, take, capture, kill, attempt to take, capture, or kill, possess, offer for sale, sell, offer to barter, barter, offer to purchase, purchase, deliver for shipment, ship export, import, cause to be shipped, exported, or imported, deliver for transportation, transport or cause to be transported, carry or cause to be carried, or receive for shipment, transportation, carriage, or export, any part, nest, or egg of any such bird, or any product, whether or not manufactured" (16 U.S.C. 703(a)). Apart from certain limited exceptions, the USFWS has not implemented an incidental take permit program for the MBTA.

## Bald and Golden Eagle Protection Act (16 U.S.C. 668, enacted by 54 Stat. 250)

The Bald and Golden Eagle Protection Act (BGEPA) of 1940 prohibits any form of possession or take of bald eagles and golden eagles, including actions to "pursue, shoot, shoot at, poison,

wound, kill, capture, trap, collect, molest or disturb" an eagle (16 U.S.C. 668c). To disturb a bald and golden eagle means "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available: (1) injury to an eagle; (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior'' (72 FR 31132; 50 CFR 22.3). A 1962 amendment created a specific exemption for possession of an eagle or eagle parts (e.g., feathers) for religious purposes of Indian tribes.

On November 10, 2009, USFWS implemented new rules (74 Federal Register 175) that finalized permit regulations to authorize the limited take of these species associated with certain otherwise lawful activities, including take in the form of disturbance or actual physical take of eagles (50 CFR 22.26), and a the removal of eagle nests (50 CFR 22.27). The regulations establish a hierarchy of take permits that could be issued for specific categories of activity to ensure that the total amount of authorized incidental take does not adversely affect the eagle populations in the western and eastern United States. The USFWS has indicated that, other than permits for religious and ceremonial activities, BGEPA take permits will generally not be available except for certain "programmatic" activities that may disturb or otherwise take eagles on an ongoing operational basis. To date, programmatic BGEPA permit guidance has been developed by the USFWS for wind and other renewable energy projects, including the development of Avian Protection Plans Eagle Conservation Plans (ECP). Programmatic permits are not currently available for residential projects, and a very limited number of programmatic permits for renewable energy development have been issued by the USFWS.

## Clean Water Act (33 U.S.C. §1251 et seq.)

The federal Clean Water Act (CWA) was enacted to protect the nation's waters. Section 404 of the CWA authorizes the Secretary of the Army, acting through the U.S. Army Corps of Engineers (USACE), to issue permits regulating the discharge of dredged or fill materials into "navigable waters at specified disposal sites." Waters of the United States (WOUS) are defined in CFR, Title 33, Section 328.3, subdivision (a) to include navigable waters, perennial and intermittent streams, lakes, rivers, and ponds, as well as wetlands, marshes, and wet meadows. The CWA extends additional protection to certain sensitive aquatic habitats, including wetlands. Authorization to discharge dredge or fill materials into sensitive aquatic habitats requires that an applicant demonstrate the proposed activity represents the least environmentally damaging practicable alternative for the project. A proposed discharge into federally regulated wetlands must also not result in a net loss of wetland functions or values (Compensatory Mitigation for Losses of Aquatic Resources, 73 Federal Register [FR] 19594 [April 10, 2008]; Executive Order 11990 [1977]) All authorizations to discharge dredge or fill materials into WOUS must demonstrate that the proposed projects have been designed to avoid, minimize and mitigate for all unavoidable effects on water of the United States.

The location and extent of WOUS are formally identified by the USACE through a jurisdictional delineation process applying technical criteria described in various guidance documents issued by the USACE, including the 1987 Corps of Engineers Wetlands Delineation Manual

(Environmental Laboratory 1987), the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2) (USACE 2008), A Field Guide to the Identification of the Ordinary High Water Mark in the Arid West Region of the Western United States (USACE 2008), and in USACE Regulatory Guidance Letter No. 05-05 (USACE 2005).

Although there are some streams in the Project Area that are navigable by small boats (e.g., kayaks and rafts) for limited periods of time, all have "ephemeral" or "intermittent" flows and most are never navigable. Most of these streams do not discharge into a navigable water when they do flow for limited periods of time and terminate at various valley floor locations. The USACE has issued jurisdictional determinations (JDs) for several waters and wetlands in the Project Area, and in certain instances has concluded that the applicable resources were not federally jurisdictional. A JD is generally valid for a period of five years.

The section 404 permit program also applies to the dredge and fill of federal wetlands. Physically, a federal wetland must meet three specified criteria: (i) less permeable soils more likely to cause rainwater and other surface water flows to pond; (ii) seasonal ponding during specified types of rain events; and (iii) the presence of plants that are consistent with seasonally ponding. The extent to which a wetland area that meets the applicable criteria is federally jurisdictional, however, is subject to considerable legal uncertainty. In 2001, the United States Supreme Court issued a split decision concerning the jurisdictional status of a wetland that was not hydrologically connected to a federal surface water, occurred entirely within a single state, and was not used in interstate commerce. In Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers, 531 U.S. 159 (2001) (SWANCC), Justice Kennedy, in his own concurrence in the opinion, articulated a "nexus" test of jurisdictionality: if a wetland has a physical "nexus" to a jurisdictional water, then it is federally jurisdictional. Wetlands that lack a physical nexus with a federally jurisdictional water are not subject to federal jurisdiction.

The USACE and EPA issued a joint guidance interpreting SWANCC, which set forth a detailed procedure by which both agencies would consider whether a particular wetland was federally jurisdictional (USACE 2007).

In March 2014, the USACE and EPA issued a proposed rule that would modify the current regulatory definition of WOUS for CWA and other federal jurisdictional purposes. As proposed, the new rule generally was considered to expand federal wetland and waters jurisdiction relative to the SWANCC Guidance (EPA 2014). In January 2015, a scientific advisory panel for EPA issued a report that developed an even broader basis for determining nexus and connectivity (EPA 2015). For example, the EPA report found that geographically isolated wetlands completely surrounded by uplands—waters that would normally be considered nonjurisdictional under the SWANCC Guidance—may still have hydrologic (i.e., subsurface or flood period flows), chemical, and biological (i.e., animal or insect movement) connections to downstream waters.

On May 27, 2015, the USACE and EPA issued a final WOUS rule. The final rule establishes categories of waters that are (1) jurisdictional by rule, (2) jurisdictional if meeting the regulation's "significant nexus" standard, as determined on a case-by-case basis, and (3) excluded from the definition of WOUS that are jurisdictional by rule include traditional navigable waters, interstate

waters, territorial seas, impoundments of jurisdictional waters, tributaries that flow directly or indirectly to traditional navigable waters and have certain physical indicators, and waters that are adjacent to these categories, including wetlands, ponds, lakes, oxbows, impoundments and similar waters. Waters may meet the significant nexus test on a case-by-case basis if they are found to contribute significantly to the chemical, physical, or biological integrity of the nearest downstream traditional navigable water, interstate water or territorial seas, based on an evaluation of specified aquatic functions. Waters excluded from the definition of WOUS include waste treatment systems, prior converted cropland, certain ditches that have limited flow and are not within or do not relocate jurisdictional tributaries or do not flow directly or indirectly into traditional navigable waters, interstate waters or the territorial seas, and artificially irrigated and other features created on dry land.

Although the WOUS rule has been finalized, the potential extent of water and wetland connectivity sufficient to support federal jurisdiction remain uncertain. The new rule has not yet been applied by the agencies or interpreted by the courts in a manner that allows for consistent application by the USACE when performing jurisdictional delineations. In addition, the U.S. House of Representative passed a bill which would require the USACE and EPA to withdraw the WOUS rule and develop a new rule. Several public and private stakeholders have also threatened to sue the EPA and the outcome of any such litigation, if pursued, would add additional uncertainty regarding the definition of wetlands and waters subject to CWA Section 404 jurisdiction.

# State

## California Endangered Species Act (California State Fish and Game Code §2050 et seq.)

The CESA (California Fish and Game Code [CFGC], 2050 et seq.) is intended to conserve, protect, restore, and enhance any state-protected endangered or threatened species and its habitat and is implemented by the CDFW. CESA prohibits the unauthorized take of species listed as threatened or endangered under the act. Take under state law is defined as actions to “hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill” a state-listed species (CFGC Section 86). The CFGC authorizes the take of endangered, threatened, or candidate species through an incidental take permit that may be issued by the CDFW under Section 2081. Alternatively, an incidental take of CESA-listed species may be authorized under Section 2080.1, which allows the CDFW to find that an incidental take permit issued under the federal ESA is consistent with CEQA state take permit requirements.

CDFW also maintains lists of SSC. An SSC designation is administrative in nature and does not create a formal legal status. CDFW has indicated that SSC designations are intended to: (1) focus attention on at-risk animals identified by state, local, and federal entities; land managers; planners; consulting biologists; and others; (2) stimulate species research; and (3) stimulate conservation measures that would avoid a CESA listing.

## California State Fish and Game Code §1600-1616

Sections 1600 to 1616 of the CFGC states that it is unlawful to "substantially divert or obstruct the natural flow of, or substantially change or use any material from the bed, channel, or bank of any river, stream, or lake" without first notifying CDFW of that activity. If CDFW determines and informs the project proponent that the activity will not substantially adversely affect any existing fish or wildlife resources, the activity may be undertaken without further permitting. If CDFW determines that the proposed activity may substantially and adversely affect an existing fish or wildlife resource, a Lake or Streambed Alteration Agreement must be completed and approved by the CDFW, including reasonable measures necessary to protect the affected resources may be required prior to initiating the proposed activity (CFGC 1602).

## State Waters (Water Code Section 13000 et seq.)

The Porter-Cologne Water Quality Control Act (Porter-Cologne) provides the State and Regional Boards with the authority to regulate discharges of waste to wetlands or other waters of the state. Section 13050(e) of the Water Code defines waters of the state to mean "any surface water or groundwater, including saline waters, within the boundaries of the state." Discharges of waste have been construed to include fill, any material resulting from human activity, or any other discharge that may directly or indirectly impact waters of the state. All WOUS in California are also waters of the state. Non-federal waters, including wetlands or waters that the USACE has delineated as isolated from federally regulated rivers or streams, are regulated by the State and Regional Boards under Porter-Cologne. State jurisdiction over waters of the state is broader in scope than federal jurisdiction of WOUS in California.

In general, the Porter Cologne Act requires that all parties proposing a discharge that could affect waters of the state file a report of waste discharge with the applicable regional board. The regional board may either issue waste discharge requirements (WDRs), including conditions and measures to protect waters of the state in a public hearing, or may waive the issuance of WDRs with or without additional discharge conditions. As discussed above, Section 4012 of the federal CWA requires state agencies certification that a proposed permit for the fill of a WOUS complies with state water quality objectives. In some instances, the state definition of a water may be larger in size and/or broader in scope than the definition used for federal CWA delineation purposes. Most regional boards utilize the 401 certification process to determine whether additional WDRs may be required for impacts to waters of the state that are not addressed by a proposed federal fill permit. Discharges to waters of the state that are not federally regulated require compliance with the Porter-Cologne discharge notice and WDR issuance process. Many regional boards have adopted criteria for the issuance of WDRs that are similar to federal CWA Section 404 permit requirements, including the need to demonstrate a project has been designed to avoid, minimize, and mitigate for unavoidable effects to waters of the state and would not result in a net loss of wetlands.

The State Board is considering the adoption of a Wetland and Riparian Area Protection Policy in three phases (State Board Resolution No. 2008-0026) in three phases. Phase 1, the "Wetland Area Protection and Dredge and Fill Permitting Policy," is currently under review by the Board and

includes a proposed wetland definition, delineation methods, an assessment framework for collecting and reporting aquatic resource information, and requirements applicable to discharges of dredged or fill material. A draft policy, draft regulation text, and CEQA analysis of the Phase 1 proposal remain pending (Cal/EPA 2015).

## California State Fish and Game Code §§ 3503, 3503.5 and 3513 (Raptors and Migratory Birds)

Several provisions of the CFGC protect avian species, nests, and eggs. Section 3503 provides that it is unlawful "to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto." Section 3503.5 extends these statutory protections more specifically to raptors and birds of prey (Falconiformes or Strigiformes). The CDFW has not implemented incidental take permit programs for Sections 3503 or 3503.5. Section 3513 makes it unlawful to "possess any migratory nongame bird as designated in the Migratory Bird Treaty Act or any part of such migratory nongame bird except as provided by rules and regulations adopted by the Secretary of the Interior under provisions of the Migratory Treaty Act." As discussed above, apart from certain limited exceptions, the USFWS has not implemented an incidental take program for the MBTA.

Sections 3511, 4700, 5050, and 5515 of the CFGC prohibit the take or possession of certain birds, mammals, fish, and reptiles. These species are commonly referred to as "fully protected" under state law and state agencies are prohibited from permitting actions that would result in the incidental take of these species except under the auspices of an approved Natural Community Conservation Plan.

## California Native Plant Protection Act of 1977; California Fish and Game Code §1900 et seq.

The Native Plant Protection Act of 1977 (CFGC 1900 et seq.) authorizes CDFW to designate rare and endangered native plants and provides specific protection measures for state listed species.

## CEQA Guidelines Section 15380

CEQA Guidelines Section 15380(b) provides that species not listed on the federal or state list of protected species may be considered rare or endangered if the species can be shown to be "endangered" or "rare" within the meaning of the statute. To be "endangered" means that the species survival and reproduction in the wild are in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, disease, or other factors. A species is "rare" when either: (1) although not presently threatened with extinction, the species exists in such small numbers throughout all or a significant portion of its range that it may become endangered if the environment worsens or (2) the species is likely to become endangered within the foreseeable future throughout all or a significant portion of its range and not be considered "threatened" within the meaning of the ESA.

## California Oak Protection Act §21083.4

Public Resources Code (PRC) § 21083.4 establishes state conservation standards for oak woodlands and requires the adoption of an oak woodland management plan, in any county where oak woodlands occur. Oak woodlands are defined as areas having a 10% or greater canopy cover of Quercus species with individual trees having a diameter at breast height (DBH) of 5 inches or more. PRC § 21083.4 also sets statewide minimum mitigation standards for significant impacts to oak woodland under CEQA. Kern County has not adopted a management plan for oak woodlands

## Wildlife Protection and Oil Sump Regulations (Publication No. PRC01)

DOGGR has adopted regulations that protect wildlife from potential oil sump impacts related to petroleum and gas activities in California (PRC §§ 3780 through 3785). The regulations define an oil sump as "any open depression or basin in the ground, whether manmade or natural, which contains oil or a combination of oil and water" (PRC Section 3780). The regulations include the following requirements to protect wildlife:

**Section 3780**. As used in this chapter, an "oil sump" is any open depression or basin in the ground, whether manmade or natural, which contains oil or a combination of oil and water.

**Section 3781**. The Legislature hereby finds and declares that it is essential in order to protect the wildlife resources of California that all hazardous exposed oil sumps in this state be either screened or eliminated.

**Section 3782.** The Supervisor shall promulgate rules and regulations for the adequate screening of oil sumps to protect wildlife and shall order the closure of any oil and gas production operation maintaining an exposed or inadequately screened oil sump in violation of such rules and regulations.

**Section 3783**. Whenever the Supervisor receives notification from the Department of Fish and Game pursuant to subdivision (a) of Section 1016 of the Fish and Game Code that an oil sump is hazardous to wildlife, he shall forthwith given written notice of such hazardous condition to the owner, lessee, operator, or person responsible for the existence of the condition and set forth the hazardous conditions as specified by the Department of Fish and Game. The owner, lessee, operator, or person responsible shall, within 30 days from the date of such notification, or such longer period as may be mutually agreed upon by the Supervisor, the Department of Fish and Game, and the owner, lessee, operator, or person responsible, clean up or abate the condition to the satisfaction of the Supervisor and the Department of Fish and Game. If the owner, lessee, operator, or person responsible does not clean up or abate the condition to the satisfaction of the Supervisor and the Department of Fish and Game within the required period of time, the Supervisor shall forthwith order the closure of the oil and gas production operation maintaining the oil sump.

**Section 3784**. Whenever the Supervisor receives notification from the Department of Fish and Game pursuant to subdivision (b) of Section 1016 of the Fish and Game Code that an oil sump constitutes an immediate and grave danger to wildlife, he shall forthwith give written notice of

such immediately dangerous condition to the owner, lessee, operator, or person responsible for the existence of the condition and set forth the immediately dangerous condition as specified by the Department of Fish and Game. The owner, lessee, operator, or person responsible shall, within 10 days from the date of such notification, or such longer period as may be mutually agreed upon pursuant to Section 3784.5 by the Supervisor, the Department of Fish and Game, and the owner, lessee, operator, or person responsible, clean up or abate the condition to the satisfaction of the Supervisor and the Department of Fish and Game. If the owner, lessee, operator, or person responsible does not clean up or abate the condition to the satisfaction of the Supervisor and the Department of Fish and Game within the required period of time, the Supervisor shall forthwith order the closure of the oil and gas production operation maintaining the oil sump.

**Section 3784.5.** Extension of the 10-day period in Section 3784 may be granted only in cases where the Supervisor and the Department of Fish and Game have determined that screening or elimination of the oil sump cannot be reasonably accomplished within 10 days.

**Section 3785**. The Supervisor and the Department of Fish and Game shall develop a joint program to coordinate their respective responsibilities under this chapter and Section 1016 of the Fish and Game Code to protect the wildlife resources of the state from the hazards of exposed oil sumps.

### Natural Community Planning Act (Fish and Game Code 2800 et seq.)

In 1991 California enacted the Natural Community Conservation Planning Act (CFGC Section 2800 et seq.) to authorize the creation and implementation of natural community conservation plans (NCCPs) to conserve natural communities at the ecosystem level while accommodating compatible land use. The act was revised in 2003 and has been subsequently amended. An MCPC is intended to function much like a federal HCP and provide for the long-term conservation of wildlife and plant communities in regional locations in manner that also allows for economic development and growth. Section 2805(e) allows the incidental take of fully protected species that are covered under an approved MCPC.

## Regional and Local

### Kern County General Plan

The Project Area is located within the Kern County General Plan (KCGP) area and, therefore, would be subject to applicable policies and measures of the KCGP. The Land Use, Conservation, and Open Space Element, the Noise Element, and the Energy Element of the KCGP include goals, policies, and implementation measures related to biological resources that apply to the Project, as described below.

# Chapter 1. Land Use, Conservation, and Open Space Element

## 1.3. Physical and Environmental Constraints

### Policies

**Policy 9.** Construction of structures that impede water flow in a primary floodplain will be discouraged.

**Policy 11.** Protect and maintain watershed integrity within Kern County.

### Implementation Measures

**Implementation Measure I.** Designated flood channels and water courses, such as creeks, gullies, and riverbeds, will be preserved as resource management areas or in the case of urban areas, as linear parks whenever practical.

## 1.9. Resource

### Policies

**Policy 11.** Minimize the alteration of natural drainage areas. Require development plans to include necessary mitigation to stabilize runoff and silt deposition through utilization of grading and flood protection ordinances.

**Policy 20.** Areas along rivers and streams will be conserved where feasible to enhance drainage, flood control, recreational, and other beneficial uses while acknowledging existing land use patterns.

## 1.10. General Provisions

### 1.10.5. Threatened and Endangered Species

### Policies

**Policy 27.** Threatened or endangered plant and wildlife species should be protected in accordance with State and federal laws.

**Policy 28.** County should work closely with State and federal agencies to assure that discretionary projects avoid or minimize impacts to fish, wildlife, and botanical resources.

**Policy 29.** The County will seek cooperative efforts with local, State, and federal agencies to protect listed threatened and endangered plant and wildlife species through the use of conservation plans and other methods promoting management and conservation of habitat lands.

**Policy 31.** Under the provisions of the California Environmental Quality Act (CEQA), the County, as lead agency, will solicit comments from the California Department of Fish and Game

and the USFWS when an environmental document (Negative Declaration, Mitigated Negative Declaration, or Environmental Impact Report) is prepared.

**Policy 32.** Riparian areas will be managed in accordance with United States Army Corps of Engineers, and the California Department of Fish and Game rules and regulations to enhance the drainage, flood control, biological, recreational, and other beneficial uses while acknowledging existing land use patterns.

### Implementation Measures

**Implementation Measure Q.** Discretionary projects shall consider effects to biological resources as required by the California Environmental Quality Act.

**Implementation Measure R.** Consult and consider the comments from responsible and trustee wildlife agencies when reviewing a discretionary project subject to the California Environmental Quality Act.

**Implementation Measure S.** Pursue the development and implementation of conservation programs with State and federal wildlife agencies for property owners desiring streamlined endangered species mitigation programs.

## 1.10.6. Surface Water and Groundwater

### Policies

**Policy 44.** Discretionary projects shall analyze watershed impacts and mitigate for construction-related and urban pollutants, as well as alterations of flow patterns and introduction of impervious surfaces as required by the California Environmental Quality Act (CEQA), to prevent the degradation of the watershed to the extent practical.

## 1.10.7. Light and Glare

### Policies

**Policy 47.** Ensure that light and glare from discretionary new development projects are minimized in rural as well as urban areas

**Policy 48.** Encourage the use of low-glare lighting to minimize nighttime glare effects on neighboring properties.

### Implementation Measures

**Implementation Measure AA.** The County shall utilize CEQA Guidelines and the provisions of the Zoning Ordinance to minimize the impacts of light and glare on adjacent properties and in rural undeveloped areas.

### 1.10.10. Oak Tree Conservation

#### Policies

**Policy 65.** Oak woodlands and large oak trees shall be protected where possible and incorporated into project developments.

**Policy 66.** Promote the conservation of oak tree woodlands for their environmental value and scenic beauty.

#### Implementation Measures

**Implementation Measure KK.** The following applies to discretionary development projects (General Plan Amendment, zone change, conditional use permit, tract maps, parcel maps, precise development plan) that contains oak woodlands, which are defined as development parcels having canopy cover by oak trees of at least ten percent (10%), as determined from base line aerial photography or by site survey performed by a licensed or certified arborist or botanist. If this study is used in an Environmental Impact Report, then a Registered Professional Forester (RPF) shall perform the necessary analysis.

a. Development parcels containing oak woodlands are subject to a minimum canopy coverage retention standard of thirty percent (30%). The consultant shall include recommendations regarding thinning and diseased tree removal in conjunction with the discretionary project.

b. Use of aerial photography and a dot grid system shall be considered adequate in determining the required canopy coverage standard.

c. Adjustments below thirty percent (30%) minimum canopy standard may be made based on a report to assess the management of oak woodlands.

d. Discretionary development, within areas designated as meeting the minimum canopy standard, shall avoid the area beneath and within the trees unaltered dripline unless approved by a licensed or certified arborist or botanist.

**Implementation Measure LL.** The following applies to development of parcels having oak tree canopy cover of less than ten percent (10%), but containing individual oak trees equal to or greater than a 12-inch diameter trunk at 4.5 feet breast height.

a. Such trees shall be identified on plot plans.

b. Discretionary development shall avoid the area beneath and within the trees unaltered drip line unless approved by a licensed or certified arborist or botanist.

c. Specified tree removal related to the discretionary action may be granted by the decision making body upon showing that a hardship exists based on substantial evidence in the record.

## Chapter 3. Noise Element

### 3.2. Noise Sensitive Areas

#### Policies

**Policy 3.** Encourage vegetation and landscaping along roadways and adjacent to other noise sources in order to increase absorption of noise.

**Policy 4.** Utilize good land use planning principles to reduce conflicts related to noise emissions.

## Chapter 5. Energy Element

### 5.3. Petroleum Resources and Development

### 5.3.6. Environmental Impacts of Petroleum Development

#### Policies

**Policy 6.** The County should work closely with State and federal agencies to avoid or minimize direct impacts to threatened and endangered species.

#### Implementation Measures

**Implementation Measure B.** The County will continue to participate in programs, such as the proposed Kern County Valley Floor Habitat Conservation Plan program, which are intended to mitigate impacts of development on threatened or endangered species, including seeking State and federal funding for endangered species protection programs.

**Implementation Measure D.** Energy resource industries should participate in the Kern County Valley Floor Habitat Conservation Plan to mitigate impacts to threatened and endangered species.

## Metropolitan Bakersfield General Plan

The MBGP, a joint effort between the Kern County Planning Department and the City of Bakersfield Planning Division, was last adopted on December 11, 2007. The MBGP includes both city and unincorporated County lands. The MBGP describes the community's physical development as well as its economic, social and environmental goals and is currently undergoing an update. The Project Area includes a total of 152,040 acres of unincorporated County lands that are covered under the MBGP (7.41%). Project-related development on unincorporated lands within the MBGP Planning Area would be subject to the following applicable policies and implementation measures of the MBGP, with respect to biological resources.

# Chapter V. Conservation Element

## A. Biological Resources

### Goals

**Goal 1.** Conserve and enhance Bakersfield's biological resources in a manner which facilitates orderly development and reflects the sensitivities and constraints of these resources.

**Goal 2.** To conserve and enhance habitat areas for designated "sensitive" animal and plant species.

### Policies

**Policy 1.** Direct development away from "sensitive biological resource" areas, unless effective mitigation measures can be implemented (1·1, f-3, 1-4).

**Policy 2.** Preserve areas of riparian vegetation and wildlife habitat within floodways along rivers and streams, in accordance with the Kern River Plan Element and channel maintenance programs designed to maintain flood flow discharge capacity (1-4).

**Policy 3.** Discourage, where appropriate, the use of off-road vehicles to protect designated sensitive biological and natural resources (l-2).

**Policy 4.** Determine the feasibility of enhancing sensitive biological habitat and establishing additional wildlife habitat in the Project Boundary with State and/or Federal assistance (1-3).

**Policy 5.** Determine the locations and extent of suitable habitat areas required for the effective conservation management of designated "sensitive" plant and animal species (1-3).

### Implementation Measures

**Implementation Measure 1.** When considering discretionary development proposals, consult available biological resource data covering the area. Determine the potential impacts and necessary mitigation measures for identified biological resources, as requiring in the California Environmental Quality Act. Regularly consult with responsible resource agencies.

**Implementation Measure 3.** Preserve habitat and avoid "take" of protected species as required in the Metropolitan Bakersfield Habitat Conservation Plan.

# Chapter VI. Open Space Element

### Goals

**Goal 3.** Locate and site development to minimize the disruption of open space areas.

### Policies

**Policy 1.** Promote the establishment, maintenance and protection of the planning area's open space resources, including the following:

a) Conservation of natural resources (refer to Chapter II-Land Use, Chapter V-Conservation, and Chapter XII Kern River Plan Element).

- Kern River corridor
- Management of hillsides

**Policy 5.** Development location and siting should be sensitive to its relationship to the Kern River (I-3).

**Policy 9.** Encourage depleted resource extraction sites to be restored as alternative open space or developed with uses compatible with those adjacent (I-5).

## Kern County Specific Plans

Kern County has adopted 24 Specific Plans for properties within the Project Area. These Specific Plans are intended to be an amplification of the goals and policies of the KCGP and are, therefore, consistent therewith. As depicted in Figure 4.10-3, less than 8% of the Project Area is located wholly or partially within adopted Specific Plan areas. Future oil and gas exploration and production activities that would be authorized under the proposed Amendment to Chapter 19.98 (Oil and Gas Production) of the Kern County Zoning Ordinance that would be located within the boundary of an adopted Specific Plan would be regulated according to County zoning, with the exception of the Specific Plans identified as Tier 5.

## Kern River Plan Element

The Kern River Plan Element governs land use within the Kern River Planning Area. The Element was prepared as a joint effort by the City of Bakersfield and Kern County. The following Kern River Plan Element policies are applicable to the proposed Project with respect to biological resources for all unincorporated county lands within the Kern River Planning Area:

## Chapter III. Issues, Goals, and Basic Plan Policies

### 3.2. Open Space Versus Development

**Policy 11.** New or relocated utility lines shall be placed underground, except in areas subject to intensive agricultural uses, areas designated as A.4 (Mineral and Petroleum) and electrical power lines to oil wells, water wells, and water control devises in areas designated as 8.5 (Resource Management) unless otherwise required by law, and at River crossings, or where it can be shown that the specific nature of the facility is such that it is entirely infeasible to do so.

### 3.3. Riparian Vegetation and Wildlife Habitat

#### Policies

**Policy 2.** All development proposals shall be evaluated by a competent biologist to identify any significant biological areas necessary for protection. Cost incurred under this procedure shall be borne by the applicant.

**Policy 3.** Native vegetation shall be protected by minimizing the introduction of dominant nonnative plant species. All development proposals, except intensive agriculture, shall include a landscape plan to identify vegetation to be used on the site and the method of long-term maintenance of landscaped areas. The submitted landscape plan shall be used to verify the acceptability of vegetation for use along the River. Those plants not found acceptable shall not be used.

**Policy 4.** Existing significant plant specimens and stands of riparian vegetation shall be protected to the greatest extent feasible where channel maintenance is not affected.

**Policy 5.** Riparian vegetation and wildlife habitat shall be protected within the area of primary floodway to the degree that the floodway will not be obstructed or propagate debris.

**Policy 6.** The placement of structures and other related accessory uses shall respect wildlife corridors and shall not obstruct nor hinder the movement or migration of wildlife.

### 3.4. Floodplain Management

#### Policies

**Policy 9.** Oil and mineral exploration and production shall be allowed within the secondary floodway, provided that adverse effects on riparian vegetation and wildlife habitat are minimized. Appurtenant facilities, such as tank farms and steam generators, shall be located outside any floodway; except that they may be allowed within the 8.4/2.5 (Mineral and Petroleum/Secondary Floodway) upon showing by the operator that no other location is reasonably available for then, the proposed location and extent of construction is necessary for the operation of wells in the immediate vicinity, and the intent of this plan for the secondary floodway is followed.

### 3.6. Mineral and Petroleum

#### Goals

**Goal.** To provide for the continued production of petroleum resources and to ensure that future exploration activities can take place, while ensuring that other open space values in the River area are reasonably protected. Utilize sand and gravel resources of the River in such a way as to ensure that floodway, groundwater recharge, and wildlife habitat values are protected.

### Policies

**Policy 1.** Sand and gravel removal shall be done in such a manner as not to degrade, or otherwise adversely affect, the natural and scenic qualities of the Kern River, riparian vegetation, or wildlife habitat except as is necessary or appropriate to maintain the required channel capacity for flood control in the primary floodway.

**Policy 3.** Petroleum extraction zone overlays and drilling island delineation shall be established in areas designated for resource uses for the purpose of protecting natural vegetation and wildlife. Brush clearing, moving of vegetation, and similar activities shall be permitted only to the extent required for those activities and a reclamation plan prepared.

**Policy 4.** Noise abatement measures shall be required of all resource management activities which would adversely affect adjacent land uses or wildlife habitat.

## Chapter IV. Map Provisions and Policies

The intent of this plan with regard to the Primary and Secondary Floodways of the Kern River is that:

- No development or physical improvements for uses in the Primary Floodway which would restrict flows, interfere with groundwater recharge or increase the rise in water surface during high flows of the Kern River, or displace the primary floodway will be permitted.

- Limited development, with an emphasis on preserving open space within the area of the Secondary Floodway, with recognition of the potential flood hazard that exists therein, may be permitted.

### 4.8. Industrial

### Policies

**Policy 6.** Industrial areas adjacent to the Kern River primary or secondary floodway should be buffered by landscaping or vegetation to provide the least possible conflict with open space values of the River.

## Chapter V. Implementation Policies

### B. Open Space and Development

### Implementation Policies

**Implementation Policy 2.** Any new non-open space development, including projects by public agencies, shall not occur without prior City or County approval of a "Development Plan." The "Development Plan" shall be reviewed for completeness and consistency with the following guidelines:

a. Elevation drawings of all proposed structures and signs.

b. Landscaping plan which provides for screening of obnoxious uses and respects existing views of the Kern River channel.

c. Grading and revegetation plan.

d. Plot plan or recent aerial photograph depicting existing uses and natural vegetation cover.

e. A biota survey and analysis of effects which development would impose on any significant identified biota.

f. A certified delineation of the primary and secondary floodways, if applicable to the site, depicting both predevelopment conditions and future development conditions.

g. Other standard zoning and subdivision ordinance requirements in force at the time of application.

**Implementation Policy 7.** New or relocated utility lines shall be placed underground, except in areas subject to intensive agricultural uses, 8.4 areas (Mineral and Petroleum), and at River crossings or where it can be shown that the specific nature of the facility is such that it is entirely infeasible to do so.

### C. Riparian Vegetation

### Implementation Policies

**Implementation Policy 1.** The City and County shall develop a master list of plant species for criteria to approve "Development Plans." This list shall be considered for incorporation into this plan by General Plan Amendment. Revegetation or landscaping with native or compatible shrubs and trees shall be required as part of all public and private projects. Areas of unique habitat value, such as the Mesquite-Saltbush Association in the vicinity of Enos lane, shall be preserved in accordance with the City's approved plan for use of the 2,800-acre recharge area and River channel maintenance.

**Implementation Policy 2.** Prior to any development within the Kern River Plan boundaries, including residential, commercial, industrial, recreational, water recharge, channel improvement, and resource recovery projects, a landscaping plan shall be submitted to the respective City or County Planning Department for review and approval.

**Implementation Policy 3.** For all new development in residentially, commercially, and industrially zoned properties within the plan boundaries, the River setback area shall be either landscaped or revegetated. Except as might be required by the City or County Fire Department, no clearing of shrubs or tree cutting will be allowed unless otherwise provided for by this plan.

### F. Mineral and Petroleum Extraction

#### Implementation Policies

**Implementation Policy 1.** The City and County shall revise, within two years from adoption of this plan, mineral and petroleum extraction regulations and provisions of their respective floodplain zoning ordinances consistent with all plan policies and incorporate the following features:

b. Restrictions on the removal of riparian vegetation.

## Kern County Zoning Ordinance (Title 19 of the Ordinance Code of Kern County)

### Chapter 19.98 Oil and Gas Production

The purpose of this chapter is to promote the economic recovery of oil, gas, and other hydrocarbon substances in a manner compatible with surrounding land uses and protection of the public health and safety by establishing reasonable limitations, safeguards, and controls on exploration, drilling, and production of hydrocarbon resources. The procedures and standards contained in this chapter shall apply to all exploration drilling and production activities related to oil, gas, and other hydrocarbon substances carried out in unincorporated Kern County.

**Section 19.98.050(I):** Whenever oil or gas is produced into and shipped from tanks located on the premises, such tanks, whenever located within five hundred (500) feet of any dwelling or commercial building, shall be surrounded by shrubs or trees, planted and maintained so as to develop attractive landscaping or shall be fenced in such a manner as to, insofar as practicable, screen such tanks from public view. Such fencing shall comply with the requirements of the California Division of Oil and Gas.

**Section 19.98.050(K):** Pumping wells shall be operated by electric motors or muffled internal combustion engines.

**Section 19.98.050(L):** The height of all pumping units shall not exceed thirty-five (35) feet and shall be painted and kept in neat condition.

**Section 19.98.050(N):** After production begins and a pump is installed on the wellhead, a fence at least six (6) feet in height shall be installed around the pump site or drilling island for public safety. This fence shall be constructed of chain link with wood or metal slats or other screening fence as may be approved by the Planning Director. This fencing and screening requirement shall apply only to those pump sites located within five hundred (500) feet of any dwelling. Such fencing shall comply with the requirements of the California Division of Oil and Gas.

**Section 19.98.050(O):** All required federal, State, and County rules and regulations shall be complied with at all times.

## Habitat Conservation Plans, Natural Community Conservation Plans or other Approved Local, Regional, or State HCP in the Planning Area

Oil and gas exploration and production activities could take place in areas within the boundaries of an approved HCP and/or Natural Community Conservation Plan (NCCP). As discussed in the regulatory setting below, HCPs are approved by the USFWS in conjunction with providing incidental take permit coverage for listed species and to also foster the conservation of other covered species. NCCPs are approved by the CDFW and are intended to function in a manner similar to the federal a HCP for state listed and other covered species. The CDFW may also issue incidental take permits for state covered species that are based on and coordinated with an approved federal HCP under section 2081(b) of the CESA. HCPs and NCCPs typically have permits terms ranging from 30 to 50 years.

The following sections summarize proposed and approved and HCPs for oil and gas activity, including oil and gas exploration, other HCPs within the Project Area, and approved regional plans or permits that address conservation and incidental take for oil and gas activities within the Project Area. The locations of HCPs and NCCPs within the Project Area are shown in figure 4.4-12

### Draft Valley Floor HCP

The VFHCP encompasses 3,110 square miles and generally includes most of the San Joaquin Valley Floor portion of Kern County up to an elevation of 2,000 feet. The 2,000-foot elevation line was selected as the elevation limit for the VFHCP because (1) this border would, based on the professional judgment of resource agency personnel (including USFWS, CDFG, and BLM) encompass most locations in the Kern County valley floor likely to be subject to potential take of threatened and endangered species during the 30-year term of the proposed program; and (2) the 2,000-foot level approximates the elevation at which the species compositions of valley floor flora and fauna transition to foothill species. The HCP is intended to provide federal and state protected species incidental take authorization for covered activities throughout the valley floor area over a 30-year period.

The VFHCP planning process was initiated in 1989 by an interagency Memorandum of Understanding (MOU) among the USFWS, CDFW, BLM, CEC, DOGGR, and Kern County. The goals of the MOU include the development of (1) an HCP for the San Joaquin Valley Floor portion of Kern County; (2) a cooperative program among local, state, and federal agencies with endangered species permit authority in the valley floor portion of Kern County; and (3) a program to assure long-term species conservation and the continued economic growth of Kern County.

Some portions of the Kern County Valley Floor area are not covered by the VFHCP Program Area, including the Coles Levee Ecosystem Preserve that is part of the former Arco Western Energy (now Aera Energy) oil and gas HCP, the Freeport-McMoRan Oil & Gas (formerly Nuevo-Torch) HCP, and the CRC (formerly Occidental) Elk Hills and BLM-managed lands that were previously part of the Naval Petroleum Reserves. Other individual HCPs, including the Kern County Waste Management Department HCP, and the Kern Water Bank HCP, are also not

covered by the VFHCP. The MBHCP area footprint would be included in the VFHCP only for: (1) oil and gas production activities; (2) activities of water districts; and (3) activities which are not covered by the current MBHCP.

Tables 4.4-66 and 4.4-67 summarize the 14 plant and 11 animal species that would be covered by the VFHCP.

**Table 4.4-66: Draft Valley Floor Habitat Conservation Plan Covered Plant Species List**

| Common Name | Scientific Name | Status | | |
|---|---|---|---|---|
| | | Federal | State | CNPS |
| Heartscale | *Atriplex cordulata* | - | - | 1B |
| Bakersfield smallscale | *Atriplex tularensis* | - | CE | 1B |
| Lost Hills crownscale | *Atriplex vallicola* | - | - | 1B |
| California jewelflower | *Caulanthus californicus* | FE | CE | 1B |
| Slough thistle | *Cirsium crassicaule* | - | - | 1B |
| Vasek's clarkia | *Clarkia tembloriensis* ssp. *calientensis* | - | - | 1B |
| Recurved larkspur | *Delphinium recurvatum* | - | - | 1B |
| Kern mallow | *Eremalche kernensis* | FE | - | 1B |
| Hoover's eriastrum | *Eriastrum hooveri* | FT* | - | 4 |
| Striped adobe-lily | *Fritillaria striata* | - | CT | 1B |
| Comanche Point layia | *Layia leucopappa* | - | - | 1B |
| San Joaquin woolly-threads | *Monolopia congdonii* | FE | - | 1B |
| Bakersfield cactus | *Opuntia basilaris* var. *treleasei* | FE | CE | 1B |
| San Joaquin adobe sunburst | *Pseudobahia peirsonii* | FT | CE | 1B |

**Table 4.4-67: Draft Valley Floor Habitat Conservation Plan Covered Wildlife Species List**

| Common Name | Scientific Name | Status | |
|---|---|---|---|
| | | Federal | State |
| Blunt-nosed leopard lizard | *Gambelia sila* | FE | CE, FPS |
| California horned lizard | *Phrynosoma coronatum frontale* | - | SSC |
| San Joaquin whipsnake | *Masticophis flagellum ruddocki* | - | SSC |
| Le Conte's thrasher | *Toxostoma lecontei* | - | SSC |
| Buena Vista Lake shrew | *Sorex ornatus relictus* | FE | SSC |

**Table 4.4-67: Draft Valley Floor Habitat Conservation Plan Covered Wildlife Species List**

| Common Name | Scientific Name | Status | |
|---|---|---|---|
| | | Federal | State |
| San Joaquin antelope squirrel | *Ammospermophilus nelsoni* | - | CT |
| Tipton kangaroo rat | *Dipodomys nitratoides nitratoides* | FE | CE |
| Short-nosed kangaroo rat | *Dipodomys nitratoides brevinasus* | - | SSC |
| Giant kangaroo rat | *Dipodomys ingens* | FE | CE |
| San Joaquin kit fox | *Vulpes macrotis mutica* | FE | CT |
| American badger | *Taxidea taxus* | - | - |

Source: Garcia and Associates 2010
Key:
Federal
FE = Federal Endangered
- = no Federal status
State
CE = state Endangered
CT = state Threatened
SSC = species of special concern
FPS = fully protected species
- = no state status
CNPS
1B = Plants rare and endangered in California and elsewhere
4 = Plants of limited distribution

As shown in Figure 4.4-13, the VFHCP has attempted to develop a conservation program that characterizes covered lands and proposed compensatory mitigation within the Kern County valley floor area based on presumed habitat values. The proposed classifications include: (1) Red Zones (which contain the highest valued conservation habitat); (2) Green Zones (which contain habitat areas of moderate conservation value); and (3) White Zones (which have limited conservation value, primarily due to existing intensive land uses). Various overlays, including oil and gas zones, have also been proposed in the draft versions of the VFHCP.

The VFHCP habitat zone approach has been referenced in several proposed conservation planning and state and federal incidental take permit applications. The VFHCP has not yet been approved by the CDFW, USFWS, Kern County, or other applicable local, state, and federal agencies.

## Chevron North American Exploration and Production Lokern Habitat Conservation Plan (LHCP)

Chevron has prepared an HCP and applied to the USFWS and CDFW for state and/or federally protected species incidental take authorization under Section 10(a)(1)(B) of the federal ESA and

Section 2081(b) of the CFGC of the CESA over a 50-year permit term. The species that would be covered by the permits are listed in Table 4.4-68.

**Table 4.4-68: Draft Lokern Habitat Conservation Plan Covered Species**

| Scientific Name | Common Name | Status | | |
|---|---|---|---|---|
| | | Federal | State | CNPS |
| **Wildlife** | | | | |
| *Ammospermophilus nelsoni* | San Joaquin antelope squirrel | - | CT | - |
| *Athene cunicularia hypugea* | Western burrowing owl | | SSC | - |
| *Dipodomys ingens* | Giant kangaroo rat | FE | CE | - |
| *Dipodomys nitratoides brevinasus* | Short-nosed kangaroo rat | - | SSC | - |
| *Dipodomys nitratoides nitratoides* | Tipton kangaroo rat | FE | CE | - |
| *Gambelia sila* | Blunt-nosed leopard lizard | FE | CE, FPS | - |
| *Lanius ludovicianus* | Loggerhead shrike | | SSC | - |
| *Phrynosoma blainvillii* | Coast horned lizard | - | SSC | - |
| *Taxidea taxus* | American badger | - | SSC | - |
| *Toxostoma lecontei* | Le Conte's thrasher | | SSC | - |
| *Vulpes macrotis mutica* | San Joaquin kit fox | FE | CT | - |
| **Plants** | | | | |
| *Atriplex cordulata* | Heartscale | - | - | 1B |
| *Atriplex vallicola* | Lost Hills crownscale | - | - | 1B |
| *Caulanthus californicus* | California jewelflower | FE | CE | 1B |
| *Eremalche kernensis* | Kern mallow | FE | - | 1B |
| *Monolopia congdonii* | San Joaquin woolly-threads | FE | - | 1B |

Source: Chevron 2014
Notes:
Federal
FE = Federal Endangered
-- = no Federal status
State
CE = state Endangered
CT = state Threatened
SSC = state species of special concern
FPS = fully protected species
-- = no state status
CNPS
1B = Plants rare and endangered in California and elsewhere
4 = Plants of limited distribution

As shown in Figure 4.4-14, the LHCP would include certain preserves (Chevron Lokern Lands), land adjacent to and within the Chevron Lokern Lands (Lokern Contiguous Area) and four existing fields in which Chevron currently conducts oil and gas operations, the Lost Hills, Cymric-McKittrick, Midway-Sunset and the Kern River oil fields.

The Chevron Lokern Lands consist of 13,333 acres, including 13,090 acres of currently undisturbed, high quality habitat, located north of the existing Elk Hills oil field and east of the existing Cymric-McKittrick oil fields and would be used primarily for conservation purposes. Chevron proposes to limit development in the Chevron Lokern Lands to 10% of the existing undisturbed habitat, or 1,309 acres. In addition, no more than 25% of any single section (or proportionately less if Chevron owns only part of a section) would be subject to impacts in the Chevron Lokern Lands. As a result, 11,781 of the Chevron Lokern Lands would be reserved for conservation and mitigation purposes, including mitigation for Chevron oil and gas activities within the Chevron Lokern Lands, the Lokern Contiguous Area, and the four oil fields covered by the HCP as a part of its permit area.

The Lokern Contiguous Area includes a checkerboard pattern of 14,522 acres adjacent to, within and extending to the northeast of Chevron Lokern Lands that are not under Chevron's control. The HCP would allow for Chevron to impact up to 150 acres of the Lokern Contiguous Area to support conservation and management activities on Chevron's Lokern Lands and in other preserve areas, and to connect oil and gas infrastructure necessary to service Chevron activities covered by the HCP.

The four existing oil fields in which Chevron operates and that would be covered by the HCP include the 59,118 acre Lost Hills oil field in the northern portion of the western project Subarea, the 34,918 acre Cymric-McKittrick and the 88,214 acre Midway-Sunset oil fields extending along the western border of the western project Subarea, and the 22,363 acre Kern River Field in the eastern project Subarea. The four oil fields include a total of 204,613 acres.

The Chevron Lokern Lands, Lokern Contiguous Area, and the four oilfields included in the HCP total 232,473 acres. The HCP would cover Chevron's construction, operation and closure of up to 12,000 new wells and 10,000 abandoned wells over the 50-year permit term.

The HCP would allow Chevron to generate conservation credits by using conversation easements to permanently preserve and providing funding for the management of Chevron Lokern Lands over the permit term. Chevron would permanently protect 1,500 acres of the Chevron Lokern Lands at the time that the HCP becomes effective. The credits created by preservation within the Chevron Lokern Lands would be used to mitigate for covered activity impacts in Chevron Lokern Lands, Lokern Contiguous Area, and the four oil fields included in the HCP. Chevron also proposes to allow for the use of conservation credits by Chevron or by sale to third parties to mitigate for impacts within an 2,261,715 acre (3,534 square mile) credit area that includes the San Joaquin Valley floor up to 2,000-foot elevation within Kern County. The state and federal incidental take permits that would be issued to Chevron by the USFWS and CDFW would not provide coverage for third party or Chevron activities outside of the Chevron Lokern Lands, Lokern Contiguous Area, and the four oil fields included in the HCP, and the use of credits generated by preservation within the Chevron Lokern Lands would be subject to separate approval/permitting processes as necessary.

The activities for which take coverage would be provided under the proposed HCP and state 2081(a) permits include existing and potential future oil and gas drilling and operational activities

described in Chapter 3, Project Description (Section 3.5, Potential Future Oil and Gas Development Scenario) together with the mitigation measures identified in Section 4.4.4, Impacts and Mitigation Measures. Habitat management and site restoration, reclamation and re-vegetation described in the Best Management Practices or required by mitigation measures may include, among other activities, scientific research to facilitate implementation of mitigation measures (to avoid and minimize take) and for monitoring; and continuation of livestock grazing on areas historically grazed or additional areas for management of non-native vegetation. There also may be incidental site visits for educational purposes, including school tours, VIP tours, regulatory agency tours, and other tours benefiting the public, with controlled ingress and egress on existing roads and supervision by Chevron.

The project EIR for the LHCP includes and analyzes impacts related to all proposed LHCP covered activities except activities, such as the use of conservation credits in other counties, that would occur outside of the Project Area.

## California Resources Corporation Elk Hills Habitat Conservation Plan (EHHCP)

### Background

The federal government established the EHOF in 1912 for national defense purposes as part of the Naval Petroleum Reserves (NPR). The EHOF was designated as NPR-1 and was largely maintained in reserve shut-in status until 1976. As a result of oil shortages in the early 1970's, Congress passed the Naval Petroleum Reserves Production Act in 1976, directing the Department of Energy (USDOE) to operate the EHOF at the "maximum efficient rate." EHOF oil and gas production activities consistent with the Naval Petroleum Reserves Production Act commenced at that time and continued until 1998. In the National Defense Authorization Act for Fiscal Year 1996, Congress directed the USDOE to sell the federal government's interests in NPR-1. The sale of the government's interests in EHOF was successfully concluded in 1998 and the EHOF was operated by Occidental of Elk Hills, Incorporated, until another corporation was spun off and created in 2014. This entity is known as California Resources Corporation - Elk Hills (CRC).

CRC proposes to continue its oil and gas operations in and near the EHOF, and to modify those operations by extending the anticipated duration of oil and gas operations, increasing the impacted acreage, and modifying certain other facilities and activities. CRC's continued and modified operations require additional take authorization under Section 2081 of CESA. The proposed incidental take permit (ITP) sought by the applicant under CESA Section 2081(b) would supersede an existing CESA Memorandum of Understanding (MOU) that was issued to the purchaser of the EHOF.

### Requested ITP

CRC is applying for an ITP from CDFW, pursuant to Section 2081(b) of the Fish and CFGC. The Section 2081 application, which includes an associated HCP that supports the proposed conservation and management program for the proposed EHOF, was deemed complete by CDFW on March 3, 2014. The area covered by the proposed EHOF ITP encompasses the EHOF which is approximately 47,884 acres; facility rights-of-way (ROWs) located outside of the EHOF (refer to

Figures 4.4-16 and 4.4-17); and any Conservation Lands located within a Target Acquisition Area inside the 2-mile buffer and within a second Target Acquisition Area located outside the 2-mile buffer as identified on Figure 4.4-18 that are dedicated pursuant to the proposed EHOF and managed for the mitigation of impacts (the EHOF ITP Covered Lands). The proposed EHOF ITP Covered Lands includes projected oil and gas operations for 50 years; accordingly the requested ITP would have a term of 50 years and would authorize incidental take of certain State listed species (See Table 4.4-69) during the course of otherwise lawful activities described further below.

**Table 4.4-69: Draft Elk Hills Habitat Conservation Plan Covered Species**

| Scientific Name | Common Name | Status | |
|---|---|---|---|
| | | Federal | State |
| **Wildlife** | | | |
| *Ammospermophilus nelsoni* | San Joaquin antelope squirrel | - | CT |
| *Dipodomys ingens* | Giant kangaroo rat | FE | CE |
| *Dipodomys nitratoides nitratoides* | Tipton kangaroo rat | FE | CE |
| *Vulpes macrotis mutica* | San Joaquin kit fox | FE | CT |
| **Plants** | | | |
| *Caulanthus californicus* | California jewelflower | FE | CE |
| *Eremalche kernensis* | Kern mallow | FE | - |
| *Monolopia congdonii* | San Joaquin woolly-threads | FE | - |

Federal
FE = Federal Endangered
-- = no Federal status
State
CE = state Endangered
CT = state Threatened
-- = no state status

## Proposed Covered Activities

The proposed EHOF ITP would cover all existing and proposed facilities and activities within the EHOF ITP Covered Lands for a period of 50 years related to the continued exploration, development, production, recovery and processing of oil and gas reserves; on-site and off-site (to the extent that a ROW located within the EHOF extends off the EHOF into the 2-mile buffer) operation and maintenance of associated facilities, implementation of the conservation program described herein, and other miscellaneous proposed activities and uses described below.

Within the EHOF itself, the activities for which take coverage would be provided under the proposed ITP include existing and potential future oil and gas drilling and operational activities described in Chapter 3, Project Description (Section 3.5, Potential Future Oil and Gas Development Scenario) together with the mitigation measures identified in Section 4.4.4, Impacts and Mitigation Measures. Habitat management and site restoration, reclamation and re-vegetation described in the Best Management Practices or required by mitigation measures may include, among other

activities, scientific research to facilitate implementation of mitigation measures (to avoid and minimize take) and for monitoring; and continuation of livestock grazing on areas historically grazed or additional areas for management of non-native vegetation. There also may be incidental site visits for educational purposes, including regulatory agency tours, school tours, VIP tours, and other tours benefiting the public, with controlled ingress and egress on existing roads and supervision by CRC.

Implementation of a Conservation Program, including all activities associated with the implementation of the proposed ITP, will be included in a Management Plan for CDFW approval. The Management Plan would be property specific and any necessary activities would be developed and implemented based on existing conditions of each specific area. Such Management Plans are standard requirements of ITPs and must be developed and approved as part of the ITP conditions within a specified time period following issuance of an ITP. The purpose of the Management Plan is to ensure the Conservations Lands are managed, monitored and maintained in perpetuity. The Management Plan is also intended to assist in minimizing and fully mitigating the impacts of the authorized take. The Management Plan is a binding and enforceable instrument, implemented by the CDFW. The CDFW's approval of a Management Plan relies on meeting the fully mitigated standard. A Land Manager will be selected to manage and monitor the Conservation Lands in perpetuity to preserve its habitat and conservation values in accordance with the Conservation Easement and the Management Plan. The Land Manager will be responsible for providing annual reports to the CDFW that will include but not be limited to a discussion of the management tasks and monitoring activities that occurred during the specific monitoring year and the funds expended to cover those activities. The Management Plan will also document the status of the Covered Species and other species of concern and describe the status of the Conservation Lands. Components of this Management Plan would include, but not be limited to all activities associated with the implementation of the proposed ITP, including take avoidance and minimization activities (including salvage of Covered Species within Covered Lands), establishment and management of preserved habitat areas (including an endowment fund to cover short and long term management costs, fencing to prevent trespass, signage and trash removal), vegetation manipulation and enhancement (for example, ground disturbance, grazing, mowing or burning), monitoring (such as spotlighting surveys, walking transects, scent stations, small mammal trapping), maintenance of Conservation Lands infrastructure such as fences, gates, signs and access roads, habitat restoration, related vehicular access, and all activities associated with adaptive management and responses to changed or unforeseen circumstances.

Monitoring shall also be conducted to assess condition of fences, gates, and signage and to identify sources of illegal trash disposal. Fencing, gates, and signage will be repaired or replaced as necessary throughout the year. Trash will be collected and removed as identified to prevent attractive nuisances.

Revegetation opportunities for future habitat reclamation exist in areas on the EHOF where land has been disturbed as a result of prior construction and development, travel, or any other action which caused plant cover destruction and the disturbed area is no longer required to support ongoing operations. Inactive well pads and tank setting locations, ROWs, and dirt roads can all

offer opportunities for habitat reclamation. Many studies have been conducted in the area and it has been found that natural revegetation or reclamation with subsequent monitoring is the best way to restore smaller disturbed areas to their natural state. When comparing natural revegetation with other habitat reclamation projects the results are almost identical on a statistical recovery of vascular plant cover (EG&G Energy Measurements Inc. 1995; D. C. Anderson and B. L. Cypher, 1995, unpublished data).

The habitat reclamation program at the EHOF on smaller sites (less than three acres), therefore, consists of site cleanup, slope re-contouring and ripping of compacted sites/heavily disturbed sites followed by replacement of any salvaged topsoil and seed bank, scarifying the area to create seed traps and microhabitat, along with soil stabilization and erosion control measures. Smaller areas can be naturally reclaimed from windblown seed and infill from surrounding natural habitat and/or with the seed bank from re-spreading stockpiled topsoil. When larger (greater than three acres) areas of disturbances are to be reclaimed, enhanced reclamation measures such as artificial seeding is recommended as the size is too large to ensure that windblown seed sources and infill would be adequate to ensure reclamation success. With the use of monitoring practices, natural habitat reclamation or revegetation in disturbed areas has shown successful results to restore land to its natural state.

Dirt roads no longer needed to support ongoing operations can offer excellent opportunities for habitat reclamation. Road use can be limited with the use of locked gates and exclusion fencing. Where appropriate, travel on roads no longer needed is prevented with the use of earthen berms or barriers to prevent access. Signage can also be used to identify closed roads/reclaimed areas. Road reclamation can include ripping to reduce compaction and provide seed traps and microhabitats so as to help facilitate natural habitat reclamation.

Within the 2-mile buffer and the Two Target Acquisition Areas, Covered Activities would not include the full range of oil and gas-related facilities and activities described in Chapter 3, Project Description (Section 3.5, Potential Future Oil and Gas Development Scenario). Rather, in these areas, Covered Activities would consist of the following:

1. Operations and Maintenance of Facilities Associated with Existing Facility (ROWs). These activities include the operation, maintenance, repair, construction, reconstruction, replacement, and abandonment of transmission lines and pipelines located within the 2-mile buffer. This includes the maintenance of various powerlines or hydrostatic testing and cleaning of pipelines.

2. Limited Construction of Linear Facilities. From time to time, additional pipelines and transmission lines may have to be constructed within the 2-mile buffer in order to maintain EHOF operations and accommodate product sales, processing and distribution demands. The covered linear projects would be located within an area limited to a width of 200 feet of the centerline (total width of 400 feet) of existing ROWs. Each individual linear project would be limited to no more than a construction ROW width of 100-feet and length of 1-mile on a not to exceed basis per section (approximately 12-acres of disturbance per section). Note that if new disturbance occurs during this activity, it would be included in

the proposed Project's 4,000 acres of net permanent disturbance and 3,000 acres of temporary disturbance;

3. This also includes the installation, operation and maintenance of limited new facility ROWs within the 2-mile buffer located outside 200 feet of the centerline of existing ROWs. Any new authorized activity would be limited to no more than 12 sections with a maximum allowable disturbance (temporary and/or permanent) of 12 acres per section for a total cumulative disturbance amount of 144 acres. Lands acquired for this purpose would be subject to specific performance criteria as discussed. Note that any disturbance occurring from this activity would be included in the proposed Project's 4,000 acres of net permanent disturbance and 3,000 acres of total temporary disturbance;

4. Limited Construction of Linear Facilities within Conservation Lands Located within the 2-Mile Buffer. Authorized activities within Conservation Lands located within the 2-mile buffer include the construction of linear facilities (e.g., pipelines and transmission lines) not to exceed 12 acres per section. Note that if new disturbance occurs during this activity, it would be included in the proposed Project's 4,000 acres of net permanent disturbance and 3,000 acres of total temporary disturbance;

5. Implementation of Conservation Program Activities. Implementation of the Management Plan described above. Management of the Initial Conservation Lands and any potential conservation lands includes, but is not limited to, a) annual monitoring of Covered Species, b) annual reporting of findings to agencies, and c) habitat enhancements to increase sustainability of Covered Species. Habitat enhancements will likely include: 1) appropriate fencing to prohibit trespassing, 2) trash removal and signage, 3) improve vegetation appropriate for Covered Species (for example, enhance saltbush, improve grasslands through limited grazing, etc.), 4) limit road use and implement the reclamation of roads no longer needed for operations, and 5) reseeding areas with shrubs.

6. Geophysical Surveys to determine the extent of potential natural gas and oil reserves present within the EHOF formations (not within the 2-mile buffer), and whether such resources warrant development of additional production. Note that geophysical surveys will be restricted to the vibroseis method (not the shothole method) within any Conservation Lands.

7. Emergency Response and Environmental Remediation of spills including all activities necessary to protect public health, safety, the environment or property during an emergency, including responses to and remediation of spills or releases of petroleum, produced water, or hazardous substances; and actions required in response to Acts of God such as flood, fire or seismic activity.

8. Actions Required in Response to Acts of God such as Flood, Fire or Seismic Activity Natural disasters such as fires, floods, or earthquakes can create extremely dangerous conditions that require resources and actions from agency emergency response personnel to protect public health, safety and the environment. Responses to such acts would be

managed and directed by agency emergency responders and EHOF internal emergency response resources would be available in a support role to the agencies if assistance is required. The range of possible response actions to specific events is quite broad.

9. Regulatory Agency Requirements including all activities required by federal, state, regional and local regulatory agencies. In general these requirements include but are not limited to those required by the Department of Transportation and DOGGR for pipeline inspections and maintenance.

Except as described above in items 1-8, any disturbance of Covered Lands outside of the EHOF and within the 2-mile buffer and the Two Target Acquisition Areas would not be a Covered Activity. As a result, if CRC elects in the future to pursue any such disturbance, it would be required at that time to obtain all applicable regulatory approvals, including separate incidental take authorization.

In regards to FESA, CRC has also prepared an HCP in connection with a future proposed additional federal take authorization under Section 10 of FESA. There is no impending expiration date in the take authorization approved by the Service under FESA, or any other federal approval. Therefore, a future separate EIS will be prepared to comply with NEPA (42 [U.S.C.] 4321; 40 CFR 1500.1) with the Service as lead agency when it begins its evaluation for issuance of the federal ITP under Section 10 of the FESA, whenever such additional approval is deemed necessary.

## Freeport-McMoRan Oil & Gas HCP

The Freeport-McMoRan Oil & Gas (formerly Nuevo-Torch then Plains Exploration and Production Company) HCP was adopted in 1999 and addresses ongoing oilfield exploration and production activities on oilfield properties located in western Kern County. The HCP encompasses 21,900 acres, including an initial 839.9 acres of conservation area lands in the Lokern area that will be set aside incrementally to compensate for habitat disturbances from oilfield activities. The federal incidental take statement authorized up to 1,700 acres of incidental take on the plan area lands. When Plains Exploration and Production Company acquired the properties from Nuevo-Torch in 2005, an additional 4,905 acres of land and were added to the HCP (an additional 414 acres of conservation area lands). In 2009, 300 acres of the incidental take acreage and 15 acres of the conservation land acreage were transferred to CRC (formerly Occidental) of Elk Hills, Inc., and Freeport-McMoRan (then Plains Exploration and Production Company) retained 1,400 acres of take acreage. Freeport-McMoRan has added an additional 146 acres of conservation area lands to the HCP through acquisitions throughout the years. Covered species include the recurved Larkspur (*Delphinium recurvatum*), California horned lizard (*Phrynosoma coronatum frontale*), San Joaquin pocket mouse (*Perognathus inornatus*), Tulare grasshopper mouse (*Onychomys torridus tularensis*), western burrowing owl (*Athene cunicularia hypugea*), mountain plover (*Charadrius montanus*), Nelson's antelope ground squirrel (*Ammospermophilus nelsoni*), San Joaquin LeConte's thrasher (*Toxostoma lecontei macmillanorum*), San Joaquin whipsnake (*Masticophis flagellum ruddocki*), Hoover's woolly-star (*Eriastrum hooveri*), Bakersfield cactus (*Opuntia treleasei*), California condor (*Gymnogyps*

*californianus*), San Joaquin kit fox (*Vulpes macrotis mutica*), California jewelflower (*Caulanthus californicus*), giant kangaroo rat (*Dipodomys ingens*) Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*), blunt-nosed leopard lizard (*Gambelia silus*), Kern mallow (*Eremalche kernensis*), and San Joaquin woolly-threads (*Monolopia (=Lembertia) congdonii*).

## CRC (formerly Occidental of Elk Hills, Inc.) Non-Unit HCP

The CRC Non-Unit HCP is a conservation plan that covers 7,050 acres (Live Oak Associates 2013). The HCP was originally prepared for Nuevo-Torch in February 1999. Incidental take authorization and responsibilities under the HCP were transferred to Plains Exploration and Production Company (PXP) on May 9, 2005. PXP subsequently transferred 300 acres of authorized incidental take and 15 acres of conservation lands to CRC on August 3, 2009. PXP retained take authorization and responsibilities on the remaining 1,400 acres of the original 1,700 acres authorized for incidental take, and these interests were subsequently conveyed to Freeport-McMoRan. In December 2009 USFWS approved the inclusion of 3,504 acres of new properties located in the vicinity of McKittrick Valley and the EHOF into the CRC Non-Unit HCP; 1,134 acres of the 3,504 acres were designated for use as mitigation land. No increase in the initially authorized 1,700 acres of take was included in the 2009 approval.

## Aera Coles Levee Ecosystem Preserve HCP (previously Arco Western Energy HCP)

The Aera Coles Levee HCP was approved in 1996 and covers 120,320 acres (188 sections) of land used for oil and gas exploration and production and a 6,059 acre preserve area. The HCP covers the San Joaquin kit fox (*Vulpes macrotis mutica*), giant kangaroo rat (*Dipodomys ingens*), Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*), blunt-nosed leopard lizard (*Gambelia silus*), Kern Mallow (*Eremalche kernensis*), short-nosed kangaroo rat (*Dipodomys nitratoides brevinasus*), recurved Larkspur (*Delphinium recurvatum*), western burrowing owl (*Athene cunicularia hypugea*), Nelson's antelope ground squirrel (*Ammospermophilus nelsoni*), slough thistle (*Cirsium crassicaule*), San Joaquin LeConte's thrasher (T*oxostoma lecontei macmillanorum*), southwestern pond turtle (*Actinemys marmorata pallida*), and Hoover's woolly-star (*Eriastrum hooveri*). The Coles Levee Ecosystem Preserve encompasses the last 2 miles of riparian habitat along the Kern River before it enters the Buena Vista Lake or reaches the California Aqueduct.

The Coles Levee Ecosystem Preserve is a land bank of compensation credits which have been pre-approved by the federal and state resource agencies for many of the listed species in the southern San Joaquin Valley. These credits are used by Aera for oil exploration and production projects, and may also be used by third parties that have acquired credits for projects which impact habitat and listed species. Aera has indicated that it intends to pursue updated versions of the federal and state (CESA Section 2081) incidental take authorizations while adding additional mitigation acreage to the preserve boundary.

## Chevron Pipeline HCP

The Chevron Pipeline HCP includes 25.5 acres located in Western Subarea and covers the San Joaquin kit fox (*Vulpes macrotis mutica*), California jewelflower (*Caulanthus californicus*), giant kangaroo rat (*Dipodomys ingens*), blunt-nosed leopard lizard (*Gambelia silus*), Kern mallow (*Eremalche kernensis*), San Joaquin woolly-threads (*Monolopia lembertia congdonii*), green fiddleneck (*Amsinckia vernicosa*), heartscale (*Atriplex cordulata*), short-nosed kangaroo rat (*Dipodomys nitratoides brevinasus*), San Joaquin pocket mouse (*Perognathus inornatus*), Tulare grasshopper (*Onychomys torridus tularensis*) western burrowing owl (*Athene cunicularia hypugea*), Nelson's antelope ground squirrel (*Ammospermophilus nelsoni*), San Joaquin LeConte's thrasher (*Toxostoma lecontei macmillanorum*), San Joaquin Whipsnake (*Masticophis flagellum ruddocki*), and Hoover's woolly-star (*Eriastrum hooveri*).

## California Aqueduct - San Joaquin Field Division HCP

The proposed California Aqueduct San Joaquin Field Division HCP would cover 11,816 acres adjacent to 121 miles of the California Aqueduct from Kettleman City to the Edmonston Pumping Plant at the base of the Tehachapi Mountains. The HCP also includes four pumping plants, two Operations and Maintenance Centers, and the initial 14.8 miles of the Coastal Branch Phase 1, a smaller canal that branches off from the California Aqueduct. The California Aqueduct San Joaquin Field Division HCP would allow for routine and non-routine maintenance activities, minor new construction, and emergency procedures for these facilities.

## Kern County Waste Facilities HCP

The Kern County Waste Management Department (KCWMD) is responsible for the construction and management of 14 sanitary solid waste facilities (landfills) in Kern County, including seven closed or inactive sites where transfer stations may be operated. The Kern County Waste Facilities HCP covering these locations was adopted in 1997 and is in the process of being amended to cover expansion at the remaining active landfills and the closure of historic burn dumps. Covered species include the San Joaquin kit fox (*Vulpes macrotis mutica*), Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*), giant kangaroo rat (*Dipodomys ingens*), blunt-nosed leopard lizard (*Gambelia silus*), desert tortoise (*Gopherus agassizii*), the Hoover's eriastrum (*Eriastrum hooverii*), and the San Joaquin antelope squirrel (*Ammospermophilus nelsoni*) if listed during the 50-year term of the permit. In October 2005, the USFWS published a Notice of Intent to prepare an EIS for an amendment of the take statement and the Kern County Waste Facilities HCP.

## Kern Water Bank HCP/Natural Community Conservation Plan

The Kern Water Bank HCP/Natural Community Conservation Plan (HCP/NCCP) is managed by the Kern Water Bank Authority and covers 19,900 acres. The plan was approved in 1997 and covers water conservation by developing water recharge and recovery facilities, the conservation and restoration of upland, intermittent wetland/rangeland, and other sensitive habitat, and the San Joaquin kit fox (*Vulpes macrotis mutica*), Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*), giant kangaroo rat (*Dipodomys ingens*), San Joaquin antelope squirrel

(*Ammospermophilus nelsoni*), and Bakersfield cactus (*Opuntia basilaris var*). The plan also includes a conservation bank that allows for conservation credit sales to third parties under certain conditions and subject to USFWS and CDFW approval. In 1997, 5,592 acres of the plan area were permanently preserved in the HCP area, and 3,267 acres were included in the conservation bank.

## Pacific Gas and Electric (PG&E) San Joaquin Valley Operations and Maintenance Program HCP

The PG&E San Joaquin Valley region HCP was approved in early 2008 and covers routine operations and maintenance and minor new construction activities related to PG&E's electrical system in the San Joaquin Valley for 30 years. The HCP covers 23 wildlife and 42 plant species, including the San Joaquin kit fox, California red-Legged frog, vernal pool fairy shrimp, and Western burrowing owl. PG&E facilities that are covered by the HCP occur throughout the Project Area, generally within existing ROWs owned by the company.

## Tehachapi Uplands Multiple Species HCP (TUMSHCP)

The TUMSHCP was approved in 2013 and includes 141,886 acres within Tejon Ranch and 25 species, including the California condor (Dudek 2013). The HCP term is 50 years. As discussed in the upland elevation section, the northern boundary of the TUMSHCP is largely defined by the 2,000-foot elevation level above the valley floor. Portions of the Project Area extend above 2,000 feet and include lands that are covered by the HCP. As discussed in greater detail in Section 4.4.4, Impacts and Mitigation Measures, pre-construction surveys and avoidance mandates for project activity above 2,000 feet have been modified to address the different species of concern at higher elevations. (USFWS 2012)

## Metropolitan Bakersfield HCP

Implemented in 1994, the MBHCP (City of Bakersfield and County of Kern 1994) covers both federally and state-listed species in the 408-square-mile Metropolitan Bakersfield area, which includes both City land and unincorporated County land. The goal of the MBHCP is to allow urban development consistent with the Metropolitan Bakersfield 2010 General Plan and offset habitat loss by acquiring, preserving, and enhancing habitat for sensitive species. Oil drilling activities are not covered under the MBHCP. The federal Section 10(a) permit and state 2081 permit allow take outside of the primary floodplain of the Kern River and the KWBHCP area. Both permits were issued for a concurrent period of up to twenty years or until urban development permits are issued for 15,200 acres of natural lands or 43,000 acres of open lands. The Metropolitan Bakersfield HCP is a joint program of the City of Bakersfield and Kern County (Chapter 17.62 of the Kern County Ordinances) to assist urban development applicants in complying with federal- and state-endangered species regulations (City of Bakersfield and County of Kern 1994). The program uses mitigation fees paid by applicants for grading or building permits to fund the purchase and maintenance of habitat land to compensate for the impact of urban development on endangered species habitat. The County and City have updated the HCP to support the extension of the plan or a new set of take permits. A new Incidental Take

Permit was issued by CDFW and signed by the County and City on September 21, 2014 to authorize the take of species outlined in the permit as allowed in CFGC Section 2081, subdivisions (b) and (c) (See Cal. Code Regs., title 14, § 783.4). The ITP expires on September 1, 2019.

## Recovery Plans

Section 4 of the federal ESA requires, subject to certain exceptions, that the USFWS develop recovery plans for listed species. A recovery plan is not regulatory action, and is intended to provide guidance for managing land and resources in a manner that fosters the recovery and continued survival of threatened and endangered species. The following sections discuss recovery plans that have been developed by the USFWS for the Project Area and adjacent lands.

### Recovery Plan for Upland Species of the San Joaquin Valley, California (USFWS 1998)

In 1998, the USFWS published an ecosystem-oriented recovery plan for 11 threatened and endangered species (one, Hoover's woolley star, since delisted) and 23 other native plants and animals in the San Joaquin Valley, including the California jewelflower, palmate-bracted bird's-beak, Kern mallow, San Joaquin woolly-threads, Bakersfield cactus, Hoover's woolly-star, giant kangaroo rat, Fresno kangaroo rat, Tipton kangaroo rat, blunt-nosed leopard lizard, San Joaquin kit fox, lesser saltscale, Bakersfield smallscale, Lost Hills saltbush, Vaseks clarkia, Temblor buckwheat, Tejon poppy, diamond-petaled California poppy, Comanche Point lavia, Munz's tidy-tips, jared's peppergrass, Merced monardella, Merced phacelia, oil neststraw, San Joaquin dune beetle, Dovens dune weevil, San Joaquin antelope squirrel, short-nosed kangaroo rat, riparian woodrat, Tulare grasshopper mouse, Buena Vista Lake shrew, riparian brush rabbit, and San Joaquin Le Conte's thrasher.

The SJV Recovery Plan recommends the protection of land in large blocks to minimize edge effects, increase the likelihood that ecosystem functions will remain intact, and facilitate management. The plan also seeks to connect blocks of conservation lands to allow for movement of species between blocks. The plan focuses on the conservation of the San Joaquin kit fox because this species occurs in nearly all the natural communities used by plan plants and animals. As a result, kit fox conservation provides an "umbrella of protection" for these species, and the kit fox is treated as the plan "umbrella" species. The recovery plan also focuses on the giant kangaroo rat and, to a lesser extent, the Fresno, short-nosed, and Tipton kangaroo rats as "keystone" species because they provide important or essential components of the biological niche of other covered species.

The 1998 plan identified four locations as the highest priority for large block land conservation in Kern County: (1) Elk Hills and Buena Vista Valley; (2) the Kern Fan Element; (3) Western Kern County (including the Lokern area); and (4) the Pixley National Wildlife Refuge/Allensworth Natural Area along the Kings County border. Two other areas including land in Kern County were identified as lower priority locations: (1) the Kern National Wildlife Refuge Semitropic

Ridge Natural Area; and (2) the Bitter Creek National Wildlife Refuge. Fifteen smaller areas were identified as potential specialty reserves in the County.

## Recovery Plan for Vernal Pool Ecosystems of California/Southern Oregon

The Vernal Pool Recovery Plan (USFWS 2004) seeks to protect known and potential habitat for vernal pools and associated sensitive species. The plan recommends the preparation and adoption of an HCP in areas potentially containing the listed species. As discussed in the Sensitive Natural Communities Section of the plan, certain locations in the Eastern Subarea and in the northern portions of the Central and Western Subareas in recovery plan "regions" are included. No species recovery plan "Core Areas" are located in the Project Area.

## California Condor Recovery Plan

The California Condor Recovery Plan was developed in 1984 and last revised in April 1996 (USFWS 1996). The plan calls for a multi-pronged recovery strategy for the California condor, including (1) increasing reproduction in captivity to provide condors for release, (2) the release of condors to the wild, (3) minimizing condor mortality factors in wild populations, (4) maintaining habitat for condor recovery, and (5) implementing condor information and education programs. The primary objective of the recovery plan is the down-list of the condor to threatened status; with the minimum criterion for achieving this objective being the maintenance of at least two non-captive populations and one captive population. As discussed previously in the California Condor section of the Category 2 Special Status Wildlife Section the USFWS conducted a 5-year listing review for the species in 2013. The review concluded that condor recovery is unlikely to be constrained by a lack of foraging habitat throughout its current and potential future range and as the wild population increases in size. Condor occurrence is overwhelmingly limited to upland locations outside of the Project Area.

## Pacific Bald Eagle Recovery Plan

The United States published five bald eagle recovery plans for various regions of the United States. The Pacific Bald Eagle (*Haliaeetus leucocephalus*) Recovery Plan (USFWS 1986) covers the western states including California. The primary objectives of The Pacific Bald Eagle Recovery Plan are to provide secure habitat for bald eagles in the Pacific recovery area and to increase the bald eagle population size to a level that warrants delisting of the species. Subsequent to the publication of the plan, the bald eagle was delisted under the ESA, but remains protected under the federal Bald and Golden Eagle Protection Act. Bald eagles may traverse the Project Area during seasonal migration, but the Project Area contains no breeding habitat, and potential areas of more intensive use are limited to perennial waterbodies in higher elevations outside of the Project Area.

## 4.4.4 Impacts and Mitigation Measures

# Methodology

The following section describes potential impacts related to biological resources that could occur as a result of the Project, and proposed mitigation measures.

The CEQA Guidelines define *direct impacts* as those impacts that result from a project and occur at the same time and place. *Indirect impacts* are caused by a project, but can occur later in time or farther removed in distance while still reasonably foreseeable and related to the project. The potential impacts discussed in this analysis are those most likely to be associated with construction and operation of the Project. Construction impacts would include both direct and indirect impacts to biological resources. While direct impacts associated with construction of the Project are expected to occur only through the duration of construction activities, indirect construction impacts, such as the spread of non-native and invasive weeds, could potentially remain an ongoing source of disturbance. Operational impacts would also include both direct and indirect impacts to biological resources. Ongoing operations and maintenance impacts would occur during routine inspection and maintenance of the Project facilities and would include such activities as routine inspections and emergency repairs. Operational impacts would remain an ongoing source of disturbance for many plants and wildlife species that occur within the facility perimeter and in adjacent habitat.

Project impacts are considered permanent if they would involve the conversion of land to a new use, such as with the construction of new roads, well pad foundations, or operation and maintenance (O&M) facilities. Temporary project impacts are those effects that do not result in the permanent land use conversion. Temporary effects to vegetation communities or other ground disturbance activities restricted solely to the construction phase, such as grading roads and clearing vegetation within staging areas, are considered temporary, provided that native vegetation is not replaced with infrastructure or the area is not maintained free of vegetation, and that restoration is completed.

Construction and operation of the Project could impact plants and wildlife in a variety of ways. Construction activities could result in both direct and indirect impacts to species. Direct impacts as a result of construction activities associated with the installation of well pads and associated facilities would include temporary disturbance and/or loss of native vegetation communities utilized as habitat for both common and special-status wildlife and plants. Other impacts could include fugitive dust, lighting that may alter species behavior, and increased noise levels due to heavy equipment operations during construction. Increased interaction with humans, loss of burrows and dens during well pad preparation, trenching activities associated with flow/pipelines and steam lines, or entrapment during other activities associated with construction may cause increased harassment, injury and/or mortality of a species.

Direct impacts as a result of construction activities associated with the project could include:

- The permanent removal and/or temporary disturbance of native vegetation communities utilized as habitat for both common and special-status wildlife and plants, fugitive dust, and increased noise levels due to heavy equipment operations occurring in these areas.

- Excessive dust from construction activities can decrease the vigor and productivity of vegetation communities through effects on light penetration, photosynthesis, respiration, transpiration, increased penetration of phytotoxic gaseous pollutants, and increased incidence of pests and diseases.

- Noise and vibration associated with project activities may affect behavior of wildlife in several ways. Excessive noise may affect species behavior by causing nest or burrow abandonment and interfering or altering normal behaviors.

- Lighting may also affect behavioral activities, physiology, population ecology, and ecosystems of both diurnal and nocturnal wildlife.

- Increased human activity in the Project Area could affect essential behavioral activities and physiology of wildlife. Increased human activity could alter species behavior causing them to abandon nests or den sites. Abandonment (even temporary) of active nests or dens increases the risk to eggs, nestlings, fledglings, and other dependent young. Flushing animals from nests, dens, and other refuges also increases their risk of injury or mortality from collisions with construction equipment and other vehicles, as well as predation.

- An increase in nonnative and invasive species could potentially increase and remain an ongoing source of disturbance. Impacts could include the loss of habitat due to the establishment of nonnative and invasive weeds.

- An increase in mortality, injury, or displacement of special-status plants or wildlife, loss or degradation of native habitat, or interference with wildlife movement or migration may also occur.

Indirect impacts to habitat could include alterations to existing topographical and hydrological conditions, increased erosion and sediment transport, and the establishment of nonnative and invasive weeds. Operational impacts include disturbance due to increased human presence, risk of injury or mortality from maintenance vehicles on access roads, and further opportunities for the introduction and spread of nonnative and invasive weeds. More specifically, indirect impacts as a result of construction activities associated with the project could include:

- The removal of vegetation can result in indirect effects to biological resources from the permanent loss of habitat. Loss or degradation of habitat including damage to shrubs and plants could alter access to a variety of essential resources, including shade and food sources.

- Indirect impacts to habitat could include alterations to existing topographical and hydrological conditions, increased erosion and sediment transport, and the establishment of nonnative and invasive weeds.

- Indirect effects caused by disturbance-type impacts, such as construction activity near an active nest or primary foraging area, also have the potential to impact raptor species.

- Indirect impacts attributed to the colonization of nonnative weeds could include a gradual decrease in natural biodiversity as nonnative weed infestations may extirpate native plant populations.

Operational impacts could also include mortality, injury, or displacement of special-status plants or wildlife; loss or degradation of native habitat; interference with wildlife movement or migration; disturbance to plants, animals and habitat from noise, light, or dust; and disturbance due to increased human presence; risk of injury or mortality from maintenance vehicles on access roads; and further opportunities for the introduction and spread of nonnative and invasive weeds.

# Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist state that a project would normally be considered to have a significant impact if it would:

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations or by the CDFW or USFWS;

- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the CDFW or USFWS;

- Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means;

- Interfere substantially with the movement of any native resident or migratory fish or wildlife species, or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;

- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance;

- Conflict with the provisions of an adopted HCP, NCCP, or other approved local, regional, or state HCP.

# Project Impacts

## Impact 4.4-1: Have a Substantial Adverse Effect, either Directly or through Habitat Modifications, on any Species Identified as a Candidate, Sensitive, or Special Status Species in Local or Regional Plans, Policies, or Regulations or by the California Department of Fish and Wildlife or United States Fish and Wildlife Service

### Methodology

As shown in Table 4.4-70 below, 90.1% (2,430) of the annual number of future production wells subject to the proposed Zoning Ordinance amendment review process (2,697) would be located in Tier 1 areas, 6.3% (169) would be in Tier 2, and 2.6% (71) would be located in Tier 3. About 64% (1,730) of the new wells would also be located in the Western Subarea, 5% (131) in the Central Subarea, and 31% (836) in the Eastern Subarea. Accordingly, the majority of new wells, approximately 95%, would be located in the Eastern and Western Subareas, which include the Project Area locations that have been subject to oil and gas exploration and production activities for several decades.

**Table 4.4-70: Number of New Producing Wells per Year by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| Tier 1 | 1,630 | 100 | 700 | 2,430 |
| Tier 2 | 74 | 20 | 75 | 169 |
| Tier 3 | 15 | 6 | 50 | 71 |
| Tier 4 | 10 | 5 | 10 | 25 |
| Tier 5 | 1 | - | 1 | 2 |
| **TOTAL** | **1,730** | **131** | **836** | **2,697** |

Table 4.4-71 summarizes the potential disturbance acreage that could occur in each subarea and tier assuming that all future oil and gas exploration and production subject to the proposed Zoning Ordinance amendment review process occurs in land that is not undergoing active disturbance, either from existing oil and gas activity, urban development, or agriculture.

Potential acreage impacts are estimated for each subarea based on the average historical disturbance per production well for all oil and gas exploration and production related activities, including well pads and staging areas, roads, utilities, pipelines, tanks, and other facilities and related infrastructure. Project Area special status plants and wildlife could be adversely affected by construction and operational activities that occur as a result of the Project. These activities include road, utility line, well and oil, and gas-related facility grading; staging; vehicular movement; construction; and oil and gas facility O&M, as more fully described in Chapter 3, Project Description. New land disturbance in locations occupied by special status plants and

wildlife could result in both direct and indirect impacts to such species. New land disturbance outside of actively disturbed areas could reduce the amount of available habitat for one or more special status species within the Project Area. Oil and gas activities could also indirectly affect special status plants and wildlife by generating dust, emissions, noise, light, and unintentional spills or discharges; introducing invasive species; or increasing the risk of unauthorized vehicular use or other human activity that disturb occupied or suitable species status species habitats.

The projected new land disturbance acreage in Table 4.4-71 is based on estimates of actual disturbance for any operations, including accidental spills or vehicular intrusion, observed in the 10 largest oilfields in each subarea. Impacts related to dust, emissions, light, noise and accidental spills and hazards are discussed in Sections 4.1, Aesthetic and Visual Resources; 4.3, Air Quality; and 4.8, Hazards and Hazardous Materials/Public Health Risks of this DEIR.

**Table 4.4-71: Assumed New Disturbance Acres per Year by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| Tier 1 | 3,260 | 300 | 840 | 4,400 |
| Tier 2 | 148 | 60 | 90 | 298 |
| Tier 3 | 30 | 18 | 60 | 108 |
| Tier 4 | 20 | 15 | 12 | 47 |
| Tier 5 | 2 | - | 1 | 3 |
| **TOTAL** | **3,460** | **393** | **1,003** | **4,856** |

Table 4.4-71 shows that 91% of the assumed new disturbance, or 4,400 of 4,856 acres per year, will occur in existing Tier 1 locations. Within each subarea, the majority of assumed new disturbance would occur in Tier 1 locations including 94% of all new disturbances in the Western Subarea (3,260 of 3,460 acres), 76% in the Central Subarea (300 of 393 acres), and 84% in the Eastern Subarea (840 of 1,003 acres). Assumed new disturbance within Tier 2 locations would account for 6.1% of total potential disturbance in the Project Area (298 of 4,856 acres), including 4% of all new disturbances in the Western Subarea (148 of 3,460 acres), 15% in the Central Subarea (60 of 393 acres), and 9% in the Eastern Subarea (90 of 1,003 acres). Given existing conditions, it is likely that anticipated new disturbance in the Central Subarea would occur on intensively farmed lands; however, for the purposes of impact assessment, it has been assumed that new disturbance would occur in land that is not undergoing active disturbance, as described above. About 71% of all future disturbances would occur in the Western Subarea (3,460 of 4,856 acres) compared with 21% in the Eastern Subarea (1,003 of 4,856 acres) and 8% in the Central Subarea (393 of 4,856 acres).

The potential annual disturbance levels projected in Table 4.4-71 are conservatively high because they have been rounded up and increased from the calculated levels of disturbance observed historically in each subarea. At least some future oil and gas exploration and production activities in the Project Area are likely to utilize existing actively disturbed areas, such as existing well pads, access roads, or existing facilities, such as pipelines and tanks, urban development and

intensively farmed areas to a greater extent than assumed in the analysis. As part of the site plan review process under the Zoning Ordinance Amendment, each Applicant would be required to submit a site plan to the County that identifies the existing areas of ongoing active disturbance and areas of new land disturbance that would result from proposed Project activities. As discussed below, the County would require mandatory minimum mitigation for any new land disturbance associated with oil and gas activities in the Project Area. The actual acreage of land subject to mandatory mitigation requirements would be verified in a completion report to be filed with the County. The primary objective of this new mandatory mitigation requirement is to encourage the avoidance and preservation of land that is not actively disturbed throughout the Project Area.

Potential impacts to special status wildlife and plants were analyzed by using: (1) statistical and habitat suitability models for 28 wildlife and 9 plant species, and (2) an assessment of the occurrence potential of 19 special status wildlife and 31 plant species by tier and subarea for which sufficient modeling data is not available.

## A. Modeled Species Analysis Approach

Modeled data was obtained from URS (SBM and HSM models), ICF, and QK, and are described in more detail in Section 4.4.2, Environmental Setting. As discussed above, modeled habitat data and maps (see Appendix N) were used to analyze potential Project impacts for all Category 1 species, including nine plant and 28 wildlife species. The model results were used to generate the estimated suitable habitat acreage grouped by "high" or "poor to moderate" categories for the URS SBM and HSM models, "high" quality habitat for the ICF and QK models by tier and subarea for all modeled species, and to the extent that such information was produced in model outputs for the applicable species. Tables 4.4-26 to 4.4-64 summarize the model outputs that were grouped into each category. As discussed in Section 4.4.2, Environmental Setting, the identification of modeled high quality habitat and, where available, modeled poor to moderate quality habitat provides a conservative analysis of potential species occurrence within the Project Area because they generally do not account for existing land uses, such as agriculture, higher intensity oil and gas operations, or urban development that preclude or significantly reduce use by many of the more sensitive special-status species. The model results are used to provide a reasonable analysis of the potential Project Area impacts to habitat for the various species based on the conservative annual disturbance factors summarized in Table 4.4-71. By analyzing habitat impacts to each Category 1 species, impacts can be quantified without knowing the actual occurrence of a species at a particular place. The advantage of this analysis method is that given the fluctuations in species occupation levels, the importance of habitat to a species is based on relative quality instead of occupation levels that tend to change over time.

The group of modeled species includes the "umbrella" San Joaquin kit fox and "keystone" species (i.e., the giant, short-nosed, and Tipton kangaroo rats) identified by the USFWS in the SJV Recovery Plan for the Project Area. Both high quality and poor to moderate quality habitat model results are available for each of these species. The SJV Recovery Plan utilizes a "community-level strategy" to define conservation goals for the Project Area (as well as other parts of the San Joaquin Valley that are not in the Project Area) that places greater emphasis on

San Joaquin kit fox conservation and keystone species ecosystem dynamics. According to the SJV Recovery Plan, San Joaquin kit fox conservation provides an "umbrella of protection" for many other species that require less habitat, because the kit fox occurs in nearly all the natural communities used by other SJV Recovery Plan species. The giant, short-nosed, and Tipton kangaroo rats create burrows and provide refuges and living places for many small animals, including the blunt-nosed leopard lizard and San Joaquin antelope squirrel. Soils over and near keystone species burrows are also favored microhabitats for the California jewel flower and San Joaquin woolly-threads (USFWS 1998). As a result, the modeling data and impact analysis for the San Joaquin kit fox and giant, short-nosed, and Tipton kangaroo rats also provide a general means for assessing potential impacts to other SJV Recovery Plan and special status species in the Project Area.

Potential impacts to modeled special status species were characterized in terms of annual impacts to all identified habitat categories for each species analyzed within the Project Area. As noted above, this approach is conservative because it includes urbanized, agricultural, or high-density oil and gas production areas where predicted habitat values have been reduced or eliminated. Impacts were further divided into tiers and subareas based on the projected new disturbance acreage that could occur in each of these geographic locations (see Table 4.4-71). The level of impacts was calculated as the product of (1) the ratio of modeled high quality or, when available, poor to moderate quality habitat acreage to total acreage in each tier and subarea, and (2) the annual new disturbance acreage projected in each tier and subarea. (Table 4.4-72).

The following tables provide a detailed summary of the impact methodology used for Category 1 species with reference to the San Joaquin kit fox. As discussed above, the URS SBM model results were used for this species, and the predicted habitat locations generated by the model were grouped into two "high" and "poor to moderate" categories. Tables 4.4-72 to 4.4-74 summarize the total high and poor to moderate quality habitat acreage from the URS SBM model for the San Joaquin kit fox by tier and subarea. These results are also presented in the discussion of the San Joaquin kit fox in Section 4.4.2, Environmental Setting. and mapped on Figure 4.4-32 in Appendix N.

**Table 4.4-72: Modeled San Joaquin Kit Fox High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| **High Quality Modeled San Joaquin Kit Fox Habitat** | | | | |
| Tier 1 | 132,762 | - | 13,104 | 145,866 |
| Tier 2 | 175,957 | 69,309 | 24,055 | 269,322 |
| Tier 3 | 1,223 | 977 | 5,266 | 7,466 |
| Tier 4 | 2,089 | 1,147 | 4,091 | 7,327 |
| Tier 5 | - | - | 13 | 13 |
| **TOTAL** | **312,032** | **71,434** | **46,529** | **429,994** |

**Table 4.4-72: Modeled San Joaquin Kit Fox High Quality and Poor to Moderate Quality Habitat, Acres by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| **Poor to Moderate Quality Modeled San Joaquin Kit Fox Habitat** | | | | |
| Tier 1 | 30,275 | 3,002 | 27,414 | 60,691 |
| Tier 2 | 542,945 | 452,701 | 419,500 | 1,415,147 |
| Tier 3 | 821 | 1,824 | 5,770 | 8,415 |
| Tier 4 | 1,416 | 9,224 | 10,498 | 21,139 |
| Tier 5 | 771 | - | 1,727 | 2,499 |
| **TOTAL** | **576,229** | **466,752** | **464,911** | **1,507,891** |

Source: Chevron 2014.

As discussed in Chapter 3, Project Description, there are approximately 2.051 million acres in the Project Area. Table 4.4-73 summarizes the Project Area acreage by tier and subarea.

**Table 4.4-73: Project Area Acreage By Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| Tier 1 | 163,227 | 3,002 | 40,518 | 206,747 |
| Tier 2 | 800,442 | 523,071 | 467,789 | 1,791,303 |
| Tier 3 | 2,043 | 2,801 | 11,359 | 16,203 |
| Tier 4 | 5,423 | 10,413 | 18,614 | 34,450 |
| Tier 5 | 772 | - | 1,740 | 2,512 |
| **TOTAL** | **971,908** | **539,287** | **540,020** | **2,051,215** |

Table 4.4-74 summarizes the percentage of the land in each tier and subarea that modeled as high quality and poor to moderate quality San Joaquin kit fox habitat, calculated by dividing the amount of high or poor to moderate San Joaquin kit fox habitat by the total Project Area acreage in each tier and subarea. About 81% of the Tier 1 land in the Western Subarea (132,762 acres of high quality habitat of a total of 163,227 acres), and 32% of the Tier 1 land in the Eastern Subarea (13,104 acres of high quality habitat of a total of 40,518 acres) consists of modeled high quality San Joaquin kit fox habitat. None of the Central Subarea contains modeled high quality San Joaquin kit fox, and all of the Central Subarea is modeled as poor to moderate quality habitat.

**Table 4.4-74: High Quality and Poor to Moderate Quality Modeled San Joaquin Kit Fox Habitat, Percentage of Total Project Area Acreage by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea |
|---|---|---|---|
| **High Quality Modeled San Joaquin Kit Fox Habitat** | | | |
| Tier 1 | 81% | 0% | 32% |
| Tier 2 | 22% | 13% | 5% |
| Tier 3 | 60% | 35% | 46% |
| Tier 4 | 39% | 11% | 22% |
| Tier 5 | - | - | 1% |
| **TOTAL** | **32%** | **13%** | **9%** |
| **Poor to Moderate Quality Modeled San Joaquin Kit Fox Habitat** | | | |
| Tier 1 | 19% | 100% | 68% |
| Tier 2 | 68% | 87% | 90% |
| Tier 3 | 40% | 65% | 51% |
| Tier 4 | 26% | 89% | 56% |
| Tier 5 | 100% | NA | 99% |
| **TOTAL** | **59%** | **87%** | **86%** |

Note:

The percentage of total acreage (high and poor to moderate quality habitat) does not necessarily add to 100% of the Project Area acreage in each subarea tier because: (a) as discussed in Section 4.4.2, Environmental Setting, the models do not generally include Project Area locations above about 2,000 feet, and/or (b) the model outputs may include locations that have no habitat value and are not included in the high or poor to moderate quality habitat categories (URS SBM and HSM models) or high quality category (ICF and QK models).

Table 4.4-75 summarizes the annual impacts to San Joaquin kit fox high quality habitat that could occur from Project Activities based on the projections in Table 4.4-71 and conservatively assuming that no existing disturbed areas would be used for any future oil and gas activities. Under these assumptions, about 3,032 acres of modeled high-quality San Joaquin kit fox habitat could be impacted per year in the Project Area, including 2,923 acres in Tier 1 areas, and 2,710 acres in the Western Subarea.

**Table 4.4-75: Modeled San Joaquin Kit Fox High Quality and Poor to Moderate Quality Habitat, Potential Annual Impacts of Total Acreage by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total (sum of individual subarea tier impacts) |
|---|---|---|---|---|
| **High Quality Modeled San Joaquin Kit Fox Habitat** | | | | |
| Tier 1 | 2,652 | - | 272 | 2,923 |
| Tier 2 | 33 | 8 | 5 | 45 |
| Tier 3 | 18 | 6 | 28 | 52 |

**Table 4.4-75: Modeled San Joaquin Kit Fox High Quality and Poor to Moderate Quality Habitat, Potential Annual Impacts of Total Acreage by Tier and Subarea**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total (sum of individual subarea tier impacts) |
|---|---|---|---|---|
| Tier 4 | 8 | 2 | 3 | 12 |
| Tier 5 | - | - | - | - |
| **TOTAL (sum of individual subarea tier impacts)** | **2,710** | **16** | **307** | **3,032** |
| **Poor to Moderate Quality Modeled San Joaquin Kit Fox Habitat** | | | | |
| Tier 1 | 605 | 300 | 568 | 1,473 |
| Tier 2 | 100 | 52 | 81 | 233 |
| Tier 3 | 12 | 12 | 30 | 54 |
| Tier 4 | 5 | 13 | 7 | 25 |
| Tier 5 | 2 | - | 1 | 3 |
| **TOTAL (sum of individual subarea tier impacts)** | **724** | **377** | **687** | **1,789** |

**Chevron 2014**

This methodology was used to estimate potential impacts to modeled high quality habitat data for all modeled species, and potential impacts to poor to moderate quality habitat when available for certain species. All model outputs were reviewed to ensure that model results did not unintentionally include lands that are considered outside of a species' range by published sources, such as Jepson (2013), VertNet, etc. A more detailed description of the methodologies and definitions of high quality and poor to moderate quality habitat used in the analysis is provided in Section 4.4.2, Environmental Setting.

## B. Non-Modeled Species Analysis Approach

Non-modeled species were analyzed on the basis of species-specific occurrence information, including unique habitat requirements for aquatic plants and wildlife, fairy shrimp, certain plants or riparian species, reported occurrence information in publicly available species databases, and the field experience and judgment of qualified biologists with significant knowledge of the Project Area that were retained by the lead agency. The analysis included a summary assessment of which each non-modeled species could occur in each subarea and tier, and identified key habitat requirements or constraints that could affect the spatial distribution and of special status species in the Project Area.

The non-modeled species analysis is conservative because occurrence was considered possible even if there were only limited historical observations or an extremely low likelihood of species activity throughout a tier/subarea. As discussed in Section 4.4.2, Environmental Setting, actual occupation of habitat during critical life stages by certain species is limited to specific habitats (e.g., the sphinx moth), isolated and relatively minute portions of the Project Area (e.g., the

Tehachapi slender salamander), or higher elevation areas (e.g., the California condor). To provide a conservative assessment, the summary assessment by tier and subarea identifies potential occurrence even when the probability of species activity in the vast majority of the tier or subarea may be negligible. The assessment results were further refined by considering habitat, behavioral, seasonal activity, elevation, or other factors that would substantially affect the magnitude and significance of potential impacts from oil and gas activities.

## C. High Elevation Species

Except where specifically noted, the model results, and in certain cases the non-modeled tier and subarea assessments, do not include or fully distinguish between the lower valley floor and the small amount of land along the southern and eastern borders of the Project Area that is above 2,000 feet in elevation. As discussed in Section 4.4.2, Environmental Setting, and in the TUMSHCP approved by the USFWS in 2013 (USFWS 2013d), the suite of species occurring in and adjacent to the valley floor transitions from valley floor to foothill and montane habitat near the 2,000-foot elevation level near the boundaries of the Project Area, especially in the southern and eastern boundary areas. Certain special status species, including the California condor, golden eagle, and the Tehachapi slender salamander, occur almost exclusively within, or only engage in significant life cycle activities such as breeding or roosting in higher elevation habitats just within the border of or adjacent to the Project Area.

### *Potential Special Status Plant Impacts*

Table 4.4-76 summarizes the potential impacts, in terms of acres per year, that could occur to modeled high quality special status plant species habitats, and the potential occurrence of non-modeled special status plants by subarea and tier. Modeling data was utilized to analyze impacts to modeled high quality habitat for five of the six state and/or federally listed threatened or endangered species that occur in the Project Area, including the San Joaquin adobe sunburst (federal threatened, state endangered), Kern mallow (federal endangered), Bakersfield cactus (federal and state endangered), San Joaquin woolly-threads (federal endangered), and the California jewel flower (federal and state endangered). Impacts to modeled poor to moderate quality habitat, as described in Section 4.4.2, Environmental Setting, under "Methods" and in accordance with the category groupings summarized in Tables 4.4-26 and 4.4-36, were also evaluated for these species except for the San Joaquin adobe sunburst. Modeled high quality habitat data was available for four other unlisted plant species that occur within the Project Area: the recurved larkspur, Lost Hills crownscale, heartscale, and Kern County larkspur (rose-flowered larkspur). The model also predicted some low to moderate quality habitat for the Lost Hills crownscale and heartscale. The occurrence potential by tier and subarea was evaluated as either yes or no for 31 non-listed plants species for which Project Area modeling data was not available. Occurrence potential was determined based on presence of potentially suitable habitat given habitat requirements of each of the non-modeled species. Habitat potential was determined based on occurrence data for each species, known habitat requirements compared to CALVEG mapping and Google Earth images (University of California, Berkeley 2013; CDFW 2015a; USFS 2014; Google Earth Pro 2015).

**Table 4.4-76: Summary of Potential Impacts to Special Status Plants by Subarea and Tier (acres per year for modeled species, occurrence potential for non-modeled species)**

| | Status | Western Subarea | Central Subarea | Eastern Subarea | Tier 1 | Tier 2 | Tier 3 | Tier 4 | Tier 5 | Total* |
|---|---|---|---|---|---|---|---|---|---|---|
| **High Quality Modeled Habitat** | | | | | | | | | | |
| San Joaquin adobe sunburst | T / E / 1B.1 | - | 0.2 | 670 | 613 | 39 | 18 | 0.6 | - | 671 |
| Recurved larkspur | - / - / 1B.2 | 473 | 189 | 1.7 | 636 | 20 | 4.1 | 3.3 | 0.0 | 664 |
| Kern mallow | -/-/1b.2 | 299 | 0.4 | - | 290 | 8 | 0.3 | 1.1 | - | 300 |
| Lost Hills crownscale | E/-/1b.2 | 262 | 0.2 | - | 261 | 1.0 | - | 0.6 | - | 262 |
| Heartscale | -/-/1b.2 | 253 | 1.8 | - | 248 | 3.2 | 2.3 | 2.1 | - | 255 |
| Bakersfield cactus | E/E/1b.1 | 0.2 | - | 77 | 63 | 3.3 | 8.3 | 2.2 | - | 77 |
| San Joaquin woolly-threads | E/-/1b.2 | 10 | 6.0 | 2.2 | 16 | 0.4 | 2.1 | 0.1 | - | 18 |
| Kern County larkspur (Rose-flowered larkspur) | - / - / 1B.3 | 2.7 | - | 7.2 | 1.0 | 5.1 | 3.1 | 0.7 | - | 10 |
| California jewel flower | E/E/1b.1 | - | - | 3.2 | - | 0.04 | 3.2 | 0.0 | - | 3 |
| **Low to Moderate Quality Modeled Habitat** | | | | | | | | | | |
| Bakersfield cactus | E/E/1b.1 | 3,434 | 390 | 918 | 4,333 | 275 | 95 | 35 | 3 | 4,741 |
| California jewel flower | E/E/1b.1 | 3,434 | 390 | 991 | 4,396 | 278 | 100 | 37 | 3 | 4,815 |
| Heartscale | -/-/1b.2 | 3,180 | 388 | 994 | 4,148 | 275 | 101 | 35 | 3 | 4,563 |
| Kern mallow | -/-/1b.2 | 3,135 | 389 | 994 | 4,106 | 270 | 103 | 36 | 3 | 4,518 |
| Lost Hills crownscale | E/-/1b.2 | 3,172 | 390 | 994 | 4,136 | 277 | 103 | 37 | 3 | 4,556 |
| San Joaquin woolly-threads | E/-/1b.2 | 3,424 | 384 | 992 | 4,380 | 278 | 101 | 37 | 3 | 4,800 |
| **Non-Modeled Species** | | | | | | | | | | |
| Alkali mariposa lily | - /- /1B.2 | Yes | Yes | No | Yes | Yes | Yes | Yes | No | NA |
| Bakersfield smallscale | - / - /1A | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No | NA |
| Calico monkeyflower | - / - / 1B.2 | No | No | Yes | Yes | Yes | Yes | Yes | No | NA |

**Table 4.4-76: Summary of Potential Impacts to Special Status Plants by Subarea and Tier (acres per year for modeled species, occurrence potential for non-modeled species)**

| | Status | Western Subarea | Central Subarea | Eastern Subarea | Tier 1 | Tier 2 | Tier 3 | Tier 4 | Tier 5 | Total* |
|---|---|---|---|---|---|---|---|---|---|---|
| California satintail | - / - /2B.1 | No | No | Yes | Yes | Yes | Yes | Yes | No | NA |
| California tortula moss (California screw-moss) | - / - /1B.2 | No | No | Yes | Yes | Yes | Yes | Yes | No | NA |
| Comanche Point layia | - / - / 1B.1 | No | No | Yes | Yes | Yes | Yes | Yes | No | NA |
| Coulter's goldfields | - / - / 1B.1 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No | NA |
| Deltoid bract saltbush (Subtle orache) | - / - / 1B.2 | Yes | Yes | No | Yes | Yes | Yes | Yes | No | NA |
| Diamond-petaled California poppy | - / - / 1B.1 | Yes | No | No | Yes | Yes | No | Yes | No | NA |
| Erectstem saltbush (Earlimart orache) | - / - / 1B.2 | No | Yes | No | No | Yes | Yes | Yes | No | NA |
| Hall's tarplant | - / - / 1B.1 | Yes | No | No | Yes | Yes | No | No | No | NA |
| Hispid bird's-beak | - / - / 1B.1 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No | NA |
| Horn's milk vetch | - / - / 1B.1 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No | NA |
| Jared's pepper-grass | - / - / 1B.2 | Yes | No | No | Yes | Yes | Yes | Yes | No | NA |
| Kings gold | - / - / 1B.1 | Yes | Yes | No | Yes | Yes | Yes | Yes | No | NA |
| Lemmon's jewel flower | - / - / 1B.2 | Yes | No | No | Yes | Yes | Yes | Yes | No | NA |
| Lesser saltscale | - / - / 1B.1 | Yes | Yes | No | Yes | Yes | Yes | Yes | No | NA |
| Mason's neststraw | - / - / 1B.1 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | NA |
| Munz's tidy tips | - / - / 1B.2 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No | NA |
| Oil neststraw | - / - / 1B.1 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | NA |
| Pale yellow layia | - / - / 1B.1 | Yes | No | Yes | Yes | Yes | Yes | Yes | No | NA |
| Piute Mountains navarretia | - / - / 1B.1 | Yes | No | Yes | Yes | Yes | Yes | Yes | No | NA |

**Table 4.4-76: Summary of Potential Impacts to Special Status Plants by Subarea and Tier (acres per year for modeled species, occurrence potential for non-modeled species)**

| | Status | Western Subarea | Central Subarea | Eastern Subarea | Tier 1 | Tier 2 | Tier 3 | Tier 4 | Tier 5 | Total* |
|---|---|---|---|---|---|---|---|---|---|---|
| Round-leaved filaree | - / - / 1B.1 | Yes | No | Yes | Yes | Yes | Yes | Yes | No | NA |
| Shevock's golden aster | - / - / 1B.3 | No | No | Yes | Yes | Yes | Yes | Yes | No | NA |
| Showy golden madia | - / - / 1B.1 | Yes | No | No | Yes | Yes | No | Yes | No | NA |
| Slough thistle | - / - / 1B.1 | Yes | Yes | No | Yes | Yes | Yes | Yes | No | NA |
| Spiny-sepaled button-celery | - / - / 1B.2 | No | Yes | Yes | Yes | Yes | Yes | Yes | No | NA |
| Striped adobe-lily | - / T / 1B.1 | No | No | Yes | Yes | Yes | Yes | Yes | No | NA |
| Tejon poppy | - / - / 1B.1 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No | NA |
| Temblor buckwheat | - / - / 1B.2 | Yes | No | No | Yes | Yes | Yes | Yes | No | NA |
| Vasek's clarkia | - / - / 1B.1 | No | No | Yes | Yes | Yes | Yes | No | No | NA |

Status abbreviations:
Federal and State Listing Code
E = Federal or State-listed Endangered
T = Federal or State-listed Threatened
DL = Delisted
California Rare Plant Rank (formerly CNPS List)
1A: Plants Presumed Extirpated in California and Either Rare or Extinct Elsewhere
1B: Plants Rare, Threatened, or Endangered in California and Elsewhere
2A: Plants Presumed Extirpated in California, But Common Elsewhere
2B: Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere
3: Plants About Which More Information is Needed - A Review List
4: Plants of Limited Distribution - A Watch List
Threat Ranks
0.1-Seriously threatened in California (over 80% of occurrences threatened / high degree and immediacy of threat)
0.2-Moderately threatened in California (20-80% occurrences threatened / moderate degree and immediacy of threat)
0.3-Not very threatened in California (less than 20% of occurrences threatened / low degree and immediacy of threat or no current threats known)
*NA in "Total" column identifies non-modeled species

Table 4.4-76 shows that, based on modeled high quality habitat for six of the nine modeled plants that have poor to moderate quality habitat data that are based on the projected future disturbance impacts as shown on Table 4.4-71. Impacts to high quality modeled habitat for the Bakersfield cactus and the San Joaquin adobe sunburst would largely occur in Tier 1 locations within the Eastern Subarea. Impacts to high quality modeled habitat for the Lost Hills crownscale, recurved larkspur, Kern mallow, and heartscale would occur predominantly (recurved larkspur) or largely (Lost Hills crownscale, Kern mallow, and heartscale) occur in the Western Subarea. High quality modeled habitat for the San Joaquin woolly-threads, California jewel flower, and Kern County larkspur would occur to a much more limited extent in specialized Project Area habitats (Figures 4.4-2, 4.4-9, and 4.4-9 in Appendix N). Potential impacts to San Joaquin woolly-threads high quality modeled habitat would be largely confined to Tier 1 areas and could occur in each subarea. Potential impacts to California jewel flower high quality modeled habitat would be almost exclusively limited to Tier 3 locations in the Eastern Subarea. Impacts to Kern County larkspur high quality modeled habitat would be largely confined to Tier 2 and Tier 3 areas in the Western and Eastern Subareas. In general, areas that are not modeled as high quality habitats are modeled as poor to moderate quality habitat for applicable special status plants. Consequently, potential impacts to low to moderate quality modeled habitat vary to a lesser extent than for modeled high quality habitat.

The amount of modeled high quality habitat that could be impacted also varies for each modeled plant species, including more than 600 acres per year for the San Joaquin adobe sunburst and recurved larkspur; from 200 to 300 acres per year for the Kern mallow, Lost Hills crownscale and heartscale; and 77 acres per year for the Bakersfield Cactus. Impacts to modeled high quality San Joaquin woolly-threads, California jewel flower, and Kern County larkspur habitat would range from about 3 to 18 acres per year (Table 4.4-76). Impacts to poor to moderate quality modeled habitat would range from 4,518 acres per year (Kern mallow) to 4,815 acres per year (California jewel flower). Table 4.4-77 analyzes the amount of total modeled high quality and poor to moderate quality habitat for each modeled special status plant in the Project Area that could be impacted by the projected annual level of disturbance summarized in Table 4.4-71 over 25 years.

**Table 4.4-77: Project Area Impacts to Total Modeled High Quality and Low to Moderate Special Status Plant Habitat per Year and Over 25 years (percent)**

| | Annual Impact | 25-Year Impact |
|---|---|---|
| **High Quality Modeled Habitat** | | |
| Lost Hills Crownscale | 1.36% | 33.9% |
| Heartscale | 0.82% | 20.5% |
| San Joaquin Woolly-threads | 0.59% | 14.7% |
| Kern Mallow | 0.49% | 12.1% |
| Recurved Larkspur | 0.46% | 11.4% |
| California Jewel Flower | 0.41% | 10.2% |
| Bakersfield Cactus | 0.30% | 7.5% |
| San Joaquin Adobe Sunburst | 0.29% | 7.1% |

**Table 4.4-77: Project Area Impacts to Total Modeled High Quality and Low to Moderate Special Status Plant Habitat per Year and Over 25 years (percent)**

| | Annual Impact | 25-Year Impact |
|---|---|---|
| Kern County larkspur (Rose-flowered larkspur) | 0.04% | 0.9% |
| **Poor to Moderate Quality Modeled Habitat** | | |
| California Jewel Flower | 0.25% | 6.2% |
| San Joaquin Woolly-threads | 0.25% | 6.2% |
| Bakersfield Cactus | 0.25% | 6.2% |
| Kern Mallow | 0.24% | 6.0% |
| Heartscale | 0.24% | 6.0% |
| Lost Hills Crownscale | 0.24% | 5.9% |

Table 4.4-77 indicates that if the maximum level of annual disturbance conservatively assumed in Table 4.4-71 occurred each year for 25 years, impacts in the Project Area could range from 0.9% (Kern County larkspur) to 33.9% (Lost Hills crownscale) of the total modeled high quality habitat. On an annual basis, potential impacts would range from 0.04% (Kern County larkspur) to 1.36% (Lost Hills crownscale) of the total Project Area modeled high quality habitat. Impacts to the Lost Hills crownscale, heartscale San Joaquin woolly-threads, Kern mallow, recurved larkspur, and California jewelflower could range from 0.41% to 1.36% per year, and 10.2% to 33.9% over 25 years, of total Project Area high quality modeled habitat. Impacts to poor to moderate quality modeled habitat would range from 0.24% to 0.24% per year and 5.9% to 6.2% over 25 years for each of the six modeled plants for which such data was available. These impacts would be significant without mitigation.

As shown in Table 4.4-78, potential impacts to non-modeled special status plants would vary primarily by subarea, and to a lesser extent by tier. None of the non-modeled special status plants except the mason's nestraw and oil nestraw are anticipated to occur in Tier 5. As discussed above, most of the potential future Project Area disturbance is projected to occur in Tier 1 (91%) and Tier 2 (6.1%). All of the non-modeled plants could occur in Tier 1 or Tier 2 areas except for the Erectstem saltbush, which is limited to Tiers 2 through 4 in the Central Subarea. As a result, all except one non-modeled special status plant could occur in the Project Area tiers that have the highest levels of projected future disturbance.

Potential impacts to non-modeled special status plants vary to greater extent by subarea. Table 4.4-78 groups each non-modeled species by subarea occurrence.

**Table 4.4-78: Non-Modeled Plant Species Occurrence by Subarea**

| |
|---|
| **All Subareas** |
| Bakersfield smallscale |
| Coulter's goldfields |
| Horn's milk vetch |
| Tejon poppy |
| Mason's neststraw |
| Munz's tidy tips |
| Oil neststraw |
| Hispid bird's-beak |
| **Eastern Subarea Only** |
| Calico monkeyflower |
| California satintail |
| California tortula moss (California screw-moss) |
| Comanche Point layia |
| Shevock's golden aster |
| Striped adobe-lily |
| Vasek's clarkia |
| **Western Subarea Only** |
| Diamond-petaled California poppy |
| Hall's tarplant |
| Jared's pepper-grass |
| Lemmon's jewel flower |
| Showy golden madia |
| Temblor buckwheat |
| **Central Subarea Only** |
| Erectstem saltbush (Earlimart orache) |
| **Central and Eastern Subareas** |
| Spiny-sepaled button-celery |
| **Western and Eastern Subareas** |
| Pale yellow layia |
| Piute Mountains navarretia |
| Round-leaved filaree |
| **Western and Central Subareas** |
| Alkali mariposa lily |
| Deltoid bract saltbush (Subtle orache) |
| Lesser saltscale |

**Table 4.4-78: Non-Modeled Plant Species Occurrence by Subarea**

| |
|---|
| Slough thistle |
| Kings gold |

Eight of the non-modeled plants occur in all three subareas: Bakersfield smallscale, Coulter's goldfield, Horn's milk vetch, Tejon poppy, Mason's neststraw, Munz's tidy tips, Oil neststraw, and Hispid bird's-beak. These species are the most widely distributed in the Project Area, and could also occur in both Tier 1 and Tier 2 locations where more than 97% of future disturbance is projected to occur. As a result, impacts to these species would be significant without mitigation.

Seven of the non-modeled plants occur only in the Eastern Subarea: Calico monkeyflower, California satintail, California tortula moss (California screw-moss), Comanche Point layia, Shevock's golden aster, Striped adobe-lily, and Vasek's clarkia. All of these species could also occur in Tiers 1 through 3 within the Eastern Subarea. As discussed above, about 21% (1,003 acres per year) of all Project Area future disturbance is projected to occur in the Eastern Subarea, of which 84% would occur in Tier 1, 9% in Tier 2, and 6% in Tier 3. As a result, the seven non-modeled plant species that occur only in the Eastern Subarea of the Project Area also could occur in Tiers 1 through 3 which account for 99% of the total projected future disturbance in the subarea. Impacts to these species would be significant without mitigation.

Six of the non-modeled plants occur only in the Western Subarea: Diamond-petaled California poppy, Hall's tarplant, Jared's pepper-grass, Lemmon's jewel flower, Showy golden madia, and Temblor buckwheat. All of these species could also occur in Tier 1 and Tier 2 within the Western Subarea. As discussed above, about 71% (3,460 acres per year) of all Project Area future disturbances is projected to occur in the Western Subarea, of which 94% would occur in Tier 1 and 4.5% would occur in Tier 2. As a result, the six non-modeled plant species that occur only in the Western Subarea also could occur in Tiers 1 through 2, which account for 98.5% of the total projected future disturbance in the subarea. Impacts to these species would be significant without mitigation.

One non-modeled plant, Erectstem saltbush, occurs only in the Central Subarea. This species is not expected to occur in Tier 1, but could occur in Tiers 2 through 4 of the Central Subarea. About 8% of total Project Area disturbance is projected to occur in the Central Subarea, and 24% of this potential activity (about 93 acres per year) would occur in Tiers 2 through 4. The species is associated with seasonal wetlands and washes located in the northern portion of the Central Subarea, some of which is protected in existing preserve lands. Although impacts to Erectstem saltbush would likely be lower than for other non-modeled plant species due to the limited locations in which the species occurs, potential impacts could still be significant without mitigation in the event future oil and gas activities occur in these areas.

One non-modeled plant, spiny-sepaled button-celery, occurs only in the Central and Eastern Subareas. This species could also occur within Tiers 1 through 4 of in the Central and Eastern Subareas. About 29% of total Project Area disturbance is projected to occur in the Central and

Eastern Subareas, and 99.9% of this potential activity (about 1,395 acres per year) would occur in Tiers 1 through 4. Potential impacts to the spiny-sepaled button-celery would be significant without mitigation because the species occurs in locations where almost all future oil and gas disturbance would be concentrated in the Central and Eastern Subareas.

Three non-modeled plants, Pale yellow layia, Piute Mountains navarretia, and Round-leaved filaree, only occur in hilly terrain within the Western and Eastern Subareas. These species could also occur within Tiers 1 through 4 of in the Western and Eastern Subareas. About 92% of total Project Area disturbance is projected to occur in the Western and Eastern Subareas, and 99.9% of this potential activity (about 4,460 acres per year) would occur in Tiers 1 through 4. Potential impacts to the Pale yellow layia, Piute Mountains navarretia, and Round-leaved filaree, would be significant without mitigation because these species occur in locations where almost all future Project Area oil and gas disturbance would be concentrated.

Five non-modeled plants, Alkali mariposa lily, Deltoid bract saltbush (*Subtle orache*), Lesser saltscale, Slough thistle, and Kings gold, only occur within the Western and Central subareas. These species could also occur within Tiers 1 through 4 of in the Western and Central Subareas. About 79% of total Project Area disturbance is projected to occur in the Western and Central Subareas, and 99.9% of this potential activity (about 3,851 acres per year) would occur in Tiers 1 through 4. Potential impacts to the Alkali mariposa lily, Deltoid bract saltbush, Lesser saltscale, Slough thistle, and Kings gold would be significant without mitigation because these five species occur in locations where almost all future oil and gas disturbance would be concentrated in the Western and Central Subareas.

### *Potential Special Status Wildlife Impacts*

Table 4.4-79 summarizes the potential impacts, in terms of acres per year that could occur to modeled high quality special status wildlife habitats. Table 4.4-80 summarizes the potential impacts that occur to modeled poor to moderate quality habitat for all but three species, the Tehachapi slender salamander, San Joaquin pocket mouse, and least Bell's vireo, for which poor to moderate habitat modeling data was unavailable. Table 4.4-81 summarizes the potential occurrence of non-modeled special status wildlife by subarea and tier.

Modeling data was utilized to analyze impacts to most of the state and federally listed threatened or endangered species that occur in the Project Area and that could be significantly affected by future oil and gas activity, including the San Joaquin kit fox (federal endangered, state threatened), San Joaquin antelope squirrel (state threatened), giant kangaroo rat (federal and state endangered), Tipton kangaroo rat (federal and state endangered), Buena Vista Lake shrew (federal endangered), blunt-nosed leopard lizard (federal and state endangered, state fully protected); Tehachapi slender salamander (state threatened; high quality modeled habitat only), tricolored blackbird (state endangered), least Bell's vireo (federal and state endangered high quality modeled habitat only), golden eagle habitat (state fully protected; lower elevation areas only), and Swainson's hawk (state threatened).

Eleven listed species were analyzed using occurrence probability estimates by tier and subarea, including the ringtail (state fully protected), California red-legged frog (federal threatened), California tiger salamander (federal and state threatened), Kern Canyon slender salamander (state threatened), bald eagle (state fully protected), California condor (federal and state endangered, state fully protected), western snowy plover (federal threatened), white tailed kite (state fully protected), vernal pool fairy shrimp (federal threatened), longhorn fairy shrimp (federal endangered), and the Kern primrose sphinx moth (federal threatened).

Modeling data was also available for 17 other unlisted special status species that occur within the Project Area, including the western spadefoot, San Joaquin pocket mouse (high quality modeled habitat only), American badger, Tulare grasshopper mouse, short-nosed kangaroo rat, western mastiff bat, San Joaquin coachwhip, silvery legless lizard (including Bakersfield legless lizard and Temblor legless lizard), western pond turtle, coast horned lizard, burrowing owl, Le Conte's thrasher, grasshopper sparrow, lesser sandhill crane, northern harrier, yellow headed blackbird, and mountain plover.

The occurrence potential by Tier and Subarea was evaluated for eight non-listed special status species for which Project Area modeling data was not available. Occurrence potential was determined based on presence of potentially suitable habitat given habitat requirements of each of the non-modeled species. Habitat potential was determined based on occurrence data for each species, known habitat requirements compared to CALVEG mapping and Google Earth images (CNDDB 2015; VertNet 2015; CALVEG 2014; Google Earth Pro 2015).

**Table 4.4-79: Summary of Potential Impacts to Special Status Wildlife Modeled High Quality Habitat by Subarea and Tier (acres per year)**

| | Status | Western Subarea | Central Subarea | Eastern Subarea | Tier 1 | Tier 2 | Tier 3 | Tier 4 | Tier 5 | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| **Mammals** | | | | | | | | | | |
| San Joaquin pocket mouse | -/CSC | 3,136 | 220 | 826 | 3,978 | 140 | 50 | 14 | 0.12 | 4,182 |
| San Joaquin kit fox | E/T | 2,710 | 16 | 307 | 2,923 | 45 | 52 | 12 | 0.01 | 3,032 |
| San Joaquin antelope squirrel | -/T | 1,729 | 0.05 | - | 1,690 | 15 | 16 | 8 | - | 1,729 |
| American badger | -/CSC | 441 | 9.1 | 717 | 1,042 | 97 | 23 | 4 | 0.05 | 1,167 |
| Giant kangaroo rat | E/E | 901 | - | - | 891 | 6.7 | 1.8 | 1.5 | - | 901 |
| Tulare grasshopper mouse | -/CSC | 542 | 0.66 | - | 530 | 10 | 0.4 | 1.8 | - | 543 |
| Short-nosed kangaroo rat | -/CSC | 406 | - | - | 392 | 5.4 | 4.3 | 3.8 | - | 406 |
| Tipton kangaroo rat | E/E | 223 | 64 | 16 | 257 | 26 | 12 | 9 | 0.5 | 303 |
| Western mastiff bat | -/CSC | 31 | 0.3 | 2.5 | 27 | 4.34 | 1.61 | 0.47 | - | 34 |
| Buena Vista Lake shrew | E/- | 0.41 | 0.82 | 0 | 0.18 | 0.87 | 0.01 | 0.18 | 0.002 | 1.23 |
| **Reptiles and Amphibians** | | | | | | | | | | |
| Blunt-nosed leopard lizard | E/E, SFP | 1,772 | 2 | 1 | 1,727 | 27 | 16 | 5.3 | 0.07 | 1,774 |
| San Joaquin coachwhip | -/CSC | 1,259 | 0 | 10 | 1,235 | 14 | 14 | 5.8 | 0.14 | 1,269 |
| Silvery legless lizard | -/CSC | 44 | 18 | 42 | 87 | 3 | 10 | 3 | - | 103 |
| Tehachapi slender salamander | -/T | - | - | 1.66 | - | 1.6 | - | 0.1 | - | 1.66 |
| Western pond turtle | -/CSC | 32 | 9 | 29 | 62 | 1 | 7.5 | 0.3 | - | 70 |
| Coast horned lizard | -/CSC | 10 | 15 | - | 8.2 | 10.7 | 3 | 2.6 | - | 25 |
| Western spadefoot | -/ CSC | 0.03 | - | - | - | 0.03 | - | - | - | 0.03 |
| **Birds** | | | | | | | | | | |
| Burrowing owl | -/CSC | 727 | 218 | 60 | 941 | 30 | 24 | 9 | 2 | 1,003 |
| Le Conte’s thrasher | -/CSC | 830 | 0 | - | 810 | 5 | 11 | 3 | - | 830 |
| Grasshopper sparrow | -/CSC | 438 | - | 56 | 420 | 63 | 9 | 2 | 0.007 | 494 |
| Lesser sandhill crane | -/CSC | 104 | 24 | - | 85 | 38 | 1 | 4 | - | 128 |

**Table 4.4-79: Summary of Potential Impacts to Special Status Wildlife Modeled High Quality Habitat by Subarea and Tier (acres per year)**

| | Status | Western Subarea | Central Subarea | Eastern Subarea | Tier 1 | Tier 2 | Tier 3 | Tier 4 | Tier 5 | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| Tricolored blackbird | -/E | 35 | 4 | 4 | 37.07 | 3.41 | 1.74 | 0.02 | 0.002 | 42 |
| Least Bell's vireo | E/E | 1.3 | 0.2 | 9.3 | 7.84 | 0.5 | 2.39 | 0.04 | - | 10.8 |
| Northern harrier | -/CSC | 0.51 | - | 7.4 | 3.56 | 4.31 | - | - | - | 7.9 |
| Mountain plover | C/CSC | 0.64 | 2.88 | - | - | 3.22 | - | 0.3 | - | 3.52 |
| Yellow headed blackbird | -/CSC | 0.41 | 0.77 | 1.25 | 1.24 | 0.84 | 0.17 | 0.18 | 0.002 | 2.42 |
| Golden eagle | -/WL, SFP | - | - | - | - | - | - | - | - | - |
| Swainson's hawk | -/T | - | - | - | - | - | - | - | - | - |

*NA in "Total" column identifies non-modeled species

**Table 4.4-80: Summary of Potential Impacts to Modeled Special Status Wildlife Modeled Poor to Moderate Quality Habitat by Subarea and Tier (acres per year)**

| | Status | Western Subarea | Central Subarea | Eastern Subarea | Tier 1 | Tier 2 | Tier 3 | Tier 4 | Tier 5 | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| **Mammals** | | | | | | | | | | |
| Western mastiff bat | -/CSC | 3,403 | 390 | 992 | 4,369 | 274 | 102 | 37 | 3 | 4,784 |
| Tipton kangaroo rat | E/E | 3,211 | 327 | 978 | 4,139 | 252 | 93 | 29 | 2 | 4,515 |
| Short-nosed kangaroo rat | -/CSC | 3,029 | 390 | 994 | 4,004 | 273 | 99 | 33 | 3 | 4,412 |
| Tulare grasshopper mouse | -/CSC | 2,892 | 389 | 994 | 3,866 | 268 | 103 | 35 | 3 | 4,275 |
| Giant kangaroo rat | E/E | 2,533 | 390 | 994 | 3,506 | 271 | 101 | 36 | 3 | 3,917 |
| American badger | -/CSC | 2,820 | 378 | 250 | 3,169 | 187 | 65 | 25 | 3 | 3,448 |
| San Joaquin antelope squirrel | -/T | 1,706 | 390 | 994 | 2,706 | 263 | 88 | 29 | 3 | 3,089 |
| San Joaquin kit fox | E/T | 724 | 375 | 687 | 1,473 | 233 | 52 | 25 | 3 | 1,787 |
| Buena Vista Lake shrew | E/- | 0 | - | 0 | 0 | 0 | 0 | - | - | 0 |
| **Reptiles and Amphibians** | | | | | | | | | | |
| Western spadefoot | -/ CSC | 3,434 | 390 | 994 | 4,396 | 278 | 103 | 37 | 3 | 4,818 |
| Coast horned lizard | -/CSC | 3,424 | 375 | 994 | 4,388 | 267 | 101 | 35 | 3 | 4,794 |
| Western pond turtle | -/CSC | 3,402 | 381 | 965 | 4,335 | 277 | 96 | 37 | 3 | 4,748 |
| Silvery legless lizard | -/CSC | 3,390 | 372 | 952 | 4,309 | 275 | 93 | 35 | 3 | 4,715 |
| San Joaquin coachwhip | -/CSC | 2,175 | 389 | 984 | 3,161 | 264 | 89 | 31 | 3 | 3,548 |
| Blunt nosed leopard lizard | E/E, SFP | 1,662 | 388 | 993 | 2,670 | 252 | 88 | 32 | 3 | 3,044 |
| **Birds** | | | | | | | | | | |
| Swainson's hawk | -/T | 3,434 | 390 | 994 | 4,396 | 278 | 103 | 37 | 3 | 4,818 |
| Golden eagle | -/WL, SFP | 3,434 | 390 | 994 | 4,396 | 278 | 103 | 37 | 3 | 4,818 |
| Mountain plover | C/CSC | 3,433 | 387 | 994 | 4,396 | 275 | 103 | 37 | 3 | 4,814 |

**Table 4.4-80: Summary of Potential Impacts to Modeled Special Status Wildlife Modeled Poor to Moderate Quality Habitat by Subarea and Tier (acres per year)**

| | Status | Western Subarea | Central Subarea | Eastern Subarea | Tier 1 | Tier 2 | Tier 3 | Tier 4 | Tier 5 | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| Northern harrier | -/CSC | 3,427 | 389 | 994 | 4,393 | 274 | 103 | 37 | 3 | 4,811 |
| Tricolored blackbird | -/E | 3,400 | 386 | 990 | 4,359 | 275 | 102 | 37 | 3 | 4,776 |
| Le Conte's thrasher | -/CSC | 2,605 | 390 | 994 | 3,586 | 273 | 92 | 34 | 3 | 3,988 |
| Burrowing owl | -/CSC | 2,707 | 172 | 934 | 3,456 | 248 | 80 | 29 | 1 | 3,813 |
| Grasshopper sparrow | -/CSC | 2,106 | - | 8 | 2,049 | 45 | 17 | 3 | 0 | 2,114 |
| Yellow blackbird | -/CSC | 552 | 110 | 836 | 1,221 | 197 | 56 | 21 | 2 | 1,498 |
| Lesser sandhill crane | -/CSC | 2 | 4 | - | 2 | 3 | 0 | 0 | - | 5 |

*NA in "Total" column identifies non-modeled species.

**Table 4.4-81: Summary of Potential Impacts to Non-Modeled Special Status Wildlife Occurrence Potential by Subarea and Tier**

| | Status | Western Subarea | Central Subarea | Eastern Subarea | Tier 1 | Tier 2 | Tier 3 | Tier 4 | Tier 5 | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| **Mammals** | | | | | | | | | | |
| Pallid bat | -/CSC | Yes | No | Yes | Yes | Yes | Yes | Yes | No | NA |
| Ringtail | -/CSC, SFP | Yes | No | Yes | Yes | Yes | Yes | Yes | No | NA |
| Townsend's big-eared bat | -/C | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No | NA |
| **Reptiles and Amphibians** | | | | | | | | | | |
| California red-legged frog | T/- | Yes | No | No | No | Yes | No | No | No | NA |
| California tiger salamander | T/T | Yes | No | No | No | Yes | No | No | No | NA |
| Kern Canyon slender salamander | -/T | No | No | Yes | No | Yes | Yes | No | No | NA |
| Yellow-blotched salamander | -/CSC | Yes | No | Yes | No | Yes | No | Yes | No | NA |
| **Birds** | | | | | | | | | | |
| Bald eagle | D/E, SFP | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | NA |
| California condor | E/E, SFP | Yes | No | Yes | Yes | Yes | Yes | Yes | Yes | NA |
| Fulvous whistling-duck | -/CSC | Yes | Yes | No | No | Yes | No | No | No | NA |
| Loggerhead shrike | -/CSC | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | NA |
| Long-eared owl | -/CSC | Yes | No | Yes | Yes | Yes | Yes | Yes | No | NA |
| Short-eared owl | -/CSC | Yes | Yes | No | Yes | Yes | Yes | Yes | Yes | NA |
| Western snowy plover | T/- | Yes | Yes | No | Yes | Yes | Yes | Yes | No | NA |
| White-tailed kite | -/SFP | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No | NA |
| **Aquatic Species** | | | | | | | | | | |
| Kern brook lamprey | -/CSC | No | No | Yes | Yes | Yes | | | | NA |
| Vernal pool fairy shrimp | T/- | No | Yes | Yes | No | Yes | No | No | No | NA |
| Longhorn fairy shrimp | E/- | Yes | Yes | No | Yes | Yes | Yes | Yes | No | NA |
| **Insects** | | | | | | | | | | |
| Kern primrose sphinx moth | T/- | Yes | No | No | Yes | Yes | Yes | Yes | No | NA |

*NA in "Total" column identifies non-modeled species

### *Mammals*

As shown in Tables 4.4-79 to 81, potential impacts to 13 special status mammals were evaluated, including 10 modeled and 3 non-modeled species. The modeled species include the San Joaquin kit fox, the "umbrella" species identified by the SJV Recovery Plan, and three "keystone species" in the SJV Recovery Plan, the giant, Tipton, and short-nosed kangaroo rats.

Table 4.4-79 shows that impacts to high quality modeled habitat for several mammals would either substantially (San Joaquin pocket mouse, San Joaquin kit fox, Tipton kangaroo rat) or largely (San Joaquin antelope squirrel, giant kangaroo rat, Tulare grasshopper mouse, short-nosed kangaroo rat) occur in Tier 1 locations and in the Western Subarea. Impacts to American badger high quality modeled habitat would also be concentrated in Tier 1 locations, but would occur in the Eastern Subarea to a greater extent than in the Western Subarea. Impacts to modeled high quality habitat for the western mastiff bat would be smaller in magnitude than for other mammals and largely confined to Western Subarea Tier 1 locations. Buena Vista shrew high quality habitat is relatively rare in the Project Area and generally associated with isolated existing or historical lakebed locations. About 1.2 acres of modeled Buena Vista shrew high quality habitat could be impacted each year, primarily in the Central Subarea. Impacts to modeled high quality mammal habitat would range from 3,000 to nearly 4,000 acres per year for the San Joaquin kit fox and pocket mouse, and from about 300 acres to over 1,700 acres per year for the San Joaquin antelope squirrel, American badger, giant kangaroo rat, Tulare grasshopper mouse, short-nosed kangaroo rat, and Tipton kangaroo rat.

Table 4.4-80 shows that, for most species, modeled poor to moderate quality habitat comprises the majority of the land in each tier and subarea. Consequently, impacts to modeled poor to moderate quality special status mammal habitats would generally occur to the greatest extent in the Western Subarea, to a lesser extent in the Eastern Subarea, and mainly in Tier 1 areas because the largest amount of future disturbance is projected to occur in these portions of the Project Area. Special status mammals with the greatest amount of poor to moderate quality modeled habitat, and the largest level of potential impacts to such habitat, include the western mastiff bat (foraging), Tipton kangaroo rat, short-nosed kangaroo rat, and Tulare grasshopper mouse. Table 4.4-80 also indicates that certain species with proportionately higher amounts of high quality habitat in the Project Area, including the American badger, San Joaquin antelope squirrel, and San Joaquin kit fox, would also be subject to potential impacts to poor to moderate quality habitat ranging from 1,787 acres (San Joaquin kit fox) to nearly 3,500 acres per year (American badger). Given the proximity of large amounts of high-quality habitat in the Project Area, it is more likely that impacts to occupied habitat could also occur to these species in areas of modeled poor to moderate quality habitat.

Table 4.4-82 analyzes the amount of total modeled high quality habitat for each modeled special status mammal, and low to moderate quality habitat for each species except the San Joaquin pocket mouse in the Project Area that could be impacted by the projected annual level of disturbance summarized in Table 4.4-72 over 25 years.

**Table 4.4-82: Project Area Impacts to Total Modeled High Quality and Poor to Moderate Quality Special Status Mammal Habitat per Year and Over 25 Years (percent)**

| | Annual Impact | 25-Year Impact |
|---|---|---|
| **High Quality Modeled Habitat** | | |
| Giant Kangaroo Rat | 1.11% | 27.7% |
| San Joaquin Antelope Squirrel | 1.03% | 25.7% |
| Short-Nosed Kangaroo Rat | 0.81% | 20.3% |
| San Joaquin Kit Fox | 0.71% | 17.6% |
| Tulare Grasshopper Mouse | 0.63% | 15.9% |
| San Joaquin Pocket Mouse | 0.43% | 10.8% |
| American Badger | 0.20% | 5.0% |
| Tipton Kangaroo Rat | 0.14% | 3.5% |
| Western Mastiff Bat | 0.13% | 3.3% |
| Buena Vista Lake Shrew | 0.02% | 0.4% |
| **Poor to Moderate Quality Modeled Habitat** | | |
| Tipton Kangaroo Rat | 0.26% | 6.6% |
| American Badger | 0.25% | 6.3% |
| Western Mastiff Bat | 0.25% | 6.3% |
| Short-Nosed Kangaroo Rat | 0.23% | 5.8% |
| Tulare Grasshopper Mouse | 0.23% | 5.8% |
| Giant Kangaroo Rat | 0.21% | 5.3% |
| San Joaquin Antelope Squirrel | 0.17% | 4.4% |
| Buena Vista Lake Shrew | 0.16% | 4.1% |
| San Joaquin Kit Fox | 0.12% | 3.0% |

Table 4.4-82 indicates that, if the maximum level of annual disturbance conservatively assumed in Table 4.4-71 occurred each year for 25 years, impacts in the Project Area could range from 0.4% (Buena Vista shrew) to 27.7% (giant kangaroo rat) of the total modeled high quality habitat. On an annual basis, potential impacts would range from 0.02% (Buena Vista shrew) to 1.11% (giant kangaroo rat) of the total Project Area modeled high quality habitat. Impacts to the giant kangaroo rat, San Joaquin antelope squirrel, short-nosed kangaroo rat, San Joaquin kit fox, Tulare grasshopper mouse, and San Joaquin pocket mouse could range from 0.43% to 1.11% per year, and 10.8% to 27.7% over 25 years, of total Project Area high quality modeled habitat. Impacts to poor to moderate quality modeled habitat would range from 0.12% (San Joaquin kit fox) to 0.26% (Tipton Kangaroo rat) per year and 3% to 6.6% over 25 years. Impacts to the Buena Vista Lake shrew would affect less than 0.5% of total high quality modeled habitat and 4.1% of poor to moderate quality modeled habitat in the Project Area if the maximum level of potential impacts

occurred annually for 25 years. Potential impacts to special status mammals would be significant without mitigation.

The occurrence assessment for the pallid bat, ringtail, and Townsend's big-eared bat indicates that these species could occur in Tiers 1 through 4 in the Western and Eastern Subareas. About 92% of the total potential annual impacts in the Project Area (4,460 acres) would occur in these locations. The Townsend's big-eared bat could also occur in the Central Subarea. Potential impacts to these species could be significant without mitigation. The ringtail is a nocturnal species that requires access to perennial water sources and generally prefers areas with high vegetative cover. It is more likely to occur in higher elevations, or in deeper canyons with reliable water supplies, than in most of the lower elevation, drier, and sparsely-covered portions of the Project Area. Potential impacts to the ringtail would be unlikely to occur in most of the Project Area other than deeper canyons and in higher elevation locations with significant groundcover and access to perennial water sources.

### *Reptiles and Amphibians*

As shown in Tables 4.4-79 to 4.4-81, potential impacts to 10 special status reptiles and amphibians were evaluated, including seven modeled and three non-modeled species. The modeled species include the blunt-nosed leopard lizard (BNLL), a state and federal endangered and state fully protected species, and the Tehachapi slender salamander, as state threatened species.

Table 4.4-79 shows that impacts to modeled high quality habitat for BNLL and the San Joaquin coachwhip would largely occur in Tier 1 locations and in the Western Subarea. Impacts to BNLL high quality modeled habitat would, using the conservative assumptions summarized in Table 4.4-72, be about 1,774 acres per year, and 1,269 acres per year for the San Joaquin coachwhip. Impacts to other modeled species' high quality habitat, including the silvery legless lizard, western pond turtle, coast horned lizard, Tehachapi slender salamander, and western spadefoot would range from 0.03 acres per year (western spadefoot) to 103 acres per year for the silvery legless lizard. Potential impacts to modeled high quality habitat for the Tehachapi slender salamander would be limited to the Eastern Subarea, and to the Western Subarea for the western spadefoot. Potential impacts to other modeled high quality habitat could occur in all three subareas (silvery legless lizard, western pond turtle) and the Western and Southern Subareas (coast horned lizard).

Table 4.4-80 indicates that modeled poor to moderate quality habitat comprises the majority of the land in each tier and subarea. Consequently, impacts to modeled poor to moderate quality reptile and amphibian habitats would generally occur to the greatest extent in the Western Subarea, to a lesser extent in the Eastern Subarea, and mainly in Tier 1 areas because the largest amount of future disturbance is projected to occur in these portions of the Project Area. Reptiles and amphibians with the greatest amount of poor to moderate quality modeled habitat, and the largest level of potential impacts to such habitat, include the western spadefoot, coast horned lizard, western pond turtle and silvery legless lizard. Two species, the BNLL and the coachwhip, have relatively high amounts of modeled high quality habitat in the Project Area. Impacts to

occupied habitat may also be more likely to occur to these species in areas of modeled poor to moderate quality habitat.

Table 4.4-83 analyzes the amount of total modeled high quality habitat for each modeled special status reptile and amphibian, and low to moderate quality habitat for each species except the Tehachapi slender salamander in the Project Area that could be impacted by the projected annual level of disturbance summarized in Table 4.4-72 over 25 years.

**Table 4.4-83: Project Area Impacts to Total Modeled High Quality and Poor to Moderate Quality Special Status Reptile and Amphibian Habitat per Year and Over 25 Years (percent)**

| | Annual Impact | 25-Year Impact |
|---|---|---|
| **High Quality Modeled Habitat** | | |
| San Joaquin Coachwhip | 0.89% | 22.4% |
| Blunt Nosed Leopard Lizard | 0.75% | 18.7% |
| Western Pond Turtle | 0.70% | 17.6% |
| Silvery Legless Lizard | 0.40% | 9.9% |
| Coast Horned Lizard | 0.03% | 0.7% |
| Tehachapi Slender Salamander | 0.02% | 0.5% |
| Western Spadefoot | 0.02% | 0.5% |
| **Poor to Moderate Quality Modeled Habitat** | | |
| Coast Horned Lizard | 0.26% | 6.5% |
| Western Spadefoot | 0.25% | 6.2% |
| Silvery Legless Lizard | 0.25% | 6.2% |
| Western Pond Turtle | 0.25% | 6.2% |
| San Joaquin Coachwhip | 0.20% | 4.9% |
| Blunt Nosed Leopard Lizard | 0.18% | 4.5% |

Table 4.4-79 indicates that, if the maximum level of annual disturbance conservatively assumed in Table 4.4-72 occurred each year for 25 years, impacts in the Project Area could range from 0.5% (western spadefoot, Tehachapi slender salamander) to 22.4% (San Joaquin coachwhip) of the total modeled high quality habitat. On an annual basis, potential impacts would range from 0.02% (western spadefoot, Tehachapi slender salamander) to 0.89% (San Joaquin coachwhip) of the total Project Area modeled high quality habitat. Impacts to the BNLL, western pond turtle, coachwhip and silvery legless lizard could range from 0.40% to 0.89% per year, and 9.9% to 22.4% over 25 years, of total Project Area modeled high quality habitat. Potential annual and 25-year impacts to modeled high quality habitat for the coast horned lizard, Tehachapi slender salamander and western spadefoot would affect between 0.5% to 0.7% of total modeled high quality habitat in the Project Area if the maximum level of potential impacts occurred annually

for 25 years. As discussed below, mitigation measures that require the avoidance (unless fully permitted by state and federal resource agencies) impacts to riparian and aquatic habitats in addition to species-related mitigation measures would reduce the level of the potential impacts to the Tehachapi slender salamander, western spadefoot and western pond turtle by avoiding the primary habitats where these species occur. Impacts to modeled poor to moderate quality habitat would range from 0.18% (BNLL) to 0.26% (coast horned lizard) per year and 4.5% to 6.5% over 25 years. These impacts would be significant without mitigation.

The occurrence assessment for the California red-legged frog, California tiger salamander, Kern Canyon slender salamander, and Yellow-blotched salamander indicates that the project would be unlikely to significantly impact these species. None have a substantial likelihood of occurring in Tier 1 areas, where over 90% of future disturbance is projected to be concentrated. The potential occurrence of the California red-legged frog and California tiger salamander is generally limited to Tier 2 locations in the far northwest corner of the Project Area and where critical habitat has been designated for these species (see Figure 4.4-3). The Kern Canyon slender salamander is generally limited to the Tier 2 and Tier 3 areas in the vicinity of the Kern River canyon. The yellow blotched salamander generally occurs in Tier 2 and Tier 4 areas in the Eastern and Western Subareas. As discussed below, mitigation measures that require the avoidance (unless fully permitted by state and federal resource agencies) of impacts to riparian and aquatic habitats in addition to species-related mitigation measures would reduce the level of the potential impacts to the Kern Canyon slender salamander in aquatic habitats associated with the Kern River and aquatic habitats that also support the yellow blotched salamander in the Eastern and Western Tier 2 and Tier 4 locations. Potential impacts to could occur in occupied north-facing slope habitat outside of aquatic and riparian areas that these species may also occupy.

### *Birds*

As shown in Tables 4.4-79 to 4.4-81, potential impacts to 20 special status birds were evaluated, including 11 modeled and 9 non-modeled species. The modeled species include the unlisted burrowing owl, the tricolored blackbird (state endangered), and the least bell's vireo (state and federal endangered). As discussed above, the modeling data is generally confined to Project Area locations below about 2000 feet in elevation. Models of high quality habitat for the golden eagle (state fully protected) and Swainson's hawk (state threatened) were also used to evaluate potential project impacts to these species in lower elevation locations.

Table 4.4-79 shows that impacts to modeled high quality habitat for the burrowing owl, grasshopper sparrow, lesser sandhill crane and tricolored blackbird would be largely concentrated in Tier 1 areas and in the Western Subarea. Almost all of the projected impacts to Le Conte's thrasher modeled high quality habitat would occur in Tier 1 of the Western Subarea. Burrowing owl and lesser sandhill crane modeled high quality habitat impacts could occur to lesser extent in the Central Subarea, and impacts could also occur to burrowing owl and grasshopper sparrow modeled high quality habitat in the Eastern Subarea. Potential impacts to modeled high quality habitat would primarily occur in Tiers 1-2 of the Eastern Subarea for the northern harrier and Tier 1 and Tier 3 of the subarea for the least bell's vireo. Impacts to mountain plover high quality modeled habitat would mainly occur in Tier 2 of the Central Subarea. Potential impacts to yellow

headed blackbird modeled high quality habitat would occur in each of the three subareas and mainly in Tiers 1-2.

The models do not identify high quality habitat for the golden eagle or the Swainson's hawk within the lower elevation portions of the Project Area. The TUMSHCP EIS and the Biological Opinion for the TUMSHCP issued by the USFWS in 2013 show that, in contrast with the lower elevation portions of the Project Area, locations above 2,000 feet are known to support active golden eagle territories, nests, and high quality breeding and foraging habitat. Based on data from Tejon Ranch surveys conducted for the TUMSHCP, the USFWS concluded that, due to abundant prey, breeding pairs of golden eagles in higher elevations along the southern border of the Project Area likely maintain smaller than average territories (i.e., about 5,000 to 8,000 acres), which could result in greater than typical species densities in these locations (USFWS 2013d). To provide a conservative assessment, this DEIR assumes that all Project Area land located above 2,000 feet in elevation is high quality golden eagle habitat, and that disturbance in these areas could result in significant impacts to the species without mitigation. The Swainson's hawk was not included in the TUMSHCP.

Table 4.4-79 shows that acreage impacts to modeled high quality habitat vary by species. Impacts to burrowing owl, Le Conte's thrasher, grasshopper sparrow and lesser sandhill crane modeled high quality habitat would, using the conservative assumptions summarized in Table 4.4-71, range from 128 acres per year (lesser sandhill crane) to 1,003 acres per year (burrowing owl). Potential impact to modeled high quality habitat for the tricolored blackbird, least Bell's vireo, northern harrier, mountain plover and yellow-headed blackbird would range from 2.42 acres per year (yellow headed blackbird) to 42 acres per year (tricolored blackbird).

Table 4.4-80 shows that, consistent with the results for most mammals, reptiles and amphibians, most of the Project Area is modeled as poor to moderate quality modeled avian habitat for many species. Impacts to poor to moderate habitat for these species, including the Swainson's hawk, golden eagle, mountain plover, northern harrier, tricolored blackbird and Le Conte's thrasher, would range from just under 4,000 acres (Le Conte's thrasher) to more than 4,800 acres (Swainson's hawk, golden eagle, mountain plover, northern harrier) and would occur in the Western Subarea, to a lesser extent in the Eastern Subarea, and mainly in Tier 1 areas because the largest amount of future disturbance is projected to occur in these portions of the Project Area. Birds that have large amounts of modeled poor to moderate quality habitat in addition to modeled high quality habitat in the Project Area include the Le Conte's thrasher, burrowing owl, grasshopper sparrow and yellow-headed blackbird. Impacts to occupied habitat may also be more likely to occur to these species in areas of modeled poor to moderate quality habitat.

Table 4.4-84 analyzes the amount of total modeled high quality habitat for each modeled special status bird, and modeled poor to moderate quality habitat for each species except the least Bells' vireo in the Project Area that could be impacted by the projected annual level of disturbance summarized in Table 4.4-72 over 25 years.

**Table 4.4-84: Project Area Impacts to Total Modeled High Quality and Poor to Moderate Quality Special Bird Habitat per Year and Over 25 years (percent)**

| | Annual Impact | 25-Year Impact |
|---|---|---|
| **High Quality Modeled Habitat** | | |
| Le Conte's Thrasher | 1.15% | 28.8% |
| Burrowing Owl | 0.45% | 11.1% |
| Least Bell's vireo | 0.26% | 6.6% |
| Tricolored Blackbird | 0.20% | 5.1% |
| Grasshopper Sparrow | 0.14% | 3.4% |
| Lesser Sandhill Crane | 0.05% | 1.1% |
| Yellow Headed Blackbird | 0.04% | 0.9% |
| Northern Harrier | 0.03% | 0.9% |
| Mountain Plover | 0.01% | 0.3% |
| Golden Eagle (low elevations only) | NA | NA |
| Swainson's Hawk | NA (nesting) | NA (nesting) |
| **Poor to Moderate Quality Modeled Habitat** | | |
| Grasshopper Sparrow | 0.61% | 15.2% |
| Mountain Plover | 0.25% | 6.3% |
| Northern Harrier | 0.25% | 6.3% |
| Tricolored Blackbird | 0.25% | 6.2% |
| Golden Eagle | 0.25% | 6.2% |
| Swainson's Hawk | 0.25% | 6.2% |
| Burrowing Owl | 0.22% | 5.6% |
| Le Conte's Thrasher | 0.21% | 5.3% |
| Yellow Blackbird | 0.12% | 2.9% |
| Lesser Sandhill Crane | 0.02% | 0.5% |

Table 4.4-84 indicates that, if the maximum level of annual disturbance conservatively assumed in Table 4.4-71 occurred each year for 25 years, impacts in the Project Area could range from 0.3% (mountain plover) to 28.8% (Le Conte's thrasher) of total modeled high quality habitat. On an annual basis, potential impacts would range from 0.01% (mountain plover) to 1.15% (Le Conte's thrasher) of the total Project Area modeled high quality habitat. Impacts to the Le Conte's thrasher and burrowing owl could range from 1.15% to 0.45% per year, and 28.8% to 11.% over 25 years, of total Project Area high quality modeled habitat. Potential 25-year impacts to high quality modeled habitat for the least Bell's vireo, tricolored blackbird, and grasshopper sparrow could range from 3.4% to 6.6%. Potential 25-year impacts to high quality modeled habitat for the lesser sandhill crane, yellow headed blackbird, northern harrier and mountain plover could range between 0.3% to 1.1%. Impacts to poor to moderate quality modeled habitat

would range from 0.02% (lesser sandhill crane) to 0.61% (grasshopper sparrow) per year and 0.5% to 15.2% over 25 years. These impacts would be significant without mitigation.

The occurrence assessment for the Fulvous whistling-duck indicates that the species is only likely to occur in Tier 2 areas within the Western and Central Subareas. About 4% (208 acres per year) of total Project Area impacts would occur in these locations, and mitigation measures that require the avoidance (unless fully permitted by state and federal resource agencies) of impacts to riparian and aquatic habitats in addition to species-related mitigation measures would reduce potential impacts to an additional extent. Project activities are unlikely to significantly affect the Fulvous whistling-duck. The occurrence assessments for the loggerhead shrike, long-eared owl, short-eared owl, western snowy plover and white-tailed kite indicate that each these species can occur in the Western Subarea and at least one additional subarea (long-eared owl, short-eared owl, western snowy plover) or the other two subareas (loggerhead shrike, white-tailed kite). All of these species could also occur in Tiers 1-4. Projected project impacts would occur primarily in the Western Subarea and in Tiers 1-4. Potential impacts to the loggerhead shrike, long-eared owl, short-eared owl, western snowy plover and white-tailed kite could be significant without mitigation.

As discussed above, the occurrence assessments for non-modeled species are conservative and treat any historical evidence of occurrence as indicating the possibility of future occurrence in an applicable tier or subarea. Using this approach, the occurrence assessment indicates that the California condor could occur in Tiers 1-5 of the Western and Eastern Subareas based on historical records that in most instances predate the capture of the existing population in the 1970s and subsequent re-release. Condor activity for the current population is regularly monitored by the USFWS using transmitters that are positioned on individual birds. The data for periods since 2000 were recently compiled and analyzed by the USFWS in conjunction with the TUMSHCP and show that, in contrast with historical reports, condors currently do not utilize lower elevation portions of the Project Area, other than very rare occurrences at the base of the adjacent mountain ranges (Figure 4.4.-5). The TUMSHCP approved by the USFWS in 2013 found that condor movement is topographically constrained to upland areas that produce updrafts, and that although prehistoric condors possibly made use of San Joaquin Valley floor habitat, and that the contemporary condor population appears to largely avoid the Central Valley floor for foraging, probably due to the lack of thermal activity and food sources (USFWS 2013d). Consequently, condor occurrence in the lower elevation portions, particularly any significant distance from the surrounding mountains that generate updrafts used by the species for movement (see Figure 4.4-9) is highly unlikely. In contrast, condor use of Project Area and adjacent locations above 2000 feet, particularly along the southern and eastern boundaries, has been well documented to occur, and is likely to occur to greater extent over time as the population recovers in the wild. To provide a conservative assessment, this DEIR assumes that all Project Area land located above 2,000 feet in elevation is high quality condor, and that disturbance in these areas could result in significant impacts to the species without mitigation.

Similarly, the occurrence assessment for the bald eagle is conservatively based on species migration patterns, and the occasional observation of the species in the Tiers 1-5 and the three

subareas over time. Bald eagles generally migrate south through the Project Area to southern locations during the winter. High quality wintering locations are characterized by trees for roosting and perennial waterbodies with food sources, including fish. Very few locations, and virtually none within the lower elevations of the Project Area meet these criteria. The limited extent of high quality bad eagle habitat in the region is indicated by the TUMSHCP analysis of the species, in which the USFWS determined that the 141,886-acre Tejon Ranch contained only 518 acres of modeled foraging habitat and 1,438 acres of modeled winter roosting habitat, all located exclusively around Castaic Lake. Castaic Lake is outside of the Project Area to the south. The modeling indicated no other locations within the ranch representing bald eagle foraging or wintering habitat, although eagles may temporarily use portions of the site during migration. Bald eagles are also not known to breed within the lower or upper elevations of the Project Area, or in the uplands to the south (USFWS 2013d). The Project Area is primarily used by bald eagles for temporary migratory purposes and does not provide high quality breeding, wintering or foraging habitat for the species.

### *Aquatic Species and Insects*

As shown in Table 4.4-81, occurrence assessments were used to analyze potential impacts to the Kern brook lamprey, vernal pool fairy shrimp, longhorn fairy shrimp and the Kern primrose sphinx moth. The Kern brook lamprey could occur in streams in the Eastern Subarea. The vernal pool fairy shrimp could occur in seasonally inundated areas in the Central and Eastern Subareas, and the longhorn fairy shrimp could occur in seasonally inundated areas in the Western and Central Subareas. All of these species occur in pooled areas that remain inundated for a sufficient time period and exhibit suitable pH and other characteristics that support their reproductive cycle. Project impacts to habitats that may contain these species would be significant. As discussed below, mitigation measures require the avoidance (unless fully permitted by state and federal resource agencies) impacts to riparian and aquatic habitats, and potential project impacts to these species in these habitat types would be reduced to less than significant levels. However, where vernal pool fairy shrimp and longhorn fairy shrimp occur outside of aquatic or riparian habitats, impacts could be significant.

The sphinx moth is known to presently occur in only three general locations, all of which are outside of the Project Area: the Walker Basin on the eastern side of the Sierra range, the Carrizo Plain to the west of the Project Area, and the Cuyama Valley to the west of the Carrizo Plains. In 2007, the USFWS conducted a 5-year review of the species and did not identify oil and gas activity as factor affecting species survival or recovery. The review also indicated that the species has a high probability of recovery because suitable habitat exists on public land in the Carrizo Plain and Cuyama Valley areas that may support the species and pupae can diapause for several years in response to adverse conditions. In addition, the review concluded that species recovery did not conflict with “economical and land development practices within the area of known Kern primrose sphinx moth distribution” (USFWS 2013). Oil field activities were well-established in 2007 along the Temblor Range to the east of the Carrizo Plain, the closest area of known species occupation. Project Area activities are not likely to impact the known locations of, or suitable habitat for the species in the Walker Basin, Carrizo Plain, or Cuyama Valley. It is possible that sandy washes with appropriate vegetation may exist within the Western Subarea that support the

moth. Given the limited distribution of the species, impacts in these locations would be significant without mitigation.

Based on the analysis described above, potential project impacts to special status plants and wildlife would be significant without mitigation.

## Mitigation Measures

**MM 4.4-1** With the exception of focused surveys that are seasonally restricted, special status wildlife surveys must be completed by a qualified biologist within a 30-day period prior to commencement of new ground-disturbance construction activities. The purpose of the pre-disturbance surveys is to confirm the presence or absence of any species listed as threatened or endangered under the federal Endangered Species Act, threatened or endangered under the California Endangered Species Act, or designated as fully-protected in the California Fish and Game Code (collectively, "Protected Species"), and to confirm the presence or absence of any other species considered "sensitive" under California Environmental Quality Act ("Sensitive Species"), and to identify and implement feasible avoidance and minimization measures for such species. The surveys shall be conducted in accordance with all currently-applicable presence and absence survey and/or species protocols established by the United States Fish and Wildlife Service and the California Department of Fish and Wildlife ("Species Protocols"). In the absence of any approved protocols, the survey shall extend for a minimum of 250 feet from all areas where any ground disturbance activities would occur, provided that permission to access has been obtained. As an alternative to individual pre-disturbance surveys for each application, and after consultation with and concurrence by the California Department of Fish and Wildlife and the United States Fish and Wildlife Service, multiple parcels or areas of oil and gas production lands (including lands which may have multiple surface or mineral ownership) may be consolidated for the purpose of more efficiently managing pre-disturbance surveys and determinations regarding the absence of protected species in areas of proposed new ground disturbance activities.

**MM 4.4-2** No incidental take of any species listed as threatened or endangered under the federal Endangered Species Act, threatened or endangered under the California Endangered Species Act , or designated as fully-protected in the California Fish and Game Code (Protected Species) may occur unless the incidental take is authorized by applicable state and federal wildlife agencies in the form of a permit or other written authorization, an approved state or federal conservation plan, or in accordance with an approved regional plan such as the Draft Valley Floor Habitat Conservation Plan and/or Natural Community Conservation Plan.

**MM 4.4-3** Exclusion barriers or buffers may be used, where effective and feasible in the opinion of the qualified biologist, to avoid any unauthorized incidental take of

Protected Species, and to minimize any incidental take of Sensitive Species, by separating the planned disturbance area from any locations where pre-disturbance surveys or previously conducted focused surveys have detected the presence of Protected Species or Sensitive Species. All buffers must extend for a minimum of 50 feet from the nearest point of disturbance unless a smaller avoidance buffer has been established by either the United States Fish and Wildlife Service or the California Department of Fish and Wildlife as the minimum to avoid unauthorized take of protected species, and the barriers must prevent the potential migration of wildlife into the construction area and unlawful incidental take of any Protected Species during ground disturbance activities. The minimum buffer distance shall be increased if required to avoid unauthorized incidental take of any Protected Species as determined by a qualified biologist. Exclusion barriers, buffer distances, and other avoidance measures that may be implemented to avoid impacts to Protected Species or Sensitive Species must be consistent with the United States Fish and Wildlife Service and/or the California Department of Fish and Wildlife, and shall be implemented and overseen by the qualified biologist.

**MM 4.4-4** Occupied burrowing owl burrows shall not be disturbed during the species nesting season (February 1 through August 31). The following distances shall be maintained between all disturbance areas and burrowing owl nesting sites (Table 4.4-85).

**Table 4.4-85: Setback Distances for Burrowing Owl Nesting Sites by Level of Proposed Project Impacts**

| **Location** | | |
|---|---|---|
| Nesting sites | Nesting sites | Nesting sites |
| **Time of Year** | | |
| April 1–Aug 15 | Aug 16–Oct 15 | Oct 16–Mar 31 |
| **Project Impact Level** | | |
| **Low** | | |
| 656 feet (200 meters) | 656 feet (200 meters) | 164 feet (50 meters) |
| **Medium** | | |
| 1,640 feet (500 meters) | 656 feet (200 meters) | 328 feet (100 meters) |
| **High** | | |
| 1,640 feet (500 meters) | 1,640 feet (500 meters) | 1,640 feet (500 meters) |

Burrowing owls present in proposed disturbance areas or within 500 feet or as specified under an approved Habitat Conservation Plan (as identified during pre-disturbance surveys) outside of the breeding season (between September 1 and January 31) may be moved away from the disturbance area using passive

relocation techniques approved by the California Department of Fish and Wildlife. Passive relocation techniques in the California Department of Fish and Wildlife Staff Report on Burrowing Owl Mitigation Guidelines (California Department of Fish and Game 2012) include installing one-way doors in burrow entrances for 48 hours, to ensure the owl(s) have left the burrow, daily monitoring during the passive relocation period, and collapsing existing burrows to prevent reoccupation. A minimum of one or more weeks will be required to relocate the owl(s) and allow for acclimatization to alternate off-site burrows. Prior to burrow exclusion or eviction, a burrowing owl management plan shall be prepared and approved by the California Department of Fish and Wildlife. Destruction of burrows shall occur only pursuant to a management plan for the species approved by the California Department of Fish and Wildlife; burrow excavation shall be conducted by hand whenever possible.

As an alternative to passive relocation, occupied burrows identified off-site within 500 feet of construction activities may be buffered with hay bales, fencing (e.g. sheltering in place), or as directed by the qualified biologist and the California Department of Fish and Wildlife, to avoid disturbance of burrows.

**MM 4.4-5** The pre-disturbance surveys shall determine whether active bat maternity roosts are located in or within 250 feet of any disturbance area. All active bat maternity roosts shall be avoided during breeding periods, including postponing disturbance activities if required, and to the maximum extent feasible at other times. If an active bat maternity roost location cannot feasibly be avoided by disturbance, the United States Fish and Wildlife Service and California Department of Fish and Wildlife must be contacted to identify appropriate impact minimization measures prior to initiating any disturbance that would affect the roost.

**MM 4.4-6** Any potential San Joaquin kit fox dens (as defined in United States Fish and Wildlife Service 2011) detected during pre-disturbance surveys shall be reevaluated for species activity no more than 14 days prior to the commencement of ground disturbance. Potential kit fox dens shall be marked and a 50-foot avoidance buffer shall be delineated using stakes and flagging or similar materials to prevent inadvertent damage to the potential den. If a potential den cannot feasibly be avoided, the den may be hand excavated in accordance with the United States Fish and Wildlife Service *Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox Prior to or During Ground Disturbance* (United States Fish and Wildlife Service 2011). If species activity is detected, the location shall be identified as a "known" kit fox den in accordance with the U.S. Fish and Wildlife Service species guidelines (United States Fish and Wildlife Service 2011). A minimum 100-foot buffer from any disturbance area shall be maintained for known dens and a minimum 500-foot buffer from any disturbance area shall be maintained for natal dens. No excavation of a known or natal den shall occur without prior authorization from the United States

Fish and Wildlife Service and the California Department of Fish and Wildlife. For activities occurring on land covered under an approved Habitat Conservation Plan, the requirements set forth in those documents shall be implemented. Other standard measures to protect San Joaquin kit fox, including capping pipes, covering trenches, adding exit ramps to excavated areas, shall be implemented in accordance with MM 4.4-19.

**MM 4.4-7** Occupied American badger dens detected during pre-disturbance surveys shall be flagged and ground-disturbing activities avoided within 50 feet of the den. Maternity dens shall be avoided and a minimum 200-foot buffer from disturbance shall be maintained during pup-rearing season (February 15 through July 1). Maternity dens must be avoided to the maximum extent feasible. If a maternity den cannot feasibly be avoided, the California Department of Fish and Wildlife must be contacted to identify appropriate impact minimization measures prior to initiating any disturbance that would affect the den, including potential passive relocation by excavation before or after the rearing season.

**MM 4.4-8** Pre-disturbance surveys for all sites located above 2,000 feet in elevation, or within 200 feet down gradient from the 2,000-foot elevation contour line, shall specifically survey for any golden eagle nests located within 2 miles of the site. If golden eagle nests are detected by the surveys, the qualified biologist shall conduct a nest-specific viewshed analysis. No disturbance may occur within 0.25 mile, or within 0.5 mile of the viewshed of an active golden eagle nest. The United States Fish and Wildlife Service and California Department of Fish and Wildlife must be notified prior to the commencement of any disturbance activities within 1 mile of an active golden eagle nest to avoid golden eagle take.

**MM 4.4-9** All sites located above 2,000 feet in elevation, or within 200 feet down gradient from the 2,000-foot elevation contour line, shall implement the following measures to avoid and minimize potential adverse impacts to the California condor:

a. The site shall, at all times, be maintained to avoid any trash, debris, food sources and microtrash, such as bottle caps, that could be ingested by or attract California condor. Trash shall be disposed in animal-proof containers as required in BIO 4.4-19.

b. The Worker Environmental Awareness Program described in BIO MM 4.4-18 shall include information about microtrash and potential effects to California condor, and shall prohibit the disposal of trash (and microtrash) on the site of oil and gas activities.

c. If a condor is observed in a proposed construction site, all disturbance activities must immediately cease within 500 feet of the condor until the animal has moved from the site. If condor occurrence persists, the United States Fish and Wildlife Service and the California Department of Fish and

Wildlife must be contacted to identify appropriate avoidance measures prior to initiating or resuming any disturbance activity.

d. All condor observations shall be reported within 24 hours to the United States Fish and Wildlife Service and the California Department of Fish and Wildlife.

e. All tanks, liquid storage facilities, and any open area containing water or other liquid materials, including drilling sumps, must be covered or otherwise shielded in a manner that prevents condor intrusion and potential entrapment.

f. No overhead transmission lines may be used at the site without the prior approval of the United States Fish and Wildlife Service and the California Department of Fish and Wildlife.

**MM 4.4-10** Pre-disturbance surveys for active bird nests must be conducted no more than 10 days prior to the commencement of disturbance. Surveys shall follow United States Fish and Wildlife and California Department of Fish and Wildlife guidance and/or protocols, as applicable. If no active nests or nesting birds are identified, then Project construction activities may proceed and no further mitigation measures for nesting birds are required. If active nest(s) are identified, the active nest(s) should be continuously surveyed for the first 24 hours after detection, to establish a behavioral baseline prior to any construction-related activities. Once construction commences, all nests shall be continuously monitored to detect any behavioral changes as a result of the Project (i.e., nest avoidance or abandonment). If behavioral changes are observed, the work causing that change should cease and the California Department of Fish and Wildlife and the United States Fish and Wildlife should be consulted for additional avoidance and minimization measures. If continuous monitoring of identified nests by a qualified wildlife biologist is not feasible, a minimum no-disturbance buffer of 250 feet will be established around active nests and a 500-foot no-disturbance buffer around the nests of raptors until the breeding season has ended, or until a qualified biologist has determined that the birds have fledged and are no longer reliant upon the nest or parental care for survival, and any adult birds are no longer occupying the nest. Variance from these no-disturbance buffers may be implemented a qualified biologist concludes that work within the buffer area would not cause nest avoidance or abandonment (e.g., when the disturbance area would be concealed from a nest site by topography). The California Department of Fish and Wildlife and the United States Fish and Wildlife must be notified in advance of implementing of a variance in the no-disturbance buffer.

**MM 4.4-11** The following measures will be implemented to avoid take of blunt-nosed leopard lizard and to ensure protection of these animals during Project activities:

a. Project activities will avoid all potential burrows that may be occupied by blunt-nosed leopard lizards. Suitable burrows within and adjacent to potential habitat for the species should be avoided by a minimum distance of 50-feet in all areas where ground-disturbing Project activities will occur.

b. No more than one year prior to ground disturbing activities, focused surveys following current California Department of Fish and Wildlife and United States Fish and Wildlife protocols for detection of this species or other methods approved by both agencies shall be conducted in all potential blunt-nosed leopard lizard habitat within the work site and a 250-foot buffer area. If no individual blunt-nosed leopard lizards are observed during focused surveys, and surveys are current (e.g., completed in the same calendar year), then Project activities may proceed.

c. If blunt-nosed leopard lizards are detected during focused surveys, a blunt-nosed leopard lizard avoidance plan shall be prepared for the Project that will result in avoidance of incidental take of this species unless take is separately authorized under a Natural Communities Conservation Plan and appropriate federal authorization is obtained. At a minimum, the blunt-nosed leopard lizard avoidance plan shall contain the following elements:

    1. A Worker Environmental Awareness Program shall be implemented for all construction personnel before construction begins (see MM 4.4-18).

    2. During periods that are optimal for blunt-nosed leopard lizard activity (early spring through late fall), a qualified biologist will be present during all ground disturbing activities. The qualified biologist will check the Project site(s) and access route(s) daily during the blunt-nosed leopard lizard active season to determine presence or absence of lizards in or near the work areas. Monitoring by a qualified biologist is not required during periods of inactivity (the winter season).

    3. All open trenches or excavations shall be covered at the end of each workday or protected with the use of exclusion fencing to prevent wildlife entrapment. If an excavation is too large to cover, escape ramps shall be installed at an incline ratio of no greater than 2:1. All trenches and pipes shall be inspected for the presence of wildlife each day prior to the commencement of work. If blunt-nosed leopard lizards are observed at the work site during construction, construction shall cease within a 250-foot radius and the United States Fish and Wildlife Service and the California Department of Fish and Wildlife shall be consulted to determine what additional measures would be necessary to prevent take of this species.

    4. Offsite locations where blunt-nosed leopard lizards have been observed or are likely to occur shall be clearly marked to prevent workers from driving off the road and to prevent inadvertent destruction of burrows. Barriers, such as exclusionary fencing may be installed. All construction equipment

and construction personnel vehicles will be checked prior to moving to ensure no blunt-nosed leopard lizard are under equipment/vehicles.

5. A speed limit of 10 miles per hour shall be posted and observed within 0.25 miles of any reported blunt-nosed leopard lizard observation.

6. Construction activities shall avoid burrows that may be used by blunt-nosed leopard lizards. Any location of proposed construction activity with potential to collapse or block burrows (i.e., stockpile storage, parking areas, staging areas, trenches) will be identified prior to construction in the blunt-nosed leopard lizard avoidance plan and approved by the qualified biologist. The qualified biologist may allow certain activities in burrow areas if the combination of soil hardness and activity impact is not expected to collapse burrows and no blunt-nosed leopard lizards have been found during pre-Project surveys in the impact area.

7. All individual blunt-nosed leopard lizards observed above-ground will be avoided. Any individual blunt-nosed leopard lizard that may enter the Project site(s) would be allowed to leave unobstructed, and on its own accord. If a blunt-nosed leopard lizard is detected during biological monitoring or observed at any other point, the California Department of Fish and Wildlife and the United States Fish and Wildlife Service shall be notified to determine what additional measures would be necessary to prevent take of the species.

**MM 4.4-12** The Applicant shall comply with the following:

a. Plant surveys for Protected Species and Sensitive Species must be completed by a qualified biologist during the appropriate blooming periods for species identification and detection. Plant surveys shall be conducted in accordance with all applicable protocols established by the United States Fish and Wildlife Service and the California Department of Fish and Wildlife for particular plant species ("Plant Survey Protocol"), and shall extend 50 feet from areas where any new disturbance would occur unless a greater survey distance is specified in the Plant Survey Protocol. All detected plant populations of Protected Species and Sensitive Species shall be identified in the field during the surveys with temporary flags or other appropriate materials to avoid and minimize impacts to the plant populations from any disturbance activities.

b. No incidental take or relocation of any plant listed under the California Endangered Species Act may occur unless the incidental take is authorized by the California Department of Fish and Wildlife in a permit or other authorization, or in an approved Natural Communities Conservation Plan. If pre-construction surveys detect the presence of any California Endangered Species Act Plant, the plant populations shall be buffered from disturbance activities by implementing applicable impact avoidance protocols established

by the California Department of Fish and Wildlife. Projects covered under incidental take authority shall conduct activities in accordance with the take authorization. The California Department of Fish and Wildlife may be contacted to determine the appropriate buffer required to prevent incidental take of a California Endangered Species Act Plant if avoidance protocols have not been established for the species. The qualified biologist shall confirm that all applicable California Endangered Species Act Plant buffers have been implemented prior to the commencement of any disturbance activity.

c. If any non-listed sensitive plant species are identified that may be impacted by new ground disturbing activities, populations must be avoided by a 50-foot buffer.

**MM 4.4-13** No incidental take or relocation of any plant listed under the California Endangered Species Act may occur unless the incidental take is authorized by the California Department of Fish and Wildlife in a permit or other authorization, or in an approved Natural Communities Conservation Plan. If pre-construction surveys detect the presence of any California Endangered Species Act Plant, the plant populations shall be buffered from disturbance activities by implementing applicable impact avoidance protocols established by the California Department of Fish and Wildlife, unless incidental take authority is obtained. Projects covered under incidental take authority shall minimize disturbance in accordance with the take authorization. The California Department of Fish and Wildlife shall be contacted to determine the appropriate buffer required to prevent incidental take of a California Endangered Species Act Plant if avoidance protocols have not been established for the species. The qualified biologist shall confirm that all applicable California Endangered Species Act Plant buffers have been implemented prior to the commencement of any disturbance activity. If any non-listed sensitive plant species are identified that may be impacted by new ground disturbing activities, populations must be avoided by a 50-foot buffer.

**MM 4.4-14** A Worker Environmental Awareness Program shall be developed and implemented for all personnel that could access the site prior to commencing any disturbance activities. The program shall consist of an on-site or center presentation that will describe the locations and types of sensitive plant, wildlife, and sensitive natural communities (collectively, “Biological Resources”) on and near the site, an overview of the laws and regulations governing the protection of Biological Resources, the reasons for protecting the Biological Resources, the specific protection and avoidance measures that are applicable to the site, and the identity of designated points of contact should questions or issues arise, including the qualified biologist. The program shall provide training to recognize, avoid and report to applicable qualified biologists any Biological Resources on the site.

a. The Worker Environmental Awareness Program shall emphasize the need to avoid contact with onsite wildlife, and avoid entry into areas where Biological Resources have been identified based on pre-disturbance field surveys and to implement the buffer avoidance or other protection measures established by the United States Fish and Wildlife Service shall be identified California Department of Fish and Wildlife or required by the Biological Resource mitigation measures. The training shall emphasize the importance of not feeding or domesticating wildlife and the need to avoid any trash, microtrash, or potential food disposal onsite except in animal-proof containers emptied daily to avoid attracting, or causing adverse impacts to special status wildlife.

b. All onsite personnel must sign a statement verifying that they have completed the Worker Environmental Awareness Program, and that they understand and agree to implement the biological requirements for the worksite. If signed employee statements are not available, documentation may be provided by Worker Environmental Awareness Program training records, which shall be kept by the Applicant for a minimum of 5 years. Each Applicant shall maintain a list of all persons who have completed the training program, and shall provide the list to the County or to state and federal wildlife agency representatives upon request.

**MM 4.4-15** The following additional measures shall be implemented to avoid and minimize potential significant adverse impacts to Protected and Sensitive Species:

a. All vehicles shall observe a 20-mile-per-hour speed limit in all areas of disturbance and on unpaved roads unless otherwise posted. Off-road traffic outside of designated access routes is prohibited. Speed limit signs shall be posted in visible locations at the point of site entry and at regular intervals on all unpaved access roads.

b. All disturbance activities, except emergency situations or drilling that may require continuous operations, shall only occur during daylight hours. Night time disturbance activity for drilling purposes shall use directed lighting, shielding methods, or reduced lumen intensity to avoid unnecessary visual disturbance to wildlife and to comply with applicable lighting mitigation measures.

c. All food-related trash items and all forms of microtrash, such as wrappers, cans, bottles, bottle tops, and food scraps shall be disposed of in closed, animal proof containers and removed daily from the site.

d. Excavations, spoils piles, access roadways, and parking and staging areas shall subject to dust control as set forth in the dust control mitigation measures.

e. The use of herbicides for vegetation control shall be restricted to those approved by the United States Fish and Wildlife Service and the California

Department of Fish and Wildlife. No rodenticides shall be used on any site unless approved by the United States Fish and Wildlife Service, and the California Department of Fish and Wildlife, and shall observe label and other restrictions mandated by the United States Environmental Protection Agency, California Department of Food and Agriculture, and state and federal laws and regulations. For split estates, no herbicides for vegetation control may occur in Tier 2 areas without surface owner approval.

f. No plants or wildlife shall be collected, taken, or removed from the site or any adjacent locations except as necessary for Project-related vegetation removal or wildlife relocation by a qualified biologist and subject to all applicable permits and authorizations.

g. All open trenches or excavations shall be covered at the end of each workday to prevent wildlife entrapment. If an excavation is too large to cover, escape ramps shall be installed at an incline ratio of no greater than 2:1 to. All trenches and pipes shall be inspected for the presence of wildlife each day prior to the commencement of work.

h. To enable San Joaquin kit foxes and other wildlife to pass through the Project site, any perimeter fencing shall include a 4- to 8-inch opening between the fence mesh and the ground or the fence shall be raised 4 inches above the ground except blunt-nosed leopard lizard exclusion fencing. The bottom of the fence fabric shall be knuckled (wrapped back to form a smooth edge) to protect wildlife.

i. All vertical tubes used in Project construction and chain link fencing poles, shall be temporarily or permanently capped to avoid the entrapment and death of special-status wildlife and birds.

j. All dead or injured special status wildlife shall be left in place and reported to the United States Fish and Wildlife Service and the California Department of Fish and Wildlife within 48 hours of discovery for rescue or salvage. Discovery of state or federal listed species that are injured or dead shall also be reported immediately via telephone and within 24 hours in writing, and with a copy to Kern County Planning and Community Development.

k. All drilling installations and operations will comply at all times with the applicable federal, State, county, and local law ordinances and regulations.

l. All activity shall use previously disturbed areas to the maximum extent feasible to minimize the amount of new disturbance.

m. Vehicle, equipment, and material storage must be limited to previously disturbed areas. No construction or operational materials may be placed or stored outside of the planned disturbance area or stockpiled for future disposal. All concrete and asphalt debris should be removed from the site for recycling or proper disposal.

n. No vehicles or construction equipment shall be parked within a wetland or waterbody/dry wash.

o. Tracked vehicles and other construction equipment must be washed or maintained to be weed-free prior to entering and working within areas of new disturbance.

p. All washing of trucks, paint, equipment, or similar activities should occur in areas where runoff is fully contained for collection and offsite disposal. Wash water may not be discharged from the site and shall be located at least 100 feet from any water body, or sensitive Biological Resources.

q. Locate all extra work areas (such as staging areas and additional spoil storage areas) at least 50 feet away from wetland boundaries or waterbody, except where the adjacent upland consists of cultivated or rotated cropland or other disturbed land.

r. All areas that must be avoided as result of the pre-disturbance surveys, and areas where new disturbance will occur, shall be clearly delineated by fencing or staking and flagging and/or rope or cord.

s. No firearms shall be allowed on any site.

t. No pets shall be allowed on any site.

u. No smoking may occur except in designated areas.

v. If ground disturbance is intended to be temporary, perform topsoil segregation during construction activities to preserve the seed bank for restoration efforts. Store the segregated topsoil separate from the subsoil and restore segregated topsoil to its original location.

**MM 4.4-16** Ground disturbance shall be mitigated at a 1.0 to 1.0 ratio (one-acre of new disturbance shall require one-acre of mitigation) except in Tier 1 areas that contain existing disturbance of 70% or greater which shall be mitigated at a 1.0 to 0.5 ratio (one-acre of new disturbance shall require one-half acre of mitigation). This compensatory mitigation requirement does not apply to construction on ground for which compensatory mitigation has already been provided, or on ground that has been previously disturbed (e.g., cleared of vegetation for other oil and gas extraction uses, existing unpaved roads, and existing unvegetated well pads). Ground disturbance activities that are authorized by permits or other written authorizations approved by the United States Fish and Wildlife Service and the California Department of Fish and Wildlife, which include avoidance and compensatory mitigation acreage requirements, may be used to satisfy this County compensatory mitigation ratio. Compensatory mitigation shall be required for the actual acreage of ground disturbance documented during the site plan review and completion process. New disturbance mitigation may be satisfied by one or a combination of the following measures:

a. The recordation of a conservation easement or similar permanent, long-term conservation management agreement in a form acceptable to the County for land within the Project Area on land that has mitigation value. The easement lands may be owned by an Applicant or a third party under contract with an Applicant. Larger land areas may be placed under a conservation easement or similar agreement, and an Applicant may "draw down" the conserved land as needed to satisfy the acreage mitigation requirements for multiple site plan review conformity permits or other authorizations from the County for oil and gas activities.

b. Acquisition of land preservation credits from a mitigation bank located within the Project Area which is owned by the County, on other lands approved by the County, or on lands approved for mitigation or conservation purposes by the United States Fish and Wildlife Service or the California Department of Fish and Wildlife.

c. Removal of legacy oil and gas equipment, inclusive of compliance with applicable legal requirements (e.g., well plugging and abandonment requirements under state or federal regulations), restoration of the surface grade to be consistent with surrounding lands, complete a reseeding effort using native species, and notification of the site owner (if not the Applicant) of the completion of the removal and grading restoration work.

d. Enhancement or restoration of existing habitat on lands already subject to a conservation easement or similar agreement, or which become subject to a conservation easement or similar agreement subsequent to the certification of this Environmental Impact Report, provided that such activities are covered in a permit or authorization, conservation plan, Habitat Conservation Plan, or Natural Community Conservation Plan, approved by the United States Fish and Wildlife Service or the California Department of Fish and Wildlife.

Payment of a biological resources mitigation fee for the acquisition and management of mitigation lands, legacy equipment removal, and/or land enhancement already subject to conservation easements or a similar agreements under the terms of any biological resource mitigation program that is adopted by Kern County and approved by the United States Fish and Wildlife Service or the California Department of Fish and Wildlife. The County shall coordinate with the United States Fish and Wildlife Service or the California Department of Fish and Wildlife to identify priority conservation areas and potential conservation partners and funding sources to increase the efficiency and effectiveness of mitigation fee expenditures.

## Level of Significance After Mitigation

Impacts would be less than significant.

## Impact 4.4-2: Have a Substantial Adverse Effect on any Riparian Habitat or other Sensitive Natural Community Identified in Local or Regional Plans, Policies, Regulations, or by the California Department of Fish and Wildlife or United States Fish and Wildlife Service

Potential impacts to sensitive natural communities in the Project Area were evaluated for each subarea and tier using the same methodology described for special status wildlife and plants in Threshold 4.4-1. The annual potential impacts to each community was estimated based on the acreage of each sensitive natural community and by assuming that the conservative annual disturbance projections in Table 4.4-71 would occur in each subarea and tier. The percentage of the total amount of each sensitive natural community in the Project Area that could be impacted each year, and over 25 years, was estimated from the results of the analysis. The location of sensitive natural communities in the Project Area is shown in Figure 4.4-4. As discussed in Section 4.4.2, Environmental Setting, the sensitive natural communities identified within the Project Area include wetlands, water and other riparian habitat that are subject to state or federal permit requirements prior to physical disturbance.

Tables 4.4-86 and 4.4-87 indicate that the largest extent of potential impacts could occur to the great valley mesquite scrub, desert scrub, desert wash, great valley cottonwood riparian forest, and native valley foothill riparian sensitive natural communities. The great valley mesquite scrub community is primarily located in Tier 1 of the Central Subarea, the location where most of the future impacts would occur in that location. Potential impacts to great valley mesquite scrub could be over 3% of the total acreage in the Project Area per year, and 83.5% of the total acreage in the Project Area over 25 years. The desert scrub community is primarily located in the Western Subarea and occurs in Tier 1 locations where most of the future Project Area disturbance is projected to occur. Potential impacts to desert scrub could be about 1.1% of the total acreage in the Project Area per year, and 28.6% of the total acreage in the Project Area over 25 years. The desert wash community primarily occurs in Tier 1 of the Western Subarea, and impacts to total acreage in the Project Area could be 0.84% per year and 21.03% over 25 years. The great valley cottonwood riparian forest community primarily occurs in the Eastern Subarea, including Tier 1 locations, and impacts to total acreage in the Project Area could be 0.31% per year and 7.9% over 25 years. Potential impacts to the native valley foothill riparian community would primarily occur in Tier 1 areas of the Eastern Subarea and, to a lesser extent, the Western Subarea. Potential impacts to the native valley foothill riparian community could be about 0.21% of the total acreage in the Project Area per year, and 5.2% of the total acreage in the Project Area over 25 years.

**Table 4.4-86: Summary of Potential Impacts to Sensitive Natural Communities by Subarea and Tier (acres per year)**

| Sensitive Natural Community | Western Subarea | Central Subarea | Eastern Subarea | Tier 1 | Tier 2 | Tier 3 | Tier 4 | Tier 5 | Total |
|---|---|---|---|---|---|---|---|---|---|
| Alkali Seep | - | 0.008 | - | - | 0.008 | - | - | - | 0.008 |
| Coastal and Valley Freshwater Marsh | 0.456 | 1.030 | 3.685 | 3.369 | 1.299 | 0.320 | 0.180 | 0.002 | 5.169 |
| Desert Scrub | 1.258 | - | 0.000 | 1.250 | 0.009 | - | - | - | 1.258 |
| Desert Wash | 28.1 | 0.00034 | 2.060 | 29.56 | 0.384 | 0.221 | 0.001 | - | 30.17 |
| Great Valley Cottonwood Riparian Forest | 0.019 | 0.101 | 6.023 | 5.301 | 0.244 | 0.594 | 0.005 | - | 6.144 |
| Great Valley Mesquite Scrub | - | 156 | 10.72 | 164.7 | 0.417 | 1.572 | 0.040 | - | 166.8 |
| Mixed Chaparral | 7.785 | - | 0.479 | 5.268 | 2.153 | 0.018 | 0.825 | - | 8.264 |
| Montane Hardwood | 0.020 | - | 0.016 | - | 0.036 | - | - | - | 0.036 |
| Native Valley Foothill Riparian | 0.396 | 0.044 | 2.657 | 2.722 | 0.230 | 0.137 | 0.008 | - | 3.097 |
| Stabilized Interior Dunes | - | - | 0.052 | - | 0.046 | - | 0.006 | - | 0.052 |
| Valley Needlegrass Grassland | - | - | 0.063 | - | 0.063 | - | - | - | 0.063 |
| Valley Oak Woodland | 1.077 | 0.005 | 1.967 | - | 2.926 | - | 0.122 | - | 3.048 |
| Valley Sacaton Grassland | 0.015 | - | - | - | 0.015 | - | - | - | 0.015 |
| Valley Saltbush Scrub | 8.399 | 1.811 | 0.285 | 7.091 | 2.176 | 0.766 | 0.462 | - | 10.49 |
| Valley Sink Scrub | 0.557 | 1.227 | - | - | 1.694 | 0.062 | 0.028 | - | 1.785 |
| Vernal Pool | 0.014 | 2.594 | 0.092 | - | 0.502 | 0.003 | 2.194 | - | 2.699 |

**Table 4.4-87: Potential Impacts to Sensitive Natural Communities by Subarea and Tier Percent Total in Project Area per Year and 25 Years**

| Sensitive Natural Community | Annual Impact | 25-Year Impact |
|---|---|---|
| Great Valley Mesquite Scrub | 3.34% | 83.52% |
| Desert Scrub | 1.14% | 28.62% |
| Desert Wash | 0.84% | 21.03% |
| Great Valley Cottonwood Riparian Forest | 0.31% | 7.86% |
| Native Valley Foothill Riparian | 0.21% | 5.24% |
| Valley Saltbush Scrub | 0.07% | 1.71% |
| Mixed Chaparral | 0.07% | 1.67% |
| Coastal and Valley Freshwater Marsh | 0.06% | 1.40% |
| Vernal Pool | 0.05% | 1.22% |
| Stabilized Interior Dunes | 0.02% | 0.52% |
| Valley Oak Woodland | 0.02% | 0.49% |
| Valley Needlegrass Grassland | 0.02% | 0.48% |
| Montane Hardwood | 0.02% | 0.47% |
| Valley Sacaton Grassland | 0.02% | 0.46% |
| Valley Sink Scrub | 0.01% | 0.34% |
| Alkali Seep | 0.01% | 0.29% |

Potential impacts to the valley saltbush scrub, mixed chaparral, coastal and valley freshwater marsh, vernal pool, stabilized interior dunes, valley oak woodland, valley needlegrass grassland, montane hardwood, valley sacaton grassland, valley sink scrub and alkali seep natural communities would range from 0.01% of the total acreage in the Project Area (valley sink scrub and alkali seep) to 0.7% (valley saltbush scrub and mixed chaparral) per year. Over 25 years, potential impacts to the total acreage of these communities in the Project Area could range from 0.29% (alkali seep) to 1.7% (valley saltbush scrub).

Impacts to sensitive natural communities and riparian habitats in the Project Area would be significant without mitigation.

## Mitigation Measures

Implement MM 4.4-1 through 4.4.18, described above, and dust control, spill and hazardous material avoidance and containment, and surface and subsurface water quality and hydrology mitigation measures.

**MM 4.4-17** Pre-disturbance surveys shall be conducted by a qualified biologist during the appropriate periods for detecting Sensitive Natural Communities that could occur within the Project Area. The surveys shall be completed consistent with applicable protocols approved by the United States Fish and Wildlife Service and/or the California Department of Fish and Game, including the Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities (California Department of Fish and Wildlife 2009). The qualified person shall map and identify all sensitive natural communities, including riparian communities that occur in or within 100 feet of any new disturbance area. The site plan for the proposed activity shall identify waters, wetlands and other riparian habitats that occur in and within 100 feet of the disturbance area.

**MM 4.4-18** No land disturbance activity in any Sensitive Natural Community that requires a state or federal permit, including state or federally regulated wetlands and waters, shall occur unless the activity is specifically authorized by the issuance of permits or approvals as required by state and federal law. This provision is not intended to restrict survey activities.

### Level of Significance After Mitigation

Impacts would be less than significant.

## Impact 4.4-3: Have a Substantial Adverse Effect on Federally Protected Wetlands as Defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through Direct Removal, Filling, Hydrological Interruption, or other Means

As discussed in Section 4.4.2, Environmental Setting, the occurrence of wetlands and waters within the Project Area was estimated by using spatial data from the NWI and the NHD. Tables 4.4-88 and 4.4-89 summarize the acreage of potentially jurisdictional wetlands and linear feet of waters in the Project Area estimated from the available databases.

**Table 4.4-88: NWI Database Summary for each Subarea and the Project Area**

| Subarea | Tier 1 | Tier 2 | Tier 3 | Tier 4 | Tier 5 | Total |
|---|---|---|---|---|---|---|
| **Western Subarea** | | | | | | |
| Freshwater Emergent Wetland | 9.7 | 1,098.29 | 0 | 7.29 | 0.95 | 1,170 |
| Freshwater Forested/ Shrub Wetland | 7.06 | 511.3 | 0 | 0 | 0 | 539 |
| Freshwater Pond | 416.43 | 668.3 | 0.28 | 10.77 | 0.31 | 1,192 |
| Lake | 302.71 | 1399.44 | 0 | 0.7 | 0 | 1,796 |
| Other | 109.16 | 899.89 | 0.45 | 2.28 | 0 | 1,207 |

**Table 4.4-88: NWI Database Summary for each Subarea and the Project Area**

| Subarea | Tier 1 | Tier 2 | Tier 3 | Tier 4 | Tier 5 | Total |
|---|---|---|---|---|---|---|
| Riverine | 61.14 | 448.73 | 0.68 | 0 | 0 | 2,035 |
| **Central Subarea** | | | | | | |
| Freshwater Emergent Wetland | 0 | 3,884.83 | 3.48 | 102.01 | 0 | 14,388 |
| Freshwater Forested/ Shrub Wetland | 0 | 206.37 | 1.97 | 1.48 | 0 | 510 |
| Freshwater Pond | 0.34 | 906.65 | 3.2 | 5.14 | 0 | 1,209 |
| Lake | 0 | 4,474.18 | 0 | 103 | 0 | 6,372 |
| Other | 0 | 1,076.36 | 0 | 4.85 | 0 | 1,728 |
| Riverine | 0.27 | 659.02 | 1.41 | 3.31 | 0 | 1,382 |
| **Eastern Subarea** | | | | | | |
| Freshwater Emergent Wetland | 50.23 | 342.93 | 27.21 | 8.08 | 0 | 544 |
| Freshwater Forested/ Shrub Wetland | 95.34 | 509.67 | 18.22 | 1.48 | 0 | 685 |
| Freshwater Pond | 44.64 | 395.92 | 24.54 | 13.05 | 2.18 | 607 |
| Lake | 0 | 725.8 | 110.16 | 0.05 | 0 | 1,677 |
| Other | 25.69 | 232.52 | 16.96 | 15.41 | 0.91 | 420 |
| Riverine | 43.6 | 377.88 | 130.86 | 9.39 | 2.49 | 1,026 |
| **Project Total** | | | | | | |
| Freshwater Emergent Wetland | 59.93 | 5,326.04 | 30.69 | 117.38 | 0.95 | 16,103 |
| Freshwater Forested/ Shrub Wetland | 102.4 | 1,227.34 | 20.2 | 2.95 | 0 | 1,734 |
| Freshwater Pond | 461.41 | 1,970.87 | 28.02 | 28.96 | 2.49 | 3,008 |
| Lake | 302.71 | 6,599.42 | 110.16 | 103.74 | 0 | 9,844 |
| Other | 134.85 | 2,208.77 | 17.41 | 22.54 | 0.91 | 3,355 |
| Riverine | 105 | 1,485.63 | 132.94 | 12.7 | 2.49 | 4,443 |

**Table 4.4-89: NHD Database Summary for the Project Area and Each Subarea**

| | Tier 1 | Tier 2 | Tier 3 | Tier 4 | Tier 5 | Total |
|---|---|---|---|---|---|---|
| **Eastern Subarea** | | | | | | |
| Canal/Ditch | 19,889 | 339,246 | 7,942 | 15,212 | 7,844 | 662,546 |
| Stream/River Intermittent | 507,755 | 6,130,488 | 47,101 | 95,017 | - | 7,023,912 |
| Stream/River Perennial | 24,111 | 255,998 | 21,989 | 17,095 | - | 362,596 |

**Table 4.4-89: NHD Database Summary for the Project Area and Each Subarea**

| | Tier 1 | Tier 2 | Tier 3 | Tier 4 | Tier 5 | Total |
|---|---|---|---|---|---|---|
| **Central Subarea** | | | | | | |
| Canal/Ditch | 3,813 | 2,692,773 | 167 | 21,079 | - | 3,457,923 |
| Stream/River Intermittent | 1,343 | 1,645,067 | 2,916 | 14,834 | - | 1,914,730 |
| Stream/River Perennial | - | 56,886 | - | - | - | 71,496 |
| **Western Subarea** | | | | | | |
| Canal/Ditch | 54,573 | 3,297,052 | - | - | - | 3,462,040 |
| Stream/River Intermittent | 3,534,047 | 8,871,929 | 38,527 | 113,867 | - | 15,800,975 |
| Stream/River Perennial | 6,271 | 138,488 | - | 822 | - | 155,898 |
| **Project Area** | | | | | | |
| Canal/Ditch | 78,275 | 6,329,071 | 10,809 | 43,324 | 7,844 | 6,469,323 |
| Stream/River Intermittent | 4,043,145 | 16,647,485 | 88,543 | 223,718 | - | 21,002,892 |
| Stream/River Perennial | 30,383 | 451,372 | 21,989 | 17,917 | - | 521,660 |

As described in Impact 4.4-2 above, federally jurisdictional wetlands, and other waters and riparian habitats that are subject to state or federal jurisdiction, are included in the analysis of the sensitive natural communities within the Project Area. Any oil and gas activity that could be authorized under this Project that occurred in wetlands or other water would have a significant impact.

## Mitigation Measures

Implementation of the Biological Resources mitigation measures would ensure that oil and gas activities would not disturb state or federally regulated wetlands and waters unless the activity is specifically authorized by the issuance of permits or approvals as required by state and federal laws and that activities in the vicinity of wetlands and water bodies would not adversely disturb them. Other mitigation measures identified in this Environmental Impact Report would further reduce potential state or federally jurisdictional wetland and waters, including dust control, spill and hazardous material avoidance and containment, surface and subsurface water quality and hydrology, mitigation measures.

## Level of Significance After Mitigation

Impacts would be less than significant.

## Impact 4.4-4: Interfere Substantially with the Movement of any Native Resident or Migratory Fish or Wildlife Species or with Established Native Resident or Migratory Wildlife Corridors, or Impede the Use of Wildlife Nursery Sites

As discussed in Section 4.4.2, Environmental Setting, and shown in Figure 4.4-11, the generalized patterns of wildlife movement in and through the Project Area have been characterized in certain studies. The length and width of these corridors have not been precisely determined and most correspond with major geographic features that are likely to facilitate species movement, including the Kern River and Poso Creek channels, and along the base of the mountain ranges that border the Project Area to the east, south and west.

Oil and gas exploration and production activities are more porous and maintain wildlife movement to a greater extent than urban development, and, depending on species requirements, agricultural uses that modify surface vegetation, soils and irrigation. A recent study conducted in 2008-2010 for the BLM found that species assemblages in saltbush scrub habitat remain relatively intact in oilfield locations with up to 70% disturbance in Kern County (Fiehler, C.A. and B. Cypher, 2011). This result indicates that even moderately developed oilfields as documented in the 2011 survey would retain the capacity for wildlife movement. However, oilfield development with more than 70% disturbance could reduce species movement, and potential impacts to wildlife movement in higher density locations would be significantly impacted by project activities without mitigation.

### Mitigation Measures

Implementation of the Biological Resources mitigation measures would reduce wildlife movement impacts. Other mitigation measures identified in this Environmental Impact Report to further reduce wildlife movement impacts, include dust control, nighttime lighting, noise controls, spill and hazardous material avoidance and containment,, and surface and subsurface water quality and hydrology (including but not limited to Kern River and Poso Creek channels), measures.

### Level of Significance After Mitigation

Impacts would be less than significant with mitigation.

## Impact 4.4-5: Conflict with any Local Policies or Ordinances Protecting Biological Resources, such as a Tree Preservation Policy or Ordinance

The Kern County General Plan and other ordinances and the Metropolitan Bakersfield General Plan include policies that protect several biological resources as summarized in Section 4.4.3, Regulatory Setting, including special status species, sensitive natural communities, wetlands, waters and riparian habitats and the Kern River corridor. As discussed in Impacts 4.4-1 through 4.4-4, potential impacts to these resources would be mitigated to less than significant levels.

Kern County has adopted oak tree conservation policies and implementation measures in Section 1.10.10 of the Kern County General Plan Land Use, Open Space and Conservation Element.

These policies and measures generally require avoidance of oak tree impacts, and the implementation of other protection measures for sites that have more than 10% oak tree cover (oak woodlands) and sites that have less than 10% oak tree cover. Impacts to oak trees are not anticipated to occur from oil and gas exploration and development activity because oak trees can generally be avoided by modifying the disturbance envelope. As shown in Table 4.4-86, the valley oak woodland community occurs within the Project Area and could be subject to 3 acres of impacts per year, mainly in Tier 2 locations in the Eastern Subarea (about 2 acres per year) and the Western Subarea (about 1 acre per year).

### Mitigation Measures

**MM 4.4-19** In the event that new disturbance would occur at a site within an oak woodland area as defined in Section 1.10.10 of the Kern County General Plan Land Use, Open Space and Conservation Element (10% or greater oak tree cover), the Applicant shall comply with the minimum 30% canopy retention standard in Section 1.10.10 KK (a). Impacts to oak trees in other locations, and in locations that meet the criteria for an oak woodland area, shall be avoided to the maximum extent practicable, including modification of the disturbance area, if feasible, to avoid existing oak trees within a site.

### Level of Significance After Mitigation

Impacts would be less than significant with mitigation.

## Impact 4.4-6: Conflict with the Provisions of an Adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other Approved Local, Regional, or State Habitat Conservation Plan

As discussed in Section 4.4.3, Regulatory Setting, the following HCPs have been adopted within, include portions of or are located in areas adjacent to the Project Area:

- Freeport-McMoRan Oil & Gas HCP
- Aera Coles Levee HCP (previously Arco Western Energy) HCP
- Chevron Pipeline HCP
- California Aqueduct - San Joaquin Field Division HCP
- Kern County Waste Facilities HCP
- Pacific Gas and Electric (PG&E) San Joaquin Valley Operations and Maintenance Program HCP
- TUMSHCP
- Metropolitan Bakersfield HCP

- CRC Non-Unit HCP

Three HCPs have been proposed but have not yet been approved for the Project Area:

- VFHCP.
- Chevron North American Exploration and Production LHCP.
- California Resources Corporation EHHCP.

The proposed Zoning Ordinance amendment would not conflict with any adopted HCP in or adjacent to the Project Area.

The proposed Zoning Ordinance amendment would also be consistent with the proposed Chevron LHCP and California Resources Corporation EHHCP.

As discussed above in the Regulatory Setting, there are three approved Habitat Conservation Plans for oil and gas activities in the Project Area: the Freeport-McMoRan Oil & Gas HCP, the Aera Coles Levee (previously Arco Western Energy) HCP, and the Chevron Pipeline HCP.

The Project is consistent with these approved HCPs. The Project continues to authorize oil and gas activities, including oil and gas activities included as "Covered Activities" in these approved HCPs, but imposes a variety of new mitigation measures, administrative procedures, and substantive compliance standards on such oil and gas activities which are not in conflict with these approved HCPs. The approved HCPs do include some "Covered Activities" that are outside the scope of activities included in the Project (e.g., hazardous substance remediation activities), but the Project does not impose any requirements that are inconsistent with or would otherwise preclude ongoing implementation of Covered Activities in these approved HCPs.

The Project Area also includes five HCPs that do not cover oil and gas production activities: the California Aqueduct - San Joaquin Field Division HCP, the Kern County Waste Facilities HCP, the Pacific Gas and Electric Company San Joaquin Valley Operations and Maintenance Program HCP, the TUMSHCP, and the Metropolitan Bakersfield HCP. The original term of the Metropolitan Bakersfield HCP has expired, and a renewal process is underway. The Project is likewise not inconsistent with these five HCPs that do not include oil and gas production as "Covered Activities."

Three additional HCPs have been proposed that would cover oil and gas activities in the Project Area.

The VFHCP would cover activities from multiple sectors, including most of the oil and gas production activities included in the Project, within the Valley Floor portion of the Project Area. Kern County is the lead Applicant for the VFHCP. Kern County and other stakeholders are also considering the potential for completing a Natural Communities Conservation Plan (NCCP) under California law, alongside a federal HCP. There is no pending draft HCP or proposed NCCP, and thus consistency with these plans cannot be evaluated in detail at this time. It is

anticipated, however, that a VFHCP/NCCP would be consistent with, or impose more stringent requirements than, the mitigation measures, procedural and substantive requirements included in this Project and EIR.

The Chevron LHCP is a pending application for a federal HCP, and for a state incidental take permit to be issued by the California Department of Fish and Game under section 20081(b), for oil and gas activities in for Chevron production lands within the Project Area, including (1) the Lokern lands owned by Chevron in the Western Subarea, the Lokern "Contiguous Area" surrounding the Lokern lands which are designated to be used primarily for biological enhancement and conservation activities with only limited authorized oil and gas activities, and (3) the "Four Fields," consisting of oil and gas production properties in Kern County in which Chevron has or may in the future have an ownership or mineral lease interest (see Figure 4.4-14). Because the "Four Fields" category includes lands not currently owned or leased by Chevron, the HCP does not include a specified total acreage amount for the "Covered Lands" included in the HCP.

The framework for permitted activities ("Covered Activities") in the LHCP include six general categories: (1) oil and gas extraction and production, and related activities; (2) emergency response; (3) ongoing operations on existing developed oil and gas production lands; (4) recreation and education activities; (5) scientific research; and (6) avoidance, minimization, mitigation, monitoring, habitat management (including livestock grazing), and restoration activities.

The LHCP includes 16 "Covered Species" which are listed or may become listed under federal or state species protection laws during the term of the HCP. This Biological Resources section addresses all of these Covered Species.

The Project is consistent with the overall framework of the LHCP, and imposes new mitigation measures, as well as substantive and procedural requirements, on most oil and gas production Covered Activities, including those within and outside of the three categories of lands included in the LHCP. Specifically:

1. Construction, operation and maintenance of oil and gas production activities on all Covered Lands are all included in the Project, with the exception of the construction and operation of new or expanded cogeneration facilities, landfills, and transmission lines. Specifically, these Project activities include the construction, operation and maintenance of oil field equipment, regulatory compliance activities required by DOGGR, and other regulatory agency compliance activities.

2. Emergency response and environmental remediation of accidental spills and releases of hazardous substances or hazardous wastes are included in the Project, but the construction or operation of new remediation facilities (e.g., landfills, hazardous waste treatment and storage facilities) are not included);

3. Passive recreational or education activities remain an authorized use on Chevron Covered Lands under existing County zoning requirements, and are not being modified by the Zoning Ordinance Amendments. New commercial recreational activities, as well as educational facilities (e.g., K-12 schools), are not authorized under the Project.

4. Scientific research, such as exploratory testing, monitoring or measuring environmental conditions, and other scientific observation and measurement activities that are ancillary to oil and gas production activities, are included in the Project; passive scientific observation and measurement activities unrelated to oil and gas activities are an authorized use on Chevron Covered Lands under applicable County Zoning requirements and are not being changed by the Project;

5. Avoidance, minimization, mitigation, habitat management (including livestock grazing), restoration and monitoring activities. Avoidance, minimization, and passive monitoring activities (e.g., passive field observations, but not temporary trapping or relocation of any protected species) are not restricted by the County's Zoning Code and remain authorized activities under the Project. Livestock grazing is an authorized use in several Tiers by the County's Zoning Code, and is likewise remain authorized activities under the Project. The Zoning Code Amendments and the Mitigation Measures set forth in this EIR require implementation of specified mitigation measures and development standards which include avoidance, minimization and mitigation of impacts to Biological Resources, none of which would preclude implementation of the corresponding measures included in the draft LHCP and are accordingly not inconsistent with this HCP.

CEQA requires responsible agencies to use the EIR prepared by the lead agency for projects, or portions of projects, that are wholly or partially within the jurisdiction of a responsible agency. This EIR provides project-level coverage under CEQA for the specified Covered Activities described above in the LHCP. The Project imposes new mitigation requirements, as well as procedural and substantive compliance requirements, on oil and gas activities that can currently be done "by right;" however, these new regulatory requirements are consistent with, and would not impede or otherwise interfere with, the draft HCP or ITP. The United States Fish and Wildlife Service, as the lead federal agency for the HCP, and the California Department of Fish and Wildlife as a responsible permitting agency for the Section 2081 permit for the Covered Activities described in the HCP and ITP, retain the jurisdiction to approve or disapprove the pending application, and to impose conditions of approval and other compliance requirements that fall within their respective jurisdictions.

The California Resources Corporation Elk Hills HCP is a pending application for an HCP, and for a California incidental take permit (ITP) to be issued by the California Department of Fish and Game Code under section 21081(b), for oil production and conservation activities, on the 47,884-acre Elk Hills Oil Fields (see Figure 4.4-15). EHOF is located approximately 26 miles southwest of Bakersfield in the Western Subarea. The Covered Activities in the pending HCP and ITP application are organized within the following framework:

Continued exploration, development, production, recovery and processing of oil and gas reserves, including the permanent disturbance of up to 4,000 acres and the temporary disturbance of up to 3,000 acres of presently undisturbed land;

The operation, maintenance and repair of facilities associated with existing linear facilities (e.g., pipelines, waterlines, transmission and powerlines) and associated rights of way (ROWs) in the EHOF and a surrounding 2-mile "buffer" area;

The installation, operation and maintenance of limited new off-site facilities within the 2-mile buffer; and

Implementation of specified conservation program activities on designated Conservation Lands within the EHOF.

Within this overall framework, the draft HCP and ITP explains that covered activities include but are not limited to twelve categories of activities: (1) construction, operation and maintenance of production activities including well stimulation as defined by SB4; (2) surface excavations; (3) activities required by the California Division of Oil, Gas and Geothermal Resources (DOGGR); (4) construction and operation of related facilities; (5) installation, maintenance and repair of perimeter and interior fencing; (6) transmission lines; (7) emergency response and environmental remediation; (8) livestock grazing; (9) regulatory agency requirements; (10) recreational and education activities; and (11) scientific research; and (12) implementation of conservation program activities.

The draft HCP and ITP includes 15 Covered Species which are listed under federal or state species protection law, or have the potential to be listed during the expected term of the HCP and ITP. (EHOF HCP, Table 2.5-2) All of these Covered Species are addressed in the Biological Resources section of this EIR.

The Project is consistent with the overall framework of the EHOF HCP and ITP, and imposes new mitigation measures, as well as substantive and procedural requirements, on most oil and gas production Covered Activities, including those within and outside of EHOF. Specifically:

Construction, operation and maintenance of oil and gas production activities are all included in the Project, with the exception of the construction and operation of new or expanded cogeneration facilities, landfills, and transmission lines.

Surface excavations are all included in the Project, provided that such excavations are undertaken as part of or in furtherance of production activities or ancillary activities thereto as described in the Zoning Ordinance Amendments.

Activities required by DOGGR are all included in the Project;

- Construction and operation of what the HCP and ITP designates as "related facilities" are included in the Project as described in Category (1) above;

- Installation, maintenance and repair of perimeter and interior fencing are all included in the Project, provided that such fencing is undertaken as part of or in furtherance of production activities or ancillary activities thereto as described in the Zoning Ordinance Amendments;

- Maintenance and operation of transmission lines are included in the Project, but construction and operation of new transmission lines are excluded;

- Emergency response and environmental remediation of accidental spills and releases of hazardous substances or hazardous wastes are included in the Project, but the construction or operation of new remediation facilities (e.g., landfills, hazardous waste treatment and storage facilities) are not included);

- Livestock grazing remains an authorized use in the Zoning Ordinance Amendments for designated Tiers, including EHOF, under the Project;

- Regulatory agency compliance for oil and gas production activities in the Project is included, except for the construction of new landfills or hazardous waste treatment and disposal facilities (which may be required to fulfill remediation obligations) and biological restoration and enhancement activities that could result in any unpermitted take of a protected species or regulated water;

- Passive recreational or education activities remain an authorized use in EHOF under existing County zoning requirements, and are not being modified by the Zoning Ordinance Amendments. New commercial recreational activities, as well as educational facilities (e.g., K-12 schools), are not authorized under the Project.

- Scientific research, such as exploratory testing, monitoring or measuring environmental conditions, and other scientific observation and measurement activities that are ancillary to oil and gas production activities, are included in the Project; passive scientific observation and measurement activities unrelated to oil and gas activities are an authorized use in EHOF under applicable County Zoning requirements and are not being changed by the Project;

- Implementation of biological resource enhancement and other conservation program activities on designated areas of EHOF are not included in the Project, although implementation of these activities is not inconsistent with the Project.

CEQA requires responsible agencies to use the EIR prepared by the lead agency for projects, or portions of projects, that are wholly or partially within the jurisdiction of a responsible agency. This EIR provides project-level coverage under CEQA for the specified Covered Activities described above in the Elk Hills HCP. The Project imposes new mitigation requirements, as well as procedural and substantive compliance requirements, on oil and gas activities that can currently be done "by right;" however, these new regulatory requirements are consistent with, and would not impede or otherwise interfere with, the draft HCP or ITP. The United States Fish and

Wildlife Service, as the lead federal agency for the HCP, and the California Department of Fish and Wildlife as a responsible permitting agency for the Section 2081 permit for the Covered Activities described in the HCP and ITP, retain the jurisdiction to approve or disapprove the pending application, and to impose conditions of approval and other compliance requirements that fall within their respective jurisdictions.

Potential impacts related to conflicts with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan could be significant.

### Mitigation Measures

**MM 4.4-20** Applicants shall fund through the Site Conformity Review administrative fee, preparation by Kern County of, an annual report describing the Project's ground disturbance acreage, and the acreage of compensatory mitigation lands, in each sub-area.

### Level of Significance After Mitigation

Impacts would be less than significant with mitigation.

## 4.4.5 Cumulative Setting, Impacts, and Mitigation Measures

### Impact 4.4-7: Cumulative Impacts to Biological Resources

The Project Area is interspersed with numerous incorporated cities and towns and federal and state owned lands. The cities of Arvin, Bakersfield, Delano, Maricopa, McFarland, Ridgecrest, Shafter, Taft, Tehachapi and Wasco account for about 141,149 acres within or adjacent to the Project Area. Federal land, including locations managed by the BLM and wildlife preserves, include about 117,186 within the Project Area. State-owned land, including wildlife and habitat preserves, account for about 25,548 within the Project Area.

Urbanized development areas are currently interspersed with less or undeveloped lands that are or may be planned for eventual urbanized development under adopted General Plans. Certain incorporated areas, such as the Kern River corridor through the City of Bakersfield, are subject to protection for regional habitat and wildlife conservation purposes.

State and federal lands within the Project Area include wildlife preserves, and other locations that are managed primarily to conserve biological resources. Certain state or federal lands, including BLM managed areas, are subject to commercial uses, including leases for oil and gas exploration and development. State and federal leased lands have biological resources that are similar in quality to the Tier 1 locations in the Project Area. Less developed Tier 1 areas typically have similar biological resource values as state and federal conservation lands.

Land uses along the periphery of the Project Area include federal forests, higher elevation ranching and rural homes, and privately-owned open space preserves such as the Wind Wolves Preserve located near the southwest border of the Project Area.

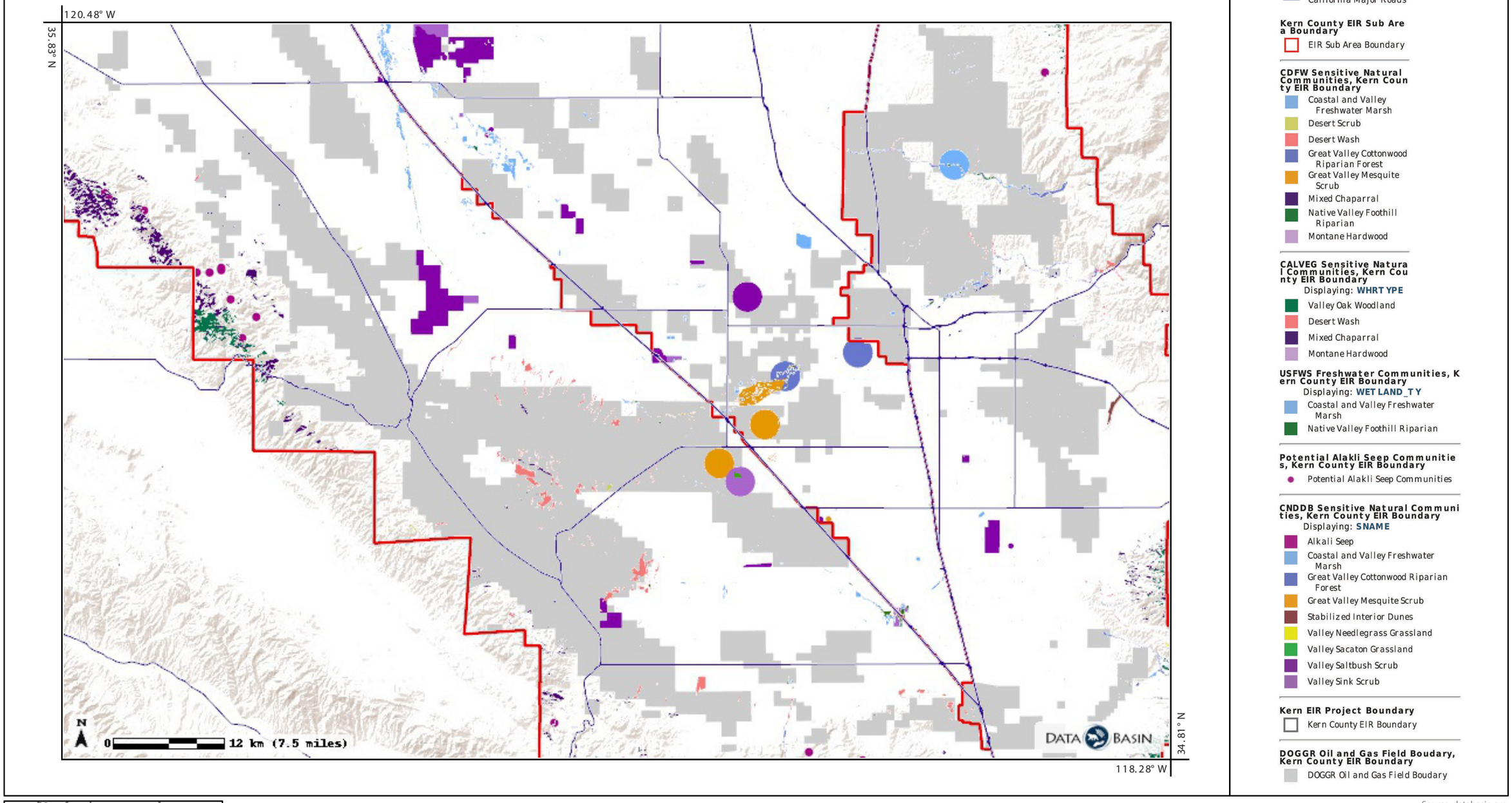
Future oil and gas exploration and production activities related to the proposed Zoning Ordinance amendment could contribute to a significant cumulative impact on Project Area biological resources because future use and development of federal, state and incorporated urban lands are not within the County's jurisdiction or control. Future land uses and development could affect biological resources in each of these jurisdictions and would be undertaken as independent actions with associated impacts, avoidance and minimization requirements, and mitigation, if required, under applicable federal, state, regional and local agency law.

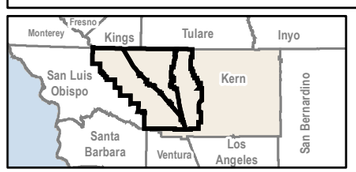
## Mitigation Measures

Implement MM 4.4-1 through MM 4.4-20, as described above.

## Level of Significance After Mitigation

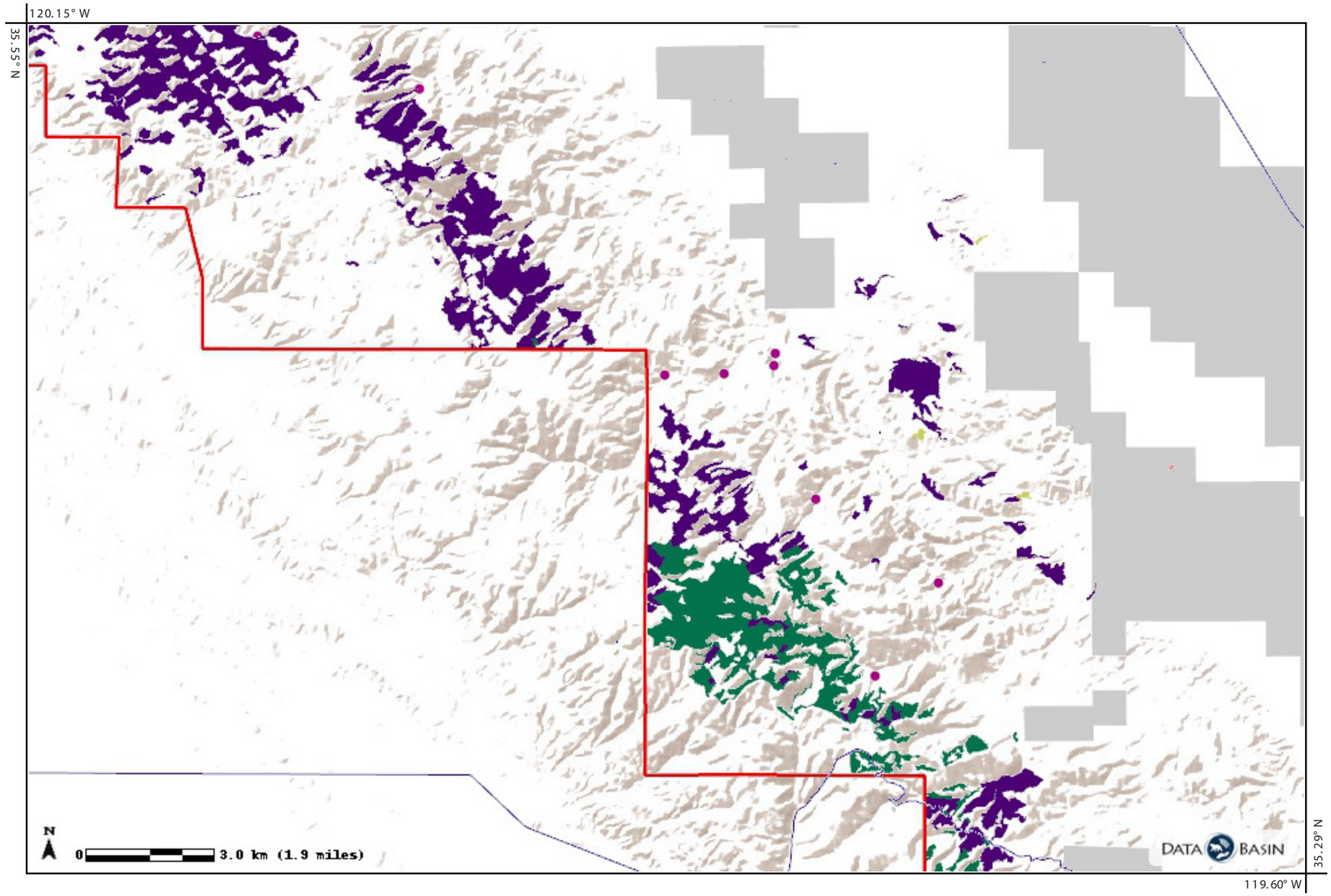
Impacts would remain significant and unavoidable with mitigation.




Source: databasin.org

Figure 4.4-0A
Data Basin Example Maps




**Legend**

California Major Roads

**Kern County EIR Sub Area Boundary**
- EIR Sub Area Boundary

**CDFW Sensitive Natural Communities, Kern County EIR Boundary**
- Coastal and Valley Freshwater Marsh
- Desert Scrub
- Desert Wash
- Great Valley Cottonwood Riparian Forest
- Great Valley Mesquite Scrub
- Mixed Chaparral
- Native Valley Foothill Riparian
- Montane Hardwood

**CALVEG Sensitive Natural Communities, Kern County EIR Boundary**
Displaying: **WHRTYPE**
- Valley Oak Woodland
- Desert Wash
- Mixed Chaparral
- Montane Hardwood

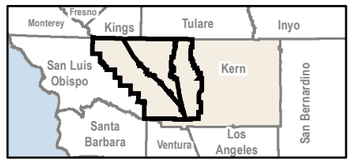
**USFWS Freshwater Communities, Kern County EIR Boundary**
Displaying: **WETLAND_TY**
- Coastal and Valley Freshwater Marsh
- Native Valley Foothill Riparian

**Potential Alakli Seep Communities, Kern County EIR Boundary**
- Potential Alakli Seep Communities

**CNDDB Sensitive Natural Communities, Kern County EIR Boundary**
Displaying: **SNAME**
- Alkali Seep
- Coastal and Valley Freshwater Marsh
- Great Valley Cottonwood Riparian Forest
- Great Valley Mesquite Scrub
- Stabilized Interior Dunes
- Valley Needlegrass Grassland
- Valley Sacaton Grassland
- Valley Saltbush Scrub
- Valley Sink Scrub

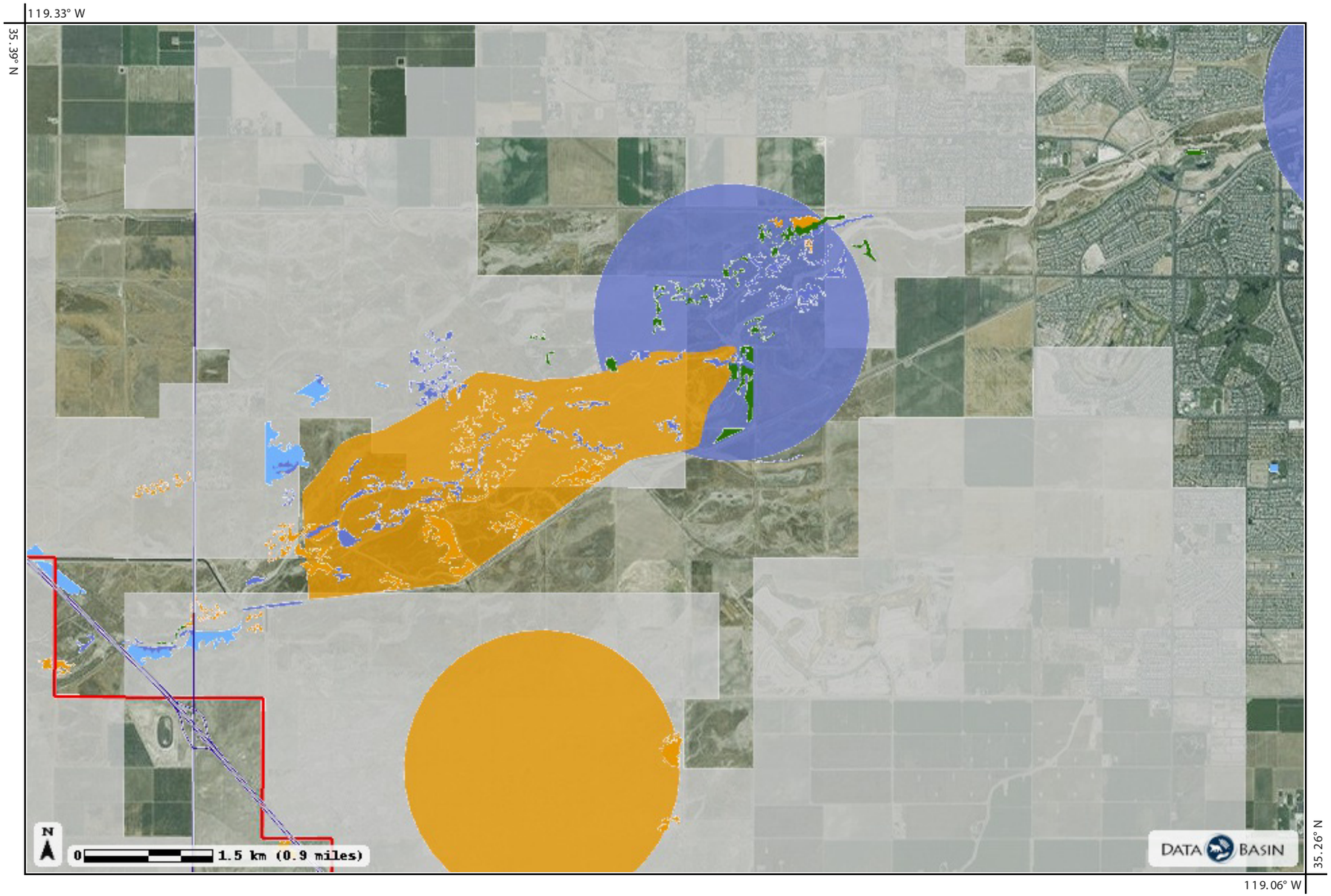
**Kern EIR Project Boundary**
- Kern County EIR Boundary

**DOGGR Oil and Gas Field Boudary, Kern County EIR Boundary**
- DOGGR Oil and Gas Field Boudary




Source: databasin.org

Figure 4.4-0B
Data Basin Example Maps




## Legend

California Major Roads

**Kern County EIR Sub Area Boundary**
- EIR Sub Area Boundary

**CDFW Sensitive Natural Communities, Kern County EIR Boundary**
- Coastal and Valley Freshwater Marsh
- Desert Scrub
- Desert Wash
- Great Valley Cottonwood Riparian Forest
- Great Valley Mesquite Scrub
- Mixed Chaparral
- Native Valley Foothill Riparian
- Montane Hardwood

**CALVEG Sensitive Natural Communities, Kern County EIR Boundary**
Displaying: **WHRTYPE**
- Valley Oak Woodland
- Desert Wash
- Mixed Chaparral
- Montane Hardwood

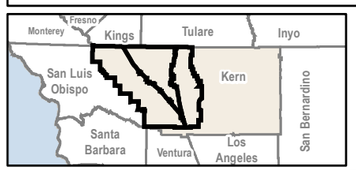
**USFWS Freshwater Communities, Kern County EIR Boundary**
Displaying: **WETLAND_TY**
- Coastal and Valley Freshwater Marsh
- Native Valley Foothill Riparian

**Potential Alakli Seep Communities, Kern County EIR Boundary**
- Potential Alakli Seep Communities

**CNDDB Sensitive Natural Communities, Kern County EIR Boundary**
Displaying: **SNAME**
- Alkali Seep
- Coastal and Valley Freshwater Marsh
- Great Valley Cottonwood Riparian Forest
- Great Valley Mesquite Scrub
- Stabilized Interior Dunes
- Valley Needlegrass Grassland
- Valley Sacaton Grassland
- Valley Saltbush Scrub
- Valley Sink Scrub

**Kern EIR Project Boundary**
- Kern County EIR Boundary

**DOGGR Oil and Gas Field Boudary, Kern County EIR Boundary**
- DOGGR Oil and Gas Field Boudary




Source: databasin.org

Figure 4.4-0C
Data Basin Example Maps

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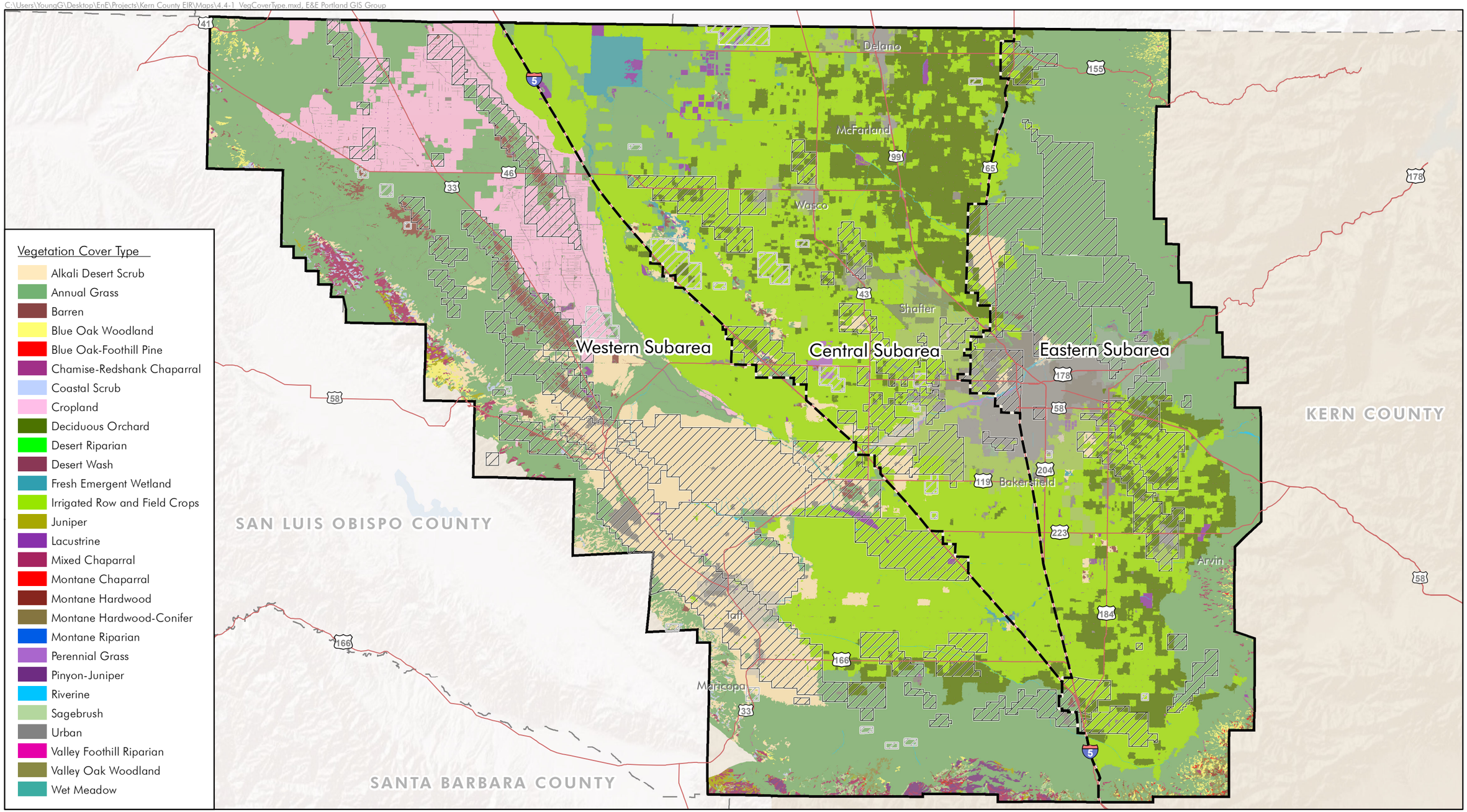


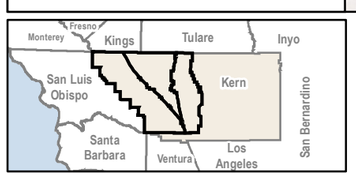


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Project Area
Subarea
Kern County
City Limits
Highways
County Boundary
DOGGR Administrative Well Field Boundaries
DOGGR Administrative Well Field Boundaries (Abd)

Data Sources: Kern County, 2013, ESRI 2010; DOGGR, 2013; CalVeg 2014

Figure 4.4-1
Vegetation Cover Types in the Project Area by Subarea

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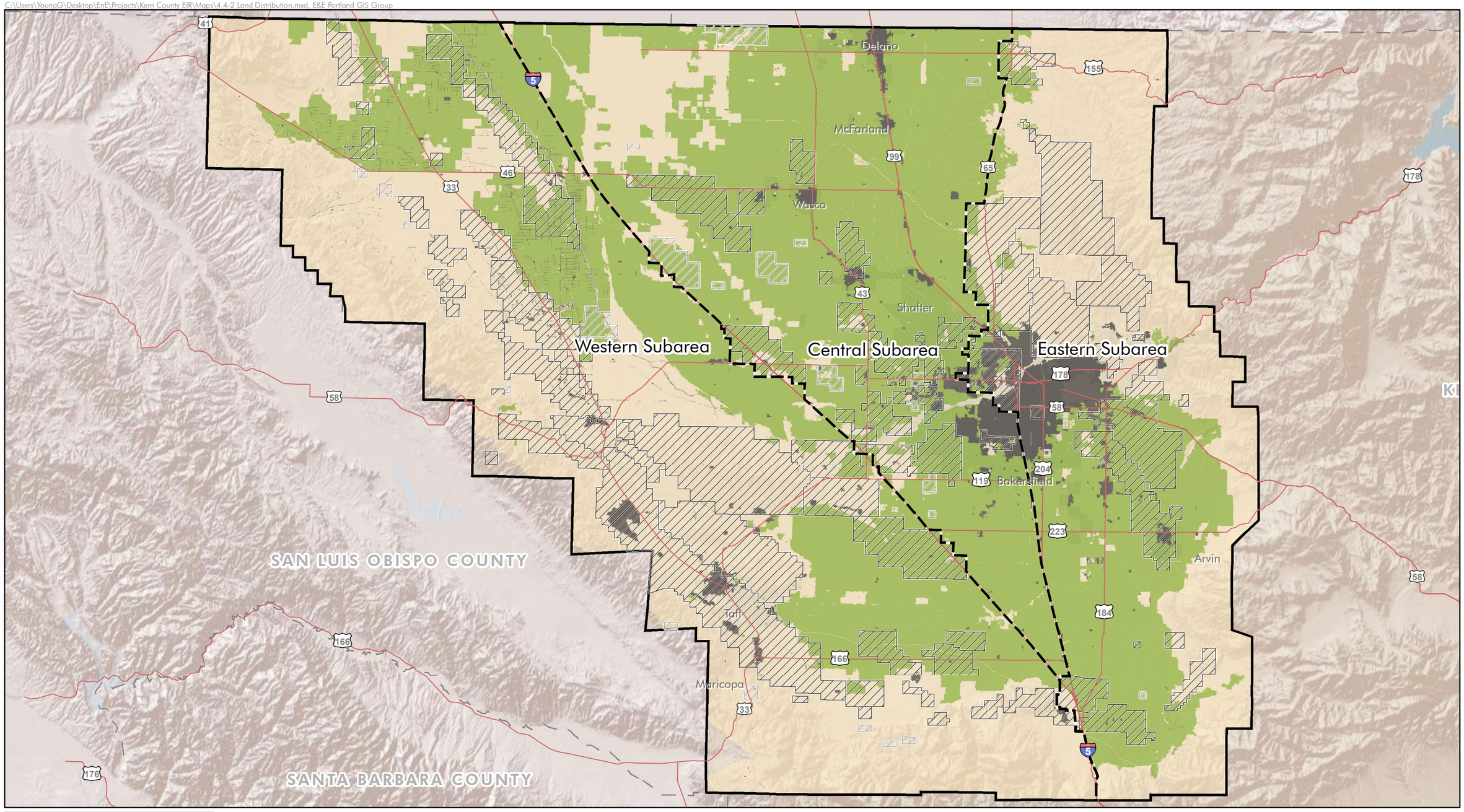


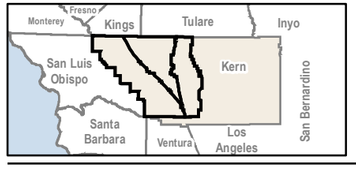


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Project Area
Subarea
Kern County
City Limits
Highways
County Boundary
DOGGR Administrative Well Field Boundaries
DOGGR Administrative Well Field Boundaries (Abd)

Land Distribution
Natural
Agricultural
Urban

Data Sources: Kern County, 2013, ESRI 2010; DOGGR, 2013; CalVeg 2014

Figure 4.4-2
Distribution of Agriculture, Urban and Natural Lands in the Project Area

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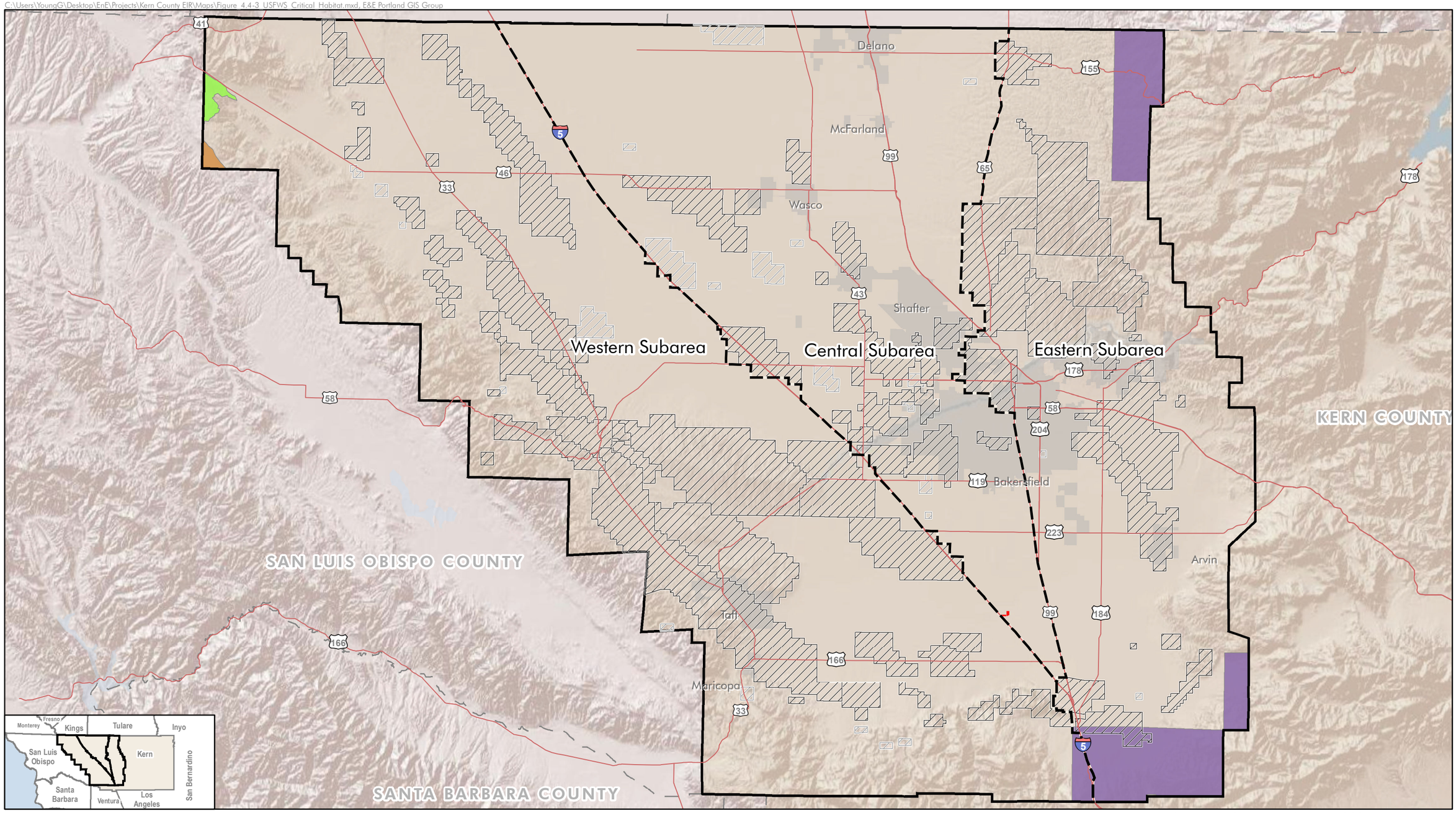


Data Sources: Kern County, 2013, ESRI 2010; DOGGR, 2013; USFWS 2015

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Project Boundary
Subarea
Kern County
City Limits
Highways
County Boundary
DOGGR Administrative Well Field Boundaries
DOGGR Administrative Well Field Boundaries (Abd)

USFWS Designated Critical Habitat
Buena Vista Lake shrew
California condor
California red-legged frog
California tiger salamander

Figure 4.4-3
USFWS Designated Critical Habitat

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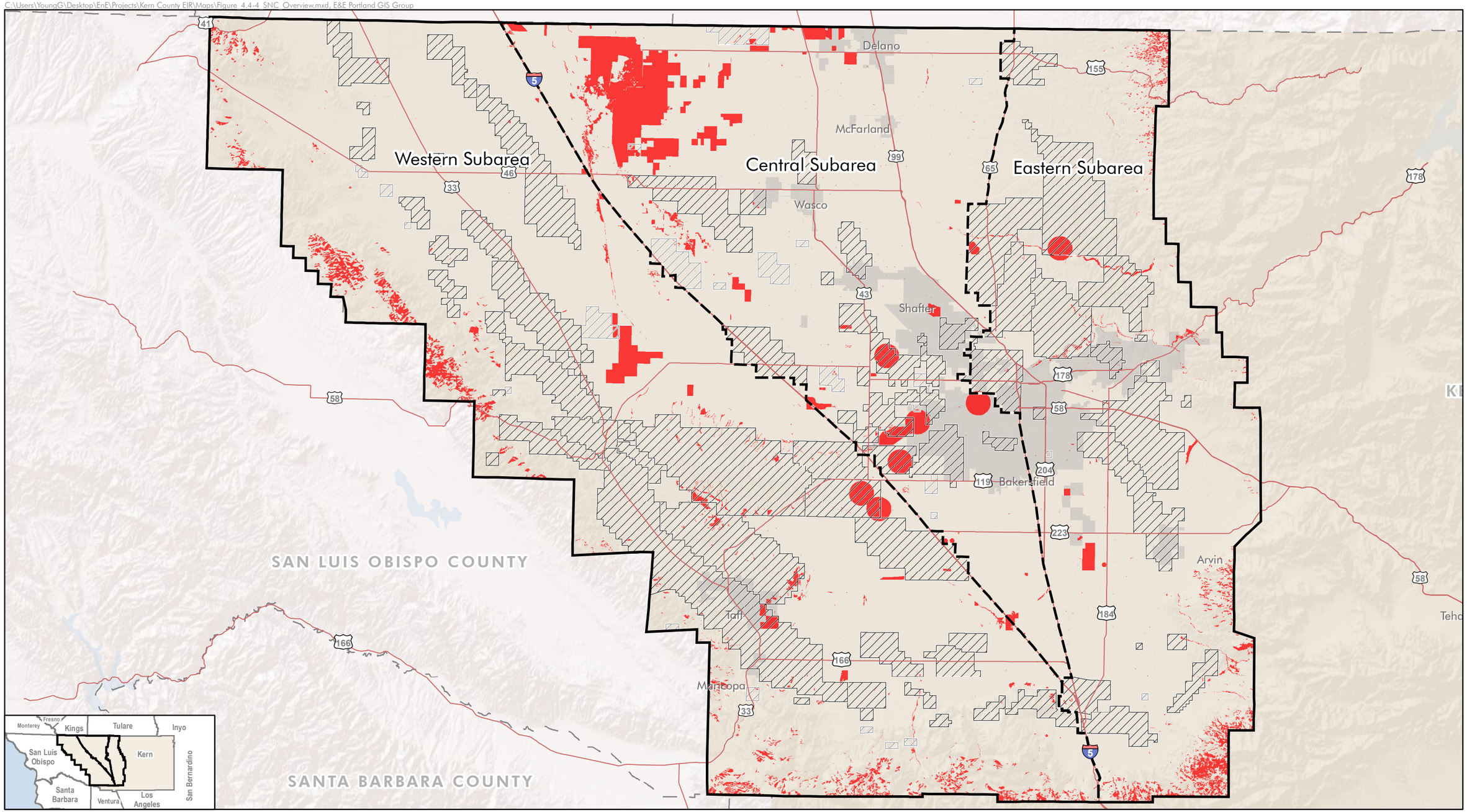


Data Sources: CalVeg, 2015; CDFW, 2009; CDFW CNDDB, 2015; USDA FS 2014; USFWS, 2011; Kern County, 2013, ESRI 2010; DOGGR, 2013;

Figure 4.4-4
Sensitive Natural Communities in the Project Area

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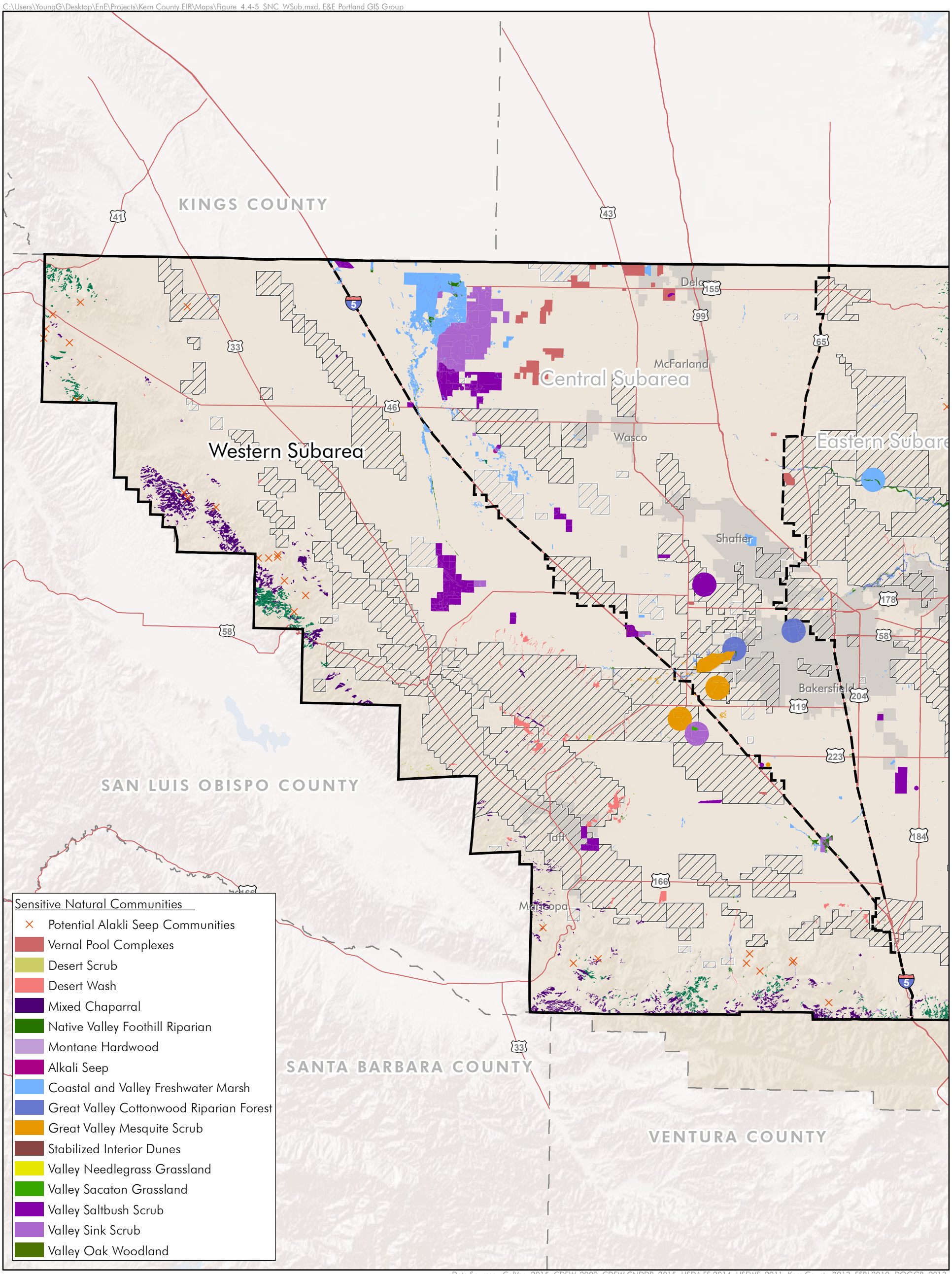


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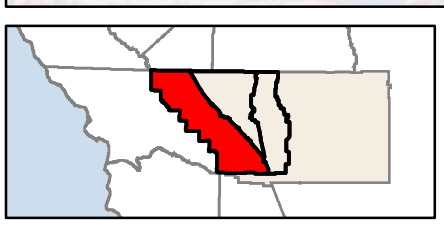

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Project Boundary
Subarea
Kern County
City Limits

Highways
DOGGR Administrative Well Field Boundaries
DOGGR Administrative Well Field Boundaries (Abd)

Figure 4.4-5
Sensitive Natural Communities in the Western Subarea

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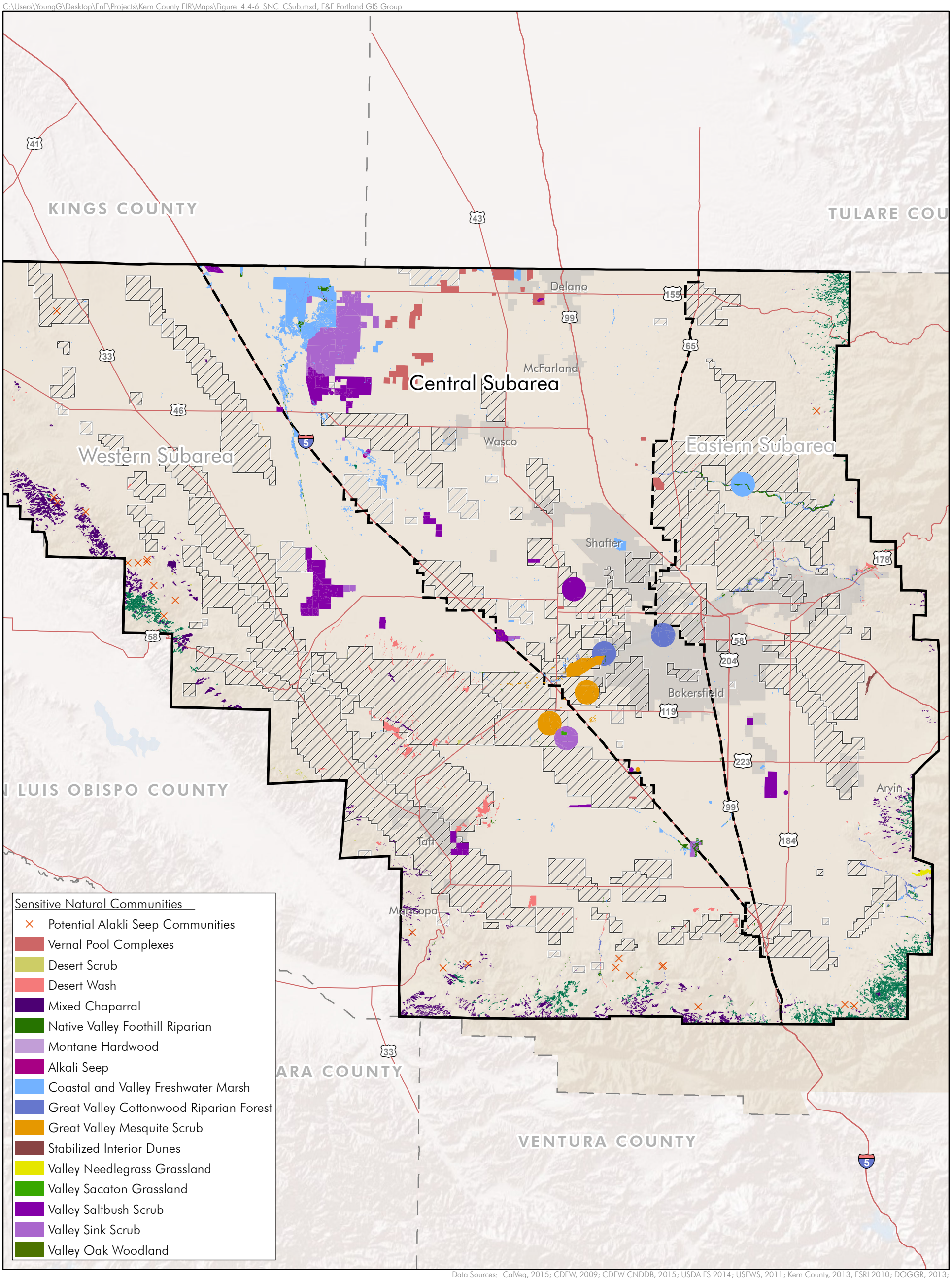


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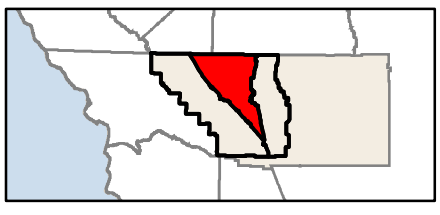

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Project Boundary
Subarea
Kern County
City Limits

Highways
DOGGR Administrative Well Field Boundaries
DOGGR Administrative Well Field Boundaries (Abd)

Figure 4.4-6
Sensitive Natural Communities in the Central Subarea

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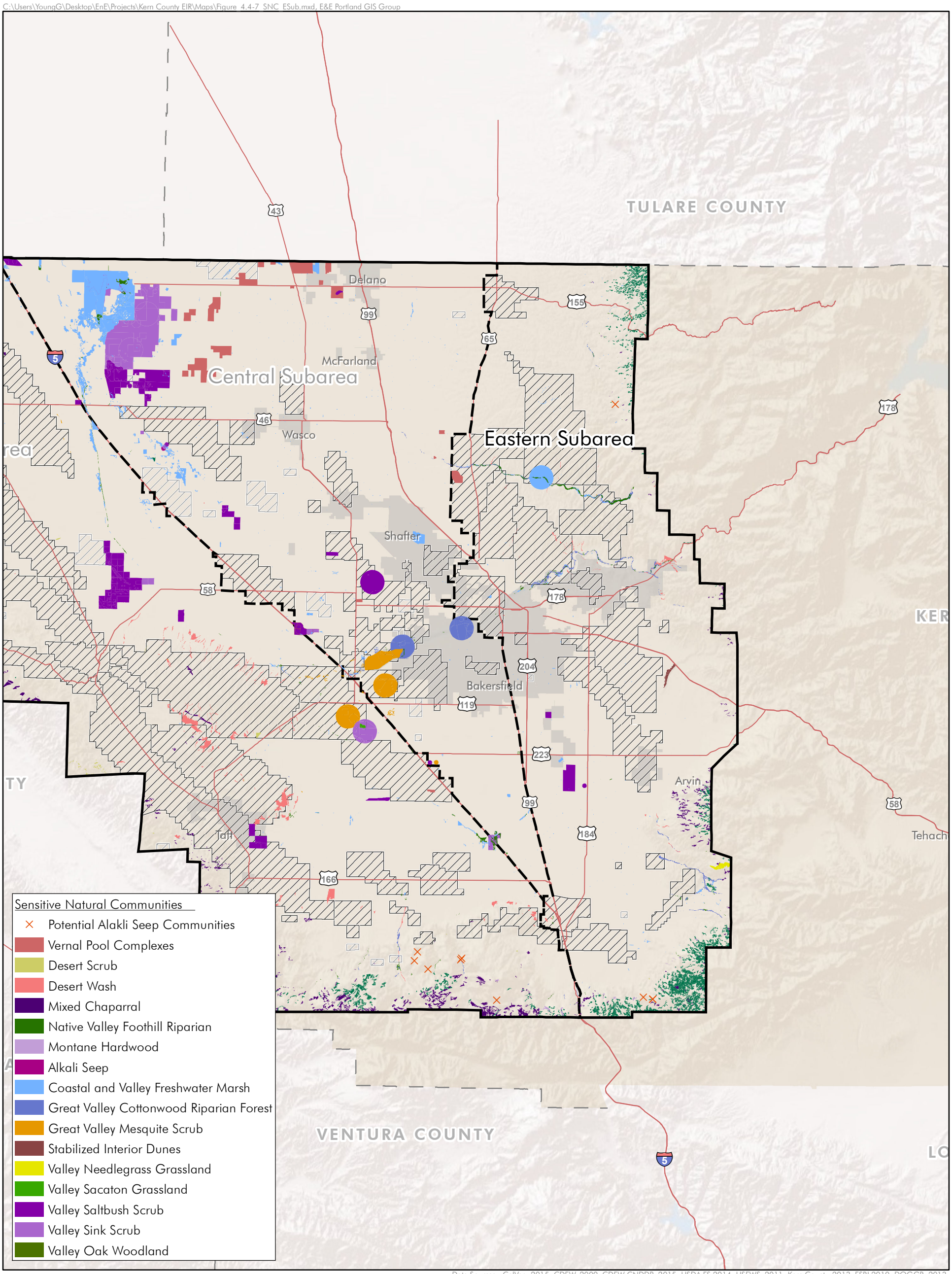


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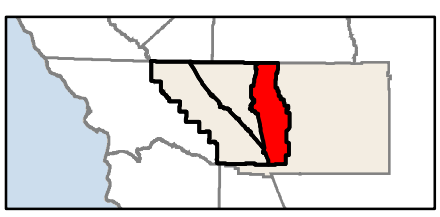

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Project Boundary
Subarea
Kern County
City Limits

Highways
DOGGR Administrative Well Field Boundaries
DOGGR Administrative Well Field Boundaries (Abd)

Figure 4.4-7
Sensitive Natural Communities in the Eastern Subarea

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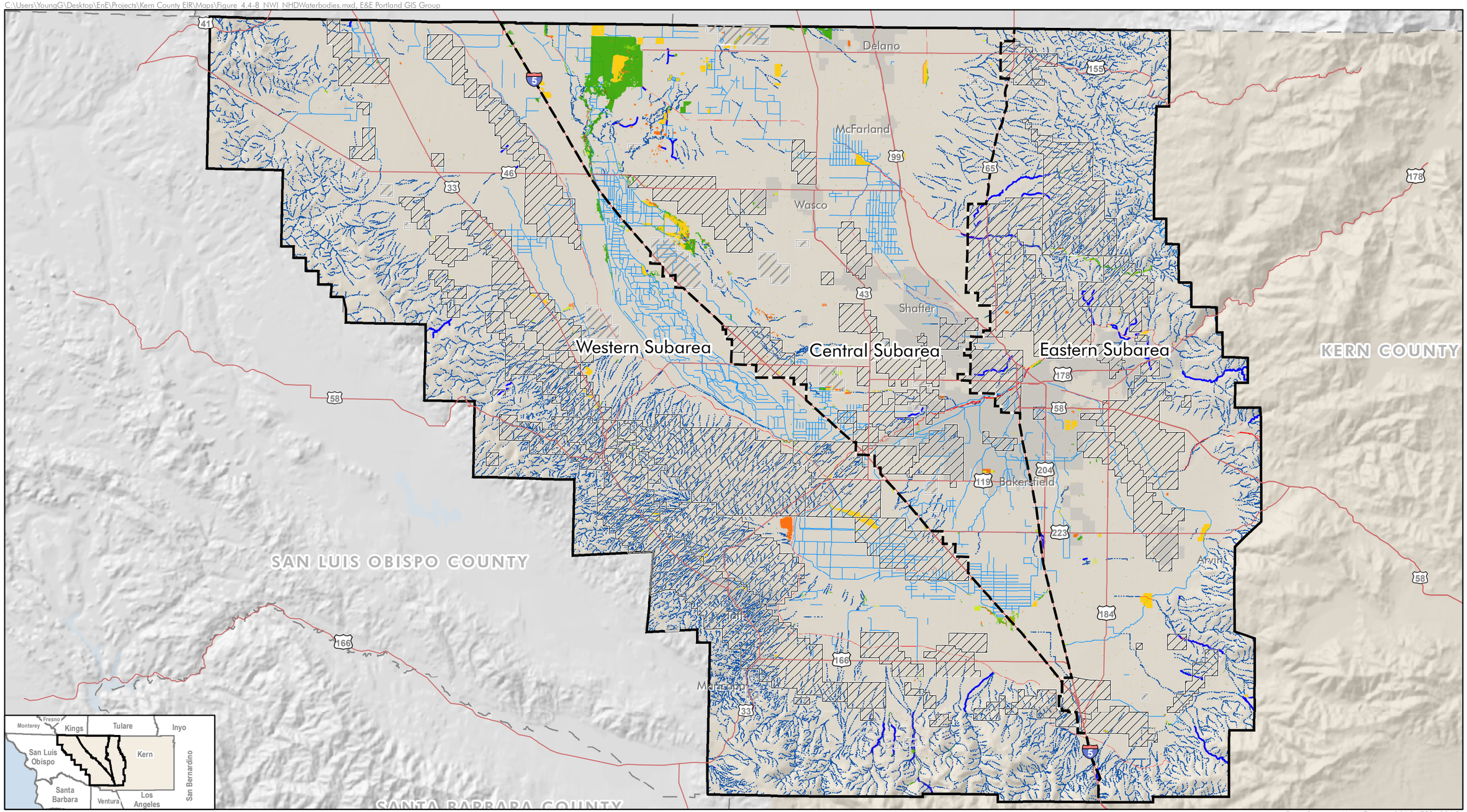


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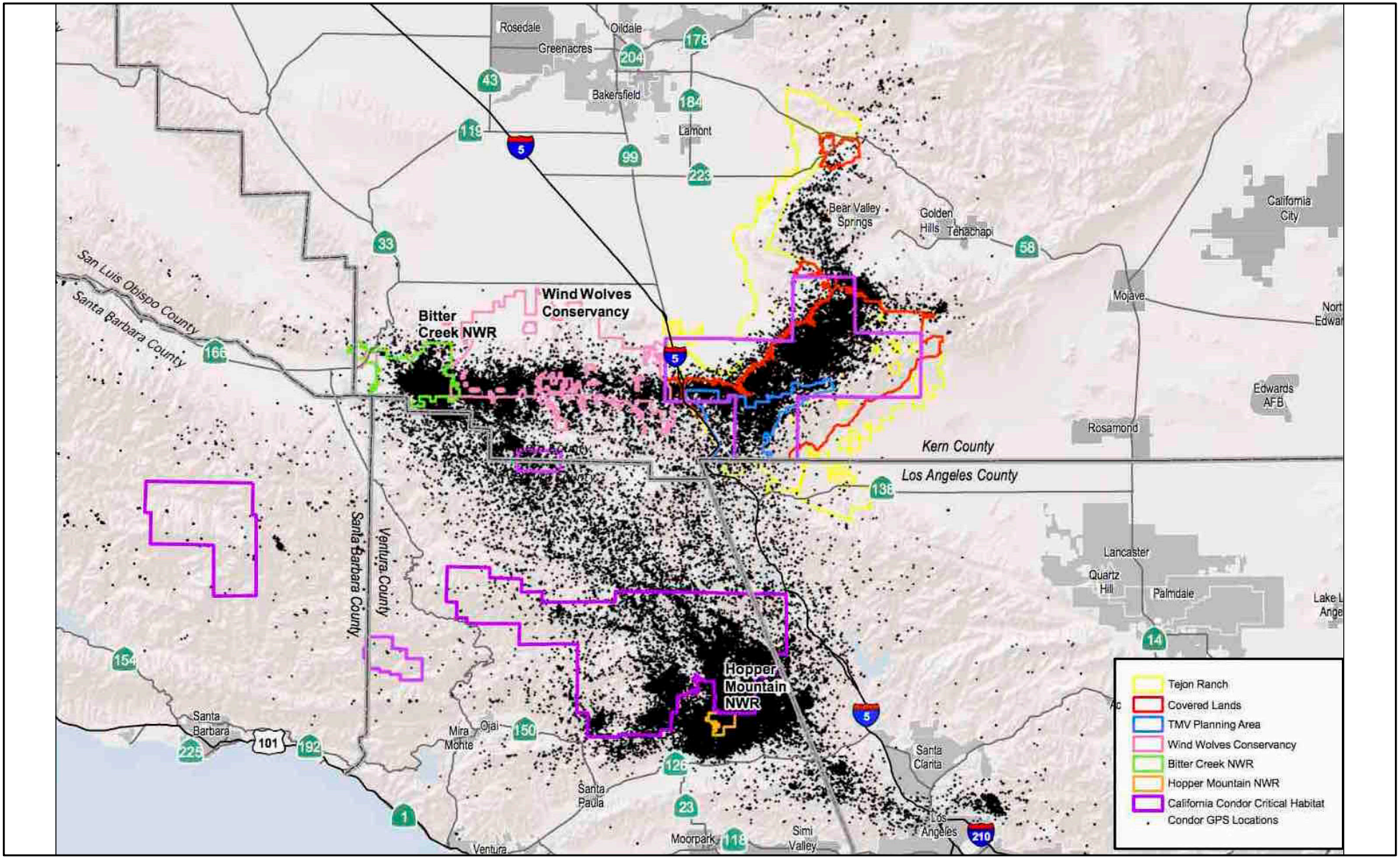
Project Boundary
Subarea
Kern County
City Limits
Highways
County Boundary
DOGGR Administrative Well Field Boundaries
DOGGR Administrative Well Field Boundaries (Abd)

NWI Wetlands
Freshwater Emergent Wetland
Freshwater Forested/Shrub Wetland
Freshwater Pond
Lake
Other
Riverine

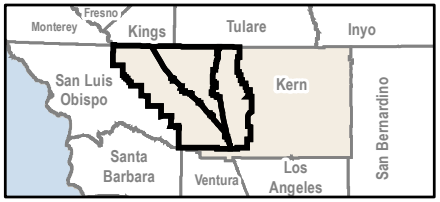
NHD Flowlines
Canal/Ditch
Stream/River: Intermittent
Stream/River: Perennial

Data Sources: Kern County, 2013, ESRI 2010; DOGGR, 2013; USGS, 2014; USFWS, 2014

Figure 4.4-8
NWI/NHD Waterbodies

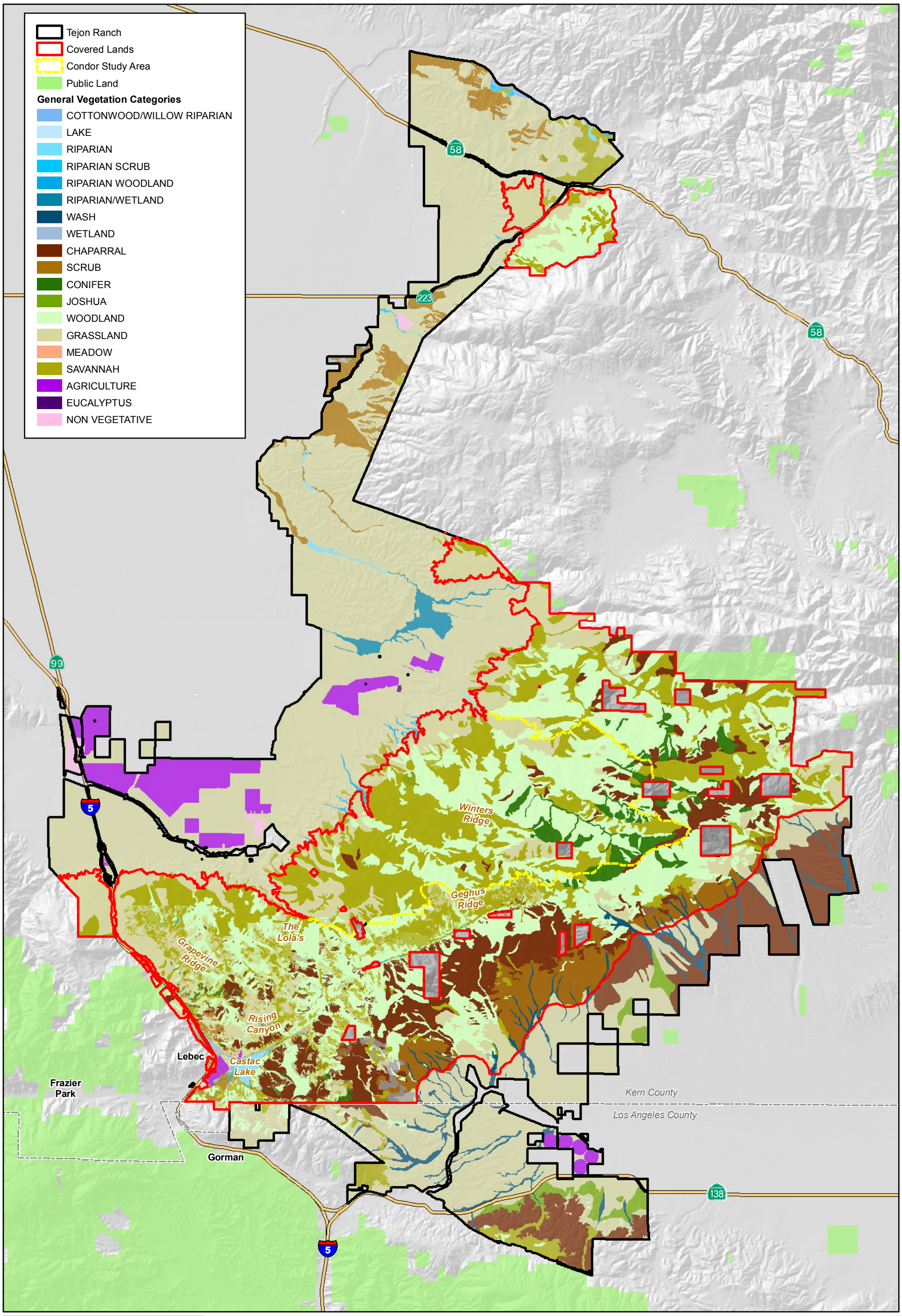



Source: USFWS 2011; TRC 2007.



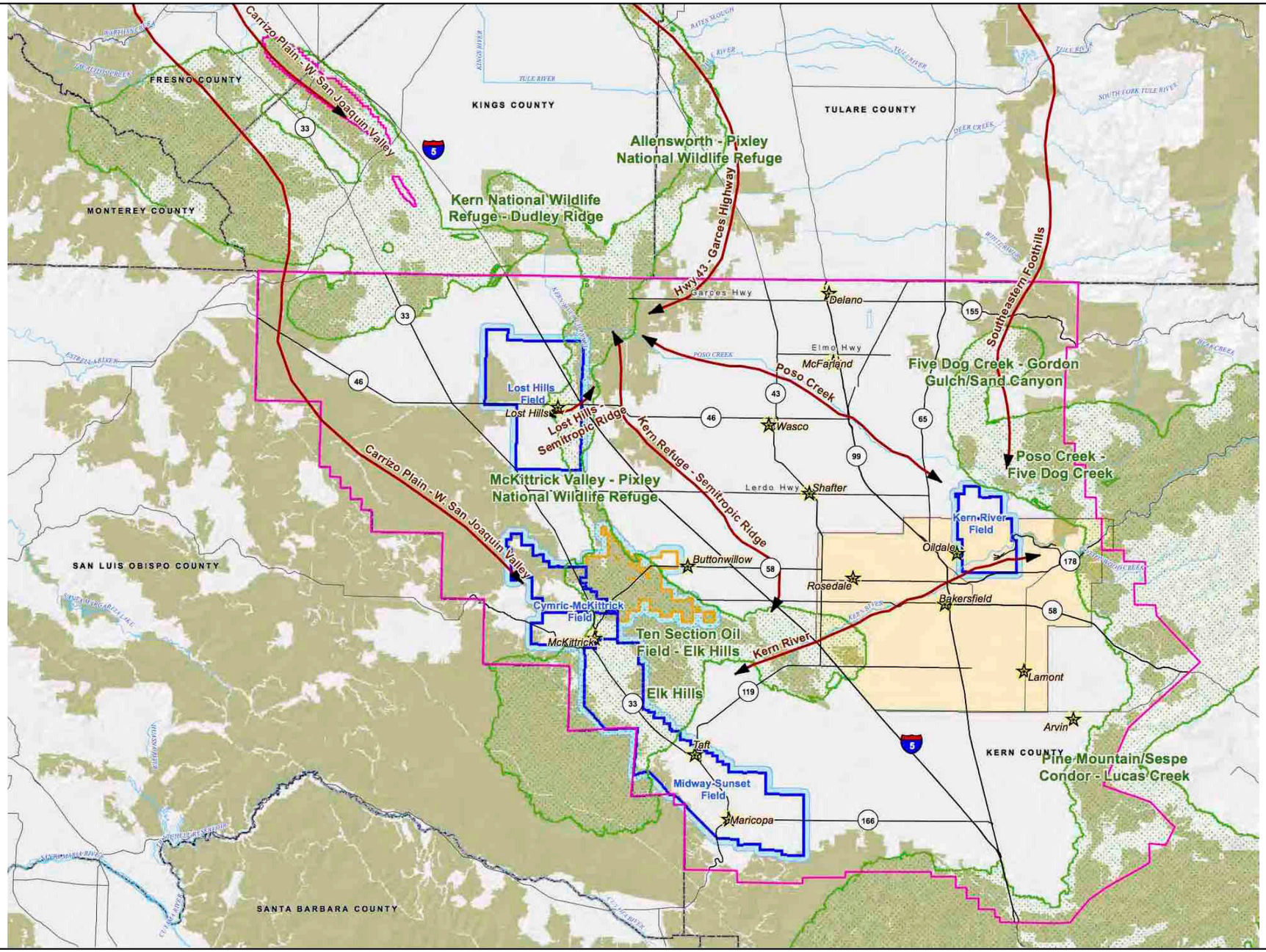

0 12.5
Miles

Figure 4.4-9
California Condor GPS Locations (Aerial and Ground) in Southern California, April 2002 - May 9th, 2011




Base Map Source: Tehachapi HCP April 2013.

Figure 4.4-10
Vegetation Transition from Lower to Higher (above 2000 feet amsl)
Project Area Locations




## Legend

- City Locations
- Regional Study Area
- Four Fields
- Chevron's Lokern Lands and Lokern Contiguous Area
- Permit Area
- County Boundary

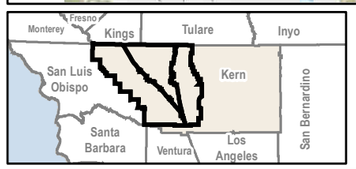
**Habitat Connectivity**

- Potential Corridor[1]
- Essential Connectivity Area[2]
- Natural Landscape Blocks [3]

Metropolitian Bakersfield HCP (For reference purposes only)

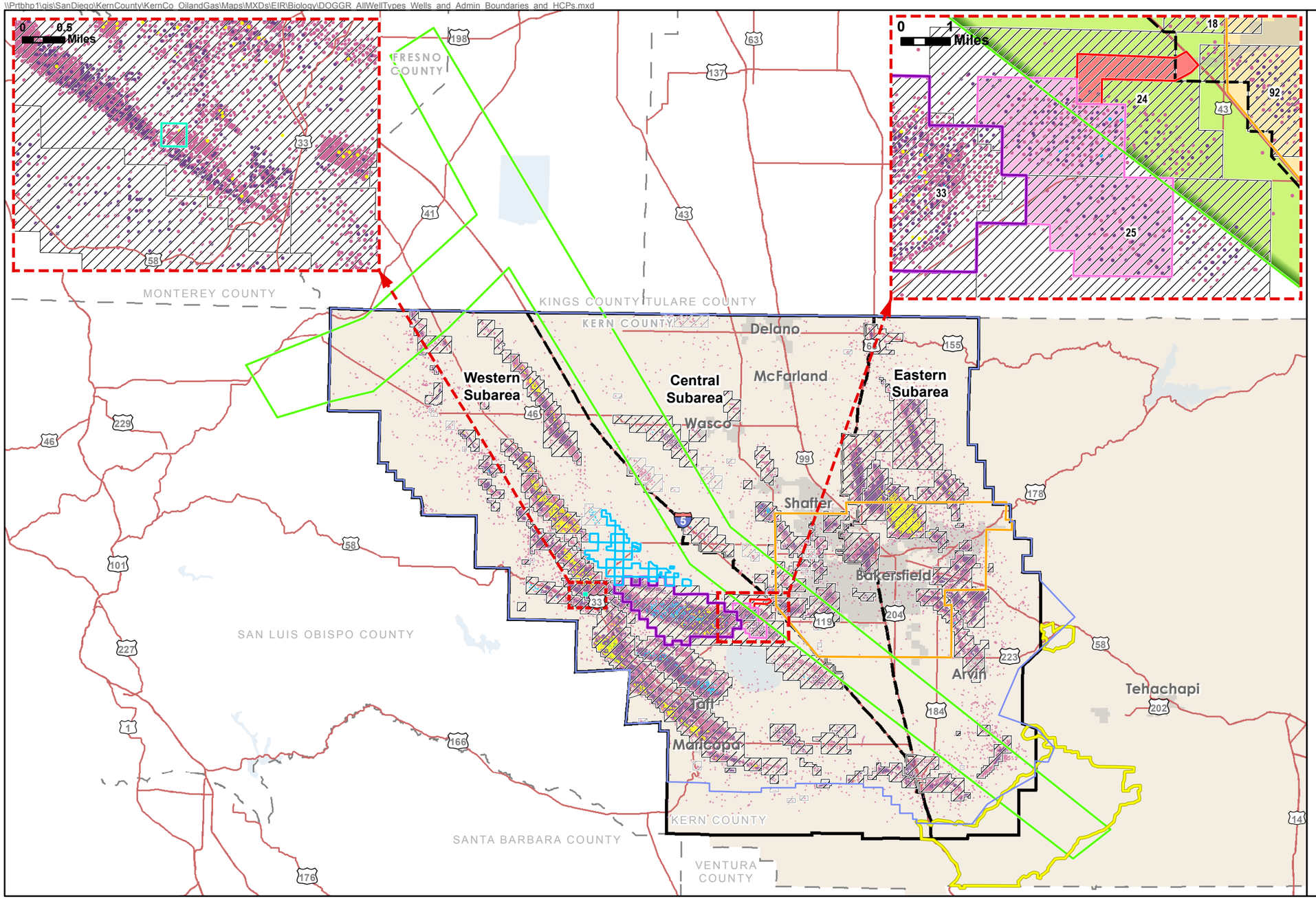
Source Notes:
[1]Missing Linkages: Restoring Connectivity to the California Landscape (Penrod et al. 2001)
[2]California Essential Habitat Connectivity Project: A Strategy for Conserving a Connected California (Spencer et al. 2010)
[3] California Department of Fish and Game, 2010

Data Source: Draft Chevron Lokern HCP April 2008.




0 12
Miles
0 16
Kilometers

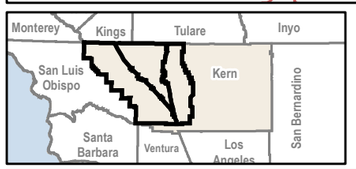
Figure 4.4-11
Locations of Potential Corridors, Natural Habitat Blocks, and Essential Connectivity




Legend

HCP/NCCP (locations approximate)
- Arco Western Energy HCP
- Chevron Lokern HCP
- Kern Water Bank HCP/NCCP
- Metropolitan Bakersfield HCP
- Occidental of Elk Hills HCP
- San Joaquin Field Division Aqueduct
- Tehachapi Uplands Multiple Species HCP
- Torch Operating/Nuevo Energy HCP
- Valley Floor HCP

DOGGR Well Location
- Active or Idle Air Injector
- Active or Idle Dry Gas
- Active or Idle Dry Hole
- Active or Idle Gas Disposal
- Active or Idle Liquid Petroleum Gas
- Active or Idle Observation
- Active or Idle Oil and Gas
- Unknown Well Type

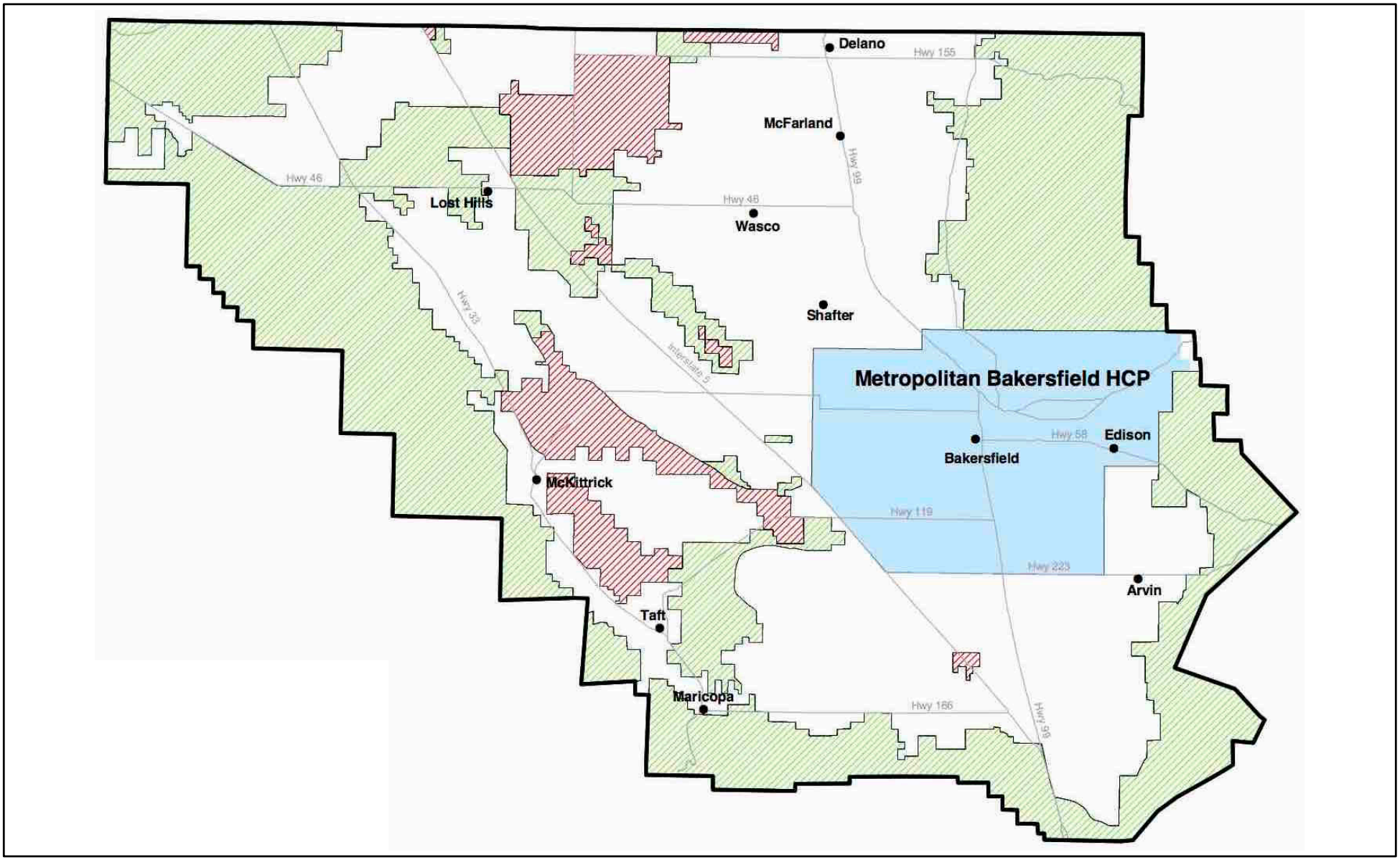


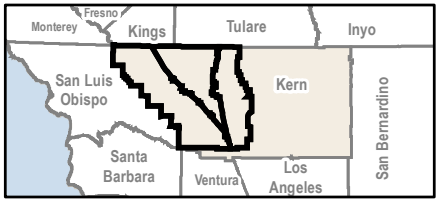

0 10 Miles

Project Area
Subarea
DOGGR Administrative Well Field Boundaries
DOGGR Administrative Well Field Boundaries (Abd)
Kern County
City Limits
Highways
County Boundary

Service Layer Credits:
Data Sources: Kern County, 2013, ESRI 2010; DOGGR, 2013; E&E, 2014

**Figure 4.4-12**
**DOGGR Wells, Administrative Boundaries, and HCPs in the Project Area**



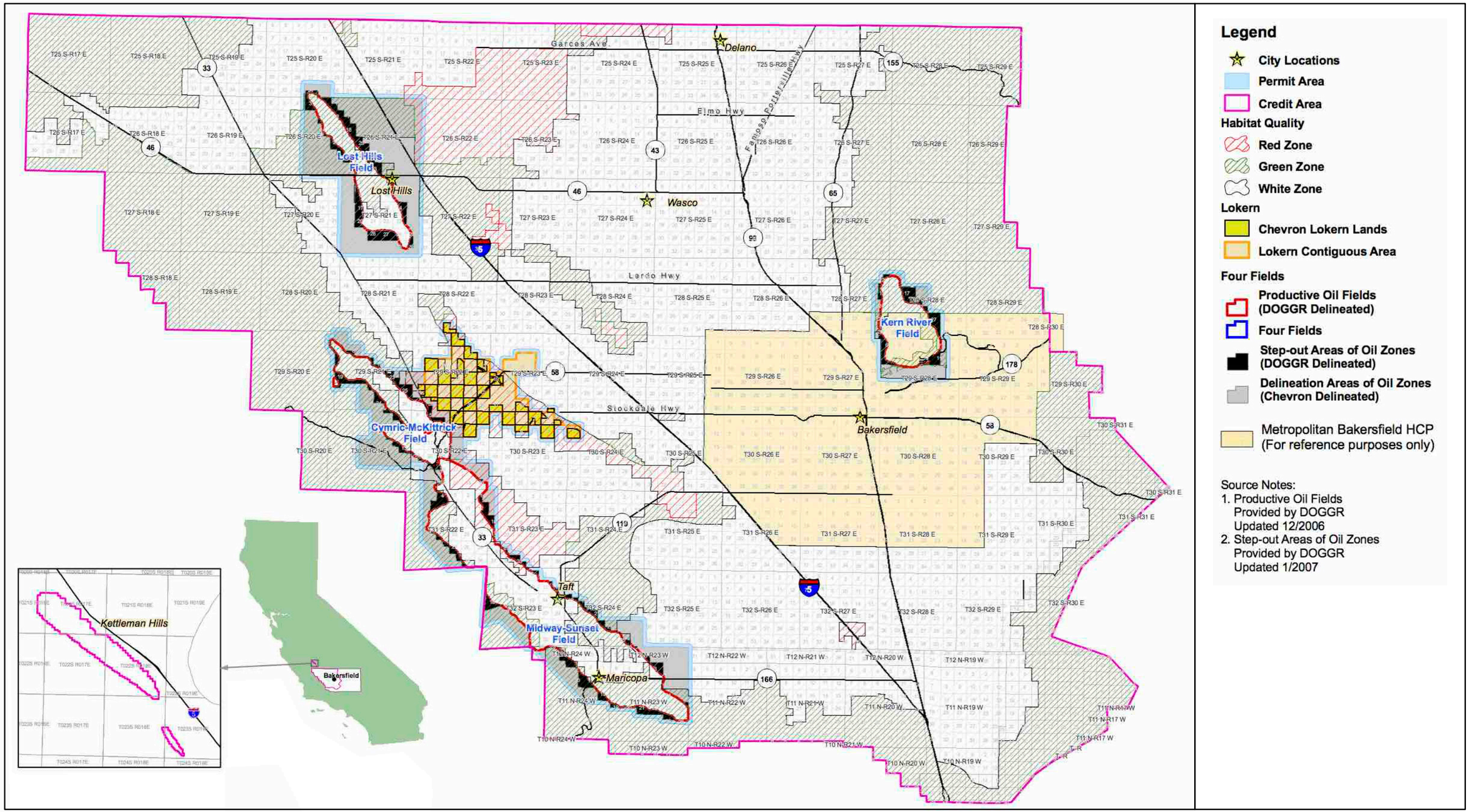




0 12
Miles

LEGEND
- Cities
- Major Highways
- Valley Floor HCP Boundary
- Metropolitan Bakersfield HCP
- Green Zone
- Red Zone
- White Zone

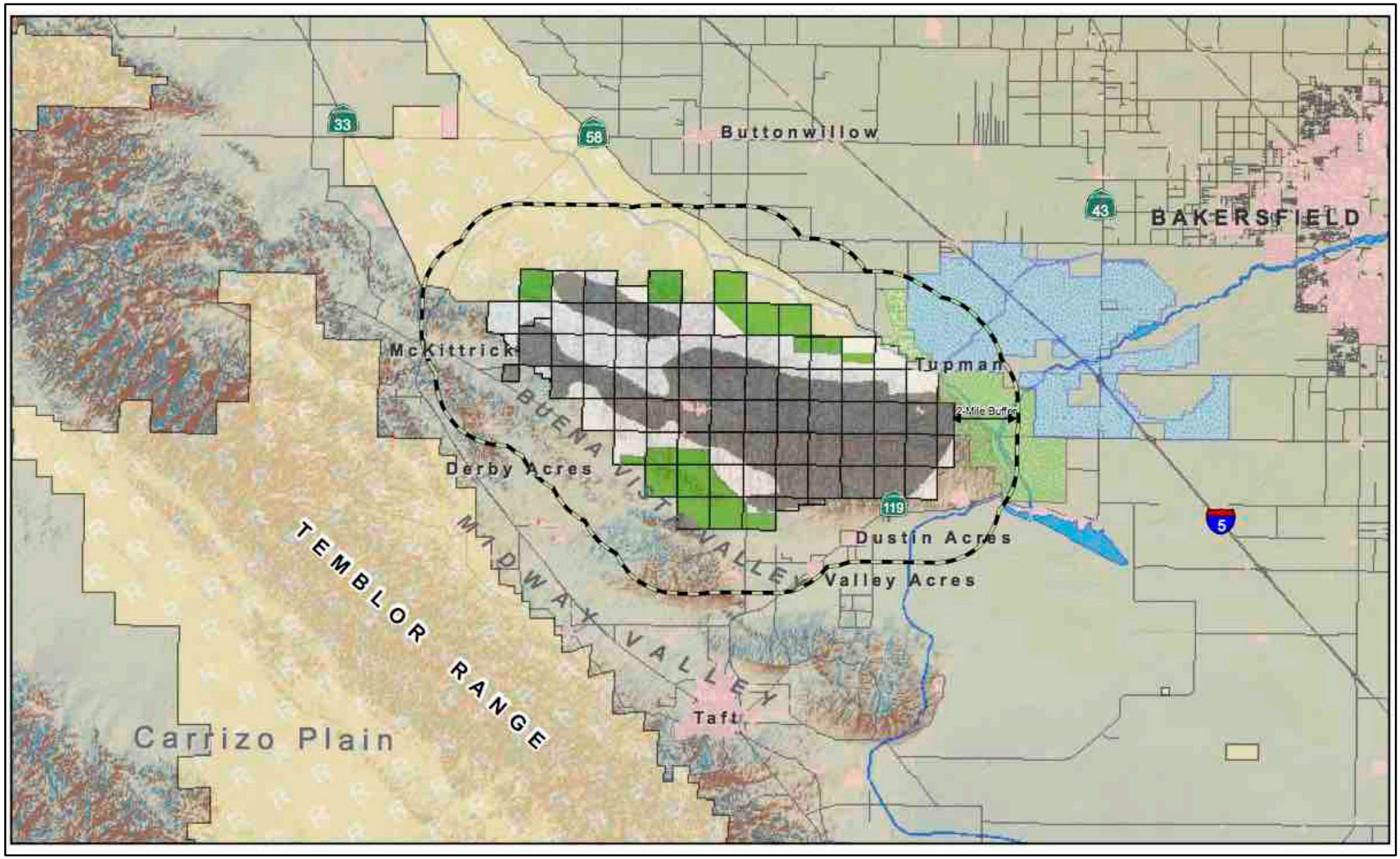
Data Source: Draft Valley Floor HCP Feb 2010.

Figure 4.4-13
2010 Draft VFHCP Habitat Zone Map



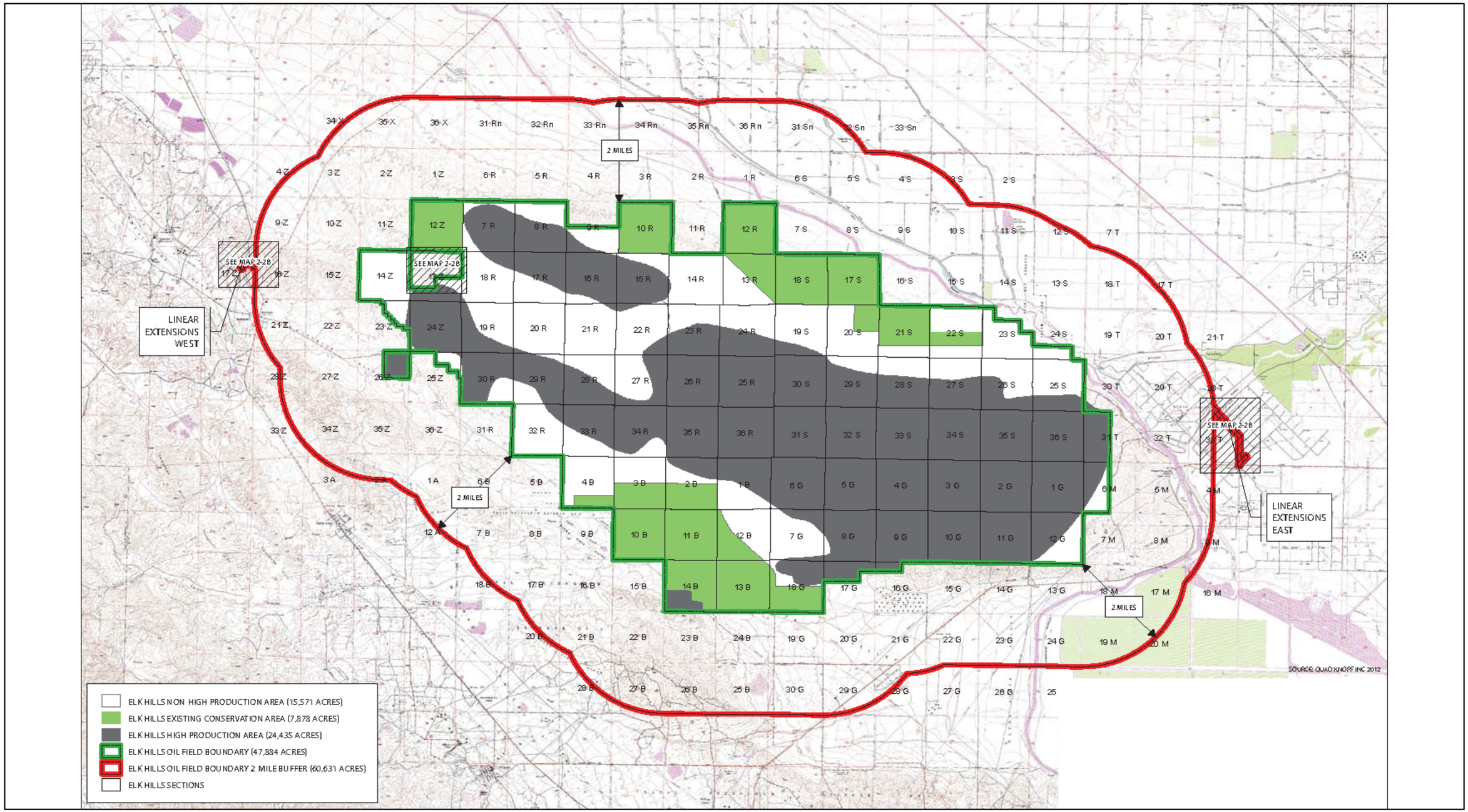

Data Source: Draft Chevron Lokern HCP April 2008.

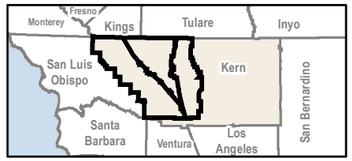
Figure 4.4-14
Locations of the Chevron Lokern Lands, The Lokern Contiguous Areas and Four Oil Fields




Data Source: Quad Knopf 2012.

Figure 4.4-15
Locations of the Elk Hills Oil Field, Proposed Preserve Areas, and the Two Mile Buffer Included in the Proposed Take Permit and HCP

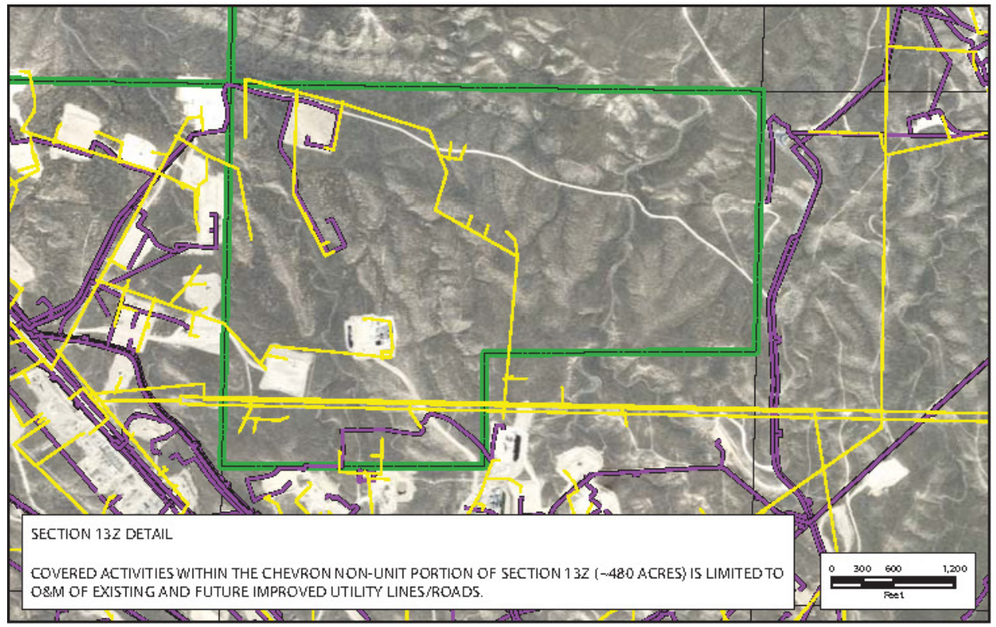


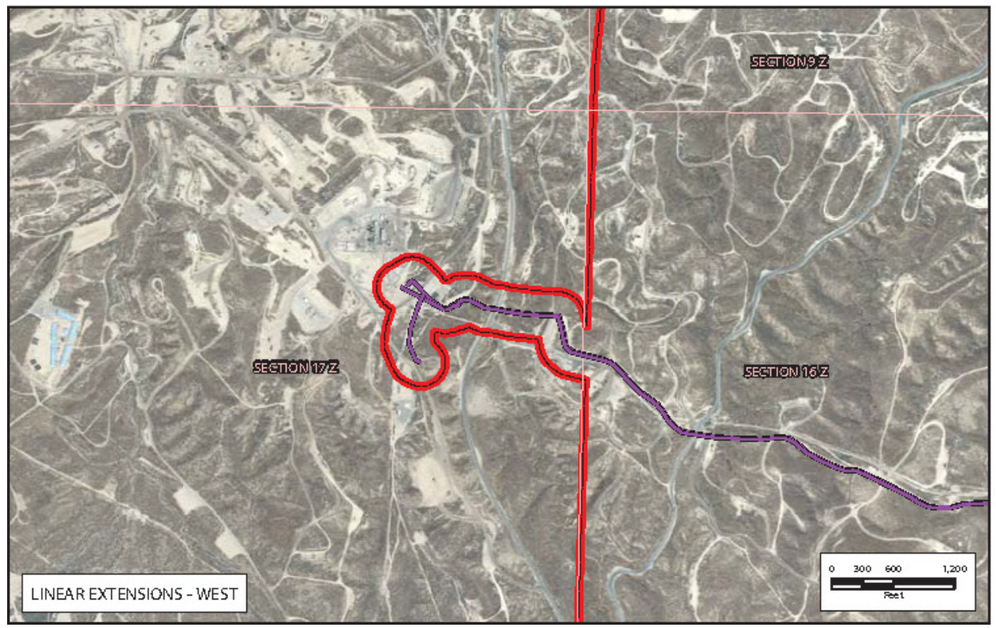



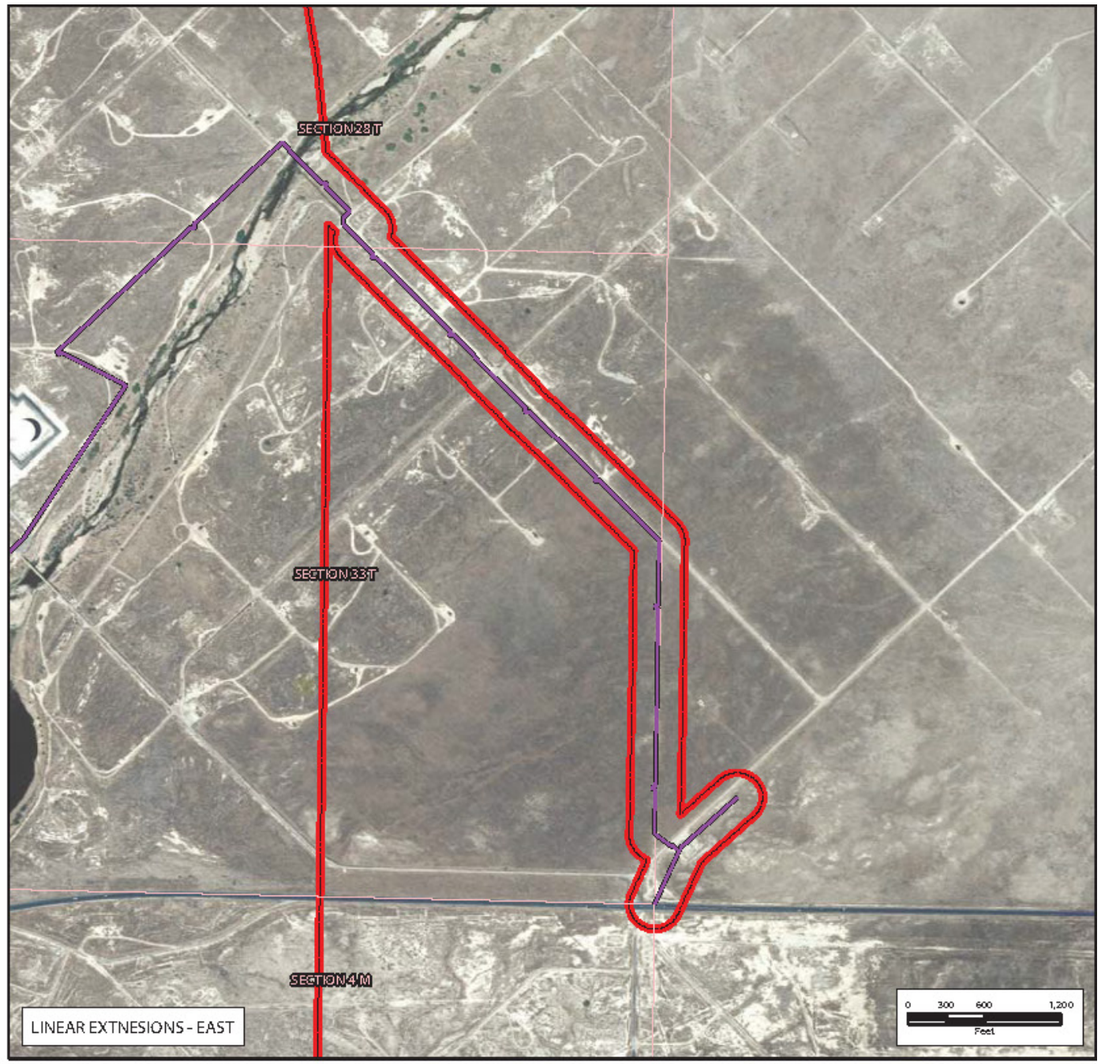

0 2
Miles

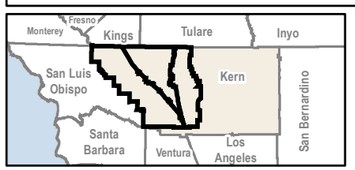
Source: South Valley Biology Consulting LLC.

Figure 4.4-16
California Resources Corporation Elk Hills HCP Project Overview



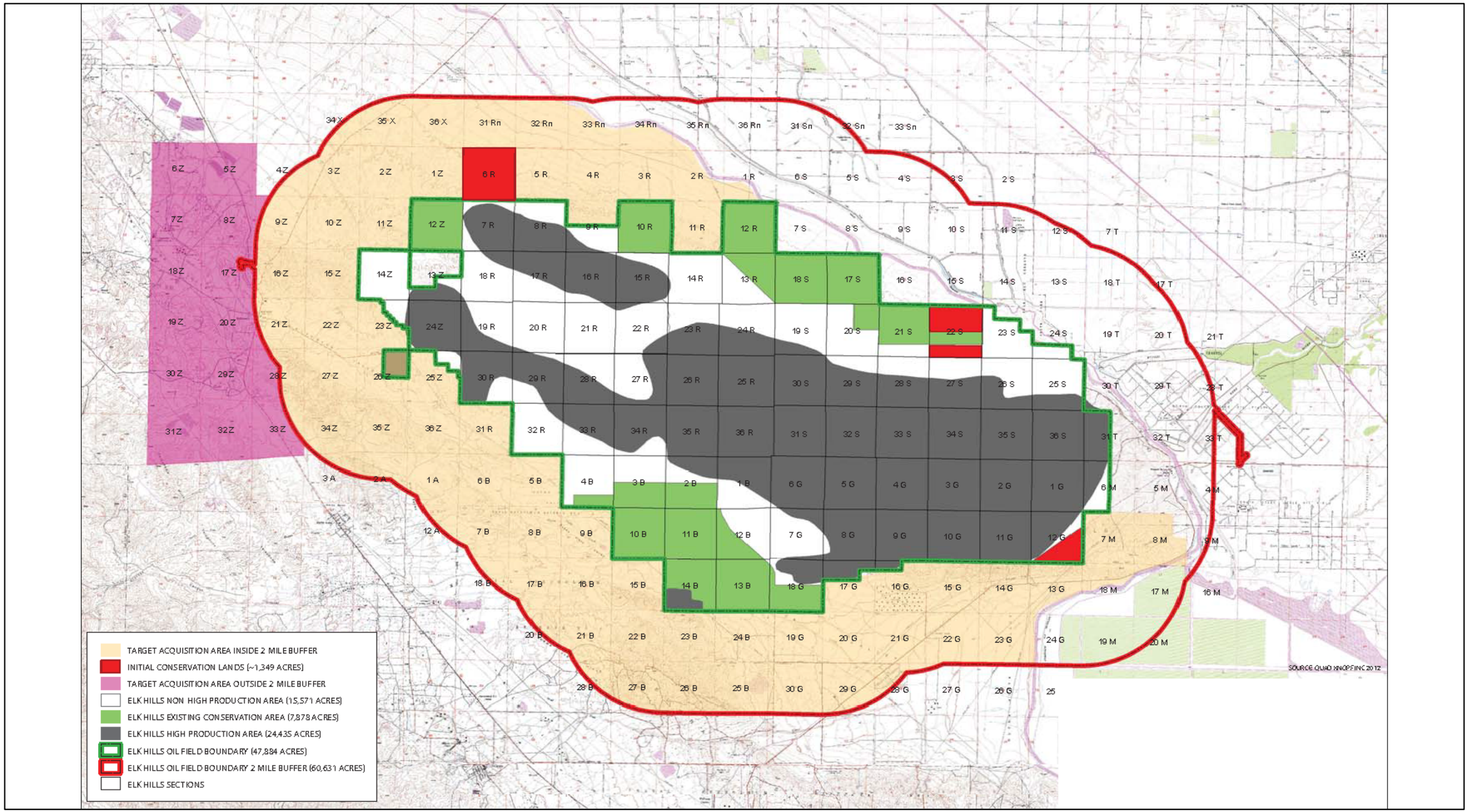



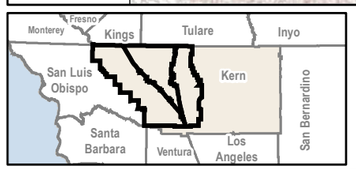




TRANSMISSION LINES
PIPELINES
ELK HILLS OIL FIELD BOUNDARY (47,884 ACRES)
ELK HILLS OIL FIELD BOUNDARY 2 MILE BUFFER (60,631 ACRES)

Source: South Valley Biology Consulting LLC.

Figure 4.4-17
California Resources Corporation Elk Hills HCP Project Area Detail




0 2
Miles

Source: South Valley Biology Consulting LLC.

Figure 4.4-18
California Resources Corporation Elk Hills HCP Target Aquisition Area

Section 4.5

# Cultural and Paleontological Resources

Section 4.5

# Cultural and Paleontological Resources

## 4.5.1 Introduction

This section provides contextual background information on historical resources in the Project Area, including the prehistoric, ethnographic, historical, and paleontological settings. This section also summarizes the results of previous cultural surveys of the Project site, analyzes the Proposed Project's potential impacts on cultural and paleontological resources, and identifies all feasible mitigation measures to address adverse impacts.

The historical resources information in this section is based on using three kinds of data and analyses: (1) a review and data tabulation of recent large-area surveys; (2) a synthesis of existing degrees of ground surface disturbance; and (3) the development of a geographic information system (GIS) predictive model of prehistoric/Native American site distribution and archaeological sensitivity. The paleontological resources information in this section is based on four sources of data and analyses: (1) an on-line search of institutional paleontological locality records; (2) the development of potential fossil yield classification (PFYC) rankings for Kern County geologic rock units; (3) a comprehensive review of published and unpublished paleontological literature for the Project Area; and (4) the compilation of available geologic mapping information to produce a GIS database including a geologic map and paleontological potential map.

The cultural evaluation was conducted in compliance with Section 5024.1 of the California Public Resource Code (PRC) to identify archaeological or historical resources in the Project Area. The cultural resources evaluation is presented as Appendix O of the EIR, and the paleontological resources evaluation is presented as Appendix P. Because of the confidential nature of the locations of cultural resources, such information has been removed from the report and is not included in the appendices.

For the purposes of the California Environmental Quality Act (CEQA), "historical resources" is a term of art with a defined statutory meaning (see PRC 21084.1 and CEQA Guidelines, Sections 15064.5(a) and 15064.5(b)). The term embraces any resource listed in, or determined to be eligible for listing in, the California Register of Historic Resources (CRHR). The CRHR includes resources listed in, or formally determined eligible for listing in, the National Register of Historic Places (NRHP), as well as some California State Landmarks and Points of Historical Interest.

## 4.5.2 Environmental Setting

This section discusses the existing conditions related to cultural resources, as described by Whitley et al. 2014, and paleontological resources in the Project Area.

# Local and Regional Natural Setting

The Project Area lies within the unincorporated portions of the San Joaquin Valley and surrounding mountains, extending to about 2,000 feet in elevation. Much of the Project Area, especially the Central Subarea, is now a flat, open plain. This plain rises gradually from a minimum of roughly 200 feet above mean sea level near the center of the valley floor at the Kings and Tulare county lines, to almost 1,000 feet at the southernmost end of the valley near the Grapevine Canyon mouth. The valley floor is bordered to the south and southeast by the narrow foothills and steep slopes of the Tehachapi Mountains. The northeastern portion of the Eastern Subarea includes the broad, open and rolling foothills of the Greenhorn Mountains/Sierra Nevadas. The Western Subarea, in contrast, includes more internal topographic relief. From east to west in this Subarea, this includes the open valley floor, the low rolling and roughly north-south trending Lost, Antelope, Elk and Buena Vista hills, and the steep and heavily incised eastern flanks of the Temblor Range.

Although now open flats, historically, the southern San Joaquin Valley was a swampy, marsh zone consisting of a series of shallow lakes interconnected by sloughs and channels, primarily fed by streams originating in the mountains to the east. Kern River especially, and Poso Creek, were the two most important of these water sources. Other significant drainages included the Tehachapi/Caliente and Sycamore creeks on the east side, Tejon, Pastoria, Grapevine, and Pleito creeks to the south, and Buena Vista and Chico Martinez creeks to the west. Each of these were seasonal and/or at least historically drained into “sinks” in the valley bottom.

Kern Lake, near the boundary between the Eastern and Central Subareas, and Buena Vista Lake, in the Western Subarea, were jointly the southwestern terminus of the Kern River Delta. Goose Lake, near the northern Project Area boundary, and also in the Central Subarea, was a northern terminus of this same deltaic system of sloughs and swamps. Goose Lake was also fed by Poso Creek. Lakes, lakeshore environments, and swampy terrain then extended historically across the valley floor from the foothills of the Eastern Subarea to the series of low hills in the Western Subarea. One historical result was the concentration of human population along the eastern side of the valley, above the swamps and near the main fresh water source, the Kern River. Although reclamation of the valley bottom started in the late nineteenth century and is now virtually complete, San Joaquin Valley population distribution continues to be heavily oriented towards the east side of the valley. It is worth noting in contrast that, prehistorically, a significant concentration of Native American villages was located on the western edge of the lakes, especially Buena Vista Lake.

Vegetation on the valley floor is currently predominated by modern cultigens (row crops, vineyards and orchards) and other introduced species, such as Russian thistle (tumbleweed; *Salsola tragus*) and grasses, but also includes cheatgrass (*Bromus tectorum*) and doveweed (*Croton setiger*). Historically, however, this area was most likely covered by the Valley Grassland, Saltbush Scrub, and Riparian communities. Valley Grassland was dominated by perennial bunchgrasses, such as needle-grasses (*Stipa* spp.), triple-awned grasses (*Aristida* spp.), bluegrasses (*Poa* spp.), and rye grasses (*Elymus* spp.), as well as annual grasses, herbs, and geophytes. Saltbush Scrub includes indigenous saltbush (*Atriplex* spp.) and, occasional, other

species such as cheesebush (*Hymenoclea salsola*), bladderpod (*Isomeris arborea*), and vinegar weed (*Trichostema lanceolatum*). The marshy Riparian habitat included bulrushes or tules (*Scirpus lacustris*), rushes (*Juncus*), sedges (*Cyperus*), and cattails (*Typha*), with water-loving trees, such as willows (*Salix*), on higher ground. Riparian Woodlands likely bordered the larger streams. In addition to willows, this community included sycamore (*Platanus*), cottonwood (*Populus*), and box elder (*Acer negundo*).

The mountain foothills and slopes on the southeast and south sides of the Project Area include oak woodlands and riparian environments. Vegetation includes vinegar weed (*Trichostema lancedatim*), doveweed, fiddleneck (*Amsinckia* spp.), scrub and live oak (*Quercus* spp.), poison oak (*Toxicodendron diversilobum*), saltbush (*Atriplex* spp.), coyote brush/chaparral broom (*Baccharis pilularis*), gooseberry trees (*Ribes divericatum*), California buckeye trees (*Aesculus californica*), jimsonweed (*Datura wrightii*), Russian thistle, cheatgrass, and other annual grasses. The drier foothills to the northeast and the hills and flanks of the Temblor Range, on the west, were predominantly Saltbush Scrub habitat.

# Ethnographic and Archaeological Context

## Prehistoric Setting

The southern San Joaquin Valley region, remote from other portions of California, has received minimal archaeological attention compared to other areas of the state. This is due, in part, to the fact that the majority of California archaeological work has been concentrated in the Sacramento Delta, Santa Barbara Channel, and Mojave Desert areas. Although knowledge of the prehistory of the Project Area is limited in specific details, enough is known to conclude that the archaeological record is broadly similar to central and especially south-central California as a whole. Therefore, the general prehistory of the Project Area can be outlined as provided in the following sections (Whitley et al. 2014).

### Early Holocene (12,000 to 7,000 B.P.)

Initial occupation of the region occurred at least as early as the Paleoindian Period, or prior to about 10,000 years before the present (B.P.). Evidence of this early use of the region has been revealed by the repeated discovery of characteristic fluted and stemmed projectile points found around the margins of Tulare and Buena Vista lakes, in the foothills of the Sierra, and in the Mojave. These finds suggest a terminal Pleistocene/early Holocene lakeshore adaptation similar to that found in other portions of the Far West at this same time, although little else is known about these earliest peoples. Importantly, many of the identified and characteristic projectile points have been discovered in lakeshore deposits, below the historic lake high-stands, reflecting the fact that this earliest period was a time of drought, with lake levels subsequently rising (Whitley et al. 2014).

### Middle Holocene (7,000 to 4,000 B.P.)

Substantial evidence for human occupation of California first occurs during the middle Holocene, from roughly 7,500 to 4,000 B.P. This period is known as the Early Horizon, and is sometimes

alternatively referred to as the Early Millingstone along the Santa Barbara Channel. In the coastal area, population concentrated along the shore, with minimal visible use of inland areas. Adaptation appears to have emphasized hard seeds and nuts, with toolkits dominated by mullers and grindstones (manos and metates). Minimal evidence of Early Horizon occupation has been found in most inland portions of the state. In part, this is due to a severe cold and dry paleoclimatic period that occurred at this time. Evidence for an Early Horizon occupation of southern San Joaquin Valley is limited, and primarily consists of some early dates from the west side of Buena Vista Lake. While this indicates that the occupation of the west side of this lake, and thus portions of the Western Subarea, extends back for 7,000 or more years, it is clear overall that Early Horizon population density was low in interior south-central California, and probably throughout the Project Area. For example, very little evidence for Early Horizon sites has been found in the Tehachapi Mountains or Carrizo Plain to the west (Whitley et al. 2014).

## Late Holocene I (4,000 to 2,000 B.P.)

Environmental conditions improved dramatically after about 4000 B.P., during the Middle Horizon (or Intermediate Period). This period is known climatically as the Holocene Maximum, and it was characterized by significantly warmer and wetter conditions than had been experienced previously (or than occur today). It was marked archaeologically by a large population increase and radiation into new environments along the south-central California coast, the southern Sierra Nevadas, and the Mojave Desert. In the Sacramento Delta region to the north, this same period of favorable environmental conditions was marked by the appearance of the Windmiller culture, which exhibited a high degree of ritual elaboration (especially in burial practices) and perhaps even a rudimentary mound-building tradition. Along with ritual elaboration, Middle Horizon times experienced increasing subsistence specialization, perhaps correlating with the appearance of the acorn-processing technology. Penutian-speaking peoples (including the Yokuts) are also posited to have entered the state, roughly at the beginning of this period and, perhaps, to have brought this technology with them. Likewise, the so-called “Shoshonean Wedge” in southern California, or the Takic-speaking groups that included the Gabrielino/Fernandeño, Tataviam, and Kitanemuk, appear to have moved into this region at about this time.

Test excavations have demonstrated a substantial Middle Horizon occupation in the Tehachapis; all habitation sites included at least some deposit from this period, and some of the villages were only inhabited at this time. A significant population increase is believed to have occurred in the Carrizo Plain, as well. The existing evidence, in fact, suggests that a similar pattern occurred in the inland Ventura County region, as well as possibly in the Antelope Valley and western Mojave Desert, the southern Sierra Nevadas, and the Coso Range region. A major expansion in settlement, the establishment of large site complexes, and an increase in the range of environments exploited appear to have occurred throughout this wide region roughly around 4,000 years ago. Although most efforts to explain this expansion have focused on very local circumstances and events, this was a major Southern California-wide occurrence (Whitley et al. 2014).

## Late Holocene II, III (2,000 to 1,100 B.P.; 1,100 to 300 B.P.)

The beginning of the Late Horizon is set variously at 1500 and 800 B.P., although a consensus seems to be growing for the shorter chronology for this period. Regardless of the specific date, the appearance of the Late Horizon correlates with another series of periodic droughts at circa A.D. 800-1200, which decimated major portions of western North America. This is known, climatically, as the Medieval Climatic Anomaly, followed by the Little Ice Age, and this general period of climatic instability extended to about A.D. 1860. In much of inland south-central California, the Carrizo Plain, and the Mojave Desert, a large-scale abandonment of sites occurred approximately at the start of this period. For the ancestral Chumash, this appears to correlate with an increase in coastal populations, suggesting a shift from inland to seashore occupation rather than a drop in total numbers of people.

In contrast, along Buena Vista Lake, population appears to have been increasingly concentrated towards the later end of the Medieval Climatic Anomaly. Similarly, the Late Horizon environmental collapse did not result in wide-spread abandonment in the Tehachapi Mountains. This area is unusually well-watered and probably was not subjected to the same degree of desiccation as occurred elsewhere in interior south-central California. Some Middle Horizon villages were abandoned before the start of the Late Horizon, but those sites with Late Horizon occupation appear to have been more intensively occupied during the last 1,000 years, and no significant population change has yet been identified.

The Tehachapis and southern San Joaquin Valley then experienced intensification rather than the abandonment seen in surrounding areas during the last millennium. This most likely resulted from favorable (i.e., better watered) environments. Regardless of regional circumstance, the ethnographic Native American tribes and conditions are recognized as a direct outgrowth of the Late Horizon occupations of this portion of south-central California.

The identified prehistoric record in the Project Area has a series of implications for cultural resource management. The first is that a full range of site types are present. These include:

- Villages, primarily located on or near permanent water sources, occupied by large groups during the winter aggregation season;
- Seasonal camps, again typically located at water sources, occupied during other parts of the year tied to locally and seasonally available food sources;
- Special activity areas, especially plant processing locations containing bedrock mortars (BRMs), commonly (though not exclusively) near existing oak woodlands, and invariably at bedrock outcrops or exposed boulders;
- Stone quarries and tool workshops, occurring in two general contexts: (1) at or below naturally occurring chert exposures on the eastern front of the Temblor Range; and (2) at quartzite cobble exposures, often on hills or ridges;
- Ritual sites, most commonly pictographs (rock art) found at rockshelters or large exposed boulders, and cemeteries, both commonly associated with villages; and

- A variety of small lithic scatters (low-density surface scatters of stone tools).

The second implication for cultural resources management in the Project Area is that the locations of the water sources have sometimes changed over time so villages and camps are not exclusively associated with existing (or known historical) water sources. The sizes and locations of the Project Area's lakes, sloughs, and Kern River delta channels changed significantly during the last 12,000 years due to major paleoclimatic shifts. This altered the area's hydrology and, thus, prehistoric settlement patterns. The western shoreline of the Buena Vista Lake, the largest of the three lakes, was relatively stable, because it abutted the series of low hills in the Western Subarea. However, the northern, southern and eastern shorelines comprised the near-flat valley floor. Relatively minor fluctuations up or down in the lake level resulted in very significant changes in the areal expression of the lake on these three sides and, therefore, the locations of villages and camps. Although perhaps not as systematic, similar changes occurred with respect to stream channels and sloughs and potential site locations associated with them. This circumstance has implications for predicting site locations and archaeological sensitivity. Although discussed in more detail below, site sensitivity is hardest to predict in the open valley floor, especially in the Kern River delta area, near the northern, southern, and eastern shorelines of Buena Vista Lake, as well as around Kern Lake, due to fluctuating surface water levels (Whitley et al. 2014).

## Ethnographic Setting

The Project Area was a contact point between three separate tribal groups immediately prior to the arrival of Euro-Americans in California: the southern Valley Yokuts, interior Chumash, and Kitanemuk- Haminat. These three groups were bordered at higher elevations by the Kawaiisu, in the Tehachapi area, and the Tubatulabal, in the Kern River Valley.

The San Joaquin Valley floor and, thus, the majority of the Project Area, was occupied by southern Valley Yokuts speakers, themselves divided into a series of autonomous "tribelets," the boundaries of which are not well defined. The Yauelmani Yokuts lived from the Kern River area, in modern Bakersfield, to the southeast corner of the valley, on the Tejon Ranch. The Hometwali were centered around Kern Lake, while the Tulamni occupied the west side of Buena Vista Lake and the foothills of the Temblors, at least to McKittrick. The Tuhohi resided from the Kern River delta north to the Goose Lake area and west to the sloughs near Buttonwillow. Yokuts villages apparently extended up to, but not into, the mouths of the canyons on the northern and western fronts of the Tehachapi Mountains, well into the foothills and lower elevations of the Sierra Nevadas on the east, and to the crest of the Temblor Range on the west. The Yokuts are Penutian speakers, and are linguistically related to northern occupants of the San Joaquin Valley.

The Kitanemuk occupied the south and central "heart" of the Tehachapi Mountains and the adjacent northwestern end of the Antelope Valley. These are speakers of the Serran branch of the Takic branch of the Uto-Aztecan language stock, and they are sometimes referred to as Haminat. They were closely related linguistically to other Serran Takic groups, such as the Serrano proper and Vanyume, who lived along the northern front of the Transverse Ranges. The Kitanemuk, however, probably did not extend any distance down onto the San Joaquin Valley floor, which was occupied by the Yokuts. The westernmost Kitanemuk occupation appears to have been at or

near Pastoria Creek, judging from known village locations, with most of their villages found farther east and south. Historic villages are known at the Pastoria, Tunis, El Paso, Tejon, and Chanac canyon mouths.

Chumash tribal territory is commonly viewed as focused on the Malibu to San Luis Obispo coast, but the interior Chumash extended to the edge of the southern San Joaquin Valley floor, from Grapevine Canyon westward. Chumash occupied four historic villages in canyon mouths on the Tejon and San Emidgio Ranches. The interior Chumash in this region most likely spoke Ventureño Chumash. The various Chumash languages are members of the Hokan linguistic stock, believed to be one of the oldest language families in the Americas.

Despite the apparent linguistic distinctions between these three groups, their lifeways were in many instances similar, reflecting widespread adaptive patterns in south-central California, as well as a deep and shared series of cultural traditions.

The Chumash, for example, followed a hunting-gathering-fishing subsistence pattern that incorporated a heavy reliance on maritime resources, including pelagic and littoral fish, and shellfish, at least for groups living along the coast. The sea resources that they exploited may have been a key factor in their evolutionary success; at the time of the arrival of the Spanish, the Chumash had reached levels of population density and complexities in social organization unequaled worldwide by other non-farming groups. These included permanent coastal villages along the Santa Barbara Channel area containing as many as 1,000 inhabitants, as well as a hierarchical sociopolitical organization consisting of at least two major chiefdoms. Further, based on recent reconstructions using mission registers, the Chumash appear to have had a matrilocal and, perhaps, matrilineal clan-based society.

The interior Chumash lacked direct access to the marine resources that contributed to such unusually high population densities along the Santa Barbara coastline. Adaptation to the environment was, therefore, more closely tied to terrestrial resources, especially the acorn-bearing oak, with cultural patterns, in general, very similar to surrounding interior groups, such as the Yokuts. Notably, however, the interior Chumash are particularly renowned for their rock paintings or pictographs, important concentrations of which are located on the San Emigdio Ranch and the Carrizo Plain.

Yokuts groups, in contrast, were organized in recognized and distinct tribelets (i.e., landowning groups linked by their shared territory and descent from a common ancestor). Depending upon tribelet location, subsistence emphasized the acorn-bearing oak, with the addition of a wide variety of other plants, fish, and game, or the bountiful lacustrine resources found around lakeshore environments.

Less ethnographic information exists on the Kitanemuk. Like many south-central California groups, however, the Kitanemuk were most likely divided into tribelets, with political organization and subsistence practices similar to their Yokuts neighbors. Following the acquisition of California by the United States, a Native American reserve was created on the Tejon Ranch in 1853 by Edward F. Beale. The so-called Sebastian Indian Reserve was created, in

part, because the influx of Euro-American settlers into the San Joaquin Valley had created unrest and resistance among tribal groups. The reserve was intended to be multi-tribal and was primarily occupied by Kitanemuk, Yokuts, and Chumash peoples, but also included members of other tribes such as the Tubatulabal, Kawaiisu, and (from the Los Angeles Basin) the Fernandeño. The reserve was disbanded and moved to Porterville following the Civil War, but a number of Native American families stayed on the Tejon Ranch, ultimately living exclusively in Tejon Canyon. Following the White Wolf Earthquake of 1952, most of the community moved to the Bakersfield area, but the last family continued to reside in Tejon Canyon until the mid-1960s. This multi-tribal community was the origin of the contemporary Tejon Indian Tribe, currently the only federally recognized tribe in Kern County (Whitley et al. 2014).

## Historic Context

The historic account of early exploration and development within the Project Area, described below, is derived from the cultural resources survey report prepared by Whitley et al. 2014 in the Cultural Resources Technical Report for ASM Affiliates, Inc. (Appendix O).

### Early Exploration and Development

Oil exploration, exploitation, and consumption are inextricably woven into the history of California and, in particular, Kern County. Spanish explorers visited the southern end of the San Joaquin Valley in 1772, but its lengthy distance from the missions and presidios along the Pacific Coast delayed permanent settlement for many years, including during the Mexican period of control over the Californian region. In the 1840s, Mexican rancho owners along the Pacific Coast allowed their cattle to wander and graze in the San Joaquin Valley. The Mexican government granted the first ranchos in the southern part of the San Joaquin Valley in the early 1840s, but these did not result in permanent settlement. It was not until the annexation of California in 1848 that the exploitation of the southern San Joaquin Valley occurred (Whitley et al. 2014).

### Agriculture

The discovery of gold in northern California in 1848 resulted in a dramatic increase in population, consisting, in good part, of fortune seekers and gold miners who began to scour the rest of the state. In 1851, when gold was discovered in the Sierra Nevada Mountains in eastern Kern County, the population of the area grew rapidly. Some new immigrants began ranching in the San Joaquin Valley to supply the miners and mining towns. Ranchers grazed cattle and sheep, and farmers dry-farmed or used limited irrigation to grow grain crops, leading to the creation of small agricultural communities throughout the valley.

After the annexation, the southern San Joaquin Valley became significant as a center of food production for this new influx of people in California. The expansive unfenced and principally public foothill spaces were well-suited for grazing both sheep and cattle. As the Sierra Nevadas' gold rush presented extensive financial opportunities, and ranchers introduced new breeds of livestock, consisting of cattle, sheep, and pig.

Along with the dramatic increase of ranching in the southern San Joaquin Valley came the dramatic change in the landscape, as non-native grasses more beneficial for grazing and pasture replaced native flora. After the passing of the Arkansas Act in 1850, efforts were made to reclaim small tracts of land in order to create more usable spaces for ranching. Eventually, as farming supplanted ranching as a more profitable enterprise, large tracts of land began to be reclaimed for agricultural use, aided, in part, by the extension of the railroad in the 1870s.

Following the passage of statewide 'No-Fence' laws in 1874, ranching practices began to decline, while farming expanded in the San Joaquin Valley in both large land holdings and smaller, subdivided properties. As the farming population grew, so did the demand for irrigation. Settlers began reclamation of swampland in 1866 and built small dams across the Kern River to divert water into the fields. By 1880, 86 different groups were taking water from the Kern River. Ten years later, 15 major canals provided water to thousands of acres in Kern County.

During the period of reclaiming unproductive land in the southern San Joaquin Valley, grants were given to individuals who had both the resources and the finances to undertake the operation alone. One small agricultural settlement, founded by Colonel Thomas Baker in 1861 after procuring one such grant, took advantage of reclaimed swampland along the Kern River. This settlement became the City of Bakersfield in 1869, and quickly became the center of activity in the southern San Joaquin Valley and in the newly formed Kern County. Located on the main stage road through the San Joaquin Valley, the town became a primary market and transportation hub for stock and crops, as well as a popular stopping point for travelers on the Los Angeles and Stockton Road. The Southern Pacific Railroad reached the Bakersfield area in 1873, connecting it with important market towns elsewhere in the state and dramatically impacting both agriculture and oil production.

The San Joaquin Valley was dominated by agricultural pursuits until the oil boom of the early 1900s, which saw a shift in the region, as some reclaimed lands previously used for farming were leased to oil companies. The shift of the San Joaquin Valley towards oil production did not halt the continued growth of agriculture. The Great Depression of the 1930s brought with it the arrival of great number of migrants from the drought-affected Dust Bowl region looking for agricultural labor. These migrants established temporary camps in the valley, staying on long past the end of the drought and the Great Depression, and eventually settling in towns such as Bakersfield (Whitley et al. 2014).

## Petroleum and Railway Development

While mining and agriculture led to the settlement of Kern County, the exploitation of the San Joaquin Valley's petroleum resources became the primary industry of the area in the late nineteenth and twentieth centuries. Historically, early European settlers noticed oil seeping from the ground and that Native Americans in the area used it to waterproof their tule balsas (reed boats). The new settlers used the petroleum as axle grease and lubrication for farm machinery. The use of petroleum did not begin in earnest until the Civil War, when the Union's supply of illuminating oil from Confederate sources was interrupted. Kerosene was used as a substitute, and

the Buena Vista Oil Refinery, the first in California, was established for this purpose in 1864, near McKittrick.

The beginning of oil industry development in the southern San Joaquin Valley began on the western side, with the first oil well drilled in 1877 and the first wooden oil derrick raised in 1887. By 1899, there were three oilfields established: (1) on the west side of the valley; (2) McKittrick and Midway-Sunset; and (3) with Kern River on the northeast of Bakersfield. The establishment of the western oilfields was greatly aided by the extension of the rail line to McKittrick in 1893. Thus, the expansion of the railways into the southern San Joaquin Valley was directly tied to, and symbiotic with, the drilling and production of the oil industry.

The McKittrick oilfield was originally established for the exploitation of asphaltum, and was subsequently the site of the first oil well and derrick. The area's rapid oil development was aided by the discovery of Klondike Oil Company's Shamrock Gusher in 1896, which produced, on average, 1,300 barrels per day. Thirty miles west of Bakersfield, the early development of the McKittrick oilfield was initially hindered by its remote location. Growth continued after the railway extension and, by 1914, McKittrick had 270 producing wells that were responsible for the production of 103,000 barrels of oil between 1903 and 1914. By 1943, McKittrick oilfield comprised 1,545 acres, with 250 producing wells and yielding 100 million barrels of oil.

Midway and Sunset oilfields were initially unconnected, separated by the Mount Diablo/San Bernardino baseline. With the first well drilled in the Sunset field in 1891, and systematic production beginning in 1894, the field became economically significant by 1900, when the 18 wells produced 12,500 barrels of oil. Within ten years, this increased to 9.2 million barrels, in large part due to the discovery and exploitation of the Lakeview Gusher in 1909, producing 7 million barrels in the subsequent year. After its development in 1900, Midway field entered heavy production and, by 1916, was producing 32 million barrels. Combined, the Midway and Sunset fields contained 1,710 producing wells. During the 1913-1916 period, the Midway and Sunset fields were responsible for roughly 50% of California's oil production.

The Kern River oilfield originally consisted of a hand-dug pit located 5 miles north of Bakersfield, near the Kern River, in 1899. As the first oilfield on the east side of San Joaquin Valley, its immediacy to Bakersfield and the main railway lines stimulated rapid development. By 1900, the field comprised 130 producing wells with a Southern Pacific railroad spur line. The field continued to thrive, producing 16 million barrels of oil in 1903. Boomtowns sprang up around the area, including Oildale, Oil Center, and Oil City. In turn, Bakersfield prospered from this proximity, eventually expanding to absorb these small boomtown communities. By 1914, the Kern River Oilfield covered 10 square miles with 1,675 wells producing 167 million barrels of oil.

The turn of the twentieth century brought with it the demand for crude oil, as it became the primary source of fuel for ships, railroad locomotives, automobiles, and farm machinery. In contrast to previous oil production procedures, which were primarily comprised of guesswork and hard labor, new efforts were made at standardization. Scientific methods were used to gauge

where to place oil derricks and pipelines, as well as new drilling techniques to minimize loss of oil.

In order to compensate for the growth of the oil industry, the southern San Joaquin Valley experienced a growth in small oil towns and settlements. Even with the advancement of railroads in the region, many of the most profitable oilfields were in remote locations, often requiring horse drawn carriages to haul barrels of oil to the railroads. These "lease towns," often no more than campsites, sprang up along the most commonly used routes, acting as housing for both laborers and their families. The larger oil companies formalized these sites, building bunk and boarding houses for their workers. The Sunset Railroad, jointly owned by the Southern Pacific and Santa Fe railroad companies, serviced the west side of the oilfields and was greatly responsible for the development of both the McKittrick and Midway-Sunset oilfields. The 1909 extension 7 miles beyond Maricopa, "Siding Two," was created to reach Midway-Sunset Field. The resulting settlement at this siding, originally called "Boost City," later "Moron," and finally "Taft," continues to be the largest community on the west side. Other such settlements have continued on today, originating in towns such as Fellows, Maricopa, McKittrick, and Oildale.

In 1903, the Standard Oil Company completed a 280-mile pipeline from the Kern River oilfield to its Point Richmond refineries on San Francisco Bay. The high viscosity of the oil from the Kern River oilfield required heating at pumping stations along the pipeline so that it flowed easily. Other pipelines connected the region's oilfields to nearby towns like Bakersfield or to railroad stations where it could be loaded into tank cars. In nearly all of the area's oilfields, producers were forced to develop new techniques to remove water or to prevent water from getting into their wells. Because of these advances, production in the Kern County oilfields rose steadily to meet the growing demand, and California became the nation's leading oil producing state in 1903. California produced over 24 million barrels that year, with approximately 70%coming from Kern County.

While the largest oil corporation, Standard Oil, was broken up by the U.S. Government in 1911, the vitality of the oil industry was safeguarded by the massive amounts of capital the monopolies had devoted to developing the industry, which experienced standardization in exploration and technology, and business conglomeration and organization. The industry became increasingly important economically due to the parallel development of the automobile and the growing need for gasoline. Though industrial standardization was slow, the history of oil drilling technology and production is particularly important for understanding the archaeology of the oilfields. The majority of the historical material culture in the oilfields comprises remnants of petroleum exploration, extraction, and movement. Despite the fact that industrial changes were far from uniform or synchronous (even within a single oilfield), the following summary is useful when looking at the oilfields material cultural record.

Initial drilling technology in the California fields involved the use of so-called cable (or percussion) rigs. These used wooden frame derricks to hoist the drill bit attached to a stem, and subsequently to insert or remove lengths of pipe down-hole. Once the well was drilled, a pump was erected within the derrick structure. Initially these were wooden "walking beam" pumps. Operating the derrick and the pump required an engine or motor of some kind, and a power

source. A variety of belts (subsequently chains) and pulley wheels (eventually gears) were also required, along with one or more (wooden) tanks.

Due to earthquake faulting, and the resulting small size of the subterranean petroleum pools, California oilfields developed more densely than oilfields in other parts of the world (where, a single well/pump may access a much larger underground reservoir). World War II disrupted the development of oilfield equipment and, following the war, internal combustion engines were used to run the drills and pumps.

Although the rotary drilling rig was introduced in 1908, cable rigs were initially still standard, especially in the California oilfields. Until the development of better rotary drill bits and circulating fluids, older technology was more efficient with difficult down-hole conditions. Initially, rotary rigs continued to be constructed with wooden derricks. Due to the variable down-hole conditions in the California fields, combination rigs, which allowed drillers to switch between cable-percussion and rotary bits and set-ups, were also employed.

Metal derricks, replacing the old wooden structures, were introduced locally in 1924 and allowed more flexibility to local field conditions. Although in theory metal derricks could be placed on the ground surface, most were built on concrete foundations with foundation bolts holding them in place. Derrick size (height and dimensions of base) was a function of well depth, and length of the necessary piping. In general terms, California oilfields required additional and heavier piping, resulting in larger derricks. However, no clear size distinction exists between derricks for cable versus rotary rigs, or wooden as opposed to metal construction.

Although earlier examples exist in other parts of the country, practical use of portable drilling rigs occurred in the region in 1940. This eliminated the need for a foundation, ultimately resulting in a pump jack resting on a small concrete foundation or pad.

The destabilization of the oil market during the period of the Great Depression was alleviated by the onset of World War II, which revived the industry and brought with it bigger, more global markets. The abandonment of Anti-Trust laws by the U.S. Government allowed oil production to increase 30% by the end of the war. With the number of vehicles in the United States doubling by 1950, the oil industry was permanently on the rise.

The 1960s began a new era of automation in the oil industry. Automated production machinery required minimal maintenance, and the well-developed regional infrastructure of the southern San Joaquin Valley allowed workers to live in more urban centers such as Bakersfield, eliminating the need for lease towns, which began to decline in population.

The practice of well stimulation by hydraulic fracturing began in the 1940s in California. However, hydraulic fracturing and other forms of well stimulation activity are brief and, once completed, do not result in the installation of surface equipment different from equipment used for wells that have not been stimulated. Therefore, well stimulation and other well stimulation treatment is not associated with historical resources impacts distinct from those of oilfields in general.

Based on the above discussion, and taking into account potential variation, the chronological trends in oilfield technology and their archaeological indicators are as follows:

- Most (but not all) wooden derricks lack concrete foundations and pre-date ca. 1924. The archaeological record at these locations typically includes a standing well-pipe, substantial quantities of wire-cut nails and (potentially) milled wood fragments, along with sumps.

- Most steel derrick remnants date between ca. 1924 and 1940. These typically include a standing well-pipe, four large concrete derrick foundations arrayed in a square or rectangle, and a series of additional concrete foundations for the pumpjack and motors, set-up in-line with the well-head. Because some set-ups of this type were enclosed in wooden sheds, milled wood fragments and wire-cut nails may also be present, along with sumps and other features.

- Potential cultural resources resulting from portable drilling rigs, post-dating about 1940, primarily consist of a standing well-pipe and flat concrete pad for the pumpjack with minimal other remains. In many cases, it may not be possible to determine whether resources of this type are 70, 50, or even 20 or 10 years old, based on the archaeological record.

- Boilers primarily will pre-date World War II. Because they were located a few hundred feet from the pumpjack, for safety purposes, they are expected to be encountered in isolation of other resources.

Table 4.5-1 lists the oilfields in the study area and their approximate creation dates. (Due to inconsistencies in the available records, certain dates represent the designation dates of oilfield rules and, thus, field delineations, whereas others are approximate initial exploration dates.) Based on oilfields in the Project Area and their approximate creation dates, ~20% of the oilfields date from 1925 or earlier (including 13% of the total that are over 100 years old), ~22% from 1926 – 1940, ~48% from 1941 to 1970, and ~9% after that date (Whitley et al. 2014).

The historical archaeological implications of the oilfield chronology are that:

- ~42% of the oilfields may have historical industrial remains.
- These are also fields with the longest history of use and, therefore, disturbance, resulting in the least likelihood that historical sites will maintain integrity.
- The remaining oilfields post-date 1940 and for that fact are less likely to include historical sites that meet the 50 years minimum age criterion for significance.

However, because the archaeological signature of post-war oil technology is very similar to that dating from the 1970s, it is often not possible to affirmatively establish, on the basis of the archaeological record alone, that mid-century oil industry remains meet the age criterion as

historical resources. The practical implication is that the large majority of potential identifiable oil industry historical sites will occur in the oilfields that pre-date World War II.

**Table 4.5-1: Kern County Oilfields**

| Delineated Oilfields | Date Founded | Delineated Oilfields | Date Founded | Delineated Oilfields | Date Founded |
|---|---|---|---|---|---|
| Ant Hill | 1944 | Kern Front | 1912 | Shale Flats Gas (Abd) | 1960 |
| Antelope Hills | 1942 | Kernsumner (Abd) | 1961 | Shale Point Gas | 1956 |
| Antelope Plains Gas (Abd) | 1950 | Lakeside | 1960 | Coles Levee, South | 1938 |
| Asphalto | 1923 | Landslide | 1985 | Lakeside, South (Abd) | 1960 |
| Beer Nose | 1968 | Los Lobos | 1951 | Stockdale | 1962 |
| Belgian Anticline | 1946 | Lost Hills | 1910 | Strand | 1939 |
| Bellevue | 1944 | McClung (Abd) | 1943 | Tejon | 1935 |
| Blackwells Corner | 1941 | McDonald Anticline | 1945 | Tejon Flats (Abd) | 1953 |
| Bowerbank | 1942 | McKittrick | 1896 | Tejon Hills | 1948 |
| Buena Vista | 1909 | Monument Junction | 1989 | Temblor Hills | >1970 |
| Buttonwillow Gas (Abd) | 1926 | Mountain View | 1933 | Temblor Ranch | 1900 |
| Cal Canal Gas | 1977 | Antelope Hills, North | 1950 | Ten Section | 1936 |
| Calders Corner | 1949 | Belridge, North | 1912 | Trico Gas | 1934 |
| Canal | 1937 | Coles Levee, North | 1938 | Union Ave. | 1941 |
| Canfield Ranch | 1938 | Tejon, North | 1956 | Valpredo | 1961 |
| Capitola Park | 1960 | Edison, Northeast | 1935 | Wasco | 1937 |
| Carneros Creek | 1976 | Lost Hills, Northwest | 1953 | Welcome Valley | 1952 |
| Chico Martinez | 1927 | Semitropic Gas, NW (Abd) | 1935 | Bellevue, West | 1957 |
| Comanche Point | 1921 | Paloma | 1939 | Jasmin, West (Abd) | 1959 |
| Cymric | 1909 | Pioneer | 1950 | Wheeler Ridge | 1922 |
| Devils Den | 1910 | Pleito | 1954 | White Wolf | 1960 |
| Temblor, East (Abd) | 1953 | Poso Creek | 1920 | Yowlumne | 1974 |
| Edison | 1928 | Rio Bravo | 1937 | Rose | >1970 |
| English Colony | 1963 | Rio Viejo | 1975 | Midway -Sunset | 1894 |
| Fruitvale | 1928 | Rosedale | 1951 | Round Mountain South | 1927 |
| Garrison City Gas (Abd) | 1959 | Rosedale Ranch | 1945 | Cienega Canyon | 1926 |
| Gonyer Anticline (Abd) | 1956 | Round Mountain | 1927 | Pyramid Hills | 1940 |
| Goosloo | 1952 | San Emidio Nose | 1958 | Dyer Creek | 1941 |

**Table 4.5-1: Kern County Oilfields**

| Delineated Oilfields | Date Founded | Delineated Oilfields | Date Founded | Delineated Oilfields | Date Founded |
|---|---|---|---|---|---|
| Greeley | 1936 | San Emigdio (Abd) | 1948 | Mount Poso | 1926 |
| Jasmin | 1946 | Semitropic | 1935 | Railroad Gap | 1964 |
| Jerry Slough (Abd) | 1956 | Seventh Standard | 1966 | Elk Hills | 1911 |
| Kern River | 1899 | Shafter (Abd) | 1941 | Shafter, North | 1983 |
| Kern Bluff | 1944 | Shafter SE Gas (Abd) | 1954 | Belridge, South | 1911 |

Source: Whitley et al. 2014

# Paleontological Setting

The description of the paleontological setting is provided as described by Deméré and Donohue (2015) of the Department of PaleoServices, San Diego Natural History Museum, in the paleontological resources technical report for ASM Affiliates, Inc. (Appendix P). The Project Area has a geologic history that extends back in time almost 160 million years. This history is recorded in the thick sequence of sedimentary and igneous rock units that mostly underlie the floor of the San Joaquin Valley, but also are exposed in the upland areas that surround the valley to the east, south, and west. Geologic events documented in these strata include periods of marine inundation when the waters of the ancestral Pacific Ocean flooded the region and sediments accumulated on the ancient sea floor. These fine-grained marine strata would later become the source rocks of the future hydrocarbon riches of the valley. Additional geologic events documented in the deeply buried strata include periods of low sea level and the accumulation of sediments derived directly from surrounding uplands and deposited by regional rivers and alluvial fan systems. These coarser-grained deposits would later become the reservoir rocks that today serve as traps for migrating oil and gas resources. More recent geologic events document the final retreat of marine waters as the uplift of the Coast Ranges by regional tectonic processes (i.e., faulting and folding) and eventually created a permanent physical barrier between the valley and the Pacific Ocean (Deméré and Donohue 2015).

Another important aspect of the history of the region is the biological history of the organisms, including large-bodied and small-bodied vertebrates, invertebrates, and plants that lived and died in the ancient marine and non-marine environments, and whose remains and traces are preserved today as fossils in the sedimentary rocks of the Project Area. These fossils document not only the startling changes in the past biological diversity of the region, but also the complexity of the ecosystems supporting that diversity and the dramatic fluctuations in climate that continue to the present. The rock units preserving the majority of this geologic and paleontological history are sparingly exposed at the surface today, largely in the upland regions of the Western Subarea and Eastern Subarea. This patchwork of bedrock exposures is the result of a combination of plate tectonic forces expressed as regional uplift, folding and faulting and surficial forces expressed as weathering, erosion, and sedimentation. Although not all of the rock units exposed today in the

Project Area contain significant paleontological resources, a majority of these deposits do. Generally, no fossils are preserved in basement rocks nor in recent sediments less than 10,000 years old. Marine fossils known from the Project Area include a diverse and abundant array of marine animals and plants dating from 140 to 42.5 million years (Ma). Non-marine fossils represent diverse, although less numerous, assemblages dating from 68 Ma to 10,000 years B.P.

## Basement Rocks

Basement rocks of late Paleozoic to Mesozoic age (~300 to 66 Ma) flank the Project Area to the south and east, and consist of intrusive igneous rocks (e.g., granite) and high-grade metamorphic rocks. The majority of the basement complex rocks are granitics from the intrusion of the Sierra Nevada Batholith in Mesozoic time (~167 to 67 Ma). Basement rocks are primarily located adjacent to the eastern uplands of the Eastern Subarea. They are also found within the San Emigdio and Tehachapi Mountains in the southern portion of the Project Area, in both the Western and Eastern Subareas (Deméré and Donohue 2015).

## Franciscan Complex

The Franciscan Complex represents a suite of deepwater marine sedimentary and volcanic rocks of a subduction zone and associated accretionary wedge that formed adjacent to the North American Plate during Mesozoic time. The highly deformed mélange is believed to have been deposited in the late Jurassic to late Cretaceous (~160 to 68 Ma) within, and adjacent to, the subduction zone. As the oceanic tectonic plate descended into the mantle beneath the North American Plate, deep marine sedimentary rocks and volcanic rocks (basalt generated at a seafloor spreading location) were scraped off the descending plate and welded to the North American Plate. This accretionary process led to complex deformation including faulting, folding, and metamorphism. The Franciscan Complex is found in the Temblor Range at the northwest edges of the Project Area (Deméré and Donohue 2015).

## Gravelly Flat Formation

The Gravelly Flat Formation is the lowermost (i.e., oldest) member of the Cretaceous, deep marine, sedimentary rocks known collectively as the Great Valley Sequence. The formation was deposited in a deep marine, forearc basin in late Jurassic to early Cretaceous time (~150 to 75 Ma). The type section consists of dark gray to olive brown shale, with interbeds of dark colored, brown-weathering, graywacke sandstones. Outcrops of the Gravelly Flat Formation are found in the Temblor Range within the northwestern most portion of the Project Area. Prominent exposures occur on either side of State Route 46, and a larger area of outcrop occurs just south of Bitterwater Creek (Deméré and Donohue 2015).

## Hex Claystone

The Hex Claystone is a nearly homogenous, gray marine claystone of early Cretaceous age (~145 to ~100 Ma). It consists of gray bentonitic claystones with scattered fragments of oolitic limestone that transition westward into light blue tuffaceous shale with abundant gypsum veins. The Hex Claystone was likely injected as a plastic mass along fault planes between the Gravelly

Flat Formation and Panoche Formation, which is suggested by the strong plastic deformation of the formation and because it is bounded by faults. Because of the complex depositional history of the Hex Claystone its precise stratigraphic placement cannot be determined and the assigned early Cretaceous age is based on the presence of diagnostic fossils (e.g., cephalopods and foraminiferans). One minor outcrop of the Hex Claystone occurs within the northwestern most portion of the Project Area, east of the Devil's Den Field, and north of State Route 46 (Deméré and Donohue 2015).

## Panoche Formation

The Panoche Formation is the uppermost (i.e., youngest) rock unit in the Cretaceous-age Great Valley Group exposed within the Project Area. The Panoche Formation was deposited in a submarine fan complex during late Cretaceous time (~75 to 68 Ma) and the deposits consist of "interbedded concretion-rich light-colored sandstone and dark-gray clay shale or claystone." The Panoche Formation is widely exposed within the Temblor Range in the Western Subarea. Prominent outcrops occur in the northwestern corner of the Project Area (east of the Devil's Den Field) and extend southward (Deméré and Donohue 2015).

## Pattiway Formation

The Pattiway Formation is a marine sedimentary rock unit located in the Western Subarea. Paleomagnetic analyses indicate a middle Paleocene age (60.9 to 58.0 Ma). The Pattiway Formation ranges from olive gray to dark gray siltstone with interbeds of claystone and sandstone with localized concretions, to light olive gray fine- to medium-grained sandstones with some graded bedding. Conglomerate lenses also occur within the Pattiway Formation, suggesting it was deposited in a submarine fan complex. Conglomerates consist of yellow-gray to pale green-gray, lenticular, massive to thickly bedded, channelized sequences of pebble to boulder conglomerate. The Pattiway Formation is one of the only Paleocene-aged formations to crop out in the southwestern San Joaquin Valley. It is unconformably overlain by the Simmler Formation, and the base of the formation has not yet been exposed. The Pattiway Formation is located in a narrow, 3-mile-long outcrop belt in the southwesternmost corner of the Project Area, at the southern Project boundary (Deméré and Donohue 2015).

## Lodo Formation

The Lodo Formation is a Paleocene- to Eocene-aged (~59 to 50 Ma), deepwater marine, sedimentary rock unit composed of soft gray claystone, mudstone, and shale. The Lodo Formation occurs as a narrow (about 0.25 mile thick), 9-mile-long band within the Temblor Range of the west-central portion of the Project Area, just north of State Route 58 (Carrisa Highway). This outcrop is the southernmost extent of the formation (Deméré and Donohue 2015).

## Tejon Formation

The Tejon Formation is a middle-Eocene-aged (~49 to 39 Ma), marine, sedimentary rock unit deposited during a major marine transgressive–regressive cycle and has been subdivided into four members. These include, in ascending order: (1) the basal Uvas Conglomerate, a nearshore high

energy breccia, sandstone, and conglomerate transgressive facies; (2) the Liveoak Shale, an offshore sandstone and shale facies; (3) the Metralla Sandstone, a regressive shallow marine sandstone facies with interbedded conglomerate and shale; and (4) the Reed Canyon Siltstone, a shallow marine to brackish water sandy siltstone facies with lenses of coal and carbon debris. The Tejon Formation is the oldest Cenozoic sedimentary rock unit found along the southern margin of the San Joaquin Valley in the San Emigdio and western Tehachapi Mountains (Western and Eastern Subareas) (Deméré and Donohue 2015).

## Avenal Sandstone

The Avenal Sandstone is a middle-Eocene-aged (~48 to 40 Ma), non-marine to shallow marine, sedimentary rock unit. Within the Project Area, the Avenal Sandstone occurs as two thin lenses in the Western Subarea. The southern lens is located adjacent to Media Agua Creek in the Temblor Range (west of the Carneros Creek Field), and is approximately 2 miles long, while the smaller northern lens is located at Point of Rocks, north of Antelope Valley (west of the Welcome Valley Field), and is approximately 0.5 mile long. Both lenses consist of fine-grained sandstones, suggesting upper sand flat and shoreface paleoenvironments (Deméré and Donohue 2015).

## Kreyenhagen Shale

The Kreyenhagen Formation is a middle-Eocene-aged (~48 to 37 Ma), marine, sedimentary rock unit composed predominantly of shales, claystones, siltstones, and sandstones. In general, the Kreyenhagen Formation records a dramatic marine transgression of the Eocene San Joaquin Basin and represents a deepwater marine environment, although some parts of the formation represent submarine fan deposits. The Kreyenhagen Formation occurs within the northwestern portion of the Project Area, and crops out for approximately 30 miles within the Temblor Range. East of the Bacon Hills, exposures of the Kreyenhagen Formation are as much as 2.5 miles across (Deméré and Donohue 2015).

## San Emigdio Formation

The San Emigdio Formation is an Eocene-aged to late Oligocene age (~48 to 24 Ma), shallow, marine rock unit that generally represents a transgressive-regressive marine sequence from deepwater marine to shallow water delta. The San Emigdio Formation consists of medium- to coarse-grained sandstone, bioturbated fine-grained sandstones, and nearshore marine sandstones. This formation is prominently exposed in the San Emigdio Mountains of the southern portion of the Western Subarea (Deméré and Donohue 2015).

## Wagonwheel Formation

The Wagonwheel Formation is an upper Eocene-aged (~38 to 35 Ma), deepwater marine, sedimentary rock unit consisting of sandstones and clayey shales. The interpreted depositional environment of the Wagonwheel Formation is the interface between the continental shelf and continental slope; however, fossils also indicate a very rare cold seep environment. This formation has a very limited area of exposure in the Western Subarea, consisting of one small (2.5 miles in length) outcrop just west of Wagonwheel Mountain (Deméré and Donohue 2015).

## Walker Formation

The Walker Formation is a non-marine sedimentary rock unit of late Eocene to earliest Miocene age (~38 to 23 Ma). The Walker Formation has two facies that have distinct stratigraphic horizons, lithologic characters, and depositional styles geographically separated by the Bakersfield Arch. The axis of the Bakersfield Arch underlies and roughly parallels the channel of the lower Kern River. North of the Kern River, deposits of the Walker Formation are late Eocene to Oligocene in age, and contain a sequence of volcanic lahar deposits. South of the Kern River, deposits of the Walker Formation are Oligocene to early Miocene in age, and are fluvial in origin. The geology is complex, but generally consists of claystones and sandstones with volcanic tuff layers. The Walker Formation has a limited area of outcrop in the Eastern Subarea and is confined to the east side foothill region between Poso Creek to the north and Caliente Canyon to the south (Deméré and Donohue 2015).

## Bealville Fanglomerate

The Bealville Fanglomerate is a late Oligocene to early Miocene-aged (~35 to 18 Ma), terrestrial deposit consisting of light gray, poorly consolidated boulder debris flows, talus, and colluvium along Bealville Road, on the south side of Caliente Canyon, west of Caliente. There are a number of debris flow episodes recorded within the fanglomerate, while the remainder of the formation was likely deposited as part of a near-source alluvial fan. A single exposure of the Bealville Fanglomerate that is approximately 3 miles wide and 2.5 miles long is located in the Tehachapi Foothills, south of Caliente Creek, near Bena, California (Deméré and Donohue 2015).

## Vedder Sand

The Vedder Sand is an Oligocene-aged (~34 to 24 Ma), marine, sedimentary rock unit that is primarily found in the subsurface, but has a limited area of outcrop north of Poso Creek. The formation consists of light gray, fine- to medium-grained, well-sorted sandstone, with locally well-cemented horizons. The Vedder Sand is present in several northeast trending outcrops to the north of Poso Creek, about 15 miles northeast of Bakersfield (Deméré and Donohue 2015).

## Pleito Formation

The Pleito Formation is an Oligocene to early Miocene-aged (~34 to 22 Ma), marine, sedimentary rock unit and consists of basal white, tan, or yellowish-brown, massive to thickly bedded, medium- to coarse-grained sandstones with conglomerate horizons. These lower strata transition to gray, micaceous shales in the middle section, and are capped by massive yellow and gray medium- to coarse-grained sandstones at the top of the unit. The lower and upper sandstones of the Pleito Formation represent shallow marine depositional environments, while the middle shale was deposited in a deep marine environment, indicating fluctuations in sea level and/or tectonic events during the Oligocene. The Pleito Formation is prominently exposed in the San Emigdio Mountains of the southern portion of the Western Subarea (Deméré and Donohue 2015).

## Simmler Formation

The Simmler Formation is an Oligocene to early Miocene-aged (~34 to 22 Ma), non-marine, sedimentary rock consisting of red and greenish-gray, well bedded sandstones, siltstones, and cobble conglomerate. A large, 3-mile-long by 2-mile-wide exposure of the Simmler Formation is found in the southwestern corner of the Project Area, just south of Bitter Creek and the San Andreas Fault Zone (Deméré and Donohue 2015).

## Vaqueros Formation

The Vaqueros Formation is an Oligocene to early Miocene-aged (~34 to 22 Ma), marine, sedimentary rock unit that was first named for exposures of sandstones along Vaqueros Creek near King City. The Vaqueros Formation consists of grayish-yellow to yellowish-gray, fine- to medium-grained, regularly bedded sandstones, with intervals of pebble conglomerate. The Vaqueros Formation has a very limited area of outcrop in the Project Area, being confined to a single 0.5-mile-long exposure in the southwestern corner of the Western Subarea, adjacent to the San Andreas Fault Zone (Deméré and Donohue 2015).

## Tecuya Formation

The Tecuya Formation is an Oligocene to middle Miocene-aged (~28 to 18 Ma), predominantly coarse-grained rock unit that was deposited in a large alluvial-fan to delta-fan system during a major marine regression. The formation consists of an upper and lower non-marine stratigraphic sequence, with a middle volcanic rock unit. In its easternmost areas of outcrop, the depositional environment of the Tecuya Formation is interpreted to have been a broad alluvial fan system with strata dominated by alternating debris-flow and braided-stream deposits. The base of the formation is a matrix- to clast-supported, pebble to boulder conglomerate unit with occasional horizons of coarse-grained sandstone and mudstone. The Tecuya Formation thins to the west, and clast size generally decreases in that direction, reflecting a general transition in depositional environments from an alluvial fan to a delta fan. The Tecuya Formation crops out within the southern portions of the Western and Eastern Subareas, on the north-facing flanks of the San Emigdio and Tehachapi Mountains (Deméré and Donohue 2015).

## Temblor Formation

The Temblor Formation is an Oligocene to middle Miocene-aged (~28 to 18 Ma), predominantly marine, sedimentary rock unit. It is geologically complex along its nearly 100 miles of outcrop in the southern San Joaquin Valley, and consists of shallow marine, deep marine, and terrestrial deposits. Seven members have been formally recognized in the Temblor, and include, from oldest to youngest, the Cymric Shale, the Wygal Sandstone, the Santos Shale (lower and upper units), the Agua Sandstone, the Carneros Sandstone, the Media Shale, and the Buttonbed Sandstone. Generally, these members represent transitions between shales deposited in deeper, outer continental shelf conditions, and sandstones deposited in shallower, inner continental shelf conditions. The Temblor Formation has extensive surficial exposures in the Temblor Range and San Emigdio Mountains of the Western Subarea (Deméré and Donohue 2015).

## Freeman Silt/Jewett Sand

The Jewett Sand and Freeman Silt are early Miocene-aged (~22 to 17 Ma), marine rock units that primarily occur in the subsurface. Surface exposures of these two formations are difficult to differentiate in outcrop because of their similar appearance; for this reason, they are often lumped together as a single rock unit designated as the Freeman Silt/Jewett Sand. The Jewett Sand in outcrop is generally very fine- to fine-grained, silty sandstone with reddish-brown concretions. In outcrop, the Freeman Silt is generally a light gray, sandy to clayey, micaceous siltstone. The Freeman Silt and Jewett Sand crop out in the Sierran foothills north of the Kern River, both north and south of Poso Creek, and about 15 miles northeast of Bakersfield (Deméré and Donohue 2015).

## Olcese Sand

The Olcese Sand is an early Miocene-aged (~19 to 17 Ma), primarily marine rock unit that consists of a lower portion of very fine-grained, silty sandstone with interbedded sandy and clayey siltstone; a middle portion that is non-marine in origin and consists of bluish-gray, fine- to coarse-grained sandstone (often pumaceous and cross-bedded), with interbedded pebbly sandstones; and an upper portion that grades into siltstones of the overlying Round Mountain Silt and typically consists of light gray to tan, very fine- to fine-grained sandstone and sandy siltstone with interbeds of tuffaceous sandstones. The Olcese Sand was deposited during a series of marine transgressions and regressions. Marine strata in the lower part of the formation suggest a middle-shelf paleoenvironment, while marine strata in the upper part of the formation suggest depositional environments from shelf-edge to strandline. Non-marine strata in the middle part of the formation suggest deposition in braided stream and tidally dominated deltaic settings. The Olcese Sand crops out in the foothills of the western Sierras, northeast of Bakersfield, and to the south in the Tejon Hills (Deméré and Donohue 2015).

## Bena Gravel

The Bena Gravel is a middle to late Miocene-aged (~18 to 11 Ma), coarse-grained, terrestrial to marine geologic deposit that occurs at three distinct locations within the Eastern Subarea. The type section of the Bena Gravel at Caliente Canyon east of Bakersfield exposes poorly bedded and poorly sorted medium- to very coarse-grained pebbly sandstone, and sandy pebble-cobble conglomerate that is mostly friable but clayey, and is light gray to grayish yellow in color. North of Kern River, the Bena Gravel includes a paralic facies that both underlies and overlies the fluvial facies and contains a fining upward sequence of sandstone, siltstone, and claystone that is interbedded with the typical conglomerates of the fluvial facies. In the Tejon Hills region, a fluvial facies of the Bena Gravel can be found (Deméré and Donohue 2015).

## Caliente Formation

The Caliente Formation is a middle to late Miocene-aged (~17 to 5 Ma), non-marine, sedimentary rock unit with three members. The lower member consists of reddish brown to gray, massive to thickly bedded, coarse-grained sandstone and conglomerate deposited in a braided river system. The middle member consists of reddish brown thickly bedded sandstone and siltstone that grade

upward from medium- to coarse-grained sandstone to fine-grained sandstone and siltstone, representing fluvial deposits with an increasing lacustrine influence. Occasional channelized sandstone and gravel beds are found throughout this member. The upper member predominantly consists of pale brown to pink mudstone and claystone with a dark brown bentonite rich claystone bed, the Lockwood Clay. Two small, 0.5-mile-long and 0.25-mile-wide exposures of the Caliente Formation occur in the Western Subarea. The first is approximately 2.0 miles north of the southwestern most corner of the Project Area boundary, and the second is approximately 1.0 mile east of the southwestern most corner of the Project Area boundary (Deméré and Donohue 2015).

## Round Mountain Silt

The Round Mountain Silt is a marine sedimentary rock unit of middle Miocene age (~16 to 13 Ma). The lower siltstone facies consists of light brown interbedded siltstone and sandy siltstone containing locally abundant micro- and macro-fossils indicative of inner to outer shelf water depths. This lower siltstone facies interfingers with strata of the underlying Olcese Sand. A middle diatomite facies consists of thick sequences of pure diatomite and diatomaceous shale with thin interbeds of siltstone and tuff. Microfossils (diatoms) from this facies are indicative of an open ocean paleoenvironment. The upper siltstone facies primarily consists of grayish tan, massive clayey and sandy siltstones, with local sequences of cross-bedded sandstones and pebble conglomerates. Taphonomic analysis suggests the world famous Sharktooth Hill bone bed (which occurs in the upper siltstone facies) formed over a period of ~700,000 years, between 16 and 15 Ma ago, coincident with a significant transgressive-regressive cycle. The Round Mountain Silt has a limited area of surface exposure in the Eastern Subarea that is confined to the foothills of the Sierras east of Bakersfield from Poso Creek in the north to Cottonwood Creek in the south (Deméré and Donohue 2015).

## Monterey Formation

The Monterey Formation is a widespread and geologically complex marine sedimentary rock unit of middle to late Miocene age (~16 to 8 Ma). This rock unit is the major source rock for hydrocarbons throughout its area of occurrence. The Monterey Formation is characteristically known for its siliceous sediments, which range from soft diatomites to well cemented cherts and porcelanites. However, the formation also contains extensive sequences of phosphatic- and carbonate-rich strata that reflect the diversity of paleoenvironments in which the Monterey Formation was deposited. The Monterey Formation has extensive surficial exposures in the Temblor Range, and minor exposures in the San Emigdio Range of the Western Subarea (Deméré and Donohue 2015).

## Santa Margarita Formation

The Santa Margarita Formation is a late Miocene-aged (~12 to 8 Ma), shallow marine to marginal marine, sedimentary rock unit. Typical exposures of the Santa Margarita Formation consist of white, generally poorly consolidated, massive to cross-bedded, coarse-grained sandstones that laterally grade into fine- to medium-grained sandstone or pebble conglomerate. The Santa Margarita Formation is exposed in the Temblor Range west of Fellows, where the northwest-

trending outcrops of this rock unit underlie the western portion of the Midway-Sunset Field (Deméré and Donohue 2015).

## Chanac Formation

The Chanac Formation is a late Miocene-aged (~11 to 9 Ma), non-marine rock unit. Typical exposures consist of pale yellow brown sandy mudstones and brown clayey sandstones, with interbeds of light gray, friable, coarse-grained, pebbly sandstones containing deeply weathered plutonic clasts. These strata are generally referred to as fanglomerates and grade downward and laterally into finer-grained marine sedimentary rocks. The Chanac Formation is exposed in the western Sierra foothills, north of Kern River, and in the Tejon Hills near Arvin (Deméré and Donohue 2015).

## Bitterwater Creek Shale

The Bitterwater Creek Shale is a late Miocene to possible early Pliocene-aged (~10 to 5 Ma) marine deposit. Typical exposures of the Bitterwater Creek Shale consist of pale brown, yellowish brown, pale olive green, or greenish gray, siliceous shales that are thinly bedded to indistinctly bedded. A pebble conglomerate facies with well-rounded granitic and sedimentary clasts, and occasional claystone and siltstone lenses, is also reported. The Bitterwater Creek Shale has been complexly folded, and its easily eroded nature makes outcrop study difficult. It is generally known that the onset of deposition occurred in the late Miocene, and potentially extended into the Pliocene. An 8-mile-long by 3-mile-wide exposure of the Bitterwater Creek Shale Formation is located along CA-33, southwest of Maricopa, California (Deméré and Donohue 2015).

## Kern River Formation

The Kern River Formation is a late Miocene to early Pleistocene-aged (~8.5 to 2 Ma), non-marine, sedimentary rock unit located east of Bakersfield. The Kern River Formation was deposited as a broad, braided-stream, alluvial fan complex draining the western Sierra Nevada. The formation typically consists of light yellow to light brown, poorly sorted, angular to subrounded, massive to crudely bedded, sandstones and conglomerates with occasional interbedded horizons of green to brown siltstone and mudstone that likely represent small ephemeral lakes or ponds. Ash horizons are also present at several intervals within the formation. Conglomerates are most abundant in the easternmost exposures, and the formation becomes finer grained to the west, giving way to medium- to coarse-grained sandstones. The Kern River Formation is an important reservoir of hydrocarbons migrating from underlying, oil-bearing Monterey Formation rocks. The Kern River Formation has a crescent-shaped region of outcrop in the Eastern Subarea that is largely confined to the area north of the Kern River. The outcrop belt is widest between Poso Creek and Rag Gulch, northeast of Bakersfield (Deméré and Donohue 2015).

## Unnamed Miocene Marine Deposits

Two prominent exposures of Miocene-aged marine sediments that are yet to be formally named or described are found within the Eastern Subarea. In the first region, the Tejon Hills, the unnamed sediments are present in two exposures north of the Comanche Point Field. Marine sandstones and siltstones whose age and composition have been debated in the literature have been informally referred to as the "Reserve" Sandstone and Edison Silts and represent a shallow marine phase (Deméré and Donohue 2015).

In the second region, approximately 20 miles northeast of Bakersfield, the sediments occur as an approximately 7.5-mile-long and up to 3.0-mile-wide exposure directly east of the Mount Poso Field. A minor, 0.3-mile-long surficial exposure of the unnamed sediments extends west into the Mount Poso. These sediments were mapped as a lower Miocene marine sandstone that is equivalent in age to the lower portion of the Olcese Sand, and to the undivided Freeman Silt/Jewett Sand. The sandstone ranges from massive to thin-bedded, friable, very fine-grained, and commonly bioturbated (Deméré and Donohue 2015).

## Etchegoin Formation

The Etchegoin Formation is a Pliocene-aged (~5.4 to 4 Ma), shallow marine to estuarine rock unit. In general, the Etchegoin Formation consists of thick sequences of pale yellow to pale brown, massive to cross-bedded, sandy siltstones and fine-to coarse-grained sandstones. These are interbedded with blue, cross-bedded, coarse-grained sandstones to pebble conglomerates. A lacustrine facies is also known from the uppermost part of the formation, in its northern area of outcrop. The blue, pebble, cross-bedded sandstones represent a marine dominated delta complex, while the finer-grained pale yellow and brown sediments represent shallow marine and estuarine facies. A lower member dominated by siltstones with interbedded sandstones and conglomerates and an upper member dominated by sandstones are recognized. The Etchegoin Formation occurs as several minor outcrops within the Western Subarea of the Project Area (Deméré and Donohue 2015).

## Quatal Formation

The Quatal Formation is a Pliocene-aged (~5 to 2.5 Ma), non-marine, sedimentary rock unit generally composed of a lower unit of red, brown, or gray thinly bedded claystones and siltstones with gypsum, and an upper unit of white, light brown, or orange clayey, gypsiferous sandstones with pebbles. A prominent gypsum bed is present at the base of the formation, and was deposited in a lacustrine setting, along with the overlying claystones. The pebbly sandstones were likely deposited in a fluvial system. A thin, about 500-foot-wide, approximately 2.0-mile-long exposure of the Quatal Formation occurs in the southwesternmost corner of the Project Area, bordering the Project boundary (Deméré and Donohue 2015).

## Unnamed Pliocene Deposits

Exposures of Pliocene-aged (~5 to 2.5 Ma), terrestrial to brackish-water sediments, which are yet to be formally named or described, are known from the southern portion of the San Joaquin

Valley. These "terrestrial and marine sediments" have been divided into informal subunits, including a basal terrestrial claystone unit, a brackish water marine claystone unit, a brackish water marine sandstone unit, and an upper terrestrial sandstone unit. Both claystone units consist of greenish gray clay with minor interbeds of sandstone and pebbles, and the sandstones consist of gray sands with interbeds of claystone and pebble conglomerates. The unnamed Pliocene sediments are exposed along Wheeler Ridge in the southern portion of the Western Subarea, directly west of the Interstate 55/State Route 99 interchange (Deméré and Donohue 2015).

## Paso Robles Formation

The Paso Robles Formation is a Pliocene- to late Pleistocene-aged (~5 to 0.1 Ma) fluvial deposit composed of unconsolidated sandstones and siltstones with occasional gravels, clays, and limestone deposits. The majority of the formation was deposited in fluvial environments with sediments derived from the adjacent Temblor Range, but marine facies are known from its westernmost exposures, outside of the Project Area, near Atascadero, California. The Paso Robles Formation is found within the Temblor Range, along the westernmost boundary of the Project Area, spanning from just south of CA-46 in the northwest to CA-166 in the southwest. The formation has been complexly folded and faulted due to movement along the San Andreas Fault Zone and uplift of the Temblor Range (Deméré and Donohue 2015).

## San Joaquin Formation

The San Joaquin Formation is a Pliocene to Pleistocene-aged (~4.0 to 2.2 Ma), shallow marine, estuarine, and lacustrine sedimentary rock unit. Sediments generally consist of thick sequences of massive silty claystones, siltstones, and fine-grained sandstones that are interbedded with blue, cross-bedded, pebbly coarse-grained sandstones to pebble conglomerates. Lacustrine deposits are represented by thick sequences of silty claystones and siltstones, while estuarine and marine deposits are represented by siltstones and sandstones. The blue cross-bedded sandstones represent a marine-dominated delta complex. The San Joaquin Formation is generally subdivided into an upper member and a lower member, both of which are found within the Project Area. The variety of different sediment types found in the San Joaquin Formation document a series of advances and retreats of sea level during the late Pliocene and the eventual permanent withdrawal of marine waters from the San Joaquin Basin in the early Pleistocene. The San Joaquin Formation occurs as one relatively small (about 3 miles long by 0.75 mile wide) exposure within the Western Subarea, between State Route 33 and Interstate 5. This exposure is within the southernmost portion of the Kettleman Hills, on the west flank of South Dome (Deméré and Donohue 2015).

## Morales Formation

The Pliocene to Pleistocene-aged (~4 to 0.1 Ma) Morales Formation consists of fluvial claystones, siltstones, sandstones, and conglomerates with occasional lacustrine horizons. The Morales Formation laterally grades into or interfingers with the Quatal Formation in the lower part where it is predominantly composed of claystones and siltstones. Two exposures of the Morales Formation occur within the Western Subarea. The first exposure is in the southwesternmost corner of the Project Area, bordering the Project boundary, and is

approximately 1.5 miles in length and up to 0.8 mile in width. The second exposure consists of two, approximately 1.75-mile-long linear outcrops in the Temblor Range, just south of State Route 58 (Carrisa Highway) (Deméré and Donohue 2015).

## Tulare Formation

The Pleistocene-aged (2.5 to 0.6 Ma) Tulare Formation predominantly consists of poorly to moderately consolidated claystones, siltstones, sandstones, and conglomerates. Thick sequences of cross-bedded, pebbly sandstone are common, with horizons of conglomerate typically occurring in the upper part of the formation. Laterally extensive, finely bedded claystones and siltstones, and occasional freshwater limestones occur at irregular intervals throughout the formation and represent former lake beds. Ash deposits are found at several horizons within the Tulare Formation. In the subsurface, the Tulare Formation is proposed to be broadly correlative with the upper part of the Kern River Formation, which is its east-side equivalent in terms of depositional setting. Broadly speaking, strata of the Tulare Formation record the transition from the marine conditions that dominated the Miocene and Pliocene history of the San Joaquin Basin and the estuarine, lacustrine, fluvial, and alluvial fan conditions that characterized the Quaternary history of the basin. It is found on the western half of the Project Area (Deméré and Donohue 2015).

## Quaternary Brea Deposits

Quaternary brea (asphalt seep, or "tar pit") deposits of late Pleistocene age (0.4 to 0.1 Ma) consist of oil-soaked unconsolidated sediments that formed when hydrocarbons percolated upwards to the surface along fractures, fault planes, or through permeable deposits. During upward migration and exposure at the surface, the lighter, volatile fraction of the petroleum evaporates, leaving behind viscous asphalt pools that can serve as "sticky animal traps," which entrain animals. Continuous episodes of entrapment can lead to high-density concentrations of well-preserved, asphalt-impregnated bones. Quaternary brea deposits occur within the Western Subarea and are located in the vicinity of McKittrick and Maricopa (Deméré and Donohue 2015).

## Older Alluvial Deposits

The southern San Joaquin Basin has been accumulating sediments derived from uplift and erosion of the surrounding highlands since at least the early Pleistocene (~2.5 Ma), resulting in Quaternary older alluvial deposits several hundred feet thick covering the floor of much of the southern San Joaquin Valley. Older alluvial sediments are generally composed of reworked material from these surrounding highlands (e.g., Kern River Formation in the Eastern Subarea and Tulare Formation in the southwestern San Joaquin Valley). As sedimentation continued into the Holocene (10,000 years to present), the majority of these deposits were buried by deposits of Holocene younger alluvium. Surficial exposures of Quaternary older alluvial sediments generally occur as uplifted ridges (e.g., river terraces), and as large alluvial fan complexes flanking the surrounding uplands. Such older alluvial deposits can often be distinguished from younger alluvial deposits based on the greater number of erosional features (e.g., gullies and badland topography) in the former. Quaternary older alluvial sediments are found within all Subareas of the Project Area. These deposits most commonly flank the lower slopes of the surrounding

uplands, and occur as raised ridgelines in the center of the southern San Joaquin Valley (Deméré and Donohue 2015).

### Holocene Deposits

Holocene-aged (10,000 years to present), alluvial, fluvial and lacustrine sediments make up the majority of the surficial sediments in western Kern County. For the purposes of this section, all Holocene alluvial sediments will be discussed together. Alluvial sediments are found across the floor of the San Joaquin Valley, and drainages and low-lying areas within the surrounding uplands. Sediments are primarily composed of unconsolidated or poorly consolidated clays, silts, sands, gravels, and cobbles that have been reworked from older formations and transported downstream. Much of the alluvial sediments are found in extensive, gravel and cobble rich alluvial fans that are actively building outwards from the base of the surrounding highlands. Other late Holocene depositional environments include rivers and streams, lakebeds, aeolian dunes, recent rock falls, and chemical weathering of granitic and metamorphic highlands. The estimated maximum thickness of Holocene alluvial sediments is 100 feet, but alluvial sediments can be found in veneers as thin as 1 foot. Alluvial sediments are found in all low-lying areas of the Project Area where they cover the majority of the valley floor, and can be found flanking the surrounding uplands as alluvial fan deposits or slope wash deposits. Holocene sediments are still being deposited within active river and stream drainages in the uplands and adjacent outwash plains (Deméré and Donohue 2015).

## 4.5.3 Regulatory Setting

# Federal

### Section 106 of the National Historic Preservation Act

Archaeological resources are protected through the National Historic Preservation Act (NHPA) of 1966, as amended (16 United States Code [U.S.C.] 470f), and its implementing regulation, Protection of Historic Properties (36 Code of Federal Regulations [CFR] Part 800), the Archaeological and Historic Preservation Act of 1974, and the Archaeological Resources Protection Act of 1979. Prior to implementing an "undertaking" (e.g., issuing a federal permit), Section 106 of the NHPA requires federal agencies to consider the effects of the undertaking on historic properties and to afford the Advisory Council on Historic Preservation and the State Historic Preservation Officer a reasonable opportunity to comment on any undertaking that would adversely affect properties eligible for listing in the NRHP. As indicated in Section 101(d)(6)(A) of the NHPA, properties of traditional religious and cultural importance to a tribe are eligible for inclusion in the NRHP. Under the NHPA, a resource is considered significant if it meets the NRHP listing criteria at 36 CFR 60.4.

### National Register of Historic Places

The NRHP was established by the NHPA of 1966, as "an authoritative guide to be used by federal, state, and local governments, private groups and citizens to identify the Nation's historic

resources and to indicate what properties should be considered for protection from destruction or impairment" (36 CFR 60.2). The NRHP recognizes both historical-period and prehistoric archaeological properties that are significant at the national, state, and local levels. In the context of the Project, which does not involve any historical-period structures, the following NRHP criteria are given as the basis for evaluating archaeological resources.

To be eligible for listing in the NRHP, a resource must be significant in American history, architecture, archaeology, engineering, or culture. Districts, sites, buildings, structures, and objects of potential significance must meet one or more of the following four established criteria (U.S. Department of Interior 1995):

- Are associated with events that have made a significant contribution to the broad patterns of our history;
- Are associated with the lives of persons significant in our past;
- Embody the distinctive characteristics of a type, period, or method of construction or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- Have yielded, or may be likely to yield, information important in prehistory or history.

Unless the property possesses exceptional significance, it must be at least 50 years old to be eligible for NRHP listing (U.S. Department of the Interior 1995).

In addition to meeting the criteria of significance, a property must have integrity. Integrity is defined as "the ability of a property to convey its significance" (U.S. Department of the Interior 1995). The NRHP recognizes seven qualities that, in various combinations, define integrity. To retain historic integrity a property must possess several, and usually most, of these seven aspects. Thus, the retention of the specific aspects of integrity is paramount for a property to convey its significance. The seven factors that define integrity are location, design, setting, materials, workmanship, feeling, and association.

### Paleontological Resources Preservation Act

This act aims to manage and protect paleontological resources on federal land, using scientific principles and expertise, and to develop plans for inventorying, monitoring, and deriving the scientific and educational use of such resources.

## State

### California Register of Historical Resources

Created in 1992 and implemented in 1998, the California Register of Historical Resources (CRHR) is "an authoritative guide in California to be used by state and local agencies, private

groups, and citizens to identify the state's historical resources and to indicate what properties are to be protected, to the extent prudent and feasible, from substantial adverse change." Certain properties, including those listed in or formally determined eligible for listing in the NRHP and California Historical Landmarks numbered 770 or higher, are automatically included in the CRHR. Other properties recognized under the California Points of Historical Interest program, identified as significant in historic resources surveys or designated by local landmarks programs, may be nominated for inclusion in the CRHR. A resource, either an individual property or a contributor to a historic district, may be listed in the CRHR if the State Historical Resources Commission determines that it meets one of more of the following criteria, which are modeled on NRHP criteria:

- Criterion 1. It is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.
- Criterion 2. It is associated with the lives of persons important in our past.
- Criterion 3. It embodies the distinctive characteristics of a type, period, region, or method of construction, represents the work of an important creative individual, or possesses high artistic values.
- Criterion 4. It has yielded, or may be likely to yield, information important in history or prehistory.

Furthermore, under 14 California Code of Regulations (CCR) Section 4852(c), a cultural resource must retain integrity to be considered eligible for the CRHR. Specifically, it must retain sufficient character or appearance to be recognizable as a historical resource and convey reasons of significance. Integrity is evaluated with regard to retention of such factors as location, design, setting, materials, workmanship, feeling, and association. Cultural sites that have been affected by ground-disturbing activities, such as grazing and off-road vehicle use, often lack integrity because they have been directly damaged or removed from their original location, among other changes.

Typically, a prehistoric archaeological site in California is recommended eligible for listing in the CRHR based on its potential to yield information important in prehistory or history (Criterion 4). Important information includes chronological markers, such as projectile point styles or obsidian artifacts that can be subjected to dating methods, or undisturbed deposits that retain their stratigraphic integrity. Sites such as these have the ability to address research questions.

## California Historical Landmarks

California Historical Landmarks (CHLs) are buildings, structures, sites, or places that have anthropological, cultural, military, political, architectural, economic, scientific or technical, religious, experimental, or other value and that have been determined to have statewide historical significance by meeting at least one of the criteria listed below. The resource also must be approved for designation by the County Board of Supervisors (or the city or town council in whose jurisdiction it is located), be recommended by the State Historical Resources Commission, and be officially designated by the Director of California State Parks. The specific standards now

in use were first applied in the designation of CHL #770. CHLs #770 and above are automatically listed in the CRHR.

To be eligible for designation as a landmark, a resource must meet at least one of the following criteria:

- It is the first, last, only, or most significant of its type in the state or within a large geographic region (e.g., Northern, Central, or Southern California);
- It is associated with an individual or group having a profound influence on the history of California; or
- It is a prototype of, or an outstanding example of, a period, style, architectural movement or construction, or is one of the more notable works or the best surviving work in a region of a pioneer architect, designer, or master builder.

## California Points of Historical Interest

California points of historical interest are sites, buildings, features, or events that are of local (city or county) significance and have anthropological, cultural, military, political, architectural, economic, scientific or technical, religious, experimental, or other value. Points of historical interest designated after December 1997 and recommended by the State Historical Resources Commission are also listed in the CRHR. No historic resource may be designated as both a landmark and a point. If a point is later granted status as a landmark, the point designation will be retired. In practice, the point designation program is most often used in localities that do not have a locally enacted cultural heritage or preservation ordinance.

To be eligible for designation as a point of historical interest, a resource must meet at least one of the following criteria:

- It is the first, last, only, or most significant of its type within the local geographic region (city or county);
- It is associated with an individual or group having a profound influence on the history of the local area; or
- It is a prototype of, or an outstanding example of, a period, style, architectural movement, or construction, or is one of the more notable works or the best surviving work in the local region of a pioneer architect, designer, or master builder.

## Native American Heritage Commission

Section 5097.91 of the California Public Resources Code (PRC) established the Native American Heritage Commission (NAHC), whose duties include the inventory of places of religious or social significance to Native Americans and the identification of known graves and cemeteries of Native Americans on private lands. Section 5097.98 of the PRC specifies a protocol to be followed when the NAHC receives notification of a discovery of Native American human remains from a county coroner.

## California Public Records Act

Sections 6254(r) and 6254.10 of the California Public Records Act were enacted to protect archaeological sites from unauthorized excavation, looting, or vandalism. Section 6254(r) explicitly authorizes public agencies to withhold information from the public relating to "Native American graves, cemeteries, and sacred places maintained by the Native American Heritage Commission." Section 6254.10 specifically exempts from disclosure requests for "records that relate to archaeological site information and reports maintained by, or in the possession of, the Department of Parks and Recreation, the State Historical Resources Commission, the State Lands Commission, the NAHC, another state agency, or a local agency, including the records that the agency obtains through a consultation process between a Native American tribe and a state or local agency."

## Health and Safety Code, Sections 7050 and 7052

Health and Safety Code Section 7050.5 declares that, in the event of the discovery of human remains outside of a dedicated cemetery, all ground disturbance must cease and the County Coroner must be notified. Section 7052 establishes a felony penalty for mutilating, disinterring, or otherwise disturbing human remains, except by relatives.

## California Penal Code, Section 622.5

California Penal Code Section 622.5 provides for misdemeanor penalties for injuring or destroying objects of historic or archaeological interest located on public or private lands, but specifically excludes the landowner.

## Public Resources Code, Section 5097.5

PRC Section 5097.5 defines as a misdemeanor the unauthorized disturbance or removal of archaeological, historic, or paleontological resources located on public lands.

## Senate Bill 18

Senate Bill (SB) 18, which went into effect on January 1, 2005, requires local governments (city and county) to consult with Native American tribes before making certain planning decisions and to provide notice to tribes at certain key points in the planning process. The intent is to "provide California Native American tribes and opportunity to participate in local land use decisions at an early planning stage, for the purpose of protecting or mitigating impacts to, cultural places" (Governor's Office of Planning and Research 2005).

The purpose of involving tribes at these early planning stages is to allow consideration of cultural places in the context of broad local land use policy, before individual site-specific, project-level, land use designations are made by a local government. The consultation requirements of SB 18 apply to General Plan or Specific Plan processes proposed on or after March 1, 2005.

According to the Tribal Consultation Guidelines: Supplemental to General Plan Guidelines (2005), the following are the contract and notification responsibilities of local governments:

- Prior to the adoption or any amendment of a General Plan or Specific Plan, a local government must notify the appropriate tribes (on the contact list maintained by the NAHC) of the opportunity to conduct consultations for the purpose of preserving, or mitigating impacts to, cultural places located on land within the local government's jurisdiction that is affected by the proposed plan adoption or amendment. Tribes have 90 days from the date on which they receive notification to request consultation, unless a shorter timeframe has been agreed to by the tribe (Government Code Section 65352.3).

- Prior to the adoption or substantial amendment of a General Plan or Specific Plan, a local government must refer to the proposed action to those tribes that are on the NAHC contact list and have traditional lands located within the city or county's jurisdiction. The referral must allow a 45-day comment period (Government Code Section 65352). Notice must be sent regardless of whether prior consultation has taken place. Such notice does not initiate a new consultation process.

- Local governments must send a notice of a public hearing at least 20 days prior to the hearing to tribes who have filed a written request for such notice (Government Code Section 65092).

As this Project involves the amendment of a Zoning Ordinance, Kern County is required to conduct SB 18 consultations with the appropriate tribes.

### Assembly Bill 52

On September 25, 2014, Governor Brown signed Assembly Bill (AB) 52, which amends CEQA (PRC Section 21000, et seq.) to include a new category of "tribal cultural resources." The law requires lead agencies to consider tribal cultural values in their environmental documents, in addition to the scientific and archaeological values that must be evaluated under preexisting provisions of CEQA, when determining impacts and mitigation. The requirements of AB 52 apply to a project for which a notice of preparation of an environmental impact report (EIR) or a notice of negative declaration or mitigated negative declaration was filed on or after July 1, 2015 (PRC Section 21084.3 (c)).

## Paleontological Resources

Consideration of paleontological resources is required by CEQA (see CEQA Guidelines, Appendix G). Other state requirements for paleontological resource management are found in PRC Chapter 1.7, Section 5097.5, Archaeological, Paleontological, and Historical Sites. This statute specifies that state agencies may undertake surveys, excavations, or other operations as necessary on state lands to preserve or record paleontological resources.

No state or local agencies have specific jurisdiction over paleontological resources. No state or local agency requires a paleontological collecting permit to allow for the recovery of fossil remains discovered as a result of construction-related earth moving on state or private land in a project site.

# Local

## Kern County General Plan

The Project Area is located within the Kern County General Plan (KCGP) area and, therefore, would be subject to applicable policies and measures of the KCGP. The Land Use, Conservation, and Open Space Element of the KCGP includes goals, policies, and implementation measures related to cultural resources that apply to the Project, as described below.

### Chapter 1. Land Use, Conservation, and Open Space Element

#### 1.10.3. Archaeological, Paleontological, Cultural, and Historical Preservation

##### Policies

**Policy 25.** The County will promote the preservation of cultural and historic resources which provide ties with the past and constitute a heritage value to residents and visitors.

##### Implementation Measures

**Implementation Measure K.** Coordinate with the California State University, Bakersfield Archaeology Inventory Center.

**Implementation Measure L.** The County shall address archaeological and historical resources for discretionary projects in accordance with CEQA.

**Implementation Measure M.** In areas of known paleontological resources, the County should address the preservation of these resources where feasible.

**Implementation Measure N.** The County shall develop a list of Native American organizations and individuals who desire to be notified of proposed discretionary projects. This notification will be accomplished through the established procedures for discretionary projects and CEQA documents.

**Implementation Measure O.** On a project-specific basis, the County Planning Department shall evaluate the necessity for the involvement of a qualified Native American monitor for grading or other construction activities on discretionary projects that are subject to a CEQA document.

## Metropolitan Bakersfield General Plan

The MBGP, a joint effort between the Kern County Planning Department and the City of Bakersfield Planning Division, was last adopted on December 11, 2007. The MBGP includes both city and unincorporated County lands. The MBGP describes the community's physical development as well as its economic, social and environmental goals and is currently undergoing an update. The Project Area includes a total of 152,040 acres of unincorporated County lands that are covered under the MBGP (7.41%). Project-related development on unincorporated lands

within the MBGP Planning Area would be subject to the following applicable policies and implementation measures of the MBGP, with respect to cultural resources.

## Chapter 2. Land Use Element

### Policies

104. As part of the environmental review procedure, an evaluation of the significance of paleontological, archaeological, and historical resources and the impact of proposed development on those resources shall be conducted and appropriate mitigation and monitoring included for development projects.

105. Development on land containing known archaeological resources (i.e., high sensitivity areas) shall utilize methodology set forth, as described necessary by a qualified archaeologist, to locate proposed structures, paving, landscaping, and fill dirt in such a way as to preserve these resources undamaged for future generations when it is the recommendation of a qualified archaeologist that said resources be preserved in situ.

106. The preservation of significant historical resources shall be encouraged by developing and implementing incentives such as building and planning application permit fee waivers, Mills Act contracts, grants and loans, implementing the State Historic Building Code and other incentives as identified in the City's Historic Preservation Ordinance.

107. The preservation of significant historical resources shall be promoted and other public agencies or private organizations shall be encouraged to assist in the purchase and/or relocation of sites, buildings, and structures deemed to be of historical significance.

## Kern County Specific Plans

Kern County has adopted 24 Specific Plans for properties within the Project Area. These Specific Plans are intended to be an amplification of the goals and policies of the KCGP and are, therefore, consistent therewith. As depicted in Figure 4.10-3, less than 8% of the Project Area is located wholly or partially within adopted Specific Plan areas. Future oil and gas exploration and production activities that would be authorized under the proposed Amendment to Chapter 19.98 (Oil & Gas Production) of the Kern County Zoning Ordinance that would be located within the boundary of an adopted Specific Plan would be regulated according to County zoning, with the exception of the Specific Plans identified as Tier 5.

# 4.5.4 Impacts and Mitigation Measures

# Methodology for Cultural Resources (Archaeology and Historical Architecture)

The cultural resources analysis for the ~2.4 million-acre Project Area was prepared using three kinds of data and analyses: (1) a review and data tabulation of recent large-area surveys; (2) a synthesis of existing degrees of ground surface disturbance; and (3) the development of a GIS predictive model of prehistoric/Native American site distribution and archaeological sensitivity.

According to Whitley et al. (2014), reliable, systematically recorded site locational data within the Study Area is primarily limited to large-area surveys conducted for federal projects since 2010, when the Bureau of Land Management (BLM) standardized the recording requirements for historical oilfield sites on federal lands and mineral estates, and large-area surveys on privately-owned fee lands for other kinds of land development. In order to develop a reliable and accurate synthesis of extant prehistoric and historical sites within the Project Area, the results of 25 large-area surveys conducted since 2010 were reviewed and tabulated. These surveys ranged from 160 to over 19,000 acres in size, and total over 65,000 intensively surveyed acres, or almost 3% of the Project Area. Although about two-thirds of the total acreage is within existing oilfields; the remainder falls outside of delineated oilfields, including over 15,000 acres that were surveyed and unrelated to oil industry projects (Whitley et al. 2014).

# Existing Cultural Resources

## Records Search

Based on Whitley et al. (2014), the 25 studies documented 1,250 archaeological sites: 151 prehistoric (12% of the total); 1,087 historical (87%); and 12 (1%) multi-component sites (i.e., sites that have both prehistoric and historical components).

## Oil Well Density and Existing Ground Surface Disturbance

In order to evaluate both the degree of previous oil and gas development within the Project Area, and how much of the ground surface has been disturbed by that use-history, a well density map was developed by Whitley et al. (2014) (see Appendix O, Figures 8, 9, and 10). This was produced using oil well locations provided by the California Department of Conservation, Division of Oil, Gas and Geothermal Resources (DOGGR) (Department of Conservation 2013) Based on their records, there are a total of 136,149 existing or abandoned oil wells within the Project Area.

Whitley et al. (2014) conducted the analysis determining well density and degree of disturbance for the Eastern Subarea, Central Subarea, and Western Subarea (Appendix O). The oil well density analysis has the following implications:

- There is a small but significant portion (2.6%) of the Project Area with nearly 100% ground disturbance and, thus, very little chance for preserved prehistoric archaeological sites;
- A slightly higher proportion (3.5%) has been very heavily disturbed, including about 1% with 75% disturbance, which likewise has a low probability for preserved prehistoric sites;
- The large majority of prehistoric sites are preserved in sections with less than 50 existing oil wells;
- Because oil well density is partly a function of historical development, the heavily disturbed areas have the highest probability for historical oil industry sites; and
- Concomitantly, these same areas are, due to the history of development, the least likely to contain intact historical sites.

## Potential for Unknown Buried Cultural Resources

According to Whitley et al. 2014, two primary factors affect archaeological site preservation and, thus, potential project impacts to cultural resources. The first factor is the original presence or absence of sites in the Project Area. The GIS predictive model of site locations provides a section by section measure of site sensitivity for the Project Area, ranging from high to low. The second factor is whether these sites are still preserved or instead have been destroyed due to natural forces or previous development. An oil well density map was generated to gauge the ranges of previous ground surface disturbance in each section. Though oil and gas development is far from the only activity that can adversely impact site preservation, this is the only type of potential effect that could be easily quantified for the 2.4 million acres of the Project Area (Whitley et al. 2014).

Archaeological site sensitivity and estimated range of ground surface disturbance were cross-tabulated to provide a measure of the likelihood of site preservation within any given section. No, minimal, moderate, and high likelihood categories were defined. A total of 100 sections (~3%) have no likelihood, 1,154 (31%) have minimal likelihood, 182 (~4%) have moderate likelihood, and 2,258 (~61%) have high likelihood of preserved prehistoric sites (Whitley et al. 2014).

## Potential Impact Analysis

According to Whitley et al. (2014), adverse impacts potentially occur to cultural resources for oil and gas projects involving: (1) geophysical surveys (vibroseis, shotholes); (2) construction, operation, and maintenance (construction/demolition of pads and infrastructure); (3) treatment, equipment and facilities (construction/demolition of facilities and equipment); (4) pipelines (construction/demolition); (5) storage facilities (construction/demolition); (6) spill prevention, response, and remediation (construction of containment structures, heavy equipment use); (7) septic tanks and leach fields (administrative facility building and personal housing); (8) access roads (construction/maintenance); (9) transmission lines (construction/maintenance); (10) fencing (construction/maintenance and off-road travel); (11) plugging, decommissioning, and

abandonment (demolition); and (12) cathodic protection abandonment (demolition). More specifically, where sites are present, adverse impacts may occur as a result of grading, filling, grubbing, vehicular off-road travel, and other activities that disturb the ground surface, including the demolition of existing structures, facilities, and equipment.

Based on the background research, tabulations, and GIS modeling presented above, the approximately 2.4 million-acre Project Area has an average overall archaeological density of one site per 53 acres. This results in a total estimate of approximately 45,000 cultural resources within this portion of Kern County. Prehistoric/Native American archaeological site density is estimated at one site per 463 acres, yielding an estimate of slightly more than 5,000 such sites within the Project Area. Historical (Euro-American) site density is one site per 60 acres, or about 40,000 of these sites total. Not all of these resources are significant or unique and, therefore, qualify as historical resources under CEQA or historical properties under Section 106 of the NHPA, and the distribution of intact/preserved cultural resources is not uniform across the 2.4 million acres (Whitley et al. 2014).

With respect to prehistoric/Native American sites, one hundred 640-acre sections (~3%) have no likelihood of containing resources, based on predictive modeling and previous oilfield development, 1,154 sections (~31%) have minimal likelihood, 182 sections (~4%) have moderate likelihood, and 2,258 sections (~61%) have a high likelihood. Regionally, 93% of the Eastern Subarea sections have high (86%) plus moderate (7%) site likelihoods. In the Central Subarea, 54% have high (53%) plus moderate (1%) likelihoods. For the Western Subarea, the figures are 66% total (62% high plus 4% moderate). Whether calculated across the 2.4 million acres or within each Subarea, the clear majority of the 640-acre sections have high to moderate likelihoods of containing prehistoric/Native American sites. These likelihoods are greatest on the eastern and western sides of the valley, where oilfield development is also most intensive (Whitley et al. 2014).

All prehistoric/Native American archaeological sites are recommended as CEQA Significant/Unique, because they have potential research value (Criterion D), and/or because they have high expressed heritage values to Native American tribes or individuals. Unmitigated impacts to these cultural resources would constitute significant adverse impacts related to the Project. While impacts to research values could be mitigated with data recovery (salvage excavations), such mitigation could conflict with the religious and heritage values maintained by Native Americans, potentially representing further adverse impacts to these values. Preservation of all prehistoric/Native American sites in place, which is the preferred CEQA mitigation measure for cultural resources, would eliminate all significant adverse impacts to prehistoric/Native American archaeological sites (Whitley et al. 2014).

Historical archaeological sites are eight-times more common within the Project Area, with approximately 40,000 such sites estimated to be present in the 2.4 million acres. The large majority of these are oil industry related and, for that fact, they concentrate in the areas of the most intensive historical oilfield development and, thus, previous disturbance. These are the Eastern Subarea, particularly its northern half in the Kern River area, and the Western Subarea, primarily in a band that extends roughly from the South Belridge to the Midway-Sunset oilfields.

The Central Subarea, in contrast, has had minimal historical oilfield development. Historical archaeological site density appears to be relatively low throughout this zone (Whitley et al. 2014).

According to Whitley et al. (2014), not all of the historical archaeological sites are significant/unique. As described above, oil derrick and pump-jack foundations, brick scatters, tanks, and small refuse scatters lack appreciable research value (CEQA significance Criterion D), do not have significant associative values (Criteria A and B), are not exemplary of craftsmanship or representative of distinctive types (Criterion C), typically lack integrity due to DOGGR-mandated oilfield clean-ups, and have no identifiable heritage value to county residents. Previous State Historic Preservation Office (SHPO) and BLM evaluations of the significance and NRHP eligibility of these types of sites have consistently found them to be Not Eligible or Significant, including at the landscape level. These site types constitute approximately 70-80% of the historical sites in the Project Area as a whole, and likely higher proportions within the Eastern and Western Subareas, specifically. Following PRC Section 21083.2, Whitley et al. (2014) recommends that oil derrick and pump-jack foundations, brick scatters, tanks, and small refuse scatters be categorically determined Not Significant/Unique. Project-related impacts to historical oil derrick and pump-jack foundations, brick scatters, tanks, and small refuse scatters will not constitute significant adverse impacts to historical resources (Whitley et al. 2014).

Camps, homesteads, ranch complexes, large refuse scatters, mines and other kinds of historical sites may, however, have research value (Criterion D), according to Whitley et al. (2014). Intact historical oilfield equipment, such as wooden walking beam pump-jacks, intact brick boilers, wooden oil derricks, and intact historical buildings, are rare and, therefore, may have educational or other values, outside of the CEQA criteria. Whitley et al. (2014) recommends that these site types be considered potentially CEQA Significant/Unique, with any potential adverse impacts mitigated through preservation in-place, removal and curation, or data recovery; specifically, salvage excavation for historical archaeological sites. Data recovery for historical structures and equipment shall follow the guidelines of the Secretary of the Interior's Standards for Architectural and Engineering Documentation, thereby contributing to the Historic American Buildings Survey (HABS) and/or Historic American Engineering Record (HAER) (Whitley et al. 2014).

# Methodology for Paleontology

Previously discovered paleontological resources in the vicinity of the Project Area were assessed through literature searches and, where available, online searches of institutional records for museums with significant paleontological collections obtained from Kern County. This included the San Diego Natural History Museum, the Natural History Museum of Los Angeles County, and the University of California Museum of Paleontology (Deméré and Donohue 2015).

A search of existing paleontological and geological literature was conducted to provide a context for discussing the paleontological resources of the Project Area, and for locating existing paleontological collection localities not documented within museum databases. Sources consulted include published articles in peer-reviewed scientific journals and books, fieldtrip guidebooks, published professional conference abstracts, preliminary studies issued as government open-file

reports, and geological data summarized on published geologic maps. All data sources are listed in Appendix P.

These data were then used to assign PFYC values to formations for evaluation purposes. Adverse impacts may occur as a result of grading, other earth disturbance, grubbing, vehicular off-road travel, and other activities that disturb the ground-surface or subsurface, including the demolition of existing structures, facilities and equipment.

# Existing Paleontological Resources

There are no fossils preserved in basement rocks. Holocene-aged alluvial sediments do not contain significant fossil resources due to their young age, however, these sediments are archaeologically important for answering questions concerning climatic and environmental changes. Fossils known from the other 39 rock units and their potential to produce fossils are discussed below, which are ranked using the PFYC system. This system was developed by the Forest Service and BLM and ranks rock units based on the relative abundance of vertebrate fossils or scientifically significant invertebrate or plant fossils and their sensitivity to adverse impacts. The recognized classes include:

- Class 1 or very low, used for rocks with little to no potential to yield fossils;
- Class 2 or low, used for rocks with some potential to yield fossils;
- Class 3 is divided into 3a, used for rock units know to produce fossils in limited portions of the sediment, and 3b, used for rocks that have not produced fossils in the past but may in the future;
- Class 4 or high, used for rocks known to produce many fossils; and
- Class 5 or very high, used for rocks that produce abundant fossils in predictable locations.

## Basement Complex

Igneous and metamorphic basement rocks have no potential for fossil resources. These rocks are assigned a very low PFYC Class 1 (Deméré and Donohue 2015).

## Franciscan Complex

Deposits of the Franciscan Complex rarely preserve macrofossils; however, none are known within the Project Area. Elsewhere in California, rare occurrences of invertebrates, dolphin-like marine reptiles called ichthyosaurs, and a long-necked marine reptiles called a plesiosaur have been reported. The Franciscan Complex is assigned a low PFYC Class 2, based on the well-cemented nature of most surface exposures of this rock unit (Deméré and Donohue 2015).

## Gravelly Flat Formation

Fossils of Mesozoic clams are known from this formation. The Gravelly Flat Formation is assigned a moderate PFYC Class 3a, based on the presence of sparse but significant invertebrate fossils (Deméré and Donohue 2015).

## Hex Claystone

Fossils of cephalopods called belemnites and clams are known from this formation. The Hex Claystone is assigned a moderate PFYC Class 3a (Deméré and Donohue 2015).

## Panoche Formation

The Panoche Formation has produced remains of numerous types of marine invertebrates including mollusks (clams, snails, cephalopods), and plants of woody, flowering, and terrestrial plants (angiosperms), along with fish teeth. The Panoche Formation is assigned a high PFYC Class 4 (Deméré and Donohue 2015).

## Pattiway Formation

Fossil mollusks have been recovered from the Pattiway Formation exposed in the Caliente Range. The Pattiway Formation is assigned a moderate PFYC Class 3a (Deméré and Donohue 2015).

## Lodo Formation

The Lodo Formation has not produced fossils within the Project Area but has produced fossils elsewhere in California. These include fossils of marine mollusks and marine vertebrates (sharks, rays, bony fishes). The Lodo Formation is assigned unknown moderate PFYC Class 3a for its potential to produce fossils (Deméré and Donohue 2015).

## Tejon Formation

The Tejon Formation has produced a wealth of well-studied fossil remains from several areas along the southern and western margins of the San Joaquin Valley. The most common fossils recovered include marine mollusks (clams, snails, and tusk shells), but marine vertebrate fossils are also known. The Tejon Formation is assigned a high PFYC Class 4 (Deméré and Donohue 2015).

## Avenal Sandstone

The Avenal Sandstone has not produced fossils within the Project Area. Elsewhere in California, marine mollusks (clams, snails, and tusk shells) and plants have been recovered from this rock unit. The Avenal Sandstone is assigned an unknown PFYC Class 3b for its potential to produce fossils (Deméré and Donohue 2015).

## Kreyenhagen Shale

No macro-invertebrate or vertebrate fossils are known from the Kreyenhagen Formation. The Kreyenhagen Formation is assigned a low PFYC Class 2 (Deméré and Donohue 2015).

## San Emigdio Formation

The San Emigdio Formation has produced fossils of marine mollusks, particularly bivalve clams, snails, and tusk shells in California. The San Emigdio Formation is assigned a moderate PFYC Class 3a (Deméré and Donohue 2015).

## Wagonwheel Formation

The Wagonwheel Formation has produced an unusual assemblage of marine invertebrates dominated by articulated lucinid clams that represent a cold-seep paleoenvironment. The Wagonwheel Formation is assigned a moderate PFYC Class 3a, based on the occurrence of its limited, but rare and scientifically significant invertebrate fauna (Deméré and Donohue 2015).

## Walker Formation

Fossils are rare in the Walker Formation and include silicified wood (e.g., sycamore and oak), leaf impressions of broadleaved trees, and shells of terrestrial pulmonate gastropods. The Walker Formation is assigned an unknown, PFYC Class 3b. The age and depositional environment of the Walker Formation suggest there is a possibility of finding significant paleontological resources in the future (Deméré and Donohue 2015).

## Bealville Fanglomerate

No fossils are known from the Bealville Fanglomerate. The Bealville Fanglomerate is assigned a low PFYC Class 2 (Deméré and Donohue 2015).

## Vedder Sand

The Vedder Sand has not produced macro-invertebrate or vertebrate fossils. However, based on its marine origin, known benthic foraminiferal assemblages, and unproven potential for containing marine vertebrate fossils the Vedder Sand is assigned an unknown PFYC Class 3b (Deméré and Donohue 2015).

## Pleito Formation

Nearshore marine molluscan fossils are present within the lower and upper portion of the Pleito Formation in California. The Pleito Formation is given a moderate PFYC Class 3a (Deméré and Donohue 2015).

## Simmler Formation

The Simmler Formation is generally considered to be unfossiliferous, but has produced fragmentary fossil plant remains and isolated vertebrate fossil remains. The Simmler Formation is

assigned an unknown PFYC Class 3b based on its potential to produce vertebrate fossils (Deméré and Donohue 2015).

## Vaqueros Formation

Marine invertebrate fossils, including snails, scallops, oysters, and barnacles, have been recovered from this formation. In other areas of California, the Vaqueros Formation is also known for a diverse assemblage of marine vertebrate fossils. The Vaqueros Formation is assigned a high PFYC Class 4 (Deméré and Donohue 2015).

## Tecuya Formation

The Tecuya Formation has produced important remains of terrestrial mammals from several recorded fossil localities in Tecuya Canyon (near Grapevine Pass). Collected fossils include small mammals, such as rabbit, squirrel, mouse, mouse deer, and pikas, and large mammals, such as horse, oreodont, rhinoceros, and bear. Oyster fossils are also known in the western outcrops of the Tecuya Formation. The Tecuya Formation is assigned a high PFYC Class 4 (Deméré and Donohue 2015).

## Temblor Formation

The Temblor Formation has produced a rich diversity of marine invertebrate fossils, partially within the Project Area. Marine vertebrates are represented by fish scales, fish teeth, and shark teeth. A terrestrial assemblage including over 1,200 vertebrate fossils of terrestrial mammals, birds, reptiles, and amphibians, and included a new species of mustelid was recently recovered from the Temblor Formation at a site in central California. The Temblor Formation is given a high PFYC Class 4 (Deméré and Donohue 2015).

## Freeman Silt/Jewett Sand

The undifferentiated Freeman Silt/Jewett Sand contains abundant molluscan fossils, including both gastropods and bivalves, along with early marine mammals, including pinnipeds, toothed whales, and baleen whales. Sparse remains of land mammals have also been recovered. The combined Freeman Silt/Jewett Sand is assigned a high PFYC Class 4 (Deméré and Donohue 2015).

## Olcese Sand

Fossils are common to locally abundant in the Olcese Sand and are dominated by marine mollusks and a large assemblage of marine lower vertebrates consisting of sharks, skates, and rays, and more than 65 different types of bony fishes. Rare, important land mammals include a horned, deer-like artiodactyls, and a bear dog. Petrified logs and leaf impressions are known. The Olcese Sand is assigned a high PFYC Class 4 (Deméré and Donohue 2015).

## Bena Gravel

Near Caliente Canyon east of Bakersfield, the Bena Gravel has produced rare marine fossils including an extinct sea lion, oysters, and barnacles. In the Tejon Hills mammals, including ancient horses, bone-crushing dog, oreodont, antilocaprid, and a deer-like mammal, have been recovered. The Bena Gravel is assigned a high PFYC Class 4 (Deméré and Donohue 2015).

## Caliente Formation

The Caliente Formation is most notable for its abundant fossils of terrestrial mammals, including numerous small mammals (e.g., hedgehogs, shrews, squirrels, mice, hares, rabbits), carnivores (e.g., bone-crushing dogs, bear dogs, cats, weasels, ring tails), bats, camels, oreodonts, pronghorns, and a variety of species of ancient horses. The Caliente Formation is assigned a very high PFYC Class 5 (Deméré and Donohue 2015).

## Round Mountain Silt

The densely concentrated occurrence of marine vertebrate fossils known as the Sharktooth Hill Bonebed east of Bakersfield is considered to be so significant that it was designated as a National Natural Landmark in 1976. Invertebrate fossils (e.g., clams, snails, crustaceans, and echinoderms) are present. The marine vertebrate fossil assemblage is especially significant and consists of numerous species of sharks and rays, bony fish, sea turtles, sea birds, and marine mammals (e.g., early walruses, extinct seals, ancestral dolphins, primitive sperm whales, archaic baleen whales, early sea cows, and bizarre hippo-like desmostylians). Rare remains of land mammals (e.g., cat, dear dog, tapir, horse, camel, and gomphothere) have also been recovered. The Round Mountain Silt is assigned a very high PFYC Class 5 (Deméré and Donohue 2015).

## Monterey Formation

Although the Monterey Formation has produced extremely diverse assemblages of marine organisms including mollusks, sharks, rays, bony fish, sea birds, pinnipeds, toothed whales, baleen whales, sea cows, and hippo-like desmostylians the lithologic complexity of the formation and the wide range of styles of fossil preservation makes it difficult to assign a single PFYC class to this rock unit. Hard, brittle, siliceous shale strata are so well-cemented as to make recovery of individual fossil specimens unlikely, while soft, fissile, diatomite strata (e.g., Belridge Diatomite Member) are more likely to yield individual, well-preserved fossil specimens. As a consequence, strata of the Belrdige Diatomite are assigned a very high PFYC Class 5, while strata of the other members of the Monterey Formation are assigned a high PFYC Class 4 (Deméré and Donohue 2015).

## Santa Margarita Formation

The Santa Margarita Formation contains distinctive molluscan fauna that include several species of marine snails, large scallops, and a giant oyster. Strata of the Santa Margarita Formation exposed in the Temblor Range portion of the Western Subarea contain some of these typical fossils. The Santa Margarita Formation is assigned a high PFYC Class 4 (Deméré and Donohue 2015).

## Chanac Formation

This formation has produced important land mammal fossils in the North Tejon Hills. The recovered fossil assemblage consists of bones and teeth of saber-toothed carnivorans, hyaena-like dogs, horse, oreodont, large-horned deer-like ruminants, and pronghorn antelope. The Chanac Formation is assigned a high PFYC Class 4 (Deméré and Donohue 2015).

## Bitterwater Creek Shale

Fossils have rarely been reported from the Bitterwater Creek Shale, but include fish scales from the southwestern Temblor Range. The Bitterwater Creek Shale is assigned an unknown PFYC Class 3b based on its potential to produce vertebrate fossils (Deméré and Donohue 2015).

## Kern River Formation

Fossils from the Kern River Formation include skeletal remains of an extinct honey badger, weasel-like carnivore, ring-tail, extinct horse, extinct rhino, camel, pronghorn, peccary, ground squirrel, field mouse, and rabbits. Fossils of a vulture and hawk are also known, as well as remains of fish, toads, lizards, snakes, and tortoises. Coarse-grained superficial sediments have not produced fossils. The Kern River Formation is assigned a high PFYC Class 4 for fine-grained deposits only (Deméré and Donohue 2015).

## Unnamed Miocene Marine Deposits

No fossils are known in these sediments at the present time, but they appear to have potential. The unnamed Miocene marine sediments are assigned an unknown PFYC Class 3b based on their potential to produce invertebrate fossils (Deméré and Donohue 2015).

## Etchegoin Formation

The Etchegoin Formation has not produced fossils in the Project Area, but abundant and well-preserved marine invertebrates, marine vertebrates, and terrestrial vertebrates are known in central California. Marine to estuarine fossils include a high diversity of invertebrates (e.g., coral, clams, scallops, mussels, sand dollars, snails, barnacles, crabs) and vertebrates (e.g., sharks, rays, bony fishes, turtle, baleen whale, dolphin, and fur seal). Occasional remains of terrestrial mammals (e.g., mastodon) and land plants (e.g., sycamore leaves) are also known. The Etchegoin Formation is assigned a high PFYC Class 4 (Deméré and Donohue 2015).

## Quatal Formation

The Quatal Formation is essentially unfossiliferous where it has previously been prospected. The Quatal Formation is assigned an unknown PFYC Class 3b based on its potential to produce vertebrate fossils (Deméré and Donohue 2015).

## Unnamed Pliocene Deposits

Fossils have not been reported from deposits mapped as unnamed Pliocene sediments. The unnamed Pliocene sediments are assigned an unknown PFYC Class 3b based on their potential to produce invertebrate fossils (Deméré and Donohue 2015).

## Paso Robles Formation

The Paso Robles Formation, in the northwestern corner of the Project Area, adjacent to State Route 46, has produced a single horse fossil. West of the Project Area in the Carrizo Plain, fragmentary fossil bones and teeth of large-bodied Pleistocene land mammals including camel, giant bison, mastodon, and along with horse, rodents, lizards, and a bird, have been recovered. Further marine mollusks and an extinct walrus are known. This formation has large exposure but only very fine-grained sedimentary rocks are known the produce fossils. The Paso Robles Formation is assigned a high PFYC Class 4 (Deméré and Donohue 2015).

## San Joaquin Formation

The San Joaquin Formation has not produced fossils within the Project Area, but has produced abundant marine invertebrate and vertebrate fossils, as well as more sparse terrestrial vertebrate fossils in adjacent counties. Marine and estuarine fossils include a diversity of invertebrates (e.g., corals, clams, scallops, mussels, snails, barnacles, crabs, and sand dollars) and vertebrates (e.g., sharks, rays, bony fishes, sea turtle, baleen whale, dolphin, and walrus). Terrestrial fossils are less common in the San Joaquin Formation, but include well-preserved bones and teeth of land mammals (e.g., rodents, horse, camel, peccary, deer, mammoth, and mastodon) and occasional compressed leaves of land plants. The San Joaquin Formation is assigned a very high PFYC Class 5 (Deméré and Donohue 2015).

## Morales Formation

Fossils are rare in the Morales Formation, and the only published paleontological record is the tooth of a three-toed horse from the eastern Caliente Range. The Morales Formation is assigned an unknown PFYC Class 3b based on its potential to produce vertebrate fossils (Deméré and Donohue 2015).

## Tulare Formation

The Tulare Formation has produced fossils within the Project Area. The base of the formation contains important fossil remains of freshwater organisms including diatoms, ostracods, clams, mussels, snails, and bony fishes. Although the molluscan assemblage contains only a little over 30 species, it is considered to be the largest and most diverse late Cenozoic freshwater molluscan assemblage from the Pacific Coast. Bony fish remains include vertebrae, dense dorsal fin elements, and taxonomically diagnostic otoliths. Mammalian fossil remains include an extinct horse, an extinct bone-crushing dog, and a saber-toothed cat collected in the Cymric-McKittrick area. Pleistocene mammal remains are known from the Elk Hills area and include horses, tapirs, camels, deer, elk, ground sloths, coyotes, bears, rabbits, gopher, mice, wood rats, and squirrels.

Known plants include silicified wood and pond weed algae. The Tulare Formation is assigned a high PFYC Class 4 (Deméré and Donohue 2015).

### Quaternary Brea Deposits

Quaternary brea deposits represent natural traps formed during the Pleistocene in areas where percolating hydrocarbons saturated poorly consolidated surficial sediments, such as those of the Tulare Formation. The McKittrick seeps have produced a very diverse terrestrial assemblage of insects, plants, birds, reptiles, amphibians, and over 43 species of mammals. Collected fossils are exceptionally well-preserved, and include thousands of specimens. The Maricopa seeps have produced a similarly impressive assemblage of plants, insects, and 97 different species of terrestrial vertebrates, including amphibians, reptiles, birds, and mammals. Quaternary brea deposits at McKittrick and Maricopa are assigned a very high PFYC Class 5 (Deméré and Donohue 2015).

### Older Alluvial Deposits

Fossils are known within the Project Area in deposits of older alluvium (alluvial, fluvial and lacustrine deposits). A large assemblage of Pleistocene animals was recovered just south of the Kern River east of Bakersfield. Scattered fossils of similar antiquity are known from numerous localities in the San Joaquin Valley. Terrestrial vertebrate fossils, especially large-bodied mammals (e.g., mammoth, mastodon, horse, bison, ancient camel, short-faced bear, dire wolf, saber-toothed cat) are known (Deméré and Donohue 2015).

The distribution of vertebrate fossils in Quaternary older alluvial sediments is not uniform and typically varies with sediment grain size. Thus, fossils are more likely to be preserved and discovered in sandstone horizons rather than in coarser–grained conglomeratic horizons. Quaternary older alluvial sediments are assigned an unknown PFYC Class 3b due to their patchy occurrence (Deméré and Donohue 2015).

### Holocene Deposits

Holocene sediments are assigned a low PFYC Class 2 due to the sediments being too young to contain fossils. However, these sediments frequently contain archaeological materials and overlie older sedimentary units that may contain fossils (Deméré and Donohue 2015).

## Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist state that a project would normally be considered to have a significant impact if it would:

- Cause a substantial adverse change in the significance of a historical resource, as defined in CEQA Guidelines Section 15064.5;
- Cause a substantial adverse change in the significance of a unique archaeological resource pursuant to CEQA Guidelines Section 15064.5;

- Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature; or
- Disturb any human remains, including those interred outside of formal cemeteries.

Section 21083.2(g) of CEQA further defines "unique archaeological resource" for purposes of determination as to whether a project may have a significant effect on archaeological resources. As used in this section "unique archaeological resource" means an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

- Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information;
- Has a special and particular quality, such as being the oldest of its type or the best available example of its type; or
- Is directly associated with a scientifically recognized important prehistoric or historic event or person.

CEQA does not define a unique paleontological resource, but for purposes of this EIR, a paleontological resource or site is considered "unique" if it meets any of the following criteria:

- Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information;
- Has a special and particular quality, such as being the oldest of its type or the best available of its type; or
- Is directly associated with a scientifically recognized important natural event.

According to CEQA Guidelines, CCR Title 14, 15064.5, a project with an effect that may cause a substantial adverse change in the significance of a historical resource is a project that may have a significant effect on the environment (CCR Title 14, 15064.5(b)). The guidelines further state that a substantial adverse change in the significance of a resource means the physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of a historic resource would be materially impaired. Actions that would materially impair the significance of a historical resource are any actions that would demolish or adversely alter those physical characteristics of a historical resource that convey its historical significance and qualify it for inclusion in the CRHR or in a local register or survey that meet the requirements of California PRC Sections 5020.1(k) and 5024.1(g).

Based on these thresholds, the effects of the project have been categorized as either a "less than significant impact" or a "potentially significant impact." Mitigation measures are recommended for potentially significant impacts. If a potentially significant impact cannot be reduced to a less than significant level through the application of mitigation, it is categorized as a "significant unavoidable impact."

# Project Impacts

## Impact 4.5-1: Cause a Substantial Adverse Change in the Significance of a Historical Resource, as Defined in CEQA Guidelines Section 15064.5

Future oil and gas exploration and production activities that would be authorized under the Project may adversely change the significance of historic resources, primarily during construction, by damaging the resource so that it no longer has integrity and is no longer representative of its period of significance. Potential construction impacts include damage to, or destruction of, historic resources from earthmoving, including vibration damage. During operations, if extant historic structures determined to be significant are avoided, no impacts are anticipated.

Historical (Euro-American) site density is one site per 60 acres, or about 40,000 of these sites total. Not all of these resources are significant or unique and, therefore, do not qualify as historical resources under CEQA or historical properties under Section 106 of the NHPA, and the distribution of intact/preserved historical resources is not uniform across the 2.4 million acres. Therefore, impacts could be significant if oil and gas activities were to be conducted in close proximity of the qualifying resource.

Camps, homesteads, ranch complexes, mines and other kinds of historical resources may, however, have research value (Criterion D). Intact historical oilfield equipment, such as wooden walking beam pump-jacks, intact brick boilers, wooden oil derricks, and intact historical buildings, are rare and therefore may have educational or other values, outside of the CEQA criteria. It is recommended that these site types be considered potentially CEQA Significant/Unique, with any potential adverse impacts mitigated through preservation in-place, removal and curation, or data recovery; specifically salvage excavation for historical archaeological sites. Data recovery for historical structures and equipment shall follow the guidelines of the Secretary of the Interior's Standards for Architectural and Engineering Documentation, thereby contributing to the HABS and/or HAER.

Historical buildings, structures, and built features that meet the CRHR criteria should be protected in place, removed and curated, or treated using appropriate data recovery procedures. Any oil and gas activity that damages or destroys a significant historical resource, thereby changing its integrity and representation of its period of significance, would be a significant adverse impact and would have to be mitigated in order to reduce the impact to less than significant. The potential for significant impacts would depend on the proximity of the oil and gas activity to the historical resource and the type of activity that would be occurring.

For the purposes of oil and gas industry cultural resources compliance, intact camps, historical structures, ranch and farm complexes and mines shall be categorically determined potentially significant. Potential adverse impacts to all such sites shall be mitigated by preservation in-place, removal and curation, or data recovery.

In summary, there could be significant impacts to historical resources as a result of the oil and gas exploration and production activities that would be authorized under the Project. The implementation of mitigation including archival research, surveys, evaluation for determination of eligibility, and applicable training, as described in MM 4.5-1, would decrease impacts to levels that are less than significant.

## Mitigation Measures

**MM 4.5-1** Prior to initiating ground disturbance activities for an activity for which a conformity review is required, the Applicant shall:

a. Have an archival records search completed by a qualified archaeologist. This shall include an examination of the California Historical Resources Information Files at the Southern San Joaquin Valley Information Center, California State University, Bakersfield, and a search of the Native American Heritage Commission Sacred Lands Files, Sacramento. The Applicant may rely on a previously performed records search for subsequent ground disturbing activities.

b. If an application location has been previously surveyed and no cultural resources have been recorded on it, no further cultural resources studies shall be required.

c. Implement either:

    1. If an application site plan is within a section that has experienced 100% previous ground-surface disturbance, as indicated by 300 or more existing oil wells or other agricultural, industrial or urban uses, and the records searches indicate that the parcel has been previously surveyed and no cultural or Native American resources are known on it, no further cultural resources studies shall be required. All other application locations shall be subject to intensive (100%) pedestrian ground-surface survey (Phase I survey/Class III inventory) by qualified archaeologists. The Applicant may rely on a previously performed ground surface survey for subsequent ground disturbing activities; or

    2. If an application location has not been previously surveyed based on the records search information, an intensive (100%) pedestrian ground-surface survey (Phase I survey/Class III inventory) by qualified archaeologists shall be required.

d. All prehistoric/Native American archaeological sites, whether identified during the records searches or during the intensive survey, shall be demarcated by a qualified archaeologist, fenced by the Applicant, and preserved in place.

e. Historical (Euro-American) archaeological sites that are potentially eligible for listing in the National Register of Historic Places shall be evaluated by a

qualified archaeologist and must meet the requirements of the National Historic Preservation Act of 1966 in order to qualify. Qualifying sites, structures and equipment that are identified during the records search or field survey shall be fenced and preserved in open-space, removed and curated, or treated using appropriate data recovery procedures.

f. Historical (Euro-American) archaeological site types relating to oil and gas activities that have been determined Not Significant/Unique shall require no archaeological study or treatment.

g. All oil and gas industry employees conducting work in the area identified on the Conformity Site Plan shall complete Worker Environmental Awareness Program training including training dedicated to cultural resources protection.

### Level of Significance After Mitigation

Impacts would be less than significant with mitigation.

## Impact 4.5-2: Cause a Substantial Adverse Change in the Significance of a Unique Archaeological Resource, Pursuant to CEQA Guidelines Section 15064.5

Future oil and gas exploration and production activities that would be authorized under the Project may adversely change the significance of archaeological resources, primarily during construction, but also during operations. Potential construction impacts include damage to, or destruction of, archaeological resources from earthmoving and unauthorized collecting. Potential impacts during operations include unauthorized collecting from surface historic trash scatters, but other impacts are not anticipated. Archaeological resources include both prehistoric and historic period sites.

Prehistoric/Native American archaeological site density is estimated at one site per 463 acres, yielding an estimate of slightly more than 5,000 such sites within the Project Area. Historical (Euro-American) site density is one site per 60 acres, or about 40,000 of these sites total. Not all of these resources are significant or unique and, therefore, do not qualify as historical resources under CEQA or historical properties under Section 106 of the NHPA. In addition, the distribution of intact/preserved cultural resources is not uniform across the 2.4 million acres.

With respect to prehistoric/Native American sites, one hundred 640-acre sections (~3%) have no likelihood of containing resources, based on predictive modeling and previous oilfield development; 1,154 sections (~31%) have minimal likelihood; 182 sections (~4%) have moderate likelihood; and 2,258 sections (~61%) have a high likelihood. Regionally, 93% of the Eastern Subarea sections have high (86%) plus moderate (7%) site likelihoods. In the Central Subarea, a total of 54% have high (53%) plus moderate (1%) likelihoods. For the Western Subarea, the figures are 66% total (62% high plus 4% moderate). Whether calculated across the 2.4 million acres or within a specific Subarea, the clear majority of the 640-acre sections have high to moderate likelihoods of containing prehistoric/Native American sites. These likelihoods are

greatest on the eastern and western sides of the valley, where oilfield development is also most intensive.

All prehistoric/Native American archaeological sites are recommended as CEQA Significant/Unique, due to the facts that they have potential research value (Criterion D), and/or because they have high expressed heritage values to Native American tribes or individuals. Unmitigated impacts to these cultural resources would constitute significant and adverse project-related impacts. While impacts to research values could be mitigated with data recovery (salvage excavations), such mitigation could conflict with the religious and heritage values maintained by Native Americans, potentially representing further adverse impacts to these values. Preservation of all prehistoric/Native American sites in place, which is the preferred CEQA mitigation measure for cultural resources, would eliminate all significant adverse impacts to prehistoric/Native American archaeological sites.

This categorical significance determination for prehistoric/Native American archaeological sites does not apply to isolated artifacts not associated with a defined archaeological site (e.g., one or a few pottery shards or projectiles), which do not meet the criteria of historical significance or uniqueness under CEQA. Such artifacts may be removed and curated under the direction of a qualified archaeologist.

Historical archaeological sites are eight-times more common within the Project Area, with approximately 40,000 such sites estimated to be present in the 2.4 million acres. The large majority of these are oil industry-related and, therefore, are concentrated in the areas of the most intensive historical oilfield development and, thus, previous disturbance. These are the Eastern Subarea, particularly its northern half in the Kern River area, and the Western Subarea, primarily in a band that extends roughly from the South Belridge to the Midway-Sunset oilfields. The Central Subarea, in contrast, has had minimal historical oilfield development. Historical archaeological site density appears to be relatively low throughout this zone.

Not all of the historical archaeological sites are significant/unique, however. As described above, oil derrick and pump-jack foundations, brick scatters, tanks, and small refuse scatters lack appreciable research value (CEQA significance Criterion D), do not have significant associative values (Criteria A and B), are not exemplary of craftsmanship or representative of distinctive types (Criterion C), typically lack integrity due to DOGGR-mandated oilfield clean-ups, and have no identifiable heritage value to County residents. Previous SHPO and BLM evaluations of the significance and NRHP eligibility of these types of sites have consistently found them to be Not Eligible or Significant, including at the landscape level. These site types constitute approximately 70 to 80% of the historical sites in the Project Area as a whole, and likely higher proportions within the Eastern and Western Subareas specifically. Following PRC Section 21083.2, it is recommended that oil derrick and pump-jack foundations, brick scatters, tanks, and small refuse scatters be categorically determined Not Significant/Unique. Impacts to historical oil derrick and pump-jack foundations, brick scatters, tanks, and small refuse scatters would not constitute significant, adverse, project-related impacts to historical resources.

Intact camps, homesteads, ranch complexes, large refuse scatters, mines, and other kinds of historical sites may, however, have research value (Criterion D). It is recommended that these site types be considered potentially CEQA Significant/Unique, with any potential adverse impacts mitigated through preservation in-place, removal and curation, or data recovery, specifically salvage excavation for historical archaeological sites.

Significance standards are those for the California Register of Historical Resources (see regulatory environment section).

For the purposes of oil and gas industry cultural resources compliance, all prehistoric/Native American archaeological sites are categorically determined Significant. Any adverse impacts to these resources would comprise a significant adverse impact. Potential adverse impacts to all such sites shall be mitigated by preservation in-place. This categorical significance determination for prehistoric/Native American archaeological sites does not apply to isolated artifacts not associated with a defined archaeological site (e.g., one or a few pottery shards or projectiles) that do not meet the criteria of historical significance or uniqueness under CEQA. Such artifacts may be removed and curated under the direction of a qualified archaeologist.

For the purposes of oil and gas industry cultural resources compliance, historical oil derrick and pump-jack foundations, brick scatters, tanks, and small refuse scatters are categorically determined Not Significant/Unique. Impacts to or destruction of such features shall not constitute significant adverse impacts and no recording, documentation, assessment, treatment or management of such sites is required.

In summary, though not all of the historical archaeological sites are significant/unique some are and as such, there could be significant impacts to archaeological resources as a result of the oil and gas exploration and production activities that would be authorized under the Project. The implementation of mitigation including archival research, surveys, evaluation for determination of eligibility, and applicable training, as described in MM 4.5-1, would decrease impacts to levels that are less than significant.

### Mitigation Measures

Implement MM 4.5-1, as described above.

### Level of Significance After Mitigation

Impacts would be less than significant with mitigation

## Impact 4.5-3: Directly or Indirectly Destroy a Unique Paleontological Resource or Site or Unique Geologic Feature

Future oil and gas exploration and production activities that would be authorized under the Project have the potential to adversely impact unique paleontological resources. Adverse impacts may occur to paleontological resources due to grading, other earth disturbance, grubbing,

vehicular off-road travel, and other activities that disturb the ground surface, including the demolition of existing structures, facilities, and equipment.

Scientific significance of fossils must be evaluated by a qualified professional. Fossils can be considered to be of significant scientific interest if one or more of the following criteria apply:

1. The fossils provide data on the evolutionary relationships and developmental trends among organisms, both living and extinct;

2. The fossils provide data useful in determining the age(s) of the rock unit or sedimentary stratum, including data important in determining the depositional history of the region and the timing of geologic events therein;

3. The fossils provide data regarding the development of biological communities or interaction between paleobotanical (plant) and paleozoological (animal) biotas;

4. The fossils demonstrate unusual or spectacular circumstances in the history of life; or

5. The fossils are in short supply and/or in danger of being depleted or destroyed by the elements, vandalism, or commercial exploitation, and are not found in other geographic locations.

Based on the background research and tabulations, about 65% of the approximately 2.4 million acres in the Project Area has rock units ranked very low or low (PFYC Class 1 or Class 2). These areas have limited paleontological resource potential. The remaining 35% of the lands are mostly of unknown, moderate, high or very high potential (PFYC Class 3, Class 4, or Class 5).

Most oil and gas activities are anticipated to be on the valley floor and the hills to the east and west, but not in the mountains. These activities will cause surface impacts to rock units ranked PFYC 3 or above; primarily, but not limited to: (1) the Tulare Formation including Quaternary brea deposits (Western Subarea); (2) the Quaternary older alluvial sediments (Central Subarea); and (3) the Kern River Formation and Round Mountain Silt (Eastern Subarea). All formations, their PFYC ranking, Subarea, environment, and probability of encounter are provided in Table 4.5-2. The probability of encounter is an interpretation based largely on the areas where the oil and gas activities are anticipated (as described above) along with the formations with PFYC 3 or above (also described above), and any rock unit that would likely overlay formations with a high potential to contain fossils.

Subsurface impacts will adversely affect additional rock units, particularly those with high potential for oil and gas deposits. The Monterey Formation is the source of oil and gas but both are known to filter into reservoir rock units (Gautier and Scheirer 2007). These reservoir rocks include the Temblor Formation, the Santa Margarita Formation, the Freeman Silt/Jewett Sand deposits, the Chanac Formation, the Kern River Formation, the Walker Formation, and the Kreyenhagen Formation (Table 4.5-2). On that basis, all of these rocks are also targets of oil and gas activities.

**Table 4.5-2: Anticipated Impacts to Paleontological Resources**

| Rock Unit | Age (millions of years) | Subarea | PFYC | Environment | Probability of Encounter | Oil & Gas Potential |
|---|---|---|---|---|---|---|
| Monterey Formation | 16-8 | W | 4 | Marine | High | High |
| Temblor Formation | 28-18 | W | 4 | Marine | High | High |
| Santa Margarita Formation | 12-8 | W | 3a | Marine | High | High |
| Freeman Silt / Jewett Sand | 22-17 | W | 4 | Marine | Moderate | High |
| Chanac Formation | 11-9 | E | 4 | Terrestrial | Moderate | High |
| Kern River Formation | 8.5-2 | E, C | 4 | Terrestrial | Moderate | High |
| Walker Formation | 38-23 | E | 3b | Terrestrial | Moderate | Moderate |
| Kreyenhagen Shale | 48-37 | W | 2 | Marine | Moderate | Moderate |
| Quaternary brea deposits | 0.4-0.1 | W | 5 | Terrestrial | Moderate | Low Grade |
| Round Mountain Silt | 16-13 | E | 5 | Marine | Moderate | n/a |
| Olcese Sand | 19-17 | W | 4 | Marine | Moderate | n/a |
| Tulare Formation | 2.5-0.6 | W | 4 | Fluvio-Lacustrine | Moderate | n/a |
| Gravelly Flat Formation | 150-75 | W | 3a | Marine | Moderate | n/a |
| Panoche Formation | 75-68 | W | 4 | Marine | Moderate | n/a |
| Bena Gravel | 18-11 | E | 4 | Marine/ Terrestrial | Moderate | n/a |
| older alluvial deposits | 2.5-0.5 | All | 3b | Terrestrial | Moderate | n/a |
| unnamed Pliocene deposits | 5-2.5 | W | 3b | Marine/ Terrestrial | Moderate | n/a |
| Franciscan Complex | 160-68 | W | 2 | Marine | Moderate | n/a |
| Vedder Sand | 34-24 | E | 3b | Marine | Moderate | n/a |
| Caliente Formation | 17-5 | W | 5 | Terrestrial | Low | n/a |
| Wagonwheel Formation | 38-35 | W | 3a | Marine | Low | n/a |
| Etchegoin Formation | 5.5-4 | W | 4 | Marine/ Estuarine/ Lacustrine | Low | n/a |
| San Joaquin Formation | 4-2.2 | W | 5 | Marine/ Estuarine/ Lacustrine | Low | n/a |
| Tejon Formation | 49-39 | W, E | 4 | Marine | Low | n/a |
| San Emigdio Formation | 48-24 | W | 3a | Marine | Low | n/a |
| Pleito Formation | 34-22 | W | 3a | Marine | Low | n/a |
| Vaqueros Formation | 34-22 | W | 4 | Marine | Low | n/a |
| Tecuya Formation | 28-18 | W, E | 4 | Marine | Low | n/a |

**Table 4.5-2: Anticipated Impacts to Paleontological Resources**

| Rock Unit | Age (millions of years) | Subarea | PFYC | Environment | Probability of Encounter | Oil & Gas Potential |
|---|---|---|---|---|---|---|
| Paso Robles Formation | 5-0.1 | W | 4 | Marine/ Terrestrial | Low | n/a |
| Lodo Formation | 59-50 | W | 3a | Marine | Low | n/a |
| Avenal Sandstone | 48-40 | W | 3b | Marine | Low | n/a |
| Simmler Formation | 34-22 | W | 3b | Terrestrial | Low | n/a |
| unnamed Miocene marine | 23-5 | E | 3b | Marine | Low | n/a |
| Bitterwater Creek Shale | 10-5 | W | 3b | Marine | Low | n/a |
| Quatal Formation | 5-2.5 | W | 3b | Lacustrine | Low | n/a |
| Morales Formation | 4-0.1 | W | 3b | Fluvial | Low | n/a |
| Hex Claystone | 145-100 | W | 3a | Marine | Low | n/a |
| Pattiway Formation | 60-58 | W | 3a | Marine | Low | n/a |
| Bealville Fanglomerate | 35-18 | E | 2 | Marine | Low | n/a |
| Holocene deposits | 0.1 | all | 2 | Fluvial | High | n/a |
| Basement rocks | 160-67 | W, E | 1 | Igneous, Metamorphic | Low | n/a |

Well drilling and operation of wells represent the majority of the Project's subsurface activities. These activities generate pulverized rock samples (including any contained fossils) from subsurface zones, and they typically affect only a small area (e.g., a well bore diameter) rather than large volumes of a fossil-bearing geologic stratum. Some shallow subsurface Project activities (e.g., installation of pipelines, typically at depths of less than 5-8 feet below surface) could result in disturbance of potentially fossil-bearing strata that have not been pulverized and, thus, may contain intact fossils.

In summary, there could be significant impacts to paleontological resources as a result of the oil and gas exploration and production activities that would be authorized under the Project.

The implementation of mitigation including applicable training and implementation of appropriate procedures should paleontological materials be discovered, as described in MM 4.5-2, and payment of mitigation fees, as described in MM 4.5-3, would decrease impacts to levels that are less than significant.

## Mitigation Measures

**MM 4.5-2** As part of any Worker Environmental Awareness Program training, all construction personnel shall be trained regarding the recognition of possible buried paleontological resources and protection of paleontological resources

during construction, prior to the initiation of construction or ground-disturbing activities. Training shall inform construction personnel of the procedures to be followed upon the discovery of paleontological materials. All personnel shall be instructed that unauthorized collection or disturbance of fossils is unlawful.

**MM 4.5-3** All well permits that use Enhanced Oil Recovery or Well Stimulation methods shall pay a mitigation fee of $50 per well shall be paid to the Buena Vista Museum to fund the continued education and curation of paleontological resources and provide educational support regarding the paleontological history of the region.

### Level of Significance After Mitigation

Impacts would be less than significant with mitigation.

## Impact 4.5-4: Disturb any Human Remains, Including Those Interred Outside of Formal Cemeteries

Any disturbance of human remains would be significant. Burials, prehistoric or historic, are below the surface and usually are not marked even in the case of historic burials as the original wooden markers have deteriorated. Health and Safety Code Section 7050.5 declares that, in the event of the discovery of human remains outside of a dedicated cemetery, all ground disturbance must cease and the County coroner must be notified. Section 7052 establishes a felony penalty for mutilating, disinterring, or otherwise disturbing human remains, except by relatives.

Potential impacts to human remains would most likely occur during construction. Earthmoving, such as grading, may reveal human skeletal materials and all work should cease upon discovery. Potential impacts to human remains are unlikely during operations except where new ground disturbance occurs.

In summary, there could be significant impacts to human remains as a result of the oil and gas exploration and production activities that would be authorized under the Project. If archaeological materials are encountered, the implementation of mitigation including avoidance (if possible through project redesign or preservation in place) or development of additional treatment measures and recovery/curation (if applicable), as described in MM 4.5-4, or coordination with the coroner or NAHC, as applicable, if human remains are uncovered, as described in MM 4.5-5, would decrease impacts to levels that are less than significant.

### Mitigation Measures

**MM 4.5-4** In the event archaeological materials are encountered during the course of ground disturbance or construction, the Project operator/contractor shall cease any ground disturbing activities within 50 feet of the find. The qualified archaeologist shall evaluate the significance of the resources and recommend appropriate treatment measures. Per California Environmental Quality Act Guidelines Section 15126.4(b)(3), Project redesign and preservation in place shall be the

preferred means to avoid impacts to significant historical resources. Consistent with California Environmental Quality Act Guidelines Section 15126.4(b)(3)(C), if it is demonstrated that resources cannot be avoided, the qualified archaeologist shall develop additional treatment measures in consultation with the County, which may include data recovery or other appropriate measures. The Planning and Community Development Department shall consult with appropriate Native American representatives in determining appropriate treatment for unearthed cultural resources if the resources are prehistoric or Native American in nature. If after consultation it is deemed appropriate, archaeological materials recovered during any investigation shall be curated at an accredited curation facility. The qualified archaeologist shall prepare a report documenting evaluation and/or additional treatment of the resource. A copy of the report shall be provided to the Kern County Planning and Community Development Department and to the Southern San Joaquin Valley Information Center.

**MM 4.5-5** If human remains are uncovered during Project construction, the Applicant shall immediately halt all work, contact the Kern County Coroner to evaluate the remains, and follow the procedures and protocols set forth in Section 15064.4 (e)(1) of the California Environmental Quality Act Guidelines. The Kern County Planning and Community Development Department shall be notified concurrently. If the County Coroner determines that the remains are Native American, the Project proponent shall contact the Native American Heritage Commission, in accordance with Health and Safety Code Section 7050.5, subdivision (c), and Public Resources Code 5097.98 (as amended by Assembly Bill 2641). The Native American Heritage Commission shall designate a Most Likely Descendant for the remains per Public Resources Code 5097.98. Per Public Resources Code 5097.98, the landowner shall ensure that the immediate vicinity, according to generally accepted cultural or archaeological standards or practices, where the Native American human remains are located, is not damaged or disturbed by further development activity until the landowner has discussed and conferred with the most likely descendant regarding their recommendations, if applicable, taking into account the possibility of multiple human remains. If the remains are determined to be neither of forensic value to the Coroner, nor of Native American origin, provisions of the California Health and Safety Code (7100 et. seq.) directing identification of the next-of-kin will apply.

## Level of Significance After Mitigation

Impacts would be less than significant with mitigation.

# 4.5.5 Cumulative Setting, Impacts, and Mitigation Measures

## Cumulative Setting

The geographic scope for cumulative impacts to cultural and paleontological resources includes the area within a one-mile radius from the Project Area. Analysis of cumulative impacts takes into consideration the entirety of impacts that the proposed Project would have on cultural resources. Future development and construction could encounter potentially significant cultural and paleontological resources during ground-disturbing construction activities, including grubbing, grading, and excavation.

Potential impacts on cultural resources include the potential to be destroyed by construction equipment and Project-related vehicles, exposure of alluvium during construction that could subject the rocks to increased weathering and erosion, unauthorized collection of fossils by project personnel (as well as amateur and commercial collectors who would have greater access to the area), and vandalism. If a future development project is located within close proximity of a known cultural and/or paleontological resource, the County would ensure that potential impacts to those resources would be reduced to insignificant levels if the mitigation measures described in this section are implemented.

This geographic scope of analysis is appropriate because the archaeological, historical, and paleontological resources within this radius are expected to be similar to those in the Project Area because of their proximity; similar environments, landforms, and hydrology would result in similar land use and, thus, site types. Similar geology within this vicinity would likely yield fossils of similar sensitivity and quantity.

### Impact 4.5-5: Cumulative Impacts to Historical, Archaeological, or Paleontological Resources and Human Remains

Cumulative impacts may result when paleontological, historical, and archaeological resources or human remains cannot be avoided by future projects. For paleontological and archaeological resources, it is important to recover a scientifically significant sample so the information can be preserved. For historic buildings and structures, detailed recordings, including measured drawings and photographs, can preserve the information. For human remains, reburial in a location not slated for future development can protect those remains from future disturbance. In summary, there could be significant impacts to paleontological, historical, and archaeological resources or human remains as a result of the oil and gas exploration and production activities that would be authorized under the Project.

Implementation of best professional practices would reduce many impacts to a less than significant level. However, it is anticipated that buried archaeological and paleontological resources may be damaged or destroyed. Direct mitigation using the measures above would reduce most of these impacts to a less than significant level; however, the exception is well stimulation or EOR activities that result in the destruction of subsurface fossils. Offset mitigation

appropriate for this is recommended as monetary assessment determined by the County to be paid to the Buena Vista Museum.

## Mitigation Measures

Implement MM 4.5-1 through MM 4.5-5, as described above.

## Level of Significance After Mitigation

Significant and unavoidable.

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Section 4.6

# Geology and Soils

Section 4.6

# Geology and Soils

## 4.6.1 Introduction

This section of the Environmental Impact Report (EIR) describes the affected environment and regulatory setting for geology and soils. It also describes the potential impacts on geology and soils that would result from implementing the Amendment to Chapter 19.98 (Oil and Gas Production) and related ordinance amendments of the Kern County Zoning Ordinance, future development of oil and gas resources pursuant to the Amended Ordinance, and mitigation measures that would reduce these impacts, if necessary.

Geologic and soil characteristics of the Project Area (Figure 4.6-1) and the potential impacts on geology and soils associated with construction and operation of the Project are described in this section. This section is based on the Preliminary Soil and Geology Study prepared by BSK Associates (BSK) in January 2015 (BSK 2015) located in Appendix Q of this EIR and incorporated by reference herein. The issues addressed in this section are risks associated with faults, strong seismic ground-shaking, seismic-related ground failure such as liquefaction, landslides, subsidence, and the potential for induced seismic events.

## 4.6.2 Environmental Setting

## Regional

The Project Area, defined as shown in Figure 4.6-1 is located in the Great Valley Geomorphic Province of California, an alluvial plain, and includes most of the western half of Kern County, bordered on the east by the Sierra Nevada Mountains and on the west by the Temblor Range. The plain generally defines the San Joaquin Valley, which extends for about 50 miles east to west and 400 miles north to south between the Coast and Sierra Nevada Mountain Ranges. The Project Area is generally defined as the portion of Kern County below an elevation of 2,000 feet above mean sea level (AMSL). The Project Area is divided into three Subareas identified as Western, Central, and Eastern Subareas (Figure 4.6-1). The San Joaquin Valley is drained by the Sacramento and San Joaquin rivers, which ultimately drain to San Francisco Bay. The valley is a northwesterly trending trough filled with 40,000 feet of sediments deposited by the surrounding mountains. Streams flowing from the Sierra Nevada to the west have formed alluvial fans at the surface. The Kern River fan is the largest alluvial fan at the western base of the range and covers 300 square miles of the valley, extending to the west from an incised channel north of downtown Bakersfield.

# Local

## Physiographic Provinces

The northern portion of the Project Area is mostly in the San Joaquin Valley. This valley is surrounded by mountain ranges on all sides. The western edge of the valley is bordered by the Diablo and Temblor Ranges. These ranges reach elevations up to 4,332 feet (Mt. McKittrick). The eastern edge of the valley is bordered by the Sierra Nevada Range, which includes peaks of more than 14,000 feet and is deeply incised by stream and glacial erosion, particularly on the longer and less steeply inclined western face of the range. There are several perennial seasonal and intermittent streams and small drainageways flowing into the valley from the east and the west. The Southern Coast Range is located to the west of the Temblor and Diablo Ranges, and forms a barrier on the west side of the valley. The west and east sides of the valley also contain alluvial fans and plains. The alluvial materials on the west side were deposited by runoff from the Coast Range. The alluvial materials on the east side were deposited by runoff from the Sierra Nevada Range (USDA 1988).

Kern County is characterized by six physiographic provinces: the Coast Range, the Great Valley, the Transverse Range, the Sierra Nevada Range, the Mojave Desert, and the Basin and Range Provinces (Figure 4.6-2). The Project Area is predominantly within the Great Valley Province (San Joaquin Valley), and is bordered by the Coast Range to the west and the Sierra Nevada Range to the east.

The Western Subarea is evenly split longitudinally (north-south) between the Coastal Range Province on the west and the Great Valley Province on the east; the Central Subarea lies entirely within the Great Valley Province, and the Eastern Subarea is split longitudinally (north-south) between the Great Valley Province on the west (60% of the Subarea) and the Sierra Nevada Province on the east (40% of the Subarea).

## Great Valley Province

The Great Valley Province is a 400-mile long and 50-mile wide alluvial plain (a largely flat landform created by the deposition of sediment over a long period of time by one or more rivers coming from highland regions) trending northwest/southeast between the Coast Range and Sierra Nevada Provinces. Kern County is located in the most southerly portion of the San Joaquin Valley, in the Great Valley Province. Landforms in the southern part of the San Joaquin Valley belong to four geomorphic types: dissected uplands, low plains and fans, flood plains and channels, and overflow lands and lake bottoms (Wood and Dale 1964). The valley represents a geosyncline (a subsiding linear trough caused by the accumulation of large amounts of sediments) filled with more than 40,000 feet of sediments along the valley axis. Sedimentary deposits in the Project Area consist predominantly of fan deposits, lake deposits, and Pliocene-Pleistocene non-marine deposits and, to a lesser extent, dune sand, basin deposits, and Pliocene marine deposits (Figure 4.6-3) (California Geological Survey 1964). The source of the sediments is the surrounding mountain ranges. Erosion of these ranges has resulted in alluvial fans at the base of the ranges. The largest alluvial fan has been formed by the Kern River and extends over

300 square miles. The Kern River flood plain consists of sand, silt, and clay deposits and is incised into the upper part of the fan, north of downtown Bakersfield, and spreads out across the broad, flat lower fan to the southwest.

## Coast Range Province

The Coast Range Province lies to the west of the Great Valley Province and is also oriented northwest/southwest. It consists of several mountain ranges, including the Temblor Range, which extends for 70 miles from the northwest corner of Kern County southeastward along the county border to the San Emigdio Mountains near Cienaga Canyon and south of Maricopa (Wood and Dale 1964). Crystalline igneous and metamorphic rocks comprise the core of this range; sediments on the Temblor Range are predominantly Miocene, Eocene, and Cretaceous marine sediments (Figure 4.6-3) (California Geological Survey 1964). The most notable structural feature in this province is the San Andreas fault, which trends northwest/southeast from Humboldt County in Northern California to the Salton Sea near the Mexican border for about 650 miles. The fault extends along the western base of the Temblor Range in the western portion of the Project Area.

## Sierra Nevada Range Province

The Sierra Nevada is a 370-mile long by 40- to 80-mile wide range extending from the north-central part of the state to the Tehachapi Mountains (Wood and Dale 1964). The Sierra Nevada Range consists of a large northwest/southeast trending block of the earth's crust that has been uplifted along a series of faults. The eastern face of the range is characterized by a sharp, steep scarp. Gentler slopes and alluvial fans occur along the western face. In Kern County and along the eastern border of the Project Area, the Sierra Nevada Range is composed predominantly of Mesozoic granitic rock, with lesser amounts of Tertiary volcanics and intrusive rocks, Miocene volcanics, pre-Cretaceous metamorphic rocks, Cretaceous metamorphic sedimentary rock, and pre-Cenozoic granitic and metamorphic rocks (Figure 4.6-3) (California Geological Survey 1964).

## Geologic Setting

Kern County is a geologically complex and diverse area and is impacted by compressional forces created as the North American and Pacific tectonic plates slide past one another along the San Andreas fault, located at the western boundary of the Project Area. Plate tectonic forces and other geomorphic activity associated with the gradual westward rotation and elevation of the batholithic core of the Sierra Nevada create fractures or faults in the earth's crust to accommodate compressional strain. Earthquakes are produced in and near the Project Area from sudden movements along these faults, generating ground motion when the accumulated stress within the rocks is released as waves of seismic energy.

## Faults and Seismic History

The San Andreas fault is the most prominent active fault system in the San Joaquin Valley. Other active fault systems in Kern County include the White Wolf fault, located about 20 miles

southeast of Bakersfield, the Breckenridge/Kern Canyon fault, located 20 miles east of Bakersfield; the Edison fault, located about 10 miles east-southeast of Bakersfield; and the Pond Poso fault located 11 miles northeast of Bakersfield. The San Andreas fault system in Kern County is located along the southwestern boundary of Kern and San Luis Obispo counties, with numerous other faults located northeast of the San Andreas fault and trending northwest to southeast. The locations of major faults or fault systems are shown in Figure 4.6-4.

**White Wolf Fault**. The White Wolf fault is a southeast dipping, left-lateral, oblique, reverse fault with a length of 45 miles. This fault is located 20 miles south of downtown Bakersfield and traverses the southeastern end of the San Joaquin Valley, from Wheeler Ridge to northeast of Caliente. On July 21, 1952, the White Wolf fault ruptured, producing an earthquake of magnitude 7.5 and, subsequently, an extensive sequence of aftershocks. Although a surface rupture formed along only 17 miles of the surface trace of this fault, a rupture probably occurred along most of its length. The magnitude 7.5 earthquake in 1952 is the only recorded rupture along the White Wolf fault in historic time. Significant features caused by the fault are the valley at the junction of SR-58 and SR-223 (sometimes called "White Wolf Valley"), and the Arvin cutoff along SR-223. This fault has been designated by the State as an Alquist-Priolo Special Studies Zone.

**Breckenridge-Kern Canyon Fault**. The Breckenridge-Kern Canyon fault is located in the southern Sierra Nevada Mountains, 20 miles east of downtown Bakersfield. It trends northward from the north end of Walker Basin to the north of Mount Whitney, a distance of 100 miles. Uncertainty exists as to the degree of activity of this fault system and its classification. It is designated by the state as an active system with a potential maximum credible earthquake of magnitude 8.0. This fault is capable of causing damage in the Bakersfield area. Areas along this fault have been designated by the State as Alquist-Priolo Special Studies Zones.

**Edison Fault**. The Edison fault is located about 10 miles east of Bakersfield. It is a normal fault that trends to the northwest-southeast over a distance of 6 miles. It is considered by the State to be a "potentially active" fault with evidence of surface displacement within the last 1.6 million years.

**Poso Creek Fault**. The Poso Creek fault is located 9 miles north of Oildale. It is a normal fault that dips to the south. The fault is known to extend about 9 miles in a west to northwest trend and may extend another 30 miles northwest to near the town of Wasco. (SCEDC 2014). The fault is considered by the State to be an active fault (BSK 2015).

**Kern Gorge Fault**. The Kern Gorge fault is located 12 miles northeast of Bakersfield. It is a normal fault that dips to the southwest. The fault extends 12 miles in a north-northwest trend (SCEDC 2014). The fault is considered by the State to be active; surface ruptures were observed in 1952 (BSK 2015)

**San Andreas Fault**. The San Andreas fault is a classic "strike-slip" transform fault that is caused by the movement of the North American and the Pacific tectonic plates along a 650-mile point of contact extending from the Mendocino Escarpment on the north to the Imperial Valley on the south. The eastern Pacific plate is generally trending north along the fault at a rate of 2 inches per year. The fault occurs 38 miles southwest of downtown Bakersfield and trends nearly north (350 degrees) throughout the Project Area, primarily along the western foot of the

Temblor Range. The San Andreas fault trends to the north through most of the Project Area. The fault trace bends to the east in the Tehachapi Mountains located south of the Project Area and continues in a more easterly direction along the San Gabriel and San Bernardino mountains. The northerly movement of the Pacific Plate creates significant compressional forces at the bend, including in the vicinity of Frazier Park in the uplands to the south of the Project Area. The last great earthquake on this segment was the 1857 Fort Tejon earthquake, which is believed to have caused a surface rupture extending 200 miles or more. The maximum credible earthquake that could occur along the fault has been estimated to be magnitude 8.3 on the Richter scale. Areas along this fault have been designated by the State as Alquist-Priolo Special Studies Zones.

As noted above, numerous other named and un-named faults are located within Kern County (Figure 4.6-4). The majority of these faults tend to be located around the perimeter of the San Joaquin Valley near the San Andreas fault system at the western edge of the Project Area; the Wheeler Ridge Anticline and Kern Front fault system located at the southern and eastern edge of the Project Area. However, other faults are found in many locations of the Project Area. Additional faults are shown on Figures 10-1 to 10-5 of the BSK 2015 report, Appendix Q.

## Soils

The Project Area includes most of the western half of Kern County. Soil surveys of the county conducted by the United States Department of Agriculture Natural Resource Conservation Service (USDA-NRCS) have divided the county into four regions (Northwest, Southwest, Northeast, and Southeast). The Project Area overlies the Northwest and Southwest survey areas except for the northeast corner of the Project Area (east of Route 65 and north of Route 178) and a narrow strip in the southeastern portion of the Project Area (east of Arvin) that are included in the Northeast and Southeast survey areas (Figures 4.6-5a, 4.6-5b, and 4.6-5c).

## Soil Map Units

The Kern County soil surveys have identified more than 434 different soil types in the Soil Survey Geographic (SSURGO) database for the Project Area. The SSURGO database contains information about soil as collected by the National Cooperative Soil Survey over the course of a century. This information is gathered by visual observations of the soil, and taking soil samples to be analyzed in laboratories. Soil maps outline areas, referred to as Map Units, which describe soils and other components that have unique properties, interpretations, and productivity. These soil units are contained in the 37 generalized soil units found in the STATSGO2 database for the Project Area. The STATSGO2 database is broad-based inventory of soils and non-soil areas that occur in a repeatable pattern on the landscape. The level of mapping is designed for broad planning and management uses covering state, regional, and multi-state areas (USDA 2015). Figures 4.6-5a, 4.6-5b, and 4.6-5c identify portions of the Project Area that have distinct soil, topographic relief, and drainage patterns. The soil survey maps are designed to compare the suitability of large areas for general land uses and are grouped into landscape categories for broad interpretive purposes (USDA-NRCS 2009). A summary of the soil map units in each Project Subarea is provided below, including the primary unit classification (Table 4.6-1).

**Table 4.6-1: Acres of Soil Map Units in Each Subarea**

| Soil Type | Acres in Central Subarea | % of the Central Subarea | % of the Total Project Area | Acres in Eastern Subarea | % of the Eastern Subarea | % of the Total Project Area | Acres in Western Subarea | % of the Western Subarea | % of the Total Project Area |
|---|---|---|---|---|---|---|---|---|---|
| s740: Vista-Rock outcrop-Auberry-Ahwahnee (s740) | | 0.00% | 0.00% | 1,966.48 | 0.32% | 0.08% | | 0.00% | 0.00% |
| s746: San Joaquin-Madera-Cometa (s746) | 9,191.69 | 1.40% | 0.39% | 15.88 | 0.00% | 0.00% | | 0.00% | 0.00% |
| s747: Vista-Rock outcrop-Cieneba (s747) | | 0.00% | 0.00% | 5,707.19 | 0.94% | 0.24% | | 0.00% | 0.00% |
| s749: Porterville-Centerville (s749) | 5.72 | 0.00% | 0.00% | 2,989.92 | 0.49% | 0.13% | | 0.00% | 0.00% |
| s751: Rock outcrop-Friant-Coarsegold (s751) | | 0.00% | 0.00% | 2,123.54 | 0.35% | 0.09% | | 0.00% | 0.00% |
| s760: Wasioja-Hesperia-Arvin (s760) | | 0.00% | 0.00% | 106,440.76 | 17.45% | 4.50% | | 0.00% | 0.00% |
| s761: Walong-Tunis-Pleito-Chanac-Badland (s761) | | 0.00% | 0.00% | 25,172.52 | 4.13% | 1.07% | | 0.00% | 0.00% |
| s762: Walong-Rock outcrop-Edmundston-Anaverde (s762) | | 0.00% | 0.00% | 49,013.23 | 8.04% | 2.07% | 1,360.20 | 0.12% | 0.06% |
| s765: Tehachapi-Steuber-Havala (s765) | | 0.00% | 0.00% | 1,885.99 | 0.31% | 0.08% | | 0.00% | 0.00% |
| s771: Reward-Pottinger-Aramburu (s771) | | 0.00% | 0.00% | | 0.00% | 0.00% | 26,676.78 | 2.43% | 1.13% |
| s772: Kilmer-Hillbrick-Aido (s772) | | 0.00% | 0.00% | | 0.00% | 0.00% | 115,405.28 | 10.52% | 4.88% |
| s773: Mercey-Kettleman-Elkhills-Delgado-Cantua-Bitterwater (s773) | | 0.00% | 0.00% | | 0.00% | 0.00% | 123,108.35 | 11.22% | 5.21% |

**Table 4.6-1: Acres of Soil Map Units in Each Subarea**

| Soil Type | Acres in Central Subarea | % of the Central Subarea | % of the Total Project Area | Acres in Eastern Subarea | % of the Eastern Subarea | % of the Total Project Area | Acres in Western Subarea | % of the Western Subarea | % of the Total Project Area |
|---|---|---|---|---|---|---|---|---|---|
| s774: Panoche-Milham-Kimberlina (s774) | 785.73 | 0.12% | 0.03% | 7,096.16 | 1.16% | 0.30% | 194,430.57 | 17.73% | 8.23% |
| s775: Wasco-Kimberlina (s775) | 219,426.01 | 33.45% | 9.29% | 122,628.63 | 20.11% | 5.19% | 257,193.68 | 23.45% | 10.89% |
| s776: Yribarren-Twisselman-Panoche (s776) | | 0.00% | 0.00% | | 0.00% | 0.00% | 38,600.18 | 3.52% | 1.63% |
| s777: Lokern-Buttonwillow (s777) | 20,141.93 | 3.07% | 0.85% | 8,635.46 | 1.42% | 0.37% | 110,010.26 | 10.03% | 4.66% |
| s778: Twisselman-Nahrub-Lethent (s778) | 84,661.77 | 12.91% | 3.58% | | 0.00% | 0.00% | 12,847.16 | 1.17% | 0.54% |
| s779: Panoche-Garces (s779) | 134,916.97 | 20.57% | 5.71% | | 0.00% | 0.00% | 21,747.65 | 1.98% | 0.92% |
| s780: McFarland (s780) | 39,872.34 | 6.08% | 1.69% | | 0.00% | 0.00% | | 0.00% | 0.00% |
| s781: Milham (s781) | 43,425.46 | 6.62% | 1.84% | | 0.00% | 0.00% | 2,245.30 | 0.20% | 0.10% |
| s782: Westhaven-Lerdo-Excelsior-Cajon (s782) | 31,342.61 | 4.78% | 1.33% | 11,771.20 | 1.93% | 0.50% | 10,758.29 | 0.98% | 0.46% |
| s783: Zerker-Premier-Delano-Chanac (s783) | 70,839.32 | 10.80% | 3.00% | 155,042.82 | 25.42% | 6.56% | | 0.00% | 0.00% |
| s805: Vaquero-Sagaser-Gaviota-Altamont (s805) | | 0.00% | 0.00% | | 0.00% | 0.00% | 1,314.07 | 0.12% | 0.06% |
| s807: Westcamp-Houser-Gepford-Armona (s807) | 1,391.37 | 0.21% | 0.06% | | 0.00% | 0.00% | | 0.00% | 0.00% |
| s809: Torriorthents-Elkhills (s809) | 1.61 | 0.00% | 0.00% | 74,107.85 | 12.15% | 3.14% | | 0.00% | 0.00% |
| s814: Soper-Rock outcrop-Jilson-Dunnlake (s814) | | 0.00% | 0.00% | 32,391.30 | 5.31% | 1.37% | | 0.00% | 0.00% |

**Table 4.6-1: Acres of Soil Map Units in Each Subarea**

| Soil Type | Acres in Central Subarea | % of the Central Subarea | % of the Total Project Area | Acres in Eastern Subarea | % of the Eastern Subarea | % of the Total Project Area | Acres in Western Subarea | % of the Western Subarea | % of the Total Project Area |
|---|---|---|---|---|---|---|---|---|---|
| s893: Mocho-Capay-Camarillo (s893) | | 0.00% | 0.00% | | 0.00% | 0.00% | 668.75 | 0.06% | 0.03% |
| s894: Still-Riverwash-Metz (s894) | | 0.00% | 0.00% | | 0.00% | 0.00% | 483.44 | 0.04% | 0.02% |
| s897: Nacimiento-Los Osos-Balcom-Ayar (s897) | | 0.00% | 0.00% | 2,900.14 | 0.48% | 0.12% | 88,214.30 | 8.04% | 3.73% |
| s899: Vista-Cieneba-Andregg (s899) | | 0.00% | 0.00% | | 0.00% | 0.00% | 933.94 | 0.09% | 0.04% |
| s925: Stutzville-Panoche-Metz (s925) | | 0.00% | 0.00% | | 0.00% | 0.00% | 827.80 | 0.08% | 0.04% |
| s934: Modjeska family-Coarsegold-Aramburu variant (s934) | | 0.00% | 0.00% | | 0.00% | 0.00% | 664.91 | 0.06% | 0.03% |
| s935: Marpa-Hilt-Arrastre (s935) | | 0.00% | 0.00% | | 0.00% | 0.00% | 695.85 | 0.06% | 0.03% |
| s936: Los Gatos-Gamboa (s936) | | 0.00% | 0.00% | | 0.00% | 0.00% | 611.50 | 0.06% | 0.03% |
| s937: Xerofluvents-Oak Glen-Dotta (s937) | | 0.00% | 0.00% | | 0.00% | 0.00% | 914.61 | 0.08% | 0.04% |
| s974: Polonio-Padres (s974) | | 0.00% | 0.00% | | 0.00% | 0.00% | 840.42 | 0.08% | 0.04% |
| s977: Panoza-Kilmer-Hillbrick-Beam (s977) | | 0.00% | 0.00% | | 0.00% | 0.00% | 86,288.59 | 7.87% | 3.65% |

## Western Subarea

The Western Subarea is comprised of 24 soil groups, 12 of which make up 99% of the area:

- Approximately 23.5% is composed of Wasco-Kimberlina soils—deep, nearly level, well-drained fine sandy loam and sandy loam—found mainly on alluvial fans, alluvial plains, basin rims, and flood plains in the eastern part of the San Joaquin Valley.
- Approximately 18% is composed of Panoche-Milham Kimberlina soils—deep, nearly level to moderately sloping, well-drained clay loam, and sandy loam—found mainly on alluvial fans, alluvial plains, and terraces of the western part of the San Joaquin Valley;
- Approximately 11% is composed of Mercey-Kettleman-Elkhills-Delgado-Cantua-Bitterwater soils—shallow to deep, rolling to very steep, somewhat excessively drained and well-drained soils underlain by weathered sandstone or shale that form thick stratified alluvium—found mainly on the foothills of the Temblor and Diablo Ranges.
- Approximately 10.5% is composed of Kilmer-Hillbrick-Aido soils—shallow to deep, gently rolling to very steep, well-drained sandy loam and loam—found mainly on the hills/mountains of the Temblor and Diablo Ranges.
- Approximately 10% is composed of Lokern-Buttonwillow soils—deep, nearly level, somewhat poorly drained clay—found mainly on the basins of the San Joaquin Valley.
- Approximately 8% is composed of Nacimiento-Los Osos-Balcom-Ayar soils—moderately deep well-drained—found mainly on the hills/mountains of the Temblor and Diablo Ranges.
- Approximately 8% is composed of Panoza-Kilmer-Hillbrick-Beam soils— shallow to deep, gently rolling to very steep, well-drained sandy loam and loam—found mainly on the hills/mountains of the Temblor and Diablo Ranges.
- Approximately 3.5% is composed of Yribarren-Twisselman-Panoche soils—deep, nearly level to gently rolling, well-drained clay, loam, and clay loam—found mainly on alluvial fans, alluvial plains, and terraces of the western part of the San Joaquin Valley.
- Approximately 2.5% is comprised of Reward-Pottinger-Aramburu soils—moderately deep and deep, undulating to very steep, well-drained shaley loam and very shaley clay loam—found mainly on the hills/mountains of the Temblor and Diablo Ranges;
- Approximately 2% is composed of Panoche-Garces soils—deep, nearly level, saline-alkali, well-drained silt loam and clay loam—found mainly on alluvial fans, alluvial plains, basin rims, and flood plains in the eastern part of the San Joaquin Valley.
- Approximately 1% is composed of Twisselman-Nahrub-Lethent soils—deep, nearly level, well-drained to somewhat poorly drained clay and silt loam—found mainly on alluvial fans, alluvial plains, and terraces of the western part of the San Joaquin Valley.

- Approximately 1% is composed of Westhaven-Lerdo-Excelsior-Cajon soils—deep to nearly level and gently sloping, well-drained and somewhat excessively drained loamy sand and fine sandy loam—found mainly on alluvial fans, alluvial plains, basin rims, and flood plains in the eastern part of the San Joaquin Valley.
- The remaining <1% is composed of the Walong-Rock outcrop-Edmundston-Anaverde; Milham; Vaquero-Sagaser-Gaviota-Altamont; Mocho-Capay-Camarillo; Still-Riverwash-Metz; Vista-Cieneba-Andregg; Stutzville-Panoche-Metz; Modjeska family-Coarsegold-Aramburu variant; Marpa-Hilt-Arrastre; Los Gatos-Gamboa; Xerofluvents-Oak Glen-Dotta; and Polonio-Padres series soils scattered throughout the Subarea.
- Approximately 0.2% of additional unnamed soil series in this Subarea are associated with urban areas.

## Central Subarea

The Central Subarea is comprised of 13 soil groups, 9 of which make up 99% of the study area:

- Approximately 33.5% is composed of Wasco-Kimberlina soils—deep, nearly level, well-drained fine sandy loam and sandy loam—found mainly on alluvial fans, alluvial plains, basin rims, and flood plains in the eastern part of the San Joaquin Valley.
- Approximately 20.5% is composed of Panoche-Garces soils—deep, nearly level, saline-alkali, well-drained silt loam and clay loam—found mainly on alluvial fans, alluvial plains, basin rims, and flood plains in the eastern part of the San Joaquin Valley.
- Approximately 13% is composed of Twisselman-Nahrub-Lethent soils—deep, nearly level, well-drained or somewhat poorly drained clay and silt loam—found mainly on alluvial fans, alluvial plains, and terraces of the western part of the San Joaquin Valley;
- Approximately 11% is composed of Zerker-Premier-Delano-Chanac soils—deep, nearly level to hilly, well-drained coarse sandy loam and clay loam—mainly on terraces in the eastern part of the San Joaquin Valley;
- Approximately 6.5% is comprised of Milham soils—deep, nearly level, well-drained sandy loam—found mainly on alluvial fans, alluvial plains, basin rims, and flood plains in the eastern part of the San Joaquin Valley.
- Approximately 6% is composed of McFarland soils—deep, nearly level, well-drained sandy loam—found mainly on alluvial fans, alluvial plains, basin rims, and flood plains in the eastern part of the San Joaquin Valley. Approximately 0.1% of this soil series is associated with urban areas.

- Approximately <5% is composed of Westhaven-Lerdo-Excelsior-Cajon soils—deep to nearly level and gently sloping, well-drained and somewhat excessively drained loamy sand and fine sandy loam—found mainly on alluvial fans, alluvial plains, basin rims, and flood plains in the eastern part of the San Joaquin Valley.

- Approximately 3% is composed of Lokern-Buttonwillow soil—deep, nearly level, somewhat poorly drained clay—found mainly on the basins of the San Joaquin Valley;

- Less than 1.5% is composed of San Joaquin-Madera-Cometa soils—undulating, moderately deep to a hardpan, well- and moderately well-drained soils that formed in alluvium derived from mixed but dominantly granitic rock sources—found mainly on the eastern side of the San Joaquin Valley.

- The remaining <1% is composed of Panoche-Milham-Kimberlina and Westcamp-Houser-Gepford-Armona soil series.

- Approximately 0.5% of additional unnamed soil series in this Subarea are associated with urban areas.

## Eastern Subarea

The Eastern Subarea is comprised of 17 soil groups, 14 of which make up 99% of the study area:

- Approximately 25.5% is composed of Zerker-Premier-Delano-Chanac soils—deep, nearly level to hilly, well-drained coarse sandy loam and clay loam—found mainly on terraces in the eastern part of the San Joaquin Valley. Approximately 1% of this soil series is associated with urban areas.

- Approximately 20% is composed of Wasco-Kimberlina soils—deep, nearly level, well-drained fine sandy loam and sandy loam—found mainly on alluvial fans, alluvial plains, basin rims, and flood plains in the eastern part of the San Joaquin Valley. Approximately 2% of this soil series is associated with urban areas.

- Approximately 17.5% is composed of Wasioja-Hesperia-Arvin soils—very deep, well-drained soils that formed in alluvium from sedimentary, metasedimentary, and granitic rock sources—found on alluvial fans, valley plains and stream terraces, mainly in the lower San Joaquin Valley.

- Approximately 12% is composed of Torriorthents-Elkhills soils—deep, well-drained soils formed in mixed stratified alluvium from sedimentary and granitic rocks—found mainly in the southwest part of the southern part of the San Joaquin Valley.

- Approximately 8% is composed of Walong-Rock outcrop-Edmundston-Anaverde soils—outcrops and moderately deep, well-drained soils that formed in material weathered from metamorphic and granitic rocks—found mainly on hillslopes, mountain slopes, flood plains, stream terraces, alluvial fans, and fan remnants on the western and central slopes in the southern Sierra Nevada and Tehachapi mountains.

- Approximately 5% is composed of Soper-Rock outcrop-Jilson-Dunnlake—shallow to moderately deep, well-drained soils that formed in material weathered from conglomerate and sandstone—found mainly on foothill areas in the western part of southern and central California.

- Approximately 4% is composed of Walong-Tunis-Pleito-Chanac-Badland soils—shallow to very deep, well-drained to excessively drained soils that formed in material weathered from metamorphic and granitic rocks—found mainly on foothills of the southern Sierra Nevada and the Tehachapi Mountains and southern and central San Joaquin Valley.

- Approximately 2% is composed of Westhaven-Lerdo-Excelsior-Cajon soils—deep to nearly level and gently sloping, well-drained and somewhat excessively drained loamy sand and fine sandy loam—found mainly on alluvial fans, alluvial plains, basin rims, and flood plains in the eastern part of the San Joaquin Valley;

- Approximately 1.5% is composed of Lokern-Buttonwillow soils—deep, nearly level, somewhat poorly drained clay—found mainly on the basins of the San Joaquin Valley;

- Approximately 1% is composed of Panoche-Milham Kimberlina soils—deep, nearly level to moderately sloping, well-drained clay loam, sandy loam—found mainly on alluvial fans, alluvial plains, and terraces of the western part of the San Joaquin Valley. Approximately 0.1% of this soil series is associated with urban areas.

- Approximately 1% is composed of Vista-Rock outcrop-Cieneba soils—very shallow to moderately deep, well-drained soils to excessively drained soils that formed in material weathered from decomposed granitic rocks—found on hills and mountainous uplands, mainly on southern California mountains and Sierra Nevada foothills.

- The remaining 2.5% is composed of less than 1% each of Vista-Rock outcrop-Auberry-Ahwahnee, Porterville-Centerville, Rock outcrop-Friant-Coarsegold, Tehachapi-Steuber-Havala, and Nacimiento-Los Osos-Balcom-Ayar soils in various locations in this Subarea.

- Approximately 0.3% of additional unnamed soil series in this Subarea are associated with urban areas.

# Potential Geologic Hazards

## Seismic Hazards

Southern California is one of the most seismically active areas in the lower 48 states. Recorded earthquake history dates back to the mid-18th century. The first strong earthquake recorded in California occurred in the Los Angeles region in 1769, probably near the San Andreas fault. Four violent shocks were recorded during the Spanish Gaspar de Portola expedition at a camp located about 30 miles southeast of what is now downtown Los Angeles. Most authorities speculate, even though the record is very incomplete, that the 1769 event was a major earthquake (USGS 2014).

Major earthquakes have also been recorded in or near the Project Area in Kern County. The largest of these earthquakes was the July 1952 Kern County earthquake, which measured 7.5 in magnitude on the Richter scale and severely damaged the towns of Tehachapi and Arvin. Twelve persons died, many were injured, and $60 million in property damage was sustained. Damage to well-designed structures was slight, but old and poorly built buildings were cracked, and many collapsed. Reinforced tunnels with walls 18 inches thick near Bealville were cracked, twisted, and caved in. Rails were shifted and bent into S-shaped curves. Near Caliente, reinforced concrete railroad tunnels were destroyed. Many aftershocks occurred, three above magnitude 6 on the Richter scale. One aftershock on August 22 (magnitude 5.8) was centered near Bakersfield and resulted in two fatalities and extensive damage to many already weakened buildings. The Kern County earthquake, the largest with an epicenter in California since 1906, originated on the White Wolf fault.

The Fort Tejon earthquake of 1857 moment magnitude scale ($M_W = 7.9$) was one of the greatest earthquakes ever recorded in the U.S. and left a surface rupture scar more than 220 miles long along the San Andreas fault. As a result of the shaking, the current of the Kern River was turned upstream, and water ran 4 feet deep over its banks. The waters of Tulare Lake were thrown upon the shore, stranding fish miles from the original lake bed. The surface rupture caused by the quake was extensive. The San Andreas fault broke the surface continuously for at least 220 miles, possibly as much as 250 miles, with an average slip of 15 feet and a maximum displacement of about 30 feet (possibly greater) in the Carrizo Plain area (SCEDC 2014).

Other significant earthquakes include the Tejon Ranch earthquake in 1988, which measured 5.4 in magnitude and caused some damage to circuit breakers at the A.D. Edmonston Pumping Plant on the California Aqueduct causing the aqueduct to be temporarily shut down. Otherwise, damage was slight, although the quake was felt across much of southern and central California. The 5.2 magnitude Wheeler Ridge earthquake in 1993 was located between Bakersfield and Taft (SCEDC 2014). As a result of the Wheeler Ridge earthquake, some minor damage occurred at Pumpkin Center, near the epicenter, where ground-shaking was the strongest, but otherwise, this earthquake caused little damage, though it was noticed over a wide area of southern and central

California. Major earthquakes that have occurred within the Project Area are shown in Figure 4.6-6.

Earthquake intensities are measured using either the Modified Mercalli Intensity Scale or the Richter (or other) Magnitude scale. The Mercalli scale is based on observation of the results of an earthquake, such as the shaking and damage that people actually feel and see where I is the least intensive (not felt except by very few under especially favorable conditions); VI is in the middle of the intensity scale (felt by all—heavy furniture is moved and, in a few instances, plaster will fall); and XII is the most intensive (severe damage—lines of sight are distorted and objects are thrown in the air). The Richter scale measures the energy released in an earthquake by measuring the size of the seismic waves. Mercalli intensities do not correspond directly to Richter magnitudes. The following is a comparison of the Mercalli intensities to Richter magnitudes:

- Mercalli I to V = Richter < 5.5
- Mercalli VI and VII = Richter 5.5 to 6.1
- Mercalli VIII and IX = Richter 6.2 to 6.9
- Mercalli X = Richter 7.0 to 7.3
- Mercalli XI = Richter 7.4 to 7.9
- Mercalli XII = Richter > 8.0

The extent of potential ground shaking hazards from earthquakes in Kern County is illustrated in (Figure 4.6-7) (USGS 2008). Ground shaking is expressed as a percentage of the force of gravity (%g) generated by a seismic event. Figure 4.6-7 is centered on Bakersfield and shows the Project Area. Contour lines identify areas where a specific force of gravity level has a 10% chance of being exceeded in any given 50-year period. The applicable ground shaking risk ranges from 15% to 25% of the force of gravity over most of the Project Area, and increases to 30% to 40% of the force of gravity in the south, where compressional forces occur due to the bending of the San Andreas fault. A 10%g to 20%g quake equates to a Mercalli intensity of about VII (capable of breaking chimneys, etc.). An earthquake of 30%g to 40%g equates to an intensity of about VIII to IX (considerable damage in ordinary substantial buildings, with partial collapse of buildings moved off foundations; ground cracks are conspicuous, and underground pipes broken). The ground shaking risk contours indicate that the Project Area is subject to above average seismic risks compared with other locations in the United States.

USGS data was also used to prepare an earthquake probability map (Figure 4.6-8). As shown in Figure 4.6-8, the probability of an earthquake with a magnitude greater than 5.0 within the next 20 years is 50% to 60% throughout most of the Project Area. The percentage decreases to 30% to 40% near portions of the western and northern boundaries of the Project Area, which are located a greater distance from many of the major fault systems in the region.

Table 4.6-2 presents a summary of Southern California seismicity based on the Southern California Earthquake Data Center (SCEDC) instrument recorded earthquakes for 1932 to 2008 (Hutton, Woessner, and Hauksson 2010). According to Hutton, Woessner, and Hauksson, "the overall seismicity rate has remained fairly constant for the last 77 years, except for major aftershock sequences."

**Table 4.6-2: Average Earthquake Rates Based on the Seismicity Catalog Recorded by the SCSN for 1932 through 2008**

| Magnitude Range | Number of Events | Number of Events/Yr. | Average Recurrence Rate |
|---|---|---|---|
| **Average Earthquake Rates** | | | |
| 3.0+ | 19,707 | ~256/yr. | 1/1.4 days |
| 4.0+ | 2485 | 32.3/yr. | 1/11.3 days |
| 5.0+ | 253 | 3.29/yr. | 1/111 days |
| 6.0+ | 28 | ~0.36/yr. | 1/2.75 yrs. |
| 7.0+ | 3 | ~0.039/yr. | 1/25.7 yrs. |
| **Average Declustered Rates** | | | |
| 4.0+ | 881 | 11.4/yr. | 1/31.9 days |
| 5.0+ | 104 | 1.35/yr. | 1/270 days |
| 6.0+ | 19 | 0.25/yr. | 1/4.05 yrs. |
| 7.0+ | 3 | 0.039/yr. | 1/27 yrs. |

Source: BSK 2015

## Fault Rupture

Surface ruptures are the result of movement along an existing fault, which breaks through the land surface. There are numerous faults throughout the Project Area and surface ruptures are present at many of these locations. Surface rupture may occur suddenly as the result of an earthquake or may be more gradual due to fault creep (slow displacement along a fault).

## Induced Seismicity

The majority of earthquakes that occur each year throughout the world are the result of natural causes. Naturally occurring earthquakes generally are the result of the buildup of stresses caused by the lateral or vertical movement of blocks or plates moving and the subsequent buildup and release of energy. However, some earthquakes are the result of human activity and are called induced-seismic events or induced earthquakes. Human activities that can result in induced seismic events include injection and withdrawal of fluids, impoundment of reservoirs, mining and controlled explosions (including underground). Hydraulic fracturing is also capable of producing induced seismic events. Hydraulic fracturing involves the injection of fluid and

propellant into a targeted formation in an effort to fracture the rock and allow for fluid flow (i.e., oil or natural gas). Generally, hydraulic fracturing generates seismic events with a less than 2.0 magnitude. However, when faults are present, larger seismic events are possible (Holland 2011).

The California Council on Science and Technology (CCST), Lawrence Berkeley National Laboratory (LBNL), and Pacific Institute (PI) issued an August 28, 2014 report, Advanced Well Stimulation Technologies in California, An Independent Review of Scientific and Technical Information. As related to potential seismic impacts from hydraulic fracturing, the following was presented in the report:

> Current hydraulic fracturing activity is not considered to pose a significant seismic hazard in California. To date, only one felt earthquake attributed to hydraulic fracturing in a California oil or gas field has been documented, and that was an anomalous slow-slip event that radiated much lower energy at much lower dominant frequencies than normal earthquakes of similar size. (BSK 2015)

Similarly, the National Academy of Sciences (NAS) evaluated induced seismicity from both enhanced oil recovery (EOR) and hydraulic fracturing, concluding that the "potential for induced seismicity is low in EOR operations" and the "process of hydraulic fracturing a well as presently implemented for shale gas recovery does not pose a high risk for inducing felt seismic events" (NAS 2013).

Induced seismicity can also occur as a result of deep wastewater injection. This was first observed at the Rocky Mountain Arsenal in 1961, where the Army disposed of chemical waste fluids via underground injection into Precambrian crystalline rock beneath sedimentary rocks of the Denver basin. The well was drilled to a depth of 12,045 feet and fluid was injected at an average rate of 181,000 gallons per day. This resulted in several felt earthquakes in 1962 and more than 700 shocks recorded by 1965. Earthquake triggering by wastewater injection is the result of increasing the pressure of existing fluid in a formation and thereby decreasing the frictional resistance between rocks along an existing fault system (BSK 2015).

While wastewater injection has triggered earthquakes in other regions of the U.S., differences between California and other U.S. regions suggest that the likelihood of induced seismicity due to wastewater injection in California is low compared to other regions in the U.S. Since 1981, the California Department of Conservation, Division of Oil, Gas, and Geothermal Resources (DOGGR) regulations under the Safe Drinking Water Act have prohibited over-pressuring injection well. In addition, as reported by the CCST:

> …present [wastewater] injection volumes [in California] are relatively small and injection intervals are shallow compared to other areas of the United States, the seismic hazard related to current wastewater injection is also likely to be relatively low. For example, California's disposed water volume per wastewater-injection well is about four times less and 1.5–2.7 km (4,700–7,700 ft) shallower than disposal into the wells in the vicinity of the Barnett Shale [in Texas] where induced events have occurred. (CCST 2014).

By comparison, the non-hydrocarbon producing zones that are used for wastewater injection in California are typically less than 6,000 feet deep and the "lack of reported felt seismicity for hydraulic fracturing in California is consistent with the relatively shallow injection depths and small injection volumes" (CCST 2014). The seimogenic zones, i.e., the zones at which the rocks are rigid enough to accumulate enough stress to cause significant earthquakes, are relatively deep in California and significantly deeper than the oil and gas development and wastewater disposal zones. Moreover, more oil and gas production in California occurs in sedimentary basins as compared to other parts of the U.S. These basins are less susceptible to induced seismicity from wastewater injection as compared to injection into fractured hard rock.

In California, injection wells have been a part of the oil and gas industry for more than 50 years, with 42,000 oilfield injection wells operating in California. Overall, seismicity rates have remained relatively constant for the last 77 years. The introduction of injection wells 50 years ago and an increase in the number of injection wells since that time has not increased the seismicity rate in Southern California. In addition, a review of locations of disposal injection wells in Northern and Southern California, obtained from DOGGR geographic information system (GIS) mapping data and compared to the spatial distribution of earthquake locations from the 1980s to 2012, found no relational pattern suggesting a link between disposal wells and induced earthquakes. If there were such a link, clustering of earthquakes would be expected closer to the disposal well, extended radially corresponding to an expanding pressure front. This type of earthquake pattern was not observed in the analysis area. Therefore, it appears that the operation of injection wells has had little effect on seismicity rates in Southern California, including Kern County (BSK 2015).

## Well Failure

Well failure may occur as a result of natural seismic activity, deficient cementing practices, or defective casings. The CCST study on advanced well stimulation technologies in California (2014) indicated that leakage due to casing and cement failures represents one of the most likely pathways for unintentional well fluid migration to underground formations. Recent studies have indicated that well failure, or blowout rates in the Project Area have been significantly reduced over time by improved well construction technologies. Blowout rates due to well operations in California Oil and Gas District 4 from 1991 to 2005 ranged from one per 10,000 to one per 60,000 well-years, depending on the wellfield activity taking place at the time of the blowout. Well failure is discussed in more detail in Section 4.9.

## Liquefaction

Liquefaction occurs when saturated, loose materials (e.g., sand or silty sand) are weakened and transformed from a solid to a near-liquid state due to increased pore water pressure. The increase in pressure is caused by strong ground motion from an earthquake. Liquefaction-related phenomena can include lateral spreading, ground oscillation, flow failure, loss of bearing strength, subsidence, and buoyancy effects. Four conditions are generally required for liquefaction to occur:

- The soil must be saturated (relatively shallow groundwater).
  - If a soil layer is within 50 feet of the ground surface, it is more likely to liquefy than deeper layers.
- The soil must be loosely packed (low to medium relative density).
  - If a soil layer is a fluvial, lacustrine, or aeolian deposit or more recent deposition, a greater potential for liquefaction exists than for till, residual deposits, or older deposits.
- The soil must be relatively cohesion-less (not clayey).
  - Liquefaction potential in a soil layer increases with decreasing fines content and plasticity of the soil. Generally, a soil saturation of at least 80% to 85% is deemed to be a necessary condition for soil liquefaction.
- Ground-shaking of sufficient intensity must occur to function as a trigger mechanism.

Seismic ground-shaking of relatively loose, granular soils that are saturated or submerged can cause the soils to liquefy and temporarily behave as a dense fluid. Liquefaction is caused by a sudden temporary increase in pore water pressure due to seismic densification or other displacement of submerged granular soils. Liquefaction occurs more often in areas underlain by young alluvium where the groundwater table is higher than 50 feet below ground surface (bgs). Although not the only factor in determining liquefaction potential, areas of high groundwater are located throughout the central portion of the Project Area (Figure 4.6-9). Additionally, deposits in the Project Area often consist of alluvial fan deposits and lacustrine (lake) deposits and, to a lesser extent, dune sand (aeolian) deposits (see Section 4.6.3, Regulator Setting). Currently, a liquefaction potential map has not been prepared for the Project Area.

## Subsidence

Land subsidence is the gradual, local settling or shrinking of the earth's surface with little or no horizontal motion. Subsidence is normally the result of gas, oil, or water extraction; hydro-compaction; and/or peat oxidation and not the result of landslide or ground failure. In general, subsidence within the Project Area is primarily related to groundwater withdrawal. Extensive groundwater withdrawal from unconsolidated sediments within the San Joaquin Valley has caused widespread aquifer-system compaction and land subsidence from 1926 to 1970. In localized areas subsidence has been as much as 27 feet. Groundwater withdrawal has been primarily used for agricultural purposes. Beginning in the 1950s, surface water began being transported into the area through the construction of canals and aqueducts. The importation of surface water resulted in decreased groundwater usage, water level recovery, and ultimately reduced rate of compaction. However, drought conditions in the mid-1970s, late 80s and early 90s, as well as drought conditions and regulatory reductions in surface water deliveries from 2007 to 2010, caused increased pumping, water level decline and renewed compaction (USGS 2013). As mentioned above, groundwater use in the Project Area and other valley locations was reduced as surface water storage and conveyance facilities, including the State Water Project and the federal Central Valley Project, became operational and imported water supplies were used

for irrigation. As a result, rates of land subsidence related to groundwater withdrawals have slowed appreciably since 1972. During the periods of drought in 1977 and the early 1990s, however, additional subsidence occurred in response to the lack of imported supplies and increased groundwater use (USDA-NRCS 2009). Statewide, groundwater meets about 40% of the state's water demands in an average year. In 2014, statewide groundwater usage was closer to 65% because of that year's drought. Because aquifer systems respond to both climatic droughts and regulatory restrictions of water deliveries, current drought conditions will also increase compaction and subsidence rates as seen in the previous examples (Borchers and Carpenter 2014).

According to the Soil Survey of Kern County, Southwest Part, the maximum subsidence within the survey area totaled 8 feet by 1972. Other data indicates that maximum subsidence may be as much as almost 12 feet in areas south of Bakersfield. For comparison purposes, subsidence due to groundwater extraction in the northern part of the San Joaquin Valley, 115 miles northwest of the Project Area, has been measured at more than 30 feet between 1926 and 1970 (USGS 2013). Figure 4.6-10 depicts the areas of subsidence within the San Joaquin Valley. Throughout most of the survey area, subsidence has occurred so slowly and over such a broad area that its effects have gone largely unnoticed by most residents. Land subsidence is most prominent in the southwest portion of the county south of Bakersfield and east of Taft and to the north, near Delano.

Land subsidence as the result of hydrocompaction, i.e., excessive wetting, is a near-surface phenomenon. Studies have demonstrated that hydrocompaction occurs only in alluvial-fan sediments above the highest prehistoric water table and in areas where sparse rainfall and ephemeral runoff have penetrated below the zone subject to summer desiccation by evaporation and transpiration. High differential settlement of soils due to hydrocompaction of near-surface soils can cause significant damage to structures and equipment placed on susceptible soils. Areas of hydrocompaction are present in isolated locations in the southwest corner of the county.

The weight of sediments overlying a producing formation is supported partially by the rock matrix and partially by the fluid pressure in the rock pores. When the reservoir fluid pressure is depleted, more of the load is transferred to the rock matrix and the formation volume compacts. The primary control on this formation compaction is therefore influenced by the material pore volume compressibility and bulk compressibility, defined as the change in pore volume and bulk volume with respect to the pore pressure at constant confining pressure (Bruno and Bovberg 1992).

Land subsidence of less than 1 foot from oilfield withdrawals is known to occur in a few isolated areas in southwest Kern County. Generally, the extent and rate of oil and gas extraction subsidence is significantly less than subsidence caused by groundwater use because hydrocarbon extraction typically occurs at much deeper locations beneath the ground surface. In addition, a substantial amount of the material extracted by oil and gas activity includes briny water (commonly called "produced water") that is re-injected into oil-bearing locations after the oil has been recovered (USDA-NRCS 2009). DOGGR monitors subsidence in oil and gas fields and regulates oil and gas withdrawal and re-pressurizing of each oilfield. If oilfield subsidence is

observed, well operators are required to stabilize the ground by injecting additional produced water or reducing the volume of produced water being pumped during field operations.

## Landslides

Landslides commonly occur in connection with other major natural disasters such as earthquakes, volcanic eruptions, wildfires, and floods; landslides also are caused by other factors such as strength of underlying material surface and groundwater conditions, surface vegetation, and seasonal rainfall. Landslides are associated with areas of steep slopes generally greater than 30%. Slopes greater than 30% are present along the eastern and southern boundaries of the Eastern Subarea and along the western boundary of the Western Subarea. Figure 4.6-11 depicts the areas of landslide incidences in Southern California (USGS 1978). Slope stability depends upon slope steepness and the strength of the underlying material. Developments on slopes over 30% are regulated according to Kern County Zoning Ordinance, Chapter 19.88 Hillside Development. The Hillside Development Chapter does not currently apply to oil and gas operations. Table 4.6-3 below shows the types of landslides and the environment in which they occur.

**Table 4.6-3: Geologic Environments Likely to Produce Earthquake-Induced Landslides**

| Landslide Type | Type of Material | Minimum Slope | Remarks |
|---|---|---|---|
| Rock falls | Rocks weakly cemented, intensely fractured, or weathered; contain conspicuous planes of weakness dipping out of slope or contain boulders in a weak matrix. | 40°<br>1.2:1<br>84% | Particularly common near ridge crests and on spurs, ledges, artificially cut slopes, and slopes undercut by active erosion. |
| Rock slides | Rocks weakly cemented, intensely fractured, or weathered; contain conspicuous planes of weakness dipping out of slope or contain boulders in a weak matrix. | 35°<br>1.4:1<br>70% | Particularly common in hillside flutes and channels, on artificially cut slopes, and on slopes undercut by active erosion. Occasionally reactivate preexisting rockslide deposits. |
| Rock Avalanches | Rocks intensely fractured and exhibiting one of the following properties: significant weathering, planes of weakness dipping out of slope, weak cementation, or evidence of previous landsliding. | 25°<br>2.1:1<br>47% | Usually restricted to slopes of greater than 500 feet (150 m) relief that have been undercut by erosion. May be accompanied by a blast of air that can knock down trees and structures beyond the limits of the deposited debris. |
| Rock slumps | Intensely fractured rocks, pre-existing rock slump deposits, shale, and other rocks containing layers of weakly cemented or intensely weathered material. | 15°<br>3.7:1<br>27% | |

**Table 4.6-3: Geologic Environments Likely to Produce Earthquake-Induced Landslides**

| Landslide Type | Type of Material | Minimum Slope | Remarks |
|---|---|---|---|
| Rock block slides | Rocks having conspicuous bedding planes or similar planes of weakness dipping out of slopes. | 15°<br>3.7:1<br>27% | |
| Soil falls | Granular soils that are slightly cemented or contain clay binder. | 40<br>1.7:1<br>84% | Particularly common on stream-banks, terrace faces, coastal bluffs, and artificially cut slopes. |
| Disrupted soil slides | Loose, unsaturated sands. | 15°<br>3.7:1<br>27% | |
| Soil avalanches | Loose, unsaturated sands. | 25°<br>2.1:1<br>47% | Occasionally reactivate preexisting soil<br>avalanche deposits. |
| Soil slumps | Loose, partly to completely saturated sand or silt; uncompacted or poorly compacted manmade fill composed of sand, silt, or clay, preexisting soil slump deposits. | 10°<br>5.7:1<br>18% | Particularly common on embankments built on soft, saturated foundation materials, in hillside cut-and-fill areas, and on river and coastal flood plains. |
| Soil block slumps | Loose, partly or completely saturated sand or silt; uncompacted or slightly compacted manmade fill composed of sand or silt, bluffs containing horizontal or subhorizontal layers or loose, saturated sand or silt. | 5°<br>11:1<br>8.7% | Particularly common in areas of preexisting landslides along river and coastal flood plains, and on embankments built of soft, saturated foundation materials. |
| Low earth flows | Stiff, partly to completely saturated clay and preexisting earth-flow deposits. | 10°<br>5.7:1<br>18% | |
| Soil lateral spreads | Loose, partly or completely saturated silt or sand, uncompacted or slightly compacted manmade fill composed of sand. | 0.3°<br>190:1<br>0.5% | Particularly common on river and coastal flood plains, embankments built on soft, saturated foundation materials, delta margins, sand dunes, sand spits, alluvial fans, lakeshores and beaches. |
| Rapid soil flow | Saturated, uncompacted or slightly compacted manmade fill composed of sand or sandy silt (including hydraulic fill earth dams and tailings dams); loose, saturated granular soils. | 2.3°<br>25:1<br>4.0% | Includes debris flows that typically originate in hollows at heads of streams and adjacent hillsides; typically travel at tens of miles per hour or more and may cause damage miles from the source area. |

**Table 4.6-3: Geologic Environments Likely to Produce Earthquake-Induced Landslides**

| Landslide Type | Type of Material | Minimum Slope | Remarks |
|---|---|---|---|
| Subaqueous landslides | Loose, saturated granular soils. | 0.5°<br>115:1<br>0.9% | Particularly common on delta margins. |
| Soil avalanches | Loose, unsaturated sands. | 25°<br>2.1:1<br>47% | Occasionally reactivate preexisting soil avalanche deposits. |
| Soil slumps | Loose, partly to completely saturated sand or silt; uncompacted or poorly compacted manmade fill composed of sand, silt, or clay, preexisting soil slump deposits. | 10°<br>5.7:1<br>18% | Particularly common on embankments built on soft, saturated foundation materials, in hillside cut-and-fill areas, and on river and coastal flood plains. |
| Soil block slumps | Loose, partly or completely saturated sand or silt; uncompacted or slightly compacted manmade fill composed of sand or silt, bluffs containing horizontal or subhorizontal layers or loose, saturated sand or silt. | 5°<br>11:1<br>8.7% | Particularly common in areas of preexisting landslides along river and coastal flood plains, and on embankments built of soft, saturated foundation materials. |
| Low earth flows | Stiff, partly to completely saturated clay and preexisting earth-flow deposits. | 10°<br>5.7:1<br>18% | |
| Soil lateral spreads | Loose, partly or completely saturated silt or sand, uncompacted or slightly compacted manmade fill composed of sand. | 0.3°<br>190:1<br>0.5% | Particularly common on river and coastal flood plains, embankments built on soft, saturated foundation materials, delta margins, sand dunes, sand spits, alluvial fans, lakeshores and beaches. |
| Rapid soil flow | Saturated, uncompacted or slightly compacted manmade fill composed of sand or sandy silt (including hydraulic fill earth dams and tailings dams); loose, saturated granular soils. | 2.3°<br>25:1<br>4.0% | Includes debris flows that typically originate in hollows at heads of streams and adjacent hillsides; typically travel at tens of miles per hour or more and may cause damage miles from the source area. |
| Subaqueous landslides | Loose, saturated granular soils. | 0.5°<br>115:1<br>0.9% | Particularly common on delta margins. |

## Expansive Soils

Expansive soils are soils that expand (swell) and contract (shrink) as the result of variations in moisture content. Clay is the most common soil constituent that makes soils expansive because of its ability to retain large amounts of water. The expansiveness of clay depends upon the minerals in the clay. Expansive soils swell and shrink because the soil behaves like a sponge: it expands when it becomes saturated and it shrinks when it loses its water. Structures built on soils with high swelling potential may experience shifting, cracking, and breaking damage as these soils expand and contract (Muhirwa, Benda, and Sargent 2015). Thus, soils that are predominantly clay or have high clay content are considered potentially expansive. Expansive soil potential in the Project Area is described below.

### Western Subarea

As shown on Figure 4.6-12a, 54% of the Western Subarea contains soils with expansive potential, mostly almost the entire southern half of the Western Subarea and along the boundaries of northern half of the Subarea.

### Central Subarea

As shown in Figure 4.6-12b, 39% of the Central Subarea contains soils with expansive potential, predominantly in the northwest portion of the Central Subarea, with smaller areas along the northeastern border and in the southern tip of the Subarea.

### Eastern Subarea

As shown in Figure 4.6-12c, 40% of the Eastern Subarea contains soils with expansive potential, predominantly in the northwest corner, along the east-central and west-central boundaries, and in the southern part of the Subarea.

## Soil Erosion

Soil erosion is the removal of soil by wind and water at a rate greater than it is formed. Soil erosion is caused by a number of factors including:

- Lack of vegetation/roots to bind the soil
- Steep slopes
- Poor farming practices
  - Overgrazing
  - Deep ploughing two or three times/year
  - Lack of crop rotation
  - Planting crops down the contour instead of along it
- Catastrophic weather events
- Impacts from human activities

- Water erosion
  - This occurs in three ways: sheet erosion (where an entire surface of a field is gradually eroded in a uniform way); gully erosion (caused by concentrated runoff at the base of steep slopes that form a deep channel or gully); and rill erosion (smaller channels of water where water finds hollows in which to settle and low-lying channels through which to run). Wind erosion generally occurs where the land surface is bare, mainly in areas with low rainfall, which allows the ground to dry out, and land flat enough to allow wind to carry soil particles. (South Africa National Department of Agriculture 2015)

    The Kern County soil surveys use erosion potentials measured as K factors and T factors to determine a particular soil's susceptibility to erosion. K factors are the susceptibility of a soil to sheet and rill erosion by water, and T factors are an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. K factors are one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual soil loss by sheet and rill erosion in tons per acre per year. K factors are based on the percentage of silt, sand, and organic matter, and soil structure and permeability. In general, the higher the K factor, the greater the susceptibility to sheet and rill erosion.

- Slope length
  - Slope length has considerable influence over runoff and can potentially accelerate erosion. The RUSLE slope length is defined as the distance from the origin of overland flow to where the flow enters a concentrated flow area like an ephemeral gully, waterway, diversion, or stream. In general, steeper slopes result in higher length slope (LS) value, thus creating greater erosion potentials from water.

The Kern County soil surveys subdivide the soils into wind erodibility groups. Group 1 soils are the most susceptible to wind erosion, and Group 8 are least susceptible. Wind erodibility indexes are also used to assign a numerical value indicating the susceptibility of soil to wind erosion, or tons per acre per year that can be lost to wind erosion. The size and composition of the surface particles along with soil moisture and frozen soil layers are also factors in wind erosion. Wind erodibiity in the Project Area is described below.

### Western Subarea

Approximately 44% of the Western Subarea contains soils exhibiting the highest K factor (>0.3) (Figure 4.6-13a). These soils generally occur in the north-central portion of the Subarea and extend to the mid-central portion of the Subarea. There is also a small area of highly susceptible soils near the southeast corner of the Subarea. Only 7% of the soils exhibit a higher length of slope factor (>50). These soils occur along the western and southern boundaries of the Western Subarea (Figure 4.6-14a).

Approximately 49% of the Western Subarea contains soils exhibiting moderate to high wind erosion susceptibility (>50 tons/acre/yr.) (Figure 4.6-15a). These soils generally occur in the southern portion of the Subarea (where water erosion susceptibility is low). Some additional areas of wind erosion-susceptible soils also occur along the north-west boundary and the north-east boundary of the Subarea.

### Central Subarea

Approximately 49% of the Central Subarea contains soils exhibiting the highest K factor (>0.3) (Figure 4.6-13b). These soils generally occur in the northwestern portion of the Central Subarea and extend to the mid-western portion of the Subarea. There are no soils in the Central Subarea with high slope factors (Figure 4.6-14b).

Approximately 38% of the Central Subarea contains soils exhibiting moderate to high wind erosion susceptibility (>50 tons/acre/yr.) (Figure 4.6-15b). These soils generally occur in the southern portion of the Subarea (opposite of the highest water erosion susceptibility). Some additional areas of wind erosion susceptible soils also occur in the northwest corner, along the northern boundary, and a very small area in the north-central portion of the Subarea.

### Eastern Subarea

Approximately 12% of the Eastern Subarea contains soils exhibiting the highest K factor (>0.3) (Figure 4.6-13c). These soils are concentrated in the central portion of the Subarea. Only 8% of the soils exhibit a higher slope factor (>50). These soils occur along the eastern and southern boundaries of the Subarea (Figure 4.6-14c).

Approximately 47% of the Eastern Subarea contains soils exhibiting moderate to high wind erosion susceptibility (>50 tons/acre/yr.) (Figure 4.6-15c). These soils generally occur throughout most of the Subarea except in the central/west-central portion of the Subarea (opposite of the highest water erosion susceptibility) and the northwest/north-central portion of the Subarea.

## Corrosive Soils

Corrosive soils are soils that induce electrochemical or chemical action that dissolves or weakens concrete or uncoated steel. The Kern County soil surveys designate low, moderate, and high corrosive properties of each soil on both concrete and uncoated steel. Corrosive soils in the Project Area are described below.

### Western Subarea

Approximately 68% of the Western Subarea contains soils exhibiting high corrosion potential for uncoated steel (Figure 4.6-16a). These soils generally occur in the northern half of the Subarea, with additional areas along the southwestern and southeastern boundaries and a minor amount along the southern boundary.

Approximately 5% of the Western Subarea contains soils exhibiting high corrosion potential for concrete (Figure 4.6-17a). These soils generally occur in isolated areas in the north/northeast and southeast/southwest portions of the Subarea.

### Central Subarea

Approximately 88% of the Central Subarea contains soils exhibiting high corrosion potential for uncoated steel (Figure 4.6-16b). These soils generally occur in the northern two-thirds of the Subarea with an additional area near the southern portion of the Subarea.

Approximately 5% of the Central Subarea contains soils exhibiting high corrosion potential for concrete (Figure 4.6-17b). These soils generally occur in isolated areas in the north/northwest and southern portions of the Subarea.

### Eastern Subarea

Approximately 53% of the Eastern Subarea contains soils exhibiting high corrosion potential for uncoated steel (Figure 4.6-16c). These soils generally occur in the northwest, west, and southeastern portions of the Subarea.

Approximately 2% of the Eastern Subarea contains soils exhibiting high corrosion potential for concrete (Figure 4.6-17c). These soils generally occur in isolated areas in the east-central and west-central southern portions of the Subarea.

## Soil Permeability

Permeability is a measure of the rate of flow of a liquid or gas through a porous media. Soil permeability is controlled by structure, porosity, and texture. In general, permeability is influenced by grain size. Particle sorting (particle uniformity) is also a factor. The larger the grain size, and the better the sorting, the higher the permeability. The Kern County soil survey classifies soils in four hydrologic groups: Group A consists of soils with high infiltration rates, thus low runoff potential, and are composed of sands and gravelly sands; Group B consists of soils with moderate infiltration rates; Group C consists of soils with slow infiltration rates; and Group D consists of soils with very slow infiltration rates and thus high runoff potential and are composed mainly of clays. Group D soils may result in ponding and flooding, can affect tillage and earthmoving operations, and put limitations on septic tank and leach fields. Low permeability soil in each Subarea of the Project is described below.

### Western Subarea

Approximately 13% of the Western Subarea contains low permeability soils (Figure 4.6-18a). These soils generally occur along the northwestern, northern, northeastern, and southern borders, with a larger area along the southeastern border extending to the west.

### Central Subarea

Approximately 28% of the Central Subarea contains low permeability soils (Figure 4.6-18b), predominantly in the northwest portion of the Subarea, extending mid-way down the western border, with another area near the southern tip of the Subarea.

### Eastern Subarea

Approximately 5% of the Eastern Subarea contains low permeability soils (Figure 4.6-18c). These low permeability soils occur predominantly along the northern border, and along the eastern and southern border in some localized areas, and a small area along the western border of the Subarea.

## 4.6.3 Regulatory Setting

Local jurisdictions generally follow state and federal jurisdictions when addressing geologic resources and geotechnical hazards. The conservation elements and seismic safety elements of city and county general plans contain policies for the protection of geologic features and avoidance of hazards.

The California Environmental Quality Act (CEQA) is the major environmental statute that guides the design and construction of projects on non-federal lands in California. This statute sets forth a specific process for environmental impact analysis and public review. In addition, the project proponent must comply with other applicable state and local statutes, regulations, and policies. Relevant and potentially relevant statutes, regulations, and policies are discussed below.

# Federal

The Uniform Building Code categorizes earthquake hazards in different regions of the United States by seismic Zones 1 through 4. Zone 1 has the least seismic potential and Zone 4 has the highest seismic potential. The Project Area is within Seismic Zone 4; accordingly, any potential future oil development and construction would be required to comply with all design standards applicable to Seismic Zone 4.

## Clean Water Act (CWA)

The Clean Water Act (CWA) (33 United States Code [U.S.C.] Section 1251 et seq.), formerly the Federal Water Pollution Control Act of 1972, was enacted with the intent of restoring and maintaining the chemical, physical, and biological integrity of the waters of the United States. Several provisions of the CWA regulate activities that could affect soil erosion and chemical composition of water. The CWA requires states to set standards to protect, maintain, and restore water quality through the regulation of point source and certain non-point source discharges to surface water. Those discharges are regulated by the National Pollutant Discharge Elimination System (NPDES) permit process (CWA Section 402). Projects that disturb one or more acre of land are required to obtain NPDES coverage under the NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (General Permit).

Construction General Permits are implemented and enforced by the California Water Resources Control Board under Order No. 2009-0009-DWQ. The General Permit requires the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP), which includes best management practices (BMPs) to protect storm water runoff.

Requirements of the federal CWA and associated SWPPP requirements are described in further detail in Section 4.9, Hydrology and Water Quality.

## Bureau of Land Management Oil and Gas Leasing Requirements

The Bureau of Land Management (BLM) leases federal land within the Project Area for oil and gas exploration and recovery. The County does not have jurisdiction to regulate oil and gas operations on federal land, and BLM or other federal agencies do not regulate land use associated with oil and gas operations on non-federal land in Kern County. BLM oil and gas leasing requirements in Kern County are summarized below for informational purposes.

In August 2014, the BLM commissioned an independent study of the best available science regarding the potential impacts of using well stimulation technology, such as hydraulic fracturing (the use of high pressure fluids or chemicals in oil and gas wells to increase the yield of oil and gas from subsurface rock formation) in the unique geology of California. The report was prepared by the CCST, LBNL, and PI (CCST 2014). The study reached 11 conclusions, including the following:

1. Present day well stimulation practices in California differ significantly from practices used for unconventional shale reservoirs in states such as North Dakota and Texas, and the impacts of hydraulic fracturing observed in other states are not necessarily relevant to California.

2. Acid fracturing has comprised a small fraction of reported well stimulation to date in California, is usually applied in relatively rare carbonate reservoirs, and is not expected to lead to major increases in oil and gas development in the State.

3. The most likely scenario for expanded well stimulation in California is production in and near reservoirs that are currently using well stimulation and that contain oil that has migrated from source rocks and not from the Monterey Formation shales.

4. Current water demand for well stimulation operations is a small fraction of statewide water use and ranges from 450 to 1,200 acre-feet per year (AFY). Ninety-five percent of water currently used is fresh water; the remainder is produced water, and most of the demand occurs in the southwestern San Joaquin Valley.

5. Most chemicals used in reported well stimulation treatments for which toxicity information is available are considered to be of low toxicity or non-toxic. However, a few reported chemicals present concerns for acute toxicity, including biocides and mineral acids. Potential risks posed by chronic exposure to most chemicals used in well stimulation activities remain unknown.

6. There are no publicly recorded instances of subsurface release of contaminated fluids into potable groundwater in California, but a lack of studies, data collection, and reporting makes it difficult to fully evaluate this potential concern.

7. Current well stimulation practices could allow flowback water containing stimulation chemicals to be mixed with produced water for use in irrigation.

8. Estimated marginal criteria air emissions (e.g., NOx, $PM_{2.5}$, VOCs; see Section 5.2.1, Air Quality, of the Advanced Well Stimulation Technologies in California: An Independent Review of Scientific and Technical Information [CCST 2014]) directly related to well stimulation appear small compared with total oil and gas production emissions in the San Joaquin Valley, where the vast majority of hydraulic fracturing takes place.

9. Fugitive methane emissions from direct well stimulation in oil wells are likely to be small compared with the total greenhouse gas (GHG) emissions from oil and gas production in California.

10. Current hydraulic fracturing for oil and gas production in California is not considered to pose a significant seismic hazard. The disposal of produced water from oil and gas production in deep injection wells has caused seismic events that were felt in several states and could increase seismic hazards in California under certain conditions.

11. Overall, the direct impacts of current well stimulation practices appear to be limited and will likely be limited in the future if proper management practices are followed. Existing or as yet unidentified technologies might be developed to extract oil and gas from new locations, e.g., the Monterey Formation, and could generate different environmental impacts compared with the impacts associated with current well stimulation activities.

## Earthquake Hazards Reduction Act

The National Earthquake Hazards Reduction Program (NEHRP) was established by the U.S. Congress when it passed the Earthquake Hazards Reduction Act of 1977, Public Law (P.L.) 95–124. At the time of its creation, Congress' stated purpose for NEHRP was "to reduce the risks of life and property from future earthquakes in the United States through the establishment and maintenance of an effective earthquake hazards reduction program." Congress recognized that earthquake-related losses could be reduced through improved design and construction methods and practices, land use controls and redevelopment, prediction techniques and early-warning systems, coordinated emergency preparedness plans, and public education and involvement programs. Since NEHRP's creation, it has become the federal government's coordinated long-term nationwide program to reduce risks to life and property in the United States that result from earthquakes. Four basic NEHRP goals are as follows:

- Develop effective practices and policies for earthquake loss reduction and accelerate their implementation
- Improve techniques for reducing earthquake vulnerabilities of facilities and systems

- Improve earthquake hazards identification and risk assessment methods, and their use
- Improve the understanding of earthquakes and their effects.

Congress has recognized that several key federal agencies can contribute to earthquake mitigation efforts. Today, there are four primary NEHRP agencies:

- Federal Emergency Management Agency (FEMA) of the Department of Homeland Security.
- National Institute of Standards and Technology (NIST) of the Department of Commerce (NIST is the lead NEHRP agency).
- National Science Foundation (NSF).
- USGS of the Department of the Interior.

Congress completed a review of NEHRP, resulting in the NEHRP Reauthorization Act of 2004, PL 108–360. PL 108–360 directed that NEHRP activities be designed to develop effective measures for earthquake hazard reduction; promote the adoption of earthquake hazards reduction measures by government agencies, standards and codes organizations, and others involved in planning and building infrastructure; improve the understanding of earthquakes and their effects through interdisciplinary research; and, develop, operate, and maintain both the Advanced National Seismic System (ANSS) and the George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES). In a major new initiative, PL 108–360 also directed that NEHRP support development and application of performance-based seismic design (PBSD).

### Oil and Gas Pipelines

The Pipeline and Hazardous Material Safety Administration (PHMSA), under the U.S. Department of Transportation (DOT) is responsible for regulating and ensuring the safe and secure movement of hazardous materials to industry and consumers by all modes of transportation, including pipelines. The PHMSA's Office of Pipeline Safety (OPS) administers the DOT's national regulatory program to assure the safe transportation of natural gas, petroleum, and other hazardous materials by pipeline. The OPS develops regulations and other approaches to risk management to ensure safety in design, construction, testing, operation, maintenance, and spill response planning of pipeline facilities. Pipeline safety regulations are listed in the Code of Federal Regulations (CFR), Title 49 Parts 190 to 199.

## State

### Alquist-Priolo Earthquake Fault Zoning Act of 1972

Formerly the Special Studies Zoning Act, the Alquist-Priolo Earthquake Fault Zoning Act of 1972 (Public Resources Code [PRC] Div. 7, Ch. 2.5) regulates development and construction of buildings near active faults to protect human occupancy structures from the surface fault rupture hazards. This state law was the direct result of the 1971 San Fernando earthquake, which was associated with extensive surface fault ruptures that damaged numerous homes, commercial

buildings and other structures. The Alquist-Priolo Earthquake Fault Zoning Act's main purpose is to prevent the construction of buildings used for human occupancy on the surface trace of active faults. The law requires the California State Geologist to establish regulatory zones (known as Earthquake Fault Zones) around the surface traces of active faults and to issue appropriate maps. Faults included in the Alquist-Priolo Earthquake Fault Zoning Program are classified by activity:

- Faults classified as "active" are those that have been determined to be "sufficiently active and well defined," with evidence of movement within Holocene time.
- Faults classified as "potentially active" have shown geologic evidence of movement during Quaternary time (within the last 1.6 million years).
- Faults considered "inactive" have not moved in the last 1.6 million years. (CGS 2007)

The resulting maps are distributed to all affected cities, counties, and state agencies for their use in planning and controlling new or renewed construction. Local agencies must regulate most development projects within the zones.

Local government agencies are mandated by the act to require site-specific geologic investigations for proposed projects located within a designated Alquist-Priolo Earthquake Fault Zone area. An evaluation and written report of a specific site must be prepared by a licensed geologist. Such investigations typically include subsurface trenching to determine the presence of faulting. The most recent movements on any observed fault are then determined by appropriate age-dating. If an active fault is found, a structure for human occupancy cannot be placed over the trace of the fault and must be set back from the fault. Fault rupture typically occurs within 50 feet of an active fault line and is limited to the immediate area of the fault zone where the fault breaks along the surface. Such a rupture could potentially displace and/or deform the ground surface. Any project that involves the construction of buildings or structures for human occupancy, such as an operations and maintenance building, is subject to review under the Alquist-Priolo Earthquake Fault Zoning Act, and any structures for human occupancy must be located at least 50 feet from any active fault.

## Seismic Hazards Mapping Act of 1990

In accordance with Public Resources Code, Chapter 7.8, Division 2, the CDOC, Division of Mines and Geology (now California Geological Survey [CGS]) is directed to delineate Seismic Hazard Zones through the Seismic Hazards Zonation Program. The purpose of the Act is to reduce the threat to public health and safety and to minimize the loss of life and property by identifying and mitigating seismic hazards, such as those associated with strong ground shaking, liquefaction, landslides, other ground failures, or other hazards caused by earthquakes. Cities, counties, and State agencies are directed to use seismic hazard zone maps developed by CGS in their land-use planning and permitting processes. In accordance with the Seismic Hazards Mapping Act, site-specific geotechnical investigations must be performed prior to permitting most urban development projects within seismic hazard zones.

## California Building Code (CBC 2013)

The state of California provides minimum standards for building design and construction relating to fire and life safety, structural safety, and access compliance through the California Building Code (CBC), California Code of Regulations, Title 24. CBC provisions provide minimum standards to safeguard life or limb, health, property, and public welfare by regulating and controlling the design, construction, quality of materials, use and occupancy, location, and maintenance of all buildings and structures and certain equipment. The code incorporates by adoption the 2012 International Building Code (IBC) of the International Code Council (ICC). The 2013 edition of the California Building Standards Code (Title 24) became effective on January 1, 2014.

Among other provisions, the CBC requires that a grading permit be issued by applicable local land use authorities if more than 50 cubic yards of soil are moved during the implementation of a project, and Chapter 16 (Structural Design) of the code describes seismic load calculation and design.

## California Division of Oil, Gas, and Geothermal Resources

DOGGR regulates production of oil and gas, as well as geothermal resources, in the state of California. DOGGR oversees the drilling, operation, maintenance, and plugging and abandonment of onshore and offshore oil, gas, and geothermal wells, to protect life, health, property, and natural resources; underground and surface waters suitable for irrigation or domestic use; and oil, gas, and geothermal reservoirs. Responsibilities of DOGGR are identified in the California Code of Regulations (CCR), Title 14, Division 2, Chapter 4, and include well design and construction standards, surface production equipment and pipeline requirements, and well abandonment procedures and guidelines.

## Underground Injection Control Program

In California, wells that inject fluids associated with oil and natural gas production operations (Class II injection wells) also are regulated by DOGGR under its Underground Injection Control (UIC) Program. Injection operations regulated under the UIC Program include enhanced oil recovery through waterflood, steamflood, and cyclic steam wells, produced water disposal, and gas storage. DOGGR is authorized to regulate Class II injection wells under United States Environmental Project Agency (EPA) oversight, pursuant to the 1982 primacy agreement between the EPA and DOGGR under the federal Safe Drinking Water Act (SDWA). The requirements of DOGGR's UIC Program are found in the PRC, the SDWA, and in the State and federal regulations. The main features of the UIC Program include permitting, inspection, enforcement, mechanical integrity testing, plugging and abandonment oversight, data management, and public outreach. It is DOGGR's intent that the UIC Program will be administered consistently in each of DOGGR's six districts.

## Field Rules

Pursuant to CCR Title 14, Division 2, Chapter 4, Section 1722 (k), the State Oil and Gas Supervisor may establish field rules for any oil and gas pool or zone in a field when sufficient geologic and engineering data are available from previous drilling operations. DOGGR has established field rules for those fields where geologic and engineering information is available to accurately describe subsurface conditions. These field rules identify downhole conditions and well-construction information that oil and gas operators should consider when drilling and completing onshore oil and gas wells.

## Senate Bill 4 (Well Stimulation Treatment)

Section 1421(d) of the federal SDWA excludes "the underground injection of fluids or propping agents (other than diesel fuels) pursuant to hydraulic fracturing operations related to oil, gas, or geothermal production activities" from regulation under the UIC program. Effective January 1, 2014, California adopted several new and amended provisions of the Public Resources Code and Water Code to regulate any oil or gas well stimulation activity designed to enhance oil or gas production or recovery by increasing the permeability of the geologic formation that contains hydrocarbon deposits. Well stimulation activities covered by the new legislation include hydraulic fracturing and acid well stimulation treatments. The legislation, commonly referred to as Senate Bill (SB) 4, amended Sections 3213, 3215, 3236.5, and 3401 of, and added Article 3 to, Chapter 1 of Division 3 of the PRC; and added Section 10783 to the Water Code. SB 4 requires that DOGGR (1) promulgate emergency interim and adopt permanent regulations regulating well stimulation treatments by January 2015, to take effect no later than July 1, 2015; (2) complete a statewide EIR on well stimulation treatments by July 2015; (3) complete an independent scientific study of well stimulation by January 2015; and (4) consult and reach formal agreements with other regulatory agencies to provide regulatory accountability and public transparency for well stimulation treatments by January 2015. SB 4 also requires that the State Water Resources Control Board develop model criteria for oil and gas-related groundwater monitoring by July 2015.

DOGGR adopted interim well stimulation regulations in January 2014, and readopted the interim regulations in July 2014. Proposed permanent regulations were circulated for public review and comment in October 2014 and were finalized in January 2015. The final regulations will become effective in July 2015. A draft program EIR for well stimulation in California was published by DOGGR on January 14, 2015. The public comment period for the draft EIR ended on March 16, 2015, and the EIR is scheduled to be finalized by July 2015 in accordance with SB 4.

SB 4 and the related interim and proposed permanent regulations require that certain physical well inspections, documentation, and public notices and disclosures be completed prior to and after completing a well stimulation process. The proposed regulations define well stimulation to include "a treatment of a well designed to enhance oil and gas production or recovery by increasing the permeability of the formation. Well stimulation is a short term and non-continual process for the purposes of opening and stimulating channels for the flow of hydrocarbons.

Examples of well stimulation treatments include hydraulic fracturing, acid fracturing, and acid matrix stimulation" (CCR § 1761(a)(1)(A)). This definition "does not include routine well cleanout work; routine well maintenance; routine treatment for the purpose of removal of formation damage due to drilling; bottom hole pressure surveys; routine activities that do not affect the integrity of the well or the formation; the removal of scale or precipitate from the perforations, casing, or tubing; a gravel pack treatment that does not exceed the formation fracture gradient; or a treatment that involves emplacing acid in a well and that uses a volume of fluid that is less than the Acid Volume Threshold for the operation and is below the formation fracture gradient" (CCR § 1761(a)(1)(B)).

The California Natural Resources Agency commissioned the CCST and LBNL to conduct an independent scientific assessment of well stimulation treatments, including hydraulic fracturing, in California. The purpose of the report is to synthesize and assess the available scientific information associated with well stimulation treatments in California. The review will survey hydraulic fracturing, matrix acidizing, and acid fracturing as they are applied both onshore and offshore for oil and gas production in the State. The study is organized by three major areas, which will be documented in three separate report volumes. Volume I ("Geology and Well Stimulation Treatments") was released on January 14, 2015. Volume I provides the factual basis describing what well stimulation treatments are, how they are conducted in general and practiced in California, and where they have been and are being used for oil and gas production in the State. Volumes II and III are scheduled for release on July 1, 2015. Volume II ("Generic and Potential Environmental Impacts of Well Stimulation Treatments") will assess the potential impacts of well stimulation treatments with respect to water, air quality, and GHG emissions, as well as induced seismicity, ecology, traffic, and noise. Volume II will incorporate input from Volume I, as the nature of the technology will define the types of potential environmental impacts that have to be assessed. Volume III ("Case Studies with Selected Evaluations of Environmental and Public Health Risk") will present case studies to assess environmental issues and qualitative hazards for specific geographic regions, based on findings in Volumes I and II. The assessment builds upon the 2014 report undertaken for the BLM concerning well stimulation in California by the CCST, LBNL, and PI (CCST 2014). Whereas, the 2014 report for the BLM exclusively addressed well stimulation for onshore oil production in California, the analysis of the subject report is planned to include both oil and gas production in California for onshore and offshore environments and to incorporate new information derived from newly released data and research.

The regulations, studies, and interagency agreements required by SB 4 are intended to regulate water quality and potential geological hazards that could be associated with well stimulation (e.g., earthquakes or ground instability resulting from bedrock fracturing or acidization). Water quality regulatory requirements associated with SB 4 are described in further detail in Section 4.9, Hydrology and Water Quality.

SB 4 and the related interim and proposed permanent regulations require that certain physical well inspections, documentation, and public notices and disclosures be completed prior to and after completing a well stimulation. The proposed regulations define well stimulation to include

"a treatment of a well designed to enhance oil and gas production or recovery by increasing the permeability of the formation. Well stimulation is a short term and non-continual process for the purposes of opening and stimulating channels for the flow of hydrocarbons. Examples of well stimulation treatments include hydraulic fracturing, acid fracturing, and acid matrix stimulation." This definition does not include "routine well cleanout work; routine well maintenance; routine treatment for the purpose of removal of formation damage due to drilling; bottom hole pressure surveys; routine activities that do not affect the integrity of the well or the formation; the removal of scale or precipitate from the perforations, casing, or tubing; or a treatment that does not penetrate into the formation more than 36 inches from the wellbore."

Before well stimulation, an operator must evaluate the cement outside of the well production casing to ensure zonal isolation during and following the treatment or, if necessary, remediate the cement before the well stimulation (CDOC 2014).

A well stimulation treatment area analysis must also be conducted to demonstrate that there is no potential conduit for fluid to migrate out of the hydrocarbon zone where the well stimulation treatment will occur. The proposed regulations require that the results of these assessments be integrated into a well stimulation treatment design.

Each well operator must obtain a permit from DOGGR in advance of a well stimulation treatment and must submit an application that includes the identification and location of the well; the time period during which the well stimulation treatment is planned to occur; a water management plan; a list of the anticipated identity and concentration of the chemical constituents of the well stimulation treatment fluids the operator plans to use; modeling of the well stimulation treatment and identification of plugged and abandoned wells and geologic faults within the modeled treatment area; indication that the operator is developing a groundwater monitoring plan meeting the criteria of the applicable Regional Water Quality Control Board (Regional Board) (operations cannot begin unless a plan has been approved); an estimate of treatment-generated waste materials that are not addressed in the water management plan; identification and contact information of the operator; the depth of the base of fresh water; and the results of specified evaluation and modeling.

Once an application has been deemed complete by DOGGR, a well operator must hire an independent entity or person to provide notification to every tenant and owner of neighboring property within a specified distance from the wellhead and horizontal projection of the applicable well at least 30 days before beginning a well stimulation treatment. Notified property owners may request baseline and follow-up water quality testing at the operator's expense, and prior notice of any such testing must be provided to the applicable Regional Board to allow for the opportunity to observe the water sampling process. Well operators must also pressure test a well and meet certain integrity requirements before beginning a well stimulation treatment. An operator may conduct the stimulation activity identified in an approved application and notice within one year from DOGGR approval.

The proposed regulations require the operator to monitor the surface injection pressure, slurry rate, proppant concentration, fluid rate, and pressure of each annuli of the well during a well

stimulation treatment. Two thresholds have been proposed that would require the operator to terminate the well stimulation treatment, report the incident to the Division, and conduct diagnostics. Notices of any termination must be provided to DOGGR and other state agencies, including the Regional Board. Tracking seismic activity during and after well stimulation treatment incorporates the use of the California Integrated Seismic Network and requires evaluation if an earthquake larger than a 2.7 magnitude occurs within the vicinity of a well stimulation treatment. Finally, the proposed regulations require operators to perform ongoing monitoring of a well after a stimulation treatment and to immediately inform DOGGR and the Regional Board of the threshold exceedance(s), conduct diagnostics, and take all appropriate measures to prevent contamination of protected water or loss of hydrocarbon resources.

SB 4 requires that each well operator disclose, within 60 days after a well stimulation treatment is completed, information regarding the source, volume, and composition and disposition of well stimulation fluids, including, but not limited to, hydraulic fracturing fluids, acid well stimulation fluids, and flowback fluids. The disclosures are provided to DOGGR and must be available online in a format that allows for searching and aggregating the information. For operations that do not meet the definition of well stimulation treatment, use of acid or the application of pressure to stimulate the formation must be briefly described and submitted for inclusion in the permanent well file maintained by DOGGR. DOGGR has proposed to maintain a searchable index of those reports so that the public can easily review such information.

As of February 25, 2015, 1,413 well stimulation notices and 633 well stimulation completion disclosures have been filed with DOGGR and posted on applicable websites throughout California, including notices and disclosures in the Project Area (http://maps.conservation.ca.gov/doggr/iwst_index.html and http://www.conservation.ca.gov/dog/Pages/WellStimulationTreatmentDisclosure.aspx).

## Senate Bill 1281 (Inventory of Surface Oil and Gas Industry Disposal Sumps and Ponds)

SB 1281, effective January 2015, amended Sections 3226.3 and 3227 of the Public Resources Code to require that (1) DOGGR provide the State Water Resources Control Board with an annual "inventory of all unlined oil and gas field sumps," and (2) well operators provide DOGGR with quarterly information regarding the source and disposition of water produced by or used in oil and gas production in addition to existing obligations to report gas and oil production and produced water information on a monthly basis. The new quarterly reporting requirements include information regarding (a) the source and volume of any water, including produced water (also subject to monthly reporting) used to generate or make up the composition of any injected fluid or gas, identified by water source if more than one water source is used; (b) the volume of untreated water suitable for domestic or irrigation purposes used in oil and gas operations; (c) the treatment of water and the use of treated or recycled water in oil and gas field activities, including, but not limited to, exploration, development, and production; and (d) the specific disposition of all water used in or generated by oil and gas field activities, including water produced from each well as reported in an operator's monthly reports, and separated by volume of disposition if more than one disposition method is used. The first quarterly reports

pursuant to SB 1281 are due to be filed by well operators by June 1, 2015. DOGGR has indicated that the information required by SB 1281 would be published after the close of each quarterly reporting period. SB 1281 and associated water quality regulations are described in further detail in Section 4.9, Hydrology and Water Quality.

### Uniform Building Code

The Uniform Building Code (UBC) was first published in 1927 by the International Council of Building Officials, a non-governmental organization. It was intended to promote public safety and provided standardized requirements for safe construction. Updated editions of the code were published every three years until 1997, which was the final version of the code. Since that time, the UBC, published by the ICC since 1997, has been adopted by many jurisdictions, including the State of California, in their building codes. Some jurisdictions continue to refer to the UBC, including Kern County and Bakersfield. The UBC defines different regions of the United States, categorizing them by Seismic Zones 1 through 4, with Zone 1 having the least seismic potential and Zone 4 having the highest seismic potential. The Project Area lies within Seismic Zone 4.

## Local

### Kern County General Plan

The Project Area is located within the Kern County General Plan (KCGP) area and, therefore, would be subject to applicable policies and measures of the KCGP. The Land Use, Conservation, and Open Space Element and the Safety Element of the KCGP include goals, policies, and implementation measures related to geology and soils that apply to the Project, as described below.

#### Chapter 1. Land Use, Conservation, and Open Space Element

##### 1.3. Physical and Environmental Constraints

###### Policies

**Policy 1.** Kern County will ensure that new developments will not be sited on land that is physically or environmentally constrained (Map Code 2.1 [Seismic Hazard], Map Code 2.2 [Landslide], Map Code 2.3 [Shallow Groundwater], Map Code 2.5 [Flood Hazard], Map Codes from 2.6 – 2.9, Map Code 2.10 [Nearby Waste Facility], and Map Code 2.11 [Burn Dump Hazard]) to support such development unless appropriate studies establish that such development will not result in unmitigated significant impact.

**Policy 2.** In order to minimize risk to Kern County residents and their property, new development will not be permitted in hazard areas in the absence of implementing ordinances and programs. These ordinances will establish conditions, criteria, and standards for the approval of development in hazard areas.

**Policy 3.** Zoning and other land use controls will be used to regulate and, in some instances, to prohibit development in hazardous areas.

**Policy 6.** Regardless of percentage of slope, development on hillsides will be sited in the least obtrusive fashion, thereby, minimizing the extent of topographic alteration required and reducing soil erosion while maintaining soil stability.

**Policy 7.** Ensure effective slope stability, wastewater drainage, and sewage treatments in areas with steep slopes are adequate for development.

### Implementation Measures

**Implementation Measure B.** A seismic analysis may be required for those areas in Kern County that are susceptible to landslides.

**Implementation Measure E.** Development proposed in areas with steep slopes (Map Code 2.4) will be reviewed for conformity to Chapter 19.88, Hillside Development Ordinance, or Chapter 19.52, Special Planning (SP) District, to ensure that appropriate soil stability, drainage, and sewage treatment will result.

## Chapter 4. Safety Element

### 4.3. Seismically Induced Surface Rupture, Ground Shaking, and Ground Failure

### Surface Fault Rupture

Surface fault ruptures are designated on the maps in the Seismic Hazard Atlas (available through the County Engineering and Survey Services Department), as well as some faults that are not apparent at the surface. It must be recognized that some faults may not have been recognized, either because the evidence for detecting them has not been preserved or because there has not been enough work in the area to detect their presence. Several atlas maps have a special note to this effect in order to call the users' attention to this lack. It could be said that all maps need additional work because all surface and subsurface information has not been collected and/or analyzed. This statement of fact should not prevent the use of the information that is available. As new geological and geophysical data are collected and analyzed that are pertinent to this study, they should be added to the maps. Known faults must be considered in planning and land use activities. The faults identified as active deserve special consideration. No structure should be built astride an active fault. Utilities that cross such faults, both underground and on the surface, must be designed to remain operable if at all possible after fault movement. The Seismic Hazard Atlas maps show the approximate location of these features. Building permit applications must identify the exact location of proposed structures so that proper evaluation may be accomplished by the building official prior to the issuance of any permits.

### Ground Shaking

Kern County is located in one of the more seismically active areas of California and may, at any time, be subject to moderate-to-severe ground shaking. This hazard exists because elastic strains

that accumulate deep within the earth become so great that the rock can no longer be contained. When this happens, movement along a fracture zone occurs, releasing enormous amounts of energy. At any given location, the amount of the resulting shaking motion caused by the sudden movement depends to a large extent on local ground conditions – e.g., the degree of water saturation. In some instances, the shock wave may actually increase in amplitude as it travels away from the source. It may cause greater damage at a location some distance from the actual rupture than at the point of surface displacement.

### Ground Failure

Small landslides are common in the County's mountain areas as loose material moves naturally downslope or fires have caused loss of soil-stabilizing vegetative cover. In addition, many human activities tend to make the earth materials less stable and, thus, increase the chance of ground failure. Some of the natural non-seismic causes of ground instability are steam and lakeshore erosion, heavy rainfall, and poor quality natural materials. Human activities contribute to soil instability by grading steep slopes or overloading them with artificial fill, by extensive irrigation, construction of impermeable surfaces, excessive groundwater withdrawal, and removal of stabilizing vegetation.

### Policies

**Policy 1.** The County shall require development for human occupancy to be placed in a location away from an active earthquake fault in order to minimize safety concerns.

### Implementation Measures

**Implementation Measure B.** Require geological and soils engineering investigations in identified significant geologic hazard areas in accordance with the Kern County Code of Building Regulations.

**Implementation Measure C.** The fault zones designated in the Kern County Seismic Hazard Atlas should be considered significant geologic hazard areas. Proper precautions should be instituted to reduce seismic hazard, whenever possible in accordance with State and County regulations.

**Implementation Measure G.** Route major lifeline components such as highways, utilities, petroleum or chemical pipelines around areas of high groundwater whenever possible. Where they must cross an area of high groundwater, plans, and permits shall require design features to accommodate extensive ground rupture without prolonged disruption of an essential service or threat to health and safety.

**Implementation Measure H.** Require that plans and permits for installation of major lifeline components such as highways, utilities, petroleum, or chemical pipelines incorporate design features to accommodate potential fault movement in areas of active faults without prolonged disruption of essential services or threat to health and safety.

**Implementation Measure I.** Design significant lifeline installations, such as highways, utilities, and petrochemical pipelines that cross an active fault to accommodate potential fault movement without prolonged disruption of essential services or creating threats to health and safety.

## 4.5. Landslide, Subsidence, Seiche, and Liquefaction

### Hazard Identification

### Landslides

Landslides are shown on the maps in the Seismic Hazard Atlas. Additional landslide areas may subsequently be identified and should be added to these maps. Development in landslide areas is an unwise practice that imposes an unnecessary risk on life and property. The slide-prone area may have reached a state of equilibrium and become stable for a number of years; however, the factors that caused the original slide could recur and cause additional movement. Added moisture injected into the soil by water and sewer systems tends to be detrimental in unstable areas, thus increasing the probability of slides. Landslide-prone areas can be identified with great accuracy by geologic studies and, when mapped in sufficient detail, can be used for reference in land use planning. The severity of landslide problems depends upon the local bedrock and soil conditions, including moisture content, slope, and vegetation. Losses due to landslides can be almost totally eliminated by a combination of geologic investigations, engineering practice, use of hazard area zoning, and effective enforcement of the Zoning and Grading Ordinances.

### Land Subsidence

Land subsidence is occurring within the San Joaquin Valley. This type of ground failure can be aggravated by ground shaking. It is most often caused by the withdrawal of large volumes of fluids from underground reservoirs, but it can also occur by the addition of surface water to certain types of soils (hydrocompaction). Subsidence from any cause accelerates maintenance problems on roads, lined and unlined canals, and underground utilities. All new installations in areas suspected of subsidence should be engineered to withstand such subsidence. The usual remedial action is that of raising the water table by injecting water or by reducing groundwater pumpage. This increases the fluid pressure in the aquifer and, in most instances, subsidence decreases or stops after a period of time. Four types of subsidence occur in Kern County.

- Tectonic subsidence, a long-term, very slow sinking of the valley, which is significant only over a geologic time period.

- Subsidence caused by the extraction of oil and gas. This type of subsidence is still too small to be of serious concern. The DOGGR monitors subsidence in oil and gas fields and regulates oil and gas withdrawal and repressurizing of the fields.

- Subsidence caused by withdrawal of groundwater in quantities much larger than replacement can occur, causing a decline of the water level. This type of subsidence is of major concern and should be regulated and reduced, especially in urbanized areas. This

practice has lowered the ground level over a large area south of Bakersfield and in other areas of the County.

- Subsidence caused by hydrocompaction of moisture-deficient alluvial deposits. This is a one-time densification from collapse of the soil structure in near-surface strata where the rainfall or other moisture has not penetrated for a long period of time. Parts of the California aqueduct were constructed through and over hydrocompacted deposits after compaction had occurred through ponding. The areas where hydrocompaction exists and suspect areas should be mapped, studied, and evaluated. Any development on these areas of damaging subsidence requires corrective measures.

### Clay Soils

Fine-grained, cohesive clay soils that expand when moisture is added tend to lose their ability to support building foundations. The weight of these structures squeezes the water-saturated clays laterally from under the foundations. A soils report, prepared by a soils engineer, should be required for every new building permit in suspect areas. This report should be based upon adequate test borings, excavations, and soil and chemical tests; approved by the Building Official; and should include recommendations for corrective measures when necessary. The Building Official may waive the requirement for a soils report if it is determined there is adequate information on the soil qualities of a particular lot available for review by DOGGR.

### Liquefaction

Liquefaction can occur in certain types of soils that are associated with a shallow water table. It has been observed in many areas of the world that ground shaking produced by earthquakes tends to cause liquefaction to the extent that buildings have fallen over on their sides due to the lack of ground support. Some buildings designed to withstand earthquake shock waves, have been deemed inhabitable due to earthquake-triggered liquefaction. The building designs were adequate but the foundations failed because liquefaction occurred during an earthquake. The CDOC has mapped liquefaction hazard areas in Los Angeles County. Near Rosamond, the liquefaction hazard extends to the Kern County border.

### Erosion

Erosion is the general process whereby the materials of the earth's crust are worn down, removed by weathering, and deposited in other places by water or air. Losses due to erosion can be greatly reduced by a properly engineered design, construction, and effective enforcement of regulations relative to grading, landscaping, and drainage (Uniform Building Code). Lakeshore erosion via wave action is a special problem but can be practically eliminated by proper engineering, construction, and soil stabilization through vegetative cover. Within urbanized areas, the major cause of erosion is from the continued need to remove sediment from drainage systems and basins. Erosion induced by seismic activity occurs on gentle-to-steep slopes covered by loose sediments. Fissures, steep slopes, and offsets along a fracture zone may enhance seismically induced erosion. It could become a significant hazard in many areas of the

County. A flood management program should provide protection against this type of geologic hazard.

### Seiche

A seiche is a standing wave in an enclosed or partly enclosed body of water. Seiches are normally caused by earthquake activity and can affect harbors, bays, lakes, rivers, and canals. In the majority of instances, earthquake-induced seiches do not occur close to the epicenter of an earthquake but hundreds of miles away because earthquake shock waves close to the epicenter consist of high-frequency vibrations, while those at much greater distances are of lower frequency, which can enhance the rhythmic movement in a body of water. The biggest seiches develop when the period of the ground shaking matches the frequency of oscillation of the water body; seiches create a "sloshing" effect on bodies of water. This effect can damage anchored boats, piers, and facilities close to the water. Secondary problems, including landslides and floods, are related to accelerated water movements and elevated water levels.

### Policies

**Policy 1.** Determine the liquefaction potential at sites in areas of shallow groundwater (Map Code 2.3) prior to discretionary development and determine specific mitigation to be incorporated into the foundation design, as necessary, to prevent or reduce damage from liquefaction in an earthquake.

**Policy 2.** Route major lifeline installations such as highways, utilities and petrochemical pipelines that cross an active fault around potential areas of liquefaction or otherwise protect them against significant damage from liquefaction in an earthquake.

**Policy 3.** Reduce the potential for exposure of residential, commercial, and industrial development to hazards of landslide, land subsidence, liquefaction, and erosion.

### Implementation Measures

**Implementation Measure B.** Require liquefaction investigations in all areas of high groundwater potential and appropriate foundation design to mitigate potential damage to buildings on sites with liquefaction potential.

**Implementation Measure C.** Develop and maintain maps, at an appropriate scale, showing the location of all geologic hazards, including active faults, Alquist-Priolo Earthquake Fault Zones, 100-year flood hazard boundary, the extent of projected dam failure inundation and time arcs, depth of inundation, land subsidence, slope failure and earthquake-induced landslides, high groundwater, and liquefaction potential.

**Implementation Measure D.** Discretionary actions will be required to address and mitigate impacts from inundation, land subsidence, landslides, high groundwater areas, liquefaction and seismic events through the CEQA process.

## Metropolitan Bakersfield General Plan

The Metropolitan Bakersfield General Plan (MBGP), a joint effort between the Kern County Planning Department and the City of Bakersfield Planning Division, was last adopted on December 11, 2007. The MBGP includes both city and unincorporated County lands. The MBGP describes the community's physical development as well as its economic, social and environmental goals and is currently undergoing an update. The Project Area includes a total of 152,040 acres of unincorporated County lands that are covered under the MBGP (7.41%). Project-related development on unincorporated lands within the MBGP Planning Area would be subject to the following applicable policies and implementation measures of the MBGP, with respect to geology and soils.

## Chapter V. Conservation Element

### C. Soils and Agriculture

### Seismic Goals and Policies

### Goals:

**Goal 2.** Promote soil conservation and minimize development of prime agricultural land as defined by the following criteria:

- Capability Class I and/or II irrigated soils
- 80-100 Storie Index rating
- Gross crop return of $200 or more per acre per year
- Annual carrying capacity of 1 animal unit per acre per year

**Goal 3.** Establish urban development patterns and practices that promote soil conservation and that protect areas of agricultural production of food and fiber crops, and nursery products.

### Policies

**Policy 7.** Land use patterns, grading, and landscaping practices shall be designed to prevent soil erosion while retaining natural watercourses when possible (I-4).

**Policy 12.** Prohibit premature removal of ground cover in advance of development and require measures to prevent soil erosion during and immediately after construction (I-4).

# Chapter VIII. Safety Element

## A. Seismic Safety

### Overview of Existing Conditions

A detailed overview of existing conditions summarizing physiographic setting, hydrologic features, and geologic features, including faults, is presented in the Metropolitan Bakersfield General Plan.

### Seismic Hazards

The south end of the San Joaquin Valley is bordered by major, active fault systems, making Bakersfield a historically active seismic area of California. These fault systems are the San Andreas, Breckenridge, Kern Canyon, Garlock, and White Wolf faults. Active faults capable of causing damage to the Bakersfield area are summarized in Table VIII-1 and illustrated in Figure VIII-1 of the Metropolitan Bakersfield General Plan. Seismic hazards are discussed below.

### Strong Ground Shaking

The principal seismic hazard affecting the planning area is the potential for strong ground shaking from any of the four major faults in the region. The most vulnerable structures in an earthquake are the unreinforced masonry buildings in Bakersfield, which were built before seismic codes were first instituted in the city and county. Other building types that may pose substantial hazards in an earthquake include pre-cast concrete tilt-up buildings and predominantly multi-story buildings of non-ductile concrete frame and composite pre-cast concrete construction.

The Uniform Building Code was revised in 1998 to:

- Upgrade the level of ground motion used in the seismic design of buildings;
- Add site amplification factors based on local soils conditions; and
- Improve the way ground motion is applied in detailed design.

SB 547, enacted in 1986, required local jurisdictions to inventory existing unreinforced masonry buildings and develop structural hazards reduction programs for such buildings by January 1, 1990. A complete inventory of unreinforced masonry buildings was completed and the city conducted a seismic retrofit construction program after 1990. The County has performed a similar inventory and notified owners of the status of their buildings.

### Fault Rupture

The Alquist-Priolo earthquake fault zones shown in detail on the Alquist-Priolo Earthquake Fault Zone Maps on file with the City of Bakersfield and Kern County have been designated by the state as areas where planning should consider the possibility of fault rupture along specific active or potentially active faults. Special studies are required prior to building structures for human occupancy within earthquake fault zones. Active faults may potentially exist outside

these zones. For critical and important developments proposed outside of these zones, additional fault investigation may be necessary.

### Liquefaction

Liquefaction is a transformation of a granular material from a solid state into a liquefied state as a consequence of increased pore-water pressures. Areas of high groundwater are at a greater risk for liquefaction of soils during a major earthquake due to the settling of the foundations of homes, buildings, irrigation equipment, roads, and freeways. High groundwater is known to exist at depths of 5 to 15 feet bgs on portions of the Lamont quadrangle at R 28 E, T 30 S. This area, in south Bakersfield between about Brundage Lane and DiGiorgio Road (Figure VIII-2 of the Metropolitan Bakersfield General Plan), could experience local areas of liquefaction during a strong earthquake, with attendant ground rupture and potential sinking or tilting of large buildings. Areas of high groundwater are rare elsewhere in the area.

### Earthquake-Induced Landslides

A strong earthquake could trigger landslides or slope failures on steeper slopes in the foothills and along the Kern River Canyon and floodplain. The common types of landslides induced by earthquakes are bluff and stream bank failures, rock falls, and soil slips on steep slopes. Deep-seated landslides are not necessarily reactivated in an earthquake.

### Other Geologic Hazards

### Landslides

Slopes subject to failure within the Bakersfield area are predominantly found along the river terraces, bluffs, and foothills to the northeast and east of the city. Investigations to date have documented two landslides in the foothills northeast of the city. Only limited exposure to landslides is predicted for the urban areas of Bakersfield because of constraints on slope-side development. Some construction, however, on sloping terrain could inadvertently trigger landslides unless appropriate precautions are use on a site-specific basis.

### Land Subsidence

Land subsidence is the gradual, local settling or sinking of the earth's surface with little or no horizontal motion. Subsidence is normally the result of gas, oil or water extraction, hydrocompaction, or peat oxidation, not the result of landslide or ground failure. The southern part of the planning area has been undergoing gradual land subsidence, with up to 4 feet of subsidence over a 40-year period. Although subsidence is not considered a significant hazard, wells, foundations, and underground utilities may be damaged.

### Issues

The following issues have been identified regarding geologic and seismic hazards:

- The planning area is susceptible to moderate to extreme ground shaking from a number of seismic sources in the region.

- The eastern part of the planning area contains an active fault, the White Wolf fault, which has been designated by the State as an Alquist-Priolo earthquake fault zone.
- An area of high ground water in the southern part of the planning area may be subject to liquefaction in an earthquake.
- More information is needed on the geographic extent of high groundwater.
- In the event of an earthquake, unacceptable risks to public health and safety can occur if sufficient standards are not incorporated into the design of critical facilities

### Goals

**Goal 1.** Substantially reduce the level of death, injury, property damage, economic, and social dislocation and disruption of vital services that would result from earthquake damage.

**Goal 2.** Ensure the availability and effective response of emergency services following an earthquake.

**Goal 3.** Prepare the planning area for effective response to, and rapid, beneficial recovery from, an earthquake.

**Goal 4.** Prevent loss of life from the failure of critical facilities in an earthquake and ensure the continued functioning of essential facilities following a disaster.

**Goal 5.** Protect essential lifelines and prevent casualties and major social and economic disruption due to liquefaction in an earthquake.

**Goal 6.** Provide a continuously improving data base and reference source for evaluation of seismic and geologic hazards.

**Goal 7.** Protect land uses from the risk of dam failure inundation, including assurances that the functional capabilities of essential facilities are available in the event of a flood; hazardous materials are not released; effective measures for mitigation of dam failure inundation are incorporated into the design of critical facilities; and the rapid and orderly evacuation of populations in the inundation area will occur.

### Policies

### Fault Rupture Policies

**Policy 10.** Prohibit development designed for human occupancy within 50 feet of a known active fault and prohibit any building from being placed astride an active fault (I-14, I-15).

**Policy 11.** Require site-specific studies to locate and characterize specific fault traces within an Alquist-Priolo Earthquake Fault Zone for all construction designed for human occupancy (I-13).

**Policy 12.** Design significant lifeline installations such as highways, utilities and petrochemical pipelines that cross an active fault, to accommodate potential fault movement without prolonged disruption of an essential service or creating a threat to health and safety (I-16).

### Liquefaction Policies

**Policy 13.** Determine the liquefaction potential at sites in areas of high groundwater prior to development and determine specific mitigation to be incorporated into the foundation design, as necessary to prevent or reduce damage from liquefaction in an earthquake (I-17 through I-19).

**Policy 14.** Route major lifeline installations around potential liquefaction areas or otherwise protect them against significant damage from liquefaction in an earthquake (I-20).

### Information Policies

**Policy 15.** Compile information on areas of potential hazards and field information developed as part of CEQA investigations and geologic reports and keep geologic reviews and policy development current and accessible for use in report preparation (I-21, I-22, I-23, I-25).

**Policy 16.** Encourage and support local, state and federal research program for delineation of geologic and seismic hazards so that acceptable risk may be continually reevaluated and kept current with state-of-the-art information and contemporary values (I-24).

### Dam Failure Inundation Risk Policies

**Policy 18.** Design discretionary critical facilities located within the potential inundation area for dam failure in order to mitigate the effects of inundation on the facility; promote orderly shut-down and evacuation (as appropriate); and prevent on-site hazards from affecting building occupants and the surrounding communities in the event of dam failure (I-26).

**Policy 19.** Design discretionary facilities in the potential dam inundation area used for the manufacture, storage or use of hazardous materials to prevent on-site hazards from affecting surrounding communities in the event of inundation (I-27).

**Policy 20.** Require emergency response structures that are within the plan area and are subject to Building Department review to adhere to the most current seismic standards adopted as part of the Uniform Building Code.

### Implementation Measures

**Implementation Measure 2.** Require detailed site studies for ground shaking characteristics, liquefaction potential, dam failure inundation and flooding potential, and fault rupture potential as background to the design process for critical facilities under city and County discretionary approval.

**Implementation Measure 3.** Require structures that are within the plan area and are subject to Building Department review to adhere to the most current seismic standards adopted as part of the UBC.

**Implementation Measure 16.** Require plans and permits for installation of major lifeline components such as for highways, utilities, and petroleum or chemical pipelines to incorporate design features to accommodate potential fault movement in areas of active faults without prolonged disruption of an essential service or threat to health and safety.

**Implementation Measure 17.** Require liquefaction investigations in all areas of high groundwater potential and appropriate foundation designs to mitigate potential damage to buildings on sites with liquefaction potential.

**Implementation Measure 18.** Develop specific guidelines for the collection of data for determination of liquefaction potential at a site.

**Implementation Measure 20.** Route major lifeline components such as highways, utilities and petroleum or chemical pipelines around areas of high groundwater wherever possible. Where an area of high groundwater must be crossed, plans and permits shall require design features to accommodate extensive ground rupture without prolonged disruption of an essential service or threat to health and safety.

**Implementation Measure 21.** Compile maps showing the location of all geologic hazards, including active faults, Alquist-Priolo earthquake fault zones, 100-year flood hazard, extent of projected dam failure inundation and time arcs, depth of inundation, land subsidence, slope failure and earthquake-induced landslides, high groundwater and liquefaction potential.

**Implementation Measure 22.** Compile information on areas of potential hazard. Field information developed as part of CEQA investigations and geologic reports by the city/county geologists should be kept current and accessible for use in report preparation, geologic reviews, and policy development.

**Implementation Measure 23.** Update the County's Seismic Hazards Atlas as necessary.

**Implementation Measure 24.** Encourage and support local, state, and federal research programs for delineation of geologic and seismic hazards so that acceptable risks may be continually reevaluated and kept current with state-of-the-art information and contemporary values.

**Implementation Measure 26.** Develop procedures for the discretionary review of critical facilities proposed in an area of potential dam inundation. Approvals shall include requirements that emergency shut-down and facility evacuation plans be developed, maintained, and exercised for each facility, and the potential effects of inundation on essential facility functions and the safety of occupants and the community in general are addressed.

**Implementation Measure 27.** Facilities used for the manufacture, storage, or use of hazardous materials shall comply with the uniform fire code, with requirements for siting or design to prevent on-site hazards from affecting surrounding communities in the event of inundation.

**Implementation Measure 28.** Incorporate specific plans for the sequential and orderly evacuation of the potential dam inundation area into emergency response plans.

**Implementation Measure 29.** Maintain effective disaster response and earthquake response plans and update on a regular basis.

**Implementation Measure 30.** Require the city and county to maintain effective mutual aid agreements for fire, police, medical response, emergency morgue, mass care, heavy rescue, and other functions as appropriate

**Implementation Measure 31.** Require emergency response plans and disaster exercise scenarios to include contingencies for the problems listed below; earthquake response exercises shall be conducted at least once a year.

- Rupture of any active fault within 40 miles of Bakersfield.
- Collapse of 50 buildings or more, including some mid-rise structures, some essential facilities, and numerous un-reinforced masonry buildings.
- Ground rupture and attendant property damage due to pockets of liquefaction in areas of high groundwater.
- Complete evacuation of the potential inundation area.
- Many aftershocks, continuing for many weeks or months.

## Kern County Specific Plans

Kern County has adopted 24 Specific Plans for properties within the Project Area. These Specific Plans are intended to be an amplification of the goals and policies of the KCGP and are, therefore, consistent therewith. As depicted in Figure 4.10-3 in the Land Use and Planning section, less than 8% of the Project Area is located wholly or partially within adopted Specific Plan areas. Future oil and gas exploration and production activities that would be authorized under the proposed Amendment to Chapter 19.98 (Oil & Gas Production) of the Kern County Zoning Ordinance that would be located within the boundary of an adopted Specific Plan would be regulated according to County zoning, with the exception of the Specific Plans identified as Tier 5.

## Kern County Code of Building Regulations – Title 17

All construction in Kern County is required to conform to the Kern County Building Code (Chapter 17.08, Building Code, of the Kern County Code of Regulations). Kern County has adopted the CBC, 2010 Edition, with some modifications and amendments. The entire County is in Seismic Zone 4, a designation previously used in the UBC to denote the areas of highest risk to earthquake ground motion. California has established an Unreinforced Masonry program that details seismic safety requirements for Zone 4. Seismic provisions associated with Seismic Zone 4 have been adopted.

According to the Kern County Code of Building Regulations "Section 17.08.060 Section 105.2 amended – Work exempt from permit," building permits shall not be required for the accepted oilfield activities listed below. The exemption does not apply where construction is part of a processing plant, refinery, cogeneration facility, or other similar activities as determined by the building official:

a. Tanks that meet American Petroleum Institute (API) or American Water Works Association (AWWA) standards and are supported directly upon grade (grade being the final ground surface elevation of the site prior to installation of the tank) with associated foundations if the ratio of height to diameter or width in the shortest direction does not exceed two to one. This also includes the associated equipment such as piping, walkways, stairs, guardrails, handrails and ladders which are covered by the Occupational Safety and Health Administration (OSHA).

b. Processing equipment and pressure vessels which meet API, American Society of Mechanical Engineers (ASME), or ANSI standards and are supported directly upon grade (grade being the final ground surface elevation of the site prior to installation of the equipment or vessel) with associated foundations if the ratio of height to width in the shortest direction does not exceed one and one-half to one. This also includes the associated equipment such as piping, walkways, stairs, guardrails, handrails and ladders which are covered by OSHA.

c. Miscellaneous equipment that meets API, ASME, or ANSI standards and is mounted on skids or supported on flanges. Placement of this equipment on an at-grade concrete slab or similar foundation, without attaching it to resist uplift or overturning is considered part of the exempted activity.

d. Flatwork or non-supporting concrete slabs.

e. One-story detached accessory buildings that do not contain a work station and are used as storage sheds, or, typically, unattended control or electrical enclosures or gauging sheds, provided the floor area does not exceed 120 square feet (11 square meters).

f. Oil derricks, artificial lift equipment, and associated foundations.

g. Pipe racks and associated foundations, if the structure height does not exceed 8 feet (2,438 millimeters).

h. Process piping.

i. Oilfield containment walls not over 4 feet (1,219 millimeters) measured from the bottom of the footing to the top of the wall.

Exemption from a building permit does not abrogate the responsibility for obtaining clearance or permits from any other entity having jurisdiction over oilfield activities. Construction of new or modifications to existing office buildings or any buildings intended for human occupancy are

not exempt. HVAC replacements, or any other electrical or mechanical alteration or replacement that are subject to the California Energy Efficiency Standards are not exempt.

### Chapter 17.28 of Kern County Grading Code

The purpose of the Kern County Grading Code is to safeguard life, limb, property, and the public welfare by regulating grading on private property. In accordance with paragraph 11 of subsection 17.28.040(B) of the Kern County Grading Code, grading permits are not required for oilfield activities related to oilfield drilling, such as oilfield roads, drilling pads, and sumps used for drilling mud, and grading required for the setting of production equipment.

All requirements of the Kern County Grading Code will be applied during implementation of the project. Any required grading permit(s) for auxiliary facilities (i.e., buildings meant for human occupancy or auxiliary facilities requiring a grading permit under the Kern County Building Code) shall be obtained prior to commencement of construction activities.

## 4.6.4 Impacts and Mitigation Measures

This section describes the methodology used in conducting the CEQA impact analysis for geology and soils; the thresholds of significance used in assessing impacts on geology and soils; and the assessment of impacts on geology and soils, including relevant Mitigation Measures.

## Methodology

The analysis in this section is largely based on Volume 1, Soil and Geology Study Amendment to Title 19 – Kern County Zoning Ordinance, focused on Chapter 19.98 (Oil and Gas Production) of the Kern County Zoning Ordinance for Oil and Gas Local Permitting Kern County, California, prepared by BSK in January 2015 (BSK 2015). The scope of tasks for this Phase I study included a review of available published references to collect available information on soils and geology, mineral resources, and induced seismicity for the proposed Amendments to Kern County Zoning Ordinance.

This section describes the potential geology and soils impacts associated with development of the Project. This analysis first established baseline conditions for the affected environment relevant to geology and soils, as presented above in Section 4.6.3, Environmental Setting.

## Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist state that a project would normally be considered to have a significant impact if it would:

- Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving
  - Rupture of a known earthquake fault
  - Strong seismic ground shaking,

  - Seismic-related ground failure, including liquefaction, or
  - Landslides
- Result in substantial soil erosion or the loss of topsoil;
- Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in onsite or offsite landslide, lateral spreading, subsidence, liquefaction, or collapse;
- Be located on expansive soil, as defined in Table 18-1-B of the UBC (1994), creating substantial risks to life or property; and
- Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems in areas where sewers are not available for the disposal of wastewater.

Based on these standards, the effects of the project have been categorized as either a "less than significant impact" or a "potentially significant impact." Mitigation measures are recommended for potentially significant impacts. If a potentially significant impact cannot be reduced to a less than significant level through the application of mitigation, it is categorized as a "significant unavoidable impact."

# Project Impacts

## Impact 4.6-1: Expose People or Structures to Substantial Adverse Effects, Including the Risk of Loss, Injury, or Death Involving the Rupture of a Known Earthquake Fault

The Project Area is located in a seismically active area containing active fault systems. This includes such fault systems as the San Andreas fault system located near the western portion of the Project Area. An expression of seismic faults may include a surface rupture, which are the result of movement along an existing fault, which breaks the land surface.

**Induced Seismicity.** Project activities including high volume hydraulic fracturing and injection of waste water from drilling activities have the potential to induce seismicity. Hydraulic fracturing by its very nature (injection of high pressure fluid to fracture rock formations) physically affects the geologic formations and may generate seismic events. However, these seismic events have a relatively low magnitude (<2.0) and are not "felt" events. Larger events are possible in areas where faults are present. However, only one felt earthquake attributed to hydraulic fracturing in an oil and gas field has been documented. In 2011, hydraulic fracturing was identified as the likely source of induced seismicity in a test well in Lancashire, England. Earthquakes of magnitude 2.3 and 1.4 were reported on April 1 and May 27, 2011 (de Pater and Baisch 2011). The induced seismicity was the result of intersecting an unknown fault. Therefore, the potential for hydraulic fracturing to cause felt induced seismic events is considered to be low unless hydraulic fracturing occurs in active fault zones which may result in a felt seismic event. Outside active fault zones, although it is anticipated that over 1,000 wells would be hydraulically fractured per year, significant induced seismicity is not anticipated.

Induced seismicity may also be caused by deep wastewater injection. This was first observed in a Colorado injection well drilled in 1961 (USGS 2015a). Most recently, waste water injection has resulted in seismic activity in north Texas and in eastern Ohio (Weingarten et al. 2015). In 2011, wastewater injection in Youngstown Ohio may have contributed to a series of earthquakes with the largest earthquake measuring a magnitude of 4.0 (Fountain 2012). However, as discussed above, wastewater injection in California occurs at much shallower depths (4,700 to 7,700 feet) than in other parts of the U.S. and the volume of wastewater injected in California is about four times less than wells in other locations where induced seismic events have occurred. The seismogenic zones at which rocks are sufficiently rigid to accumulate stress and cause significant earthquakes are relatively deep in California and significantly deeper than the oil and gas development and wastewater disposal zones. In addition, more oil and gas production in California occurs in sedimentary basins that are less susceptible to induced seismicity from wastewater injection as compared to injection into fractured hard rock. Moreover, in California, injection wells have been in use for more than 50 years, with 42,000 oilfield injection wells currently operating, and seismicity rates have remained relatively constant for the last 77 years. Thus, the seismic hazard related to current wastewater injection practices in California is low (BSK 2015).

**Ground Shaking.** Strong seismic activity could damage current and/or future oil and gas exploration and production activities, such as drilling, well stimulation, and EOR. In addition, well and production infrastructure could be damaged resulting in the degradation of well casing or seals, as well as plugs of abandoned wells. Pipelines transporting oil, gas, waste gas, and/or produced could crack and begin to leak. Damage to active or abandoned well could result in the leakage to underground formations. Although the 2014 CCST study on advanced well stimulation technologies in California indicated that well failure, or blowout rates in the Project Area have been significantly reduced over time by improved well construction technologies, a significant ground shaking event could still potentially cause well failure or other damage to Project-related infrastructure.

In addition, future oil and gas exploration and production activities that would be authorized under the Project would involve the installation of buildings and infrastructure that could be occupied by people. As per the Alquist Priolo earthquake law and Metropolitan Bakersfield General Plan, structures intended for human occupancy cannot be located on or within 50 feet of the confirmed location of an active fault trace. All Project-related permanent facilities would have to be designed and built to California Building Code standards that take into account seismic activity. Although building codes would have to be implemented in the infrastructure, there would still be a risk of impacts associated with project activities resulting in the rupture of a known earthquake fault and, therefore, impacts could be significant.

## Mitigation Measures

**MM 4.6-1** Prior to beginning a ground disturbance activity, the Applicant shall comply with the following regulations (as applicable) and confirm compliance in its Site Plan Conformity Review application documentation:

a. Alquist-Priolo Earthquake Fault Zoning Act.

b. California Building Code.

c. Division of Oil Gas and Geothermal Resources regulations, as identified in the California Code of Regulations, Title 14, Division 2, Chapter 4, including regulations implementing Senate Bill 4 as applicable. If hydraulic fracturing is conducted for any well associated with the Site Plan Conformity Review, the Applicant shall comply with requirements to monitor the California Integrated Seismic Network for indication of an earthquake of magnitude 2.7 or greater for the period of 10 days following the end of hydraulic fracturing. The earthquake search radius shall be consistent with Division of Oil Gas and Geothermal Resources Senate Bill 4 regulations. The data will be submitted to Division of Oil Gas and Geothermal Resources for an evaluation of the risks and actions consistent with the Division of Oil Gas and Geothermal Resources Senate Bill 4 regulations.

d. Additionally, the Applicant shall:

1. Avoid placement of structures intended for human occupancy on or within 50 feet of any active faults designated and mapped pursuant to the Alquist-Priolo Earthquake Fault Zoning Act where the fault breaks the surface.

2. Have a professional geologist prepare a fault rupture hazard evaluation according to guidelines in California Geological Survey Special Publication 42, 2007 for new developments with structures that are intended for human occupancy.

3. All Class II injection wells shall be authorized, and shall comply with all applicable legal requirements, Underground Injection Control Program Approval permit conditions, and be operated according to the California Code of Regulations Title 14 requirements, as described in the mitigation measures for Hydrology and Water Quality.

4. Ensure that active fault trace placement restrictions are in place for all permanent tanks and storage reservoirs used to store, treat, or transport hazardous materials or materials that are considered pollutants to surface water and groundwater, located in an Earthquake Fault Zone.

Ensure that all pipelines designated for the transportation of hazardous materials are engineered and constructed in compliance with the requirements of the pipeline safety regulations, 49 Code of Federal Regulations Parts 192 and 195.f) Ensure that all new pipelines designated for or water used for fire suppression are engineered and constructed in compliance with the requirements of California Building Code Chapter 9, Fire Protection Systems, and the California Fire Code to address potential fault rupture displacements.

**MM 4.6-2** All structures designed for human occupancy shall be designed to withstand substantial ground shaking in accordance with applicable California Building Code seismic design standards and Kern County Building Code.

## Level of Significance After Mitigation

The impact would be less than significant after mitigation.

## Impact 4.6-2: Expose People or Structures to Substantial Adverse Effects, Including the Risk of Loss, Injury, or Death Involving Strong Seismic Ground Shaking

As discussed above, project activities of hydraulic fracturing and deep wastewater injection have the limited potential to induce seismic activity. However, there are no cases where strong seismic shaking (>4.0) have occurred as a result of induced seismicity. In California, there is limited case history with respect to induced seismicity from hydraulic fracturing or historical wastewater injection. The National Academy of Sciences found that the "potential for felt seismicity due to secondary recovery and EOR is low" and that hydraulic fracturing as presently implemented "does not pose a high risk for inducing felt seismic events" in California (NAS 2013). In addition, the California Council on Science and Technology concluded: "Current hydraulic fracturing activity is not considered to pose a significant seismic hazard in California" (CCST 2014). Even in other areas of the country, where induced seismicity from hydraulic fracturing and wastewater injection has occurred, the seismic events have not exceeded levels that would damage structures.

Significant impacts would occur if the magnitude of earthquakes from strong ground shaking rose to a level that could cause damage to structures or facilities. However, to minimize the effects to people, DOGGR regulates operation of injection wells. Over-pressuring of injected zones is controlled by operating all injection wells according to CCR Title 14, Division 2, Chapter 4, Subchapter 1, Article 3 Requirements.

### Mitigation Measures

Implement MM 4.6-1 and MM 4.6-2, as described above.

### Level of Significance After Mitigation

The impact would be less than significant after mitigation.

## Impact 4.6-3: Expose People or Structures to Substantial Adverse Effects, Including the Risk of Loss, Injury, or Death Involving Seismic-Related Ground Failure, Including Liquefaction

Liquefaction occurs when saturated, loose materials are weakened and transformed from a solid to a near liquid state due to increased pore water pressure caused by strong ground motion from an earthquake. As discussed above, project activities such as hydraulic fracturing and deep waste water injection are unlikely to cause induce strong seismic events and their impact is considered a less than significant. However, naturally occurring earthquakes have the potential to cause liquefaction and cause damage to structures. Liquefaction generally can occur in areas of high groundwater (<50 feet) and fine sandy or silty soils and typically consist of more recent Holocene deposits. In the Project Area, areas of high groundwater are located mainly in the northwest portion and southern tip of the Central Subarea and east-central and southeast portions of the Western Subarea. Most of the deposits in the Project Area tend to be more recent deposits. Although impacts from liquefaction have been observed from many major earthquakes around

the world including the 1964 earthquakes in China and Alaska, the Christchurch, New Zealand earthquake in 2011, and more recently, the 2015 earthquake in Nepal, the Project is not expected to be the cause of any significant seismic events, and thus, the liquefaction potential from any project activities is low. Impacts could be significant; however, implementation of MM 4.6-1 and MM 4.6-2 would further reduce the potential for adverse effects as a result of liquefaction; therefore, the impact would be less than significant with mitigation.

Impacts to the Project as a result of ground failure are discussed in Impact 4.6-1.

### Mitigation Measures

Implement MM 4.6-1 and MM 4.6-2, as described above.

### Level of Significance After Mitigation

The impact would be less than significant after mitigation.

## Impact 4.6-4: Expose People or Structures to Substantial Adverse Effects, Including the Risk of Loss, Injury, or Death Involving Landslides

Landslides occur due to a number of natural and man-made factors. In general, most landslides occur in connection with other major natural disasters such as earthquakes, volcanic eruptions, wildfires, and floods. Landslides also are caused by other factors such as strength of underlying material surface and groundwater conditions, surface vegetation, seasonal rainfall (i.e., soil saturation), and areas of steep slopes (generally greater than 30%). They can also occur from anthropogenic practices such as vegetation removal. Landslides caused by project activities are not expected as the area of disturbance for each well pad is relatively small (< 3 acres).

As stated above, the Project Area is located in a seismically active area containing several active fault systems; however, volcanic activity is not likely. Wildfires and flooding can occur in localized areas, therefore, the potential for landslides in the Project Area may exist if the other factors are present (steep slopes, ground saturation, and lack of vegetation).

As shown in Figure 4.6-10, the only area of high landslide incidence (where 15% of the area is involved in landsliding), is the southern border of the Project Area (Western, Central, and Eastern Subareas), typically in areas with steep slopes. Development in this area could result in potentially significant adverse effects to people and property in this area; however, it is likely that oil and gas development would not occur on these steep slopes and therefore unlikely that oil and gas activities would induce landslides if these areas would be avoided.

### Mitigation Measures

**MM 4.6-3** Operators shall avoid siting structures on slopes greater than 30% unless the Applicant determines that mineral recovery is infeasible from a different location, and site-specific Professional Engineering certification is submitted concluding that the new equipment will not cause landslides.

### Level of Significance After Mitigation

The impact would be less than significant after mitigation.

## Impact 4.6-5: Result in Substantial Soil Erosion or the Loss of Topsoil

Soil erosion is caused by a number of factors including: lack of vegetation/roots to bind the soil (from farming, overgrazing, other development); steep slopes and long slope lengths, poor farming practices, catastrophic weather events, everyday water and wind erosion, as well as other anthropogenic influences. In the Project Area, soils with high water erosion factors occur in 44% of the Western Subarea, 49% of the Central Subarea, and 12% of the Eastern Subarea and soils with high wind erosion factors occur in 49%, 38%, and 47%, respectively. Only a small percentage (7%, 0%, and 8%, respectively) exhibit areas with significant slope lengths. Project activities that would involve earth movement include constructing roads to a well site, grading a well pad, constructing pits/sumps, trenching for pipelines, and other excavations. Disturbed areas have a high potential for either wind or water driven erosion. Well pads are expected to have a small 1 to 5 acre footprint. The potential for erosion would be greatest in portions of the Project Area where there are both the high erosion factors and significant slope lengths. In these areas, there could be substantial soil erosion or topsoil loss, resulting in significant adverse effects. Erosion control measures would be necessary to reduce potential for soil erosion.

### Mitigation Measures

Implement stormwater mitigation measures, described in Section 4.9, Hydrology and Water Quality.

### Level of Significance After Mitigation

The impact would be less than significant after mitigation.

## Impact 4.6-6: Be Located on a Geological Unit or Soil that is Unstable, or that Would Become Unstable as a Result of the Project, and Potentially Result in Onsite or Offsite Landslide, Lateral Spreading, Subsidence, Liquefaction, or Collapse

Portions of the Eastern and Western Subareas in the foothill area have sufficiently steep slopes that may potentially expose structures to slope instability or landslides that could cause significant damage or collapse. Grading or construction activities that alter the slope gradient or add loads to slopes could potentially cause slope instability and failure resulting in damaging structures. Structures built on potentially unstable slopes could result in a potentially significant impact. In addition, structures built on liquefiable soils could collapse or be significantly deformed causing structural collapse or be damaged such that the structural integrity is compromised. This would be considered a potentially significant impact. Differential settlement of soils from hydrocompaction of near surface soils that may result in damage to Project-related

structures placed on susceptible soil would be a potentially significant impact. Subsidence due to oilfield fluid withdrawal activities (water withdrawal) could be a potentially significant impact.

### Mitigation Measures

Implement MM 4.6-3 and MM 4.6-4, as described above, and the following:

**MM 4.6-4** The Applicant shall confirm compliance with, and shall implement, a Division of Oil Gas and Geothermal Resources approved re-pressuring plan as required by Division 3, Chapter 1, Article 5.5 of the Public Resources Code, commencing with Section 3315. In developed areas where subsidence is confirmed or suspected, subsidence monitoring shall be required using Synthetic Aperture Radar studies and/or other methods as approved by the Division of Oil Gas and Geothermal Resources to quantify and evaluate the potential effect on the area.

### Level of Significance After Mitigation

The impact would be less than significant after mitigation.

## Impact 4.6-7: Be Located on Expansive Soil, as Defined in Table 18-1-B of the Uniform Building Code (1994), Creating Substantial Risks to Life or Property

Structures built on soils with high swelling potential may experience shifting, cracking, and breaking damage as these soils expand and contract Thus, soils that are predominantly clay or have high clay content are considered potentially expansive. As discussed above in the Potential Geologic Hazards subsection, 54% of the Western Subarea, 39% of the Central Subarea, and 40% of the Eastern Subarea contain soils with expansive potential. Therefore, structural damage to project infrastructure due to inadequate soil and foundation engineering or the placement of oil and gas structures directly on expansive soils could cause potentially significant impacts.

### Mitigation Measures

**MM 4.6-5** The Applicant shall avoid building infrastructure on expansive soils unless the Applicant determines that mineral recovery is infeasible from a different location, and site-specific Professional Engineering certification is submitted concluding that the new equipment will not cause substantial risks to life or property.

### Level of Significance After Mitigation

The impact would be less than significant after mitigation.

## Impact 4.6-8: Have Soils Incapable of Adequately Supporting the Use of Septic Tanks or Alternative Wastewater Disposal Systems Where Sewers are not Available for the Disposal of Wastewater

Potential project activities such as installation of oil and gas well, construction of pipelines and other oilfield related jobs may require the housing of temporary employees or an increase in

permanent residents requiring residential structures. While well pad activities would generally utilize portable sanitation units, company structures offices and any temporary housing may require the use of septic systems where public water systems would not be available. The placement of septic systems in areas of slow to very slow infiltration rates may cause adverse impacts to soils and soil stability including areas of saturated soil. There are areas of slow to very slow infiltration rates within the Project Area, typically in upland areas along the perimeter of the Project Area and in some instances in the Central Subarea. Most of the Project Area has high to moderate infiltration rates. Thus, the installation of septic systems in soils with slow to very slow infiltration rates could have significant impacts; however, all new septic system installations require permitting from the County to restrict such impacts.

Future oil and gas exploration and production activities could result in a need for temporary housing for workers. This increase in residential structures could have an impact on soils incapable of adequately supporting the use of septic tanks. Wastewater disposal from temporary housing and from oil and gas production activities could also impact soils and soil stability. All new septic system installations require permitting from the County, therefore, such impacts would be less than significant.

### Mitigation Measures

Implement MM 4.6-1, as described above.

### Level of Significance After Mitigation

The impact would be less than significant after mitigation.

## 4.6.5 Cumulative Setting, Impacts, and Mitigation Measures

## Cumulative Setting

The geographic scope for cumulative impacts to geologic and soil resources includes the area within six miles of the external Project Area boundary, and areas (e.g., incorporated cities) within the Project Area. While projects in a larger area may affect some of the same resources as the Project, by focusing on projects within the Project Area and six miles outside of the Project Area, the analysis of cumulative impacts can be made on those projects that would most comparably affect the same resources as the Project.

The regional plans and projections evaluated in this cumulative analysis are described in Section 3.7, of Chapter 3, Project Description. Implementation of these plans and any projects associated with these plans would be required to comply with the goals, policies, and implementation measures of applicable federal and local laws and land use standards imposed by the respective jurisdictions within with each related project is located. This includes compliance with the environmental review requirements of the CEQA and/or the National Environmental Policy Act (NEPA). Should potential geologic and soil-related impacts be identified, appropriate mitigation would be prescribed.

## Impact 4.6-9: Cumulative Impacts to Geologic and Soil Resources

Proposed oil and gas production development in the Project Area would alter landforms through activities such as site grading and road construction. In addition, hydraulic fracturing and deep waste water injection may cause low level induced seismicity, but not at a level that would be expected to result in structural damage. Cumulative impacts may occur if multiple seismic inducing activities occurred simultaneously. However, for reasons stated above, although it is anticipated that over 1,000 wells will be hydraulically fractured annually, significant induced seismicity has not been observed and is not anticipated. In addition, although in California, injection wells have been in use for more than 50 years, with 42,000 oilfield injection wells currently operating, seismicity rates have remained relatively constant for the last 77 years and are not anticipated to change. Under these circumstances, oil and gas activities are unlikely to induce multiple seismic events at a level that would cumulatively cause significant damage. Therefore, the contribution of Project-related activities to cumulative impacts on geologic resources and soils would be less than significant.

Naturally occurring impacts to soils and geology, such as naturally occurring earthquakes, may also expose workers and structures to geologic hazards that could result in cumulatively considerable or significant impacts. In these instances, conducting mitigation measures described above would result in cumulative impacts that are less than significant. Prior to beginning project activities, the Applicant would have to comply with all appropriate rules, mitigation measures, and regulations as described above.

### Mitigation Measures

Implement MM 4.6-1 through MM 4.6-5, as described above.

### Level of Significance After Mitigation

Cumulative impacts from project activities would be less than significant after mitigation

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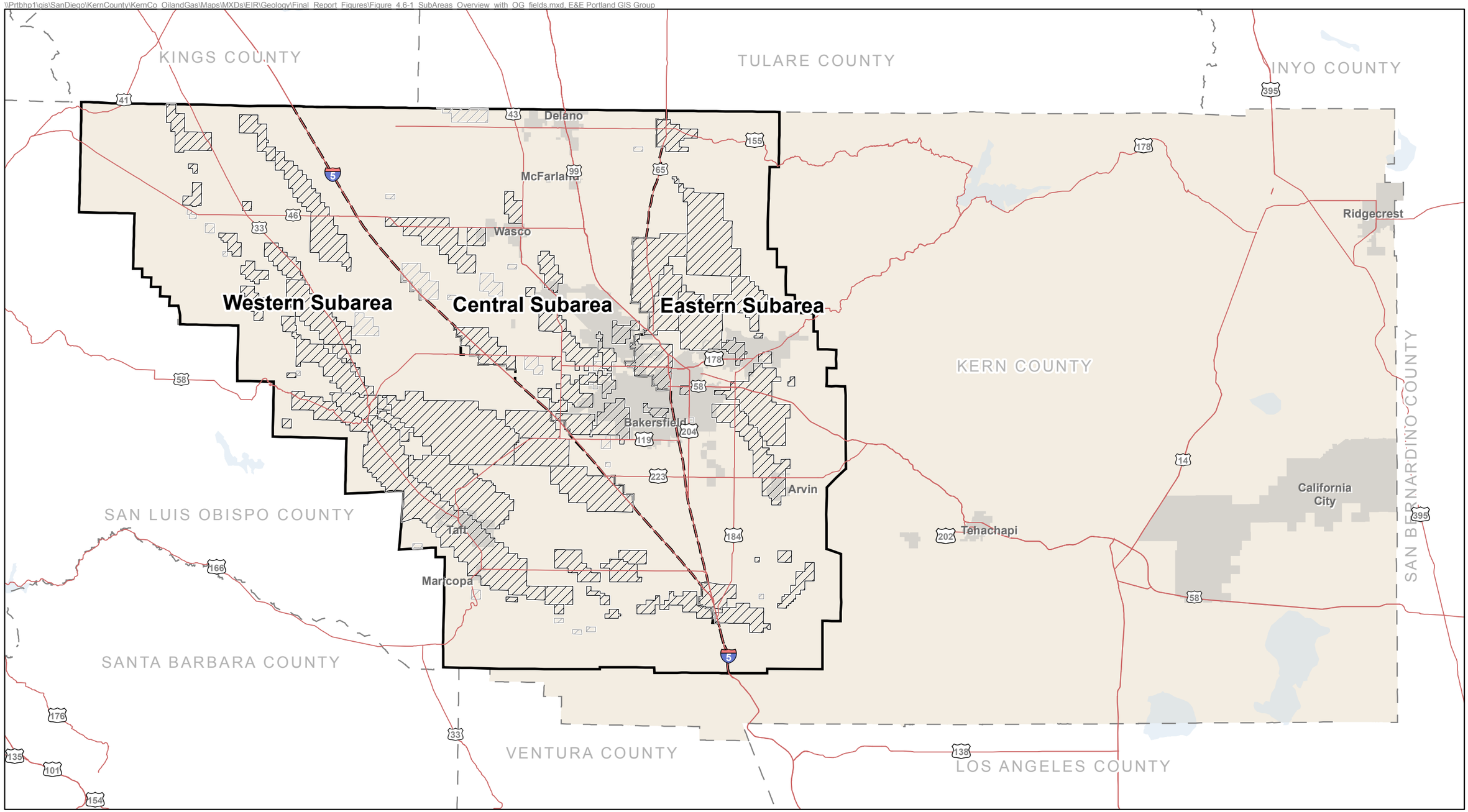


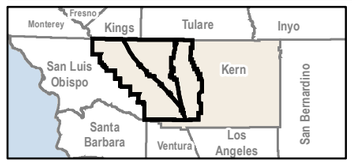


0 10 Miles

Project Area
Subarea
DOGGR Administrative Well Field Boundaries
DOGGR Administrative Well Field Boundaries (Abd)
Kern County
City Limits
Highways
County Boundary

Data Sources: Kern County, 2013, ESRI 2010; DOGGR, 2013;

**Figure 4.6-1**
**Project Area and Subareas**

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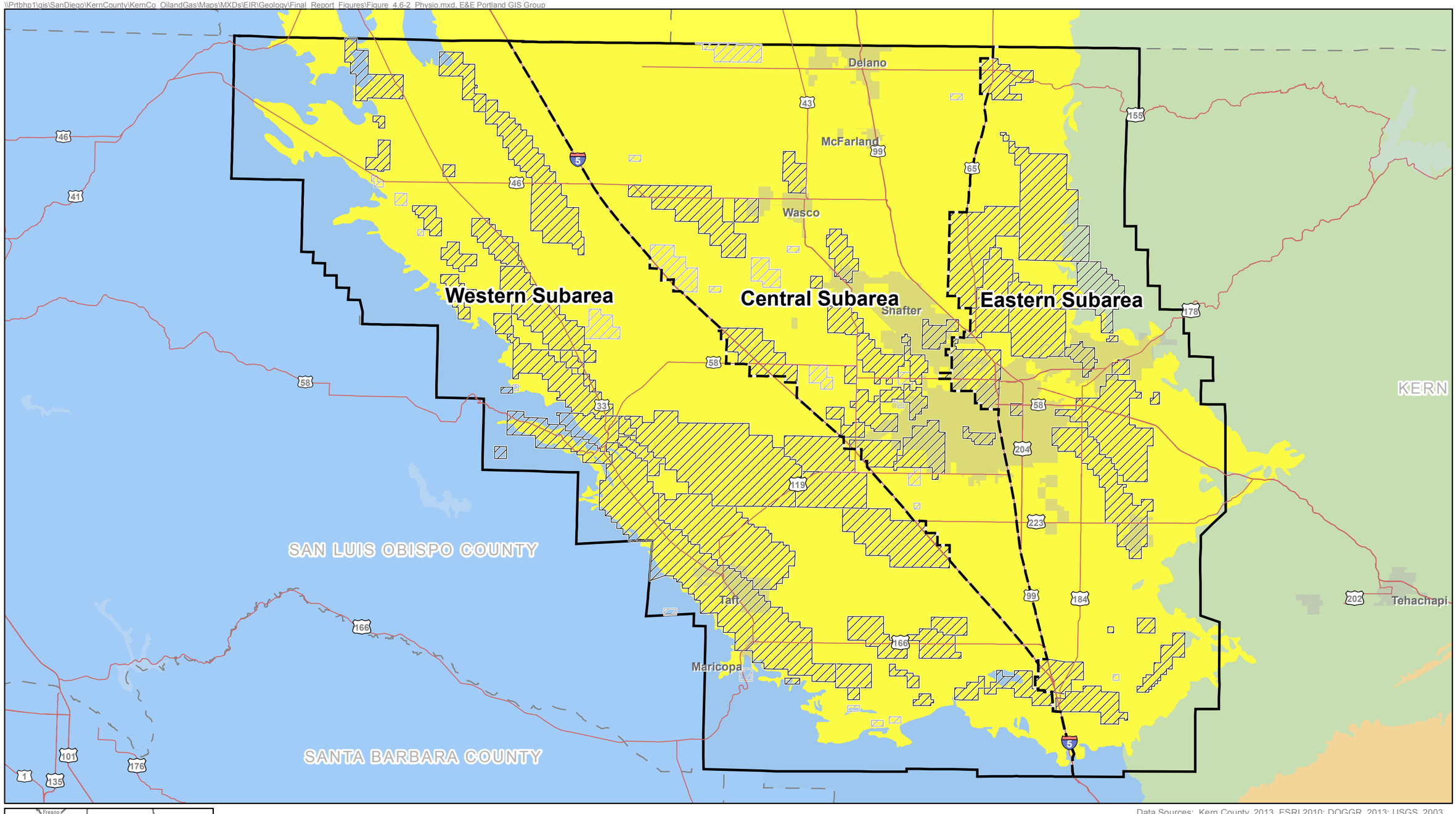


Data Sources: Kern County, 2013, ESRI 2010; DOGGR, 2013; USGS, 2003

**Figure 4.6-2**
**California Geomorphic Provinces in the Project Area**

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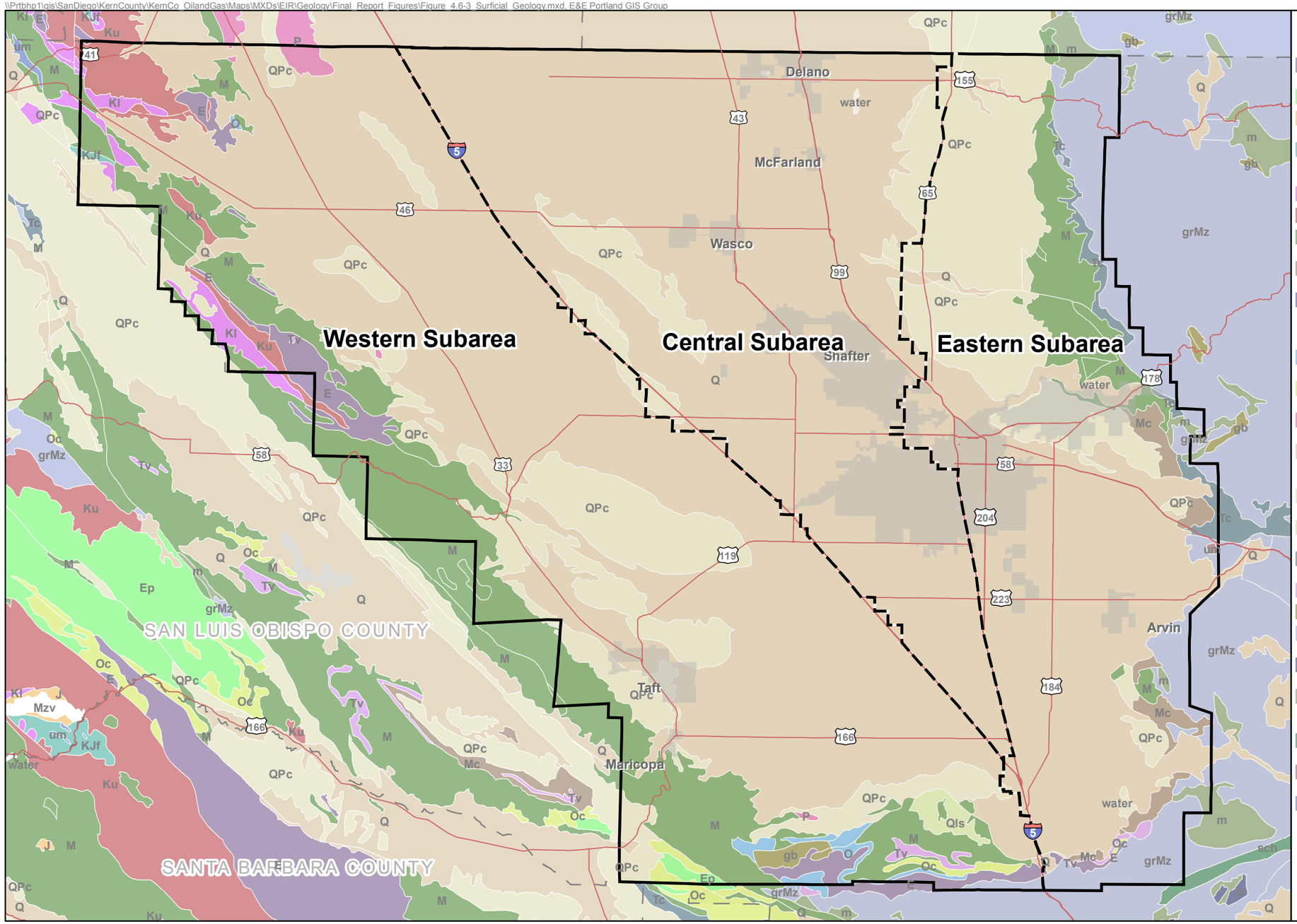
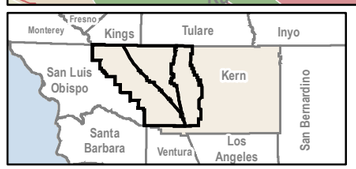
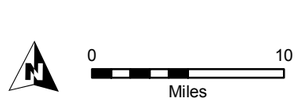



## Geologic Legend

- E: Shale, sandstone, conglomerate, and minor limestone; in part Oligocene and Paleocene.
- Ep: Sandstone, shale, and conglomerate; mostly well consolidated
- J: Shale, sandstone, minor conglomerate, chert, slate, limestone; minor pyroclastic rocks
- KJf: Franciscan complex: Cretaceous and Jurassic sandstone with smaller amounts of shale, chert, limestone, and conglomerate. Includes Franciscan melange, except where separated--see KJfm.
- Kl: Lower Cretaceous sandstone, shale, and conglomerate
- Ku: Upper Cretaceous sandstone, shale, and conglomerate
- M: Sandstone, shale, siltstone, conglomerate and breccia; in part Pliocene and Oligocene.
- Mc: Sandstone, shale, conglomerate, and fanglomerate; in part Pliocene and Oligocene.
- Mzv: Undivided Mesozoic volcanic and metavolcanic rocks. Andesite and rhyolite flow rocks, greenstone, volcanic breccia and other pyroclastic rocks; in part strongly metamorphosed. Includes volcanic rocks of Franciscan Complex: basaltic pillow lava, diabase, g
- O: Sandstone, shale, and conglomerate; in part Miocene and Eocene.
- Oc: Sandstone, shale, and conglomerate; in part Miocene and Eocene.
- P: Sandstone, siltstone, shale, and conglomerate; in part Pleistocene and Miocene.
- Q: Alluvium, lake, playa, and terrace deposits; unconsolidated and semi-consolidated. Mostly nonmarine, but includes marine deposits near the coast.
- QPc: Pliocene and/or Pleistocene sandstone, shale, and gravel deposits; in part Miocene.
- Qls: Selected large landslides, such as Blackhawk slide on north side of San Gabriel Mountains; early to late Quaternary.
- Tc: Undivided Tertiary sandstone, shale, conglomerate, breccia, and ancient lake deposits.
- Tv: Tertiary volcanic flow rocks; minor pyroclastic deposits.
- gb: Gabbro and dark dioritic rocks; chiefly Mesozoic
- grMz: Mesozoic granite, quartz monzonite, granodiorite, and quartz diorite
- ls: Limestone, dolomite, and marble whose age is uncertain but probably Paleozoic or Mesozoic
- m: Undivided pre-Cenozoic metasedimentary and metavolcanic rocks of great variety. Mostly slate, quartzite, hornfels, chert, phyllite, mylonite, schist, gneiss, and minor marble.
- sch: Schists of various types; mostly Paleozoic or Mesozoic age; some Precambrian.
- um: Ultramafic rocks, mostly serpentine. Minor peridotite, gabbro, and diabase. Chiefly Mesozoic unit 2
- um: Ultramafic rocks, mostly serpentine. Minor peridotite, gabbro, and diabase. Chiefly Mesozoic unit 3



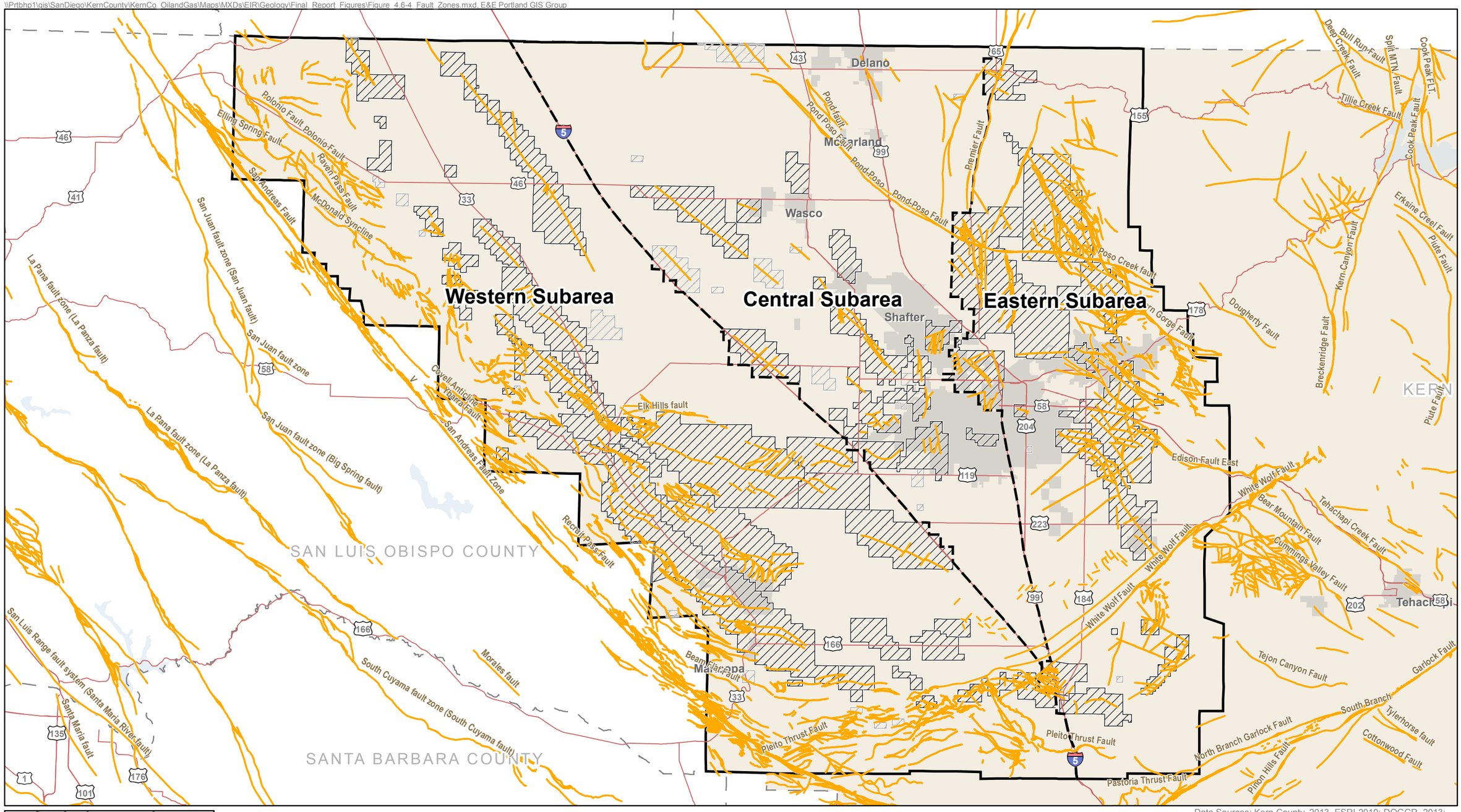




Project Area
Subarea
Kern County
City Limits
Highways
County Boundary

Data Sources: Geology Units: Ludington, Steve, Moring, Barry C., Miller, Robert J., Flynn, Kathryn S., Stone, Paul A., and Bedford, David R., 2005, Preliminary integrated databases for the United States - Western States: California, Nevada, Arizona, and Washington: U.S. Geological Survey Open-File Report OFR 2005-1305, U.S. Geological Survey, Reston, Virginia, USA. Kern County, 2013, ESRI 2010; DOGGR, 2013; USGS, 2003

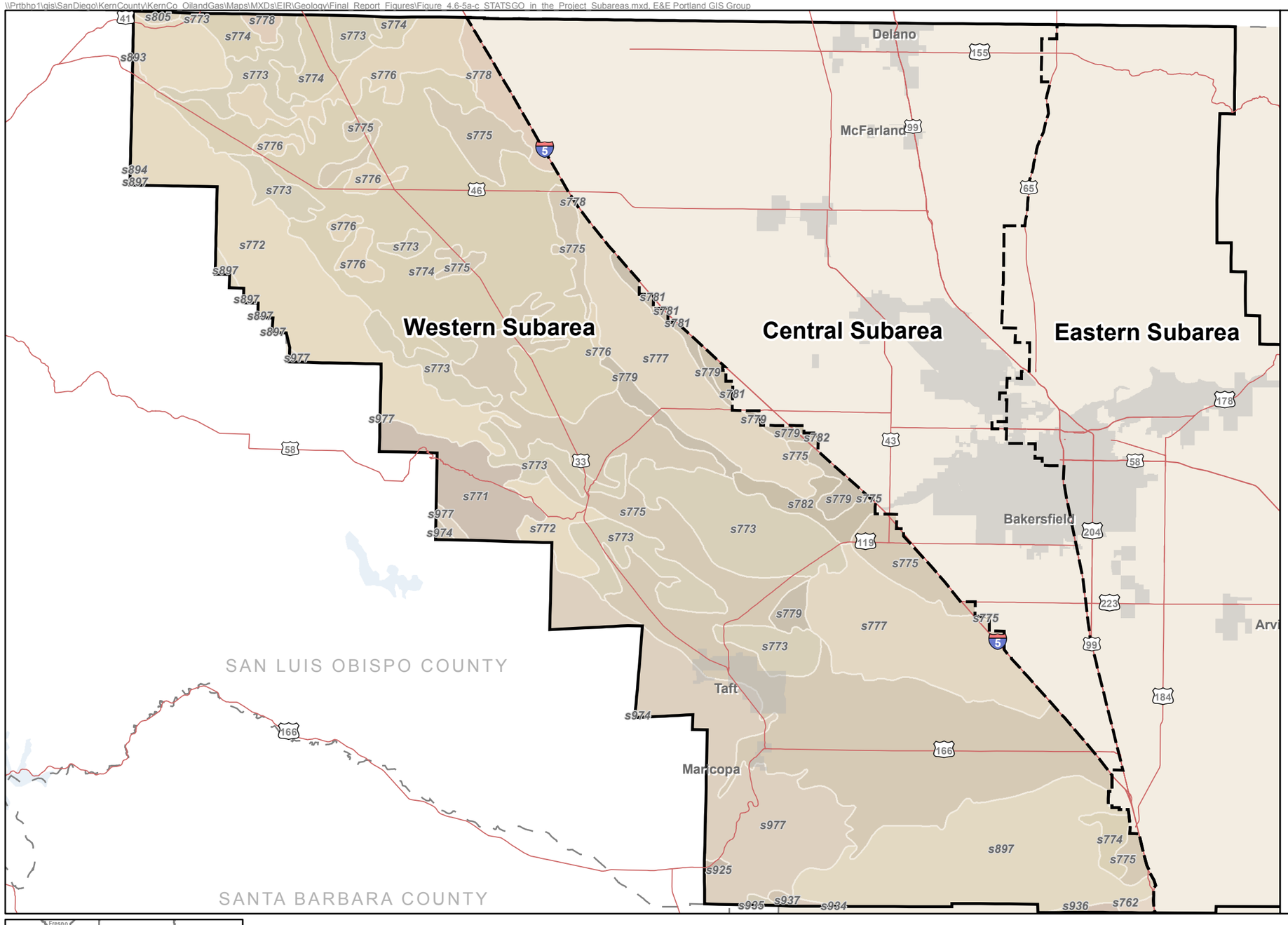
**Figure 4.6-3**
**Geological Units in the Project Area**

\\Prtbhp1\gis\SanDiego\KernCounty\KernCo_OilandGas\Maps\MXDs\EIR\Geology\Final_Report_Figures\Figure_4.6-4_Fault_Zones.mxd, E&E Portland GIS Group




Data Sources: Kern County, 2013, ESRI 2010; DOGGR, 2013; Fault Data: USGS, 2013; CA GSA, 2010

**Figure 4.6-4**
**Fault Zones in the Project Area**

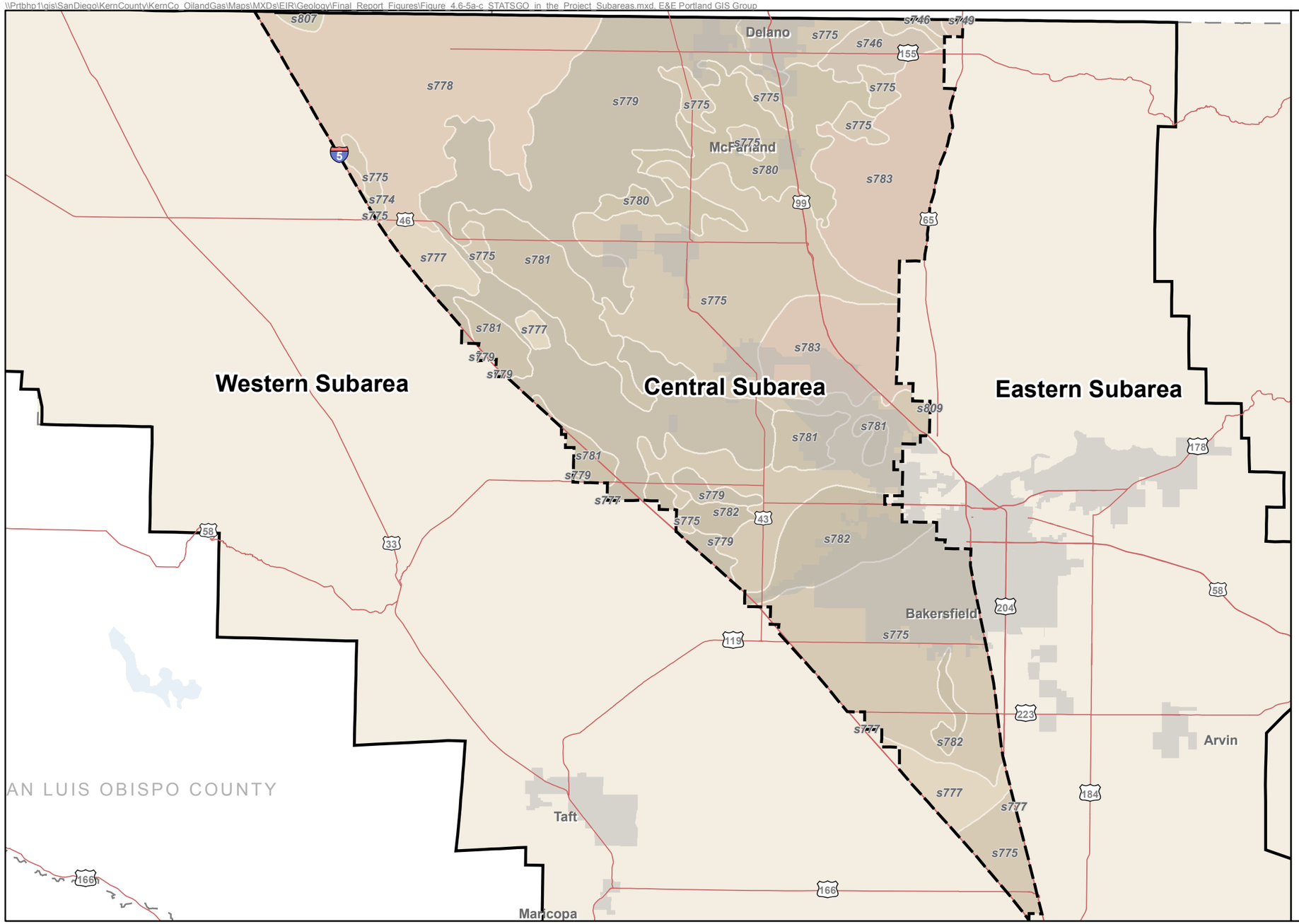



## STATSGO Soil Categories

s740: Vista-Rock outcrop-Auberry-Ahwahnee
s746: San Joaquin-Madera-Cometa
s747: Vista-Rock outcrop-Cieneba
s749: Porterville-Centerville
s751: Rock outcrop-Friant-Coarsegold
s760: Wasioja-Hesperia-Arvin
s761: Walong-Tunis-Pleito-Chanac-Badland
s762: Walong-Rock outcrop-Edmundston-Anaverde
s771: Reward-Pottinger-Aramburu
s772: Kilmer-Hillbrick-Aido
s773: Mercey-Kettleman-Elkhills-Delgado-Cantua-Bitterwater
s774: Panoche-Milham-Kimberlina
s775: Wasco-Kimberlina
s776: Yribarren-Twisselman-Panoche
s777: Lokern-Buttonwillow
s778: Twisselman-Nahrub-Lethent
s779: Panoche-Garces
s780: McFarland
s781: Milham
s782: Westhaven-Lerdo-Excelsior-Cajon
s783: Zerker-Premier-Delano-Chanac
s805: Vaquero-Sagaser-Gaviota-Altamont
s807: Westcamp-Houser-Gepford-Armona
s809: Torriorthents-Elkhills
s814: Soper-Rock outcrop-Jilson-Dunnlake
s893: Mocho-Capay-Camarillo
s894: Still-Riverwash-Metz
s897: Nacimiento-Los Osos-Balcom-Ayar
s899: Vista-Cieneba-Andregg
s925: Stutzville-Panoche-Metz
s934: Modjeska family-Coarsegold-Aramburu variant
s935: Marpa-Hilt-Arrastre
s936: Los Gatos-Gamboa
s937: Xerofluvents-Oak Glen-Dotta
s974: Polonio-Padres
s977: Panoza-Kilmer-Hillbrick-Beam

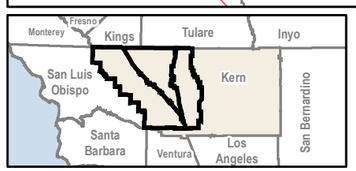
Data Sources: Kern County, 2013, ESRI 2010; NRCS STATSGO, 2014

**Figure 4.6-5a**
**Surface Soil Units in the Western Subarea**




## STATSGO Soil Categories

- s740: Vista-Rock outcrop-Auberry-Ahwahnee
- s746: San Joaquin-Madera-Cometa
- s747: Vista-Rock outcrop-Cieneba
- s749: Porterville-Centerville
- s751: Rock outcrop-Friant-Coarsegold
- s760: Wasioja-Hesperia-Arvin
- s761: Walong-Tunis-Pleito-Chanac-Badland
- s762: Walong-Rock outcrop-Edmundston-Anaverde
- s765: Tehachapi-Steuber-Havala
- s771: Reward-Pottinger-Aramburu
- s772: Kilmer-Hillbrick-Aido
- s773: Mercey-Kettleman-Elkhills-Delgado-Cantua-Bitterwater
- s774: Panoche-Milham-Kimberlina
- s775: Wasco-Kimberlina
- s776: Yribarren-Twisselman-Panoche
- s777: Lokern-Buttonwillow
- s778: Twisselman-Nahrub-Lethent
- s779: Panoche-Garces
- s780: McFarland
- s781: Milham
- s782: Westhaven-Lerdo-Excelsior-Cajon
- s783: Zerker-Premier-Delano-Chanac
- s807: Westcamp-Houser-Gepford-Armona
- s809: Torriorthents-Elkhills
- s814: Soper-Rock outcrop-Jilson-Dunnlake
- s897: Nacimiento-Los Osos-Balcom-Ayar
- s974: Polonio-Padres
- s977: Panoza-Kilmer-Hillbrick-Beam

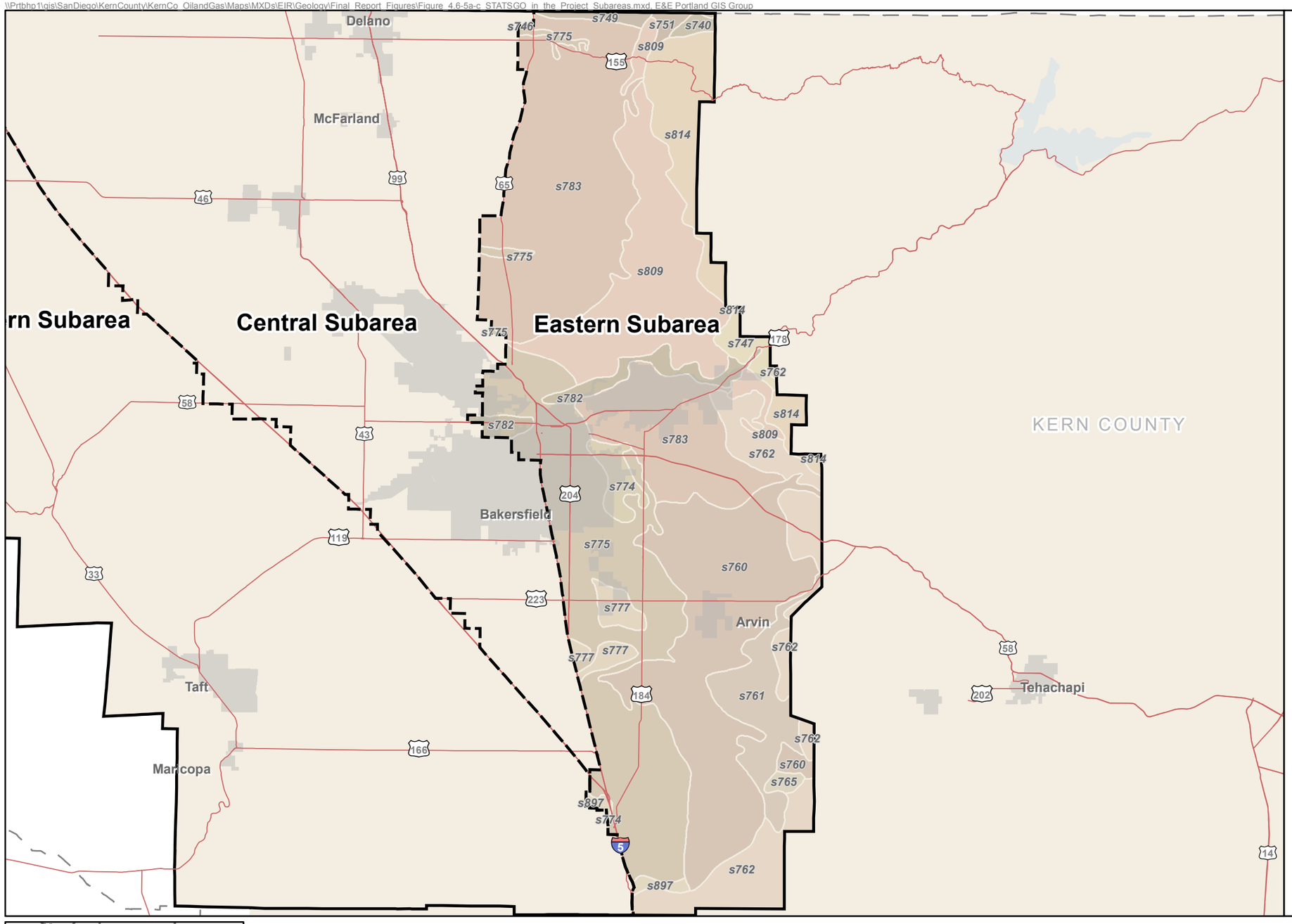



0 10
Miles

Project Area
Subarea
Kern County
City Limits
Highways
County Boundary

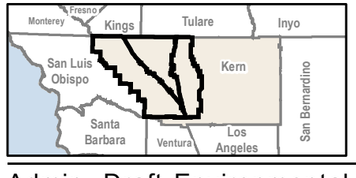
Data Sources: Kern County, 2013, ESRI 2010; NRCS STATSGO, 2014

**Figure 4.6-5b**
**Surface Soil Units in the Central Subarea**




## STATSGO Soil Categories

- s740: Vista-Rock outcrop-Auberry-Ahwahnee
- s746: San Joaquin-Madera-Cometa
- s747: Vista-Rock outcrop-Cieneba
- s749: Porterville-Centerville
- s751: Rock outcrop-Friant-Coarsegold
- s760: Wasioja-Hesperia-Arvin
- s761: Walong-Tunis-Pleito-Chanac-Badland
- s762: Walong-Rock outcrop-Edmundston-Anaverde
- s765: Tehachapi-Steuber-Havala
- s771: Reward-Pottinger-Aramburu
- s772: Kilmer-Hillbrick-Aido
- s773: Mercey-Kettleman-Elkhills-Delgado-Cantua-Bitterwater
- s774: Panoche-Milham-Kimberlina
- s775: Wasco-Kimberlina
- s776: Yribarren-Twisselman-Panoche
- s777: Lokern-Buttonwillow
- s778: Twisselman-Nahrub-Lethent
- s779: Panoche-Garces
- s780: McFarland
- s781: Milham
- s782: Westhaven-Lerdo-Excelsior-Cajon
- s783: Zerker-Premier-Delano-Chanac
- s809: Torriorthents-Elkhills
- s814: Soper-Rock outcrop-Jilson-Dunnlake
- s897: Nacimiento-Los Osos-Balcom-Ayar
- s899: Vista-Cieneba-Andregg
- s925: Stutzville-Panoche-Metz
- s934: Modjeska family-Coarsegold-Aramburu variant
- s935: Marpa-Hilt-Arrastre
- s936: Los Gatos-Gamboa
- s937: Xerofluvents-Oak Glen-Dotta
- s974: Polonio-Padres
- s977: Panoza-Kilmer-Hillbrick-Beam



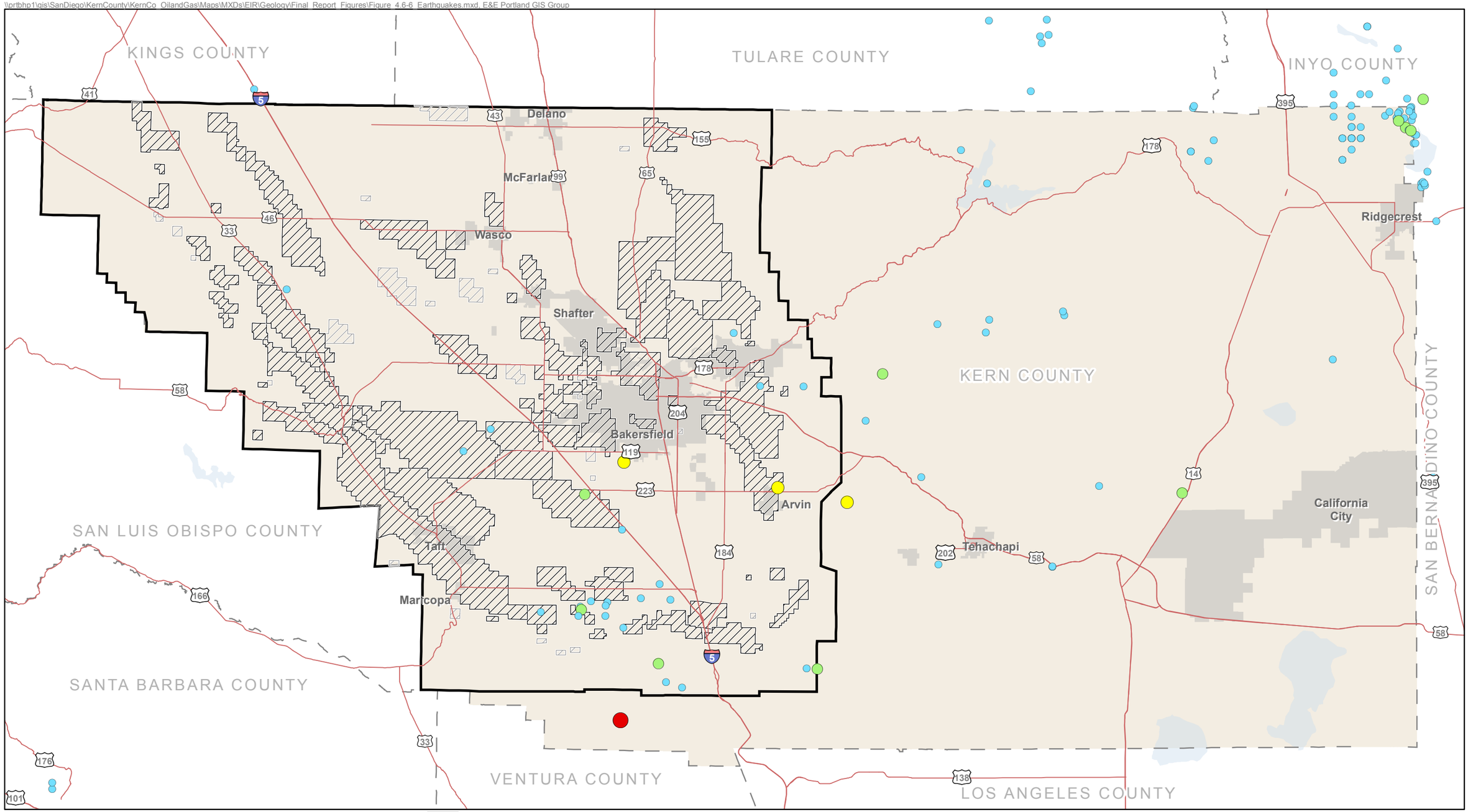

0 10 Miles

Project Area
Subarea
Kern County
City Limits
Highways
County Boundary

Data Sources: Kern County, 2013, ESRI 2010; NRCS STATSGO, 2014

**Figure 4.6-5c**
**Surface Soil Units in the Eastern Subarea**

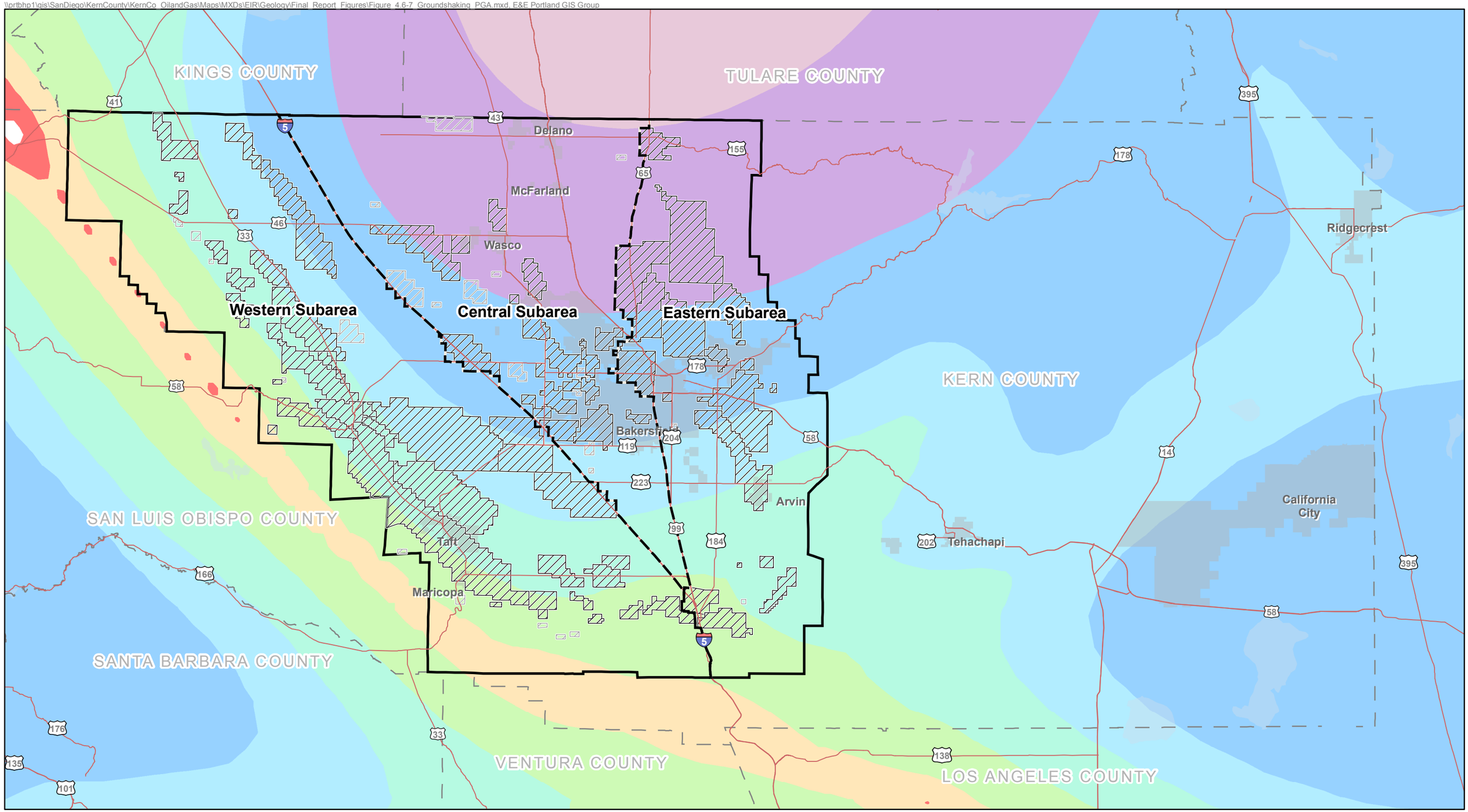
\\prtbhp1\gis\SanDiego\KernCounty\KernCo_OilandGas\Maps\MXDs\EIR\Geology\Final_Report_Figures\Figure_4.6-6_Earthquakes.mxd, E&E Portland GIS Group

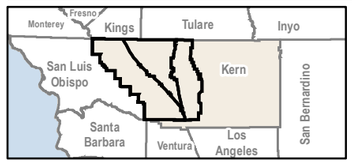



Data Sources: Kern County, 2013, ESRI 2010; DOGGR, 2013;
Earthquake Data: USGS Earthquake Archives, queried March 2015

**Figure 4.6-6**
**Recorded Earthquakes M>4.0 in the Project Area**

\\prtbhp1\gis\SanDiego\KernCounty\KernCo_OilandGas\Maps\MXDs\EIR\Geology\Final_Report_Figures\Figure_4.6-7_Groundshaking_PGA.mxd, E&E Portland GIS Group




0 10 Miles

Project Area
Subarea
City Limits
Highways
County Boundary

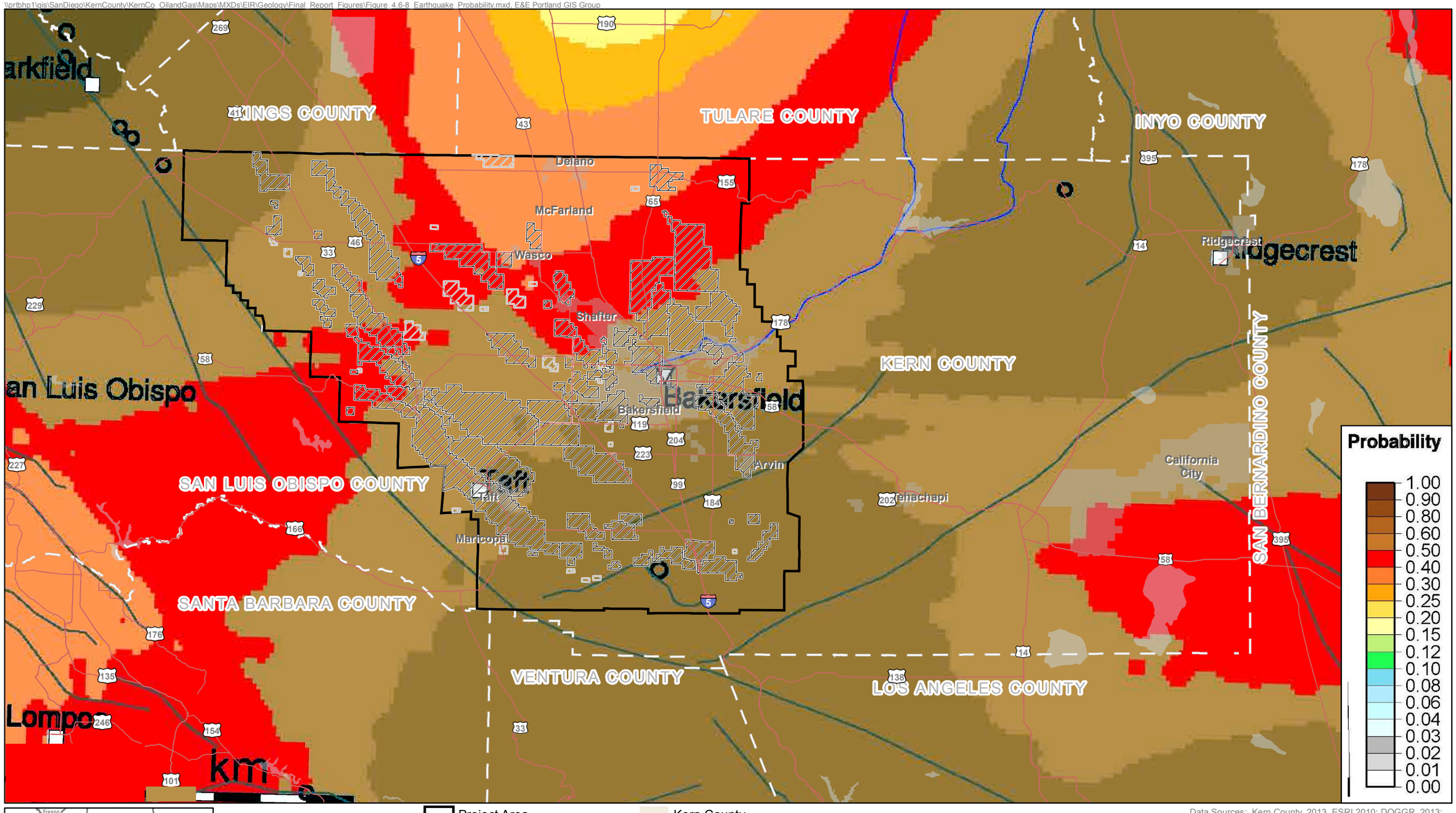
DOGGR Administrative Well Field Boundaries
DOGGR Administrative Well Field Boundaries (Abd)

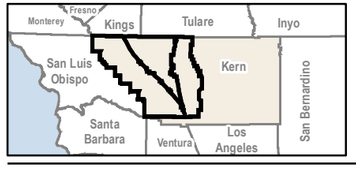
Peak Ground Acceleration

| | |
|---|---|
| 10 %g | 30 %g |
| 15 %g | 40 %g |
| 20 %g | 60 %g |
| 25 %g | 80 %g |

Data Sources: Kern County, 2013, ESRI 2010; DOGGR, 2013;
PGA data source: USGS, 2012
Service Layer Credits:

**Figure 4.6-7**
**Peak Ground Acceleration 10% in 50 years in the Project Area**



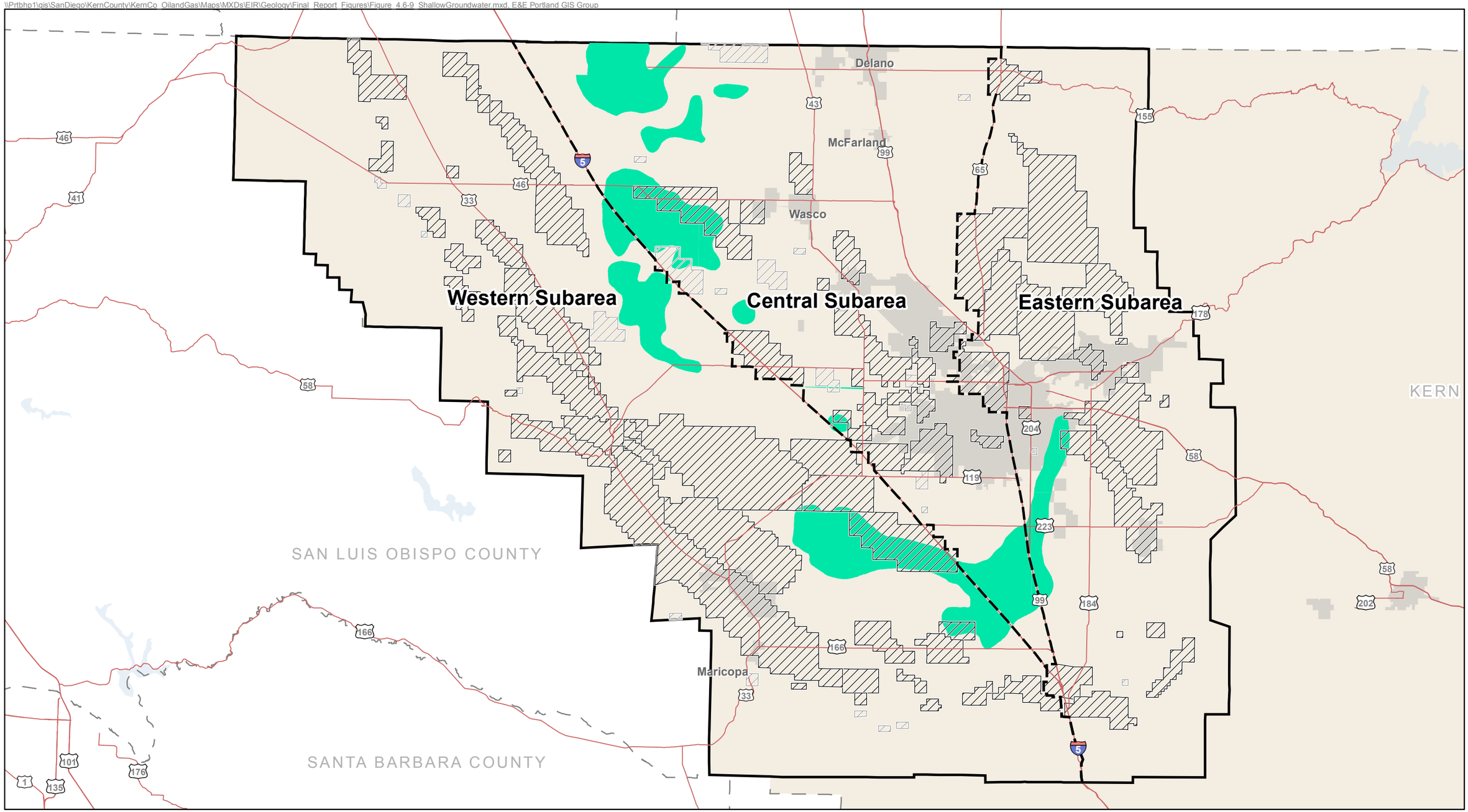

0 10
Miles

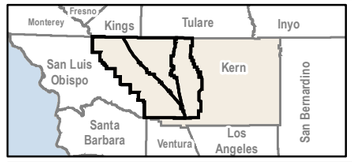
- Project Area
- DOGGR Administrative Well Field Boundaries
- DOGGR Administrative Well Field Boundaries (Abd)
- Kern County
- City Limits
- Highways
- County Boundary

Data Sources: Kern County, 2013, ESRI 2010; DOGGR, 2013;
Earthquake Probability Image Source: USGS, 2014

**Figure 4.6-8**
**Earthquake Probability M>5.0 within 20 years in the Project Area**

\\Prtbhp1\gis\SanDiego\KernCounty\KernCo_OilandGas\Maps\MXDs\EIR\Geology\Final_Report_Figures\Figure_4.6-9_ShallowGroundwater.mxd, E&E Portland GIS Group




0 10
Miles

Project Area
Subarea
Shallow Groundwater

DOGGR Administrative Well Field Boundaries
DOGGR Administrative Well Field Boundaries (Abd)

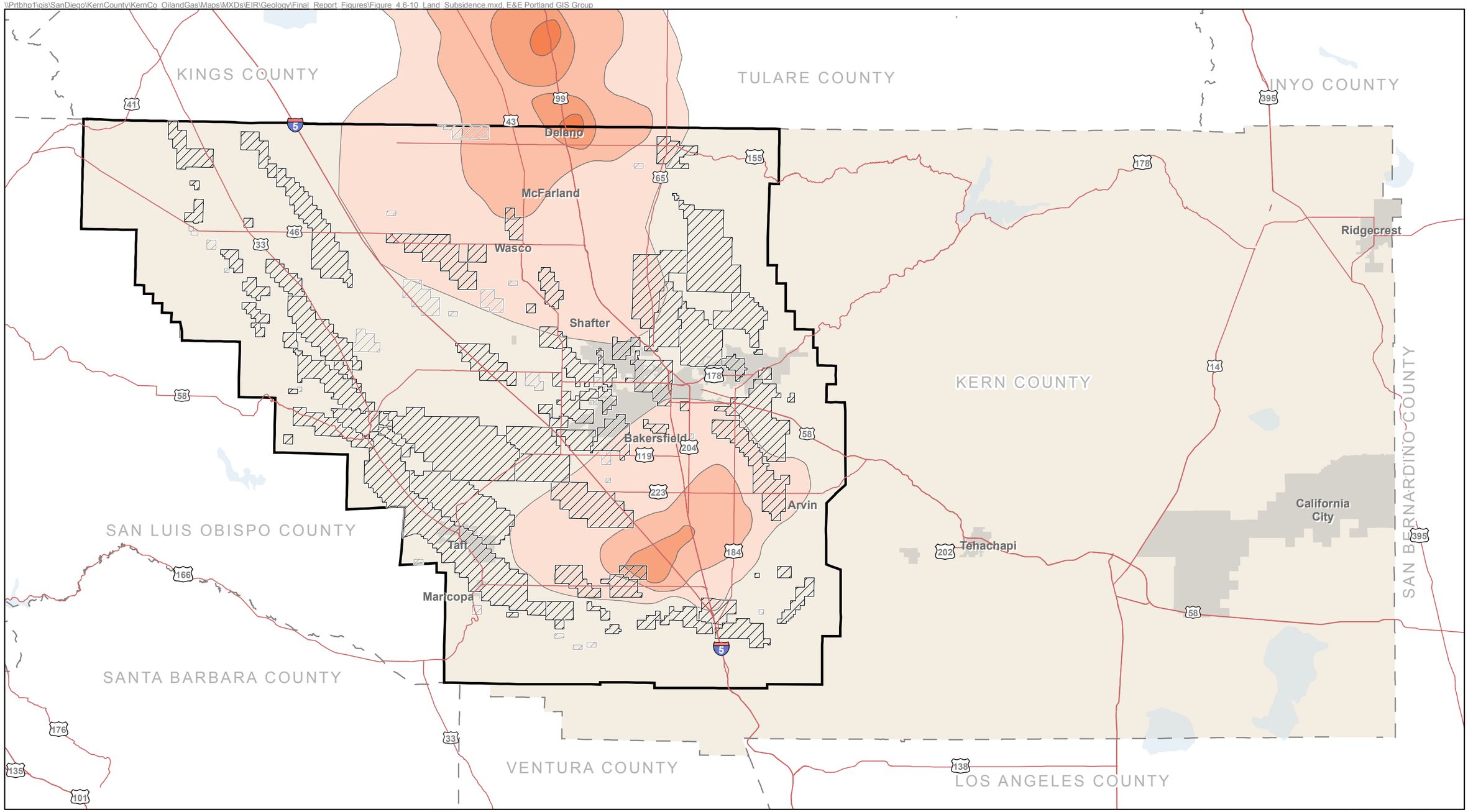
Kern County
City Limits

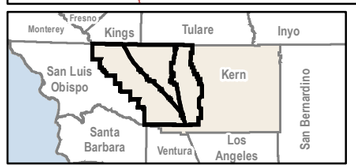
Highways
County Boundary

Data Sources: Kern County, 2013, ESRI 2010; DOGGR, 2013;
Shallow Groundwater source data: Kern County, 2013

**Figure 4.6-9**
**Shallow Groundwater Areas in the Project Area**

\\Prtbhp1\gis\SanDiego\KernCounty\KernCo_OilandGas\Maps\MXDs\EIR\Geology\Final_Report_Figures\Figure_4.6-10_Land_Subsidence.mxd, E&E Portland GIS Group




0 10 Miles

Project Area
DOGGR Administrative Well Field Boundaries
DOGGR Administrative Well Field Boundaries (Abd)

Land Subsidence (meters)
0.3 to 1.2
1.2 to 2.4
2.4 to 3.6
3.6 to 4.9

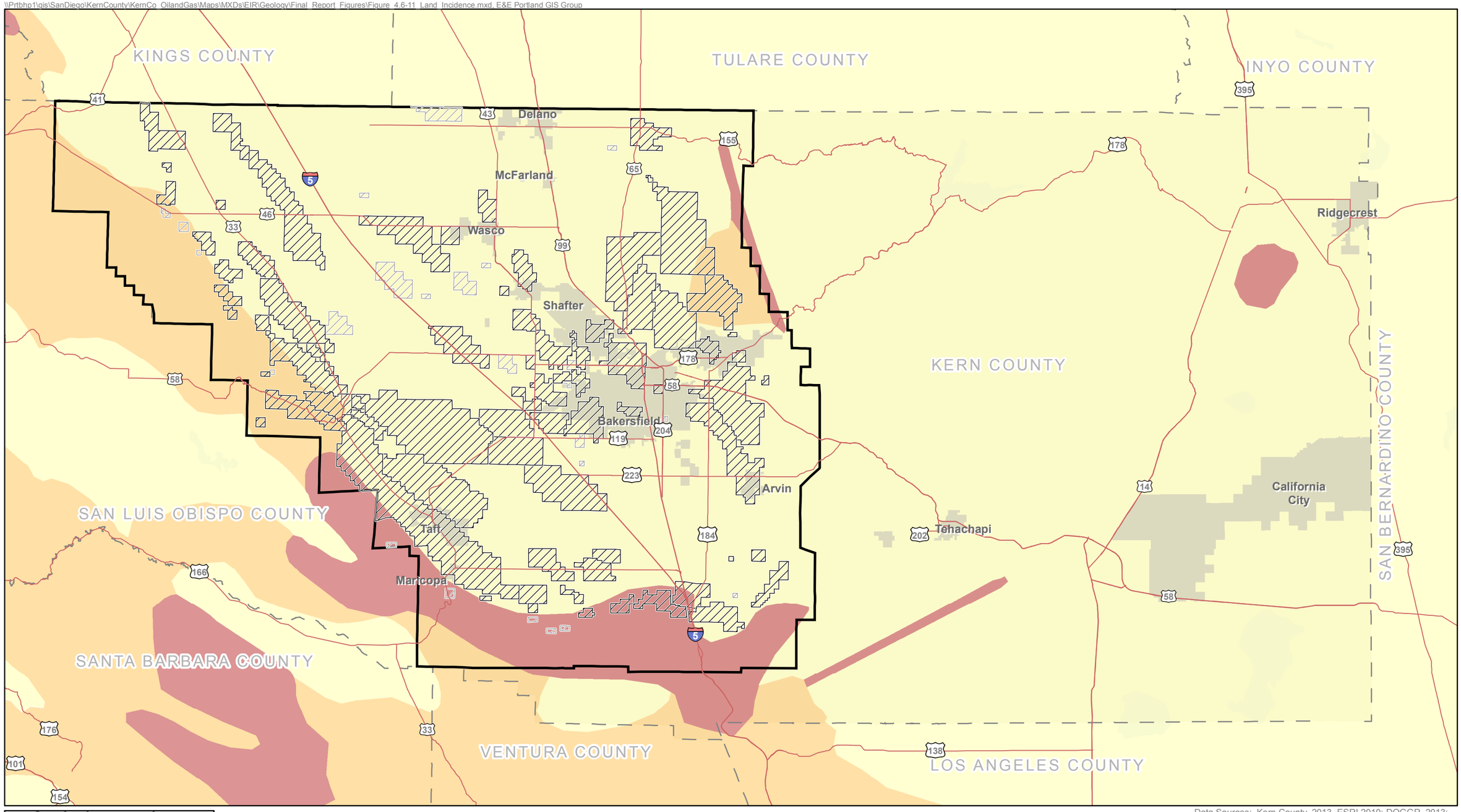
Kern County
City Limits

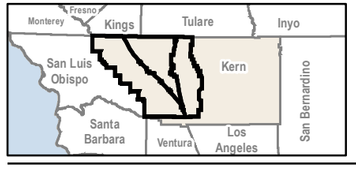
Highways
County Boundary

Data Sources: Kern County, 2013, ESRI 2010; DOGGR, 2013; Land subsidence in the San Joaquin Valley, California, 1926 - 70 (modified from Ireland and others, 1984)

**Figure 4.6-10**
**Subsidence in San Joaquin Valley**

\\Prtbhp1\gis\SanDiego\KernCounty\KernCo_OilandGas\Maps\MXDs\EIR\Geology\Final_Report_Figures\Figure_4.6-11_Land_Incidence.mxd, E&E Portland GIS Group




0 10 Miles

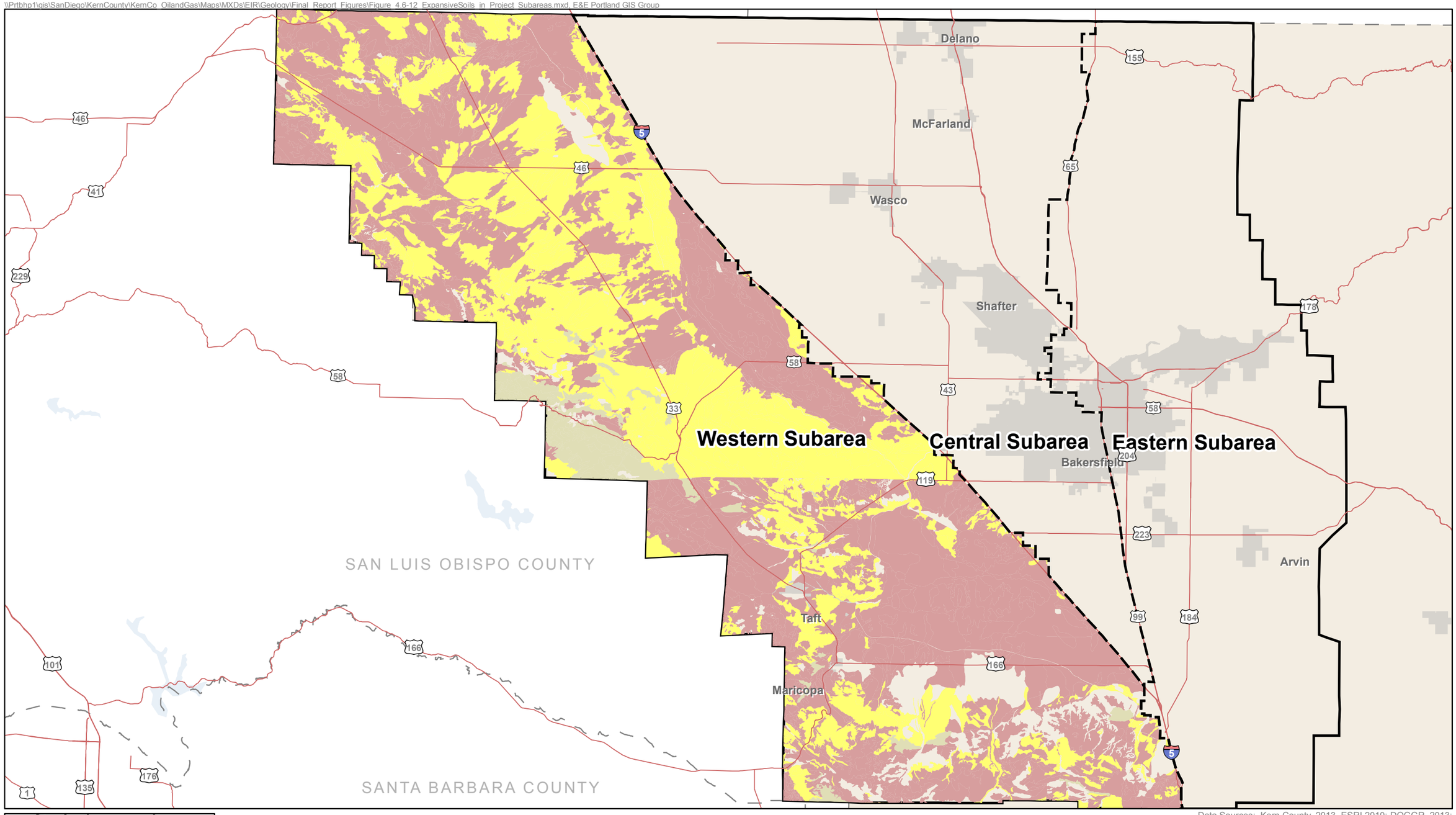
Project Area
DOGGR Administrative Well Field Boundaries
DOGGR Administrative Well Field Boundaries (Abd)

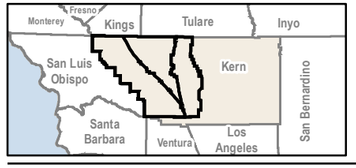
Landslide Incidence and Susceptibility
- High landslide incidence (over 15% of the area is involved in landsliding)
- High susceptibility to landsliding and moderate incidence
- Moderate landslide incidence (1.5 - 15% of the area is involved)
- Low landslide incidence (less than 1.5% of the area is involved)

Kern County
City Limits
Highways
County Boundary

Data Sources: Kern County, 2013, ESRI 2010; DOGGR, 2013;
Landslide source data: USGS, 1978 (http://pubs.usgs.gov/pp/p1183/figures/map.jpg )

**Figure 4.6-11**
**Landslide Incidence in the Project Area**




0 10 Miles

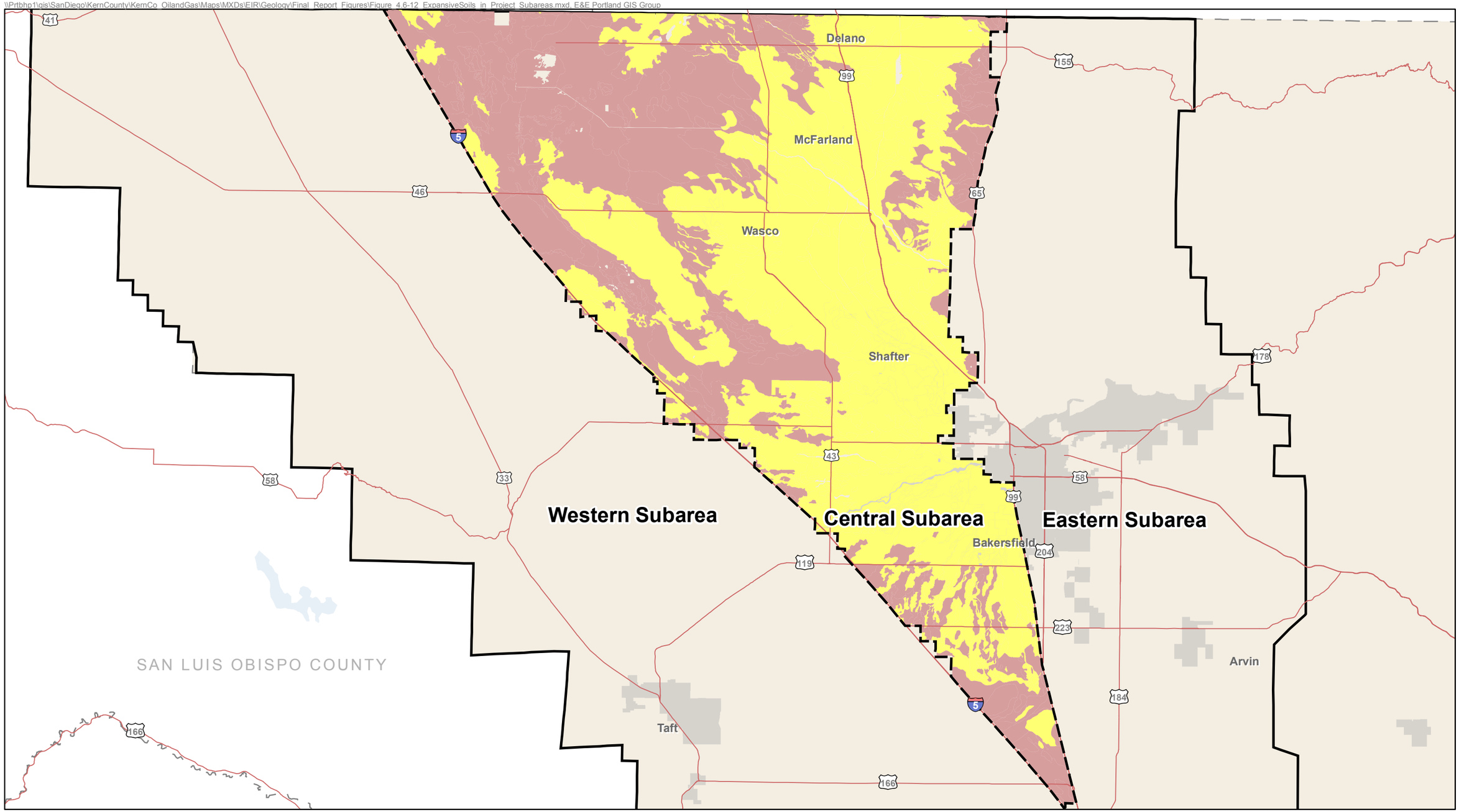
Project Area
Subarea

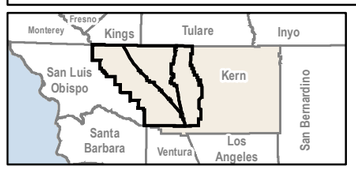
Expansive Soil Categories (SSURGO)
CH; CL; CL-ML; SC (Potentially Expansive)
GC; GC-GM; GM
ML; SC-SM; SM

Kern County
City Limits
Highways
County Boundary

Data Sources: Kern County, 2013, ESRI 2010; DOGGR, 2013; NRCS Soils, 2014

**Figure 4.6-12a**
**Expansive Soil Units in the Western Subarea**




N

0 10
Miles

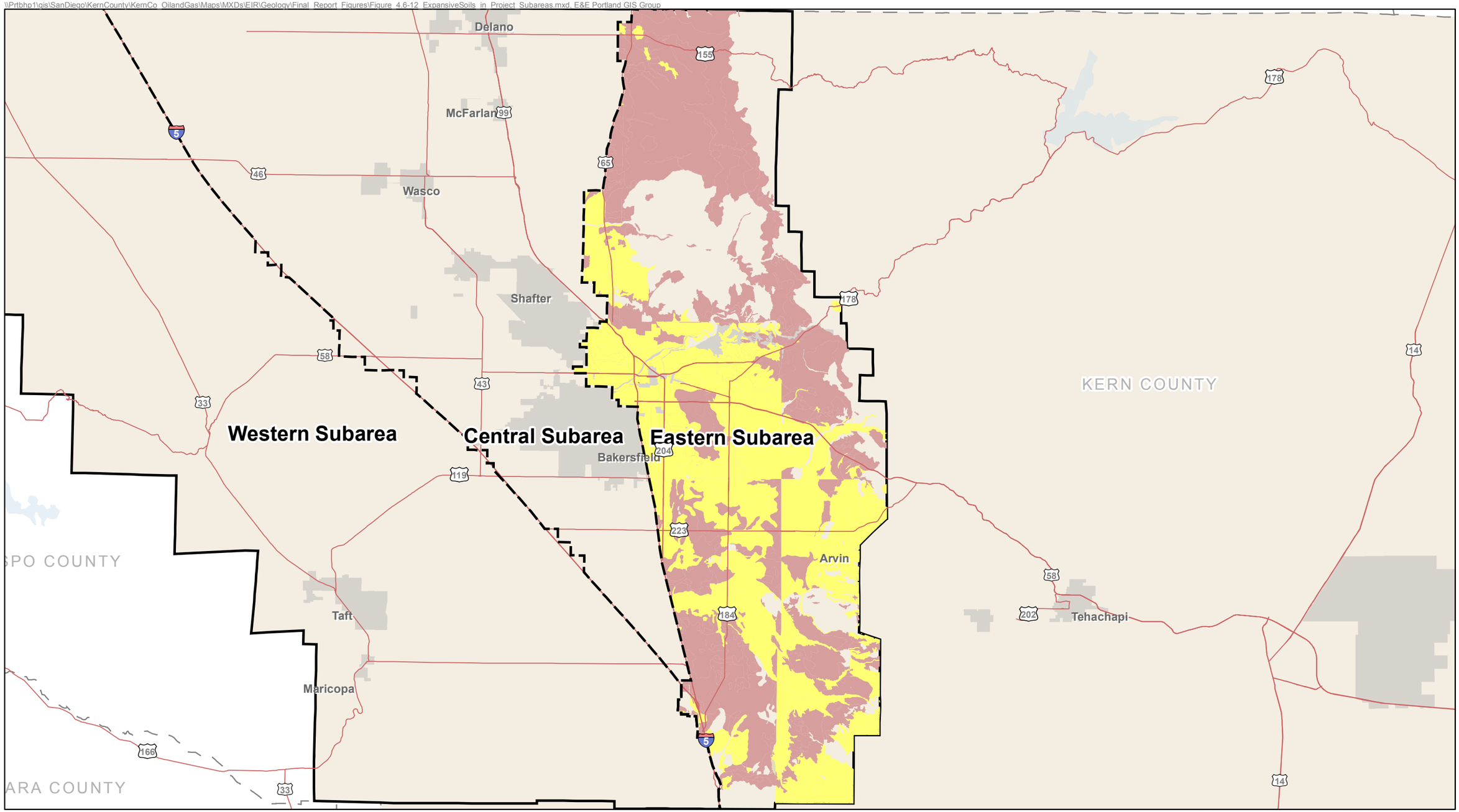
Project Area
Subarea

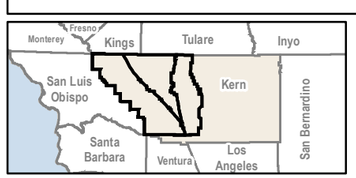
Expansive Soil Categories (SSURGO)
CH; CL; CL-ML; SC (Potentially Expansive)
GC; GC-GM; GM
ML; SC-SM; SM

Kern County
City Limits
Highways
County Boundary

Data Sources: Kern County, 2013, ESRI 2010; DOGGR, 2013; NRCS Soils, 2014

**Figure 4.6-12b**
**Expansive Soil Units in the Central Subarea**




0 10
Miles

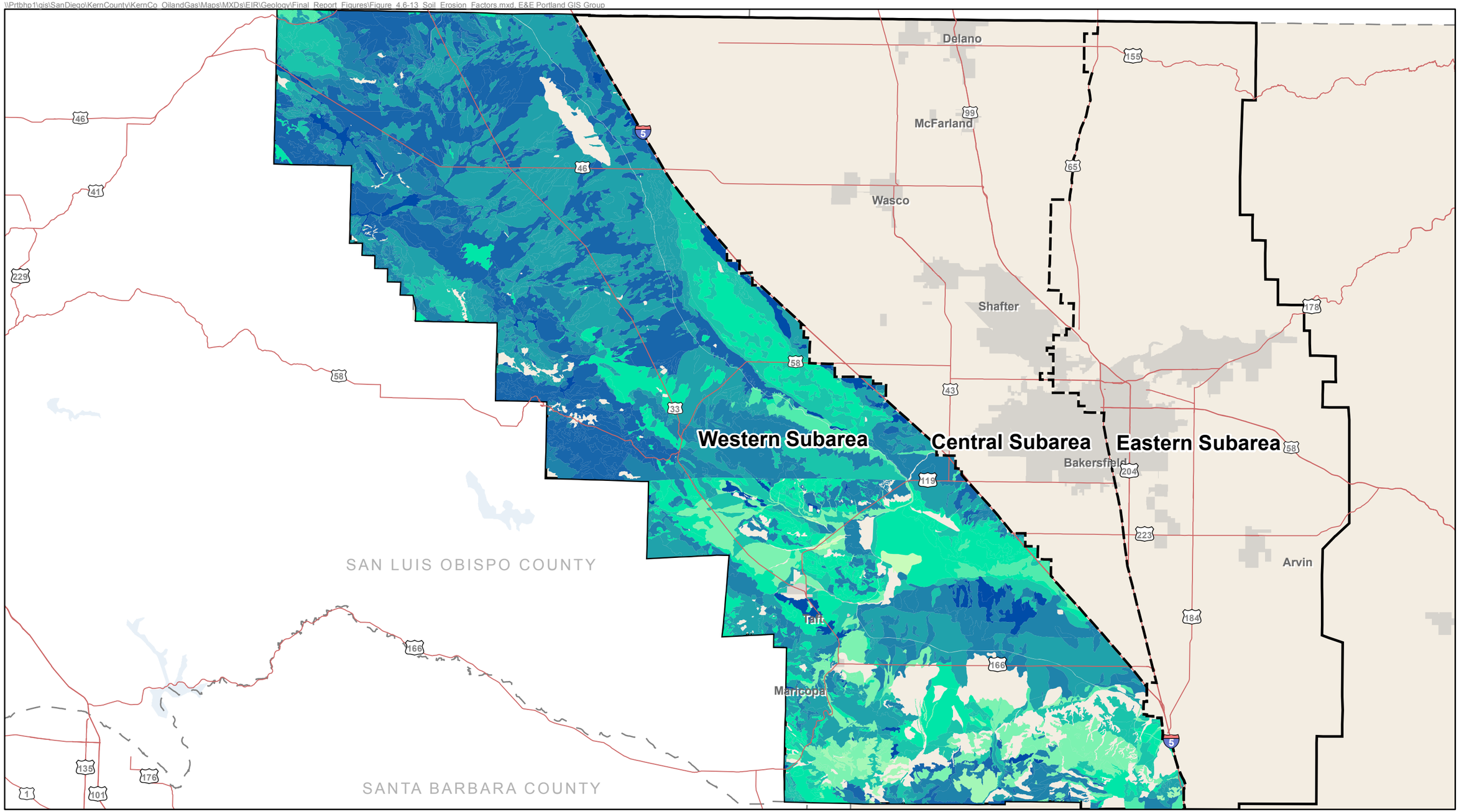
Project Area
Subarea

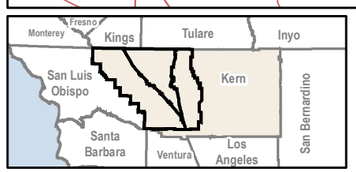
Expansive Soil Categories (SSURGO)
CH; CL; CL-ML; SC (Potentially Expansive)
GC; GC-GM; GM
ML; SC-SM; SM

Kern County
City Limits
Highways
County Boundary

Data Sources: Kern County, 2013, ESRI 2010; DOGGR, 2013; NRCS Soils, 2014

**Figure 4.6-12c**
**Expansive Soil Units in the Eastern Subarea**




0 10 Miles

Project Area
Subarea
Kern County
City Limits
Highways
County Boundary

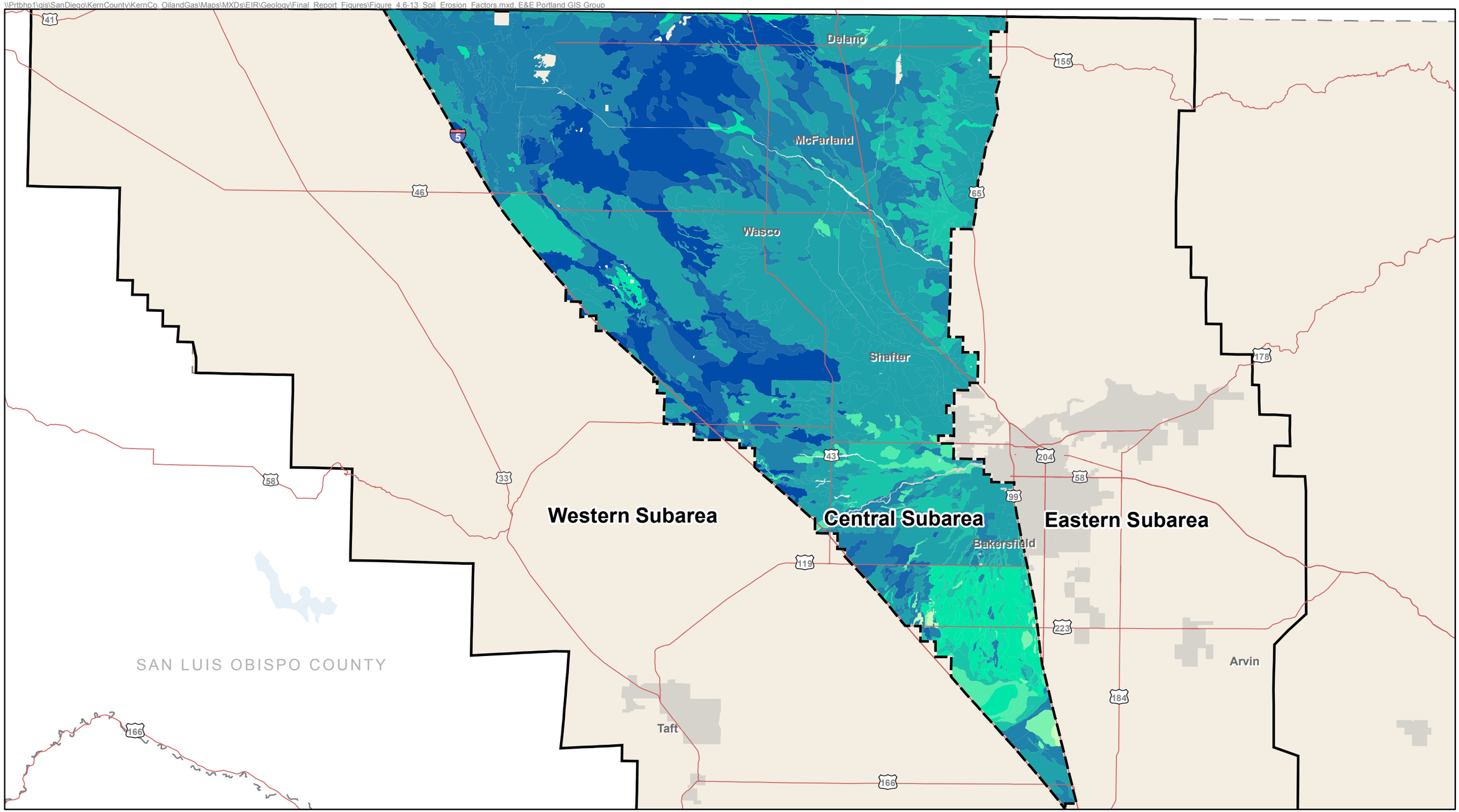
Soil Erosion Factor (SSURGO)*

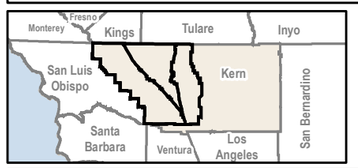
| | | |
|---|---|---|
| .05 | .20 | .37 |
| .10 | .24 | .43 |
| .15 | .28 | .49 |
| .17 | .32 | |

*Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water

Data Sources: Kern County, 2013, ESRI 2010; DOGGR, 2013; NRCS Soils, 2014

**Figure 4.6-13a**
**Soil Erosion Factors in the Western Subarea**




0 10 Miles

Project Area
Subarea
Kern County
City Limits
Highways
County Boundary

Soil Erosion Factor (SSURGO)*

| | | |
|---|---|---|
| .05 | .20 | .37 |
| .10 | .24 | .43 |
| .15 | .28 | .49 |
| .17 | .32 | |

*Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water

Data Sources: Kern County, 2013, ESRI 2010; DOGGR, 2013; NRCS Soils, 2014

**Figure 4.6-13b**
**Soil Erosion Factors in the Central Subarea**

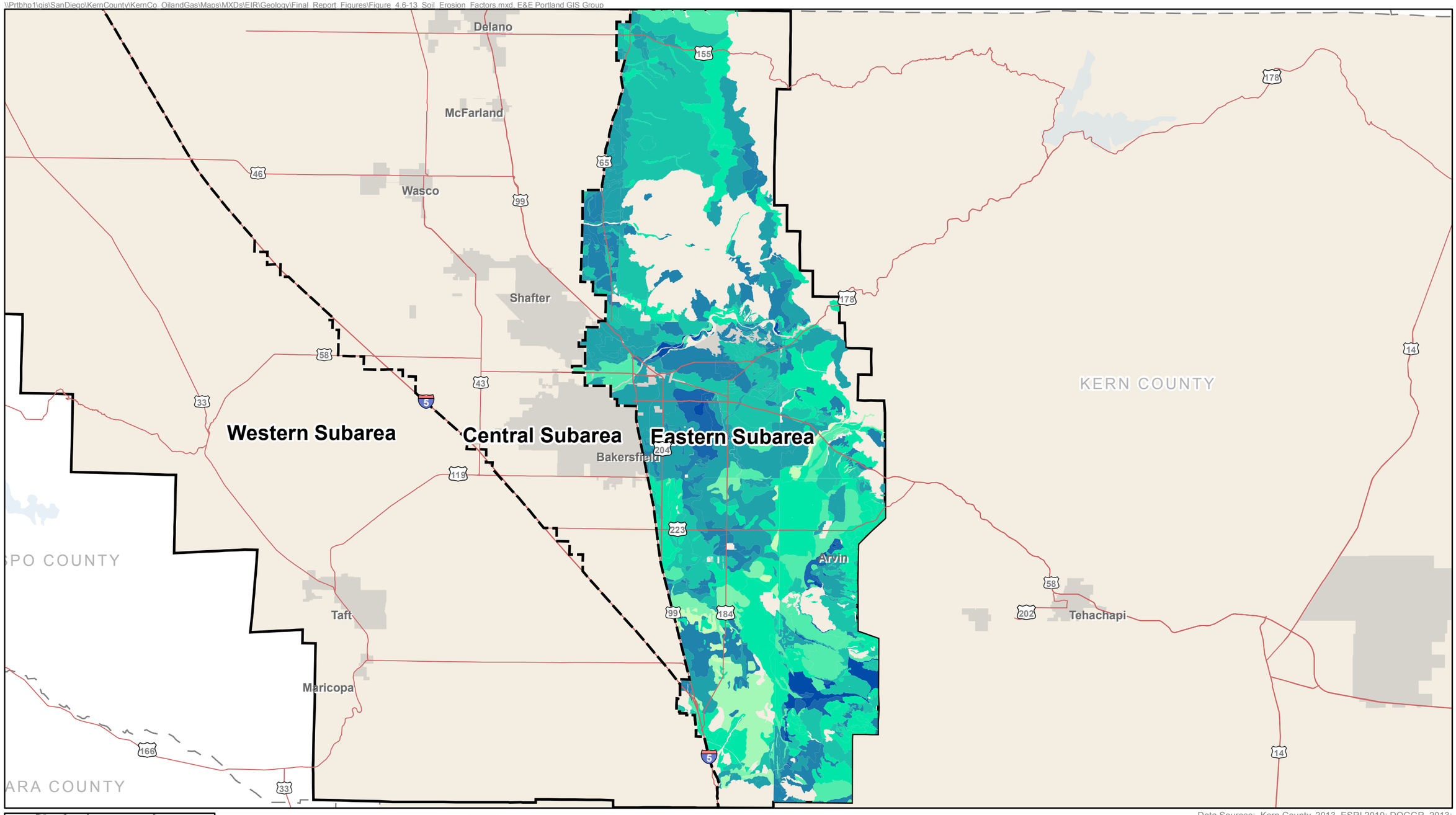



**Figure 4.6-13c**
**Soil Erosion Factors in the Eastern Subarea**

\\Prtbhp1\gis\SanDiego\KernCounty\KernCo_OilandGas\Maps\MXDs\EIR\Geology\Final_Report_Figures\Figure_4.6-14_Length_Slope_Factors.mxd, E&E Portland GIS Group

Western Subarea

Central Subarea

Eastern Subarea

Delano

McFarland

Wasco

Shafter

Bakersfield

Arvin

Taft

Maricopa

SAN LUIS OBISPO COUNTY

SANTA BARBARA COUNTY

Monterey, Fresno, Kings, Tulare, Inyo, San Luis Obispo, Kern, Santa Barbara, Ventura, Los Angeles, San Bernardino

0 10 Miles

Project Area
Subarea
Kern County
City Limits
Highways
County Boundary

Length Slope Factor (SSURGO)*

0 - 4
5 - 12
13 - 25
26 - 45
46 - 70

*Representative value of the difference in elevation between two points, expressed as a percentage of the distance between those points

Data Sources: Kern County, 2013, ESRI 2010; DOGGR, 2013; NRCS Soils, 2014

**Figure 4.6-14a**
**Length Slope Factors in the Western Subarea**

\\Prtbhp1\gis\SanDiego\KernCounty\KernCo_OilandGas\Maps\MXDs\EIR\Geology\Final_Report_Figures\Figure_4.6-14_Length_Slope_Factors.mxd, E&E Portland GIS Group

Delano
McFarland
Wasco
Shafter
Western Subarea
Central Subarea
Eastern Subarea
Bakersfield
Arvin
Taft
SAN LUIS OBISPO COUNTY

Project Area
Subarea
Kern County
City Limits
Highways
County Boundary

0 10
Miles

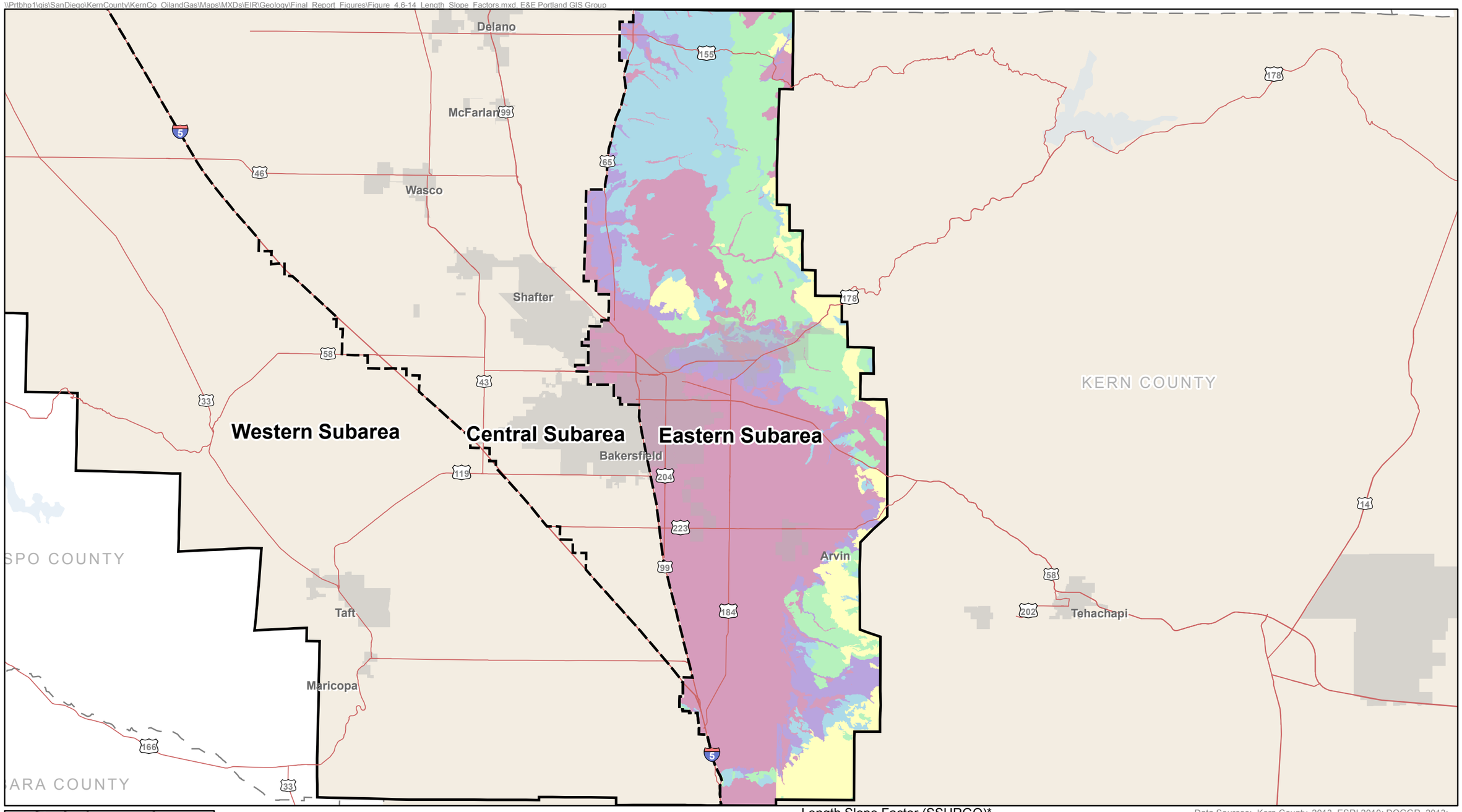
Length Slope Factor (SSURGO)*
0 - 4
5 - 12
13 - 25
26 - 45
46 - 70

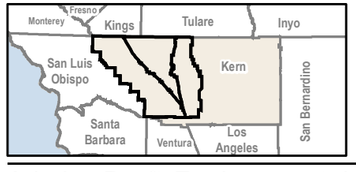
*Representative value of the difference in elevation between two points, expressed as a percentage of the distance between those points

Data Sources: Kern County, 2013, ESRI 2010; DOGGR, 2013; NRCS Soils, 2014

**Figure 4.6-14b**
**Length Slope Factors in the Central Subarea**

\\Prtbhp1\gis\SanDiego\KernCounty\KernCo_OilandGas\Maps\MXDs\EIR\Geology\Final_Report_Figures\Figure_4.6-14_Length_Slope_Factors.mxd, E&E Portland GIS Group




0 10
Miles

Project Area
Subarea
Kern County
City Limits
Highways
County Boundary

Length Slope Factor (SSURGO)*
0 - 4
5 - 12
13 - 25
26 - 45
46 - 70

*Representative value of the difference in elevation between two points, expressed as a percentage of the distance between those points

Data Sources: Kern County, 2013, ESRI 2010; DOGGR, 2013; NRCS Soils, 2014

**Figure 4.6-14c**
**Length Slope Factors in the Eastern Subarea**

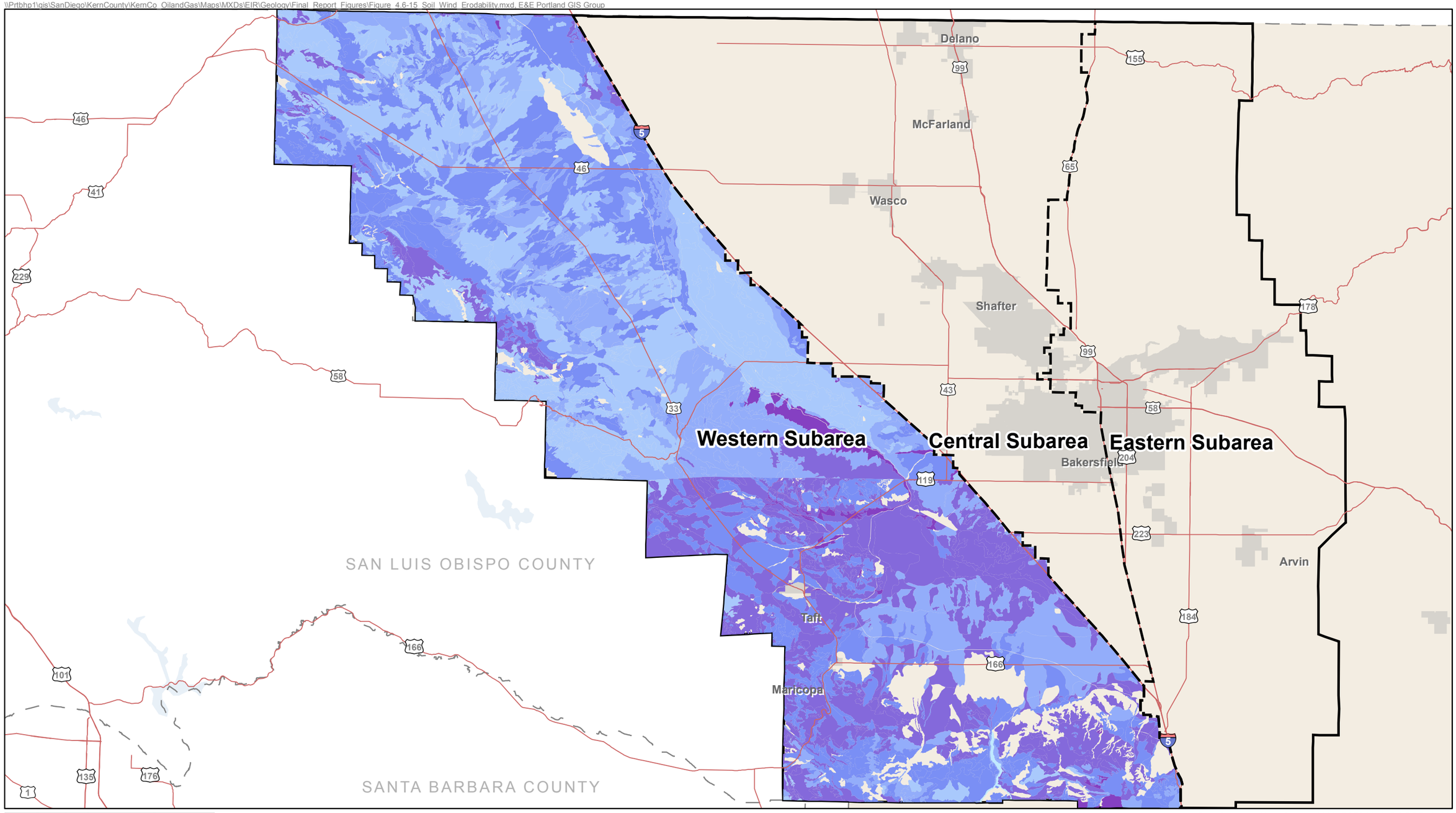
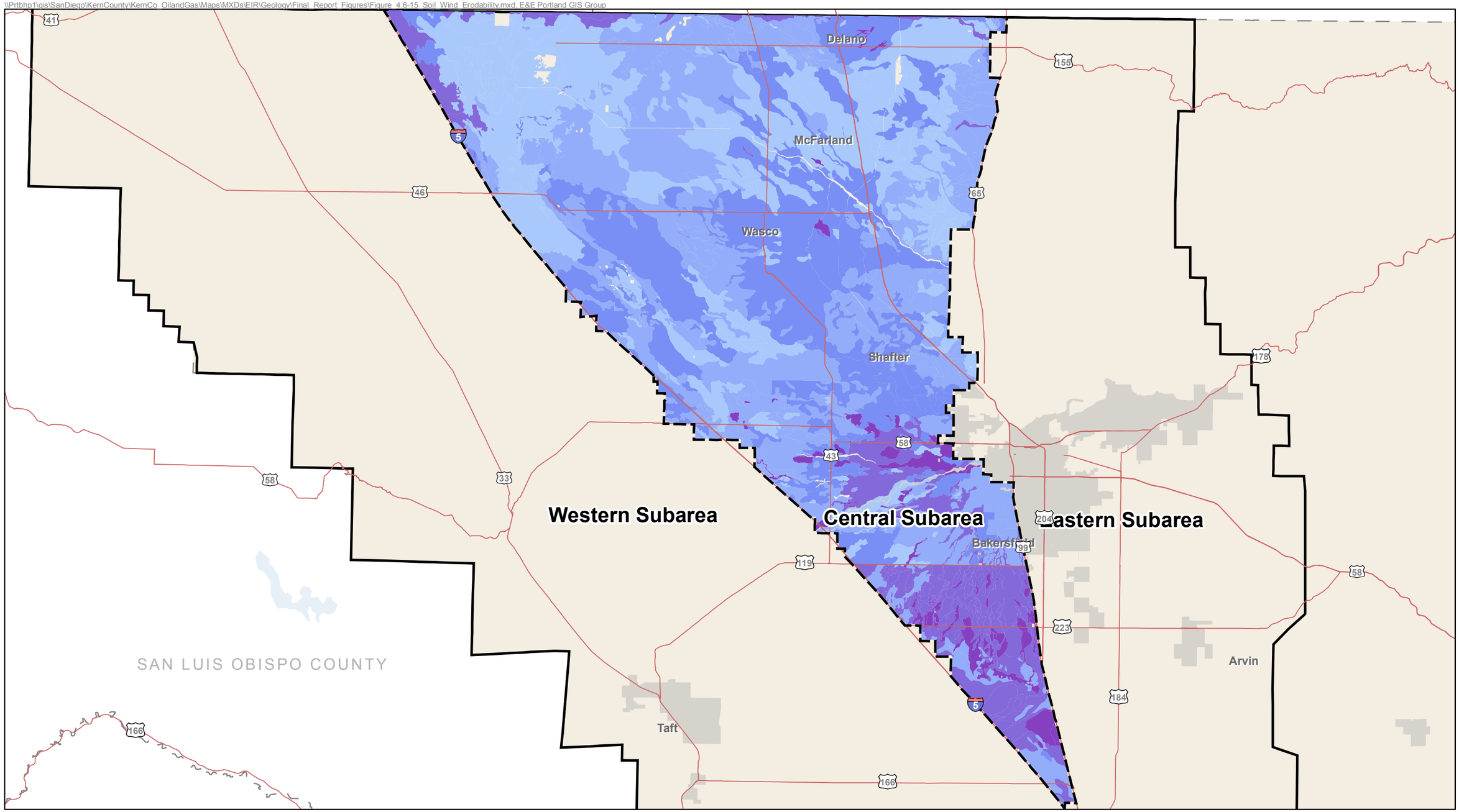
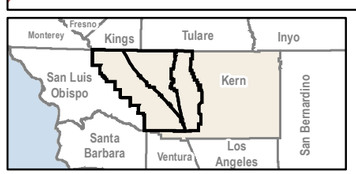



**Figure 4.6-15a**
**Soil Erodibility in the Western Subarea**

\\Prtbhp1\gis\SanDiego\KernCounty\KernCo_OilandGas\Maps\MXDs\EIR\Geology\Final_Report_Figures\Figure_4.6-15_Soil_Wind_Erodability.mxd, E&E Portland GIS Group




0 10
Miles

Project Area
Subarea
Kern County
City Limits
Highways
County Boundary

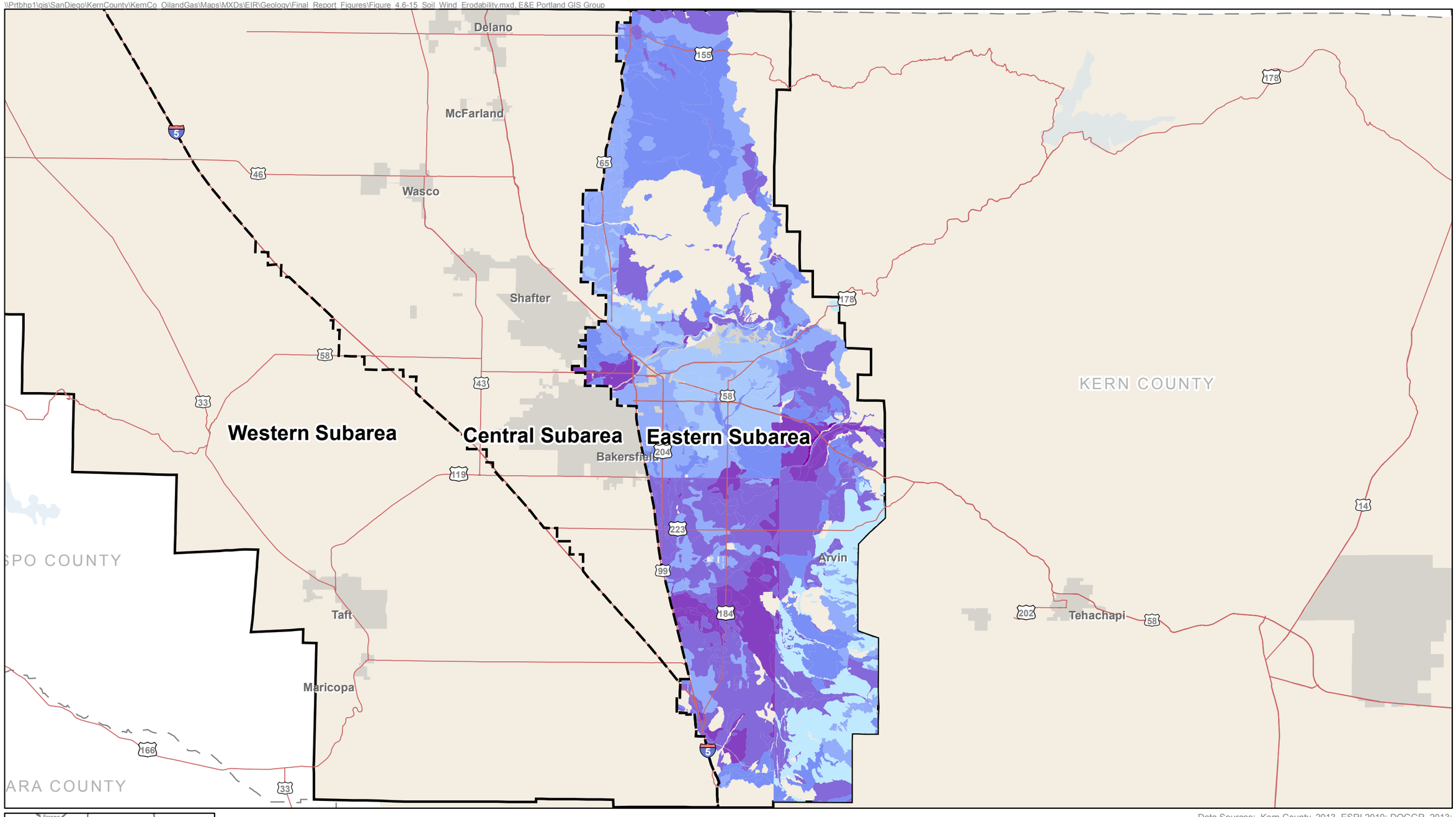
Wind Erodibility Index Value (SSURGO)*

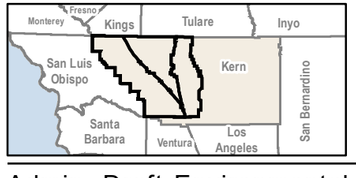
| | | | |
|---|---|---|---|
| 0 | 48 | 86 | 220 |
| 38 | 56 | 134 | |

*A value in tons/acre/year that is a factor in calculating soil loss by wind

Data Sources: Kern County, 2013, ESRI 2010; DOGGR, 2013; NRCS Soils, 2014

**Figure 4.6-15b**
**Soil Erodibility in the Central Subarea**




0 10
Miles

Project Area
Subarea
Kern County
City Limits
Highways
County Boundary

Wind Erodibility Index Value (SSURGO)*

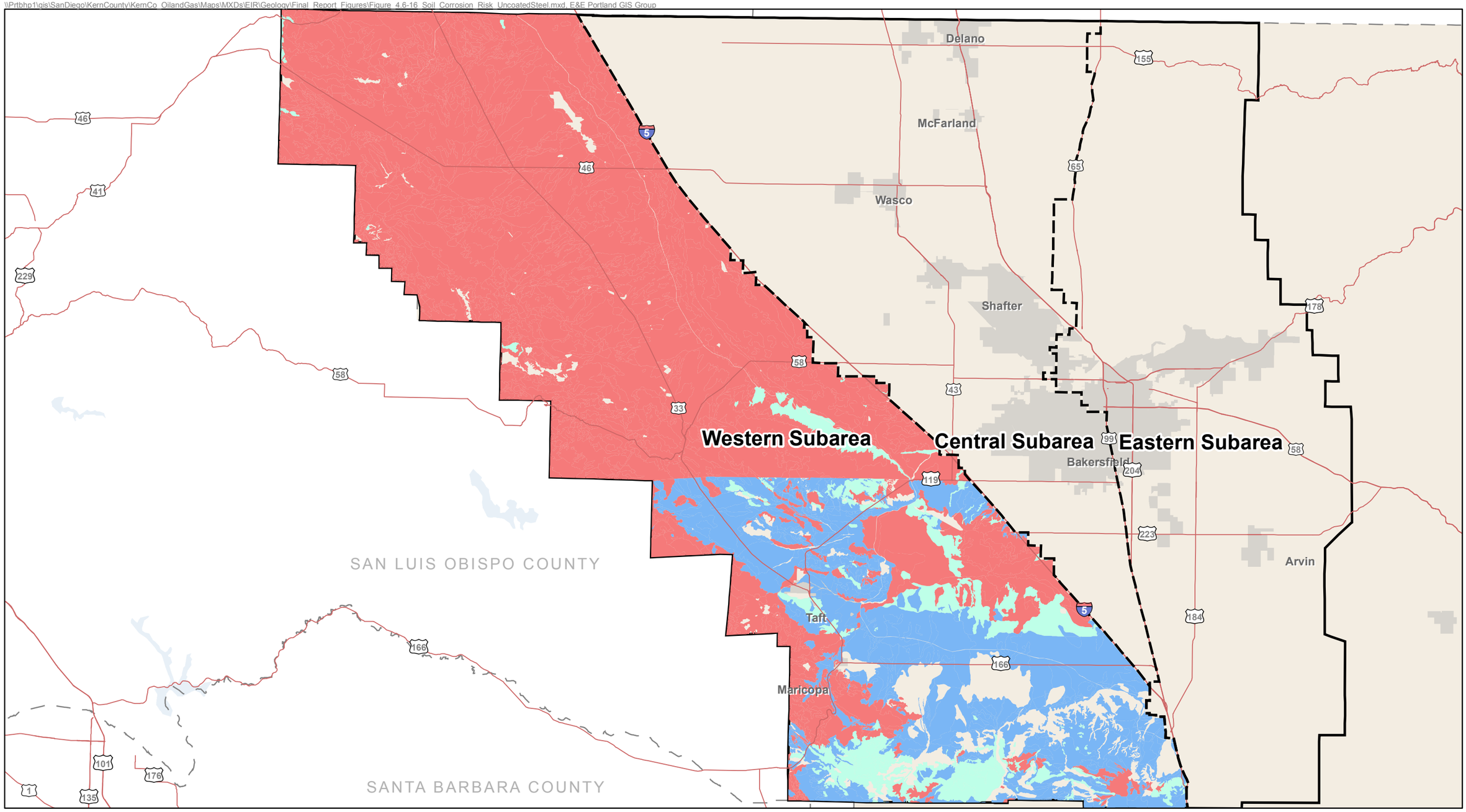
| | | | |
|---|---|---|---|
| 0 | 48 | 86 | 220 |
| 38 | 56 | 134 | |

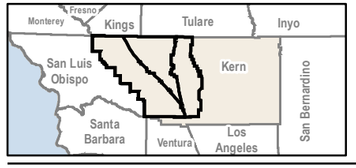
*A value in tons/acre/year that is a factor in calculating soil loss by wind

Data Sources: Kern County, 2013, ESRI 2010; DOGGR, 2013; NRCS Soils, 2014

**Figure 4.6-15c**
**Soil Erodibility in the Eastern Subarea**

\\Prtbhp1\gis\SanDiego\KernCounty\KernCo_OilandGas\Maps\MXDs\EIR\Geology\Final_Report_Figures\Figure_4.6-16_Soil_Corrosion_Risk_UncoatedSteel.mxd, E&E Portland GIS Group




0 10
Miles

Project Area
Subarea

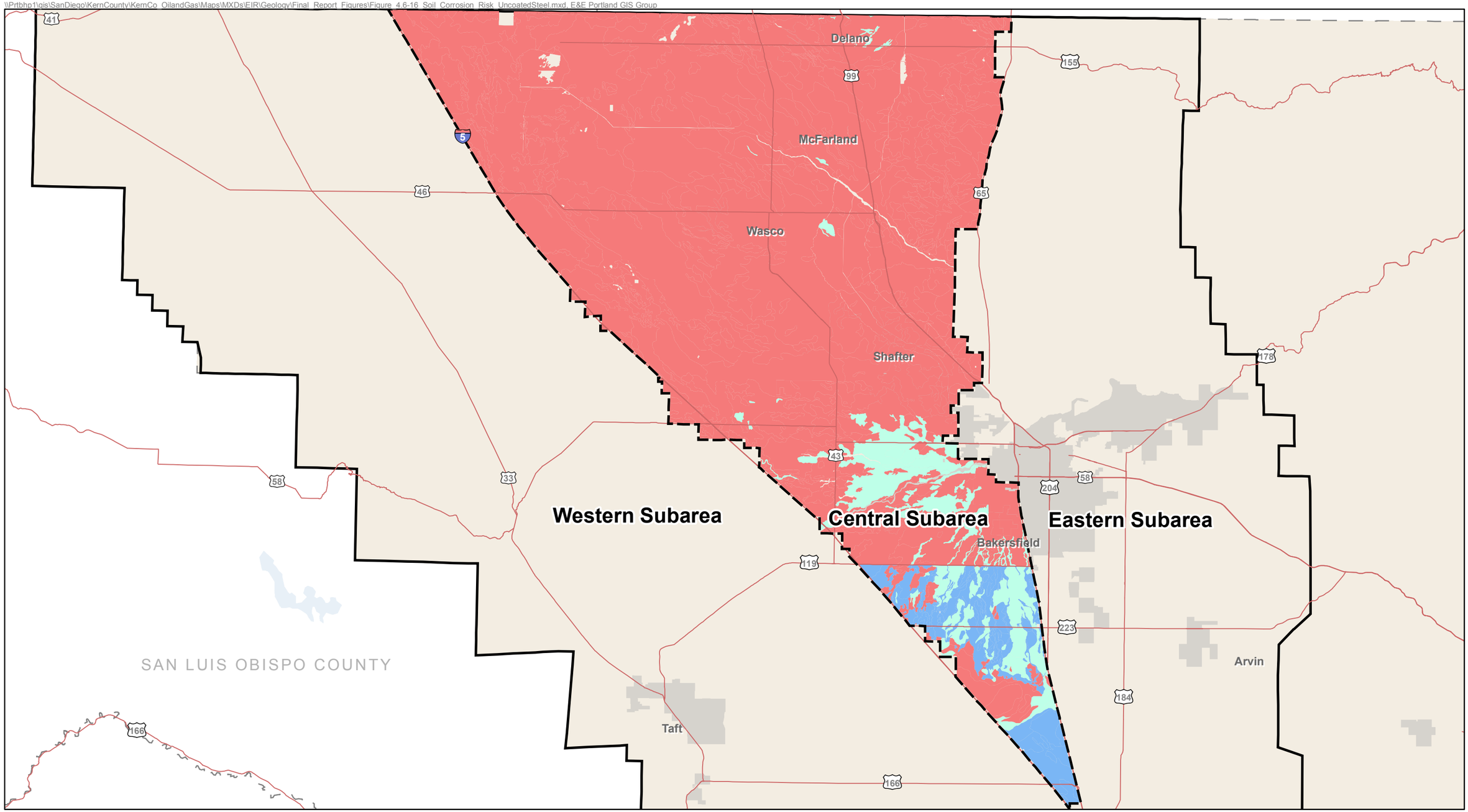
Soil Corrosion Risk (SSURGO)
Uncoated Steel Risk of Corrosion
High
Moderate
Low

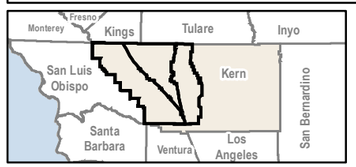
Kern County
City Limits
Highways
County Boundary

Data Sources: Kern County, 2013, ESRI 2010; DOGGR, 2013; NRCS Soils, 2014

**Figure 4.6-16a**
**Soil Corrosion of Uncoated Steel in the Western Subarea**

\\Prtbhp1\gis\SanDiego\KernCounty\KernCo_OilandGas\Maps\MXDs\EIR\Geology\Final_Report_Figures\Figure_4.6-16_Soil_Corrosion_Risk_UncoatedSteel.mxd, E&E Portland GIS Group




0 10
Miles

Project Area
Subarea

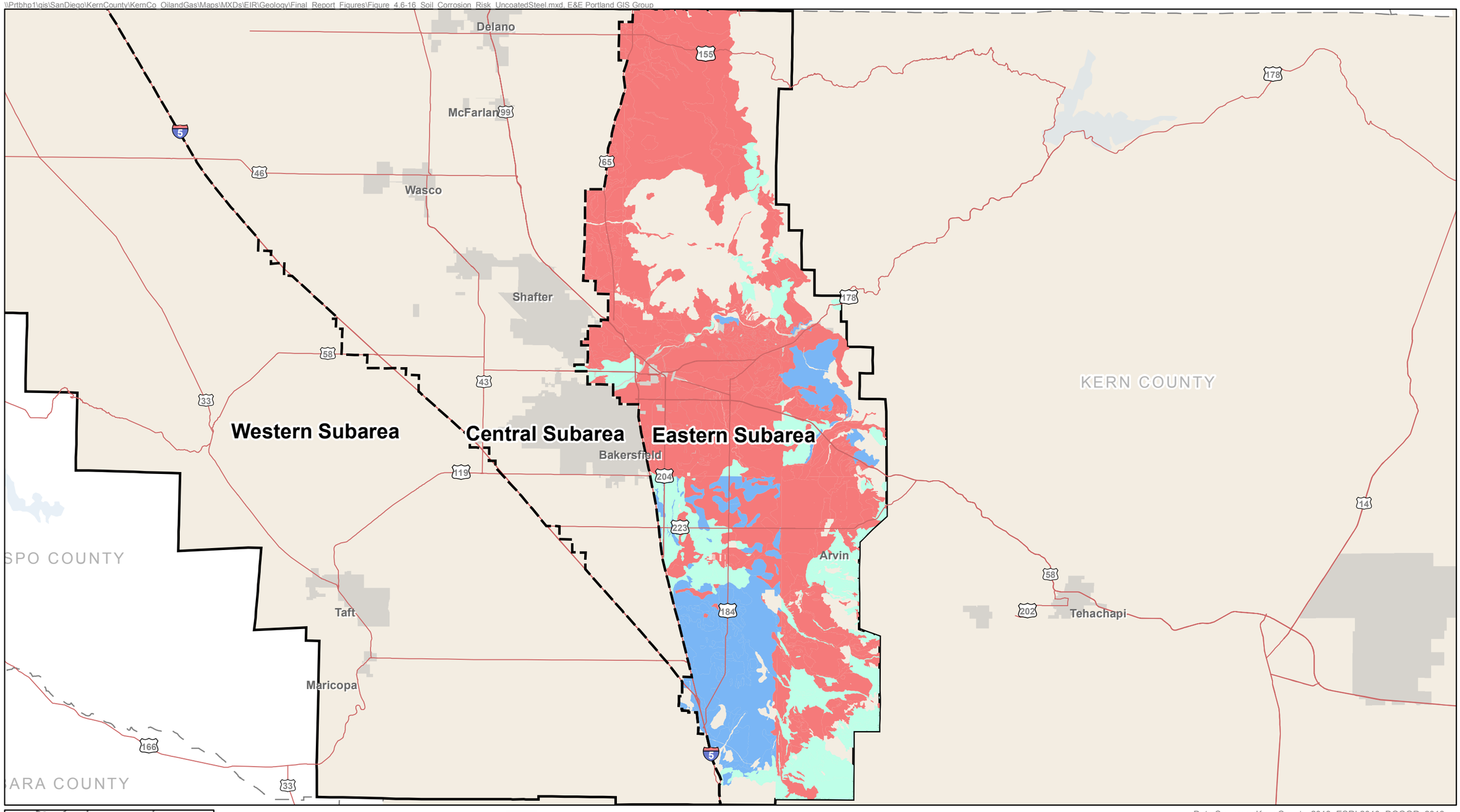
Soil Corrosion Risk (SSURGO)
Uncoated Steel Risk of Corrosion
High
Moderate
Low

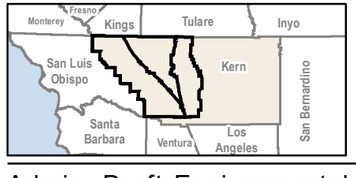
Kern County
City Limits
Highways
County Boundary

Data Sources: Kern County, 2013, ESRI 2010; DOGGR, 2013; NRCS Soils, 2014

**Figure 4.6-16b**
**Soil Corrosion of Uncoated Steel in the Central Subarea**

\\Prtbhp1\gis\SanDiego\KernCounty\KernCo_OilandGas\Maps\MXDs\EIR\Geology\Final_Report_Figures\Figure_4.6-16_Soil_Corrosion_Risk_UncoatedSteel.mxd, E&E Portland GIS Group




0 10
Miles

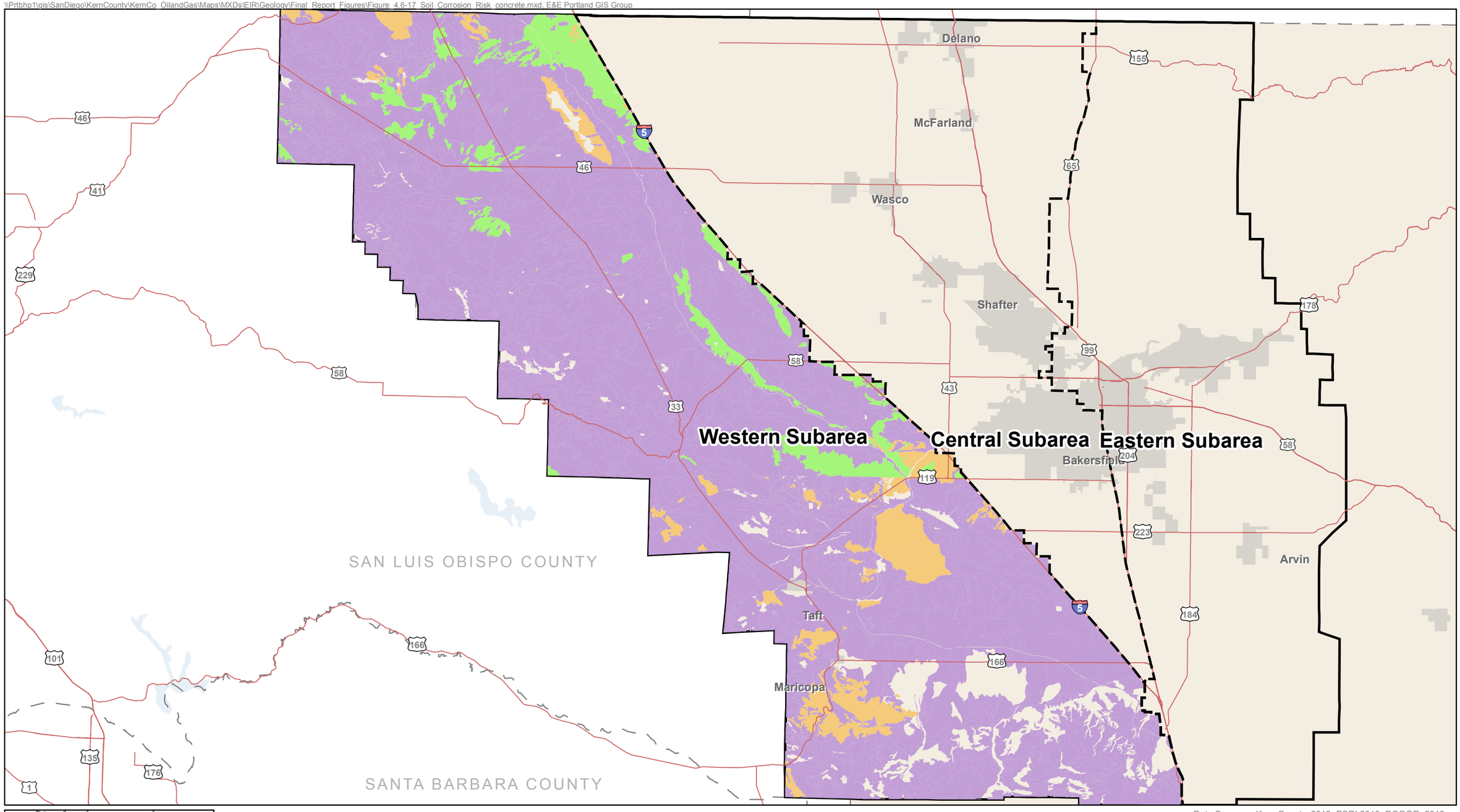
Project Area
Subarea

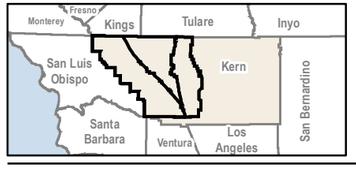
Soil Corrosion Risk (SSURGO)
Uncoated Steel Risk of Corrosion
High
Moderate
Low

Kern County
City Limits
Highways
County Boundary

Data Sources: Kern County, 2013, ESRI 2010; DOGGR, 2013; NRCS Soils, 2014

**Figure 4.6-16c**
**Soil Corrosion of Uncoated Steel in the Eastern Subarea**




0 10
Miles

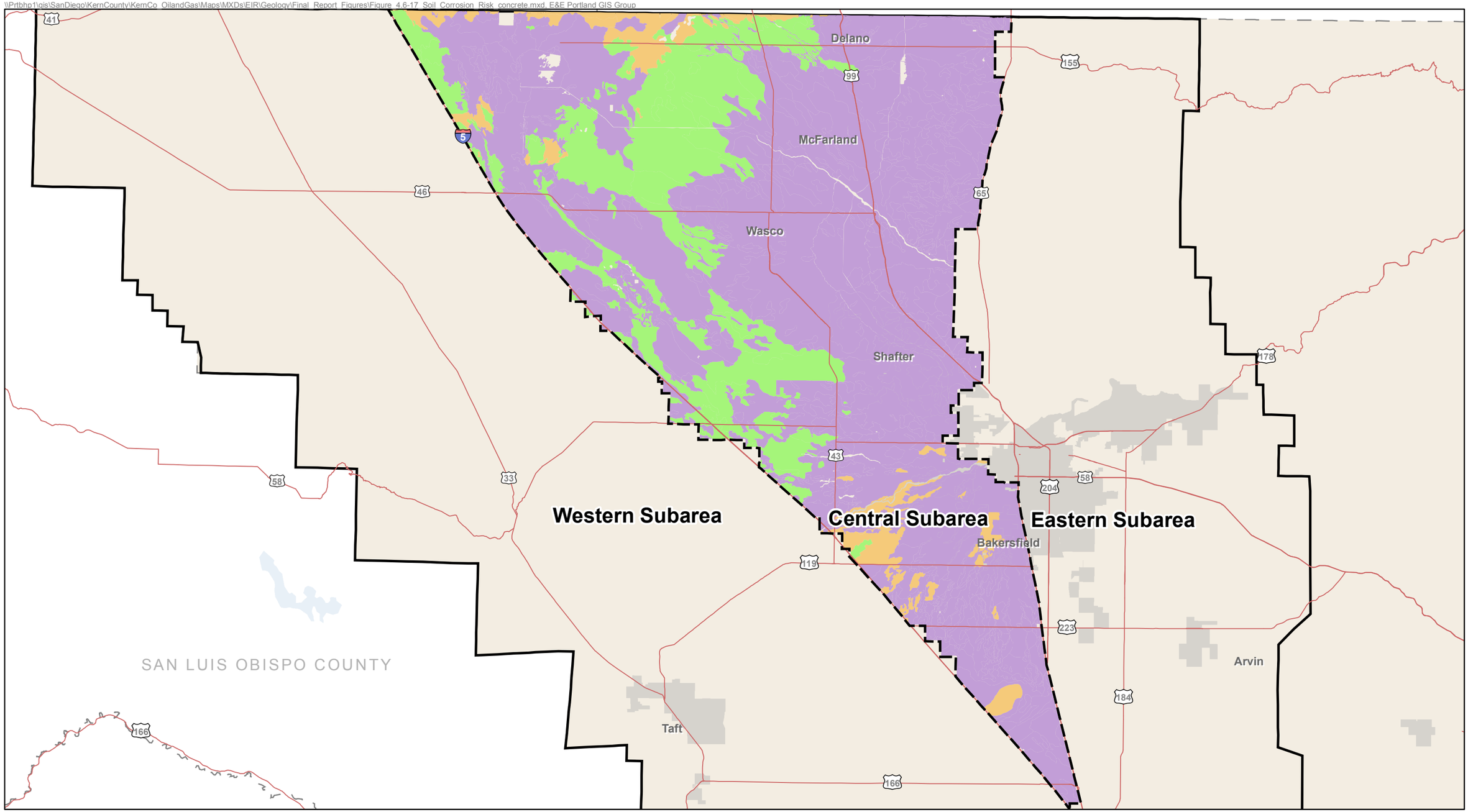
Project Area
Subarea

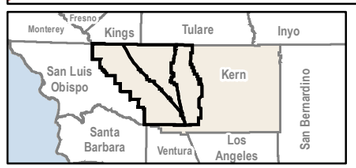
Soil Corrosion Risk (SSURGO) for Concrete
High
Moderate
Low

Kern County
City Limits
Highways
County Boundary

Data Sources: Kern County, 2013, ESRI 2010; DOGGR, 2013; NRCS Soils, 2014

**Figure 4.6-17a**
**Soil Corrosion of Concrete in the Western Subarea**




0 10
Miles

Project Area
Subarea

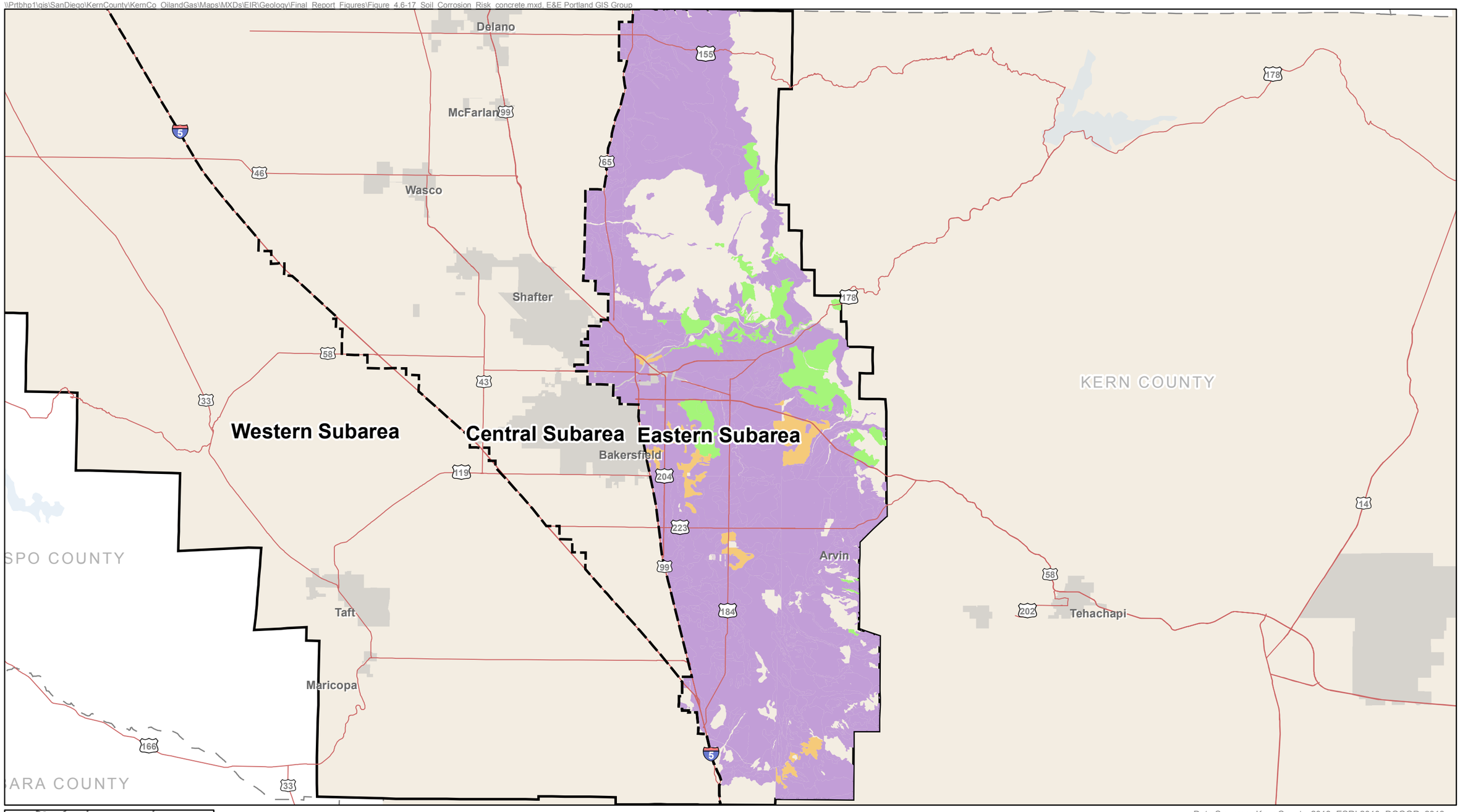
Soil Corrosion Risk (SSURGO) for Concrete
High
Moderate
Low

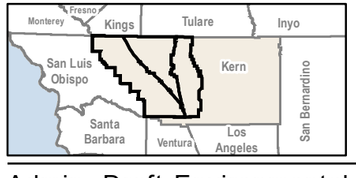
Kern County
City Limits
Highways
County Boundary

Data Sources: Kern County, 2013, ESRI 2010; DOGGR, 2013; NRCS Soils, 2014

**Figure 4.6-17b**
**Soil Corrosion of Concrete in the Central Subarea**

\\Prtbhp1\gis\SanDiego\KernCounty\KernCo_OilandGas\Maps\MXDs\EIR\Geology\Final_Report_Figures\Figure_4.6-17_Soil_Corrosion_Risk_concrete.mxd, E&E Portland GIS Group




0 10
Miles

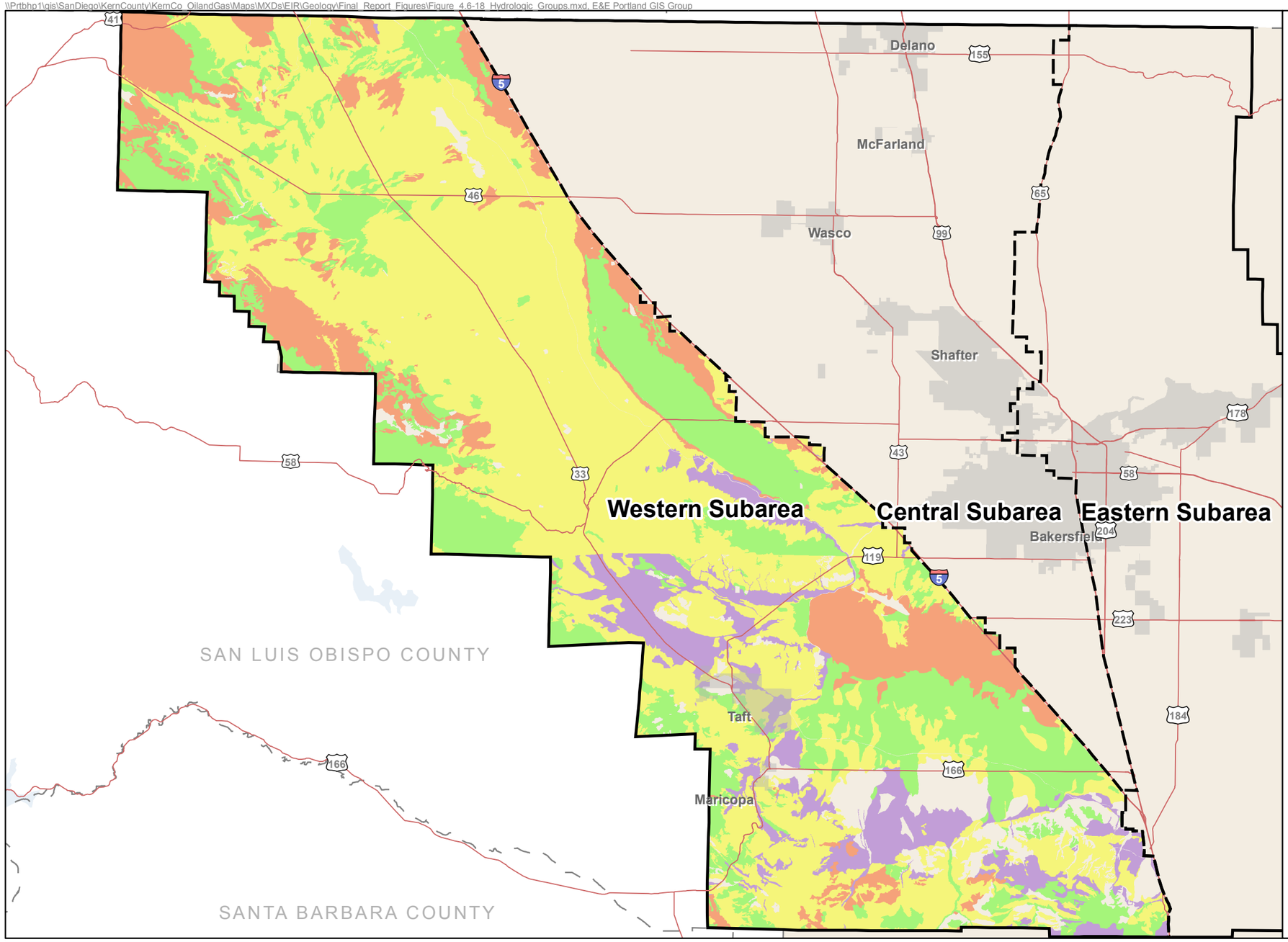
Project Area
Subarea

Soil Corrosion Risk (SSURGO) for Concrete
High
Moderate
Low

Kern County
City Limits
Highways
County Boundary

Data Sources: Kern County, 2013, ESRI 2010; DOGGR, 2013; NRCS Soils, 2014

**Figure 4.6-17c**
**Soil Corrosion of Concrete in the Eastern Subarea**



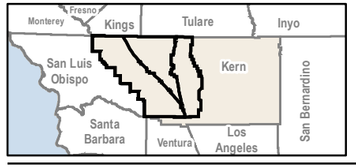

## Hydrologic Groups (SSURGO)

Group A - Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B - Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C - Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture
or fine texture.These soils have a slow rate of

Group D - Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.



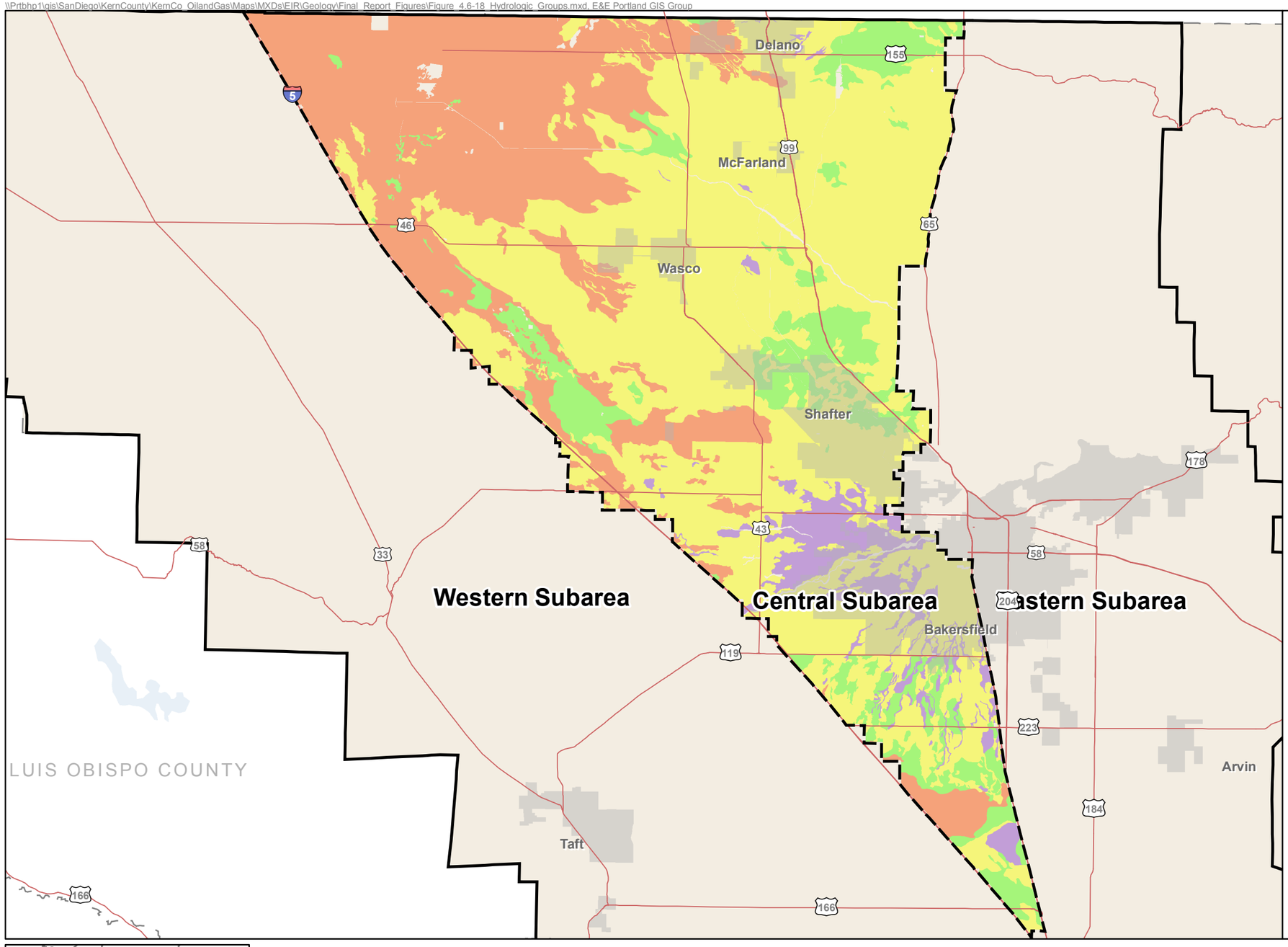

N

0 10
Miles

Project Area
Subarea
Kern County
City Limits
Highways
County Boundary

Data Sources: Kern County, 2013, ESRI 2010; DOGGR, 2013; NRCS Soils, 2014

**Figure 4.6-18a**
**Hydrologic Groups in the Western Subarea**




## Hydrologic Groups (SSURGO)

Group A - Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B - Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

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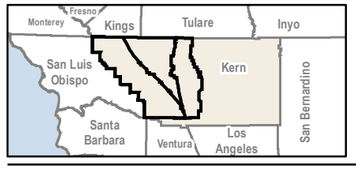
or fine texture.These soils have a slow rate of

Group D - Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.



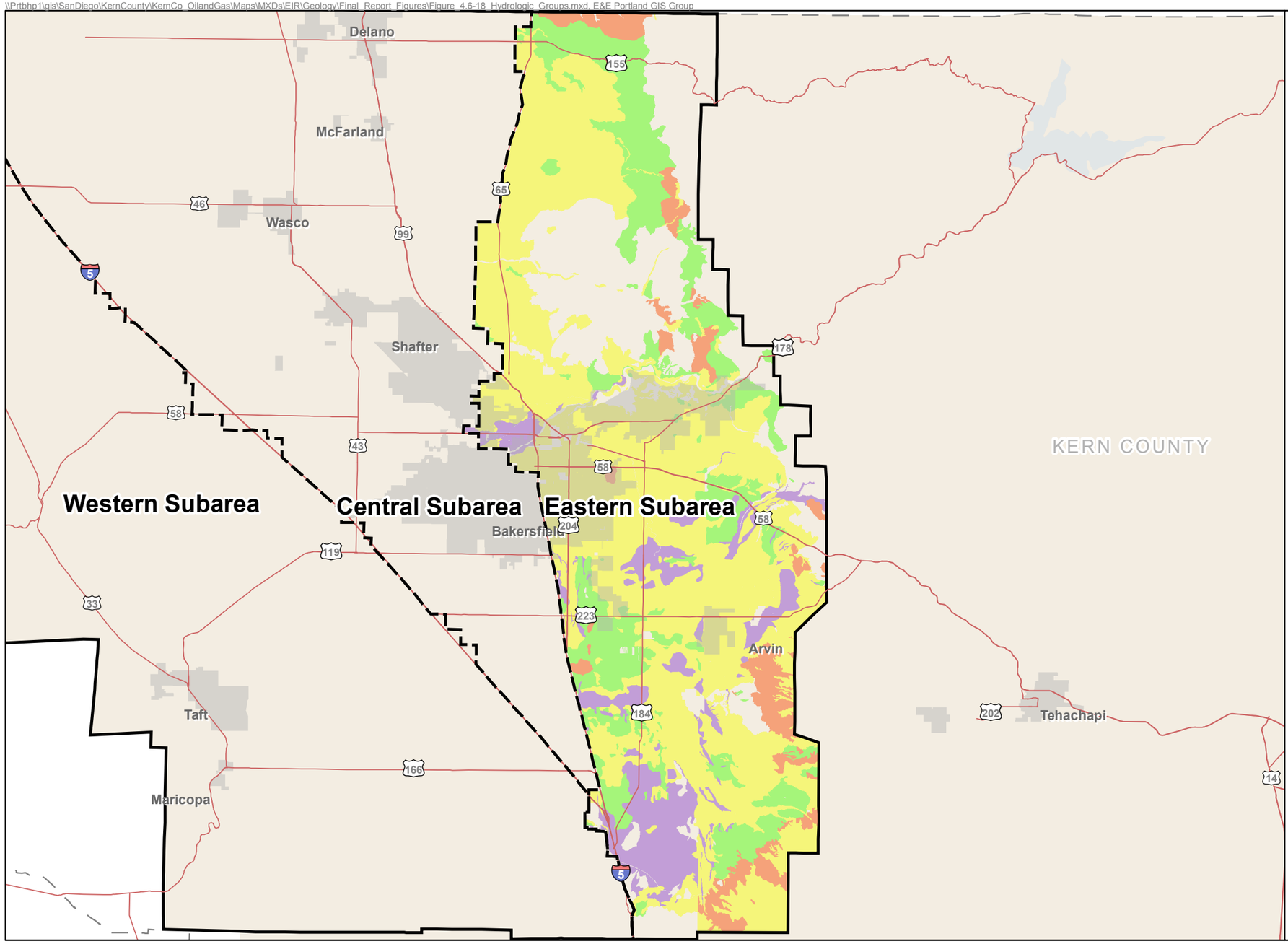




Project Area
Subarea
Kern County
City Limits
Highways
County Boundary

Data Sources: Kern County, 2013, ESRI 2010; DOGGR, 2013; NRCS Soils, 2014

**Figure 4.6-18b**
**Hydrologic Groups in the Central Subarea**



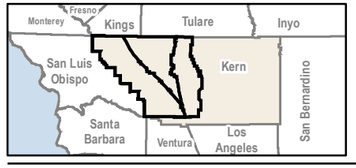

## Hydrologic Groups (SSURGO)

Group A - Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B - Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C - Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture
or fine texture.These soils have a slow rate of

Group D - Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.




0 10
Miles

Project Area
Subarea
Kern County
City Limits
Highways
County Boundary

Data Sources: Kern County, 2013, ESRI 2010; DOGGR, 2013; NRCS Soils, 2014

**Figure 4.6-18c**
**Hydrologic Groups in the Eastern Subarea**

Section 4.7

# Greenhouse Gas Emissions and Global Climate Change

Section 4.7

# Greenhouse Gas Emissions and Global Climate Change

## 4.7.1 Introduction

This section describes the affected environment and regulatory setting for greenhouse gases (GHG) and global climate change. It also describes the GHG and global climate change impacts that would result from implementation of the Amendment to Chapter 19.98 (Oil and Gas Production) of the Kern County Zoning Ordinance (Project) and related amendments, and mitigation measures that would reduce these impacts, if necessary.

## 4.7.2 Environmental Setting

Climate change and global warming are sometimes used interchangeably but the differences are significant. Climate change is a change in the statistical distribution of weather patterns when that change lasts for an extended period of time (i.e., decades to millions of years). Climate change is essentially a phrase to describe any significant change in the measures of climate lasting for an extended period of time, such as major changes in temperature, precipitation, or wind patterns, among other effects, that occur over several decades or longer. Natural climate change is caused by factors such as biotic processes, variations in solar radiation received by Earth, plate tectonics, and volcanic eruptions. In contrast, global warming is a post-industrial age and ongoing trend of consistent rising of global average temperatures that has been determined to be significantly influenced by anthropogenic sources (EPA 2015a).

There is general scientific consensus that climate change is occurring and that human activity contributes in some measure to that change. Man-made emissions of GHGs, if not sufficiently curtailed, are likely to contribute further to continued increases in global temperatures. Increases in global temperatures will cause a reduction in polar ice caps and an increase in sea level, which will result in flooding in low-lying areas of the world. Additionally, climate change will shift rainfall patterns, which will cause significant impacts to agriculture and fresh water availability worldwide.

## Greenhouse Gases

Constituent gases that trap heat in the earth's atmosphere are called GHGs, analogous to the way a greenhouse retains heat. GHGs play a critical role in earth's radiation budget by trapping infrared radiation emitted from the earth's surface, which would otherwise escape into space. Without the natural heat-trapping effect of GHGs, the earth's surface would be about 34°F cooler (CAT 2006). This natural phenomenon, known as the "greenhouse effect," is therefore responsible for maintaining a habitable climate. However, anthropogenic emissions of these GHGs in excess of natural ambient concentrations are responsible for the augmentation of the

"greenhouse effect," and have led to a trend of unnatural warming of the earth's natural climate known as global warming.

The standard definition of GHGs includes six substances identified in the Kyoto Protocol – carbon dioxide ($CO_2$), methane ($CH_4$), nitrous oxide ($N_2O$), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride ($SF_6$) – plus chlorofluorocarbons and other chlorine or bromine-containing gases phased out under the Montreal Protocol. $CO_2$ is undoubtedly the most important GHG, and collectively $CO_2$, $CH_4$, and $N_2O$ amount to 80% of the total radiative forcing from well-mixed GHGs (CARB 2014d).

$CO_2$, $CH_4$, and $N_2O$ concentrations have increased in the atmosphere since pre-industrial times, and this increase is the main driver of climate change. Globally, $CO_2$ increased by 40% from 278 parts per million (ppm) circa 1750 to 390.5 ppm in 2011. During the same time interval, $CH_4$ increased by 150%, from 722 parts per billion (ppb) to 1,803 ppb, and $N_2O$ by 20%, from 271 ppb to 324.2 ppb in 2011. In fact the National Oceanic and Atmospheric Administration (NOAA's) Earth System Research Laboratory indicates the $CO_2$ levels at Mauna Loa averaged over 400 ppm for the first time during the week of May 26, 2013 (NOAA 2015). These concentrations of $CO_2$ exceed by far the natural range over the last 650,000 years (180 to 300 ppm) as determined from ice cores.

Several factors determine how a particular GHG will affect the earth's climate. One factor is the length of time that the gas remains in the atmosphere. A second factor is each gas's unique ability to absorb energy. By considering both of these factors, scientists calculate a gas's global warming potential (GWP), which measures how much a given amount of the GHG is estimated to contribute to global warming over a specific period of time (for example, 100 years) after being emitted. For purposes of comparison, GWP values are calculated in relation to $CO_2$, which is assigned a GWP equal to 1. Table 4.7-1 describes GWPs as presented in the 2007 Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (AR4), which is the version used by the California Air Resources Board (CARB) for the 2000-2012 emission inventory (IPCC 2013). Previous versions of the inventory used GWPs from the 1995 IPCC Second Assessment Report (SAR).

**Table 4.7-1: 100-Year Global Warming Potentials from the Intergovernmental Panel on Climate Change Fourth Assessment Report (AR4)**

| Greenhouse Gas | Atmospheric Lifetime (years) | Global Warming Potential (100-year) |
|---|---|---|
| Carbon dioxide ($CO_2$) | variable (5 to 200) | 1 |
| Methane ($CH_4$) | 12 | 25 |
| Nitrous oxide ($N_2O$) | 114 | 298 |
| Chlorofluorocarbons (CFCs) | (0.7 to 1,700) | (5 to 14,400) |
| Sulfur hexafluoride ($SF_6$) | 3,200 | 22,800 |

**Table 4.7-1: 100-Year Global Warming Potentials from the Intergovernmental Panel on Climate Change Fourth Assessment Report (AR4)**

| Greenhouse Gas | Atmospheric Lifetime (years) | Global Warming Potential (100-year) |
|---|---|---|
| Hydrofluorocarbons (HFCs) | (1 to 270) | (124 to 14,800) |
| Perfluorocarbons (PFCs) | (2,600 to 50,000) | (7,390 to 12,200) |

Source: IPCC 2013

The principal GHGs resulting from human activity that enter and accumulate in the atmosphere are listed below.

- **Carbon Dioxide ($CO_2$) is** a colorless, odorless gas consisting of molecules made up of two oxygen atoms and one carbon atom. $CO_2$ is produced when an organic carbon compound (such as wood) or fossilized organic matter, (such as coal, oil, or natural gas) is burned in the presence of oxygen. $CO_2$ is removed from the atmosphere by $CO_2$ "sinks," such as absorption by seawater and photosynthesis by ocean-dwelling plankton and land plants, including forests and grasslands. However, seawater is also a source of $CO_2$ to the atmosphere, along with land plants, animals, and soils, when $CO_2$ is released during respiration. Whereas the natural production and absorption of $CO_2$ is achieved through the terrestrial biosphere and the ocean, humankind has altered the natural carbon cycle by burning coal, oil, natural gas, and wood. Since the industrial revolution began in the mid-1700s, each of these activities has increased in scale and distribution.

- **Methane ($CH_4$)** is a colorless, odorless nontoxic gas consisting of molecules made up of four hydrogen atoms and one carbon atom. $CH_4$ is combustible, and it is the main constituent of natural gas – a fossil fuel. $CH_4$ is also released when organic matter decomposes in low oxygen environments. Natural sources include wetlands, swamps and marshes, termites, and oceans. Human sources include the mining of fossil fuels and transportation of natural gas, digestive processes in ruminant animals such as cattle, rice paddies, and the buried waste in landfills. Over the last 50 years, human activities, such as growing rice, raising cattle, using natural gas, and mining coal, have added to the atmospheric concentration of $CH_4$. Other anthropogenic sources include fossil-fuel combustion and biomass burning.

- **Nitrous Oxide ($N_2O$)** is a colorless, non-flammable gas with a sweetish odor, commonly known as "laughing gas," and sometimes used as an anesthetic. $N_2O$ is naturally produced in the oceans and in rainforests. Man-made sources of $N_2O$ include the use of fertilizers in agriculture, nylon and nitric acid production, cars with catalytic converters and the burning of organic matter. Concentrations of $N_2O$ also began to rise at the beginning of the industrial revolution.

- **Chlorofluorocarbons (CFCs)** are gases formed synthetically by replacing all hydrogen atoms in $CH_4$ or ethane with chlorine and/or fluorine atoms. CFCs are nontoxic, nonflammable, insoluble, and chemically un-reactive in the troposphere (the level of air at the earth's surface). CFCs have no natural source but were first synthesized in 1928. It was used for refrigerants, aerosol propellants, and cleaning solvents. Because of the discovery that they are able to destroy stratospheric ozone, an ongoing global effort to halt their production was undertaken and has been extremely successful, so much so that levels of the major CFCs are now remaining steady or declining. However, their long atmospheric lifetimes mean that some of the CFCs will remain in the atmosphere for over 100 years.

- **Sulfur Hexafluoride ($SF_6$)** is an extremely potent greenhouse gas. $SF_6$ is very persistent, with an atmospheric lifetime of more than a thousand years. Thus, a relatively small amount of $SF_6$ can have a significant long-term impact on global climate change. $SF_6$ is human-made, and the primary user of $SF_6$ is the electric power industry. Because of its inertness and dielectric properties, it is the industry's preferred gas for electrical insulation, current interruption, and arc quenching (to prevent fires) in the transmission and distribution of electricity. $SF_6$ is used extensively in high-voltage circuit breakers and switchgear, and in the magnesium metal casting industry.

- **Hydrofluorocarbons (HFCs)** are synthesized chemicals that are used as a substitute for CFCs. Out of all of the GHGs; HFCs are one of three groups with the highest GWP. HFCs are synthesized for applications such as automobile air conditioners and refrigerants.

- **Perfluorocarbons (PFCs)** have stable molecular structures and do not break down through the chemical processes in the lower atmosphere. Because of their molecular stability, PFCs have very long lifetimes, between 10,000 and 50,000 years. The two main sources of PFCs are primary aluminum production and semiconductor manufacture.

GHGs, in most cases, have both natural and anthropogenic sources. Natural mechanisms already exist as part of the "carbon cycle" for removing GHGs from the atmosphere (often called land or ocean sinks). Levels of GHGs, due to the increase in anthropogenic sources, have exceeded the normal rates of natural absorption. This has resulted in increased atmospheric concentrations of GHGs and potentially human-induced global warming.

Climate change, by its nature, is a cumulative impact resulting from innumerable GHG sources around the world. For this reason, global solutions are required to truly address the impacts of climate change. The U.S. Environmental Protection Agency (EPA) and CARB regulate GHG emissions nationally and within the state of California, respectively. While CARB has the primary regulatory responsibility within California, local agencies can also adopt policies for GHG emission reduction. The San Joaquin Valley Air Pollution Control District (SJVAPCD) is the responsible local agency for this Project. A description of local policies for GHG reductions is provided in Section 4.7.3, Regulatory Setting.

## GHG Emission Levels

According to the World Resources Institute (WRI), in 2011 total worldwide GHG emissions were estimated to be 43,810 (M) million metric tons (MT) of carbon dioxide equivalent ($CO_2e$) ($MMTCO_2e$) and GHG emissions per capita worldwide was 6.29 $MTCO_2e$ (WRI 2015). These emissions exclude GHG emissions associated with the land use, land-use change, and forestry sector and bunker fuels. The WRI reports that in 2011, total GHG emissions in the United States were 6,550 $MMTCO_2e$, with average GHG emissions per capita of 21.02 $MMTCO_2e$; total GHG emissions in California were 402 $MMTCO_2e$, with average GHG emissions per capita of 9.69 $MMTCO_2e$.

## Statewide GHG Inventories

According to CARB, as of 2012, California's total gross GHG emissions were 458.68 $MMTCO_2e$ (CARB 2014); 85% of the emissions were in the form of $CO_2$. The transportation sector is 37% of that total and industrial sources make up another 22%. Electrical generation sources provide 11% from in-state sources and 10% from imports. The current GHG emissions inventory for the state (2014 edition) covers years 2000 to 2012. The emission estimates are statewide estimates that rely on state, regional or national data sources, and on aggregated facility-specific emission reports. Tables 4.7-2 and 4.7-3 show the GHG emissions inventory by GHG and economic sector for the period 2005-2012.

**Table 4.7-2: Statewide Greenhouse Gas Emissions Inventory**

| Gas | GHG Emissions ($MMTCO_2e$) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **2005** | **2006** | **2007** | **2008** | **2009** | **2010** | **2011** | **2012** |
| $CO_2$ | 425.3 | 421.4 | 426.3 | 422.3 | 393.8 | 386.8 | 383.5 | 388.7 |
| $CH_4$ | 34.7 | 35.7 | 37.3 | 37.9 | 37.7 | 37.3 | 37.5 | 38.1 |
| $N_2O$ | 14.7 | 14.4 | 13.7 | 14.0 | 12.9 | 13.0 | 12.6 | 13.4 |
| $SF_6$ | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 |
| Other | 10.0 | 10.8 | 11.5 | 12.6 | 13.7 | 15.6 | 17.1 | 18.1 |
| **Total GHG** | **485.1** | **482.5** | **489.2** | **487.1** | **458.4** | **453.1** | **450.9** | **458.7** |

Source: CARB 2014d
Note:
GHG emissions are weighted using the IPCC Assessment Report 4 (AR4)
Key:
$CH_4$ = methane
$CO_2$ = carbon dioxide
$CO_2e$ = carbon dioxide equivalent
GHG = greenhouse gas
MT= metric tons
MMT= million metric tons
$N_2O$ = nitrous oxide
$SF_6$ = sulfur hexafluoride

**Table 4.7-3: Statewide Greenhouse Gas Emissions Inventory by Economic Sector**

| Economic Sector | GHG Emissions ($MMTCO_2e$) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **2005** | **2006** | **2007** | **2008** | **2009** | **2010** | **2011** | **2012** |
| Transportation | 192.0 | 192.1 | 192.3 | 181.3 | 174.9 | 174.0 | 171.7 | 171.0 |
| Industrial | 101.5 | 99.7 | 96.7 | 97.5 | 95.2 | 99.3 | 99.7 | 100.7 |
| Electric Power (in-state and imports) | 108.2 | 104.9 | 114.2 | 120.4 | 101.5 | 90.6 | 88.2 | 95.3 |
| Agriculture | 36.5 | 37.8 | 37.0 | 38.0 | 35.8 | 35.7 | 36.3 | 37.9 |
| Residential/ Commercial | 46.8 | 47.9 | 48.7 | 49.7 | 50.8 | 53.2 | 54.8 | 53.6 |
| Unspecified | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| **Total GHG Emissions** | **485.1** | **482.5** | **489.2** | **487.1** | **458.4** | **453.1** | **450.9** | **458.7** |

Source: CARB 2014d
Note:
GHG emissions are weighted using the IPCC Fourth Assessment Report (AR4).
Key:
$CO_2e$ = carbon dioxide equivalent
GHG = greenhouse gas
MT= metric tons
MMT= million metric tons

Table 4.7-4 shows California Oil and Gas Extraction GHG inventory, which accounts for approximately 16.7% of the Year 2012 statewide GHG emissions for the industrial sector. Most of the GHG emissions quantified by the CARB are due to $CO_2$ from combustion, and about 7 to 8% are from sources categorized as fugitive and include process losses, petroleum gas seeps, or venting from storage tanks. The industrial subcategory for oil and gas extraction does not include pipeline transmission or rail/ship transportation of oil and gas to processors, refiners, intermediaries, or customers (DOGGR 2015).

**Table 4.7-4: Statewide Oil and Gas Extraction Greenhouse Gas Emissions**

| Oil and Gas Extraction Subcategory[3] | | | GHG Emissions ($MMTCO_2e$)[1,2] | | | |
|---|---|---|---|---|---|---|
| | | | 2009 | 2010 | 2011 | 2012 |
| Fuel combustion | Natural Gas | $CH_4$ | 0.006 | 0.005 | 0.005 | 0.006 |
| | | $CO_2$ | 12.42 | 11.40 | 11.32 | 11.89 |
| | | $N_2O$ | 0.007 | 0.006 | 0.006 | 0.007 |
| | Associated Gas | $CH_4$ | 0.001 | 0.001 | 0.001 | 0.001 |
| | | $CO_2$ | 3.46 | 3.56 | 3.50 | 3.52 |
| | | $N_2O$ | 0.002 | 0.002 | 0.002 | 0.002 |
| | Distillate | $CH_4$ | 0.00003 | 0.00003 | 0.00007 | 0.00008 |
| | | $CO_2$ | 0.03 | 0.03 | 0.07 | 0.08 |
| | | $N_2O$ | 0.00007 | 0.00006 | 0.00002 | 0.0002 |
| Petroleum Gas Seeps | Fugitives | $CH_4$ | 0.62 | 0.62 | 0.60 | 0.60 |
| Process Losses | Fugitives | $CH_4$ | 0.26 | 0.25 | 0.34 | 0.33 |
| | | $CO_2$ | 0.20 | 0.20 | 0.27 | 0.33 |
| | | $N_2O$ | 0.00003 | 0.00003 | 0.00005 | 0.0001 |
| Storage Tanks | Fugitives | $CH_4$ | 0.11 | 0.11 | 0.10 | 0.10 |
| Wastewater Treatment | Fugitives | $CH_4$ | 0.00002 | 0.00002 | 0.00002 | 0.00002 |
| **Total Oil and Gas GHG Emissions** | | | **17.12** | **16.18** | **16.22** | **16.86** |

Source: DOGGR 2015 based on CARB GHG Inventory 2000-2012 query results.
Notes:
(1) GHG emissions values have been rounded up to the nearest decimal place.
(2) The California GHG inventory uses IPCC Fourth Assessment Report's Global Warming Potentials.
(3) The subcategory includes petroleum gas seeps, although these are a natural source unrelated to extraction.
Key:
$CH_4$ = methane
$CO_2$ = carbon dioxide
$CO_2e$ = carbon dioxide equivalent
GHG = greenhouse gas
MT= metric tons
MMT= million metric tons
$N_2O$ = nitrous oxide

## Kern County GHG Inventory

In 2012, the SJVAPCD prepared a communitywide GHG inventory for all of Kern County (SJVAPCD 2012). Year 2005 was used as the base year; GHG emissions were estimated to be 27 $MMTCO_2e$. The Fossil Fuel Industry sector represented 40% of the 2005 total, followed by the Electricity Consumption sector at 22%. GHG emissions from electricity generation in Kern

County were included in the County-wide GHG emissions, but not added in the totals The County's 2005 GHG emissions, not including subtraction of sequestration sectors, are presented in Table 4-7.5.

**Table 4.7-5: 2005 Kern County Baseline Greenhouse Gas Emissions**

| Category | GHG Emissions ($MMTCO_2e$) | Percent of Total |
|---|---|---|
| Electricity Production | 13,002,127 | (*) |
| Electricity Consumption | 6,039,114 | 22% |
| Residential/Commercial/Industrial Combustion | 1,281,498 | 5% |
| Transportation | 4,569,913 | 17% |
| Fossil Fuels Industry | 10,928,153 | 40% |
| Industrial Processes | 1,852,124 | 7% |
| Waste Management | 120,494 | < 1% |
| Agriculture Fugitives | 2,024,470 | 7% |
| Forestry and Land Use | 11,028 | <1% |
| Other Sources | 218,823 | 1% |
| **Total** | **27,045,617** | |

Source: SJVAPCD 2012
Note:
(*) The Kern County Communitywide GHG emissions inventory Included emissions from electricity production for completeness purposes only, this sector was not included in further descriptions of the County's emissions.
Key:
$CO_2e$ = carbon dioxide equivalent
GHG = greenhouse gas
MMT = million metric tons

## Kern County GHG Emissions from the Oil and Gas Production Sector

GHG emissions resulting from crude oil and natural gas production and processing in Kern County were determined from emission inventories submitted by oil and gas operators to the CARB pursuant to the Mandatory Reporting Regulation (MRR) (see Section 4.7.3, Regulatory Setting). The MRR requires the reporting of GHG emissions resulting from fuel combustion, process vents, sources of fugitive emissions and other source categories associated with crude oil and natural gas extraction and processing, including emissions from portable equipment used for well drilling completions and workover. In addition, the MRR requires the reporting of GHG emissions from refineries suppliers of transportation fuels, suppliers of $CO_2$, and suppliers of natural gas, natural gas liquids, and liquefied natural gas. Table 4.7-6 summarizes the direct and supplier GHG emissions reported from oil and gas facilities subject to MRR in Kern County during year 2012. Facilities and sources that are subject to MRR and are listed in Table 4.7-6 are considered "large" sources.

To account for emissions for smaller sources that are not subject to MRR, an additional 10% of the emissions reported under MRR were added to the total of MRR-reported emissions to calculate the value for total oil and gas production stationary source emissions for Baseline Year 2012. Total baseline emissions include those that are and are not covered under the California Cap-and-Trade Regulation described in Section 4.7.3, Regulatory Setting. Emissions reported by oil and gas producers pursuant to the MRR include only direct and supplier emissions from stationary equipment and operations. GHG emissions from combustion of fuel used in motor vehicles and portable equipment are not included in Table 4.7-6. See Tables 4.7-8 and 4.7-9 (Section 4.7.4, Impact Analysis) for additional information.

## Potential Global Climate Change Effects

This subsection summarizes the global warming trends and changes in the climate system observed over the past century and how global climate change may impact California's natural resources, public health, and infrastructure.

Worldwide, average temperatures are likely to increase by 3°F to 7°F by the end of the 21st century (IPCC 2013). However, a global temperature increase does not directly translate to a uniform increase in temperature in all locations on the earth. Regional climate changes are dependent on multiple variables, such as topography. One region of the earth may experience increased temperature, increased incidents of drought, and similar warming effects, whereas another region may experience a relative cooling.

Even though climate change is a global problem and GHGs are global pollutants, the specific potential effects of climate change on California have been studied. The California Natural Resources Agency summarized the best known science on climate change impacts in seven specific sectors and provided recommendations on how to manage against those threats (CNRA 2009). Generally, research indicates that California should expect overall hotter and drier conditions with a continued reduction in winter snow (with concurrent increases in winter rains), as well as increased average temperatures, and accelerating sea-level rise. In addition to these changes, the intensity of extreme weather events is also changing. The impacts assessment indicates that extreme weather events, such as heat waves, wildfires, droughts, and floods are likely to be some of the earliest climate impacts experienced. It is anticipated that average annual temperatures in California could increase 5°F by 2050 and 9°F by 2100. Precipitation is expected to increase by 35% by 2050 and sea levels are expected to rise by 18 inches by 2050 and by 55 inches by 2100.

**Table 4.7-6: 2012 Kern County Greenhouse Gas Emissions from Oil and Gas Facilities Subject to Mandatory Reporting Regulation [1]**

| CARB ID | Facility Name | Total Emissions ($MTCO_2e$) | Facility Reported GHG Data ($MTCO_2e$) | | | CARB Calculated Emissions Cap-and-Trade Program ($MTCO_2e$) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 2012 Direct Emissions[2] | 2012 Supplier Emissions[3] | 2012 Biogenic Emissions[4] | Direct Covered Emissions | Supplier Covered Emissions | Total Covered Emissions | Total Not Covered Emissions |
| 104019 | Aera Energy Belridge Gas Plant 32 | 223,972 | 37,979 | 185,993 | 0 | 37,403 | 44,656 | 82,059 | 141,913 |
| 104016 | Aera Energy San Joaquin Basin | 3,105,981 | 3,105,981 | 0 | 0 | 3,075,243 | 0 | 3,075,243 | 30,738 |
| 101231 | All American Oil and Gas Company | 135,657 | 135,657 | 0 | 0 | 135,657 | 0 | 135,657 | 0 |
| 101237 | Alon Bakersfield Refinery - Areas 1&2 | 818,334 | 171,039 | 647,295 | 0 | 170,649 | 633,763 | 804,412 | 13,922 |
| 100897 | Badger Creek Limited | 104,744 | 104,744 | 0 | 0 | 104,744 | 0 | 104,744 | 0 |
| 100890 | Bear Mountain Limited | 105,361 | 105,361 | 0 | 0 | 105,361 | 0 | 105,361 | 0 |
| 104094 | Berry Petroleum Company - San Joaquin Basin | 1,235,302 | 1,235,302 | 0 | 0 | 1,235,302 | 0 | 1,235,302 | 0 |
| 101520 | Chalk Cliff Limited | 102,537 | 102,537 | 0 | 0 | 102,537 | 0 | 102,537 | 0 |
| 104195 | Chevron SJVBU Natural Gas Sales | 768,600 | 0 | 768,600 | 0 | 0 | 0 | 0 | 768,600 |
| 100157 | Double C Limited | 6,753 | 6,753 | 0 | 0 | 6,753 | 0 | 6,753 | 0 |
| 104215 | E&B Natural Resources - San Joaquin Valley | 15,830 | 15,830 | 0 | 0 | 0 | 0 | 0 | 15,830 |
| 101699 | ExxonMobil - South Belridge Hill | 54,411 | 54,411 | 0 | 0 | 54,185 | 0 | 54,185 | 226 |
| 104081 | Freeport-McMoRan Oil & Gas LLC-SJV Basin Facility | 881,283 | 881,283 | 0 | 0 | 875,257 | 0 | 875,257 | 6,026 |
| 100189 | High Sierra Limited | 7,570 | 7,570 | 0 | 0 | 7,570 | 0 | 7,570 | 0 |
| 104426 | Holmes Western Oil Corporation | 19,526 | 19,526 | 0 | 0 | 0 | 0 | 0 | 19,526 |
| 104320 | Jaco Oil Company | 745,541 | 0 | 745,541 | 0 | 0 | 695,704 | 695,704 | 49,837 |
| 100202 | Kern Front Limited | 5,737 | 5,737 | 0 | 0 | 5,737 | 0 | 5,737 | 0 |
| 101507 | Kern Oil | 3,026,865 | 145,030 | 2,881,835 | 0 | 145,012 | 2,756,875 | 2,901,886 | 124,978 |

**Table 4.7-6: 2012 Kern County Greenhouse Gas Emissions from Oil and Gas Facilities Subject to Mandatory Reporting Regulation [1]**

| CARB ID | Facility Name | Total Emissions ($MTCO_2e$) | Facility Reported GHG Data ($MTCO_2e$) | | | CARB Calculated Emissions Cap-and-Trade Program ($MTCO_2e$) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 2012 Direct Emissions[2] | 2012 Supplier Emissions[3] | 2012 Biogenic Emissions[4] | Direct Covered Emissions | Supplier Covered Emissions | Total Covered Emissions | Total Not Covered Emissions |
| 101514 | Kern River Cogeneration Company | 837,160 | 837,160 | 0 | 0 | 837,160 | 0 | 837,160 | 0 |
| 100218 | Lake Shore Mojave, LLC | 189,890 | 189,890 | 0 | 0 | 189,890 | 0 | 189,890 | 0 |
| 101044 | Live Oak Limited | 170,493 | 170,493 | 0 | 0 | 170,493 | 0 | 170,493 | 0 |
| 101234 | Macpherson Oil Company | 283,981 | 283,981 | 0 | 0 | 283,981 | 0 | 283,981 | 0 |
| 100296 | McKittrick Limited | 67,511 | 67,511 | 0 | 0 | 67,511 | 0 | 67,511 | 0 |
| 101515 | Mid-Set Cogeneration Company | 192,291 | 192,291 | 0 | 0 | 192,291 | 0 | 192,291 | 0 |
| 100215 | Midway-Sunset Cogeneration | 853,103 | 853,103 | 0 | 0 | 853,103 | 0 | 853,103 | 0 |
| 5019 | Mojave Pipeline Operating Company (MPOC) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 101228 | Mt. Poso Cogeneration Company | 400,269 | 18,490 | 0 | 381,779 | 18,490 | 0 | 18,490 | 381,779 |
| 104097 | Naftex Operating Company | 44,765 | 44,765 | 0 | 0 | 44,765 | 0 | 44,765 | 0 |
| 100891 | Oildale Energy LLC | 164,384 | 164,384 | 0 | 0 | 164,384 | 0 | 164,384 | 0 |
| 104030 | Oxy - Kern 745 | 753,534 | 753,534 | 0 | 0 | 722,803 | 0 | 722,803 | 30,731 |
| 101187 | Oxy - Occidental Of Elk Hills, Inc. | 99,073 | 99,073 | 0 | 0 | 86,943 | 0 | 86,943 | 12,130 |
| 104014 | Oxy - Occidental of Elk Hills, Inc. San Joaquin Valley Basin - Gas Plant | 3,391,560 | 1,940,280 | 1,451,280 | 0 | 1,940,280 | 651,122 | 2,591,402 | 800,159 |
| 100888 | Plains LPG Services/ Lone Star Frac & Isom Facility | 1,288,523 | 74,533 | 1,213,990 | 0 | 74,533 | 1,213,990 | 1,288,523 | 0 |
| 100892 | Rio Bravo Jasmin | 220,454 | 220,454 | 0 | 0 | 220,454 | 0 | 220,454 | 0 |
| 100893 | Rio Bravo Poso | 153,672 | 153,580 | 0 | 92 | 153,580 | 0 | 153,580 | 92 |
| 101239 | San Joaquin Refining Company | 345,144 | 95,349 | 249,796 | 0 | 95,349 | 244,891 | 340,240 | 4,904 |

**Table 4.7-6: 2012 Kern County Greenhouse Gas Emissions from Oil and Gas Facilities Subject to Mandatory Reporting Regulation [1]**

| CARB ID | Facility Name | Total Emissions ($MTCO_2e$) | Facility Reported GHG Data ($MTCO_2e$) | | | CARB Calculated Emissions Cap-and-Trade Program ($MTCO_2e$) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 2012 Direct Emissions[2] | 2012 Supplier Emissions[3] | 2012 Biogenic Emissions[4] | Direct Covered Emissions | Supplier Covered Emissions | Total Covered Emissions | Total Not Covered Emissions |
| 104091 | Seneca San Joaquin Production Facilities | 245,458 | 245,458 | 0 | 0 | 242,272 | 0 | 242,272 | 3,186 |
| 104220 | Southern California Gas Co - Wheeler Ridge Compressor Station | 26,283 | 26,283 | 0 | 0 | 0 | 0 | 0 | 26,283 |
| 100948 | Sunrise Power Company | 828,817 | 828,817 | 0 | 0 | 828,817 | 0 | 828,817 | 0 |
| 100886 | Sycamore Cogeneration Co | 934,133 | 934,133 | 0 | 0 | 934,133 | 0 | 934,133 | 0 |
| 101460 | TRC Cypress Group, LLC | 23,909 | 23,909 | 0 | 0 | 23,909 | 0 | 23,909 | 0 |
| 104005 | Tricor Refining, LLC | 3,239 | 3,239 | 0 | 0 | 0 | 0 | 0 | 3,239 |
| **Total GHG Reported Data Oil and Gas Industry Kern County** | | **22,881,649** | **14,355,448** | **8,144,330** | **381,871** | **14,206,552** | **6,241,000** | **20,447,551** | **2,434,097** |

Source: CARB 2013

Notes:

(1) Several companies report their emissions through MRR for all of their activities in the San Joaquin Valley, and there is no way to identify only those emissions from activities in Kern County. As a result, this Table, as well as Tables 4.7-8 and 4.7-9, are conservative in that they include GHG emissions from oil and gas production in, and to a some extent outside of, Kern County.

(2) Corresponds to direct GHG resulting from the combustion of fossil fuels, chemical and physical processes, vented emissions, geothermal emissions, and $CH_4$ and $N_2O$ emissions (converted to $CO_2e$ using global warming potentials) from non-biogenic fuel combustion.

(3) Corresponds to GHG emissions reported by suppliers of transportation fuels, suppliers of carbon dioxide, and suppliers of natural gas, natural gas liquids, and liquefied natural gas. This field represents the emissions that would result from the complete combustion of all reportable fuels supplied. The column includes both fossil and biogenic emissions.

(4) Corresponds to direct $CO_2$ emissions resulting from combustion of biogenic fuels such as biogas or forest-derived wood.

(5) "Covered emissions" which are computed by CARB, mean all emissions included in a compliance obligation under section 95852 through 95852.2 of the Cap-and-Trade Regulation, regardless of whether the Cap-and-Trade Regulation imposes a compliance obligation for the data year. Covered emissions are equal to the Total $CO_2e$ emissions minus emissions from sources or substances that are not considered covered emissions (such as biofuels). Covered emissions are only displayed for reports subject to the Cap-and-Trade requirements, and a value of "0" (zero) is displayed for reports which do not have covered emissions under the Cap-and-Trade program.

Key:

CARB = California Air Resources Board

$CO_2e$ = carbon dioxide equivalent

MT = metric tons

## 4.7.3 Regulatory Setting

In 1988, the United Nations and the World Meteorological Organization established the IPCC to evaluate the impacts of global warming and to develop strategies that nations could implement to curtail global climate change. In 1992, the United Nations Framework Convention on Climate Change established an agreement with the goal of controlling GHG emissions, including methane. As a result, the Climate Change Action Plan was developed to address the reduction of GHGs in the United States. The plan consists of more than 50 voluntary programs. In October 1993, President Bill Clinton announced his Climate Change Action Plan, which had a goal to return GHG emissions to 1990 levels by the year 2000. This was to be accomplished through 50 initiatives that relied on innovative voluntary partnerships between the private sector and government aimed at producing cost-effective reductions in GHG emissions (CAPCOA 2008).

On March 21, 1994, the United States joined a number of countries around the world in signing the United Nations Framework Convention on Climate Change. Under the Convention (UNFCCC), governments do the following: gather and share information on GHG emissions, national policies, and best practices; launch national strategies for addressing GHG emissions and adapting to expected impacts, including the provision of financial and technological support to developing countries; and cooperate in preparing for adaptation to the impacts of climate change (UNFCCC 2014b).

A particularly notable result of the UNFCCC efforts was a treaty known as the Kyoto Protocol, which was negotiated in December 1997. The agreement came into force on February 16, 2005, following ratification by Russia on November 18, 2004. When countries sign the treaty, they demonstrate their commitment to reduce their emissions of GHGs or engage in emissions trading. As of July 2012, a total of 195 countries and other governmental entities have ratified the agreement (UNFCCC 2014a). Notable exceptions include Australia and the United States. Although United States Vice President Al Gore symbolically signed the Protocol in 1998, in order for the Protocol to be formally ratified, it must be ratified by the United States Congress and this has not occurred to date. Other countries, like India and China, which have ratified the Protocol, are not required to reduce carbon emissions under the present agreement despite their relatively large populations.

On September 27, 2006, Assembly Bill (AB) 32, the California Global Warming Solutions Act, of 2006 was enacted by the State of California. The legislature stated that "global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California" (AB 32). The Act caps California's GHG emissions at 1990 levels by 2020. The Act defines GHG emissions as all of the following gases: $CO_2$, $CH_4$, $N_2O$, HFCs, PFCs and $SF_6$. AB 32 establishes the first economy-wide GHG regulatory program in the United States. While acknowledging that national and international actions will be necessary to fully address the issue of global warming, AB 32 lays out a program to inventory and reduce GHG emissions in California and from power generation facilities located outside the state that serve California residents and businesses (CAPCOA 2008).

AB 32 charges the CARB with responsibility to monitor and regulate sources of GHG emissions in order to reduce those emissions. CARB staff recommended an amount of 427 million metric tons of carbon dioxide equivalent ($MMTCO_2e$) as the total statewide GHG 1990 emissions level and 2020 emissions limit. The CARB approved the 2020 limit on December 6, 2007. This limit is an aggregate statewide limit, rather than sector- or facility-specific. On October 20, 2011, CARB approved a Cap-and-Trade Program as part of AB 32, with compliance obligations that became effective in 2013. For compliance years 2013 and 2014, an initial cap was implemented for the electrical sector and large industrial sources that emit more than 25,000 metric tons of $CO_2e$ emissions per year. Transportation fuels and natural gas usage were added to the Cap-and-Trade Program beginning in 2015, and the cap was adjusted to account for the inclusion of these new emission sources. Over time, the cap will be reduced by about 3% per year.

# Federal

## U.S. Environmental Protection Agency

On April 2, 2007, in Massachusetts v. EPA, 549 U.S. 497 (2007), the Supreme Court found that GHGs are air pollutants covered by the Clean Air Act (CAA). The Court held that the EPA must determine whether emissions of GHGs from new motor vehicles cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare. On April 17, 2009, the Administrator signed proposed endangerment and cause or contribute findings for GHGs under Section 202(a) of the CAA. The EPA found that six GHGs in combination endanger both the public health and the public welfare of current and future generations. The EPA also found that the combined emissions of these GHGs from new motor vehicles and new motor vehicle engines contribute to the GHG pollution that endangers public health and welfare under CAA section 202(a). These findings became effective on January 14, 2010.

Specific GHG regulations that the EPA has adopted to date are provided below.

**40 Code of Federal Regulations (CFR) Part 98. Mandatory Reporting of Greenhouse Gases Rule.** This rule requires mandatory reporting of GHG emissions for facilities that emit more than 25,000 $MTCO_2e$ emissions per year. $CO_2e$ is a quantity that describes, for a given mixture and amount of GHG, the amount of $CO_2$ that would have the same GWP, when measured over a specified timescale (generally, 100 years). It is also a measure for comparing $CO_2$ with other GHGs (which generally have a higher GWP), based on the amount of those other gases multiplied by the appropriate GWP factor, commonly expressed as $MTCO_2e$. $CO_2e$ is calculated by multiplying the metric tons of gas by the appropriate GWP. Additionally, reporting of emissions is required for owners of $SF_6$- and PFC-insulted equipment when the total nameplate capacity of these insulating gases is above 17,280 pounds. The Project would not be expected to trigger GHG reporting according to the rule; however, GHG emissions of the Project are quantified in this Environmental Impact Report (EIR).

**40 CFR Part 52. Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule.** The EPA mandated application of the Prevention of Significant Deterioration

(PSD) requirements to facilities whose stationary source $CO_2e$ emissions exceed 75,000 tons per year.

**National Climate Action Plan.** In June 2013, the President enacted a national Climate Action Plan (Plan) that consisted of a wide variety of executive actions and had three pillars discussed below (EOP 2013).

- **Cut Carbon in America** – The Plan consists of actions to help cut carbon by deploying clean energy such as cutting carbon from power plants, promoting renewable energy, and unlocking long-term investment in clean energy innovation.

- **Prepare the United States for Impacts of Climate Change** – The Plan consists of actions to help prepare for the impacts through building stronger and safer communities and infrastructure by supporting climate resilient investments, supporting communities and tribal areas as they prepare for impacts, and boosting resilience of building and infrastructure; protecting the economy and natural resources by identifying vulnerabilities, promoting insurance leadership, conserving land and water resources, managing drought, reducing wildfire risks, and preparing for future floods; and using sound science to manage climate impacts.

- **Lead International Efforts** – The Plan consists of actions to help the United States lead international efforts through working with other countries to take action by enhancing multilateral engagements with major economies, expanding bilateral cooperation with major emerging economies, combating short-lived climate pollutants, reducing deforestation and degradation, expanding clean energy use and cutting energy waste, global free trade in environmental goods and services, and phasing out subsidies that encourage wasteful use of fossil fuels and by leading efforts to address climate change through international negotiations.

In June of 2014, the Center for Climate and Energy Solutions (C2ES) published a one-year review of progress in implementation of the Plan (C2ES 2014). The C2ES found that the administration had made marked progress in its initial implementation. Notable areas of progress included steps to limit carbon pollution from power plants; improve energy efficiency; reduce $CH_4$ and HFC emissions; help communities and industry become more resilient to climate change impacts; and end U.S. lending for coal-fired power plants overseas.

## Greenhouse Gas Endangerment Findings

As of January 14, 2010, the EPA's finding that six GHGs, taken in combination, endanger the public health and the public welfare of current and future generations became effective. The EPA also found that the combined emissions of these GHGs from new motor vehicles and new motor vehicle engines contribute to the GHG pollution that endangers public health and welfare under CAA Section 202(a). Subsequently, federal agencies have adopted specific GHG-related regulations and initiatives, including:

## Transportation/Mobile Sources

**EPA and National Highway Traffic Safety Administration Standards to Cut Greenhouse Gas Emissions and Fuel Use for New Motor Vehicles:** coordinated steps to enable the production of a new generation of clean vehicles.

**Renewable Fuel Standard Program:** transportation fuel sold in the United States is required to contain a minimum volume of renewable fuel.

## Stationary Sources

**Carbon Pollution Standards for Power Plants:** In September 2013, the EPA proposed a rule to reduce carbon emissions from new power plants. On June 2, 2014, the EPA issued a proposal to cut carbon pollution from existing power plants (the "Clean Power Plan"). EPA's May 2015 "Unified Agenda" indicates that both of these rules are expected to be issued in August, 2015.

**Final Greenhouse Gas Tailoring Rule:** On May 13, 2010, the EPA set GHG emissions thresholds to define when permits under the New Source Review PSD and Title V Operating Permit programs are required for new and existing industrial facilities. This final rule "tailors" the requirements of these CAA permitting programs to limit covered facilities to the nation's largest GHG emitters: power plants, refineries, and cement production facilities.

**Timing of Applicability of the PSD Permitting Program to GHGs:** On March 29, 2010, the EPA completed its reconsideration of the December 18, 2008, memorandum entitled "EPA's Interpretation of Regulations that Determine Pollutants Covered by Federal Prevention of Significant Deterioration (PSD) Permit Program" (the so-called "Johnson memo"). The final action confirmed that GHGs become covered under the PSD program on January 2, 2011, when the cars rule took effect.

In June 2014, the U.S. Supreme Court ruled that the EPA cannot classify facilities as major PSD or Title V sources based solely on its GHG emissions meeting the major source threshold. However, the Supreme Court said that the EPA could continue to require that PSD permits, required due to criteria pollutant emissions, contain Best Available Control Techniques (BACT) limits for GHG emissions. This ruling struck down Step 2 of the Tailoring Rule but kept in effect Step 1 (EPA 2014a).

## Emissions Reporting

**GHG Reporting Program:** This program collects reported GHG emissions from facilities that emit more than 25,000 $MTCO_2e$ emissions per year. Additionally, reporting of emissions is required for owners of $SF_6$- and PFC-insulated equipment when the total nameplate capacity of these insulating gases is above 17,280 pounds. The Petroleum and Natural Gas Systems source category consists of onshore production; offshore production; natural gas processing; natural gas transmission; underground natural gas storage; natural gas distribution; liquefied natural gas import and export terminals; and liquefied natural gas storage equipment.

**Notification Requirements for Gas Well Completions (40 CFR Parts 60 and 63):** Air pollution standards established by the EPA under the New Source Performance Standard, Final Rule August 16, 2012, for oil and gas production require companies to provide notifications of natural gas well completions. The EPA expects to use the notifications required by the 2012 standards and ongoing technical studies through 2014 to make a foundation for determining how best to require additional control of methane and other air pollutants from the oil and gas sector, including completions and associated gas from ongoing production and hydraulically fractured oil wells (EPA 2015b).

## Other Related Actions

**Oil and Natural Gas Air Pollution Standards:** The final action includes the review of four rules for the oil and natural gas industry: a new source performance standard for volatile organic compounds (VOCs); a new source performance standard for sulfur dioxide; an air toxics standard for oil and natural gas production; and an air toxics standard for natural gas transmission and storage. Although this rule is intended for control of hazardous air pollutants, emissions of $CH_4$ would be reduced from the implementation of control measures, such as reduced emission completions (RECs), or the use of completion combustion devices to control flowback emissions (New Source Performance Standards [NSPS] 40 CFR 60, Subpart OOOO, Section 60.5375). Because this regulation addresses natural gas completions, the EPA is separately researching techniques available to reduce emissions from oil well completions (EPA 2015c).

White papers released by the EPA on April 2014 outline potential emission reduction techniques for $CH_4$ during completions of hydraulic fractured or refractured oil wells. Hydraulically fractured oil wells also may produce natural gas along with oil, which is often vented during production (EPA 2014b). Combustion control or flaring for control of associated gas emissions has been demonstrated as effective in the oil and gas industry. However, flaring results in the destruction of $CH_4$, which may be recoverable for alternate use.

**EPA Natural Gas STAR Program:** This voluntary program encourages oil and natural gas companies to adopt cost-effective technologies and practices to improve operational efficiency and prevent emissions from methane. The Natural Gas STAR program defines protocols for methane control at natural gas production facilities (EPA 2015d).

As of January 14, 2015, the EPA announced an additional strategy for a series of steps it plans to take to address $CH_4$ and smog-forming VOC emissions from the oil and gas industry (EPA 2015d). The steps include building on commonsense standards for $CH_4$ and VOC emissions to help avoid anticipated increase in methane emissions from new sources; reducing additional pollution in areas with ozone problems by issuing Control Techniques Guidelines that provide an analysis of the available, cost-effective technologies for controlling VOC emissions from covered oil and gas sources; and providing additional support for industry actions to reduce methane emissions including several voluntary efforts to address these sources that already are underway Voluntary efforts include EPA's plans to expand the successful Natural Gas STAR Program by launching a new partnership in collaboration with key stakeholders later in 2015 (EPA 2015d).

# State

A variety of statewide rules and regulations have been implemented or are in development in California that mandate the quantification or reduction of GHGs. Several gubernatorial Executive Orders (EOs) establish statewide GHG reduction goals. As a result of Senate Bill 97, the California Environmental Quality Act (CEQA) requires an analysis and mitigation of emissions of GHGs and climate change in relation to a proposed Project, where a project will result in a significant increase of GHG emissions. Certain Air Pollution Control Districts have proposed their own levels of significance. See the discussion of SJVAPCD significance thresholds on page 4.7-23 and on Section 4.7.4, Impact Analysis.

## Executive Order S-3-05 – Statewide Emission Reduction Targets

EO S-3-05 was established by Governor Arnold Schwarzenegger in June 2005. EO S-3-05 establishes statewide emission reduction targets through the year 2050:

- by 2010, reduce GHG emissions to 2000 levels;
- by 2020, reduce GHG emissions to 1990 levels; and
- by 2050, reduce GHG emissions to 80% below 1990 levels.

## Executive Order Executive Order B-30-15 – 2030 Statewide Emission Reduction Target

EO B-30-15 was signed by Governor Jerry Brown Jr. on April 29, 2015. This EO establishes an interim statewide GHG reduction target of 40% below 1990 levels by 2030, which is necessary to guide regulatory policy and investments in California in the midterm, and put California on the most cost-effective path for long-term emission reductions. Under this EO, all state agencies with jurisdiction over sources of greenhouse gas emissions will need to continue to develop and implement emissions reduction programs to reach the state's 2050 target and attain a level of emissions necessary to avoid dangerous climate change. According to the Governor's Office, this EO is in line with the scientifically established levels needed in the United States to limit global warming below 2°C - the warming threshold at which scientists say there will likely be major climate disruptions such as super droughts and rising sea levels (Office of Governor 2015).

## Assembly Bill 1493 – Pavley

In 2002, California legislature adopted regulations to reduce GHG emissions in the transportation sector, the state's largest source of GHG emissions. In September 2004, pursuant to AB 1493, the CARB approved regulations to reduce GHG emissions from new motor vehicles beginning with the 2009 model year. In September 2009, CARB adopted amendments to the Pavley regulations to reduce GHG from 2009 to 2016. CARB, EPA, and the U.S. Department of Transportation's National Highway Traffic and Safety Administration (NHTSA) have coordinated efforts to develop fuel economy and GHG standards for model 2017-2025 vehicles. The GHG standards are incorporated into the "Low Emission Vehicle" (LEV) Regulations.

## California Governor's Executive Order B-16-2012

EO B-16-2012 (March 2012) specifically focuses on reducing emissions from California's vehicle fleet and directs that California achieve a 2050 target for GHG emission reductions from the transportation sector equaling 80% less than 1990 levels. This would be accomplished by achieving benchmarks by 2020 and 2025 for advancements of zero-emission vehicle (ZEV) infrastructure and technology advancement.

## Assembly Bill 32

AB 32, also known as the California Global Warming Solutions Act of 2006, was established to mandate the quantification and reduction of GHGs to 1990 levels by the year 2020. The law establishes periodic targets for reductions, and requires certain facilities to report emissions of GHGs annually. The legislation authorizes CARB to reduce emissions from certain sectors that contribute the most to statewide emissions of GHGs.

## Assembly Bill 32 Scoping Plan

The AB 32 Scoping Plan identifies the strategies for achieving the maximum technologically feasible and cost-effective GHG reductions by 2020, and to maintain and continue reductions beyond 2020. The scoping plan includes a range of GHG emission reduction actions, which include direct regulations, alternative compliance mechanisms, monetary and non-monetary incentives, voluntary actions, market-based mechanisms such as a Cap-and-Trade system, and an AB 32 cost of implementation fee regulation to fund the program. The initial scoping plan was approved at the CARB Board hearing on December 12, 2008. CARB approved the First Update to the Scoping Plan in May 2014.

## Assembly Bill 32 Scoping Plan Control Strategies for Oil and Gas

The Scoping Plan's GHG control measures specific to oil and gas sources include the following applicable for the Project:

**Scoping Plan Measure I-2: Oil and Gas Extraction GHG Emission Reduction.** The 2008 AB 32 Scoping Plan identified a potential reduction of 0.2 $MMTCO_2e$ from this measure, which involves the potential use of controls for fugitive GHG sources that range from applying simple fixes to existing technologies, to deploying new technologies, to replace inefficient equipment and detect leaks. CARB has started a rulemaking process to implement this measure, with the final rule expected to be adopted by September 2015. The rule is expected to specify improvements at new and existing wells, including those undergoing well stimulation treatments (CARB 2014c).

**Scoping Plan Measure I-3: GHG Leak Reduction from Oil and Gas Transmission.** The 2008 AB 32 Scoping Plan identified a potential reduction of 0.9 $MMTCO_2e$ from this measure. This measure is also under review by the CARB, but expected to improve operating practices to reduce emissions when compressors along the pipeline are taken offline, installing compressor rod packing systems, and replacing and replacing older equipment along pipelines.

## Mandatory Greenhouse Gas Emissions Reporting (17 CCR 95100-95158)

Reporting of greenhouse gases by major sources is required by AB 32. A newly revised MRR was approved and became effective January 1, 2015. The MRR is applicable to industrial facilities, fuel suppliers, and electricity importers. Sources related to Petroleum and Natural Gas Systems are subject to mandatory reporting if combustion or process emissions for the facility exceed 10,000 $MTCO_2e$ per calendar year or if stationary combustion, process, fugitive, and vented emissions equal or exceed 25,000 $MTCO_2e$ per year (Section 95151). Certain well stimulation treatments at gas wells are included in Section 95153(f) of this regulation, although oil wells are not specifically addressed for well completions. Moreover, Section 95153 (j) includes methodologies for estimating GHG from well testing and flaring, and clarifies that reporting procedures apply to both oil and gas wells.

All GHG emissions data reports must comply with the regulatory requirements and be submitted via the California Electronic Greenhouse Gas Reporting Tool (Cal e-GGRT) reporting system.

## Cap-and-Trade Program (17 CCR 95800 to 96022)

On October 20, 2011, CARB approved the California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms Regulation (Cap-and-Trade Program) as part of the AB 32 implementation measures.

Cap-and-trade is a market based regulation that is designed to reduce GHGs from multiple sources, including operators of Petroleum and Natural Gas Systems facilities (Section 95852(h)). It is viewed as an environmentally effective and economically efficient response to climate change. Cap-and-trade sets a firm limit, or cap on GHG emissions from all sources in the Cap-and-Trade Program, and minimizes the compliance costs of achieving AB 32 goals. The initial cap was established in 2013 for the electrical sector and any large industrial source emitting more than 25,000 $MTCO_2e$ per year. Oil and gas production activities are considered to be industrial activities and production facilities are included in the Cap-and-Trade Program when their emissions exceed the 25,000 metric ton threshold. Beginning in 2015, the cap was expanded to include GHG emissions from the combustion of transportation fuels and natural gas. The cap declines approximately 3% each year. In the market, a price on carbon is established for GHGs. Trading and market forces create incentives to reduce GHGs below allowable levels through investments in technological innovation in clean technologies. California has linked its Cap-and-Trade Program with a similar program adopted by Quebec in order to help deliver cost-effective emission reductions.

## Senate Bill 605 - Short-Lived Climate Pollutants (SLCP)

Short-lived climate pollutants (i.e., black carbon, fluorinated gases, and methane) are powerful climate forcers that remain in the atmosphere for a much shorter period of time than longer-lived climate pollutants. Their relative potency, when measured in terms of how they heat the atmosphere, can be tens, hundreds, or even thousands of times greater than that of $CO_2$. The impacts of short-lived climate pollutants are especially strong over the short term. Reducing these emissions can make an immediate beneficial impact on climate change (CARB 2014a). Governor

Brown signed SB 605 on September 21, 2014, directing ARB to develop a Short-Lived Climate Pollutant Strategy by January 1, 2016. On May 7, 2015, CARB released a concept paper for reducing emissions of these substances.

## Senate Bill 4

On September 30, 2013, Governor Brown signed into law Senate Bill 4 (SB 4). It provides for Well Stimulation Treatment Regulations to be finalized and implemented no later than January 1, 2015. By March, 1, 2015, owner/operators were required to submit a completed well history that includes required information. By July 1, 2015, the California Department of Conservation Division of Oil, Gas, and Geothermal Resources (DOGGR) shall certify an EIR is certified and that all related activities fully conform on or before December 31, 2015.

However, effective January 1, 2014, an interim set of regulations require oil and gas operators to submit to DOGGR notification of well stimulation treatments and chemical disclosure of well stimulation fluids. All information submitted will be made available to the public (DOGGR 2015). In June 2014, SB 4 was amended in order to allow the interim rules to remain in effect until July 1, 2015.

Section 3160 (a) of SB 4 required the California Natural Resources Agency (CNRA) to conduct and complete an independent scientific study on well stimulation treatments in California, which includes consideration to the potential GHG emissions associated with well stimulation treatments. Pursuant to SB 4, the CNRA commissioned the California Council on Science and Technology (CCST) and Lawrence Berkeley National Laboratory (LBNL) to conduct this independent scientific assessment of well stimulation. The full independent scientific assessment will be issued in three volumes. On January 14, 2015, CCST released Volume I of the assessment to the public. Volumes II and III will be released in July 2015. Volume II will assess the potential impacts of well stimulation treatments with respect to water, air quality, and GHG emissions, as well as induced seismicity, ecology, traffic, and noise (DOC 2015a).

## Other Mobile Source Reduction Requirements

Several other State provisions address the GHG emissions reduction targets set by CARB for mobile sources, including trucks, passenger vehicles, trains, and ships. These measures include:

- Low Carbon Fuel Standard (EO S-01-07)
- Advanced Clean Cars Program
- SmartWay Truck Efficiency Regulation
- AB 32 Cap-and-Trade Program as applicable to transportation fuel suppliers (beginning January 1, 2015)
- SB 375 (Land Use Planning) including the development of a Sustainable Communities Strategy as part of a Metropolitan Planning Organization's Regional Transportation Plan.

In particular, SB 375 requires the Air Resources Board to set regional targets for GHG emission reductions from passenger vehicles and light duty trucks, and requires each regional Metropolitan Planning Organization (MPOs) to adopt a Sustainable Communities Strategy (SCS) into its regional transportation plan that would allow the region to meet its GHG emission reduction target. The Kern County Council of Governments adopted the SCS for Kern County as part of its Regional Transportation Plan (RTP) in 2014. The RTP and SCS incorporate forecasted development patterns, modeling and measures designed to integrate land use and transportation planning to reduce local and regional GHG emissions. Oil and gas resources, as well as other land uses, are components of the SCS. While SB 375 does not require local governments to amend their General Plans to implement the SCS, it provides incentives for them to do so. Implementation of SB 375 is expected to substantially reduce GHG emissions in the County and throughout the state.

# Local

## San Joaquin Valley Air Pollution Control District

In August 2008, the SJVAPCD adopted its Climate Change Action Plan (CCAP). The CCAP directed the District to develop guidance to assist CEQA lead agencies, project proponents, permit applicants, and interested parties in assessing and reducing the impacts of project GHG emissions on global climate change (SJVAPCD 2008). In December 2009, the SJVAPCD Board approved two guidance documents:

- Guidance for Valley Land-use Agencies in Addressing GHG Emission Impacts for New Projects under CEQA ("Land Use GHG Guidance"); and

- District Policy: Addressing GHG Emission Impacts for Stationary Source Projects Under CEQA When Serving as the Lead Agency.

These policies provide that "Projects complying with an approved GHG emission reduction plan or GHG mitigation program which avoids or substantially reduces GHG emissions within the geographic area in which the Project is located would be determined to have a less than significant individual and cumulative impact for GHG emissions" (Land Use GHG Guidance, p. 4). Under the guidance, projects implementing Best Performance Standards would have less than significant impacts for GHG emissions, as would projects that reduce or mitigate their GHG emissions by at least 29% as compared to Business as Usual (BAU).

On June 25, 2014, the SJVAPCD issued a guidance document titled "CEQA Determinations of Significance for Projects Subject to ARB's GHG Cap-and-Trade Regulation" (Policy APR-2025; "CEQA Cap-and-Trade Policy"). This policy is to be followed when the District is "providing technical guidance to lead agencies and the public regarding significance of project specific GHG emissions." The policy states the District's conclusion that "GHG emission increases subject to ARB's Cap-and-Trade Regulation would have a less than significant individual and cumulative impact on global climate change." Noting that GHG emissions from combustion of transportation fuels are covered under the Cap-and-Trade Program beginning in 2015, the policy also states that

"GHG emission increases caused by fuel use (other than jet fuels) are determined to have a less than significant impact on global climate change under CEQA."

Under the District's 2014 policy for stationary source impacts, "the District's determination of significance of project-specific GHG emissions is founded on the principal that projects with GHG emission reductions consistent with AB 32 emission reduction targets are considered to have a less than significant impact on global climate change" (SJVAPCD 2014). This policy employs a tiered approach to determining the CEQA significance of a project's GHG emissions. The first level is compliance with an approved GHG emission reduction plan that is specified in law and supported by a CEQA-compliant environmental review document. The SJVAPCD has determined that GHG emissions covered under the Cap-and-Trade Program cannot constitute significant increases under CEQA, for two reasons. First, the Cap-and-Trade Program is an approved GHG mitigation plan that meets the requirements set forth in the District's policy on stationary source GHG emission impacts (SJVAPCD 2014, pages 4-5.) Second, any increase in GHG emissions from the oil and gas production sector must be accounted for under the statewide GHG emissions cap in the Cap-and-Trade Program, and that cap decreases over time. As a result, the Cap-and-Trade Program will fully mitigate any project emission increases for emissions included under the cap (SJVAPCD 2014).

Where an approved GHG emission reduction program is not in place, or the Project will not comply with it, the guidance documents next rely on the use of performance based standards, otherwise known as Best Performance Standards (BPS), as a basis for assessing the significance of Project GHG emissions on global climate change under CEQA. BPS consist of established specifications or Project design elements that are used as a method of determining significance of Project-specific GHG emission impacts. BPS are defined as the most effective achieved-in-practice means of reducing or limiting GHG emissions from a GHG emissions source. BPS for stationary source projects include equipment type, equipment design, and operational and maintenance practices for the identified service, operation, or emissions unit class or category (SJVAPCD 2009a).

Table 4.7-7 describes the SJVAPCD BPS applicable to the Project. The District recommends use of BPS for assessing climate change impacts to streamline the process of determining significance under CEQA. BPS are not intended as a required emission reduction measure. Under SJVAPCD guidance, projects implementing BPS would be determined to have a less than cumulatively significant impact on global climate change.

Projects that do not comply with an approved GHG emission reduction plan or use BPS must demonstrate a 29% reduction in GHG emissions from (BAU) in order to be determined to have a less than cumulatively significant impact on global climate change. BAU is determined by multiplying 2002-2004 emission factors by the activity expected to occur in 2020.) The guidance does not limit a lead agency's authority to establish its own process and guidance for determining significance of Project-related impacts on global climate change (SJVAPCD 2009b).

While no appellate court decision has yet addressed reliance on statewide GHG Cap-and-Trade Program compliance as a method of determining the significance of project GHG emissions for

CEQA purposes, several cases have addressed the so-called BAU methodology which is similarly based on AB 32 compliance Under the BAU approach, GHG emissions from a project are considered to have an insignificant impact if they are more than 29% below modeled emissions under a BAU scenario, where 29% is roughly the magnitude of the statewide GHG reduction anticipated to be achieved in compliance with AB 32 by 2020. Reliance on the BAU-based significance threshold was specifically upheld as a proper exercise of agency discretion in Citizens for Responsible Equitable Environmental Development v. City of Chula Vista (2011) 197 Cal. App. 4th 327, 336-37 (CREED). Two subsequent cases concurred with the approach in CREED. Friends of Oroville v. City of Oroville (2013) 219 Cal. App. 4th 832, 841-42; Center for Biological Diversity v. Dept. of Fish and Wildlife (2014) 224 Cal. App. 4th 1105. Though Friends of Oroville criticized the lead agency's application of the BAU-based threshold in that particular case, the court found the methodology to be appropriate in itself. See Friends of Oroville, 219 Cal. App. 4th at 841: "The problem is the City improperly applied this proper standard in concluding that the Project's environmental impacts from GHG emissions are less than significant. [CREED] exemplifies the model, showing us a proper way to apply the Assembly Bill 32 threshold-of-significance standard." The Center for Biological Diversity case is currently pending appeal before the California Supreme Court.

By analogy to the BAU cases, a project's compliance with the Cap-and-Trade Regulation is also an appropriate means of determining the significance of the Project's GHG emissions because in either case, the 29% reduction in emissions anticipated by AB 32 will occur. As CARB set the statewide annual GHG allowance cap at levels low enough to assure that the overall AB 32 statewide emission reduction goal would be achieved, compliance with the Cap-and-Trade Regulation assures that a project will not cause a GHG emission increase that would cause the state to miss its GHG emission reduction goals.

**Table 4.7-7: SJVAPCD Best Performance Standards Applicable to the Project**

| Class | Category | Best Performance Standard | Percentage Achieved GHG Emission Reduction Relative to Baseline Emissions | |
|---|---|---|---|---|
| Components at Light Crude Oil and Natural Gas Production, Natural Gas Processing Facilities, Petroleum Refineries, Gas Liquids Processing Facilities, and Chemical Plants (Approved 07/01/2010) | Components Subject to Rules 4409 and 4555 Requirements | Minimize GHG emissions by applying leak standards and I&M requirements to components subject to Rules 4409 and 4455 requirements | Light Crude Oil and Natural Gas Production | 60% |
| | | | Natural Gas Processing | 82% |
| | | | Refineries | 86% |
| | | | Gas Liquid Processing | 89% |

**Table 4.7-7: SJVAPCD Best Performance Standards Applicable to the Project**

| Class | Category | Best Performance Standard | Percentage Achieved GHG Emission Reduction Relative to Baseline Emissions | |
|---|---|---|---|---|
| | Components Not Subject to Rules 4409 and 4555 Requirements | Minimize fugitive GHG emissions by applying leak standards and I&M requirements to components not subject to Rules 4409 and 4455 requirements | Components not subject to Rules 4409 and 4455 Requirements | 91% |
| Thermally Enhanced Oil Recovery (Approved 07/01/2010) | Components Subject to Rule 4401 | Minimize fugitive GHG emissions by applying leak standards and I&M to components subject to Rule 4401 | 28% | |
| | Components Not Subject to Rule 4401 | Minimize fugitive GHG emissions by applying leak standards and I&M to components not subject to Rule 4401 | 48% | |
| Steam Generators (Approved 06/24/2010) | Oilfield | Very high efficiency generator design with:<br>1. A convection section with at least 235 square feet of heat transfer surface area per MMBtu/h of maximum rated heat input (verified by manufacturer) or a manufacturer's overall thermal efficiency rating of 88%.<br>and<br>2. Variable frequency drive high efficiency electrical motors driving the blower and water pump. | 13% | |

Sources: SJVAPCD 2010, 2010a, 2010b, 2011
Key:
GHG = greenhouse gas
I&M = inspection and maintenance
MMBtu/h = million British thermal units per hour

## Kern County General Plan

The Project Area is located within the KCGP area and, therefore, would be subject to applicable policies and measures of the KCGP. The Land Use, Conservation, and Open Space Element of the KCGP includes goals, policies, and implementation measures to the Project that would indirectly impact GHG emissions through the reduction of fossil fuel use, as described below.

# Chapter 1. Land Use, Conservation, and Open Space Element

## 1.10. General Provisions

### 1.10.2. Air Quality

#### Policies

**Policy 19.** In considering discretionary projects for which an Environmental Impact Report must be prepared pursuant to the California Environmental Quality Act, the appropriate decision making body, as part of its deliberations, will ensure that:

a. All feasible mitigation to reduce significant adverse air quality impacts have been adopted; and

b. The benefits of the proposed Project outweigh any unavoidable significant adverse effects on air quality found to exist after inclusion of all feasible mitigation. This finding shall be made in a statement of overriding considerations and shall be supported by factual evidence to the extent that such a statement is required pursuant to the California Environmental Quality Act.

**Policy 22.** Kern County shall continue to work with the San Joaquin Valley Unified Air Pollution Control District and the Kern County Air Pollution Control District toward air quality attainment with federal, state, and local standards.

**Policy 23.** The County shall continue to implement the local government control measures in coordination with the Kern Council of Governments and the San Joaquin Valley Unified Air Pollution Control District.

#### Implementation Measures

**Implementation Measure F.** All discretionary permits shall be referred to the appropriate air district for review and comment.

**Implementation Measure G.** Discretionary development projects involving the use of tractor trailer rigs shall incorporate diesel exhaust reduction strategies including, but not limited to:

a. Minimizing idling time.

b. Electrical overnight plug-ins.

**Implementation Measure H.** Discretionary projects may use one or more of the following to reduce air quality effects:

a. Pave dirt roads within the development.

b. Pave outside storage areas.

c. Provide additional low Volatile Organic Compounds (VOC) producing trees on landscape plans.

d. Use of alternative fuel fleet vehicles or hybrid vehicles.

e. Use of emission control devices on diesel equipment.

f. Develop residential neighborhoods without fireplaces or with the use of Environmental Protection Agency certified, low emission natural gas fireplaces.

g. Provide bicycle lockers and shower facilities on site.

h. Increasing the amount of landscaping beyond what is required in the Zoning Ordinance (Chapter 19.86).

i. The use and development of park and ride facilities in outlying areas.

j. Other strategies that may be recommended by the local Air Pollution Control Districts.

## Metropolitan Bakersfield General Plan

The MBGP, a joint effort between the Kern County Planning Department and the City of Bakersfield Planning Division, was last adopted on December 11, 2007. The MBGP includes both city and unincorporated County lands. The MBGP describes the community's physical development as well as its economic, social and environmental goals and is currently undergoing an update. The Project Area includes a total of 152,040 acres of unincorporated County lands that are covered under the MBGP (7.41%). Project-related development on unincorporated lands within the MBGP Planning Area would be subject to the following applicable policies and implementation measures of the MBGP, with respect to GHG emissions.

### Chapter V. Conservation Element

#### E. Air Quality

#### Goals

**Goal 1**. Promote air quality that is compatible with health, well-being, and enjoyment of life by controlling point sources and minimizing vehicular trips to reduce air pollutants.

**Goal 2**. Continue working toward attainment of federal, state, and local standards, as enforced by the San Joaquin Valley Air Pollution Control District.

**Goal 3**. Reduce the amount of vehicular emissions in the Planning Area.

#### Policies

**Policy 1**. Comply and promote SJVAPCD control measures regarding Reactive Organic Gases (ROG). Such measures are focused on (a) steam-driven well vents, (b) pseudo-cyclic wells, (c) natural gas processing plant fugitives, (d) heavy oil test stations, (e) light oil production fugitives, (f) refinery pumps and compressors, and (g) vehicle inspection and maintenance.

**Policy 2**. Encourage land uses and land use practices that do not contribute significantly to air quality degradation.

**Policy 10**. Implement the Transportation System Management Program for the Metropolitan Bakersfield to improve traffic flow, reduce vehicle trips, and increase street capacity.

**Policy 12**. Encourage the use of mass transit, carpooling, and other transportation options to reduced vehicle miles traveled.

**Policy 13**. Consider establishing priority parking areas for carpoolers in projects with relatively large number of employees to reduce vehicle miles traveled.

In conjunction with the MBGP Update efforts, City staff is securing additional funding to develop a CCAP for the Metropolitan Bakersfield Update. Local Sustainable Planning will be the focus for the CCAP. CCAP will be Bakersfield's mechanism for county-wide and region-wide efforts for addressing SB 375, provide community-wide sustainability, and implementing AB 32 GHG emission reduction targets. The CCAP will include energy efficiency and conservation strategies for long-term land use planning. Even though the Bakersfield CCAP is unfinished, the advancement of renewable energy is often a cornerstone for climate action strategies.

## Kern County Specific Plans

Kern County has adopted 24 Specific Plans for properties within the Project Area. These Specific Plans are intended to be an amplification of the goals and policies of the KCGP and are, therefore, consistent therewith. As depicted in Figure 4.10-3, less than 8% of the Project Area is located wholly or partially within adopted Specific Plan areas. Future oil and gas exploration and production activities that would be authorized under the proposed Amendment to Chapter 19.98 (Oil & Gas Production) of the Kern County Zoning Ordinance that would be located within the boundary of an adopted Specific Plan would be regulated according to County zoning, with the exception of the Specific Plans identified as Tier 5.

## Kern Sustainable Communities Strategy

The SCS is a part of the 2014 RTP developed by the Kern Council of Governments. The SCS (Kern COG 2014) strives to reduce air emissions from passenger vehicle and light duty truck travel by better coordinating transportation expenditures with forecasted development patterns and, if feasible, help meet CARB GHG targets for the region (Kern COG 2014). The SCS does not regulate the use of land nor does it supersede the land use authority of the cities or county within the region.

One goal of the SCS is to "Quantify the reduction in GHG emissions projected to be achieved by the SCS and set forth the difference, if any, between the amount of that reduction and the target for the region established by CARB." CARB set targets for lowering GHG emissions in the San Joaquin Valley from 2005 levels by 5% for passenger vehicles and light trucks by 2020, and a reduction of 10% from 2005 to 2035 through land use and transportation planning. SCS strategies are expected to reduce GHG emissions from 2005 levels by 14.1% by 2020 and 16.6% by 2035, thus exceeding the targets set by CARB.

Some of the SCS proposals to reduce GHG emissions from vehicles include:

- Construct new transit lines;
- Expand bus and passenger rail service;
- Promote carpooling and vanpooling;
- Implement employer-based trip reduction strategies;
- Promote walking and biking; and
- Implement intelligent transportation systems (ITS)/traffic management.

### CAPCOA White Paper

In January 2008, the California Air Pollution Control Officers Association (CAPCOA) issued a "white paper" on evaluating GHG emissions under CEQA (CAPCOA 2008). The CAPCOA white paper strategies are guidelines and have not been adopted by any regulatory agency. The white paper serves as a resource to assist lead agencies in evaluating GHGs in environmental information documents. [The CAPCOA White Paper (CEQA and Climate Change) specifically includes a disclaimer on its first page that reads: "[t]his paper is intended as a resource, not a guidance document. It is not intended and should not be interpreted, to dictate the manner in which an air district or Lead Agency chooses to address GHG emissions in the context of its review of projects under CEQA. This paper has been prepared at a time when California law has been recently amended by the Global Warming Solutions Act of 2006 (AB 32) and the full programmatic implications of this new law are not yet fully understood." The methodologies used in this GHG analysis are consistent with the CAPCOA guidelines and with the SJVAPCD's guidance for projects subject to the statewide Cap-and-Trade Regulation.

## 4.7.4 Impacts and Mitigation Measures

This section describes the methodology used in conducting the CEQA impact analysis for GHG emissions; the thresholds of significance used in assessing impacts to GHG emissions; and the assessment of impacts to GHG emissions and global climate change, including relevant mitigation measures.

# Methodology

The GHG analysis methodology used in this EIR quantifies direct GHG emissions from permitted and non-permitted facilities, as well as combustion, venting, and fugitive sources associated with construction, well production and stimulation, and well abandonment proposed as part of the Project. Emissions from vehicles used for transportation of personnel, materials, and equipment during construction and operation are also included in the analysis. The indirect effects of the Project are also discussed as part of the overall Project GHG impacts.

The baseline for purposes of this analysis is considered to be the physical conditions existing as of 2012. GHG baseline emissions for year 2012 were determined from the CARB Annual

Summary of GHG Mandatory Reporting Non-Confidential Data for Calendar Year 2012 for all reporting oil and gas facilities in Kern County. The change in the environment subject to analysis under this EIR results from oil and gas production and processing activities conducted between 2015 and 2035.

GHG emissions impacts associated with the Project are separated by construction and operational emissions. Refer to Table 4.3-10 for further detail on data sources and assumptions used to estimate emissions from GHG and air criteria pollutants associated with construction activities.

GHG emissions from construction activities associated with the Project were estimated in three categories, as follows:

- Construction of new facilities for crude oil and natural gas production and processing, such as crude oil dehydration facilities and new steam generator plants;
- Construction of permit-exempt sources; and
- Construction activity related to wells

Operational emissions sources include emissions from oil and gas production facilities which are subject to MRR, estimated emissions from sources exempt from MRR, emissions from routine well operations and maintenance, and emissions from mobile sources, such as routine business travel. The analysis that follows is consistent with the recommendations of the SJVAPCD's March 2015 Guidance for Assessing and Mitigating Air Quality Impacts.

The GHG analysis to support this evaluation uses a baseline level of 43,028 wells that were operating in 2012 and an assumed number of 82,136 wells operating in 2035. The assumed number of new wells constructed spans from 3,966 in 2015 to 4,083 in 2035. The number of wells projected to be built in 2035 exceeds the number of wells that are projected to be authorized under this Project and therefore these estimates are considered conservative. Kern County does not anticipate authorizing more than 3,647 new well permits in a single year

As stated previously, climate change is a cumulative and global issue causing global impacts. Thus, the study area for climate change and the impact analysis of GHG emissions is broad because climate change is influenced by global emissions and their associated effects. Those effects of climate change can also have localized impacts on resources and ecosystems in California. Despite that fact that climate change is a global issue, CEQA only requires that an EIR address indirect impacts that are not speculative.

Section 4.7.3, Regulatory Setting, shows the applicable laws and regulations that ensure management and ongoing reductions of GHG at a state, regional, and local levels. All activities related to oil and gas well stimulation treatments proposed as part of the Project must comply with applicable federal, state, and local laws and regulations and will be subject to review by the SJVAPCD. Additionally, the CARB expects to adopt an Oil and Natural Gas Methane Regulation

in 2015 to achieve GHG emissions reductions from oil and gas extraction and transmission activities.

Note that analytical tools have not been developed that can determine the effect on worldwide global warming from a particular Project-specific increase in GHG emissions, or the effect of global GHG emissions on the climate at a particular location

# Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist, following the "Environmental Checklist Form," Appendix G to the Statewide CEQA Guidelines as amended by the CNRA and effective on March 18, 2010, state that a project would have significant impacts on GHG emissions if it would:

- Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment; or

- Conflict with any applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs.

Kern County has not developed a quantitative threshold of significance for GHG emissions, but a project found to contribute to a net decrease in GHG emissions and found to be consistent with the adopted implementation of the CARB Climate Change Scoping Plan is presumed to have less-than-significant GHG emission impacts (CARB 2014b).

As indicated in Section 4.7.3, Regulatory Setting, the SJVAPCD has adopted guidance documents for assessing and mitigating GHG impacts on global climate change. Rather than establishing specific numeric thresholds of significance (as in the case of criteria pollutant emissions), the SJVAPCD guidance utilizes a tiered approach to assess cumulative impacts on global climate change. First, a project can demonstrate compliance with an approved GHG emissions reduction program (such as CARB's statewide GHG Cap-and-Trade Program). Second, a project can demonstrate implementation of BPS to reduce GHG emissions. Finally, a project can demonstrate achievement of a 29% reduction in GHG emissions from BAU.

SJVAPCD's CEQA Cap-and-Trade Policy also recommends that projects that are required to comply with CARB's GHG Cap-and-Trade Program be determined to have a less than cumulatively significant impact on global climate change. This policy is included in the SJVAPCD's December 2009 CEQA GHG policies (described above) and its March 19, 2015 Final "Guidance for Assessing and Mitigating Air Quality Impacts" which states that a project whose emissions have been reduced or mitigated consistent with the California Global Warming Solutions Act of 2006 (AB 32) should be considered to have a less than significant impact on global climate change (SJVAPCD 2015).

This approach would include both the CARB's GHG Cap-and-Trade Program and other adopted GHG-reducing regulations (such as the oil and gas methane rule now in development) as adopted

GHG emissions reduction plans. Under the SJVAPCD's tiered approach in assessing significance of project-specific GHG emission increases, projects complying with an approved GHG emission reduction plan or GHG mitigation program which avoids or substantially reduces GHG emissions within the geographic area in which the Project is located would be determined to have a less than significant individual and cumulative impact for GHG emissions (SJVAPCD 2015).

# Project Impacts

As discussed previously, climate change impacts are inherently global and cumulative, and not project specific. The SJVAPCD's March 2015 Guidance for Assessing and Mitigating Air Quality Impacts observes that:

"It is widely recognized that no single project could generate sufficient GHG emissions to noticeably change global climate temperature. However, the combination of GHG emissions from past, present and future projects could contribute substantially to global climate change. Thus, project specific GHG emissions should be evaluated in terms of whether or not they would result in a cumulatively significant impact on global climate change" (SJVAPCD 2015, section 8.9.).

## Impact 4.7-1: Generate Greenhouse Gas Emissions, Either Directly or Indirectly, that may have a Significant Impact on the Environment

### Construction of New Facilities

GHG emissions would occur during all aspects of oil and gas activities, including the construction and operation of permitted sources, and the operation of non-permitted sources in the Western, Central, and Eastern Subareas. New facilities that could be constructed under this Project include crude oil and natural gas production and processing plants, such as crude oil dehydration facilities and new steam generator plants. Equipment that was assumed would be built included boilers, process heaters, internal combustion engines, steam generators, production tanks, and flaring facility. Equipment assumed to be used during construction of new facilities includes graders, tractors/loaders/backhoes, concrete/industrial saws, rubber-tired bulldozers, cranes, forklifts, cement and mortar mixers, pavers, rollers, and air compressors. Total emissions resulting from the construction of new facility equipment during a project year (i.e., any year between 2015 and 2035), and the construction of facilities over the Project period (2015 - 2035) are summarized below in Tables 4.7-8 and 4.7-9.

GHG construction emissions include those related to small permit-exempt oil and gas production settings that would be constructed on an as-needed basis over time and would typically occupy less than 0.5 acre. Future production activities would entail the construction of these types of small facilities throughout the proposed Project Area. No information is available on the number and location of permit-exempt equipment and small production settings that would be constructed or installed during the Project years 2015 – 2035. Due lack of data and because GHG emissions from sources not subject to mandatory GHG reporting are known to be small in quantity, they were assumed to be equivalent to be 5% of the construction GHG emissions for large facilities.

## Emissions from Well Activities

Combustion processes associated with the removal and processing of the recovered oil and gas would be the largest source of GHG emissions from the Project. Other GHG emissions would result from the use of off-road equipment typically used in drilling, construction of processing facilities, and operational activities that include diesel-powered pumps, cranes, generators, and blenders, along with truck-mounted storage tanks and vessels that may release methane by venting. Typical mobile sources include vehicles being used offsite to access oil and gas fields for commuting and materials delivery during well construction and operation. These include moving equipment and hauling water, wastewater, well drilling and stimulation fluids, other materials and byproducts, or off-hauling produced oil and gas to processing facilities (DOGGR 2015).

In addition to off-road and mobile sources associated to well construction and operations, the use of well stimulation treatments during the proposed oil and gas development could increase the potential for vented and fugitive GHG losses. Vented emissions are intentional releases of vapors to the atmosphere. Fugitive emissions are unintentional releases of vapors to the atmosphere. Both vented and fugitive emissions could occur during aspect of the Project, such as well completion or while wells are in production, either by additional fuel burning equipment required for the increased production of a given well, or as a result of fugitive losses from sumps and pits, valves and fittings, pumps, compressors, and well heads. The contributions of vented and fugitive sources to overall GHG emissions from oil and gas production are more difficult to quantify than combustion-related emissions, which are a function of fuel burning.

## Operational Emissions

GHG emission from the operations of the Project include those facilities subject to MRR, an allowance (10%) for emissions from small facilities not subject to MRR, and emissions from mobile sources associated with well operations and maintenance and routine business travel. Emissions from facilities subject to MRR are estimated based on a projection from the baseline level (2012) and the estimated number of active wells per year.

Table 4.7-8 presents the estimated annual GHG emissions associated with proposed Project construction and operation of the Project. Table 4.7-9 presents baseline emissions (Year 2012) and emissions from the Project at full build-out (Year 2035).

GHG emissions from non-permitted sources and activities are calculated based on emissions within the state. For comparison purposes, construction emissions are amortized over the Project development timeframe (2015 – 2035). For the purposes of this EIR, the anticipated emissions levels anticipated after consideration of compliance with regulatory standards such as the AB 32 Cap-and-Trade Program are considered mitigated emissions.

**Table 4.7-8: Proposed Project Annual Greenhouse Gas Emissions**

| Emission Source | Project Annual Direct GHG Emissions by Subarea ($MMTCO_2e$/year)[1] | | | |
|---|---|---|---|---|
| | Western | Central | Eastern | Project Area |
| **Construction Emissions** | | | | |
| Construction of New Facilities[3] | 0.29 | 0.01 | 0.34 | 0.68 |
| Construction Related to Wells[4] | 0.81 | 0.17 | 0.31 | 1.29 |
| Subtotal Construction Emissions | 1.10 | 0.19 | 0.65 | 1.97 |
| **Operational Emissions** | | | | |
| Facilities subject to MRR (Average 2015-2035) | 11.26 | 0.35 | 9.94 | 21.55 |
| GHG Emissions Allowance for Small Facilities (+10%) | 1.13 | 0.03 | 0.99 | 2.15 |
| Operational Mobile Sources[5] | 0.15 | 0.005 | 0.13 | 0.28 |
| Subtotal Operational Emissions | 12.53 | 0.39 | 11.07 | 23.99 |
| **Annual Direct GHG Emissions[6]** | **13.63** | **0.57** | **11.72** | **25.96** |

Sources: Vector 2015a, 205b; CARB 2013
Notes:
(1) For the purposes of this DEIR, annual emissions have been estimated as an average of GHG emissions for all project sources emissions over the proposed Project lifetime (2015-2035).
(2) For comparison purposes, construction of new facilities emissions are amortized over the proposed Project lifetime (2015-2035).
(3) Construction of new facilities emissions include the following source categories: Process Heater, Production Tanks, VOCDD (Flare), Internal Combustion Engines (RICE), and Steam Generators. Number of units per Subarea is detailed in Appendix J.
(4) Emissions from construction related to wells include the following sources: drilling, rework, stimulation, and abandonment.
(5) Operational mobile sources include emissions form routine well operations and maintenance, and routine business travel.
(6) Unmitigated emissions are the anticipated emissions levels anticipated before consideration of compliance with regulatory standards such as the AB 32 Cap-and-Trade Program and the mitigation measures set forth in this section.
Key:
MRR = Mandatory Reporting Regulation
GHG = greenhouse gases
$MMTCO_2e$ = million metric tons of carbon dioxide equivalent

**Table 4.7-9: Project Greenhouse Gas Emissions Increase**

| Project Source | Direct GHG Emissions Increase in the Project Area ($MMTCO_2e$/year ) | |
|---|---|---|
| | Baseline Direct Emissions (Year 2012) | Project Build Out Emissions (Year 2035) |
| Construction Emissions | 0.98 | 1.97 |
| Operational Emissions | | |
| Facilities subject to MRR | 14.36 | 27.40 |

**Table 4.7-9: Project Greenhouse Gas Emissions Increase**

| Project Source | Direct GHG Emissions Increase in the Project Area ($MMTCO_2e$/year ) | |
|---|---|---|
| | **Baseline Direct Emissions (Year 2012)** | **Project Build Out Emissions (Year 2035)** |
| GHG Emissions Allowance for Small Facilities (+10%) | 1.44 | 2.74 |
| Operational Mobile Sources | 0.18 | 0.28 |
| Subtotal Operational Emissions | 15.97 | 30.43 |
| **TOTAL DIRECT GHG EMISSIONS** | **16.95** | **32.40** |

Sources: CARB 2013; Vector 2015a, 2015b
Key:
MRR = Mandatory Reporting Regulation
GHG = greenhouse gases
$MMTCO_2e$ = million metric tons of carbon dioxide equivalent

Emissions shown in Table 4.7-9 for the Project build-out in 2035 are expected to be a decrease from BAU levels as regulatory initiatives are phased in to reduce GHG emissions from sources across the state. On a per-well basis, GHG emissions from oil production would be reduced over time due to GHG emission reductions required under multiple programs, including California's GHG Cap-and-Trade Program, California's pending rule limiting methane emissions from oil and gas production, and implementation of the EPA's Reformulated Fuels Standard (RFS-2). The total anticipated GHG emissions from oil and gas operations in Kern County are projected to increase from 2012 to 2035 due to a projected increase in the number of wells. However, GHG emissions from construction and operation of oil and gas wells will continue to be subject to CARB's AB 32 Cap-and-Trade Program and other regulatory mandates, so that oil and gas production in Kern County would not conflict with statewide GHG emissions goals and objectives.

**GHG Reductions from the California GHG Cap-and-Trade Program**. As discussed above, CARB's Cap-and-Trade Regulation establishes a set of rules that limit GHG emissions from the state's largest sources of GHGs by applying a statewide aggregate GHG allowance budget to covered entities (17 CCR 95800 to 96023). The regulation also provides a trading mechanism for compliance instruments (17 CCR 95920 et seq.). The Cap-and-Trade Program imposes an enforceable statewide cap on GHG emissions at covered facilities (including refineries, electric power providers, cement production facilities, and oil and gas production facilities, and expanded to include fuel suppliers beginning in 2015) that steadily declines over time. For each compliance period (2013-2014, 2015-2017, and 2018-2020), each covered facility ultimately is required to surrender GHG compliance instruments (emission allowances or offset credits) equal to its GHG emissions during the compliance period (with limited exceptions for GHG emissions that are not subject to a compliance obligation). The quantity of compliance instruments required to be surrendered is the facility's compliance obligation. Since a facility's compliance obligation is equal to its actual GHG emissions during the relevant compliance period, the compliance

obligation can be reduced by implementing programs within the facility to reduce GHG emissions.

An allowance is a tradable permit to emit 1 $MTCO_2e$ GHG emission. Covered entities may also use a limited number of CARB offset credits to meet their compliance obligation. A covered facility may obtain GHG compliance instruments by any or all of the following methods:

- Receiving free allowances allocated by CARB;
- Purchasing allowances at CARB quarterly allowance auctions;
- Purchasing allowances from other covered facilities or entities in the program;
- Purchasing GHG offset credits generated by emission reduction activities at other facilities; and
- Purchasing compliance instruments (allowances or credits) from other GHG trading programs formally "linked" to California's Cap-and-Trade Program.

If a covered facility does not surrender sufficient compliance instruments to meet its GHG emissions compliance obligation by the applicable deadline following the end of a compliance period, the facility has a limited time following the deadline in which to provide additional compliance instruments to cover its shortfall in surrendering compliance instruments. The shortfall must be covered by providing allowances (not offset credits) in an amount equal to four times the amount of the shortfall.

In general, the total number of allowances available statewide for each calendar year decreases annually through 2020, thus establishing the cap. (The total quantity of allowed emissions actually increased for 2015 to account for the addition of fuel suppliers and additional electricity importers to the program. However, the net effect of the Cap-and-Trade rule is to reduce statewide GHG emissions from covered sources.) The cap will decline approximately 3% each year beginning in 2013, representing an 18% reduction from the statewide 1990 baseline (CARB 2015; DOGGR 2015).

A certain number of allowances are allocated without cost to the recipient (the "direct allocation"), based on rules in the Cap-and-Trade Regulation and depending on the type of facility. The quantity of direct allowances allocated to covered facilities engaged in crude petroleum and natural gas extraction activities is determined using a product output-based allocation methodology, which is based on barrel efficiency benchmarks (17 CCR 95891). The direct allocation to a given facility may be less than the facility's compliance obligation. The remainder of allowances required for annual compliance must be purchased through auctions managed by CARB, from other owners of GHG allowances, or from third-party traders, as discussed above.

California petroleum and natural gas system processes or operations, including onshore oil and gas production, with covered emissions of 25,000 MT or more of $CO_2e$ per data year are covered under the Cap-and-Trade Program 17 CCR 95811(a)(9), 95852(h), 95802(a)(143)(C) ("Where a person or entity owns or operates more than one well in a [hydrocarbon] basin, then all onshore petroleum and natural gas production equipment associated with all wells that the person or entity owns or operates in the basin would be considered one facility."), 95802(a)(258). See also 17 CCR 95812(c) (4), 95101(e) (2). An onshore petroleum or natural gas production facility that does not exceed the inclusion threshold of 25,000 MT or more of $CO_2e$ per data year may elect to voluntarily opt-in to the Cap-and-Trade Program. The entity with operational control over a covered source (a facility within a covered sector and with covered emissions that meet or exceed the applicability threshold) bears responsibility for meeting the Cap-and-Trade compliance obligations 17 CCR 95811(a), 95802(a)(258) (For onshore petroleum and natural gas production, the operator is the operating entity listed on the state well drilling permit, or a state operating permit for wells where no drilling permit is issued by the state).

With respect to the proposed Project's permitted source GHG emission impacts, operators of covered facilities are required to comply with the Cap-and-Trade Program (e.g., by reducing GHG emissions within their facilities or by surrendering GHG allowances, offset credits, or other compliance instruments to offset the GHG emissions identified in Table 4.7-8).

With regard to onshore oil and natural gas production, only facility emissions (e.g., emissions resulting from combustion of fossil or other fuel and certain process and vented emissions) create a Cap-and-Trade compliance obligation for a covered facility (17 CCR 95852). For an onshore petroleum and natural gas production facility, the operator must report $CO_2$, $CH_4$, and $N_2O$ emissions from the following source types on a well-pad, associated with a well-pad or associated with equipment to which an emulsion (a mixture of crude oil, condensate, or produced water in any proportion [17 CCR 95102(a)(147)]) is transferred : (1) metered natural gas pneumatic device and pump venting; (2) non-metered natural gas pneumatic device venting; (3) acid gas removal vents; (4) dehydrator vents; (5) well venting for liquids unloading; (6) gas well venting during well completions and workovers; (7) equipment and pipeline blowdowns; (8) dump valves; (9) well testing venting and flaring; (10) associated gas venting and flaring; (11) flare stack or other destruction device emissions; (12) centrifugal compressor venting; (13) reciprocating compressor rod packing venting; (14) enhanced oil recovery (EOR) injection pump blowdown; (15) crude oil, condensate and produced water $CO_2$ and $CH_4$; (16) equipment leaks from valves, connectors, open-ended lines, pressure relief valves, pumps, flanges, and other equipment leak sources (such as instruments, loading arms, stuffing boxes, compressor seals, dump lever arms, and breather caps); and (17) stationary or portable equipment including equipment which is integral to the extraction, processing, and movement of oil and/or natural gas; such as well pad construction equipment, well drilling and completion equipment, equipment used for abandoned well plugging and site reclamation, workover equipment, natural gas dehydrators, natural gas compressors, electrical generators, steam boilers, and process heaters (17 CCR 95152(c)). These emissions are reported under MRR lead to the Cap-and-Trade compliance obligation.

Other process, vented, and fugitive emissions, including, but not limited to, emissions from storage tanks used in petroleum and natural gas production, emissions from natural gas transmission storage tanks used in petroleum and natural gas production, and emissions from produced water do not count toward a covered entity's compliance obligation under the Cap-and-Trade Program because they are specifically identified as exempt emissions (17 CCR 95852.2 (b) (3), (5)). Following the reasoning in the SJVAPCD "CEQA Cap-and-Trade Policy," stationary source emissions that are exempt from Cap-and-Trade and from facilities with emissions below the Cap-and-Trade applicability threshold are considered insignificant.

Other categories of Project-related GHG emissions do not contribute to the covered facility's Cap-and-Trade Program GHG compliance obligation, including emissions from fuel combustion in construction equipment and other mobile sources used in connection with Project construction and operation, and indirect emissions from electricity generation. While these emissions do not create a compliance obligation for oil and gas production facilities, they are covered by the Cap-and-Trade Regulation in connection with the activities of other source categories, such as electricity generation or import and fuel suppliers. To the extent that fuels are supplied from fuel suppliers that are not subject to the Cap-and-Trade Regulation because emissions from the quantities of fuel supplied would not exceed the Cap-and-Trade applicability threshold, the SJVAPCD's CEQA Cap-and-Trade Policy states: "As did the ARB when excluding such sources from the Cap-and-Trade Regulation, the District considers GHG emissions resulting from the combustion of all fuels supplied by those fuel suppliers not subject to the Cap-and-Trade Regulation to be insignificant. Therefore, it is reasonable to apply this policy to GHG emissions resulting from the combustion of all fuels in the State of California."

As described above, the Project will result in an overall increase in GHG emissions from oil and gas production activities within the County. GHG emissions not covered by the Cap-and-Trade Program and fugitive emissions also contribute to a net increase of GHGs in the region. For example, the use of enhanced recovery and well stimulation treatments could increase the GHG emissions from oil and gas production by increasing the potential for vented and fugitive losses during well completion or while in production, by increasing the production of a given well, and by requiring additional fuel burning equipment. Nevertheless, the Project would be consistent with the Cap-and-Trade Regulation because all significant facility emissions are subject to the Cap-and-Trade Regulation, either as stationary source emissions for which the facility operator has a compliance obligation, or as emissions from fuel combustion, for which the fuel supplier has a compliance obligation; methane emissions will be limited by the new CARB methane rule expected to be adopted by the end of 2015.

However, GHG emissions not covered by Cap-and-Trade Regulations and the BPS, and fugitive emissions may contribute a net increase of GHG in the region that would be a potentially significant impact. To account for additional sources of Project-related GHG emissions not estimated in this analysis (i.e., indirect sources, fugitive emissions), the County has determined to conservatively mitigate project direct GHG emissions to net zero.

GHG emissions from the Project would be potentially significant. Implementation of Mitigation measures MM 4.7-1 to 4.7-4 would reduce impacts to a less than significant level.

## Mitigation Measures

**MM 4.7-1** An Applicant with permitted stationary sources shall comply with the Cap-and-Trade regulation (e.g., by reducing greenhouse gas emissions within their facilities or by surrendering greenhouse gas allowances, offset credits, or other compliance instruments to offset the greenhouse gas increases), and implement Best Performance Standards applicable to greenhouse gas reduction for Components at Light Crude Oil and Natural Gas Production, Natural Gas Processing Facilities, Petroleum Refineries, Gas Liquids Processing Facilities, and Chemical Plants (San Joaquin Valley Air Pollution Control District 2010), Thermally Enhanced Oil Recovery Wells (San Joaquin Valley Air Pollution Control District 2010a), Steam Generators (San Joaquin Valley Air Pollution Control District 2010b), and Front-line Organic Liquid Storage Tanks (San Joaquin Valley Air Pollution Control District 2011).

**MM 4.7-2** Each Applicant shall comply with applicable Cap-and-Trade regulations, and other applicable greenhouse gas emission control and reduction regulations as these may be adopted or amended over time, to reduce, avoid, mitigate and/or sequester greenhouse gas emissions from Project-related air emissions.

**MM 4.7-3** Each Applicant shall implement methods to recover for reuse or destroy methane existing in associated gas and casinghead gas, as follows:

a. Recover all associated gas produced from the reservoir via new wells, regardless of the well type, except for gas produced from wildcat and delineation wells or as a result of start-up, shutdown and maintenance activities (whether planned or unplanned), system failures, and emergencies in accordance with San Joaquin Valley Air Pollution Control District regulations (Rule 4401 and 4409), as this may be amended over time.

b. Compliance with the expected California Air Resources Board methane regulation.

**MM 4.7-4** Each Applicant shall offset all greenhouse gas emissions not covered by the Cap-and-Trade program or other mandatory greenhouse gas emission reduction measures through Applicant reductions of greenhouse gas emissions as verified by the San Joaquin Valley Air Pollution Control District, through acquisition of offset credits from the California Air Pollution Control Officers Association Exchange Register or other third party greenhouse gas reductions as verified by the San Joaquin Valley Air Pollution Control District, or through inclusion in an Emission Reduction Agreement, to offset Project-related greenhouse gas emissions that are not included in the Cap-and-Trade program to assure that no net increase in greenhouse gas emissions from the Project.

## Level of Significance After Mitigation

Impacts would be less than significant with mitigation.

## Impact 4.7-2: Conflict with any Applicable Plan, Policy, or Regulation Adopted for the Purpose of Reducing the Emissions of Greenhouse Gas

The Project regulatory setting (Section 4.7.3, Regulatory Setting) describes the applicable plans, policies, and regulations adopted at federal, state, and local levels for the purpose of reducing GHG emissions from oil and gas sources in Kern County. The primary requirements for oil and gas activities in the Project Area would include the MRR, the Cap-and-Trade Program, the low carbon fuel standard (LCFS) (applies to all providers of transportation fuels in California), and the SJVAPCD requirements established in rules, BPS, and the CCAP.

As mentioned previously, covered facilities associated with the Project are subject to CARB's GHG Cap-and-Trade Program, which imposes an enforceable cap on regulated facilities that declines over time. Under the program, the facility operator will be required to reduce GHG emissions within the facility or to surrender GHG allowances, offset credits, or other compliance instruments to offset any permitted source GHG emission increases associated with the proposed Project. Similarly, suppliers of transportation fuels used in Project-related construction and other vehicle use associated with the Project must also surrender compliance instruments equal to the GHG emissions from the combustion of all fuels that they supply. This will ensure that the proposed Project's permitted and mobile source GHG emission increases will be consistent with California's Cap-and-Trade Program for reducing GHG emissions under AB 32.

Electric utilities supplying power to the facilities also are subject to the GHG Cap-and-Trade Program. This will ensure that these emissions will be consistent with California's AB 32 program for reducing GHG emissions.

Non-permitted sources/activities associated with the proposed Project could also be affected by the following California Climate Change Scoping Plan measures:

**E-3 (Achieve a 33% Renewables Mix by 2020)**. This measure is being implemented by the California Energy Commission and the California Public Utilities Commission under Senate Bill X1-2 (Simitian), signed by Governor Brown in April 2011. The Public Utilities Commission reports that the State's three large investor-owned utilities collectively served 19.6% of their 2012 retail electricity sales with renewable power (CPUC 2014):

- Pacific Gas and Electric: 19%;
- San Diego Gas and Electric: 20.3%; and
- Southern California Edison: 19.9%.

It is expected that electricity providers will comply with the mandated 33% renewables standard.

**T-2 (Low Carbon Fuel Standard).** CARB approved the LCFS in April 2009, and it became effective in 2010. Since its adoption, the LCFS has faced legal and regulatory challenges. To the extent that the LCFS becomes fully effective and low-carbon fuels come to the California marketplace, locomotive, truck, and other vehicle operators are expected to purchase such fuels.

**T-4 (Vehicle Efficiency Measures).** Vehicle efficiency measures include low friction oil, tire pressure regulation, tire tread program, and solar reflective automotive paint/window glazing. The tire pressure regulation has been approved and the tire tread program is under evaluation by CARB. CARB reports that the low friction oil component already has been achieved in practice. Potential reductions through design are to be considered as part of CARB's Advanced Clean Cars measure. Truck and other motor vehicle operators are expected to comply with such measures as technology required by the program comes to the California marketplace.

On a per-well basis, Project-related GHG emissions are expected to decrease over time as regulatory initiatives are phased in to reduce GHG emissions from many sources across the state. Although GHG emissions from oil production activities that constitute the Project may increase over time due to an increase in the number of active wells, as discussed above, numerous initiatives by the State of California will reduce statewide GHG emissions and certain emissions associated with oil and gas production facilities, including the Pavley rules that will reduce emissions from automobiles, regulations that will reduce emissions from heavy duty trucks, the Renewable Portfolio Standard (RPS) that will reduce emissions from electricity, the LCFS that will reduce emissions from heavy duty trucks and off-road mobile equipment, and the CARB rules discussed in Section 4.3, Air Quality.

Several policies, including recent EOs calling for increased GHG reductions in future years (e.g., 2030) and for specific sectors (e.g., transportation fuels) are anticipated to result in a significant decrease in the demand for oil. Oil is a global commodity, and is historically produced in sufficient quantities to meet global demand, although various factors influence pricing and availability of this commodity at any one time. Oil produced in California is subject to stringent environmental, workplace safety, and public safety standards and, unlike oil produced elsewhere, does not require transportation (and transportation-based GHG emissions) to reach the California market. It is anticipated that oil produced in California will continue to help supply state and regional needs, and potentially serve an increasing share of the market as overall consumption of oil is reduced over time to meet GHG reduction policies.

Based on the foregoing, the proposed Project will be consistent with California's adopted California Climate Change Scoping Plan, CARB's GHG Cap-and-Trade Program, and other applicable adopted standards and regulations. Impacts are therefore anticipated to be less than significant.

Impacts from the Project on applicable plans, policies, or regulations adopted for the purpose of reducing the emissions of GHG emissions would be potentially significant. While implementation of MM 4.7-1 through MM 4.7-3 and the 2014 RTP mitigation measures would encourage reduction in GHG emissions at a regional level, they do not provide a mechanism that guarantees GHG emission reductions on a cumulative basis. Kern County also lacks the jurisdiction and control over the many cumulative sources of GHG emissions, and over the global source of GHG emissions, that collectively contribute to climate change. Many other agencies with the requisite jurisdiction are taking steps to reduce GHG emissions; however, the County cannot assure that these steps will ultimately be implemented or sufficient to address global climate change. Therefore, Impact 4.7-2 would remain significant and unavoidable.

### Mitigation Measures

Implement MM 4.7-3, as described above.

### Level of Significance After Mitigation

Impacts would be significant and unavoidable.

## 4.7.5 Cumulative Setting, Impacts, and Mitigation Measures

## Cumulative Setting

As discussed previously, impacts associated with GHG emissions are cumulative in nature, rather than Project-specific. Refer to Section 4.7.1, Introduction, for a discussion of the cumulative setting for GHG emissions.

Under AB 32, CARB, which is the agency in charge of regulating sources of emissions of GHGs in California, has been tasked with adopting regulations for the reduction of GHG emissions. The effects of this Project are evaluated based not upon the quantity of emissions, but rather on whether the Project is consistent with reduction strategies identified in AB 32, the governor's EOs S-3-05 and B-30-15, or other strategies to help toward reducing GHGs to the proposed levels. If so, it could reasonably follow that the Project would not result in a significant contribution to the cumulative impact of global climate change.

The geographic scope for cumulative impacts for GHGs includes the area within 6 miles of the external Project Area boundary, and areas (e.g., incorporated cities) within the Project Area. While projects in the region and the larger area affect the volume of GHG in the atmosphere, by focusing on plans scheduled to be implemented within the Project Area and in the vicinity of the Project Area, the analysis of cumulative impacts can be given a regional context.

### Impact 4.7-3: Cumulative Greenhouse Gas Emissions Impacts

The Kern County 2005 base year GHG emissions inventory was estimated to be 27 $MMTCO_2e$/year, of which the Fossil Fuel Industry sector represents 40%, followed by the Electricity Consumption sector at 22% (Table 4.7-5). The 2020 forecasted GHG emissions inventory was estimated to be 27 $MMTCO_2e$/year of which the Electricity Consumption sector represents 31% followed by the Fossil Fuel Industry sector at 26% (SJVAPCD 2012).

As shown in Table 4.7-9, Project-related unmitigated GHG emissions in 2012 (i.e., emissions before the application of AB 32 Cap-and-Trade Program and other GHG reduction requirements) were 16.95 $MMTCO_2e$/year and would be 32.40 $MMTCO_2e$/year in 2035. The total for mitigated emissions in 2035 would be lower, after application of emission reduction credits and mitigation.

Plans considered in this analysis include the Kern Council of Governments (COG) Regional Transportation Plan (RTP) (see Section 4.7.3, Regulatory Setting, for description) which provides regional-scale measures to regulate, monitor, and control GHG emissions in Kern County. The

RTP is based on an analysis that considers the entire County, and includes all projects involving changes in regional growth and land use in Kern County, as well as the countywide vehicle traffic projections. Cumulative GHG emissions analyzed in the RTP were compared to regional GHG thresholds and analyzed under statewide plans and regulations. This analysis concluded that the projected increase in GHG emissions from existing conditions to 2040 would primarily be due to changes in regional growth/land use; however, the RTP achieves GHG emissions reduction targets from mobile sources from 2005 levels by implementing a mix of land use strategies, transportation management, economic factors, and road projects.

As discussed previously, impacts associated with GHG emissions are cumulative in nature, rather than Project-specific. These impacts are addressed above under Impact 4.7-1 and Impact 4.7-2. As discussed under Impact 4.7-1, all significant Project GHG emissions are subject to the statewide GHG Cap-and-Trade program. Further, as discussed under Impact 4.7-2, the Project is anticipated to be consistent with the adopted California Climate Change Scoping Plan, CARB's GHG Cap-and-Trade Program, and other applicable adopted standards and regulations.

The Kern COG RTP recommends the implementation of six mitigation measures that would reduce cumulative GHG emissions through the adoption of measures and policies that encourage GHG emissions reduction in regional plans, adoption of Climate Action Plans by local agencies, and using BACT during construction and operation of implemented projects.

## Consistency with EO S-3-05 and EO B-30-15

As described above, EO S-3-05 establishes a goal that statewide GHG emissions be reduced to 80% below 1990 levels by 2050. EO B-30-15 sets forth an interim goal for reduction in GHG emissions to 40% below 1990 levels by 2030. This analysis considers the Project's consistency with the GHG emission reduction goals set forth in both EOs. This analysis is provided consistent with the recent appellate court decision in Cleveland National Forest Foundation, et al. v. San Diego Association of Governments (2014) 231 Cal.App.4th 1056 (SANDAG) (currently pending review by the California Supreme Court), which concluded that CEQA requires an EIR to analyze whether a project's GHG emissions are consistent with the emission reduction goals set forth in EO S-3-05.

This consistency analysis is provided for informational purposes only; the County has not established the statewide goals set forth in the EOs as thresholds of significance. The County does not believe that the 2050 target or the 2035 interim target are appropriate significance criteria for this Project. Rather, AB 32, which requires a reduction of statewide GHG emissions to 1990 levels by 2020, and which also imposes the legal obligation to continue existing policies and maintain emission reductions beyond 2020, is the current law in California. The County is not in a position to speculate as to how the Legislature will move the State forward from the 2020 mandate to achieve further reductions in future years. In addition, as an independent political subdivision of the State the County has independent authority, under both its police power and pursuant to CEQA, to establish thresholds of significance.

The County does not believe that the general directives in the EOs to reduce statewide GHG emissions from 1990 levels by 40% in 2030 and 80% in 2050 are legal mandates or required to be included as a significance threshold under the CEQA.

Further, the 2030 target of 40% below 1990 emissions and the 2050 target of an 80% reduction are general statewide goals. While AB 32 has a similar statewide goal, AB 32 been implemented on a detailed, sector-by-sector basis, with different sectors being responsible for different levels of reductions. It is impossible for the County to predict what percentage of reduction would be required of the oil and gas industry to help achieve the statewide 2030 and 2050 targets. Assigning an across-the-board 40% or 80% reduction from 1990 levels to the oil and gas industry in Kern County is not consistent with the manner in which GHG reductions have been and are being achieved under AB 32.

Based on current projections, it is anticipated that Project GHG emissions from the oil and gas industry in Kern County will result in additional GHG emissions as set forth in Table 4.7-9.

CARB designed the Cap-and-Trade Program so that most of the future cumulative GHG emission reductions from the oil and gas sector and other covered industries ensure the State achieves AB 32's 2020 GHG reduction target and continues a downward trajectory of emissions post-2020, consistent with the EOs' long-term GHG emission reduction goals. As stated in the Scoping Plan Update, "the Cap-and-Trade Regulation provides assurances that California's 2020 limit will be met because the regulation sets a firm limit on 85% of California's GHG emissions" (Scoping Plan Update, pp. 86-87). While the current cap is set to ensure California complies with AB 32's emission reduction target of returning to 1990 levels by 2020, the Scoping Plan also makes clear that the AB 32 GHG reduction program "will continue to be a vital component in achieving California's longer-term climate change goals" (Id. at p. 87). Consistent with AB 32, the Cap-and-Trade Program will be used "to maintain and continue reductions in emissions of greenhouse gases beyond 2020" (Health & Saf. Code, § 38551, subd. (b); see also Climate Change Scoping Plan, p. ES4 ["Looking out into the future, the Cap-and-Trade Program will play a critical role in keeping California on the right emissions reduction trajectory to meet ongoing reduction targets at the lowest possible cost."]) Thus, the Cap-and-Trade Program constitutes an existing flexible and adaptive approach capable of ensuring oil and gas operations within the State will allow the State to achieve either EO B-30-15's 2030 GHG target or EO S-3-05's 2050 GHG target. As a result, the County finds that the proposed Project will not interfere with the ability of the State to achieve either EO B-30-15's 2030 GHG target or EO S-3-05's 2050 GHG target. The County concludes that the proposed Project as mitigated is consistent with the goals of both EOs.

Note that there are numerous Legislative proposals to adopt interim targets, and long-term targets, for GHG reductions remain pending as of issuance of this Draft EIR (DEIR). If enacted, new legal mandates will be addressed in the Final EIR (FEIR).

Impacts from the Project on cumulative GHG emissions would be potentially significant. While implementation of MM 4.7-1 through MM 4.7-3 and the 2014 RTP mitigation measures would encourage reduction in GHG emissions at a regional level, they do not provide a mechanism that guarantees GHG emission reductions on a cumulative basis. Kern County also lacks the

jurisdiction and control over the many cumulative sources of GHG emissions, and over the global source of GHG emissions, that collectively contribute to climate change. Many other agencies with the requisite jurisdiction are taking steps to reduce GHG emissions; however, the County cannot assure that these steps will ultimately be implemented or sufficient to address global climate change. Therefore, Impact 4.7-3 would remain significant and unavoidable.

## Mitigation Measures

Implement MM 4.7-4, as described above.

## Level of Significance After Mitigation

Impacts would be significant and unavoidable.

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Section 4.8

# Hazards and Hazardous Materials

Section 4.8

# Hazards and Hazardous Materials

## 4.8.1 Introduction

This section describes the affected environment and regulatory setting for hazards and hazardous materials. It also describes the hazards and hazardous materials impacts that would result from implementation of the Amendment to Chapter 19.98 (Oil and Gas Production) and related ordinance amendments to the Kern County Zoning Ordinance (Project) and related ordinances, and mitigation measures that would reduce these impacts, if necessary.

Hazards associated with seismic conditions are addressed in Section 4.6, Geology and Soils, of the Environmental Impact Report (EIR). Although this section does address the impacts of releases of hazardous materials, the impacts of the effects of potential releases relating to water quality and biological resources are also discussed in Section 4.9, Hydrology and Water Quality, and Section 4.4, Biological Resources, of the EIR.

## 4.8.2 Environmental Setting

This section defines the existing potential hazards within the Project Area to establish a baseline from which impacts associated with the Project can be measured. A complete description of the proposed Project Area including the regional location, project boundary, and surrounding land uses can be found in Chapter 3, Project Description, of this EIR. The environmental setting for hazardous materials, air traffic, low frequency noise, disease vectors, fire hazards, and the unearthing or exposure of hazardous wastes and contaminated soil or groundwater that have the potential to affect human health are presented in this section.

## Hazardous Materials and Waste

A hazardous material is any substance that, because of its quantity, concentration, or physical or chemical properties, may pose a hazard to human health and the environment. Under Title 22 of the California Code of Regulations (CCR), the term “hazardous substance” refers to both hazardous materials and hazardous wastes. Both of these are classified according to four properties: (1) toxicity; (2) ignitability; (3) corrosiveness; and (4) reactivity (CCR Title 22, Chapter 11, and Article 3). A hazardous material is defined in CCR, Title 22 as:

A substance or combination of substances which, because of its quantity, concentration, or physical, chemical or infectious characteristics, may either (1) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or (2) pose a substantial present or potential hazard to human health or environment when improperly treated, stored, transported or disposed of or otherwise managed (CCR, Title 22, Section 66260.10).

Hazardous materials in various forms can cause death, serious injury, long-lasting health effects, and damage to buildings, homes, and other property. Hazards to human health and the environment can occur during production, storage, transportation, use, or disposal of hazardous materials.

The California Department of Toxic Substances Control (DTSC) defines hazardous waste as a waste with properties that make it potentially dangerous or harmful to human health or the environment. They can be the by-products of manufacturing processes, discarded used materials, or discarded unused commercial products, such as cleaning fluids (solvents) or pesticides. In regulatory terms, a hazardous waste is a waste that exhibits one of the four characteristics of a hazardous waste: ignitability, corrosivity, reactivity, or toxicity. However, materials can be hazardous waste even if they are not specifically listed or do not exhibit any characteristic of a hazardous waste. For example, "used oil," products, which contain materials on California's M-list (which includes certain wastes known to contain mercury, materials regulated pursuant to the mixture or derived-from rules, and contaminated soil generated from a "clean up,") can also be hazardous wastes.

## Transportation of Hazardous Materials

Hazardous materials could be shipped to, through, or from Kern County via truck, rail, and pipeline. The exact point of origin of hazardous materials that are used in the oilfields is not known. Individual companies or operators use different suppliers or oilfield services companies that could produce materials locally or transport them from wholesalers throughout the country or world.

Crude oil is transported to Kern County via truck, pipeline, or rail. However, no oil or gas produced in Kern County is shipped by rail. It is either trucked out or transported via pipelines.

Natural gas liquids are stored and sold through a natural gas liquids tanker truck loading facility or sales pipelines. A natural gas liquids loading facility typically consists of tank storage and tanker truck loading racks for delivery to offsite purchasers. Natural gas is delivered to these facilities via pipelines from gas processing facilities. Processed natural gas is then either transported through sales pipelines to sales metering stations to natural gas purchasers, or may be combusted as fuel for gas-fired equipment, or re-injected in oilfield operations for reservoir pressure maintenance.

The transportation of hazardous materials within the state of California is subject to various federal, state, and local regulations. The California Highway Patrol (CHP) restricts transportation of hazardous materials to specific routes. Information on CHP requirements and regulatory authority is provided in Section 4.8.3, Regulatory Setting, below.

The following paragraphs provide more details about the modes of hazardous material transport in the Project Area.

## Trucks

Truck transportation of hazardous materials is commonly utilized for transporting smaller quantities of a product compared to the volume of materials that could be transported by rail or pipeline.

Crude oil is distributed to refineries or to offsite storage facilities using tanker trucks. Two to 5% of crude oil produced in Kern County is transported via tanker trucks to central facilities. Trucks may carry crude oil to local refineries or to a facility where it is placed into a pipeline system. In either case, crude oil would be loaded into tanker trucks directly from the operation's onsite storage facility. The three refineries and related storage distribution facilities in Kern County are equipped to accept oil from tanker trucks. Crude oil at storage distribution facilities would later be pumped into a distribution pipeline or tanker trucks to transport the crude oil to offsite locations.

A typical tanker truck is able to transport 9,000 gallons of crude oil. The transportation of crude oil via tanker truck is regulated by the California Department of Transportation (Caltrans) and U.S. Department of Transportation (USDOT) motor carrier regulations.

## Pipelines

Crude oil is transported from the Project Area to refineries via pipeline. Refineries are located throughout the state including within the Project Area. Figure 4.8-1 illustrates the locations that transport crude oil and refineries where it could be processed. Inland California crude oils are typically first piped to local refineries in Bakersfield and Santa Maria due to their proximity. The balance of the inland crude oils are piped to Northern and Southern California refineries (Sheridan 2006).

In the Project Area, pipelines connect wells to tanks that separate oil from the other extracted liquids (primarily "produced water" from the same geologic strata as the oil or gas, along with water and additives that may be injected as steam or liquid to help extract the oil). Wells also have waste gas collection lines. Aboveground pipelines connect the thermal generator to the injection sites used for thermal enhanced oil recovery production. Pipelines are also required to pump water, steam, or other substances into the reservoir during well stimulation and enhanced oil recovery procedures. Types of pipelines in the Project Area include those discussed in Chapter 3, Project Description, and include flow lines, injection lines, steam lines, casing vapor recovery gas lines, gathering lines, and headers. In general, most pipelines are installed aboveground but may be installed underground to cross roadways. Some portions of pipelines are installed aboveground on the surface of the well pad.

Figure 4.8-2 depicts a fluid flow line from a well to a tank battery at San Joaquin Facilities Management (San Joaquin Facilities Management Production Facility Spill Contingency Plan). Figures 4.8-3 and 4.8-4 depict pipelines with other oil and gas facilities.

## Rail

Rail is used as one of the modes of transport for hazardous materials utilized in oil and gas

activities within the Project Area, and is used to transport crude oil to the Project Area, but not to transport crude oil generated within the Project Area. Rail transportation of hazardous materials in the United States is a primary method of moving large quantities of chemicals over long distances. Recent statistics show that the rail industry's safety performance is improving. The majority of hazardous materials shipped by rail tank car annually arrive without incident. For all hazardous materials, in the 12 years from 1994 through 2005, hazardous materials released in railroad accidents resulted in a total of 14 fatalities. In the same period, hazardous materials released in highway accidents resulted in a total of 116 fatalities (FRA 2015a). The number of train derailments per year has been reduced by over 46% nationwide from 2005 to 2014. In 2014, there were 1,242 derailments nationwide including all modes of rail transit. In that same year, 7,532 railcars carried hazardous materials. Rail incidents in 2014 resulted in 15 releases of hazardous materials, representing a 61% reduction from 2005. Kern County specifically has seen a 25% reduction in train accidents from 2005 to 2014 across all modes of rail transport. From 2005 to 2014, 516 railcars passed through the County carrying hazardous materials, but only three were involved in incidents resulting in a release (FRA 2015b).

## Hazardous Materials Used During Oil and Gas Drilling

To facilitate drilling and completions operations, temporary facilities, equipment, and materials may be set up and stored on the well pad (e.g., drilling mud supplies, water, drilling materials and casing, crew support trailers, pumps and piping, portable generators, field flares, fuels and lubricants). Containments (i.e., temporary pits, operations sumps, and/or portable tanks) may be set up to store drilling fluids, wellbore cuttings, and drilling wastes. Portable tanks may also be set up to mix and store other needed liquids or slurries, such as drilling fluids and completion fluids.

Table 4.8-1 provides a representative list of materials used in Kern County oil and gas drilling in 2014.

**Table 4.8-1: Representative List of Potentially Hazardous Materials Used in Kern County Oil and Gas Drilling and Production in 2014 Excluding Well Stimulation**

| Type of Material | Examples of the Material Type |
|---|---|
| Aerosol | Degreaser, Paints |
| Compressed Gases | Acetylene, Air, Ammonium Chloride, Anhydrous Ammonia, Argon, Butane, Calibration Gas, $CO_2$, CO, Chlorine, Helium, Nitrogen, Oxygen, Ethane, Fire Extinguishing Agent, Hydrogen, Isobutane, Butane, Propane, Methane, Nitric Oxide, Mixed Gases Pentane, Sulfur Hexafluoride, Stargon, Welding Gas |
| Fuel, Oils, and Lubricants | Motor Oils (10/40, 30, 40, 80-90), Gear Oil/Grease/Gear Lube Oil Lube Oil, Synthetic Grease, Diesel (Clear, RRR, #1, #2, Red), Crankcase Oil, Gas Engine Oil (40, 80W90), Cylinder Oil, Compressor Oil, Rock Drill Oil, Turbine Oil, Hydraulic oil, Heat Tran/Oil, Industrial Oil, Jet Oil, Refrigeration Oil, Hydraulic Fluid |
| Liquid | Acetic Acid, Hydrochloric Acid, Citric Acid, Emulsifiers, Ammonium Products, Biocides, Anti Foam, Antifreeze, Urea Solution, Aromatic Fluid, Dispersant, Inhibitors, Bacteriacide, Corrosion Inhibitor, Demulsifier, Sulfur |

**Table 4.8-1: Representative List of Potentially Hazardous Materials Used in Kern County Oil and Gas Drilling and Production in 2014 Excluding Well Stimulation**

| Type of Material | Examples of the Material Type |
|---|---|
| | Scavenger, Water Clarifier, Scale Inhibitor, Water Additive, Degreaser, Emulsion Breaker, Biocide, Bleach, Flocking Agent, Reverse Emulsion Breaker, Reverse Demulsifier, Asphalt Emulsions, Caustic Soda Liquid, Chlorine, Chelant, Cleaner, Coolant, Defoamer, Anti-Sludging Agent, pH Balancer, Oxygen Scavenger, Cooling Water Treatment, Microbiocide, Paint, Ethylene Glycol, Ethyl Mercaptan, Glycol, H2S Scavenger, Hydrogen Peroxide, Isopropanol, Isopropyl Alcohol, Naptha, Parafin Inhibitor, Methanol, Mineral Spirits, Paraffin Dispersant, Polymer, Radiator Fluid, Scale Remover, Soap, Sodium Hydroxide, Sodium Hypochlorite, Sulfide Scavenger, Sulfuric Acid, Surfactant, Triethylene Glycol, Water Clarifier |
| Liquid Solvent | Cleaning Solvents, Aromatic Solvent, Paraffin Solvent, Cleaning Solvent, Perchloroethylene, Petroleum Distillate, Safety Solvent, Solvents, Stoddard Solvents |
| Natural Gas | Compressed Natural Gas<br>Liquefied Natural Gas |
| Natural Gas Condensate | Condensate Treater EA301 |
| Radioactive | Calibration Nuclide V997, Well Logging Nuclide Cy4, Well Logging Nuclide |
| Solid | Shape Charges, Detonators, Blasting Caps, Polymers, Resins, Batteries, Bactericide, Ignitors, Barite, Acids, Breakers, Emulsifiers, Caustic Soda, Chelating Agents, Stabilizers, Coal, Corrosion Inhibitor, Crosslinkers, Catalysts, Dispersing Agents, Mercaptan, Surfactant, FLOCTREAT, Bulbs, Solvents, Gelling Agents, Graphite, Extender, Acids, Intensifier, Absorbents, Curing Agents, Anti Microbials, Diverting Agent, Wetting Agents, Oil Filters, Perlite, Explosives, Phase Treat, Polypropylene, Propellants, Primer Cord, Sack Black, SCALE TREAT, SCAVTREAT, Sludge, Soda Ash, Sodium Products, Degreaser, |

Source: Prepared from hazardous materials inventories obtained from the Kern County Environmental Health Division (KCEH)

Other nonhazardous materials used during oil and gas drilling include, but are not limited to, clays, sands, cements, diatomaceous earth, salts, cellulose, proppants, limestone, fire retardants, coal, fibers, gums, and fly ash.

Based on hazardous materials inventories obtained from Kern County Environmental Health Division (KCEH), the following table summarizes the maximum volumes and maximum container size of hazardous and acutely hazardous substances that are stored on site at oilfields in Kern County. Businesses in California must include a hazardous material inventory disclosure as part of their business plan. The chemicals in the hazardous materials inventory must be reported in gallons, pounds or cubic feet at standard temperature and pressure. The selected units for each substance are commodity based, reportable quantities or on how the material is stored.

**Table 4.8-2: Maximum Daily Onsite Volumes**

| Substance | Maximum Onsite Volume | Maximum Container Volume |
|---|---|---|
| Produced Water | 2,520,000 Gallons | 840,000 Gallons |
| Crude Oil | 12,096,000 Gallons | 672,000 Gallons |
| Condensate | 89,274,490 Pounds | 9,916,100 Pounds |
| Natural Gas | 25,316 Cubic Feet | 25,316 Cubic Feet |
| Gasoline/Diesel | 20,000 Gallons | 10,000 Gallons |
| Acetic Acid | 22,730 Pounds | 2,640 Pounds |
| Sulfuric Acid 93% | 750 Gallons | 750 Gallons |
| Sodium Hydroxide | 82,740 Gallons | 42,000 Gallons |
| Explosives | 4,000 Pounds | 4,000 Pounds |
| Liquefied Natural Gas | 19,000 Gallons | 19,000 Gallons |
| Butane | 808,500 Gallons | 808,500 Gallons |
| **Acutely Hazardous Materials** | | |
| Anhydrous Ammonia | 16,500 Pounds | 15,000 Pounds |
| Hydrochloric Acid | 831,572 Pounds | 15,000 Pounds |
| Oxygen Difluoride (compressed gas) | 500 Cubic Feet | 500 Cubic Feet |
| Acetic Acid 80% in Water (KCEH 2014- Peracetic Acid) | 990 Gallons | 55 Gallons |

Source: Prepared from hazardous materials inventories obtained from KCEH

## Hazardous Materials Used for Well Stimulation

Oil well stimulation can involve using pressure, heat, or chemicals to increase the flow of oil and/or gas to wells. Steam injection and waterflooding had been the methods used historically in California (Ritzius 1993). Well stimulation treatments (WST) as defined by SB 4 are designed to enhance oil and gas production or recovery by increasing the permeability of the formation. WST operations are one form of well completion operations. The operations are a short-term and non-continual process for the purposes of opening and stimulating channels for the flow of hydrocarbons. WST is used in Kern County and is necessary in certain formations in order for the wells to produce oil and natural gas. WST used in Kern County are described in Section 3.5.3 Construction Activities in Detail. The primary methods used in Kern County are acid-based well stimulation and hydraulic fracturing.

Acid-based WST operations as defined by SB 4 use either hydrochloric acid or hydrofluoric acids and mud acids. Flowback fluids, including produced water and oil, are sent to production facilities

for treatment, after which some flowback waters are disposed of in injection wells or through evaporation and percolation ponds. Some of the same chemicals used in acid-based WST are also used in non-SB 4 routine maintenance activities, though at reduced volumes that do not trigger the application of SB 4. Hydraulic fracturing uses a variety of hazardous and nonhazardous materials. The materials used for hydraulic fracturing vary from company to company and field to field. Table 4.8-3 lists the calculated total weights of the hydraulic fracturing fluid components used in greatest quantity and those with the highest toxicity in Kern County over the three-year period of available data. To determine the quantities of hazardous and nonhazardous compounds used in hydraulic fracturing in Kern County, estimates were calculated based on component concentrations and water volumes used by oil and gas applicants in Kern County as reported on their voluntary well disclosure forms obtained at https://fracfocus.org/, and accessed on January 28, 2015 (Fracfocus 2015).

According to a September 3, 2014, *Draft Kern Oil and Gas EIR* prepared by WZI, Inc., 81% of oil and gas wells in Kern County are owned by six operators: Aera Energy, LLC; Chevron USA, Inc.; Occidental Oil and Gas (now California Resources Corporation); Berry Petroleum; San Joaquin Facilities Management; and Vintage Production of California. The remaining 19% of wells in the Project Area are owned by a number of other operators. (The identified companies and estimated percentages are subject to change as a result of commercial transactions in the industry since 2014.) For wells that were hydraulically fractured, average volumes of water used in hydraulic fracturing were calculated by randomly selecting 10 disclosure forms for each operator who filed forms and calculating their average per well water use. Forms were obtained from a three-year time period where data was available for all of the largest operators who submitted forms from January 2012 through December 2014. Of the top six oil and gas operators, notification forms were only available from Aera Energy, LLC; Chevron USA, Inc.; California Resources Corporation (previously Occidental Oil and Gas); and Vintage Production of California. Because each operator reported a similar mixture of components on most all of its notification forms, the component concentrations used to calculate component quantities were taken from one of the notification forms for each operator that appeared to be representative. Average water use for each operator was converted into pounds then converted into a total average volume of fracturing fluid used by each operator using the reported total additive concentrations from the representative disclosure forms.

**Table 4.8-3: Select Hydraulic Fracturing Fluid Components Used in Kern County from 2012 through 2014**

| Fluid Component Name | Aera | | Chevron | | Occidental | | Total of Fluid Components per well fracked in pounds | Total Fluid Components in Pounds for all wells fracked 2012-2104 by these operators |
|---|---|---|---|---|---|---|---|---|
| | % total volume in Frac Fluid | Total Weight | % total volume in Frac Fluid | Total Weight | % total volume in Frac Fluid | Total Weight | | |
| Water | 75.21 | 812,763 | 72.89 | 3,727,257 | 77.99 | 1,652,496 | | |
| Crystalline Silica (silica sand) | 20.92 | 170,000.24 | 29.10 | 1,084,657.51 | 7.41 | 122,419.85 | 1,377,077.60 | 2,597,168,351.88 |
| P/F Resin | | | | | 0.36 | 5,912.96 | 5,912.96 | 11,151,841.95 |
| Hexamethylenetetramine | | | | | 0.00 | 11.90 | 11.90 | 22439.57 |
| Water in additives | 0.15 | 1,209.55 | 0.10 | 3,564.38 | 4.72 | 77,963.92 | 82,737.84 | 156,043,575.00 |
| Hydrochloric Acid | | | | | 0.83 | 13,637.22 | 13,637.22 | 25,719,796.45 |
| Guar Gum | 0.23 | 1,853.02 | 0.13 | 4,756.73 | 0.47 | 7,829.85 | 14,439.60 | 27,233,081.79 |
| Petroleum Distillates | 0.11 | 926.47 | | | 0.24 | 3,914.93 | 4,841.40 | 9,130,872.20 |
| Paraffinic Petroleum Distillates | 0.11 | 926.47 | | | 0.24 | 3,914.93 | 4,841.40 | 9,130,872.20 |
| 1-butoxy 2-propanol | 0.02 | 154.42 | | | 0.04 | 652.57 | 807.00 | 1,521,993.41 |
| Isotridecanol, ethoxylated | 0.02 | 154.42 | | | 0.04 | 652.57 | 807.00 | 1,521,993.41 |
| Potassium Carbonate | | | | | 0.32 | 5,270.47 | 5,270.47 | 9,940,105.28 |
| Glyoxal | | | | | 0.081 | 1,341.33 | 1,341.33 | 2,529,749.62 |
| Sodium tetraborate | 0.03 | 246.10 | | | 0.027 | 447.17 | 693.27 | 1,307,507.02 |
| D-glucitol | | | | | 0.027 | 447.17 | 447.17 | 843,353.76 |
| Sodium hydroxide | 0.01 | 82.01 | 0.01 | 202.39 | 0.014 | 223.58 | 507.98 | 958,051.18 |
| Methanol | | | | | 0.063 | 1,047.85 | 1,047.85 | 1,976,240.28 |
| Oxyalkylated Alkylphenols | | | | | 0.034 | 558.87 | 558.87 | 1,054,036.37 |

**Table 4.8-3: Select Hydraulic Fracturing Fluid Components Used in Kern County from 2012 through 2014**

| Fluid Component Name | Aera | | Chevron | | Occidental | | Total of Fluid Components per well fracked in pounds | Total Fluid Components in Pounds for all wells fracked 2012-2104 by these operators |
|---|---|---|---|---|---|---|---|---|
| | % total volume in Frac Fluid | Total Weight | % total volume in Frac Fluid | Total Weight | % total volume in Frac Fluid | Total Weight | | |
| Polyoxyalkylene | | | | | 0.024 | 390.82 | 390.82 | 737,077.47 |
| Oxyalkylated Amine | 0.06 | 456.61 | | | 0.0051 | 83.78 | 540.39 | 1,019,178.74 |
| Yeast Extract | | | | | 0.0021 | 34.37 | 34.37 | 64,825.42 |
| Tryptone | | | | | 0.0021 | 34.37 | 34.37 | 64,825.42 |
| Thiourea Polymer | | | | | 0.0063 | 104.60 | 104.60 | 197,281.20 |
| Fatty acids | | | | | 0.0063 | 104.60 | 104.60 | 197,281.20 |
| Propargyl Alcohol | | | | | 0.0021 | 34.87 | 34.87 | 65,760.40 |
| Olefin | | | | | 0.0011 | 17.52 | 17.52 | 33,036.03 |
| Nonhazardous ingredient (Trade Secret) | | | | | 0.034 | 568.13 | 568.13 | 1,071,489.37 |
| Calcined Diatomaceous Earth | 0.00150 | 12.19 | | | 0.021 | 352.64 | 364.83 | 688,076.92 |
| Complex Ester | | | | | 0.0064 | 105.76 | 105.76 | 199,462.83 |
| Heavy Aromatic Naphtha | | | | | 0.0021 | 35.20 | 35.20 | 66,383.72 |
| Mineral Oil | | | | | 0.0011 | 17.68 | 17.68 | 33,347.69 |
| Ethylene-vinyl Acetate Copolymer | | | | | 0.0011 | 17.68 | 17.68 | 33,347.69 |
| Naphthalene | | | | | 0.0002 | 3.47 | 3.47 | 6,544.87 |
| Citric Acid | | | | | 0.029 | 474.27 | 474.27 | 894,466.11 |
| Erythorbic Acid | | | | | 0.0100 | 164.59 | 164.59 | 310,414.02 |

**Table 4.8-3: Select Hydraulic Fracturing Fluid Components Used in Kern County from 2012 through 2014**

| Fluid Component Name | Aera | | Chevron | | Occidental | | Total of Fluid Components per well fracked in pounds | Total Fluid Components in Pounds for all wells fracked 2012-2104 by these operators |
|---|---|---|---|---|---|---|---|---|
| | % total volume in Frac Fluid | Total Weight | % total volume in Frac Fluid | Total Weight | % total volume in Frac Fluid | Total Weight | | |
| Isopropanol | | | | | 0.0082 | 134.84 | 134.84 | 254,315.10 |
| 1,2,4 Trimethylbenzene | | | | | 0.0004 | 6.78 | 6.78 | 12,778.09 |
| Light aromatic naphtha | | | | | 0.0004 | 6.78 | 6.78 | 12,778.09 |
| Triethanloamine | | | 0.0266 | 989.59 | | | 989.59 | 1,866,360.59 |
| Monoethanolamine Borate | | | 0.0238 | 885.60 | | | 885.60 | 1,670,234.56 |
| Polydimethyl diallyl ammonium chloride | | | 0.0166 | 617.98 | | | 617.98 | 1,165,508.80 |
| Sodium persulfate | | | 0.0141 | 526.29 | | | 526.29 | 992,580.47 |
| Sodium polyacrylate | | | 0.0116 | 430.50 | | | 430.50 | 811,919.58 |
| Diethanolamine | | | 0.0080 | 298.18 | | | 298.18 | 562,368.54 |
| Hemicellulase enzyme | 0.0028 | 22.92 | 0.0049 | 182.64 | | | 205.56 | 387,677.68 |
| Sodium bisulfite | | | 0.0019 | 71.19 | | | 71.19 | 134,265.49 |
| Lactose | | | 0.1632 | 6,082.88 | | | 6,082.88 | 11,472,318.19 |
| Ammonium chloride | | | 0.0083 | 308.99 | | | 308.99 | 582,754.40 |
| Bentonite and benzyl (hydrogenated tallow alkyl) dimethylammonium stearate complex | | | 0.0064 | 237.80 | | | 237.80 | 448,488.91 |
| Silica gel | | | 0.0013 | 47.71 | | | 47.71 | 89,978.97 |

**Table 4.8-3: Select Hydraulic Fracturing Fluid Components Used in Kern County from 2012 through 2014**

| Fluid Component Name | Aera | | Chevron | | Occidental | | Total of Fluid Components per well fracked in pounds | Total Fluid Components in Pounds for all wells fracked 2012-2104 by these operators |
|---|---|---|---|---|---|---|---|---|
| | % total volume in Frac Fluid | Total Weight | % total volume in Frac Fluid | Total Weight | % total volume in Frac Fluid | Total Weight | | |
| Sodium chloride | 0.0022 | 17.47 | 0.0002 | 6.71 | | | 24.18 | 45,610.01 |
| Sodium sulfate | | | 0.0000 | 1.49 | | | 1.49 | 2,811.84 |
| Ethylene glycol | 0.0303 | 246.10 | | | | | 246.10 | 464,153.26 |
| Ammonium persulfate | 0.0042 | 33.97 | | | | | 33.97 | 64,074.00 |
| 2-Butoxy 1-propanol | 0.0004 | 3.09 | | | | | 3.09 | 5,824.91 |
| 5-Chloro 2-methyl 4-isothiozolin 3-one | 0.0003 | 2.03 | | | | | 2.03 | 3,832.18 |
| Magnesium nitrate | 0.0003 | 2.03 | | | | | 2.03 | 3,832.18 |
| 2-Methyl 4-isothiozolin 3-one | 0.0001 | 1.06 | | | | | 1.06 | 1,992.73 |
| Magnesium chloride | 0.0001 | 1.06 | | | | | 1.06 | 1,992.73 |

Component concentrations are reported on the disclosure forms by weight percent of total fluid, so the total weight of components used could be calculated by multiplying the average fluid volumes by the component concentrations. The calculated weights of fluid components were then multiplied by the total number of well disclosure forms submitted by each operator over the three-year time period where data were available. The weights of all reported components represent the total weight of each used during the three-year period ending December 2014. Because 19% of the wells drilled in Kern County are owned by operators for which data were not obtained, the calculated weights of component materials used in hydraulic fracturing should be increased by a factor of 0.25 to account for all operators and all wells in Kern County under the assumption that the remaining 19% of fractured wells by operators not represented in the data set have similar water and component use as the available data. Appendix R, Table C-1 presents a list of all compounds used in hydraulic fracturing in Kern County from December 2013 through May 18, 2015, reported to the California Department of Conservation Division of Oil, Gas, and Geothermal Resources (DOGGR) through representative interim WST notices.

## Hazardous Waste Generated During Oil and Gas Activities, Transport, and Disposal

Table 4.8-4 summarizes the types of waste generated by the oil and gas industry in Kern County. The hazardous materials/waste inventory data for 2014 was collected from the KCEH Division. These records were obtained for the oil and gas industry by identifying the inventories of all businesses who reported oil- and gas-related standard industry classification (SIC) code of 1311, 1321, 1382, or 1389.

**Table 4.8-4: Wastes Reported in Kern County Oil and Gas Exploration and Production in 2014**

| |
|---|
| **Batteries:** Spent Alkaline Batteries, Spent Nicad Batteries, Lead Acid Batteries; Spent Alkaline Batteries, Spent Lead Acid Batteries, Waste Batteries, Auto Battery, Lithium Thionyl Chloride Batteries |
| **Fluorescent Lights:** Used Fluorescent Light Tubes, Spent Fluorescent Lights |
| **Filters:** Waste - Filters Fuel, Waste - Filters Oil/Glycol, Waste - Spent Filter Media, Waste Oil/Fuel Filters, Waste Oil Filter |
| **Aerosol Cans:** Aerosol Paints, Spent Aerosol Cans, Used Aerosol Cans, Universal Waste - Aerosol Cans |
| **Waste Water-** Crude Oil and Water |
| **Antifreeze:** Antifreeze-Waste, Waste Antifreeze |
| Waste Isopropyl Alcohol |
| Waste Test Acid |
| Waste Paint Thinner |
| Waste Glycol |
| Waste Amines Liquid |
| Waste Glycol |

**Table 4.8-4: Wastes Reported in Kern County Oil and Gas Exploration and Production in 2014**

| |
|---|
| Waste Perchloroethylene |
| Waste Water |
| Paint Waste |
| **Oils:** Waste - Used Oil, Motor Oil – Waste, Used Lube Oil, Used Oil Filters/Oil Waste Oil, Waste Motor Oil, Waste Oil Mixture, Motor And Lubricating Waste Oil, Waste Oil (Collected For Recycling), Waste Oil/Grease, Oily Waste; Oil Contaminated Solid Waste |
| **Sludge:** Waste – Sludge, Waste Oil Sludge, Waste Pipe Clean Out Sludge |
| **Solvent:** Nonaqueous Waste Solvent, Waste Solvent |
| **Degreaser:** Waste – Degreaser, Waste Degreaser |
| **Absorbent:** Waste - Oil Absorbent, Waste Absorbent |
| Waste - Universal Waste |
| Waste - Tank Bottom |
| Waste - Oilfield Debris |
| Waste Parts Washer |
| Waste Oil Pads |
| Waste Solid From Wash Rack |
| Uncharacterized Hazardous Waste |
| Waste Water Sump |
| Waste - Contaminated Waste Satellite Accumulation Point |
| Asbestos |
| Naturally-occurring Radioactive Material |

Source: Prepared from hazardous materials inventories obtained from KCEH

Under this Project, an estimated 267 pounds of classified waste would be generated per well drilled in Kern County. The actual amount will depend on the depth of the well. As discussed in the Regulatory Setting section, U.S. Environmental Protection Agency (EPA) regulations exempt drilling fluids, produced waters, and other wastes associated with the exploration, development, or production of crude oil and natural gas (oilfield wastes) from hazardous waste requirements under the Resource Conservation and Recovery Act (RCRA). California regulations exempt oilfield wastes from being designated a California Non-RCRA hazardous waste based on toxicity characteristics. However, California did not adopt the federal exemption and does not offer a blanket exemption from state hazardous waste requirements. Oifield wastes in California may be considered state hazardous waste and potentially subject to regulation, depending on how they are managed. The generator of the waste has an obligation to properly characterize the waste, either based on generator knowledge of the waste stream or waste-generator process, or by testing representative samples of the waste.

Oifield-related wastes that exhibit hazardous waste characteristics or that are listed hazardous wastes (e.g., spent solvents), and that are not otherwise excluded or exempt, are typically sent offsite for disposal at facilities authorized by the DTSC or are sent out of state for disposal. All hazardous waste transported from the oilfields must be transported by a state-certified transporter and taken to a state-certified hazardous waste facility. Two commercial hazardous waste disposal facilities used for waste disposal by producers are located in the vicinity of the Project Area: the Clean Harbors Buttonwillow Landfill operated by Clean Harbors, and the Waste Management Kettleman Hills facility in Kettleman City. The Clean Harbors Buttonwillow Landfill Facility conducts physical and chemical treatment, solidifies/stabilizes, landfills, neutralizes, and provides transportation services. The Kettleman Hills facility also solidifies/stabilizes, neutralizes, and landfills, but conducts fuel blending, chemical oxidation/precipitation, cyanide destruction, and polychlorinated biphenyl (PCB) services (Environmental, Health, and Safety Online 2015). Hazardous wastes from oil and gas activities are primarily sent to these facilities, with some specialized wastes sent to other facilities.

## Nonhazardous Oil and Gas Waste - Storage, Transport, Disposal

### Solid and Liquid Wastes

During production, nonhazardous solid wastes fall into two categories: (1) drilling and other wastes associated with exploration and production (E & P); and (2) other wastes. This discussion addresses drilling wastes. Wastes, such as construction material and other solid wastes, are discussed in Section 4.17, Utilities and Service Systems.

Drilling sumps are used to collect drilling fluids and cuttings, also known as “drilling muds,” which are produced during drilling operations. Drilling muds are nonhazardous. Drilling sumps are typically located adjacent to the well pad. Drilling muds must first be dried prior to back-filling. Operations sumps are used to store fluids and solids, which are produced during the life of the operational well as well as potential workover activities. Operations sumps can range from small pits located next to the well to centralized sumps that collect workover fluids at the well site and for transfer to centralized sumps for processing. The Central Valley Regional Water Quality Control Board (CVWRQCB) permits the operations of drilling sumps pursuant to statewide general orders, while operations sumps are permitted through site specific Waste Discharge Requirements (WDR).

### Produced Water

Drilling for oil and gas in California yields a mixture of oil, gas, and water from the formation; the water is separated from the oil and gas and stored in tanks and pits. This water is called “produced water” and is usually very brackish and unsuitable for human use. The water is commingled naturally in the same zone with the oil and natural gas. Produced water is brought up from the formation during oil or gas production and is not considered a hazardous waste. Because it was commingled with hydrocarbons in the formation, the water typically contains chemicals associated with the formations, such as salts, oils and greases, inorganic and organic chemicals, and naturally occurring radioactive material, that exceed state and federal standards for drinking water.

Produced water is managed in a number of ways, including reinjection for disposal or reuse for other purposes, such as steam generation, to support oil and gas production operations. In standard reinjection operations, injection wells may be located within the oilfield. The oil is separated from the water and the water is reinjected into the same formation from which it was originally recovered. In other instances, the produced water may be trucked from treatment tanks onsite to commercial injection facilities located apart from the oilfield operations.

Produced water may also be transported, via truck or pipeline to existing wastewater treatment facilities permitted to receive production water for disposal. Produced water collected in tanks is typically re-used for further extraction purposes, stored in surface impoundments where it percolates into groundwater and/or evaporates, or disposed of by injection well. The percolation ponds operate under WDRs issued by CVRWQCB. Some produced water requires treatment prior to disposal, and some produced water is treated and reclaimed for other purposes, as discussed further in Chapter 3, Project Description, Section 4.9, Hydrology and Water Quality, and Section 4.17, Utilities and Service Systems.

## Flowback

For WSTs, once the hydraulic fracturing procedure is completed, fluid flow reverses and the well is "cleaned up" by allowing oil and gas, produced water, base fluids, and excess proppant to flow back through the well to the surface. This process and the returned fluids are referred to as "flowback." Flowback may contain only a portion of the water originally used, as well as the same materials as were used in the fracturing fluids and naturally occurring constituents from the formation. Some materials in the fracturing fluids are consumed in the well (e.g., strong acids) or react during the fracturing process to form different chemicals (e.g., polymer precursors) (NYDEC 2011). Flowback may also be oil and gas and the associated produced water.

As discussed in Section 3.5.3 Construction Activities in Detail, after an acid well stimulation is performed, the used acid and sediments removed from the reservoir are washed out of the well. The flowback fluid from WSTs is handled in a number of different ways. In mature, developed field operations, the most likely scenario is that the well is connected to the field's oil and gas and produced water handling system, which would pipe the flowback fluid directly into this system. Once it is commingled with other fluids, separated, and treated, the spent acid, sediments and, in some cases, the produced water are disposed of using the common disposal practice of that field. As discussed elsewhere in this document, fluid disposal could be facilitated through waste injection wells or percolation ponds.

## Waste Gas

Some of the produced gas stream associated with oil production may contain constituents that make it unsuitable for resale or use in onsite facilities. In these instances, the produced gas stream is gathered via small pipelines using a system of vapor recovery units. Waste gas can be transported via pipeline to a dedicated "waste gas" injection well that disposes of the gas into depleted oil reservoirs. Waste gas injection wells are permitted by DOGGR as Class II injection wells. Waste gas may also be transported from the processing facility via pipelines and flared or

used for fuel in steam generators. Figure 4.8-5 illustrates the location of a flare.

There are thousands of feet of pipelines conveying oil and gas byproducts, including waste gas, throughout the Project Area. All such pipelines are subject to inspection and testing procedures as required by the DOGGR regulations adopted pursuant to Assembly Bill (AB) 1960 (see CCR, tit. 14, § 1774.1.). Under the regulations, "operators shall visually inspect all aboveground pipelines for leaks and corrosion" at least once per year. In addition, DOGGR may order any tests or inspections it deems necessary to establish the reliability of any pipeline system. Following pipeline inspection, repair, replacement, or cathodic protection may be required. Any pipeline that has had a leak in the past, resulting in the release of a reportable quantity, shall be pressure tested by the operator to verify the integrity of the pipe prior to being placed back into active service.

Consistent with the pipeline inspection requirements of the AB 1960 regulations, all operators are required to prepare a pipeline management plan for all pipelines, that lists information on each pipeline as well as a description of the testing method and schedule for all pipelines (see CCR, tit. 14, § 1774.2.). Moreover, all operators must establish and comply with a written preventative maintenance plan for the prevention of corrosion and leakage, consistent with CCR, Title 14, Section 1777.

## Accidents, Upsets, and Safety Issues

### General Safety in the Oil and Gas Sector

According to the U.S. Department of Labor, over 450,000 workers were employed in the oil and gas extraction and support industries in 2011. Between 2003 and 2010, 823 oil and gas extraction workers were killed on the job. The fatality rate for oil and gas extraction workers has been consistent since at least the early 1990s. Safety and health hazards and dangerous conditions that can result in fatalities for oil and gas workers include:

- Vehicle Accidents
- Struck-By/Caught-In/Caught-Between
- Explosions and Fires
- Falls
- Confined Spaces
- Chemical Exposures (U.S. Department of Labor 2015a).

Oil and gas well drilling and servicing activities involve the use and production of potentially hazardous materials. Potential health hazards that OSHA and NIOSH have identified include the following:

- Hydrogen Sulfide
- Silica
- Noise

- Diesel Particulate Matter
- Hazardous Chemicals
- Naturally Occurring Radioactive Material (NORM)
- Temperature Extremes
- Fatigue (U.S. Department of Labor 2015b).

Table 4.8-5 presents the number of workplace fatalities and the rates of workplace injuries and illnesses per 100 full-time workers in the oil and gas extraction industry in the United States. An injury or illness is work-related if an event or exposure in the work environment either caused or contributed to the resulting condition or significantly aggravated a pre-existing condition.

**Table 4.8-5: Safety Record in the Oil and Gas Industry**

| | 2010 | 2011 | 2012 | 2013 |
|---|---|---|---|---|
| **Fatalities** | | | | |
| Number of fatalities | 12 | 13 | 26 | (P) 12 |
| **Rate of injury and illness cases per 100 full-time workers** | | | | |
| Total recordable cases | 1.2 | 0.9 | 1.5 | 1.3 |
| Cases involving days away from work, job restriction, or transfer | 0.7 | 0.5 | 0.8 | 0.7 |
| Cases involving days away from work | 0.5 | 0.4 | 0.7 | 0.5 |
| Cases involving days of job transfer or restriction | 0.2 | 0.1 | 0.1 | 0.2 |

(P) Preliminary Source: BLS 2015a.

Records for occupational injuries and fatalities associated with the oil and gas extraction sector in California are not specific. In a review of OSHA data on fatalities in the oil and gas sector from 2003 to 2013, only three fatalities were reported, all of which occurred in 2006. However, OSHA notes that no data were available or the available data did not meet OSHA's criteria for publication. With respect to non-fatal occupational injuries and illnesses in oil and gas extraction, the data for 2004 to 2013 do not meet the publication guidelines (BLS 2015b).

## Safety Incidents in the Oil and Gas Sector in Kern County

The oil and gas sector in Kern County has experienced incidents, such as blowouts, sink holes, and pipeline ruptures. While the incidents described below are not typical of safety incidents in Kern County, they illustrate the types of risks that can occur in extreme circumstances.

### Blowouts

An uncontrollable blowout is a rare but worst-case scenario type of spill at an oilfield. Such blowouts have occurred in Kern County. Crude oil accumulates in porous rock formations where

geologic structures create a dome-like feature with an impermeable rock layer referred to as a cap rock overlying a porous layer containing oil, water, and/or gas referred to as a reservoir rock. In certain instances the pressure of oil, gas, and/or water rising against the cap rock can create high fluid pressures in the reservoir. An uncontrolled blowout condition can occur when drilling through the cap rock into the reservoir where fluid pressure in the reservoir exceeds the fluid pressure in drilling fluids. Dense materials are commonly added to drilling mud to increase fluid pressure in the drilling fluid and help reduce blowout conditions. However, the unpredictable nature of fluid pressures in oil reservoirs make drilling fluid density control an imperfect solution to preventing uncontrolled blowouts. Current regulations require the use of blowout prevention devices on all oil and gas wells during drilling.

The first big blowout, or "gusher," in Kern County was a Klondike Oil Company well called the Shamrock Gusher, which flowed at a rate of 1,300 barrels (54,600 gallons) a day in 1896 (San Joaquin Valley Geology 2014).

One of the largest blowouts was in the Lost Hills oilfield on November 23, 1998. The Bellevue Resources, Bellevue No. 1 (17-26S-21E) blew out at a depth of 17,657 feet and erupted into flame. The well burned high-pressure condensate at estimated rates of 40 to 100 million cubic feet (MCF) of gas per day for 14 days. No people working on the rig were hurt, but the rig and mud log trailer and all other equipment at the well site were damaged beyond repair. The flames were visible from 40 miles away and reached heights of 300 feet. Water began to flow with the gas after 16 days, extinguishing the fire, while condensate and water flowed for another six months. Flow ended when another well was drilled to intercept the well bore of the blowout and injected drilling fluid (mud) (San Joaquin Valley Geology 2014).

Well blowout rates in oilfields undergoing thermally enhanced recovery (via steam injection) in California Oil and Gas District 4 from 1991 to 2005 were on the order of one per 1,000 well construction operations, one per 10,000 active wells per year, and one per 100,000 shut-in/idle and plugged/abandoned wells per year (Jordan and Benson 2008).

### Sink Holes

On June 21, 2011, a fatality occurred at the Chevron Midway-Sunset Oil Field in Kern County. Steam had been seen that day emanating from a previously open sink hole (referred to by DOGGR as the Well 20 surface expression). An engineered subsurface containment structure had been recently constructed to capture fluid and steam from the subsurface. Three employees went to examine the steam emanating from the ground, the ground gave way, and one person slipped into the hole that was created. He could not be reached without endangering others. Chevron representatives, DOGGR, Kern County Sheriff's and Fire Department, and California Occupational Safety and Health Administration (Cal/OSHA) responded to the incident (DOGGR 2012). The following day, a large surface expression occurred on the adjacent property and oil/water fluid flowed from the location. Another surface expression was re-activated near the Chevron containment structure. Localized changes in ground surface elevation and slope had occurred in the days leading up to the fatality in the vicinity of the surface expression (DOGGR 2012).

On August 4, 2011, a large explosive eruption expelled rocks, water, and oil to a distance of 150 feet from the original crater site. In addition, two new surface expressions occurred on the adjacent TRC Operating Company, Inc. (TRC) property. On August 17, 2011, a larger eruption occurred from the Well 20 crater expelling fluid and spray to a height of 100 feet and a steam plume to an even greater distance. On September 29, 2011, Cal/OSHA issued a work exclusion zone order prohibiting access to the Well 20 surface expression area (DOGGR 2012).

DOGGR issued three orders following the incident to Chevron and the operator of the adjacent property, TRC, to restrict steam injection activities around Well 20 to ultimately 1,500 feet. The crater continued to grow until November 2011 (DOGGR 2012). Chevron has contested the factual conclusions in DOGGR's 2012 report.

### Arvin Waste Gas Pipeline Rupture

On March 11, 2014, Southern California Edison Gas Company was in Arvin conducting routine checks for natural gas line leaks when its instruments detected a gas release. Workers realized the next day that the leak was not from their pipeline and notified the City of Arvin. Kern County Public Health spent several days trying to determine who owned the pipeline but there is no database that maps all underground pipelines.

On March 17, 2014, the leak was identified. Gas leaking from the pipeline had saturated the soil and spread into the backyards of eight homes on Nelson Court in Arvin. Although the location of the leak was identified, local officials could not determine how long the pipeline had been leaking. The line that ruptured was a low-pressure pipeline that carried waste gas from one oilfield to another where it could be flared off. The owner of the pipeline, Petro Capital Resources (PCR) stated that although it had been using this line every day, their maps indicated that the line traveled along a different route than the line actually occupied. According to the City of Arvin these homes were built in the 1990s and DOGGR indicated that the pipeline was laid in the 1970s, never knowing that the pipelines would run beneath a residential area. DOGGR reported that the line has been shut down, purged, and tested. PCR made plans to permanently abandon the line per DOGGR regulations.

On March 18, 2014, a total of 47 people were evacuated from their homes, first to hotels then to apartments, for almost nine months. PCR financed the evacuated residents, including per diems for meals and incidentals. During the months prior to identification of the leak, residents had been experiencing headaches, coughing, dizziness, and bloody noses. Although PCR provided security, a few of the homes were burglarized during the evacuation. During the next several months while the homes were evacuated, PCR and their contractors performed several rounds of residential indoor air monitoring and collected soil samples. The contractor installed temporary vapor extraction systems in each yard in an attempt to reduce the amount of contaminated air released. Residential air sampling results determined that the contamination within the homes was 13 times higher than what the EPA deemed as safe. Compounds detected in the air and soil samples included benzene, naphthalene, n-hexane, traces of methane, heptane, and n-octane.

In October 2014 the fire department lifted the evacuation order. However the residents petitioned

and were granted the option for a second opinion on whether the cleanup that was performed was sufficient. The second set of results deemed the area clear and the residents were allowed to move home. Although it has been a year since the leak occurred the families continue to feel ill. Over 200 claims have been filed on the behalf of 100 people who live near the Arvin neighborhood where the pipeline leak occurred. The claims allege that the City of Arvin and Kern County fail to properly and safely regulate the pipelines being utilized within their jurisdictions and seek financial compensation.

## Unauthorized Spills, Discharges, and Incidents from Oil and Gas Production Activities in Kern County

### Cleanup and Abatement and Cease and Desist Orders

Certain wastes generated during oil exploration or production are not considered hazardous wastes, but operators can be cited with cease and desist orders or cleanup and abatement orders if petroleum products or hazardous materials contaminate soil and/or groundwater. Some examples are discussed in the following paragraphs.

Operations at the Harlan and Corbin Prine Sevenex Lease in the Mountain View Oil Field in 2006 resulted in a cleanup and abatement order (R5-2006-0716) because the operators were using two unlined ponds for the disposal of oilfield production wastewater, but the ponds also contained crude oil. Crude oil pools also were found on the ground between the storage tanks and in ditches leading to the impoundments. The dischargers were ordered to clean up the waste. The cleanup was completed within several months (Creedon 2006a, 2006b).

### Reported Spills in the Kern County Oilfields

Table 4.8-6 summarizes reported spills that have occurred in Kern County oilfields in the past five years. Spills associated with PHMSA-regulated pipelines are discussed in the following section.

**Table 4.8-6: Spills in Kern County Oilfields between January 2009 and June 2014 Not Associated with PHMSA-Regulated Pipelines**

| | Number of Spills | Range of the Spill Volume Gallons (BBL) | Average Spill Volume Gallons (BBL) |
|---|---|---|---|
| Oil | 403 | 0.126 – 27,300 (0.003 – 650) | 1,126 (26.8) |
| Produced Water | 263 | 2.1 – 126,000 (0.05 – 3,000) | 6,888 (164.0) |
| Acid | 9 | 33.2 - 7,333 (0.79 – 174.6) | 2,633 (62.7) |
| Diesel | 2 | 1,323 – 2,688 (31.5 – 64) | 2,003 (47.7) |
| Condensate | 2 | 42 - 84 (1 – 2) | 63 (1.5) |
| Drilling Mud | 2 | 336 - 4,023 (8 – 96) | 2,352 (56) |

**Table 4.8-6: Spills in Kern County Oilfields between January 2009 and June 2014 Not Associated with PHMSA-Regulated Pipelines**

| | Number of Spills | Range of the Spill Volume Gallons (BBL) | Average Spill Volume Gallons (BBL) |
|---|---|---|---|

Source: Prepared from spill reports obtained by WZI from DOGGR and the California Office of Emergency Services (WZI 2014a)
Key:
BBL – Barrels

## Pipeline Spills in Kern County associated with PHMSA-Regulated Pipelines

A total of 27 unintentional releases of crude oil from PHMSA-regulated pipelines in Kern County occurred from 2010 to 2014 (see Appendix R, Table A-1). These incidents were not associated with any fatalities, injuries, explosions, or evacuations. They also did not impact wildlife, aquatic habitats, or birds, or cause any water contamination; however, most resulted in some soil contamination. The average spill size associated with these events was 8,820 gallons (210 barrels [bbls]), but the median value was 2 bbls (84 gallons). Only one ignition occurred, in association with an incident at the Chevron facility in May 2014. Most of the oil was recovered. The causes of the incidents were mostly attributed to equipment failure, material failure of a pipe or weld, or due to corrosion; this led to leaks, ruptures, overfill, and overflow, among other issues. Leaks resulted from, among other things, cracks, connection failures, pinholes, and seal or packing failure. Incidents also resulted from incorrect operation and damage from a vehicle impact (PHMSA 2015a).

Between 2002 and 2009, there were 57 incidents associated with all hazardous liquid pipelines. In all incidents, crude oil was spilled. Spills ranged from 5 to 53,550 gallons (210 to 1,275 bbls). In the majority of cases, most of the crude oil was recovered, but in two cases more than 21,000 gallons (500 bbls) could not be recovered. These incidents were not associated with any fatalities, injuries, evacuations, explosions, or ignitions. Causes included corrosion, excavation damage, material or weld failures, incorrect operation, earth movement, other outside force damage, and equipment failure. More than half the incidents resulted in a temporary shutdown of operations. Soil was contaminated in all incidents except one where water was impacted. Where water was impacted, an estimated 210 gallons (five bbls) of crude oil entered an irrigation canal so floating barriers, commonly referred to as booms, were deployed to contain the oil and facilitate its removal (PHMSA 2015b, 2015c).

Between 2004 and 2013, no incidents attributable to oil and gas producers were associated with natural gas gathering or transmission lines (PHMSA 2015c, 2015d).

## Groundwater Quality and Well Stimulation Treatment Fluids

As discussed in greater detail in Section 4.9.2, Environmental Setting, no confirmed degradation of groundwater in the Project Area has been attributed to WST operations although analyses conducted to date generally recommend that additional groundwater data be developed to further assess this issue. In August 2014, the CCST, the Lawrence Berkeley National Laboratory (LBNL), and the Pacific Institute published an assessment of well stimulation activities in California for the Federal Bureau of Land Management (BLM) (CCST 2014). The BLM leases land in Kern County for oil and gas E & P. The study identified chemical constituents used in at least 2% of the reported WSTs in California, generally for the period 2012 through 2014, and identified oral toxicity information where available for these constituents. The majority of the well stimulation chemicals considered in the CCST report, such as guar gum, a gelling agent, or ethanol, a common solvent, were determined to have low hazard potential in terms of oral toxicity. Certain chemicals, such as biocides (e.g., tetrakis [hydroxymethyl] phosphonium sulfate; 2,2-dibromo-3-nitrilopropionamide; and glutaraldehyde), corrosion inhibitors (e.g., propargyl alcohol), and mineral acids (e.g., hydrofluoric acid and hydrochloric acid) were found to present concerns for acute toxicity.

As discussed in Section 4.9, Hydrology and Water Quality, in June 2015, U.S. Environmental Protection Agency (EPA) released a public review draft of a study titled Assessment of the Potential Impacts of Hydraulic Fracturing for Oil and Gas on Drinking Water Resources (EPA 2015). The study is a public review draft, and may be modified in response to public review comments.

The USEPA study, focused on potential impacts to drinking water resources that could occur from the following above-ground and underground potential mechanisms associated with the hydraulic fracturing process or cycle: :

- Water withdrawals at times or in locations of low water availability;
- Spills of hydraulic fracturing fluid, chemicals, or produced water;
- Inadequate treatment and discharge of hydraulic fracturing wastewater;
- Movement of liquids and gases via the production well into underground drinking water resources; and
- Movement of liquids and gases from the fracture zone to underground drinking water resources via pathways in subsurface rock formations.

In its report, the EPA concluded that it did not find evidence that the mechanisms it identified by which hydraulic fracturing could have impacts on drinking water resources in the U.S. have led to widespread, systemic impacts. The number of cases where drinking water resources were impacted is small in relation to the number of hydraulically fractured oil and gas wells. The apparently small number of cases where impacts to drinking water resources were identified could reflect the rarity of effects on drinking water or may be an underestimate as a result of several limiting factors. The EPA noted data limitations and uncertainties associated with its study, which preclude a determination of the frequency of impacts with any certainty (EPA 2015).

### Use of Underground Injection Wells

A March 2015 report by the California Environmental Protection Agency (CalEPA) found that underground injection wells had been discharging to aquifers that met the exemption criteria for Underground Sources of Drinking Water (USDWs), but had not been exempted by EPA in accordance with applicable requirements and thus remained classified as USDWs. In Kern County, wells in this category include 1,721 wells used for enhanced oil recovery in active hydrocarbon production zones and 388 disposal wells in the Project Area (CalEPA 2015; DOGGR 2015). DOGGR, in collaboration with the State Water Resources Control Board (SWRCB) is conducting a statewide analysis of all injection operations that were permitted outside of the aquifer exemption boundaries established in the 1980s. Operators with wells in these areas have been directed to prepare technical and geologic reports validating that the aquifers qualify for exemption. The reports will be used to determine where the exemption boundaries from the 1980s need to be updated. DOGGR has adopted emergency regulations prescribing a timeline by which injection into nonexempt aquifers must cease unless, based on the review of the technical reports and other information, the EPA approves exemptions for these aquifers. As of March 2015, 23 injection wells in the Project Area were ordered to cease operations while the review was ongoing due to proximity to drinking or agricultural water supplies. Based on statements published by the agencies, no contamination or adverse impacts to groundwater was observed from the operation of the 23 wells, and no contamination of water used for drinking or agricultural purposes related to underground injection by the oil and gas industry has been detected in testing of water supply wells by the SWRCB. DOGGR and the SWRCB completed initial review of the 176 higher priority injection wells in May 2015 and SWRCB is awaiting additional test data before making a determination as to whether to seek shut-in of additional wells before the October 15, 2015, compliance date specified in the emergency regulations (DOGGR 2015). Refer to Section 4.9, Hydrology and Water Quality, for more information.

## Hazardous Materials Release Sites in the Area – Cortese List

The State of California compiles a Hazardous Waste and Substances Sites (Cortese) List (Government Code §65962.5). A search was conducted on January 21, 2015. This database search included sites that did not necessarily contain contaminated soil or groundwater but were identified in federal or state databases for compliance with or enforcement of environmental regulations. For example, the list includes sites that are regulated by the EPA because they either generate, store, transport, or dispose of hazard waste; are recyclers; or contain underground or aboveground storage tanks. The list contains 229 sites in the Project Area including 78 that have been closed or need no action or no further action. Eighty-five are active, being referred to another agency, or undergoing closure. Two have post-closure permits. The full list is included in Appendix R. The following paragraphs describe those sites where there is known soil and/or groundwater contamination. Figure 4.8-6 provides the locations of sites that are not closed, or designated no action, no action required, no further action, or certified as of January 21, 2015.

The Brown and Bryant Arvin Facility (B&B) is a federal superfund site located in Arvin, California, and it is the only superfund site known to be present in the Project Area. The facility was used for the storage and sale of liquid fertilizer, insecticides, herbicides, fumigants and

defoliants. Operations began in 1960. Contamination resulted from poor waste disposal practices and poor housekeeping of pesticides, herbicides, fumigants, and defoliant. Wastewater was disposed in a poorly lined pond and two concrete sumps. Both groundwater and soil were contaminated. The EPA listed the site on the National Priority List (NPL) on October 4, 1989. The facility is not operating and access is restricted (California DTSC 2007a). Groundwater treatment and routine groundwater monitoring are on-going. Restrictions are in place to prohibit drilling within 0.5 mile of the site (Ramirez 2013).

Twenty facilities in the Project Area have at one time been RCRA hazardous waste facilities, two have operating permits, and six are undergoing case closure. Eight of the 20 facilities are closed, but two of the eight have land restrictions. Two facilities have post closure permits. Two facilities are classified as non-operating. There are three non-RCRA hazardous waste sites; two are closed and one is undergoing closure. There are 21 corrective action sites; five are active; three have certified land-use restrictions; one has been referred to the EPA, three were referred to the RWQCB, one was referred to the Site Mitigation and Brownfields and Reuse Program (SMBRP); and six require no further action or no action (California DTSC 2015).

## Schools

Numerous schools are located within the Project Area, as discussed in Section 4.14, Public Services. California State law has established requirements for siting of new schools. The school site selection standards, and Title 5 CCR Section 14010(h), state that school sites should not be located near an aboveground water or fuel storage tank or within 1,500 feet (0.28 miles) of the easement of an aboveground or underground pipeline that can pose a safety hazard, as determined by a risk analysis study conducted by a competent professional.

## Air Traffic and Military Aviation

There are 18 public and private airports located within the Project Area. In addition there are three United States military airbases outside the Project Area that utilize military operation airspace (MOA) within a small portion of the Project Area for military aircraft operations. Airport locations are based on airport information accessed on January 15, 2015, at https://www.airnav.com (AirNav 2015). The boundaries of the MOA were obtained from a November 13, 2012, Kern County Airports Land Use Compatibility Plan (ALUCP), prepared by the Kern County Planning and Community Development Department (PCDD; PCDD 2012). Airports located in the Project Area and the boundary of the MOA are shown on Figure 4.8-7. The following airports are located within the Project Area.

- Delano Municipal Airport, Delano
- Bakersfield Municipal Airport, Bakersfield
- Taft Airport, Taft
- Wasco-Kern Airport, Wasco
- Elk Hills-Buttonwillow Airport, Buttonwillow

- Lost Hills-Kern County Airport, Lost Hills
- Poso-Kern County Airport, Famoso
- Shafter Airport (Minter Field), Shafter
- Paradise Lakes Airport, Bakersfield
- Skydive San Joaquin Valley Airport, Bakersfield
- Tejon Ag Airport, Lebec
- Creekside Airport, Arvin
- Di Giorgio Ranch Landing Strip, Di Giorgio
- Meadows Field Airport, Bakersfield
- Majors Airport, Bakersfield
- Cashen Strip Airport, Wasco
- Belridge Strip Airport, South Belridge
- Paramount Farms Airport, Lost Hills

Kern County's (2012) ALUCP has no specific provisions to limit oil and gas industry activities around airports. Airport influence zones restricting or prohibiting specific land uses, development height, lighting, and radio communications exist around each of the 18 public use and private airports identified in the ALUCP. Restrictions on development within the established airport influence zones surrounding the airports described in the ALUCP are implemented through zoning restrictions described in the Kern County Zoning Ordinance, Chapter 19.76 – Airport Approach Height (H) combining district. Only certain land uses are compatible in the airport influence zones immediately surrounding airports specifically described in the ALUCP. Zone A is located immediately surrounding each airfield and height limitations in this zone generally limit structures and vegetation to no more than 35 feet in height. The H combining district requires that a proponent of development within an airport influence Zone A apply for and obtain a conditional use permit as well as development plan review/approval through the director of the Kern County PCDD. Individual airports have their own restrictions as described in the ALUCP.

A number of private airstrips are also located throughout western Kern County including Tejon Ag and Paradise Lakes airfields located south of Bakersfield; Majors Airfield north of Bakersfield; Joe Gottlieb Field Airport west of Bakersfield; and Cashen Airport northwest of Wasco (AirNav 2015; PCDD 2012). The ALUCP does not apply to private airstrips that are not designated for public use. The locations of airports in the Project Area are shown with respect to oil and gas fields in Kern County on Figure 4.8-7.

The China Lake Naval Air Weapons Station and Edwards Air Force Base are located outside the Project Area in the northeastern and southeastern corners of Kern County, respectively. In addition, the Lemoore Naval Air Station is located in Tulare County to the north of Kern County and routinely conducts training exercises in Kern County. The flying missions of aircraft attached

to these military installations require flying beyond the installation boundaries at supersonic speeds and as low as 200 feet above the ground. To minimize flight hazards to commercial aircraft, military aircraft attached to the two Kern County military installations fly within restricted airspace known as the Joint Service Restricted R-2508 Complex (R-2508 Complex). The boundary of the R-2508 Complex is shown with respect to the Project Area boundaries and administrative boundaries of oil and gas fields on Figure 4.8-7. To avoid development that could compromise the missions of military installations, the ALUCP requires that those installations be notified of development proposed within and near the R-2508 Complex. Specific to oil and gas E & P development, the ALUCP requires that the China Lake Naval Air Weapons Station and Edwards Air Force Base be notified of development that falls within any of the following categories:

- Any Structure within 75 miles of the R-2508 Complex that is greater than 50 feet tall.
- Any project within 50 miles of the R-2508 Complex that emit radio and communication frequencies.
- Any project that would create environmental impacts, such as visibility or elevated obstructions within 25 miles of the R-2508 Complex.

## Fire Hazard

The California Department of Forestry and Fire Protection (CALFIRE), characterizes the fire risks of areas. CALFIRE produces fire hazard severity zone maps that assign a hazard score based on the factors that influence fire likelihood and behavior. Many factors are considered, such as fire history, existing and potential fuel (natural vegetation), flame length, blowing embers, terrain (steep terrain has a greater fire hazard severity), topography, and typical weather for the area. The 2008 fire hazard severity zone maps include areas where local governments have financial responsibility for wildland fire protection, known as Local Responsibility Areas. Only lands zoned with a very high fire hazard were identified within Local Responsibility Areas. Using these methods, CALFIRE divided the state responsibility areas into three hazard zones: moderate, high and very high (CALFIRE 2007).

The portion of the Project Area located in the San Joaquin Valley is classified as mostly less than moderate fire severity. The hills peripheral to the San Joaquin Valley have moderate to very high fire severity. However, the majority of the Project Area falls within a Local Responsibility Area and is not classified within the state's Fire Hazard Severity Zones (see Figure 4.8-8).

## Disease Vectors

A disease vector is an insect or animal that carries a disease-producing micro-organism from one host to another. The Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) defines the term vector as:

…any organism capable of transmitting the causative agent of human disease or capable of producing human discomfort or injury, including mosquitoes, flies, fleas, cockroaches, or other insects and ticks, mites or rats.

The accumulation of organic wastes would act as attractors for various vectors. In addition any depressed areas, ponds, or drainage channels would provide areas for the breeding of mosquitoes.

## Mosquitoes

Mosquitoes are of particular concern because of their abundance and distribution. In Kern County, mosquitoes are most abundant and active between May and October. Mosquitoes require standing water to breed and can be prolific in areas with standing water, such as wetlands.

Adult female mosquitoes can deposit eggs in a variety of aquatic habitats and other sources that contain water. The immature stages of each mosquito species develop in particular habitats. In general, there are four mosquito habitat groups: agricultural, industrial, domestic, and natural sources. Typical sites within these habitat groups include:

- Agricultural Sources: irrigated pastures, dairies, and orchards.
- Industrial Sources: sewage treatment ponds and drain ditches.
- Domestic Sources: containers, debris in and around ponds, bird baths, pet watering dishes, animal troughs, septic tanks, catch basins, roadside ditches, leaky sprinkler systems, and stagnant swimming pools.
- Natural Sources: wetlands, floodplains, and rain pools.

All species of mosquitoes require standing water to complete their growth cycle. Therefore, any standing body of water represents a potential mosquito breeding habitat. Although mosquitoes will typically stay close to suitable breeding habitat and blood-meal hosts, they are known to travel up to 10 miles under breezy conditions. The breeding period for mosquitoes depends on temperature but generally occurs in March through October.

Water quality also affects mosquito reproduction. Generally, poor-quality water (e.g., water with limited circulation, high temperature, and high organic content) produces greater numbers of mosquitoes than high-quality water (e.g., water with high circulation, low temperature, and low organic content). Typically, water bodies with water levels that slowly increase or recede produce greater numbers of mosquitoes than water bodies with water levels that are stable or that rapidly fluctuate.

In Kern County, the Kern Mosquito and Vector Control District is responsible for vector control; however, there is no established vector control district in the area of Kern County where the Project would be located.

## Mosquito Hazards

### Mosquito-Borne Diseases

Mosquitoes are known to be the carriers of many serious diseases.

West Nile virus is the most important mosquito-borne disease affecting Kern County. In 2010, there were 111 human West Nile virus infections in California and six deaths (California

Department of Public Health 2012). Of these cases, 15 (14%) were in Kern County.

In September 2002, the Kern County Department of Health formed a West Nile Virus Task Force and has subsequently released reports documenting cases, developed strategies to prevent the occurrence of West Nile virus, and generated public education information, such as information pamphlets. Statewide, there are 52 local agencies, including local mosquito abatement districts and the California Department of Health Services Arbovirus Field Testing Stations, that work cooperatively to routinely conduct surveillance and control of mosquitoes and the diseases they transmit throughout California.

### Mosquito Species of Concern

In Kern County, two species of mosquito are primary targets for suppression. These two species, *Culex pipiens quinquefasciatus* and *Culex tarsalis*, are potential vectors of encephalitis and West Nile virus. Other species of mosquitoes exist in Kern County that can cause a substantial nuisance in surrounding communities, but the *Culex* mosquito is the primary vector species of concern.

Although the West Nile virus can be transmitted by a number of mosquito species, *Culex* is the most common carrier. This disease is thought to be a seasonal epidemic that flares up in the summer and fall. West Nile virus is spread when mosquitoes that feed on infected birds bite humans and other animals.

The encephalitis mosquito (*Culex tarsalis*) breeds in almost any freshwater pond. Birds appear to be the primary blood-meal hosts of this species, but the insect will also feed on domestic animals and humans (Bohart and Washino 1978). This species is the primary carrier in California of western equine encephalitis, St. Louis encephalitis, and California encephalitis, and is considered a significant disease vector of concern in the state.

The house mosquito (*Culex pipiens quinquefasciatus*) usually breeds in waters with a high organic material content. This species is often identified by its characteristic buzzing. Although its primary blood-meal host is birds, the house mosquito may also seek out humans. The house mosquito is a vector of St. Louis encephalitis.

### Flies

Nuisance flies have a life cycle comprised of an egg stage, three larval stages, a pupal stage, and an adult stage. Eggs are laid by a mature female fly onto a substrate appropriate for larval development. A single female can lay hundreds of eggs during her life. Nuisance fly larvae (grubs) are generally white in color and are blunt ended. They develop in wet substrates, especially dung pats and manure and wet or rotting feed, hay, and bedding straw, where they feed on food particles found on the substrate. Fly larvae are not capable of developing in truly aqueous habitats; they need wet, but not overly wet, substrates.

Within the confines of a pupal case, the developing fly will undergo further changes to become a winged adult fly that will eventually emerge from the pupal case and disperse from the site. The length of time required to complete the development from egg to adult is temperature dependent

and may be as short as seven days during the summer months in California.

Some nuisance flies are blood feeders and can inflict a painful bite while feeding on animals or humans. Blood feeding (or biting) flies include the stable fly and horn fly. Other flies do not bite (non-biting flies), instead feeding on body secretions or liquefied organic matter. Non-biting flies include the house fly, face fly, and garbage fly.

Adult flies are generally active during daylight hours and inactive at night. Nuisance flies are known to disperse from their development sites into surrounding areas; however, the distance and direction of dispersal are not well understood. Non-biting nuisance fly species are likely to disperse further than those fly species that require animal blood meals. The habitat surrounding a breeding site will play a role in the distance of nuisance fly dispersal. Nuisance flies will likely disperse further in open habitats typical of rangeland and low agricultural crops than they will in urban or forested/orchard areas that contain substantially more vertical structure on which flies may rest and that provide shade and higher humidity on hot summer days.

Most nuisance flies are not known to disperse great distances. Studies using marked house flies show that 60% to 80% of house flies were captured within 1 mile of their release point; 85% to 95% were caught within 2 miles of the release site within the first four days after they were turned loose. A few flies have been shown to travel further, but in general, fly control efforts for a community problem are focused within 1 mile of the source.

### Rodents

The accumulation of organic waste presents the potential for significant populations of mice and rats. Rodents can spread or accelerate the spread of disease from contaminated areas to uncontaminated areas via their droppings, feet, fur, urine, saliva, or blood. In addition, mice provide a food source that could attract wild predatory animals (e.g., skunks, foxes, coyotes, and stray dogs), which could pose other disease problems.

Mice are generally nocturnal and secretive animals with keen senses of taste, hearing, smell, and touch. They are small enough to enter any opening larger than one quarter of an inch. Mice prefer cereal grains, if available, but will eat garbage, insects, meat, and even manure. Mice reproduce at high rates, making early control important in minimizing the potential for infestation. Although the life span of a mouse is only nine to 12 months, a female mouse can have five to 10 litters per year with five or six young in each litter. Mice do not consume large quantities of food but can cause significant economic damage due to physical structure damage and site contamination.

### Valley Fever

Coccidioidomycosis, commonly known as Valley Fever, is primarily a disease of the lungs that is common in the southwestern United States and northwestern Mexico. The disease is of critical concern to Kern County. Valley Fever is caused by the fungus *Coccidioides immitis*, which grows in soils in areas of low rainfall, high summer temperatures, and moderate winter temperatures. These fungal spores become airborne when the soil is disturbed by winds, construction, farming, and other activities. In susceptible people and animals, infection occurs when a spore is inhaled.

Valley Fever symptoms generally occur within three weeks of exposure. Valley Fever is not a contagious disease, and secondary infections are rare.

It is estimated that more than four million people live in areas where Valley Fever fungus is prevalent in the soils. Residents of Bakersfield, California, and Phoenix, Arizona, have shown positive skin-test reaction rates of 30 to 40%, meaning that about one-third of residents tested have had Valley Fever sometime in the past. Among those who have never had Valley Fever, the chance of infection is about 3% per year, but the longer one resides in an endemic area, the greater the risk. In the southwestern U.S., there are 100,000 new infections each year.

People working in certain occupations, such as construction, agriculture, and archaeology, have an increased risk of exposure and disease because these jobs result in the disturbance of soils where fungal spores are found. Valley Fever infection is highest in California from June to November. In addition, many domestic and native animals are susceptible to the disease, including dogs, horses, cattle, coyotes, rodents, bats, and snakes. Most Valley Fever cases are very mild. It is estimated that 60% or more of infected people either have no symptoms or experience flu-like symptoms and never seek medical attention.

## 4.8.3 Regulatory Setting

# Federal

### U.S. Environmental Protection Agency (EPA)

The EPA was established in 1970 to consolidate in one agency a variety of federal research, monitoring, standard-setting, and enforcement activities to ensure environmental protection. The EPA's mission is to protect human health and to safeguard the natural environment - air, water, and land - upon which life depends. The EPA works to develop and enforce regulations that implement environmental laws enacted by Congress, is responsible for researching and setting national standards for a variety of environmental programs, and delegates to states and tribes the responsibility for issuing permits and for monitoring and enforcing compliance. Where national standards are not met, the EPA can issue sanctions and take other steps to assist the states and tribes in reaching the desired levels of environmental quality.

### National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR §300)

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP), was first developed in 1968. The NCP is administered by the EPA. Its purpose is to provide the organizational structure and procedures for preparing for and responding to discharges of oil and releases of hazardous substances, pollutants, and contaminants.

It applies to oil discharges into or on navigable waters of the United States as well as hazardous substances releases into the environment that may present an imminent or substantial danger to public health or welfare of the United States. It specifies responsibilities among the federal, state, and local governments and requires the establishment for federal, regional, and area contingency plans. It summarizes state and local emergency planning requirements under the Superfund

Amendments and Reauthorization Act (SARA). It also provides the procedures for undertaking removal actions pursuant to Section 311 of the Clean Water Act (CWA) and response actions pursuant to Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

## Comprehensive Environmental Response, Compensation, and Liability Act/Superfund Amendments and Reauthorization Act (CERCLA)

CERCLA, commonly known as Superfund, was enacted by Congress on December 11, 1980. This law (U.S.C. Title 42, Chapter 103) provides broad federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. CERCLA establishes requirements concerning closed and abandoned hazardous waste sites; provides for liability of persons responsible for releases of hazardous waste at these sites; and, establishes a trust fund to provide for cleanup when no responsible party can be identified. CERCLA also enables the revision of the NCP. The NCP (40 Code of Federal Regulations [CFR], Part 300) provides the guidelines and procedures needed to respond to releases and threatened releases of hazardous substances, pollutants, and/or contaminants. The NCP also established the NPL. CERCLA was amended by the SARA on October 17, 1986.

## Emergency Planning and Community Right-to-Know Act

Under the Emergency Planning and Community Right-to-Know Act, or Title III of the SARA, the EPA requires local agencies to regulate the storage and handling of hazardous materials and requires development of a plan to mitigate the release of hazardous materials. Businesses that handle any of the specified hazardous materials must submit to government agencies (i.e., fire departments or public health departments), an inventory of the hazardous materials, an emergency response plan, and an employee training program. The business plans must provide a description of the types of hazardous materials/waste onsite and the location of these materials. The information in the business plan can then be used in the event of an emergency to determine the appropriate response action, the need for public notification, and the need for evacuation.

In 1990, Congress passed the Pollution Prevention Act which requires facilities to report additional data on waste management and source reduction activities to the EPA under the Toxics Release Inventory Program. The goal of the Toxics Release Inventory is to provide communities with information about toxic chemical releases and waste management activities and to support informed decision making at all levels by industry, government, non-governmental organizations, and the public.

## Clean Water Act (CWA)/Spill, Prevention, Control, and Countermeasure (SPCC) Rule

The CWA (33 U.S.C. Section 1251 et seq., formally the Federal Water Pollution Control Act of 1972), was enacted with the intent of restoring and maintaining the chemical, physical, and biological integrity of the waters of the United States. As part of the CWA, the EPA oversees and enforces the Oil Pollution Prevention regulation contained in Title 40 of the CFR, Part 112 (40 CFR Part 112), which is often referred to as the "SPCC rule" because the regulations describe the

requirements for facilities to prepare, amend, and implement SPCC plans. A facility is subject to SPCC regulations if a single oil storage tank has a capacity greater than 660 gallons, or the total aboveground oil storage capacity exceeds 1,320 gallons, or the underground oil storage capacity exceeds 42,000 gallons, and if, due to its location, the facility could reasonably be expected to discharge oil into or upon the "navigable waters" of the United States.

Other federal regulations overseen by the EPA relevant to hazardous materials and environmental contamination include Title 40 CFR Chapter 1, Subchapter D – Water Programs and Subchapter I – Solid Wastes. Title 40 CFR Chapter 1, Subchapter D, Parts 116 and 117 designate hazardous substances under the CWA. Title 40 CFR Part 116 sets forth a determination of the reportable quantity for each substance that is designated as hazardous. Title 40 CFR Part 117 applies to quantities of designated substances equal to or greater than the reportable quantities that may be discharged into waters of the United States.

## The Safe Drinking Water Act of 1974 (42 U.S.C. §300f et seq.)

The Safe Drinking Water Act (SDWA) regulates the amount of toxic substances in drinking water sources. The SDWA requires the EPA to develop minimum federal requirements for Underground Injection Control (UIC) programs and other safeguards to protect public health by preventing injection wells from contaminating USDWs. The UIC sections are:

1421 – Identifies what state regulations must include in their UIC program.

1422 – Outlines the process for state primacy applications including timelines and public participation requirements.

1423 – Sets forth enforcement of the program.

1425 – Describes optional demonstrations a state may make for the portion of the UIC Program relating to oil and natural gas operations.

1426 – Requires the administrator to determine the applicability of monitoring methods.

1431 – Authorizes emergency powers for EPA to take action in a state if there is an imminent and substantial endangerment.

1442 – Addresses the EPA's authority to conduct research, studies, training and demonstrations, specifically looking at improved methods for protecting USDWs.

1443 – Establishes grants for primacy programs.

The EPA developed the UIC Program requirements, but states, territories, and tribes can obtain primary enforcement responsibility, or primacy. State regulations must be as stringent as federal requirements, but may be more stringent. As discussed in detail in Section 4.9, Hydrology and Water Quality, the EPA has delegated responsibility to DOGGR for implementing UIC Program requirements for Class II wells in California.

Of importance to this project are Class II wells. Class II wells are used for the injection of produced water and other fluids associated with oil and gas production either as a means of disposal of produced fluids, as an enhanced recovery fluid, or for purposes of hydrocarbon storage. The Class II UIC Program dictates well construction standards and mechanical integrity monitoring, as well as the types and composition of fluids that can be injected, all of which information is publicly available. The definition of "underground injection" in the SDWA excludes hydraulic fracturing (except for hydraulic fracturing utilizing diesel fuels).

## Clean Air Act Amendments of 1990: Section 112(r) (40 CFR 68)

The EPA requires facilities that handle listed regulated substances to develop Risk Management Plans (RMP) to prevent accidental releases of these substances. RMP materials are submitted to both local agencies (generally the fire department) and the EPA. Stationary sources with more than a threshold quantity of a regulated substance shall be evaluated to determine the potential for, and impacts of, accidental releases of that substance. Under certain conditions, the owner or operator of a stationary source may be required to develop and submit an RMP. RMPs consist of three main elements: a hazard assessment that includes an off- site consequence analysis and a five-year accident history; a prevention program; and an emergency response program.

## Liquid Pipelines and Oil Facilities

### United States Department of Transportation

The USDOT was established by an act of Congress in 1966. It is mandated to oversee hazardous liquid pipeline safety under the U.S.C. Title 49, Chapter 601. The Pipeline and Hazardous Materials Safety Administration (PHMSA) acting through the Office of Pipeline Safety (OPS) administers the national regulatory program to ensure the safe transportation of refined petroleum products and other hazardous materials by pipeline. It develops safety regulations and other approaches to risk management that ensure safety in the design, construction, testing, operation, maintenance, and emergency response of pipeline facilities in conjunction with the Technical Hazardous Liquids Pipeline Safety Standards Committee (THLPSSC) which provides peer review.

Many of these regulations are written as performance standards, which set the level of safety to be attained and allow the pipeline operator to use various technologies to achieve safety. Pipelines are inspected and monitored by the western region of the PHMSA or by the state delegated officials. Inspectors conduct inspections during construction to ensure that the design, materials, construction methods, welding procedures, and testing meet the USDOT standards. Following construction, PHMSA inspectors inspect the pipeline. The inspections include a review to ensure compliance with 49 CFR 195, specifically, the inspections review the operation and maintenance procedures, abnormal and emergency operating procedures, damage prevention and public education procedures, and the inspection ensures the pipeline repair and operations are in compliance.

The National Response Framework (NRF) is part of the National Strategy for Homeland Security. The NRF formally replaced the National Response Plan (NRP) in March 2008. Building on the

principles outlined in the National Incident Management System (NIMS) as well as the Incident Command System (ICS), the NRF's coordinating structures are effective procedures for the coordination of any level at any time, for the response activities among federal, state, and local response agencies (e.g., police, firefighting, emergency management, and first responder). The Oil and Hazardous Materials Incident Annex (ESF #10) of the NRF directs the federal, state, and local authorities to conduct training, plan and execute field exercises, share lessons learned, and, in general, develop and maintain specific procedures for responses to incidents of regional and national significance.

Transportation of Hazardous Liquids by Pipeline, 49 CFR 195, includes detailed requirements on a range of safety and environmental protection issues related to liquids pipelines. Part 195.30 incorporates many of the applicable national safety standards of the American Petroleum Institute (API), American Society of Mechanical Engineers (ASME), American National Standards Institute (ANSI), and American Society for Testing and Materials (ASTM). Table 4.8-7 lists portions of 49 CFR 195 that are relevant to this Project.

**Table 4.8-7: Key Elements of the Transportation of Hazards Liquids by Pipeline Regulations**

| Component of 49 CFR 195 | Key Elements and Thresholds; Applicable Permits |
|---|---|
| Part 195.50 Reporting Accidents | Requires reporting of accidents by telephone and in writing for:<br>• Explosion or fire not intentionally set by the operator;<br>• Spills of five gallons or more or five barrels if confined to company property and cleaned up promptly;<br>• Daily loss of five barrels a day to the atmosphere;<br>• Death or injury necessitating hospitalization; or<br>• Estimated property damage, including cleanup costs, greater than $50,000 |
| Subpart C Design Requirements Parts 195.100 through 195.120 | Design requirements for the temperature environment, variations in pressure, internal design pressure for pipe specifications, external pressure and external loads, new and used pipe, valves, fittings, and flanges, internal inspection devices |
| Subpart D Construction Parts 195.200-195.266 | Construction requirements for standards such as compliance, inspections, welding, siting and routing, bending, welding and welders, inspection and nondestructive testing of welds, external corrosion and cathodic protection, installing in-ditch and covering, clearances and crossings, valves, pumping, breakout tanks, and construction records |
| Subpart E – Pressure Testing Parts 195.300-195.310 | Minimum requirements for hydrostatic testing, compliance dates, test pressures and duration, test medium, and records |
| Subpart F-Operation and Maintenance Parts 195.400-195.466 | Minimum requirements for operating and maintaining steel pipeline systems, including:<br>• Correction of unsafe conditions within a reasonable time;<br>• Procedural manual for operations, maintenance, and emergencies;<br>• Training;<br>• Maps;<br>• Maximum operating pressure;<br>• Communication system;<br>• Cathodic protection system; |

**Table 4.8-7: Key Elements of the Transportation of Hazards Liquids by Pipeline Regulations**

| Component of 49 CFR 195 | Key Elements and Thresholds; Applicable Permits |
|---|---|
| | • External and internal corrosion control;<br>• Valve maintenance;<br>• Pipeline repairs;<br>• Overpressure safety devices;<br>• Firefighting equipment; and<br>• Public education program for hazardous liquid pipeline emergencies and reporting |

Gathering lines are small diameter pipelines that transport petroleum products or natural gas from a production facility or wellhead to a central collection point. They often operate at relatively low pressures and flow, and are significantly smaller in diameter than transmission lines. Gathering lines in rural oilfield settings are regulated by DOGGR under the AB 1960 regulations. The PHMSA regulates gathering lines for hazardous liquids in non-rural areas. Rural gathering lines for hazardous liquids are regulated if they are of a certain size and pressure and are located within a ¼ mile of unusually sensitive areas, such as key drinking water sources or critical ecological communities. Operators must determine if an onshore pipeline (or part of a connected series of pipelines) is an onshore gathering line using the API Recommended Practice 80, "Guidelines for the Definition of Onshore Gas Gathering Lines," (first edition, April 2000). This is done using criteria that determine when a gas gathering pipeline is close enough to a number of homes or areas/buildings where people congregate, in which an accident on the pipeline could impact them. If the criteria are met, these natural gas gathering pipelines, that operate at lower pressures, must comply with a subset of the requirements specified in 49 CFR 192.9 (PHMSA 2015e). This section contains the required gathering line information for the operators of on-shore, off-shore, Type A, or Type B lines. An operator of a new, replaced, relocated, or otherwise changed line must be in compliance with the applicable requirements in this section by the date the line goes into service.

## Pipeline Safety Improvement Act

In 2002, the U.S. Congress passed the Pipeline Safety Improvement Act (PSIA) of 2002, HR 3609, to strengthen the nation's pipeline safety laws. Under the PSIA, gas transmission operators are required to develop and follow a written integrity management program containing all the elements described in Part 192.911 of the USDOT regulations (49 CFR) to address the risk on all transmission pipeline segments of High Consequence Areas (HCAs). Specifically, the law establishes an integrity management program that applies to all HCAs.

The USDOT's OPS outlines pipeline design requirements that are based on population density in the region and, generally, more stringent design requirements correspond to areas with higher population densities (49 CFR 192.1). Areas in the vicinity of the pipeline are divided into "class location units." A unit is defined in 49 CFR 192 as "an on-shore area that extends 220 yards on either side of the centerline of any continuous 1-mile length of pipeline." Class location units are therefore confined to the area within 660 feet of 1 mile of contiguous pipeline. Class location units

are considered HCAs if the area contains 46 or more buildings intended for human occupancy; is within 100 yards of either a building, or a small well-defined outside area, such as a playground, recreation area, outdoor theater, or other place of public assembly; or where buildings with four or more stories aboveground are prevalent.

### Hazardous Liquid Pipeline Safety Act

The Hazardous Liquid Pipeline Safety Act of 1979 and amendments authorize the USDOT to regulate pipeline transportation of hazardous liquids (including crude oil, petroleum products, anhydrous ammonia, and carbon dioxide). Key elements of the Hazardous Liquid Pipeline Safety Act of 1979 and amendments are summarized below in Table 4.8-8.

**Table 4.8-8: Key Elements of the Pipeline Safety Regulations**

| Law/Regulation | Key Elements |
|---|---|
| **Federal** | |
| Pipeline Inspection, Protection, Enforcement, and Safety Act of 2006 (PIPES- Public Law 109-468, December 2006) | Provides for advanced safety and environmental protection in pipeline transportation.<br>Increases the transparency of pipeline safety evaluation.<br>Provides funding for future pipeline safety studies. |
| Pipeline Safety Act of 1994 49 U.S.C. § 60101 et seq. | Defines the framework for pipeline safety regulation in the U.S. |
| 49 CFR Part 195- Transportation of Hazardous Liquids by Pipeline | This section describes the safety standards and reporting requirements for hazardous liquid pipelines. These regulations include detailed requirements on a range of topics related to the safety and environmental protection. This section also includes the minimum requirements for operator qualification of individuals performing tasks required by the regulations. |

## Hazardous Waste Handling Requirements

### Hazardous Materials Transportation Act (P.L. 93-933, January 1975)

The Hazardous Materials Transportation Act (HMTA) is the federal legislation that regulates transportation of hazardous materials. The primary regulatory authorities are the USDOT, the Federal Highway Administration, and the Federal Railroad Administration (FRA). The Secretary of the USDOT receives the authority to regulate the transportation of hazardous materials from the HMTA, as amended and codified in 49 U.S.C. 5101 et seq. The PHMSA (formerly the Research and Special Provisions Administration [RSPA]) was delegated the responsibility to write the hazardous materials regulations, which are contained in 49 CFR Parts 100-180. The HMTA requires that carriers report accidental releases of hazardous materials to the USDOT at the earliest practical moment but no later than 12 hours after the occurrence of any incident (49 CFR Subtitle B, Chapter 1, Subchapter C, Part 171.15 Subpart B). Other incidents that must be reported include deaths, injuries requiring hospitalization, and property damage exceeding $50,000.

Under the HMTA, the USDOT regulates the transportation and handling of "reportable quantities" of hazardous substances. These regulations focus on the transportation of hazardous materials by:

- Carriers by rail, aircraft, and vessel
- Interstate and foreign carriers by motor vehicle
- Intrastate carriers by motor vehicle so far as the regulations relate to hazardous wastes, hazardous substances, and flammable cryogenic liquids in portable tanks and cargo tanks.

The transportation of hazardous materials within the state of California is subject to various federal, state, and local regulations. It is illegal to transport explosives or inhalation hazards on any public highway not designated for that purpose, unless the use of the highway is required to permit delivery or the loading of such materials (California Vehicle Code §§ 31602[b], 32104[a]).

The CHP designates through routes to be used for the transportation of hazardous materials. Transportation of hazardous materials is restricted to these routes except in cases where additional travel is required from that route to deliver or receive hazardous materials to and from users. Information on CHP requirements and regulatory authority is provided in Section 4.8.3, Regulatory Setting, below.

## Resource Conservation and Recovery Act (40 CFR §240-299)

The Federal Toxic Substances Control Act (1976) and the RCRA of 1976 established a program administered by the EPA for the regulation of the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA was amended in 1984 by the HSWA, which affirmed and extended the "cradle to grave" system of regulating hazardous wastes. Hazardous waste is regulated under the RCRA subtitle C. The RCRA established the system for controlling hazardous waste from its point of origin to its final disposal, specifically the handling, storage and disposal requirements. A RCRA hazardous waste is a waste that appears on one of the four hazardous wastes lists (F-list, K-list, P-list, or U-list), or exhibits at least one of four characteristics—ignitability, corrosivity, reactivity, or toxicity. The Hazardous Waste Manifest System includes a set of forms, reports, and procedures designed to seamlessly track hazardous waste from the time it leaves the generator facility where it was produced, until it reaches the offsite waste management facility that will store, treat, or dispose of the hazardous waste. Operating records, for example, must be kept on site for the duration of the facility's operation. Recordkeeping and reporting requirements are found at 40 CFR Part 264 subpart E and 40 CFR Part 265 Subpart E.

## Associated Hazardous and Solid Waste Amendments (HSWA) (40 CFR 260)

Under RCRA, individual states may implement their own hazardous waste programs instead of RCRA, as long as the state program is at least as stringent as the federal RCRA requirements. California's DTSC administers and enforces the federal hazardous waste regulations, in addition to more stringent state hazardous waste regulations. In the state chapter in this section is the Hazardous Waste Control Act of 1972. This Act is the California Waste Management program, which is similar to, but more stringent than RCRA program requires.

RCRA was amended by the Associated Hazardous and Solid Waste Amendments (HSWA), which affirmed and extended the concept of regulating hazardous wastes from generation through disposal. HSWA specifically prohibits the use of certain techniques for the disposal of some hazardous wastes. 40 CFR, Part 260.1 and Part 260.2 provide the guidelines to establish a Hazardous Waste Management System. Part 260.1 defines the terminology, requirements and guidelines necessary to track hazardous waste activities, treatment, storage, and disposal, facility and keep certain records plus submit reports to the EPA at regular intervals. Part 260.2 addresses the availability or confidentiality of information available to the public including both written and electronic hazardous waste manifest.

## Exploration and Production Exemption from RCRA

While RCRA was enacted to regulate hazardous waste from industrial, commercial, mining, agricultural, and community activities, certain hazardous wastes which are exempted from the Subtitle C regulations are regulated under RCRA Subtitle D. Congress exempted "drilling fluids, produced waters, and other wastes associated with the exploration, development, or production of crude oil or natural gas or geothermal energy" from regulation under RCRA Subtitle C as hazardous wastes (RCT 2001).

The exempted oil and gas wastes are unique because they are generated in large quantities, but are relatively low in toxicity. Produced waters make up about 98% of all oil and gas wastes. The exemption only applies to wastes generated from the exploration, development, and production of oil and gas associated with primary field operations. Primary field operations include primary, secondary, and tertiary production of oil or gas (RCT 2001).

Primary field operations include activities at or near the wellhead or production facility, but before the point where the custody of the oil is transferred from an individual field facility or a centrally located facility to a carrier for transport to a refiner. If no custody transfer occurs, the primary field operation ends at the last point of separation. Crude oil stock tanks are considered separation devices for the purpose of defining areas of primary field operations (RCT 2001).

With respect to natural gas production, primary field operations are activities occurring at or near the wellhead, production facility, or gas plant (including gathering lines to the plant), but before the point of transfer of the gas from an individual field facility, a centrally located facility, or a gas plant to a carrier for transport to market, or before the point of the use of natural gas in a manufacturing process (RCT 2001).

In order to be covered, wastes from primary field operations must also be unique to E & P operations, such as produced water and drilling fluid are unique. However, other wastes commonly generated that are also generate by other types of industries, such as cleaning wastes, painting wastes, and waste lubricating oil are not exempt (RCT 2001).

Many of the wastes generated during oil and gas-related activities are exempt from RCRA, but some are not. Wastes that are exempt include:

…waste materials intrinsically derived from primary field operations associated with the

exploration, development, or production of crude oil and natural gas. The phrase "intrinsically derived from primary field operations" is intended to distinguish exploration, development, and production operations from transportation and manufacturing operations (EPA 2002).

The RCRA exempt oil and gas wastes are not regulated as hazardous wastes under federal law. The following table lists the RCRA nonexempt and exempt wastes from oil and gas E & P. All exempt waste must be generated in primary field operations.

**Table 4.8-9: Example RCRA Nonexempt and Exempt Wastes Generated during Oil Exploration and Production**

| **RCRA Nonexempt Oil and Gas Wastes** |
|---|
| Oil and gas service company wastes, such as empty drums, drum rinsate, vacuum truck rinsate, sandblast media, painting wastes, spent solvents, spilled chemicals, and waste acids |
| Waste compressor oil, filters, and blowdown |
| Waste solvents |
| Boiler cleaning wastes |
| Unused fracturing fluids or acids |
| Painting wastes |
| Vacuum truck and drum rinsate from trucks and drums transporting or containing nonexempt waste |
| Liquid and solid wastes generated by crude oil and tank bottom reclaimers |
| Refinery wastes |
| Gas plant cooling tower cleaning wastes |
| Boiler refractory bricks |
| Incinerator ash |
| Sanitary wastes |
| Radioactive tracer wastes |
| Used equipment lubrication oils |
| Used hydraulic fluids |
| Waste in transportation pipeline-related pits |
| Caustic or acid cleaners |
| Boiler scrubber fluids, sludges, and ash |
| Laboratory wastes |
| Pesticide wastes |
| Drums, insulation, and miscellaneous solids |
| **Oil and Gas Wastes Exempt from RCRA Hazardous Waste Regulation** |

**Table 4.8-9: Example RCRA Nonexempt and Exempt Wastes Generated during Oil Exploration and Production**

| |
|---|
| Drilling fluids and cuttings from offshore operations disposed on-shore |
| Well completion, treatment, and stimulation fluids |
| Basic sediment and water and other tank bottom sludge from storage facilities that hold product and exempt waste |
| Accumulated materials such as hydrocarbons, solids, sand, and emulsion from production separators, fluid treating vessels, and production impoundments |
| Produced water |
| Drilling fluids and drill cuttings |
| Workover wastes |
| Pit sludges and contaminated bottoms from storage or disposal exempt wastes |
| Gas plant sweetening wastes for sulfur removal, including amine, amine filters, amine filter media, backwash, precipitated amine sludge, iron sponge, and hydrogen sulfide scrubber liquid and sludge |
| Spent filters, filter media, and backwash (assuming the filter itself is not hazardous and the residue in it is from an exempt waste stream) |
| Produced sand |
| Pipe scale, hydrocarbon solids, hydrates, and other deposits removed from piping and equipment prior to transportation |
| Wastes from subsurface gas storage and retrieval, except for the listed nonexempt wastes |
| Liquid hydrocarbons removed from the production stream but not from oil refining |
| Gases removed from the production stream, such as hydrogen sulfide and carbon dioxide, and volatilized hydrocarbons |
| Light organics volatilized from exempt wastes in reserve pits or impoundments or production equipment |
| Geothermal production fluids |
| Gas plant dehydration wastes, including glycol-based compounds, glycol filters, filter media, backwash, and molecular sieves |
| Cooling tower blowdown |
| Packing fluids |
| Hydrocarbon-bearing soil |
| Pigging wastes from gathering lines |
| Constituents removed from produced water before it is injected or otherwise disposed of |
| Materials ejected from a producing well during blowdown |
| Waste crude oil from primary field operations and production |
| Rigwash |

**Table 4.8-9: Example RCRA Nonexempt and Exempt Wastes Generated during Oil Exploration and Production**

Sources: Adapted from Tables 1 and 2 from RCT 2001 and EPA 2002
Note:
*All exempt waste *must* be generated in primary field operations.

The E & P exemption is incorporated into California regulations, 22 CCR, Section 66261.4(b)(2) and 66261.24(a)(1), but it is limited in scope. The exemption applies only where the waste is hazardous solely by meeting the federal characteristic for toxicity under the Toxicity Characteristic Leaching Procedure (TCLP). The exemption does not apply if toxicity is determined based on criteria other than TCLP, or the waste meets any of the other three characteristics of hazardous waste codified in 22 CCR, Article 3, Sections 66261.20 et seq., namely ignitability, corrosivity, and reactivity (Nagy 2002).

The California DTSC conducted a study of E & P wastes, produced water, drilling waste, oily sludges, and foam wastes to determine whether they could have hazardous waste characteristics that are not covered by the exemption. The data indicated that oily sludges may exhibit hazardous waste characteristics not covered by the exemption. The DTSC report concluded that depending on formation characteristics or facility operations, certain E & P wastes, such as oily sludges, may be regulated by the State as hazardous wastes even if they are exempted from hazardous waste regulation under federal law. It is the generator's responsibility to determine which waste streams are hazardous in California and manage them accordingly (Nagy 2002).

## Pollution Prevention

### The Oil Pollution Act of 1990 (33 U.S.C. 2701 et seq.)

Under the authority of §311 of the CWA, the Oil Pollution Act (OPA) of 1990 prescribes a prevention, response, liability and compensation program for oil pollution from vessels, offshore facilities, pipelines, and onshore facilities. The OPA requires contingency plans be developed and includes reporting requirements to ensure the earliest possible notice of discharges of oil and hazardous substances and imminent threats of such discharges to the appropriate state and federal agencies. The Bureau of Safety and Environmental Enforcement (formerly part of Mineral Management Service [MMS]), U.S. Coast Guard, and EPA are involved in the implementation of OPA. In June of 1996, the EPA issued a Spill Prevention and Reporting Compliance Guidance Plan Document which integrated all the various related rules and regulations into one compliance program (WZI 2014a).

### Oil Pollution Prevention Regulation; Non-Transportation-Related Onshore and Offshore Facilities (40 CFR §112)

These regulations establish procedures, methods, and equipment requirements to prevent the discharge of oil from onshore and offshore facilities into or upon the navigable waters of the United States. These regulations apply only to non-transportation-related facilities. The U.S. Coast Guard and the EPA share responsibility for Federal On-Scene Commander oversight for spills. The

Spill Prevention, Control, and Countermeasure (SPCC) plan requirement discussed above under the CWA, are included within these regulations.

### Chemical Facility Anti-Terrorism Standards (6 CFR Part 27)

The Federal Department of Homeland Security established the chemical facility anti-terrorism standards in 2007. This rule established risk-based performance standards for the security of chemical facilities. Petroleum refineries can be considered chemical facilities. This regulation requires covered chemical facilities to prepare security vulnerability assessments, which identify facility security vulnerabilities, and to develop and implement site security plans.

In addition to regulatory standards, there are a number of industry codes and standards that are used in the design, construction, operation, and maintenance of hazardous liquid pipelines. Organizations that have developed these standards and codes include:

- API
- ASME
- National Fire Protection Association
- National Association of Corrosion Engineers

## Hazardous Materials Transportation

### The Hazardous Materials Transportation Act, 49 CFR 171, Subchapter C

The USDOT, Federal Highway Administration, and the FRA regulate transportation of hazardous materials at the federal level (state requirements are discussed in following sections). The HMTA requires that carriers report accidental releases of hazardous materials to the USDOT at the earliest practical moment. Other incidents that must be reported include deaths, injuries requiring hospitalization, and property damage exceeding $50,000. The USDOT also specifies the types of cars that must be used to ship crude oil and other materials.

The FRA authorizes the Hazardous Materials Division to administer a safety program, under the Federal Hazardous Materials transportation law (49 U.S.C. § 5101 *et seq*.), that oversees the movement of hazardous materials (including dangerous goods), such as petroleum, chemical, and nuclear products, throughout the Nation's rail transportation system. The FRA's hazardous materials inspection program is primarily responsible for monitoring compliance pursuant to the hazardous materials regulations found in 49 CFR Parts 171–180, including in particular, 49 CFR Part 174, Carriage By Rail. Part 174 include restrictions on the types of hazardous materials that may be shipped, tank car specifications, requirements for labeling, handling, loading, unloading and storage, and requirements for safety and security inspections. In addition, specific handling and tank car requirements are prescribed for explosives, gases, flammable liquids, and poisonous and radioactive materials. FRA inspectors are authorized to inspect railroad or other facilities and all pertinent documents related to hazardous materials transportation to verify compliance with the hazardous materials regulation. Additionally, the FRA has an obligation to investigate possible

violations at points where shipments originate and monitor compliance on a regular basis (FRA 2011).

## Worker Health and Safety

### Occupational Safety and Health Act, (29 U.S.C. 651-678)

Under the authority of the Occupational Safety and Health Act of 1970, the Occupational Safety and Health Administration (OSHA), a division of the Department of Labor, established health and safety standards for the workplace, including the accidents and occupational injuries reporting requirements. Relevant regulations include those related to hazardous materials handling, employee protection requirements, first aid, and fire protection, as well as material handling and storage. Relevant portions are summarized below.

### Hazard Communication, 29 CFR 1910.1200

The purpose of this section is to ensure that the hazards of all chemicals produced or imported are classified, and that information concerning the classified hazards is transmitted to employers and employees. The requirements of this section are intended to be consistent with the provisions of the United Nations Globally Harmonized System of Classification and Labeling of Chemicals (GHS), Revision 3. The transmittal of information is to be accomplished by means of comprehensive hazard communication programs, which are to include container labeling and other forms of warning, safety data sheets and employee training.

### Process Safety Management (PSM) of Highly Hazardous Materials, 29 CFR 1910.119

This regulation establishes requirements for preventing or minimizing the consequences of catastrophic releases of toxic, flammable, reactive or explosive materials. The PSM regulation requires compiling process safety information, conducting process hazard analyses, written operating procedures, employee training and participation programs, pre-startup safety reviews, evaluation of mechanical integrity of critical equipment, contractor requirements, written procedures for managing change, hot work permit systems, incident investigations, emergency action plans, and compliance audits.

## Airports

### Federal Aviation Administration (FAA)

The FAA regulates aviation at regional, public, private, and military airports. The FAA regulates objects affecting navigable airspace and structures taller than 200 feet according to Federal Aviation Regulation 14 CFR Part 77. The U.S. and California Departments of Transportation also require the proponent to submit FAA Form 7460-1, Notice of Proposed Construction or Alteration. According to 14 CFR Part 77.5, notification allows the FAA to identify potential aeronautical hazards in advance, thus preventing or minimizing any adverse impacts on the safe and efficient use of navigable airspace. Any structure that would constitute a hazard to air navigation, as defined in 14 CFR Part 77, requires issuance of a permit from the California Department of Transportation's Aeronautics Program. The permit is not required if the FAA aeronautical study determines that the structure has no impact on air navigation.

# State

Federal statutes establish national standards for the transportation, emission, discharge, and the disposal of harmful substances; however, implementation and enforcement of many of the large programs has been delegated to the states by the EPA. In general, states set stricter standards than those required by federal law. Some of the programs delegated to the states are the emissions standards, the water quality standards and the National Pollution Discharge Elimination System (NPDES) Programs under the CWA, the hazardous waste program under RCRA, and the drinking water and UIC programs under the SDWA (Brown n.d.). In addition, state laws address gas and liquid pipelines, oil and gas facilities and hazardous materials and waste. Each of these is discussed below.

## Hazardous Materials and Hazardous Waste

Whether a material is deemed a hazardous material and/or a hazardous waste determines which state regulation will apply to it. According to Health and Safety Code § 25124, materials become waste when the material is disposed of, burned or incinerated, or accumulated, stored or treated before or in lieu of being disposed of, burned or incinerated. Recyclable materials that are managed as provided in Health and Safety Code § 25143.2 and 25143.9 are excluded from classification as waste. A hazardous waste is a waste that because of its quantity, concentration, or physical, chemical, or infectious characteristics may either:

- Cause or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness.
- Pose a substantial present or potential hazard to human health or the environment, due to factors including, but not limited to, carcinogenicity, acute toxicity, chronic toxicity, bioaccumulative properties, or persistence in the environment, when improperly treated, stored, transported, disposed of, or otherwise managed. (Health and Safety Code § 25117; 25141).

## Hazardous Materials Release Response Plans and Inventory Act of 1985

The Hazardous Material Release Response Plans and Inventory Act, (HSC, Division 20, Chapter 6.95, Sections 25500-25547.8) also known as the Business Plan Act, (HSC, Division 20, Chapter 6.95, Sections 25500-25519) requires businesses using hazardous materials to prepare a plan that describes their facilities, inventories, emergency response plans, and training programs. Hazardous materials are defined as raw or unused materials that are hazardous and are part of a process or manufacturing step. Specifically, the California Health and Safety Code Sections 25503 and 25505 require facilities that store hazardous materials in excess of 55 gallons, 500 pounds, or 200 cubic feet to submit Hazardous Materials Business Plans (HMBPs) to the Certified Uniform Program Agency. This plan must include a hazardous materials inventory and address emergency response, planning, training, and evacuation.

## Uniform Fire Code--Hazardous Materials Management Plan, Hazardous Materials Inventory Statement

The Uniform Fire Code (UFC) prescribes regulations that are consistent with best practices to address fire and explosion hazards that can arise from the storage, handling and use of hazardous substances, materials and devices. The State Fire Marshal has adopted the UFC, with amendments, as the California Fire Code. Local fire departments are required to adopt local fire codes that are no less stringent than the California Fire Code (Brown n.d.).

According to Section 8001.3.1, a permit is required to store, use, or handle hazardous material in excess of specified quantities. A local fire chief may require permit applicants to prepare a Hazardous Materials Management Plan (HMMP) (Section 8001.3.2a) and Hazardous Materials Inventory Statement (HMIS) (Section 8001.3.3a). These documents are consistent with the HMBP (Brown n.d.).

## Hazardous Materials Transportation in California

California regulates the transportation of hazardous waste originating or passing through the state in Title 13 of the CCR. The CHP and Caltrans have primary responsibility for enforcing federal and state regulations and responding to hazardous materials transportation emergencies. Caltrans sets standards for trucks in California. The regulations are enforced by the CHP. Common carriers are licensed by the CHP, pursuant to the California Vehicle Code, §32000.5. This section requires licensing of every motor (common) carrier who transports in excess of 500 pounds of hazardous materials at one time or hazardous materials shipments that require placards.

Under the RCRA, the EPA sets standards for transporters of hazardous waste. In addition, California regulates the transportation of hazardous waste originating or passing through the state; state regulations are contained in the CCR, Title 13. Hazardous waste must be regularly removed from generating sites by licensed hazardous waste transporters. Transported materials must be accompanied by hazardous waste manifests and spills or discharges must be reported.

## Hazardous Waste Control Act of 1972 (HSC Division 20, Chapter 6.5)

The Hazardous Waste Control Act established the state hazardous waste management program, which is similar to, but more stringent than RCRA program requirements. The Hazardous Waste Control Law regulates the management of hazardous waste under Health and Safety Code, Division 20 Chapter 6.5. This law defines hazardous wastes and the procedures for the handling, transportation, and disposal of hazardous waste. The implementing regulations prescribe management practices for hazardous wastes; establish permit requirements for hazardous waste treatment, storage, disposal, and transportation; and identify hazardous wastes that cannot be disposed of in landfills. Hazardous waste is tracked from the point of generation to the point of disposal or treatment using hazardous waste manifests. The manifests list a description of the waste, its intended destination, and regulatory information about the waste. The hazardous waste control program is administered by the state DTSC and by local CUPAs.

Title 22 of the CCR Division 4.5, Environmental Health Standards for Management of Hazardous Waste provides the regulatory requirements for the implementation of the law. Chapter 11 defines a waste as hazardous if it has any of the following characteristics: ignitability, corrosivity, reactivity, and toxicity. Article 3 provides detailed definitions of each characteristic. Articles 4 and 5 provide lists of RCRA hazardous wastes, non-RCRA hazardous wastes, hazardous wastes from specific sources, extremely hazardous wastes, hazardous wastes of concern, and special wastes. Chapters 12, 13, and 14 provide the standards for hazardous waste generators and transporters as well as for the owners of transfer, treatment, storage, and disposal facilities.

## Unified Hazardous Waste and Hazardous Materials Management Regulatory Program (Unified Program)

Senate Bill 1082 of 1993 (Health and Safety Code Chapter 6.11) required the Secretary of the CalEPA to establish a "unified hazardous waste and hazardous materials management" regulatory program (Unified Program) by January 1, 1996. Currently, there are 83 Certified Unified Program Agencies (CUPA) in California. All counties have been certified by the Secretary. The *Unified Program* consolidates, coordinates, and makes consistent six existing programs.

The Unified Program provides for local implementation of the following six state and federal regulatory programs:

- The Aboveground Storage Tank program (and its SPCCs)
- The Hazardous Materials Release Response Plan and Inventory Program (HMRRP) (Business Plan)
- The California Accidental Release Prevention Program (CalARP)
- The California UFC, HMMP, and HMIS
- The Underground Storage Tank program (UST)
- The Hazardous Waste Generator and Onsite Hazardous Waste Treatment program (tiered permitting)

The local implementing agencies are known as CUPAs (certified unified program agencies) or PAs (participating agencies) (Brown, n.d.).

## Aboveground Petroleum Storage Act

The Aboveground Petroleum Storage Act (APSA) requires reporting of any spill or leak in excess of one barrel as the hazardous materials release regulations (19 CCR §2620-2734). The CUPAs are responsible for its implementation. In Kern County, the Kern County Public Health Services Department Environmental Health Division is the responsible party (WZI 2014a).

## Hazardous Waste and Substances Sites (Cortese) List (California Government Code §65962.5)

This state code requires the state to compile a hazardous waste and substance list. The Cortese List is a planning document used to comply with the California Environmental Quality Act (CEQA) requirements by providing information about the location of hazardous materials release sites. The CalEPA must update the Cortese List annually (California DTSC 2007b).

## California Accidental Release Prevention (CCR 2745.1, 1997)

CalARP is designed to minimize the risk of extremely hazardous substances that potentially cause immediate harm to the public and the environment by requiring business owner/operator handling one or more regulated substance over the state and/or federal threshold to evaluate and determine the potential impacts of an accidental release. The CalARP mirrors the Federal Risk Management Program under the federal Clean Air Act Section 112(r), except that it includes external events and seismic analysis to the requirements and includes facilities with lower inventories of materials.

Facilities subject to the CalARP requirements must submit a RMP to the CUPA. The RMP must contain required elements, similar to those required under the federal RMP program, the specific requirements of which are determined by the CalARP "program level" that applies to the facility. For example, the RMP typically must include safety information, process hazard analysis, or hazard review, written operating procedures, training, maintenance, compliance audits, and incident investigations.

## Emergency Services Act of 2009

Under the Emergency Services Act, the state developed an emergency response plan to coordinate emergency services provided by federal, state, and local agencies. Rapid response to incidents involving hazardous materials or hazardous waste is an important segment of the plan administered by the CalOES, formerly the California Emergency Management Agency. CalOES is responsible for the coordination of overall state agency response to major disasters in support of local government. The office is responsible for assuring the state's readiness to respond to and recover from all hazards – natural, manmade, war-caused emergencies and disasters – and for assisting local governments in their emergency preparedness, response, recovery, and hazard mitigation efforts (CalOES 2011a).

The CalOES Hazardous Materials (HazMat) Section coordinates statewide implementation of hazardous materials accident prevention and emergency response programs for all types of hazardous materials incidents and threats (CalOES 2011b).

Releases of oil that in any way causes harm or threatens to cause harm to public health and safety, the environment, or property, require immediate notification and must be made to the CalOES Warning Center. In addition, any discharge or threatened discharge of oil into state waters must be reported to CalOES. No notification is needed if the release of oil is on land and is not discharged or threatening to discharge into state waters; and (a) does not cause harm or threaten to cause harm to the public health and safety, the environment, or property; and (b) is under 42 gallons (CalOES 2014).

## The Porter-Cologne Water Quality Control Act, California Water Code Sections 13300-13999 and Title 23 of the California Administrative Code

This Act is analogous to the federal CWA and regulates discharges that may affect the quality of the state's waters. Unlike the federal CWA, which defines "waters of the United States" to exclude groundwater, "waters of the state" as defined under the Porter-Cologne Act include groundwater. The SWRCB and the nine Regional Water Quality Control Boards (RWQCBs) are responsible for planning, permitting, and enforcement. The State Board formulates policies for water-quality control and implements the required permit system (Brown n.d.).

This Act also establishes reporting requirements for unintended discharges of any hazardous substance, sewage, or oil or petroleum products. Any discharge of one barrel of oil or greater requires reporting to the Office of Emergency Services (WZI 2014a).

The State and Regional Water Boards have enforcement authority under the Porter-Cologne Water Quality Control Act; the Toxic Pits Cleanup Act of 1984; Chapters 6.67, 6.7, and 6.75 of Division 20 of the Health and Safety Code regarding underground and aboveground tanks; Health and Safety Code section 25356.1; and Chapter 6 of Division 3 of the Harbors and Navigation Code. They can take action for:

- Violation of an effluent limit, receiving water limit, or discharge prohibition contained in an order or Water Quality Control Plan (Basin Plan).
- An unauthorized spill, leak, fill, or other discharge.
- Failure to perform an action required by the State Water Board or a Regional Water Board (Brown, n.d.).

The Porter-Cologne Act gives the CVRWQCB the authority to regulate discharges of waste to land in Kern County. The CVRWQCB has established waste classifications, site classifications, and WDRs. The CVRWQCB implements the regulations through issuance of WDRs and general orders for the waste management unit. Waste management units, permitted by the CVRWQCB for the E & P industry, include evaporation ponds, percolation ponds, and sumps. As discussed in Section 4.9, Hydrology and Water Quality, drilling muds and boring wastes associated with oil and

gas development currently are regulated under SWRCB General Order 2003-0003-DWQ which addresses low-threat discharges to land. The CVRWQCB staff has indicated it intends to prepare General WDRs for drilling sumps, but has not yet proposed tentative or final WDRs. If adopted, such WDRs – rather than the SWRCB General Order – would regulate the evaporation ponds, percolation ponds, and/or sumps covered by the WDRs.

## Lempert-Keene-Seastrand Oil Spill Prevention and Response Act of 1990

This chapter, Article 3.5 (Section 8574.1) of Chapter 7 of the Government Code, and Division 7.8 (Section 8750) of the Public Resources Code, known as the Lempert-Keene-Seastrand Oil Spill Prevention and Response Act, seeks to protect the waters of the state from oil pollution and to plan for the effective and immediate response, removal, abatement, and cleanup in the event of an oil spill. It also requires immediate cleanup of spills following approved contingency plans and fully mitigating impacts on wildlife.

The Act assigns primary authority to California Department of Fish and Wildlife and Office of Spill Prevention and Response (CDFW-OSPR) to direct prevention, removal, abatement, response, containment, and cleanup efforts with regard to all aspects of any oil spill in the marine waters of the state.

The Act was amended in 2014 by Senate Bill 861 to expand application of its provisions to all waters of the state, and not solely coastal and marine waters. The bill requires CDFW-OSPR to amend the state's oil spill contingency plan to provide for the best achievable protection of all state waters, and to submit the plan to the governor and the legislature on or before January 1, 2017. The amendments also expand the fee requirements under the Act by deleting a provision that would have reduced the oil spill prevention and administration fee, and also deleting a fee exception for independent crude oil producers. The bill also imposes the oil spill prevention fee on pipeline operators transporting petroleum products into the state by means of a pipeline operating across, under, or through any waters of the state. The amendments also impose the fee on persons owning crude oil or petroleum products at the time the crude oil or petroleum products are received at a refinery by any mode of delivery that passed over, across, under, or through waters of the state, whether from within or outside the state. Prior law imposed the fee only on crude oil arriving at a marine terminal via tanker.

## Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65; Health and Safety Codes Sections 25249.5 et seq.)

The Act requires businesses to notify Californians about significant amounts of chemicals that are released into the environment. It also requires the development of health-protective exposure standards for different media (air, water, land) to recommend to regulatory agencies.

CalEPA Office of Environmental Health Hazard Assessment (OEHHA) is responsible for implementing this Act. The OEHHA evaluates currently available scientific information on substances considered for placement on the Proposition 65 list. Proposition 65 is enforced by the attorney general, district attorneys, and the private citizens acting in the public interest.

## California Environmental Protection Agency (CalEPA)

The CalEPA was created in 1991, which unified California's environmental authority in a single cabinet-level agency and brought the California Air Resources Board (CARB), SWRCB, RWQCBs, California Department of Resources Recycling and Recovery (CalRecycle) - formerly the Integrated Waste Management Board (IWMB), DTSC, OEHHA, and Department of Pesticide Regulation (DPR) under one agency. These agencies were placed within the CalEPA "umbrella" for the protection of human health and the environment and to ensure the coordinated deployment of state resources. Their mission is to restore, protect, and enhance the environment, to ensure public health, environmental quality, and economic vitality.

## Department of Toxic Substance Control (DTSC)

The DTSC is a department of CalEPA and is the primary agency in California that regulates hazardous waste, cleans-up existing contamination, and looks for ways to reduce the hazardous waste produced in California. The DTSC regulates hazardous waste in California primarily under the authority of the federal RCRA and the California Health and Safety Code (primarily Division 20, Chapters 6.5 through 10.6, and Title 22, Division 4.5). Other laws that affect hazardous waste are specific to handling, storage, transportation, disposal, treatment, reduction, cleanup, and emergency planning.

Government Code §65962.5 (commonly referred to as the Cortese List) includes DTSC-listed hazardous waste facilities and sites, DHS lists of contaminated drinking water wells, sites listed by the SWRCB as having UST leaks and which have had a discharge of hazardous wastes or materials into the water or groundwater, and lists from local regulatory agencies of sites that have had a known migration of hazardous waste/material.

## California Office of Emergency Services (CalOES)

In order to protect the public health and safety and the environment, the CalOES is responsible for establishing and managing statewide standards for business and area plans relating to the handling and release or threatened release of hazardous materials. Basic information on hazardous materials handled, used, stored, or disposed of (including location, type, quantity, and the health risks) needs to be available to firefighters, public safety officers, and regulatory agencies. The information needs to be included in business plans in order to prevent or mitigate the damage to the health and safety of persons and the environment from the release or threatened release of these materials into the workplace and environment. These regulations are covered under Chapter 6.95 of the California Health and Safety Code Article 1–Hazardous Materials Release Response and Inventory Program (Sections 25500 to 25520) and Article 2– Hazardous Materials Management (Sections 25531 to 25543.3).

CCR Title 19, Public Safety, Division 2, Office of Emergency Services, Chapter 4– Hazardous Material Release Reporting, Inventory, and Response Plans, Article 4 (Minimum Standards for Business Plans) establishes minimum statewide standards for HMBPs. These plans include the following: (1) a hazardous material inventory in accordance with Sections 2729.2 to 2729.7; (2) emergency response plans and procedures in accordance with Section 2731; and (3)

training program information in accordance with Section 2732. Business plans contain basic information on the location, type, quantity, and health risks of hazardous materials stored, used, or disposed of in the state. Each business shall prepare a HMBP if that business uses, handles, or stores a hazardous material or an extremely hazardous material in quantities greater than or equal to the following:

- 500 pounds of a solid substance;
- 55 gallons of a liquid;
- 200 cubic feet of compressed gas;
- A hazardous compressed gas in any amount; or
- Hazardous waste in any quantity.

### California Highway Patrol (CHP)

A valid Hazardous Materials Transportation License, issued by the CHP, is required by the laws and regulations of State of California Vehicle Code Section 3200.5 for transportation of either:

- Hazardous materials shipments for which the display of placards is required by state regulations; or
- Hazardous materials shipments of more than 500 pounds, which would require placards if shipping greater amounts in the same manner.

Additional requirements on the transportation of explosives, inhalation hazards, and radioactive materials are enforced by the CHP under the authority of the State Vehicle Code. Transportation of explosives generally requires consistency with additional rules and regulations for routing, safe stopping distances, and inspection stops (Title 14, CCR, Chapter 6, Article 1, Sections 1150-1152.10). Inhalation hazards face similar, more restrictive rules and regulations (Title 13, CCR, Chapter 6, Article 2.5, Sections 1157-1157.8). Radioactive materials are restricted to specific safe routes for transportation of such materials.

# Regulatory Programs that Have Both a Federal and State Nexus Relevant to this Project

This section synthesizes information provided above for two topic areas that have multiple state and federal requirements, hazardous material releases and reporting, and discharges to underground injection wells.

## Hazardous Materials Releases and Reporting

In California, emergency release reporting and response requirements extend across several federal statutes and numerous state laws:

- Comprehensive Environmental Response, Compensation and Liability Act (U.S.)

- Emergency Planning and Community Right-to-Know Act (U.S.)
- CWA (U.S.)
- RCRA (U.S.)
- The Waters Bill (H.R.6204)
- The Hazardous Waste Control Law (CA)
- The Porter-Cologne Water Quality Protection Act (CA)
- The APSA (CA)
- The UST laws (CA)
- The Occupational Carcinogens Control Act (CA)

These laws differ as to what releases must be reported (e.g., releases to "the environment" vs. releases to "waters of the state"), and which materials or chemicals that are subject to regulations. The Waters Bill represents the minimum reporting burden for state-only releases because of the broadness of the "hazardous materials" and "release" definitions. Regulations implementing hazardous materials inventories and release reporting provisions have been adopted by the Office of Emergency Services (19 CCR §2620-2734). Kern County primarily administers these provisions (WZI 2014a).

CalARP's goal is to prevent accidental releases of substances that pose the greatest risk of immediate harm to the public and the environment. Kern County conducts inspections at CalARP facilities and reviews RMPs. Cogeneration anhydrous ammonia plants are an example of this facility type in an oilfield (WZI 2014a).

Hazardous materials handlers must report significant releases. Handlers must orally report as soon as possible without impeding control of the release and a written follow-up report must be made to the local agency and to the Office of Emergency Services (WZI 2014b).

In reporting hazardous materials releases, facilities must report, at a minimum: (1) the location of the release; (2) the hazardous materials are involved; (3) the quantity of material involved; (4) the potential hazards; (5) when the release occurred; and (6) the responsible party (WZI 2014b).

California regulates underground storage tanks through the California Health and Safety Code. Should an unauthorized release occur, the regulations require release reporting, investigation and abatement by the Owner. The release must be reported to the local administering agency, Kern County and to DTSC or the California Regional Water Quality Control Board (CRWQCB) within 24 hours of discovery. A full written report is required by the owner within five days. (WZI 2014b).

Additionally, the EPA maintains the Emergency Response Notification System (ERNS) database. This database is updated weekly and provides a record of all phone calls made to the National Response Center (NRC). The NRC is notified regarding any number of different types of spills or releases (WZI 2014b).

## Discharges to Injection Wells

State and federal authorities regulate the subsurface injection of waste. The Porter-Cologne Act regulates subsurface injection discharges that could affect the quality of "waters of the state" and requires dischargers to file a Report of Waste Discharge with the local Regional Board and comply with issued WDRs (WZI 2014a).

The federal SDWA regulates underground injection to protect usable drinking water supplies from contamination. States can apply to the EPA to regulate this program within their own boundaries. For wells associated with oil and gas production (referred to as "Class II" wells), California has a EPA-approved UIC program. DOGGR administers the Class II UIC program pursuant to a "Primacy Agreement and Memorandum of Understanding" with the EPA that was established in 1983. The current status and recent developments regarding the Class II UIC program administered by DOGGR are discussed below and in Section 4.9, Hydrology and Water Quality. For classes of wells other than Class II, California does not have an EPA-approved UIC program and EPA Region IX administers the UIC program directly (WZI 2014a).

## Liquid Pipelines and Oil Facilities

### Department of Conservation, Division of Oil, Gas and Geothermal Resources (DOGGR)

DOGGR regulates statewide oil and gas activities. It supervises the drilling, operation, maintenance, and plugging and abandonment of onshore and offshore oil, gas, and geothermal wells, preventing damage to: (1) life, health, property, and natural resources; (2) underground and surface waters suitable for irrigation or domestic use; and (3) oil, gas, and geothermal reservoirs. Division requirements encourage wise development of California's oil, gas, and geothermal resources while protecting the environment (DOGGR 2015).

The Division's programs include: well permitting and testing; well stimulation; safety inspections; oversight of production and injection projects; environmental lease inspections; idle-well testing; inspecting oilfield tanks, pipelines, and sumps; hazardous and orphan well plugging and abandonment contracts; and subsidence monitoring (DOGGR 2015).

Section 3000 of the California Public Resources Code and Title 14, Chapter 4 of the CCR addresses issues, such as well spacing, blowout prevention devices, casing requirements, plugging and abandonment of wells, maintenance of facilities and safety systems, and inspection frequency and reporting requirements.

DOGGR has published instruction manuals related to, among other topics, the testing of oil and gas wells for water shutoff (Manual 06), blowout prevention requirements (Publication No. 07) and drilling oil, gas, and geothermal wells in an $H_2S$ environment (M10). The Blowout Prevention in California Manual (Publication No. 07) assists the user with the equipment selection and testing for all well types.

In California, all Class II injection wells are regulated by the DOGGR under the State Public

Resources Code and the federal SDWA. Class II injection wells fall under the Division's UIC program, which is monitored and audited by the EPA. In 1983, the Division received the EPA's primary authority, primacy, to regulate Class II wells. The main features of the UIC program include permitting, inspection, enforcement, mechanical integrity testing, plugging and abandonment oversight, data management, and public research. Currently DOGGR and EPA are working together to strengthen DOGGR's administration of the UIC program to ensure it complies with federal requirements and to update aquifer exemption boundaries. As part of this process DOGGR is reviewing Class II wells and their relative risk to groundwater resources. In addition, DOGGR will be releasing new guidance on the aquifer exemption process, considering aquifer exemption applications and issuing rulemakings for corrective action and Class II UIC program improvements, including the creation of a searchable injection well database. The current status and recent developments regarding the Class II UIC program administered by DOGGR are discussed in more detail in Section 4.9, Hydrology and Water Quality.

## Assembly Bill 1376 (Bustamante) Field Rule

In 1998 under Assembly Bill 1376 (Bustamante), the DOGGR, RWQCB, and California Department of Fish and Game established the "field rule" for oil spill reporting in the San Joaquin Valley. The threshold for reporting in the San Joaquin Valley is:

- All spills of five barrels of crude oil or more unless the spill is within containment;
- All spills of 10 barrels or more within containment; and
- Any spill of one barrel of oil or more to land or any amount that causes a sheen on the water under the following conditions:
    - Any lease or site without appropriate or adequate containment as required by Subchapter 2, Section 1750 through 1779 of the CCR or without a current oil spill contingency plan,
    - Urban areas,
    - Into waters of the state or any place where the spill can pass into waters of the state, and
    - Any field or area designated specifically by DOGGR, DFW, or RWQCB (DOC 1998).

## AB 1960 Public Resources: Oil Production Facilities and Oil Spills

Under this bill, DOGGR is required to regulate the minimum facility maintenance standards for production facilities. The regulations that accompany this bill (14 CCR Sections 1722 – 1777.3) require operators to develop and implement spill contingency plans where condensate storage volume exceeds 50 barrels or at facilities that produce at least one barrel per day. The implementing regulations provide specific requirements for the spill contingency plan that include emergency contacts, available safety equipment, checklist for spill response, maps of the facility, a list of chemicals at the facility, containment features, corrosion prevention techniques, and the sensor and alarm systems. These plans may be fulfilled by SPCC plans if the SPCC plan is deemed

adequate by DOGGR. Relevant portions of the AB 1960 implementing regulation include:

- 1773.1 Production Facility Secondary Containment: Production facilities storing and/or processing fluids, with specific exceptions, shall have secondary containment that is capable of containing the volume of liquids from the container with the largest gross capacity within the secondary containment and should be able to confine the liquid for 72 hours.

- 1773.2 Tank Construction and Leak Detection. All new tanks shall be constructed and designed with sufficient space between tanks to facilitate maintenance, inspection, testing, and repair. New tank foundations shall support the tank, maintain the tank level, and drain fluid away from the tank. The sub-base of the foundation shall have an impermeable barrier designed to prevent downward fluid migration and to allow leaks to drain away from the tank and be detected by inspection.

- 1773.3. Tank Maintenance and Inspections. Operators shall inspect in-service tanks at least once a month for leaks at any location that could leak to evaluate the presence of corrosion; the condition of the foundation; and the condition of paint, insulation, and grounding systems.

- 1774.1. Pipeline Inspection and Maintenance. Operators are subject to pipeline inspection and testing procedures, including requirements to "visually inspect all aboveground pipelines for leaks and corrosion" at least once per year, perform tests or inspections that DOGGR may order to establish the reliability of any pipeline system, and repair, replace, or install cathodic protection as required. Any pipeline that has had a leak in the past, resulting in the release of a reportable quantity, shall be pressure tested by the operator to verify the integrity of the pipe prior to being placed back into active service.

- 1774.2. Pipeline Management Plans. Operators shall prepare a pipeline management plan for all pipelines that lists information on each pipeline as well as a description of the testing method and schedule for all pipelines.

- 1777. Maintenance and Monitoring of Production Facilities, Safety Systems, and Equipment. Operators are required to maintain production facilities in good condition to prevent leakage and corrosion and to safeguard life, health, property, and natural resources. Specifically operators must implement and comply with a preventative maintenance program which requires operators to conduct at least monthly visual inspections of aboveground facilities, excluding pipelines, for leaks and corrosion.

A blowout prevention and control plan may be necessary for certain critical or high-pressure wells. There are reporting requirements for blowouts, fires, serious accidents and significant gas or water leaks.

In addition, these regulations address oilfield sumps; production facilities containment, maintenance, and testing; pipeline construction and maintenance; maintenance and monitoring of

production facilities, safety equipment, and equipment.

### California Pipeline Safety Act of 1981 (Cal. Gov. Code § 51010)

This California Pipeline Safety Act gives regulatory jurisdiction to the state Fire Marshal for the safety of all intrastate hazardous liquid pipelines and oil interstate pipelines used for the transportation of hazardous or highly volatile liquid substances. The law establishes the federal Hazardous Liquid Pipeline Safety Act (49 U.S.C. Sec. 2001 et seq.) and federal pipeline safety regulations as the governing rules for intrastate pipelines. This statute also authorizes the state Fire Marshal by agreement with the United States Secretary of Transportation, to implement the federal Hazardous Liquid Pipeline Safety Act and federal pipeline safety regulations as to those portions of interstate pipelines located within the state. It also establishes the civil penalties for violations of the act or its regulations.

## California Pipeline Safety Regulations

The state Fire Marshal has adopted hazardous liquid pipeline safety regulations that comply with federal laws relating to hazardous liquid pipeline safety, including inspection and maintenance provisions.

The state Fire Marshal may exempt the application of regulations when it is determined that the risk to public safety is slight and the probability of injury or damage remote.

Any new pipeline needs to be designed and constructed in accordance with Subparts C and D of 49 CFR Part 195, and shall include a means of leak detection and cathodic protection which the state Fire Marshal determines is acceptable.

Any new pipeline shall be designed to accommodate the passage of instrumented internal inspection devices, and shall have leak mitigation and emergency response plans and equipment as the state Fire Marshal may require.

### Oil Pipeline Environmental Responsibility Act (Assembly Bill [AB] 1868)

The Oil Pipeline Environmental Responsibility Act requires every pipeline corporation qualifying as a public utility and transporting crude oil in a public utility oil pipeline system to be held strictly liable for any damages incurred by "any injured party which arise out of, or are caused by, the discharge or leaking of crude oil or any fraction thereof . . . ." The law only applies to public utility pipelines completed after January 1, 1996, or the part of an existing utility pipeline relocated after 1996 and more than 3 miles in length.

Damages for which a pipeline corporation is liable under this law include all response, containment, cleanup, removal, and treatment, including monitoring and administration costs. Other costs can include, but are not limited to, injury or economic losses resulting from destruction of, or injury to, real or personal property; injury to, destruction of, or loss of natural resources, including but not limited to, the reasonable cost of rehabilitating wildlife habitat, and other resources and the reasonable cost of assessing that injury, destruction, or loss, in any action

brought by the state, county, city, or district; loss of taxes, royalties, rents, use, or profit shares caused by the injury, destruction, loss, or impairment of use of real property, personal property, or natural resources; and loss of use and enjoyment of natural resources and other public resources or facilities in any action brought by the state, county, city, or district.

In addition, a pipeline corporation shall immediately clean up all crude oil that leaks or is discharged from a pipeline.

## Natural Gas Pipelines

### California Public Utilities Commission (CPUC) – General Order 112-E and Proposed Amended General Order 112-F

In addition to 49 CFR Parts 190, 191, 192, and 199, natural gas pipelines that are subject to 49 CFR Part 192 are subject to the rules and regulations of the CPUC including General Order 112-E, "State of California Rules Governing Design, Construction, Testing, Operation, and Maintenance of Gas Gathering, Transmission, and Distribution Piping Systems." General Order 112-E establishes reporting requirements including incident reports, annual reports, safety-related condition reporting, installation reports, and reporting of changes in maximum allowable operating pressure (MAOP). General Order 112-E also establishes construction and safety standards for gas pipelines, and testing requirements. CPUC General Order 112-E is presently undergoing revision by the CPUC in its proposed amended General Order 112-F. The amendments proposed in General Order 112-F would double the frequency of transmission system leak surveys, provide guidance on prioritizing leak repair, qualifying training facilities, protecting gas pipelines from encroachments, and facilitating emergency communications, provide testing pressures for all pipeline, and adopt clearance requirements not specified in federal regulations.

CPUC General Order 112-E, and its proposed amendment General Order 112-F, do not apply to pipelines for onshore gas gathering if operated at less than 0 pounds per square inch gauge or if not a "regulated onshore gathering line" as determined per 49 CFR 192.8. A pipeline is a "regulated onshore gathering line" if it meets the API RP 80 definition of "onshore gathering line" and is "regulated" if the pipeline has specified features and is in specified locations per 49 CFR 192.8(b). The specified features include material and hoop stress expressed as a percentage of SMYS created by MAOP. The specified locations include Class 2, 3, and 4 areas, which are generally more densely populated areas.

## Health and Safety

### California Occupational Safety and Health Administration (Cal/OSHA)

Cal/OSHA is the primary agency responsible for worker safety in the handling and use of chemicals in the workplace. Cal/OSHA standards are generally more stringent than federal regulations. The employer is required to monitor worker exposure to listed hazardous substances and notify workers of exposure (8 CCR Sections 337-340). The regulations specify requirements for employee training, availability of safety equipment, accident-prevention programs, and

hazardous substance exposure warnings.

### California Occupational Safety and Health Act of 1973 –Labor Code Section 6300-6332

Cal/OSHA is responsible for developing and enforcing the workplace safety regulations in Title 8 CCR. This includes ensuring worker safety in the handling and use of chemicals in the workplace. Cal/OSHA hazardous materials regulations include requirements for safety training, availability of safety equipment, hazardous substance exposure warnings, and emergency action and fire prevention plan preparation. Cal/OSHA requires businesses to prepare Injury and Illness Prevention Plans and Chemical Hygiene Plans.

Cal/OSHA also enforces hazard communication program regulations, which contain training and information requirements, including procedures for identifying and labeling hazardous substances. The hazard communication program also requires that Material Safety Data Sheets (MSDSs) be available to employees and that employee information and training programs be documented. Workers must be informed of the hazards associated with the materials they handle and manufacturers are required to label containers and provide worker training.

# Local

## Kern County General Plan (KCGP)

The Project Area is located within the Kern County General Plan (KCGP) area and, therefore, would be subject to applicable policies and measures of the KCGP. The Land Use, Conservation, and Open Space Element, Circulation Element, Safety Element, and Energy Element of the KCGP includes goals, policies, and implementation measures related to hazards and hazardous materials that apply to the Project, as described below.

## Chapter 1. Land Use, Conservation, and Open Space Element.

### 1.4 Public Facilities and Services

#### Goals

**Goal 9.** Serve the needs of industries and Kern County residents in a manner that does not degrade the water supply and the environment and protect the public health and safety by avoiding surface and subsurface nuisances resulting from the disposal of hazardous wastes, irrespective of the geographic origin of the waste.

#### Implementation Measures

**Implementation Measure N.** Secure complete and accurate information on all hazardous wastes generated, handled, stored, treated, transported, and disposed of within or through Kern County.

**Implementation Measure O.** Reduce to the greatest degree possible the amount of waste to be disposed of by encouraging private industry to construct and manage a high quality system of

transfer stations, recycling facilities, treatment plants, and incinerators located near the generators of hazardous waste.

**Implementation Measure R.** Roads and highways utilized for commercial shipping of hazardous waste destined for disposal will be designated as such pursuant to Vehicle Code Sections 31303 et seq. Permit applications shall identify commercial shipping routes they propose to utilize for particular waste streams.

# Chapter 2. Circulation Element

## 2.5. Other Modes

### 2.5.2. Airport Land Use Compatibility Plan (ALUCP)

#### Goals

**Goal 1.** Plan for land uses that are compatible with public airport and military bases and mitigate encroachment issues.

#### Policies

**Policy 1.** Plan for land uses that are compatible with public airport and military bases and mitigate encroachment issues.

**Policy 2.** To the extent legally allowable prevent encroachment on public airport and military base operations from incompatible, unmitigated land uses.

#### Implementation Measures

**Implementation Measure A.** Review discretionary land use development applications within the airports influence area and the military base operating area as shown in the Airport Land Use Compatibility Plan (ALUCP) for consistency.

**Implementation Measure B.** Coordinate and cooperate with airport operators, the County Department of Airports, the California Department of Transportation, Division of Aeronautics, affected cities, Edwards Air Force Base, NAWS China Lake, and the U.S. Department of Defense on ALUCP, review of land use applications, public education, and encroachment issues.

### 2.5.4. Transportation of Hazardous Materials

#### Goals

**Goal 1**. Reduce risk to public health from transportation of hazardous materials.

#### Policies

**Policy 1**. The commercial transportation of hazardous material, identification and designation of appropriate shipping routes will be in conformance with the adopted Kern County and

Incorporated Cities Hazardous Waste Management Plan.

**Policy 2.** Kern County and affected cities should reduce use of County-maintained roads and city-maintained streets for transportation of hazardous materials.

# Chapter 4. Safety Element

## 4.2. General Provisions

### Goals

**Goal 4**. The County shall encourage extra precautions be taken for the design of significant lifeline installations, such as highways, utilities, and petrochemical pipelines.

## 4.3. Seismic Safety

### Policy

**Policy 1.** The County shall require development for human occupancy to be placed at a location away from an active earthquake fault in order to minimize safety concerns.

### Implementation Measures

**Implementation Measure I.** Design significant lifeline installations, such as highways, utilities, and petrochemical pipelines which cross an active fault, to accommodate potential fault movement without prolonged disruption of essential service or creating threat to health and safety.

## 4.4. Dam Failure, Flooding, and Inundation

### Policy

**Policy 2.** Design discretionary critical facilities in the potential dam inundation area used for the storage, or use of hazardous materials to prevent onsite hazards from affecting surrounding communities in the event of inundation.

### Implementation Measures

**Implementation Measure A.** Facilities used for the manufacture, storage, and use of hazardous materials shall comply with the Uniform Fire Code, with requirements for siting or design to prevent onsite hazards from affecting surrounding communities in the event of inundation.

## 4.9. Hazardous Materials

### Policies

**Policy 2.** Innovative technologies to manage hazardous waste streams generated in Kern County will be encouraged.

### Implementation Measures

**Implementation Measure A.** Facilities used to manufacture, store, and use of hazardous materials shall comply with the Uniform Fire Code, with requirements for siting or design to prevent onsite hazards from affecting surrounding communities in the event of inundation.

**Implementation Measure B.** The proposed siting or expansion of hazardous waste facilities will be in conformance with the adopted Kern County and Incorporated Cities Hazardous Waste Management Plan.

## Chapter 4.6. Wildland and Urban Fire

### Hazard Identification

Access and Evacuation Routes - Good planning principles, as well as existing policies and laws, dictate that all developments must be planned with circulation routes that will assure safe access for fire and other emergency equipment. The circulation routes must include secondary means of ingress and egress, consistent with topography, to meet emergency needs.

The general circulation routes are provided throughout the County by federal, state, and County-maintained road systems which are adequate for access and evacuation. State and County laws regulate the standards for new public circulation routes.

Private circulation routes that are not maintained by the state or County are subject to the standards set forth in Kern County Ordinance No. G-1832.

Clearance of Vegetative Cover for Fire Control - In 1963 the State of California enacted the Public Resources Code clearance law. This is a minimum statewide clearance law of flammable vegetative growth around structures, especially in brush- and tree-covered watershed areas. The enactment of a local ordinance is necessary where more restrictive fire safety clearance measures are desirable to meet local conditions.

Fuel Breaks and Firebreaks - Fuel breaks and/or firebreaks separating communities or clusters of structures from the native vegetation may be required. Such fuel breaks may be "greenbelts," as all vegetation need not be removed but thinned or landscaped to reduce the volume of fuel.

All fuel and firebreaks are required to meet the minimum design standards of the Kern County Fire Chief.

The Fire Department's Chief may require a fire plan for a development during the critical fire season. This plan should reflect the proposed course of action for fire prevention and suppression.

The parcel size and setback distances of buildings placed thereon should be such that adequate clearance of flammable vegetation cover may be performed within the limits of the owner's parcel of land.

Should the owner of a property fail to apply the required firebreak clearance, following proper

notice, the County may elect to clear the firebreak vegetation and make the expense of the clearing a lien against the property upon which the work was accomplished.

Hazardous Fire Area - The Hazardous Fire Areas consists mainly of wildlands, which are mountain and hill land in an uncultivated, more or less natural state, covered with timber, wood, brush, and grasslands. This area includes some urban influence and agricultural use, such as exists around Isabella Lake and the Kern River, Woody/Glennville, Tehachapi/Cummings Valley, and Lebec/Frazier Park/Lake of the Woods.

The wildlands provide prime habitats for deer, mountain lions, bears, kit foxes, quail, chucker, wild turkeys, and condors. They also harbor fifteen identified and important rare botanic communities and vegetation associations.

The Kern County Hazardous Fire Area was established by an amendment to the Uniform Fire Code, Section 1.49H under Section 4016 of the Kern County Ordinance Code.

The boundaries of the Hazardous Fire Area are determined and publicly announced before the start of each annual "fire season" and is normally the period from April 15 to December 1 of each year, except when the Fire Chief extends this period.

The wildlands include valuable watersheds that must be preserved for receiving and passing water into surface streams and underground storage. Protection of the watersheds will prevent erosion and flood damages.

For the protection of our wildlands we must consider all factors which will aid in fulfilling the policy stated in the California Environmental Quality Act, Public Resources Code Section 21000 et seq., to "create and maintain conditions under which man and nature can exist in productive harmony to fulfill the social and economic requirements of present and future generations."

In implementing their Fire Prevention Program, Fire Department personnel periodically inspect the areas around all buildings for accumulations of flammable material and closure of openings of vacant buildings.

### Policies

**Policy 1.** Require discretionary projects to assess impacts on emergency services and facilities.

**Policy 2.** The County will encourage the promotion of public education about fire safety at home and in the work place.

**Policy 3.** The County will encourage the promotion of fire prevention methods to reduce service protection costs and costs to taxpayers.

**Policy 4.** Ensure that new development of properties have sufficient access for emergency vehicles

and for the evacuation of residents.

**Policy 5.** Require that all roads in wildland fire areas are well marked and that homes have addresses prominently displayed.

**Policy 6.** All discretionary projects shall comply with the adopted Fire Code and the requirements of the Fire Department.

#### Implementation Measures

**Implementation Measure A.** Require that all development comply with the requirements of the Kern County Fire Department or other appropriate agency regarding access, fire flows, and fire protection facilities.

## Chapter 5. Energy Element

### 5.3. Petroleum Resources and Development

### 5.3.3. Waste Disposal in Petroleum Development

#### Goals

**Goal.** To encourage the safe recycling, transportation, and disposal of wastes associated with petroleum production and processing, and to provide for the siting of disposal facilities in locations with proper access, while minimizing adverse impacts on the environment and on public health and safety.

#### Policies

**Policy 1.** The County shall continue to acknowledge the necessity to site nonhazardous oilfield waste disposal sites near petroleum development to minimize transportation hazards and expenses, consistent with the provisions of the Kern County and Incorporated Cities Integrated Waste Management Plan.

**Policy 2.** The County shall encourage recycling and new treatment methods for hazardous and nonhazardous oilfield wastes.

**Policy 3.** The County shall work cooperatively with appropriate state and regional agencies to provide for the proper siting of oilfield waste disposal facilities.

## Metropolitan Bakersfield General Plan

The MBGP, a joint effort between the Kern County Planning Department and the City of Bakersfield Planning Division, was last adopted on December 11, 2007. The MBGP includes both city and unincorporated County lands. The MBGP describes the community's physical development as well as its economic, social and environmental goals and is currently undergoing an update. The Project Area includes a total of 152,040 acres of unincorporated County lands that are covered under the MBGP (7.41%). Project-related development on

unincorporated lands within the MBGP Planning Area would be subject to the following applicable policies and implementation measures of the MBGP, with respect to hazards and hazardous materials.

## Chapter VIII. Safety Element

### Goals

**Goal 1.** Ensure that the Bakersfield metropolitan area maintains a high level of public safety for its citizenry.

**Goal 4.** Assure that fire, hazardous substance regulation and emergency medical service problems are continuously identified and addressed in a proactive way, in order to optimize safety and efficiency

**Goal 7.** Protect land uses from the risk of dam failure inundation including the assurances that: the functional capabilities of essential facilities are available in the event of a flood; hazardous materials* are not released; effective measures for mitigation of dam failure inundation are incorporated into the design of critical facilities; and the rapid and orderly evacuation of populations in the inundation area will occur.

### Policies

**Policy 2.** Require discretionary projects to assess impacts on police and fire services and facilities

**Policy 6.** Promote fire prevention methods to reduce service protection costs and costs to the taxpayer.

**Policy 7.** Enforce ordinances regulating the use/manufacture/sale, transport/disposal of hazardous substances, and require compliance with state and federal laws regulating such substances.

**Policy 8**. The Kern County and Incorporated Cities Hazardous Waste Management Plan and Final Environmental Impact Report serves as the policy document guiding all facets of hazardous waste.

**Policy 12.** Where recommended by appropriate local, state or federal agencies for discretionary projects, soils shall be tested for concentrations of agricultural chemicals prior to grading permit approval whenever feasible. Contaminated soils shall be excavated and disposed of at a certified hazardous waste disposal facility whenever necessary.

**Policy 16.** All new discretionary development projects shall be subject to environmental and design review on a site-specific, project-by-project basis, including but not limited to an assessment to determine whether hazardous materials present potential health effects to human health as required by the Department of Environmental Services.

## Kern County Specific Plans

Kern County has adopted 24 Specific Plans for properties within the Project Area. These

Specific Plans are intended to be an amplification of the goals and policies of the KCGP and are, therefore, consistent therewith. As depicted in Figure 4.10-3, less than 8% of the Project Area is located wholly or partially within adopted Specific Plan areas. Future oil and gas exploration and production activities that would be authorized under the proposed Amendment to Chapter 19.98 (Oil & Gas Production) of the Kern County Zoning Ordinance that would be located within the boundary of an adopted Specific Plan would be regulated according to County zoning, with the exception of the Specific Plans identified as Tier 5.

## Kern County Certified Unified Program Agency

The Certified Unified Program Agency (CUPA) was developed to consolidate the administration of hazardous materials programs. In the Kern County, the CUPA is the Environmental Health Services Division. The city of Bakersfield's CUPA is the Bakersfield Fire Department. Under CUPA, site inspections of aboveground storage tanks, underground storage tanks, hazardous waste treatment, hazardous waste generators, hazardous materials management and response plans, and the California Fire Code are consolidated in a single inspection. These departments also provide emergency response to hazardous materials events.

## Kern County Fire Code

Kern County has adopted, by reference, portions of the California Building Standards Code and the UFC, with modifications and amendments, in Chapter 17.32 of the Kern County Code of Building Regulations (Fire Code). The purpose of this code is to prescribe the minimum requirements necessary to establish a reasonable level of fire safety to protect life and property from hazards created by fire, explosion, and dangerous conditions.

The Kern County Fire Code defines a hazardous fire area as any land that is covered with grass, grain, brush, or forest and situated (e.g., in an inaccessible location) so that a fire originating upon such land would present an abnormally difficult job of suppression and would result in great and unusual damage through fire or the resulting erosion.

## Kern County Multi-Hazard Mitigation Plan

The purpose of the multi-hazard mitigation plan is to reduce or eliminate long-term risk to people and property from natural hazards and their effects in Kern County, California. The plan was updated in 2012 to help Kern County become less vulnerable to losses from future disasters. The multi-jurisdictional plan includes the County, and the incorporated municipalities of Arvin, Bakersfield, California City, Delano, Maricopa, McFarland, Ridgecrest, Shafter, Taft, Tehachapi, and Wasco. This plan also covers 53 special districts that include school, recreation and park, water, community service, and other districts.

Among the items assessed, the plan evaluated the risks associated with seismic events, dam failure, severe weather, and wildfire on oil and gas facilities.

## Kern County Hazardous Waste Management Plan

State Assembly Bill 2948 (1986) authorized local governments to develop comprehensive

hazardous waste management plans. The intent of each plan is to ensure that adequate treatment and disposal capacity is available to manage the hazardous wastes generated within the local government's jurisdiction. The Kern County and Incorporated Cities Hazardous Waste Management Plan (Hazardous Waste Plan) was first adopted by Kern County and each incorporated city before September 1988 and was subsequently approved by the California Department of Health Services. The Hazardous Waste Plan was updated and incorporated by reference into the KCGP in 2004 as permitted by Health and Safety Code Section 25135.7(b), and thus must be consistent with all other aspects of the KCGP.

The Hazardous Waste Plan provides policy direction and action programs to address current and future hazardous waste management issues that require local responsibility and involvement in Kern County. In addition, the Hazardous Waste Plan discusses hazardous waste issues and analyzes current and future waste generation in the incorporated cities, County, and state, and federal lands. The purpose of the hazardous Waste Plan is to coordinate local implementation of a regional action to effect comprehensive hazardous waste management throughout Kern County. The action program focuses on development of programs to equitably site needed hazardous waste management facilities; to promote onsite source reduction, treatment, and recycling; and to provide for the collection and treatment of small quantity hazardous waste generators. An important component of the Hazardous Waste Plan is the monitoring of hazardous waste management facilities to ensure compliance with federal and state hazardous waste regulations. The siting criteria and any subsequent environmental documentation required pursuant to the CEQA would also ensure the mitigation of adverse impacts associated with the siting of any new hazardous waste facility.

## Lake Isabella Dam Failure Evacuation Plan

The purpose of the dam failure evacuation plan is to establish a process and procedures for the mass evacuation and short-term support of populations at risk below the Lake Isabella Dam from a potential failure of the dam. The inundation area includes portions of Kern County; the unincorporated communities of Lake Isabella and Bodfish; and the city of Bakersfield. In the event of a dam failure, flood waters would flow down the narrow Kern Canyon until reaching the city of Bakersfield where topography flattens and the flood waters would be expected to spread out over much of Bakersfield. The plan identifies emergency evacuation routes from the inundation zone in the event of a dam failure. The inundation zone is shown with respect to oilfields in Kern County on Figure 4.8-9. The plan was last updated in 2009.

## Kern County Airport Land Use Compatibility Plan (ALUCP)

The purpose of the Kern County ALUCP is to establish procedures and criteria by which the County of Kern and the affected incorporated cities can address compatibility issues when making planning decisions regarding airports and military operations areas and the land uses around them. In general, the plan describes and maps influence areas in the vicinity of public use airports in Kern County where development restrictions are established to prevent the construction or placement of structures or objects which may be an obstruction to air navigation. The plan covers airports in the unincorporated portions of the County and the affected incorporated cities of

Bakersfield, California City, Delano, Shafter, Taft, Tehachapi, and Wasco. The plan was last updated in 2012.

## Kern County Code of Ordinances Chapter 19.76 – Airport Approach Height (H) Combining District

The purpose of the Kern County Airport Height (H) Combining District is to minimize aviation hazards by regulating land uses, restricting the height of buildings and vegetation, and specifying design criteria necessary to promote aviation safety and to implement the requirements of the adopted ALUCP. The H district may be applied to areas within the vicinity of any public or general-use airport as provided for in the ALUCP. The H district design standards restrict the types of lighting, surface reflectivity, types and heights of structures and electrical or radio interference with air navigation communications. The H district design standards also require that storage of more than 2,000 gallons of non-aviation liquid fuel at privately-owned airports in the B-1 and B-2 airport land use compatibility zones be restricted to underground storage tanks. The H district further requires that except for the construction of single-family dwellings and permitted residential accessory structures on existing lots of record, no use, building, structure, plant, or tree shall be established until and application for site development plan review has been submitted to and approved by the Planning Director.

## Best Management Practices (BMPs)

Best management practices (BMPs) are practices that industries and other organizations compile to suggest how companies can operate effectively within the regulatory requirements. The API develops equipment and operating standards for the oil and natural gas industry. API maintains an inventory of over 600 standards and recommended practices. API standards are designed to assist industry professionals improve the efficiency and cost-effectiveness of their operations, comply with legislative and regulatory requirements, safeguard health, and protect the environment. API publications that are relevant to hazardous materials and wastes and other topics discussed in this chapter include:

- API 2009. Environmental Protection for Onshore Oil and Gas Production Operations and Leases. API Recommended Practice 51R. First Edition, July 2009;
- API Order No. G00004 Guidelines for Commercial Exploration and Production Waste Management Facilities (2001); and
- API Recommended Practice 80, "Guidelines for the Definition of Onshore Gas Gathering Lines," (First Edition, April 2000).

The State Review of Oil and Natural Gas Environmental Regulations (STRONGER) is a non-profit organization whose mandate is to educate regulators and the public as to the appropriate elements of a state oil and gas E & P waste management regulatory program and to compare state programs against STRONGER guidelines and those accepted by the Interstate Oil and Gas Compact Commission. STRONGER has developed guidelines for states to assess and improve their regulations for all aspects of E & P waste management, abandoned sites, NORM, storm water

management, and hydraulic fracturing. Among others, they have developed technical criteria for the design, construction and operations of pits; regulatory and operational requirements for land-spreading, burial, landfilling, and road-spreading; and construction, operations, and closure of tanks not regulated under the SPCC program. Technical requirements in the STRONGER 2014 Guidelines can serve as BMPs.

In addition to API and STRONGER, federal agencies, including the EPA and BLM, have published recommended practices for the oil and gas industry for E & P. In its Exemption of Oil and Gas Exploration and Production Wastes from Federal Hazardous Waste Regulations, the EPA suggests the following E & P waste management practices be used at oil and gas E & P sites:

- Size reserve pits properly to avoid overflows;
- Use closed loop mud systems when practical, particularly with oil-based muds;
- Review MSDSs of materials used, and select less toxic alternatives when possible;
- Minimize waste generation, such as by designing systems with the smallest volumes possible (e.g., drilling mud systems);
- Reduce the amount of excess fluids entering reserve and production pits;
- Keep nonexempt wastes out of reserve or production pits;
- Design the drilling pad to contain stormwater and rig-wash;
- Recycle and reuse oil-based muds and high density brines, when practical;
- Perform routine equipment inspections and maintenance to prevent leaks or emissions;
- Reclaim oily debris and tank bottoms when practical;
- Minimize the volume of materials stored at facilities;
- Construct adequate berms around materials and waste storage areas to contain spills;
- Perform routine inspections of materials and waste storage areas to locate damaged or leaking containers; and
- Train personnel to use sensible waste management practices (EPA 2002).

BLM's Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development The Gold Book provide the following guidelines for hazardous waste and pollution control during exploration and development:

- Sufficiently impervious secondary containment, such as containment dikes, containment walls, and drip pans, should be constructed and maintained around all qualifying petroleum facilities, including tank batteries and separation and treating areas consistent with the EPA's SPCC regulation (40 CFR 112). The containment structure must have sufficient volume to contain, at a minimum, the content of the largest storage tank containing liquid hydrocarbons within the facility/battery and sufficient freeboard to contain precipitation, unless more stringent protective requirements are deemed necessary

by the authorized officer. Drip pans should be routinely checked and cleaned of petroleum or chemical discharges and designed to prevent access by wildlife and livestock.

- Chemical containers should not be stored on bare ground, exposed to the sun and moisture. Containers and labels are subject to degradation and punctured drums could leak contents on the ground.
- Chemicals containers should be maintained in good condition and placed within secondary containment in case of a spill or high velocity puncture.
- Containment dikes are not to be constructed with topsoil or coarse, insufficiently impervious spoil material. Containment is strongly suggested for produced water tanks. Chemicals should be placed within secondary containment and stored so that the containers are not in contact with soil or standing water and product and hazard labels are not exposed to weathering.
- Maintain a clean well location. Remove trash, junk, and other materials not in current use (BLM 2007).

BMPs do not have the weight of regulations, unless they are cited in regulations. However, depending on the BMP, they serve as an accepted standard of practice and provide the guidelines for oil and gas operators to operate effectively and adhere to regulatory requirements. Not all BMPs would be applicable to all oil and gas activities. In addition, BMPs are updated periodically. Therefore, compliance with specific BMPs is not assumed to occur in the impact analysis.

## 4.8.4 Impacts and Mitigation Measures

# Methodology

To evaluate the potential impacts of the proposed Project with respect to the thresholds of significance outlined in the following section, each threshold of significance was evaluated at a Project level. The primary issues associated with the Project that could impact public health are whether the anticipated oil and gas activity would increase risks to public safety and the environment. To evaluate these risks, present practices, regulatory requirements, and accidents/spills/releases were considered.

# Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist state that a project would normally be considered to have a significant impact if it would:

- Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials;
- Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment;

- Emit hazardous emissions or involve handling hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school;
- Create a hazard to the public or the environment as a result of being a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5;
- For a project located within the adopted Kern County Airport Land Use Compatibility Plan, result in a safety hazard for people residing or working in the Project Area;
- For a project within the vicinity of a private airstrip, result in a safety hazard for people residing or working in the Project Area;
- Impair implementation of, or physically interfere with, an adopted emergency response plan or emergency evacuation plan;
- Expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands; or
- Generate vectors (flies, mosquitoes, rodents, etc.) or have a component that includes agricultural waste. Specifically, would the Project exceed the following qualitative threshold:

  The presence of domestic flies, mosquitos, cockroaches, rodents, and/or any other vectors associated with the Project is significant when the applicable enforcement agency determines that any of the vectors:

  i. Occur as immature stages and adults in numbers considerably in excess of those found in the surrounding environment; and,
  ii. Are associated with design, layout, and management of project operations; and,
  iii. Disseminated widely from the property; and,
  iv. Cause detrimental effects on the public health or wellbeing of the majority of the surrounding population.

Based on these standards, the effects of the Project have been categorized as either a “less than significant impact” or a “potentially significant impact.” Mitigation measures are recommended for potentially significant impacts. If a potentially significant impact cannot be reduced to a less than significant level through the application of mitigation, it is categorized as a “significant unavoidable impact.”

# Project Impacts

## Impact 4.8-1: Create a Significant Hazard to the Public or the Environment through the Routine Transport, Use, or Disposal of Hazardous Materials

### Transport of Hazardous Materials

#### Construction and Operations

The routine transport, use, and/or disposal of hazardous materials can cause significant hazards to the public or the environment if not handled or contained properly. The primary method of transporting hazardous material to construction sites would be by truck. However, hazardous materials could be shipped to Kern County by rail for use in oil and gas activities. Pipelines are used during operations to transport hazardous and nonhazardous materials from wells to treatment and processing facilities as well as to transport materials to refineries and other facilities.

Regulations for the transportation of hazardous and other regulated substances are covered under the Federal Hazardous Materials Transportation Law (49 U.S.C. 5101-5127) and the Hazardous Materials Regulations (49 CFR Parts 171-180). Under these regulations, hazardous materials must be transported pursuant to materials classification, hazard communication, packaging requirements, operational rules, training and security, and registration. All hazardous materials being transported must be handled, packaged, labeled, and transported in a manner that is consistent with the Hazardous Materials Regulations set forth for each categorized hazardous material/waste.

The following subsections discuss potential impacts associated with each mode of transport.

#### Trucks

Trucks could be used to transport hazardous materials to oilfields or processing facilities or to transport crude oil, natural gas condensates, produced water to treatment facilities or refineries or to transport hazardous waste to a commercial hazardous waste facility in Kern County, elsewhere in the California, or out of state. Every time hazardous materials are moved from the site of generation, there are opportunities for accidental (unintentional) releases. Because the Project authorizes an increase in oil and gas production activity in the County for the duration of the Project compared to baseline level activities, it is possible that the number of trucks trips involving hazardous materials could increase. These truck trips would continue to be regulated as described below.

The Federal Motor Carrier Safety Administration (FMCSA) requires all motor carriers to obtain a Hazardous Materials Safety Permit (HMSP) prior to the transportation of hazardous materials. The motor carrier company transporting the hazardous materials responsibilities include:

- Employee training;
- Determine whether a material meeting the definition of a “hazardous material;”

- Shipping Papers, Proper shipping name, Class/Division, Identification Number;
- Hazard Warning Label**,** Packaging, Marking;
- Emergency Response Information and Contact Numbers;
- Certification, Capability, Blocking and Bracing Placarding; and
- Security Plan and Incident Reporting.

The USDOT conducted a study on the risks of hazardous materials and nonhazardous materials and nonhazardous materials truck shipment incidents and accidents. The FMCSA compared the risks of hazardous and nonhazardous materials truck shipment accidents and incidents. The estimated accident rate for nonhazardous material trucks was 0.73 per million miles traveled, which was almost double the average accident rate for hazardous material trucks of 0.32 per million miles traveled. Not all accidents involving hazardous materials transport result in releases of hazardous materials (FMCSA 2001).

Trucks transporting any hazardous materials would be required to comply with the above laws. The statistics suggest that truck transportation of hazardous material is safer than routine truck transportation, but is not without incident. Transportation accidents involving vehicles transporting hazardous materials can result in fires, explosions, clouds of vapors and gasses, or spills to land and water. Hazardous materials containers that are breached during an accident near a source of ignition pose a fire hazard. Containers involved in an accident that are not breached but are exposed to fire could potentially explode. According to cargo tank rollover prevention information from the FMCSA, over 78% of roll-over accidents involving cargo tank trucks involve driver error (FMCSA 2015). During routine operations, accidents could occur, such as collisions or roll-overs. The potential impact would reflect the amount of the release and type of material released. A release that results in the soil or water contamination or exposure of the public to hazardous material would be significant.

## Pipelines

Pipelines supporting oil and gas activities that could be authorized under this Project would transport crude oil, produced water, natural gas, waste gas, and other hazardous and nonhazardous substances. Larger pipelines and pipelines operating at higher pressures would be regulated federally, but many oil and gas collection pipelines (transporting oil from wells and tank farms to Kern refineries, or to terminals for shipment outside the region) in rural areas with low population densities would not. Federally regulated pipelines must comply with 49 CFR 195 which specify design, construction, testing, operation and maintenance, and accident reporting requirements.

Pipelines transporting crude oil that are not federally regulated would be low pressure and would be located more than 0.25 mile from drinking water sources and ecologically sensitive areas. However, under AB 1960's implementing regulations Section 1774 (Pipeline Construction and Maintenance), "[n]ewly installed pipelines shall be designed, constructed, and all pipelines shall be tested, operated, and maintained in accordance with good oilfield practice and applicable standards, such as set forth in either the API (API Rec. Prac. 1110, 3rd Ed., Dec. 1991, and API Spec. effective 1990), or ASTM (ASTM Designation Stand. Spec., 1991), or 49 CFR Part 192, or

other methods approved by the Supervisor…"

This regulation applies to all pipelines greater than 1 inch in diameter through which crude oil, hydrocarbons, combustible gases, and/or produced water flows from one point to another within the administrative boundaries of an oil and gas field. Therefore, some of the pipelines currently in oilfields and those that would be installed under this Project would be subject to these regulations. Under these regulations, operators would have to implement the following practices at a minimum:

- Use corrosion prevention methods to minimize external and internal corrosion;
- Use pipeline coating or external wrapping for new or replaced buried or partially buried pipelines to minimize external corrosion. The coating should have a high electrical resistance, be an effective moisture barrier, have good adhesion to the pipe, and be able to resist damage during handling;
- Use, where practical, equipment such as high and low pressure or level alarms, automatic notification devices, and safety shut-down devices to minimize spill volume in the event of a leak; and
- If feasible, locating aboveground, preferably on supports or racks, any new pipelines or parts of a pipeline system that are being relocated or replaced.

Operators must visually inspect all aboveground pipelines for leaks and corrosion at least once a year. Any pipeline that has had a leak resulting in the release of a reportable quantity shall be pressure tested to verify integrity prior to being placed back into service. A mechanical integrity test shall be performed on all active environmentally sensitive pipelines that are gathering lines, and all urban pipelines over 4 inches in diameter, every two years. Pipelines less than 10 years old are exempt from the two-year testing requirement.

In addition, operators must prepare and implement a pipeline management plan for all pipelines that have not been abandoned to the standards specified in AB 1960 Section 1776(f). The plan shall be updated within 90 days of whenever pipelines are acquired, installed, altered, or at the request of DOGGR. The pipeline management plan shall include the following:

- Information on each pipeline including, but not limited to: pipeline type, grade, actual or estimated installation date of pipeline, design and operating pressures, and any available leak, repair, inspection, and testing history.
- A description of the testing method and schedule for all pipelines.
- Pipelines regulated by AB 1960 are also subject to regular pipeline inspection and maintenance requirement pursuant to 14 CCR 1774.1, including tests or inspections that DOGGR may order to establish the reliability of any pipeline system.
- Natural gas pipelines are subject to federal regulations as well as CPUC regulations if the pipelines are considered regulated onshore gas gathering lines or if operated at less than 0

pounds per square inch gauge. The federal regulations establish requirements for corrosion control, testing, emergency planning, investigation of failures, MAOP, maintenance and repair, record-keeping, pipeline integrity management, and reporting. CPUC rules require additional testing, inspection, and reporting. Pending amendments to CPUC General Order 112-E would increase the frequency of testing, provide guidance on prioritizing leak repair, qualifying training facilities, protecting gas pipelines from encroachments, and facilitating emergency communications, and provide testing pressures and clearance requirements for all pipeline.

The effect of any release from a pipeline would depend on its location and the type and quantity of materials released. Workers could be exposed to hazardous materials at levels in excess of OSHA and Cal/OSHA standards and the public could be exposed to hazardous materials.

However, as discussed in the Environmental Setting, a total of 84 unintentional releases of crude oil from pipelines in Kern County occurred from 2002 to 2014 from PHMSA regulated pipelines (see Appendix R, Table A-1). In most cases, most of the crude oil was recovered, but in two cases more than 21,000 gallons (500 barrels) could not be recovered. These and other pipeline incidents are discussed in the following impact; however, the frequency with which these events have occurred (an average of seven per year) suggest that historical implementation of the existing regulations has not eliminated releases. Many of the incidents reported above occurred before enactment of AB 1960 in January 2009 and prior to implementation of the AB 1960 regulations on January 29, 2011, which were enacted to improve, among other things, leak detection, corrosion prevention, and pipeline integrity. However, since it is possible that a pipeline could still leak or malfunction even with implementation of existing regulations, impacts could be significant if a release occurred from a malfunctioning or leaking pipeline.

### Railroad

Crude oil is transported to Kern County via truck, pipeline or rail. However no oil or gas that would be produced in Kern County under this Project would be shipped by rail. Hazardous materials to support oil and gas drilling or operations could be shipped to Kern County via rail. As stated in the Environmental Setting, statistics show that the majority of hazardous materials shipped by rail tank car annually arrive without incident (FRA 2015b). The FRA regulates the transportation of hazardous materials at the federal level as described in the Regulatory Setting section. Implementation of these regulations would result in impacts that would be less than significant.

## Use of Hazardous Materials

### Construction

The potential exists for an accidental release of hazardous materials during routine construction activities. Improper management or maintenance of hazardous materials containers, handling of hazardous materials (transfer between containers and equipment), storage, or disposal could result in leaks or larger releases which result in the contamination of soil or potentially surface water bodies, depending on the location of the release. Oil and gas construction activities also have the potential to result in exposure to these hazardous materials by workers, or by the public, if access to the construction site is not adequately controlled or if the materials are not properly handled and contained.

Oil and gas construction activities that could be authorized under this Project include, among other activities, well pad preparation; access road construction; drilling; well completion; construction of oil, gas, and water treatment facilities; construction of sumps, evaporation ponds, and percolation ponds; construction of other facilities; construction of fencing, tanks, and containment structures; as well as well stimulation activities, which are addressed separately.

Vehicles and equipment used for construction would contain or require the short-term use of small amounts of potentially hazardous materials including, but not limited to, fuels, lubricating oils, solvents, antifreeze, hydraulic fluid, and compressed gasses. Portable generators often are used so diesel tanks could be used. Other construction activities would likely use gasoline, diesel fuel, and lubricants for fueling vehicles and paints, adhesives, and solvents for the construction of the facilities buildings. Other specialized chemicals that are potentially hazardous substances could also be used depending on the type of construction activity. These could include compressed gases; fuels, oils, and lubricants; acids; bases; demulsifiers; bactericides; and solvents. These and other products may be stored at the well pad to support the drilling process (see Table 4.8-1).

In general, large quantities of hazardous materials are not stored on construction sites. Materials that are used regularly are re-supplied by oilfield servicing companies. At any construction site to comply with federal and state regulations, hazardous materials should be stored in their original containers in a designated area that is protected from the weather and that is lined and bermed to contain any leaks or spills and prevent a release to soil or waters. The Occupational Safety and Health Standards 1910 Subpart H Hazardous Materials provides guidelines by which hazardous materials should be handled and stored in the workplace. Specific requirements are provided for many different chemicals. In addition, the California Fire Code prescribes regulations that address the storage, handling and use of hazardous substances, materials, and devices within the state. California Health and Safety Code section 25504(a-c) and 22 CCR part 66265.16 require an owner or operator to complete and submit an HMBP if the facility handles a hazardous material or mixture containing a hazardous material that has a quantity at any one time during the reporting year equal to or greater than 55 gallons of liquid; 500 pounds of a solid; 200 cubic feet at standard temperature and pressure of a compressed gas; any quantity of hazardous waste; and amounts of radioactive materials requiring and emergency plan pursuant to Parts 30, 40, or 70 of Title 10 CCR. Most applicants would have to develop HMBPs, because diesel fuel is regularly stored in

bulk at construction sites to fuel generators, hazardous waste is likely to be generated, and radioactive materials are used during drilling. In addition, storage of fuel or other petroleum products during construction in aboveground tanks or other containers with individual volumes greater than 55 gallons and that have a total volume of more than 1,320 gallons would be subject to the SPCC Plan requirements of 40 CFR Part 112, if waters of the United States are present. These regulations are designed, in part, to ensure that hazardous materials and oil and petroleum products are properly managed and contained to minimize the potential for a release to the environment, thereby limiting the potential for related exposure to the environment, workers, and the public.

Oil and gas activities authorized under the Project also would be required to comply with Cal/OSHA standards for worker safety in the handling and use of hazardous materials and hazardous wastes. These standards (found at 8 CCR Sections 337-340) require an employer to monitor worker exposure to hazardous substances and notify workers of exposure to hazardous substances. The regulations specify requirements for employee training, availability of safety equipment, accident-prevention programs, and hazardous substances exposure warnings. These requirements would limit the potential for unhealthful exposure of workers to hazardous materials during Project construction.

Temporary pits and sumps and portable tanks may be used to store drilling fluids and wastes. For these, applicants would have to comply with the AB 1960 implementing regulations. These address Spill Contingency Plan requirements; oilfield sumps; production facilities containment, maintenance, and testing; pipeline construction and maintenance; maintenance and monitoring of production facilities, safety equipment, and other equipment.

Finally, oilfields have specific field rules established by DOGGR. These are specific requirements for the field and may address issues associated with hazards.

Adherence to the regulations and requirements described in the preceding paragraphs would limit the potential for exposure from routine use of hazardous materials during construction such that unhealthful levels of exposure by workers at a construction site, or to the general public located outside of Project construction areas, would not be expected. Furthermore, adherence to these regulations and requirements would limit the potential for hazardous materials to be released to the environment due to routine use. With adherence to these requirements, routine use related to Project construction would have a low likelihood of resulting in health or environmental consequences from exposure to a hazard by the public offsite or to construction workers onsite. Therefore, with adherence to these requirements, the risk of health or environmental consequences from exposure to a hazard by the public offsite or to construction workers onsite would be less than significant.

### Well Stimulation

WST operations are considered a construction activity under this Project, but are addressed separately because of the high level of public interest associated with the issue.

Hazardous materials, such as fuel and motor oil used in construction equipment, hydraulic oil and hydraulic fracturing fluid components (cross-linker, scale treatments, breaker, activator, and pH

control), acids, biocides, and other well treatment chemicals would be used in downhole applications during the WST operations. Well stimulation in Kern County is used to complete wells in certain formations. Not all of the wells drilled and completed in Kern County require completion using WST operations as defined by SB 4, however. Well stimulation in California is regulated by DOGGR under SB4, WST Regulations. While the EPA has not issued any generally applicable federal regulations concerning WST activities, on March 26, 2015, the BLM issued its Final Rule for Oil and Gas; Hydraulic Fracturing on federal and Indian Lands, which is codified at 43 CFR Part 3160.

Under the SB 4 WST regulations, any operator must apply for and obtain a permit to use well stimulation techniques. In the application, the operator must describe:

- The composition of the fluids to be used;
- The chemicals to be used and their concentrations;
- The disposal method of recovered water;
- The anticipated procedures to comply with the Hazardous Waste Control Law; and
- An estimate of the volume of generated waste materials and how they will be disposed of.

Further, all applicants applying to conduct a defined well stimulation operation would be required to store and manage hydraulic fracturing fluids in compliance with all applicable requirements of the RWQCB, the DTSC, the Air Resources Board, the Air Pollution Control District, the CUPA, and any other state or local agencies with jurisdiction over the location of the well stimulation activities. In addition, the Applicant would be required to adhere to Storage and Handling of WST Fluids and Wastes regulations that require that fluids be stored with secondary containment, with certain exceptions. The Applicant must have a Spill Contingency Plan that accounts for all production facilities outside of secondary containment and include specific steps to be taken and equipment available to address a spill outside of secondary containment. In addition, the Applicant would have to comply with testing, inspection, and maintenance requirements for production facilities containing WST fluids. All fluids must be accounted for in the operator's Spill Contingency Plan, cannot be stored in containers and shall not be stored in sumps or pits. If an unauthorized release occurs, the Applicant must immediately implement its Spill Contingency Plan; notify the appropriate response entities for the location and the type of fluids involved, as required by all applicable federal, state, and local laws and regulations; and perform clean up and remediation of the area, and dispose of any cleanup or remediation waste, as required by all applicable federal, state, and local laws and regulations. In addition, the Applicant would have to report the release within five days.

During well stimulation procedures, applicants would have to continuously monitor and record specific parameters. Operators must terminate stimulation and immediately report to DOGGR if certain critical pressure thresholds are reached or if there is a potential breach of the well casing. If an unauthorized release occurs, the operator must implement its Spill Contingency Plan, notify the appropriate authorities, cleanup or remediate, and report to DOGGR. Potential release of hydraulic fracturing fluids to an aquifer is addressed in Section 4.9, Hydrology and Water Quality.

Unauthorized releases have occurred and would likely continue to occur during well stimulation activities. The potential effect of the release would depend on its size, its location in the well bore, and the proximity to either aquifers or surface sensitive receptors; therefore, the potential impacts could be significant.

## Operations

Operational activities that could be authorized under this Project include, among others, production of oil and natural gas, treatment of produced water, oil, and gas; water and waste management; enhanced oil recovery activities; use of injection wells, sumps, percolation and evaporation ponds; control of vegetation; maintenance and testing of well, pipeline, tank and vessels; maintenance of access roads; separation of oil and water; and distribution of crude oil.

During oil and gas production, a wide range of laboratory chemicals is used in oilfield testing laboratories, crude oil is stored in large quantities before shipment, natural gas and natural gas condensates are stored, fractionated, and treated in large quantities, well treatment chemicals are used to maintain well integrity, and motor fuels and fluids are stored as part of routine equipment and well maintenance. Production and processing can include treatment facilities, tank farms, compressors, generators, laboratories, and pipelines. Oils, fuels, solvents, paint, and treating chemicals could be used during production.

The largest volume of materials stored on a production site would be contained in tank farms or tank batteries. As described above, a tank farm is required to have secondary containment in order to contain releases and onsite personnel would have to be trained on how to prevent, stop, and abate any spills. SPCC requirements and plans would have to be implemented as well as those to comply with AB1960. Under 40 CFR 112, operators also are required to have emergency response procedures, and they must train their personnel in these procedures. Under the implementing regulations of AB1960, applicants would have to address requirements for Spill Contingency Plan; oilfield sumps; production facilities containment, maintenance, and testing; pipeline construction and maintenance; and maintenance and monitoring of production facilities, safety equipment, and equipment.

As discussed above under the Construction subheading of Use of Hazardous Materials, all hazardous chemicals would have to be stored according to OSHA and state fire code requirements. Operators would have to develop and file Consolidated Contingency Plans with Kern County Environmental Health Services Division to address the storage of crude oil, storage of produced water, well treatment chemicals, laboratories, and storage of wastes, such as tank bottoms.

In Kern County, the Kern County Environmental Health Services Division implements the Unified Program for businesses to comply with the following requirements:

- Hazardous Material Response Plans and Inventory Program;
- UFC Plans and Inventory requirements;
- Hazardous Waste Generator and Onsite Hazardous Waste Treatment Programs;

- CalARP Program;
- UST Program; and
- Aboveground Petroleum Storage Tank SPCC Plan.

These forms provide the County with information about the hazardous materials, regulated substances, storage tanks, and hazardous waste generated at a facility. This hazardous material inventory requires a description of all hazardous materials that will be stored onsite, how much is stored on a daily basis, and the type of storage container. In addition, the amount and type of hazardous wastes generated, how it is stored, and how it is disposed of must be provided as well. Businesses also must provide a Consolidated Contingency Plan which must be implemented whenever there is a fire, explosion, or release of hazardous material or waste that could threaten public health or the environment. The plan must detail the business' standard operating procedures for addressing potential releases including prevention measures and how a spill would be stopped and cleaned up. Included must be a list of available emergency equipment and the training that personnel must receive. Also included are site maps to identify where hazardous materials and wastes are stored and where emergency response equipment is located as well as emergency evacuation routes.

Adherence to the regulations and requirements described in the preceding paragraphs would limit the potential for exposure from routine use of hazardous materials during operations such that unhealthful levels of exposure by workers at a work site, or to the general public located outside of Project work areas, would not be expected. Furthermore, adherence to these regulations and requirements would limit the potential for hazardous material to be released to the environment due to routine use. In general, adherence to these requirements would result in routine use related to Project operations having a low likelihood of health or environmental consequences from exposure to a hazard by the public offsite or to construction workers onsite. However, as discussed in Table 4.8-6, spills can occur during oil and gas activities. The most commonly spilled materials are crude oil and produced water, but acids, condensates, and drilling muds are also spilled. In general, spills have historically been small and have been cleaned up immediately, but some have not been able to be cleaned up immediately because of their size. Therefore, historical precedent suggests that future oil and gas activities could have significant impacts from routine use of hazardous materials.

### Oil and Gas Generated Wastes

Table 4.8-10 provides a list of the general types of waste that could be generated during each phase of the oil and gas drilling process.

**Table 4.8-10: Potential Waste Generated during Each Phase of the Oil and Gas Drilling and Production Process**

| Activity | Potential Waste Generated |
|---|---|
| **Construction** | |
| Site preparation and construction | Debris, lubricating oil, contaminated soil and/or rainwater |
| Drilling activities (operation of the rig, drilling mud system, and drill string) | Pipe dope, hydraulic fluids, used oils and oil filters, rigwash, spilled fuel, drill cuttings, drums and containers, spent and unused solvents, paint and paint wastes, sandblast media, scrap metal, solid waste, and garbage |
| Drilling mud (fluid used to maintain hydrostatic pressure in the well, carry drill cuttings to the surface, cool and lubricate the drill bit) | Soda ash, calcium carbonate, caustic soda (NaOH), magnesium hydroxide. Drilling fluid additives (used and unused), spilled chemicals, empty containers, spilled chemicals, or surplus chemicals |
| Reserve pits (reserve pit receive drill cutting and solids and other materials) | Drill cuttings and solids, used drilling fluids, rigwash, mud-weighting materials |
| **Operations** | |
| Flowing wells (wellhead assembly and equipment for well treatment) | Paraffin, slop oil, oil and produced water-contaminated soils, produced water, scale, treating chemicals, sand, and paint |
| Wells with artificial lift (using beam pumps, gas lift, or submersible pumps) | Used lubrication oil and filters, gas lift engine fuel, released crude oil (from stuffing box), paraffin, slop oil, produced water contaminated soils, produced water, scale, treating chemicals, sand, and paint |
| Flare pits (used to collect unburned materials from a flare) | Overflow hydrocarbon condensate, produced water (condensed from flare) |
| Flow lines (use to move produced oil to treatment and storage facilities) | Paraffin, produced water, treating chemicals, contaminated soil, scale, and other materials collected in pig traps. Scale may be contaminated by naturally occurring radioactive material (NORM) |
| Separation and processing at gathering points (2- or 3- phase separation of produced water, free water knockouts, heater or electrostatic treaters, filters, desanders) | Separator bottoms, blowdown, skim oil, produced water, produced sand and scale, bottom sludges, oil absorption media, used filters, filter media, back wash |
| Tank batteries consisting of separation and treatment equipment | Produced sand, scale, and basic sediment and water, spilled crude oil, crude oil-contaminated soil |
| Produced water management | Solids, oil, used lubricating oil and filters, produced water filters and filter media, filter backwash, produced water-contaminated soil, and unused or spent chemicals |

Source: Adapted from Tables 1 and 2 from RCT 2001

During drilling, the most commonly generated wastes are drilling fluids, drill cuttings, and municipal waste. The largest volume of waste generated during drilling includes cuttings and produced water/oil. In general, wastes generated during E & P are not classified as hazardous, but are contained such that they are not released to the environment. Wastes generated during WST operations primarily consist of flow-back well fluids. Wastes generated during oil and gas production include a wide range of laboratory wastes, universal wastes, large quantities of produced water, and tank bottoms. During oil and gas well abandonment, wastes generated include well fluids and municipal waste. Table 4.8-4 details the type of wastes that could be generated during oil and gas production. Many of these wastes would not be classified as RCRA hazardous wastes, but some could be classified as California hazardous wastes. Each operator would have to ensure that all wastes generated are classified and subsequently disposed of appropriately. Exempt and nonexempt waste streams should be stored separately because if they mix, the exempt waste stream could become classified as a hazardous waste. Discarding a listed hazardous waste (e.g., a half-empty container of a listed solvent) in a reserve pit could cause the exempt pit contents to become a hazardous waste and result in the closing of the reserve pit under RCRA hazardous waste regulations (STRONGER 2014).

### Hazardous Waste

Under this Project, an estimated 267 pounds of classified waste would be generated per well drilled in Kern County. The actual amount and type would depend on the depth and location of the well. Examples of hazardous waste include waste batteries, waste chemicals, paint waste, waste petroleum product (used oil, lubricants, grease), and contaminated solid waste.

Releases or improper management of hazardous materials could result in contamination of soils or waters or exposure of the public. Applicants would adhere to RCRA and California Hazardous Waste Control Laws for hazardous waste handling, storage, management, transport, treatment and disposal of hazardous wastes at properly designed and permitted facilities. Compliance with federal and state regulations are designed to ensure that employees and the public would be safe from the routine use of hazardous materials and generation of hazardous waste; however, these requirements do not specify how operations should be conducted. Although large spills are unlikely, small-scale spills and releases could occur and depending on the location of the release and how quickly it is cleaned up, adverse effects could occur to water bodies or sensitive habitats. Therefore, impacts are potentially significant.

### Other Wastes

An estimated 1,610 pounds of Non-RCRA drilling wastes, including drilling muds, drill cuttings, wash water, and other related waste, would be generated per well drilled in in Kern County. The actual amount will depend on the depth of the well. Wastes, such as construction material and other solid wastes, are discussed in Section 4.17, Utilities and Service Systems.

In Section 3.5.3 Construction Activities in Detail, the different solid wastes generated during oil and gas activities are described, as is how such nonhazardous solid wastes are disposed of on or offsite. Methods used include: injection wells; onsite burial in pits and landfills; land treatment; evaporation; surface discharge; and recycling. All disposal methods would have to comply with

local, state, and federal regulations. Specific disposal methods for drilling muds, waste fluids in operations sumps, produced water, flowback water, and waste gas are discussed below.

Drilling sumps are used to collect drilling muds and boring wastes which are nonhazardous. Drilling muds must be dried prior to back-filling of the sump. Operations sumps are used to store fluids and solids, which are produced while a well is operational. Waste fluids in operations sumps can be transferred to centralized sumps for processing or evaporation ponds. Management of sumps is regulated by DOGGR and the CVRWQCB and discussed in detail in Section 4.9, Hydrology and Water Quality.

Produced water is not considered a hazardous waste. It typically contains chemicals associated with the formations, such as salts, oils and greases, inorganic and organic chemicals, and naturally occurring radioactive material. Produced water is managed in several different ways, including treated for use in enhanced oil steam generation activities or other beneficial purposes, reinjected into the reservoir from which it was produced or into a zone permitted to accept Class II injection, or disposed of in permitted percolation pond facilities. The disposition of produced water (including the status of the exempt aquifer determinations being made under the UIC program) is discussed above, and in detail in Section 4.9, Hydrology and Water Quality.

Flowback fluid from WST operations is typically managed through the oilfield's oil and gas and produced water handling system, which would pipe the flowback fluid directly into these systems. Once it is commingled with other fluids, separated, and treated, the spent acid, sediment, and, in some cases, the produced water are disposed of using the common disposal practice of that field. Any oil that is collected as part of the flowback is sent through the production facility. As discussed in Section 4.9, Hydrology and Water Quality, fluid disposal also could occur through waste injection wells or percolation ponds.

Waste gas is disposed of in dedicated "waste gas" injection wells that dispose of the gas into depleted oil reservoirs. Waste gas injection wells are DOGGR permitted as Class II injection wells. Other waste gas is transported from the processing facility via pipelines and flared or used as fuel in steal generators. There are thousands of feet of pipelines conveying oil and gas byproducts, including waste gas, throughout the Project Area.

All such pipelines are subject to inspection and testing procedures as required by the DOGGR regulations adopted pursuant to AB 1960 (See CCR, tit. 14, § 1774.1.). Under the regulations, "operators shall visually inspect all aboveground pipelines for leaks and corrosion" at least once per year. In addition, DOGGR may order any tests or inspections it deems necessary to establish the reliability of any pipeline system. Following pipeline inspection, repair, replacement, or cathodic protection may be required. Any pipeline that has had a leak in the past, resulting in the release of a reportable quantity, shall be pressure tested by the operator to verify the integrity of the pipe prior to placement back into active service. Finally, AB 1960 regulations require a "mechanical integrity test" to be performed on "all active environmentally sensitive pipelines that are gathering lines, and all urban pipelines over 4 [inches] in diameter, every two years" (CCR 14 § 1774.1(e).).

Consistent with the pipeline inspection requirements of the AB 1960 regulations, all operators are required to prepare a pipeline management plan for all pipelines, that lists information on each pipeline as well as a description of the testing method and schedule for all pipelines (CCR 14 § 1774.2). Moreover, all operators must establish and comply with a written preventive maintenance plan for the prevention of corrosion and leakage, consistent with CCR, Title 14, Section 1777.

However, it is possible that, even with implementation of existing regulations, a pipeline could have an inadvertent or accidental release.

### Summary

Regulations governing the transportation of hazardous material via truck and pipelines are comprehensive and serve to prevent or mitigate releases of hazardous materials in many situations. As discussed above, historical data suggest that releases have occurred at a frequency such that they occur during routine operations, though the vast majority of these releases have been minor. Further, many of the incidents reported above occurred before enactment of AB 1960 in January 2009 and prior to implementation of the AB 1960 regulations on January 29, 2011, which were enacted to improve, among other things, leak detection, corrosion prevention, and pipeline integrity. Nevertheless, potential releases have the potential to contaminate the environment or expose the public to hazardous materials and, therefore, the impacts could be significant.

The use, handling, and storage of hazardous materials is also regulated. Similar to the discussion above, despite the implementation of federal and state regulations, releases or spills have occurred in the Project Area and would be expected to continue to occur in oil and gas activities authorized under this Project. Since these potential releases could contaminate the environment or expose the public to hazardous materials, the impacts could be significant.

The disposal of hazardous materials/wastes is regulated under RCRA and California Hazardous Waste Laws. As discussed above, despite the implementation of these laws and regulations, spills and releases have occurred and would likely occur in oil and activities that would be authorized under this Project. These releases could result in significant impacts to the environment or the public, therefore, the impacts could be significant.

## Mitigation Measures

**MM 4.8-1** The Applicant shall provide a comprehensive Worker Environmental Awareness Program to the County with its first Site Plan Conformity Review permit application in each calendar year. The program shall include all training requirements identified in Applicant Best Management Practices and mitigation measures, and include training for all field personnel (including Applicant employees, agents and contractors). The Worker Environmental Awareness Program shall include hazardous materials and hazardous waste management, and emergency preparedness, release reporting, and response requirements.

**MM 4.8-2** The Applicant shall arrange for transportation, storage and disposal of all hazardous materials in compliance with the Hazardous Materials Transportation Act. Drivers transporting hazardous materials or wastes should follow the measures recommended by the Federal Motor Carrier Safety Administration for avoiding roll-over accidents. To avoid roll-over accidents involving cargo tank trucks:

a. Avoid sudden movements that may lead to roll-overs.

b. Control your load in turns and on straight roadways.

c. Identify high risk areas on roads.

d. Remain alert and attentive behind the wheel.

e. Control speed and maintain proper "speed cushions."

**MM 4.8-3** The Applicant shall implement the following practices:

a. Construction activities shall be conducted to allow for easy clean-up of spills. Construction crews shall have sufficient tools, supplies, and absorbent and barrier materials to contain and recover spilled materials.

b. Fuels and lubricants shall be stored only at designated staging areas. Fuel and lubricant tanks shall have appropriate secondary spill containment (e.g., curbs).

c. Storage of fuel and lubricants in the staging area shall be at least 100 feet away from the edge of water bodies. Refueling and lubrication of equipment shall be restricted to upland areas at least 100 feet away from stream channels and wetlands.

d. Any fuel truck shall carry an oil spill response kit and spill response equipment at all times.

e. Applicants shall be required to perform all routine equipment maintenance at the well pad, and promptly collect and lawfully dispose of wastes at an authorized recycling, treatment or disposal facility.

f. Berms and/or dikes (secondary containment) shall be constructed around the permanent above-ground bulk tanks and the foundations shall be installed with a passive leak detection system, so that potential spill materials shall be contained and collected in specified areas isolated from any water bodies. Tanks shall not be placed in areas subject to periodic flooding or washout.

g. A sufficient supply of sorbent and barrier materials shall be maintained on construction sites, and sorbent and barrier materials shall also be utilized to contain runoff from contaminated areas.

    1. Shovels and drums shall be stored at each well pad or readily available. If small quantities of soil become contaminated, shovels shall be used to

collect the soil and the material shall be stored in 55-gallon drums. Large quantities of contaminated soil may be bio-remediated on-site or at a designated remediation facility, subject to government approval, or collected utilizing heavy equipment, and stored in drums or other suitable containers prior to disposal. Should contamination occur adjacent to staging areas as a result of runoff, shovels and/or heavy equipment shall be utilized to collect the contaminated material. Contaminated soil shall be disposed of in accordance with state and federal regulations.

2. Above-ground tanks, valves and other equipment shall be visually inspected monthly and when the tank is refilled. Inspection records shall be maintained. Applicants shall periodically check tanks for leaks or spills.
3. Drain valves on temporary tanks shall be locked to prevent accidental or unauthorized discharges from the tank.
4. Equipment maintenance shall be conducted in staging areas to the extent practical.
5. The Applicant shall maintain equipment in operating condition to reduce the likelihood of fuel or oil line breaks and leakage. Any vehicles with chronic or continuous leaks shall be removed from the construction site and repaired before being returned to operation.

**MM 4.8-4** The Applicant shall implement the following measures to prevent, repair, and remediate accidental leaks and spills from oil and gas operations.

a. The Applicant shall identify gas, oil and produced water pipelines to be used for each new or reworked well site in its Site Review Plan, and shall show the location of any sensitive receptor located within 200 feet of any such pipeline. For any pipeline located within 200 feet of a sensitive receptor, the Applicant shall present evidence that each such pipeline has been integrity tested using pressure testing or other accepted test methods by a qualified professional within a two-year period prior to submittal of the Site Review Plan, and shall provide a copy of the test result to the County. For all waste gas lines less than or equal to 4 inches in diameter, a Pipeline Management Plan shall be developed and implemented in accordance with Division of Oil Gas and Geothermal Resources regulations Title 14, Division 2, Chapter 4, Section 1774.2. The Pipeline Management Plan shall include:

1. A listing of information on each pipeline including, but not limited to:
   i. Pipeline type.
   ii. Grade.
   iii. Installation date of pipeline.
   iv. Design and operational pressure.

v. Any leak, repair, inspection and testing history.

2. A description of the testing method and schedule for all pipelines.

b. The Applicant shall notify the County of reportable quantities of fuel, gas, petroleum or hazardous materials leaks to the County within 48 hours of discovery, and to other applicable agencies as required by other laws. The Applicant shall immediately contain the leak (e.g., by isolating or shutting down the leaking equipment), clean up contaminated media (e.g., soils), and repair the leak prior to recommencing operations. The Applicant shall report the status and progress of the leak repair and remediation work to the County on monthly intervals until the repair has been completed, and any contaminated media has been remediated.

**MM 4.8-5** If, during grading or excavation work, the Applicant observes visual or olfactory evidence of contamination or if soil contamination is otherwise suspected, work near the excavation site shall be terminated, the work area cordoned off and appropriate health and safety procedures implemented for the location by the contractor's Health and Safety Officer. Samples shall be collected by a trained and qualified individual. Analytical data from suspected contaminated material shall be reviewed by the contractor's Health and Safety Officer. If the sample testing determines that contamination is not present, work may proceed at the site; however, if contamination is detected above regulatory limits, the Kern County Public Health Services Department shall be notified. All actions related to encountering unanticipated hazardous materials at the site shall be documented and submitted to the Kern County Public Health Services Department.

**MM 4.8-6** The Applicant shall implement the most up-to-date best management practices as part of their normal operations. Specifically, operators and/or their contractors shall implement measures to prevent the release or accidental spillage of solid waste, garbage, construction debris, sanitary waste, industrial waste, naturally occurring radioactive materials, oil and other petroleum products, and other wastes into water bodies or water sources. The best management practices in the most up-to-date versions of the following documents shall be followed: Exemption of Oil and Gas Exploration and Production Wastes From Federal Hazardous Waste Regulations (EPA 2002).

a. Classify the various oil and gas exploration and production wastes for proper disposal as described in United States Environmental Protection Agency 2002.

b. Size reserve pits properly to avoid overflows.

c. Use closed loop mud systems when practical, particularly with oil-based muds.

d. Review safety data sheets of materials used, and select less toxic alternatives when possible.

e. Minimize waste generation, such as by designing systems with the smallest volumes possible (e.g., drilling mud systems).

f. Reduce the amount of excess fluids entering reserve and production pits.

g. Keep non-exempt wastes out of reserve or production pits.

h. Design the drilling pad to contain stormwater and rigwash.

i. Recycle and reuse oil-based muds and high density brines, when practical.

j. Perform routine equipment inspections and maintenance to prevent leaks or emissions.

k. Reclaim oily debris and tank bottoms when practical.

l. Minimize the volume of materials stored at facilities.

m. Construct adequate berms around materials and waste storage areas to contain spills.

n. Perform routine inspections of materials and waste storage areas to locate damaged or leaking containers.

o. Train personnel to use sensible waste management practices.

**MM 4.8-7** Conduct exploration and development activities as described in Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development The Gold Book (Bureau of Land Management 2007). The following specific measures should be undertaken at a minimum:

a. Sufficiently impervious secondary containment, such as containment dikes, containment walls, and drip pans, should be constructed and maintained around all qualifying petroleum facilities, including tank batteries and separation and treating areas consistent with the Environmental Protection Agency's Spill Prevention, Control, and Countermeasures regulation (40 Code of Federal Regulations 112). The containment structure must have sufficient volume to contain, at a minimum, the content of the largest storage tank containing liquid hydrocarbons within the facility/battery and sufficient freeboard to contain precipitation, unless more stringent protective requirements are deemed necessary by the authorized officer. Drip pans should be routinely checked and cleaned of petroleum or chemical discharges and designed to prevent access by wildlife and livestock.

b. Chemical containers should not be stored on bare ground, exposed to the sun and moisture. Containers and labels are subject to degradation and punctured drums could leak contents on the ground.

c. Chemicals containers should be maintained in good condition and placed within secondary containment in case of a spill or high velocity puncture.

d. Containment dikes are not to be constructed with topsoil or coarse, insufficiently impervious spoil material. Containment is strongly suggested for produced water tanks. Chemicals should be placed within secondary containment and stored so that the containers are not in contact with soil or standing water and product and hazard labels are not exposed to weathering.

e. Maintain a clean well location. Remove trash, junk, and other materials not in current use

**MM 4.8-8** Applicants shall use the appropriate American Petroleum Institute Standards, or other recognized sources imposing the same or equivalent standards, for their facility, such as the following:

a. Use cements and well materials in well completions as described in Specifications for Cements and Materials for Well Cementing (American Petroleum Institute 2011).

b. Prior to start-up of all new facilities, verify and prove the construction, installation, integration, testing, and preparation of systems have been completed as designed following the practices described in Facilities Systems Completion Planning and Execution (American Petroleum Institute 2013a).

c. When the use of centralizers and stop-collars are required during well completion activities, follow the installation and testing requirements described in Recommended Practice for Centralizer Placement and Stop-collar Testing (American Petroleum Institute 2010a).

d. Limit the environmental footprint of oil and gas exploration and production and reduce the incidence of releases of hazardous substances following the practices described in Environmental Protection for Onshore Oil and Gas Production Operations and Leases (American Petroleum Institute 2009).

e. Minimize improper disposal by following the practices described in American Petroleum Institute Order No. G00004, Guidelines for Commercial Exploration and Production Waste Management Facilities (American Petroleum Institute 2001) or other recognized methods. These guidelines discuss the relevant regulations and permitting requirements; siting, construction, and technical consideration for various waste disposal options; as well as mitigation options.

f. Minimize the environmental footprint of exploration and production activities following the practices described in Land Drilling Practices for Protection of the Environment (American Petroleum Institute 2010b) or other recognized sources.

g. Prior to pressurizing or re-pressurizing petroleum product pipelines, ensure the integrity of pipelines following the practices described in Recommended Practice for the Pressure Testing of Steel Pipelines for the Transportation of Gas, Petroleum Gas, Hazardous Liquids, Highly Volatile Liquids, or Carbon Dioxide (American Petroleum Institute 2013b) or other recognized sources.

h. To minimize releases of hazardous substances during oilfield construction, pit and sump operations shall be conducted in accordance with State Water Resources Control Board General Orders or appropriate Regional Water Quality Control Board waste discharge requirements or general orders.

**MM 4.8-9** For all operations subject to the Oil and Gas Conformity Review, the Applicant shall comply with the pipeline management plan, including inspection and maintenance requirements, as administered by the Division of Oil Gas and Geothermal Resources pursuant to 14 California Code of Regulations 1774.

### Level of Significance After Mitigation

Impacts would be less than significant with mitigation.

## Impact 4.8-2: Create a Significant Hazard to the Public or the Environment through Reasonably Foreseeable Upset and Accident Conditions Involving the Release of Hazardous Materials into the Environment

Oil and gas activities could result in spills from accidents or improper handling or disposal of fuels or hazardous materials. Spills, release, overflow of tanks, or breach of containment can occur from operator error or limited storage capacity, water ingress from stormwater or floods, poor construction or failure of tanks and/or liners, or pipeline failure. A spill or release could expose workers and the public to levels of hazardous materials in excess of applicable regulations. Several reasonably foreseeable upset/accident conditions are known to occur:

- Spills of reportable quantities of materials that occur during exploration, operations, or decommissioning;
- Spills or releases at transmission, gathering, or collector pipelines; and
- Short-circuiting of crude oil and produced water to the ground surface during steam recovery enhancement operations and well blow-out.

As discussed above, all operators are required to maintain hazardous materials in staging or storage areas in proper storage containers and with sufficient secondary containment in accordance with federal and state regulations. Transmission and some gathering pipelines must be operated according to PHMSA regulations. Therefore, this section discusses when those laws and regulations fail to prevent spills. To mitigate the effects of potential oil and chemical spills, the

following BMP is proposed for spill prevention and remediation:

Oil and chemical spills shall be cleaned up in accordance with the SPCC Plan for the site to protect personnel, wildlife, and habitat; provided, however, that nothing herein contained shall be construed to alter operator's obligations under existing laws and regulations. When a spill occurs, emergency actions to stop the spill or leak as soon as possible and ensure the safety of personnel shall be taken.

## Spills/Releases at Oilfields and Processing Facilities

As discussed above, spills can occur during oil and gas operations and from pipelines. A worst-case scenario would be a breach at central processing facility where petroleum products or hazardous materials are stored in bulk. As shown in Table 4.8-2, the maximum container size for crude oil is 672,000 gallons. Some acutely hazardous materials, such as anhydrous ammonia and hydrochloric acid, are stored in 15,000 pound containers. As discussed previously, structures containing these hazardous materials must comply with California Building Codes, California Fire Code, and OSHA, and must have sufficient secondary containment to contain a breach of the largest container. In addition, facilities must have Spill Contingency Plans to address potential breaches.

As shown in Table 4.8-6, spills occur during oil and gas activities. The most commonly spilled materials are crude oil and produced water, but also acids, condensates, and drilling muds. The most common causes are from most to least common:

- Production line failure due to corrosion, but also from the use of PVC lines instead of steel lines;
- Equipment failure mostly from valves, fittings, storage tanks, and pumps;
- Human error mostly from valves left open;
- Surface break-through by drilling mud, crude oil, and produced water during steam treatment of wells for enhanced oil recovery. Break-through occurred at nearby wells, abandoned wells, hillsides, and at a well during drilling.

Although the new production lines associated with the implementation of this Project would not be subject to corrosion right away, the number of spills from existing facilities could increase as those facilities age. Equipment failure and human error would still be possible; therefore, there could be leaks or releases that could have a significant impact to public safety and the environment.

## Pipelines

Between 2004 and 2013, no incidents attributable to oil and gas producers were associated with PHMSA-regulated natural gas gathering or distributions lines (PHMSA 2015c, 2015d). However, in 2014, an unregulated waste gas pipeline in Arvin ruptured resulting in saturation of the soil in backyards of eight homes on Nelson Court in Arvin.

A total of 27 unintentional releases of crude oil from PHMSA-regulated hazardous liquid pipelines

in Kern County occurred from 2010 to 2014 and 57 occurred between 2002 and 2009. The causes of the incidents were mostly attributed to equipment failure, material failure of a pipe or weld or corrosion, incorrect operations, earth movement, and other damage. More specifically, incidents occurred due to leaks, ruptures, overfill, overflow, and other unspecified causes. Leaks resulted from cracks, connection failures, pinholes, seal or packing failure, and valves not being properly closed (PHMSA 2015a, 2015b).

As discussed above, some of the pipelines in Kern County's oilfields are regulated under PHSMA and operators would be required to implement PHMSA guidelines with respect to materials required, pressure limitations, testing, safety, and reporting. However, as is demonstrated by the number of unintentional releases of crude oil, releases occur despite regulatory oversight. In addition, many gathering lines in the Kern County oilfields are not regulated by PHSMA, but are subject to the AB 1960 regulations concerning pipeline integrity, monitoring, testing, as well the requirement to prepare a pipeline management plan.

The effect of any potential release would depend on its location, particularly if the release occurred on land or entered a water body. Workers could be exposed to hazardous materials at levels in excess of OSHA and Cal/OSHA standards and the public could be exposed to hazardous materials directly or indirectly. Therefore, a spill or release could result in a significant impact.

## Blowouts and Steam-Related Events

The amount of cyclic steaming could increase compared to baseline levels consistent with the general increase in oil and gas activities that might occur pursuant to the Project. Cyclic steaming at or above the fracture gradient into zones with low permeability (e.g., tight reservoirs) has the potential to increase the occurrence of inadvertent releases of oil, water, steam, or mud to the surface. These releases are commonly referred to as "surface expressions." Naturally occurring seeps may also occur within oilfields. "Seeps" refers to the natural geologic flow of fluids to the surface through a fracture network or outcrop. A blowout is the worst-case surface expression. As discussed in the Environmental Setting, well blowout rates in oilfields undergoing thermally enhanced recovery (via steam injection) in California Oil and Gas District 4 from 1991 to 2005 were on the order of one per 1,000 well construction operations, one per 10,000 active wells per year, and one per 100,000 shut-in/idle and plugged/abandoned wells per year (Jordan 2008).

At a minimum, operators must use DOGGR's blowout prevention guidance document "*Blowout Prevention in California: Equipment Selection and Testing*" (DOGGR 2006) which provides DOGGR's requirements for blowout prevention equipment (BOPE), details the components of BOPE, and describes the inspection and testing procedures. In addition, operators should employ oilfield best practices, such as API's guidance on BOPE that state:

1. All BOPE should be selected, installed, and properly maintained in order to prevent uncontrolled releases to the environment.

2. All BOPE should have a working pressure that exceeds the maximum expected surface pressure.

3. Training exercises or drills should be held as necessary to ensure crew familiarity and that the BOPE is in good working order (API 2009).

DOGGR recognizes the potential impacts associated with possible surface expressions related to oil and gas operations and has provided site-specific conditions in their Project approval letters to minimize the potential for these types of events. The need for site-specific mitigations is dependent on the depth of the formation and geologic properties of the overlaying formations, which determine whether to ensure that the injection fluid is confined to the intended zone or zones of injection.

Due to the potentially catastrophic events that can occur to public safety and the environment if blow-outs or a pressure/steam-related event occur, impacts could be significant if a blowout or pressure/steam related event were to occur.

## Mitigation Measures

Implement MM 4.8-1 through MM 4.8-9, as described above, and

**MM 4.8-10** The Applicant shall incorporate annual maintenance checks for leaks and corrosion that cause releases into current operations, maintenance, and inspection schedules as provided by the Division of Oil Gas and Geothermal Resources pursuant to 14 California Code of Regulations Sections 1774.1 and 1774.2, the Applicant shall visually inspect all above-ground pipelines for leaks and corrosion at least once per year, comply with the pipeline testing requirements included therein, shall maintain records of such inspections and testing; and shall make inspection and testing records available to the County for review upon request.

**MM 4.8-11** As part of the Hazardous Materials Business Plan and the spill prevention, control, And countermeasures Plan, the Applicant shall require annual worker training requirements to: increase awareness of the most common types of failures and methods to avoid mistakes, shall maintain records of employee training, and shall make such records available to the County for review upon request.

**MM 4.8-12** An Applicant who plans to perform cyclic steam injection activities above reservoir fracture levels shall conduct such activities in accordance with the requirements set forth in the Division of Oil Gas and Geothermal Resources site-specific Project Approval Letter for the injection project. The following requirements from a Project Approval Letter for an injection project are examples of the types of conditions that would be triggered if a surface expression were to occur, though such conditions may be modified by the Division of Oil Gas and Geothermal Resources to reflect site-specific conditions and changing regulatory requirements.

a. Cease cyclic steaming operations in accordance with the site-specific Project Approval Letter. Streaming can resume following the Division of Oil Gas and Geothermal Resources specifications outlined in the Project Approval Letter.

b. All new or reactivated surface expressions that discharge oil in a reportable quantity shall be reported as an oil spill to the California Emergency Management Agency at (800) 852-7550.

c. Any measures to address surface expressions from the well and associated Project shall be reviewed by the Division of Oil Gas and Geothermal Resources prior to initiating.

d. Immediately control any water, steam, or oil flowing from a surface expression and contained. All discharged material shall be removed and disposed of in a manner approved by all state and local agencies.

e. Cordon off and clearly mark all surface expressions to prevent inadvertent access.

f. Conduct air sampling of any emissions associated to a recent surface expression in accordance to the local air board requirements to ensure a health hazard condition does not exist.

g. Report immediately to the Division of Oil Gas and Geothermal Resources all surface expressions within 300 feet of the Project site. If the surface expression continues to flow after five days, all wells within a 300-foot radius shall cease steaming until the surface expression ceases to flow. If the surface expression continues to flow, the damage will be evaluated at the Supervisor's discretion, as assigned by Section 3106 of the Public Resources Code and existing laws and regulations.

**MM 4.8-13** The Applicant shall comply with the Division of Oil Gas and Geothermal Resources requirements for assuring safe drilling and drill casing practices, well design, construction and well management requirements, blowout requirements, and all other provisions of 14 California Code of Regulations 1744 and other applicable Division of Oil Gas and Geothermal Resources regulations. The Applicant shall also reduce the incidence of well control loss by following the practices described in Recommended Practice for Well Control Operations (American Petroleum Institute 2012).

**MM 4.8-14** The Applicant shall report contamination caused by oil and gas activities, including previously unknown injection wells, of a reportable quantity of hazardous substances, as specified in the Code of Federal Regulations Title 40 and/or the California Code of Regulations Titles 22 and 23, which is discovered during Project construction activities and operations. Notification must be made to Kern County Environmental Health and the appropriate implementing regulatory agency that has responsibility or oversight of the

specific contamination conditions. The Applicant shall remediate such contamination outside Tier 1 areas as required by the Kern County Environmental Health and the appropriate implementing regulatory agency.

### Level of Significance After Mitigation

Impacts would be less than significant with mitigation.

## Impact 4.8-3: Emit Hazardous Emissions or Handle Hazardous or Acutely Hazardous Materials, Substances, or Waste within One-Quarter Mile of an Existing or Proposed School

The CEQA requires that proposed projects near schools evaluate potential health impacts resulting from the emission of or handling of hazardous or acutely hazardous material, substances, or waste. This also includes extremely hazardous materials and wastes. Emissions associated with the implementation of the ordinance amendment and potential risks associated with emissions of toxic air contaminants (TACs) are addressed in the Air Quality Section. This discussion focuses on hazardous and acutely hazardous materials, substances, or wastes.

Definitions for extremely hazardous materials and wastes and acutely hazardous materials are provided below.

- "Extremely hazardous material" means a substance or combination of substances which, if human exposure should occur, may likely result in death, disabling personal injury or serious illness caused by the substance or combination of substances because of its quantity, concentration, or chemical characteristics.

- "Extremely hazardous waste" means any hazardous waste or mixture of hazardous wastes which, if human exposure should occur, may likely result in death, disabling personal injury or serious illness caused by the hazardous waste or mixture of hazardous wastes because of its quantity, concentration or chemical characteristics (Title 19 CCR).

- Acutely hazardous materials include chemicals at or above the specified threshold quantities or a process which involves a Category 1 flammable gas or a flammable liquid with a flashpoint below 100 $^{o}$F (37.8 $^{o}$C) onsite in one location, in a quantity of 10,000 pounds (4535.9 kg) or more according to 8 CCR Section 5189, Appendix A.

Some of the acutely hazardous materials that have been used in oil and gas activities in Kern County include anhydrous ammonia, hydrochloric acid, oxygen difluoride (compressed gas), peracetic acid (acetic acid over 60%), hydrogen sulfide, and nitric oxides. During all phases of oil and gas activities, acutely or extremely hazardous materials would have to be transported according the Hazardous Materials Transport Act, handled and stored according to OSHA and California Fire Code, and disposed of according to RCRA and California Hazardous Waste regulations. Most oil and gas activities do not require the long-term storage of hazardous or acutely hazardous materials. Some of these types of chemicals would be used during acid-based WST

operations defined by SB 4, as well as non-SB 4 routine maintenance operations and generally during the production process.

California State law requires that new schools should not be located near an aboveground water or fuel storage tank or within 1,500 feet (0.28 miles) of the easement of an aboveground or underground pipeline that can pose a safety hazard as determined by a risk analysis study. Therefore, new schools would not be sited near oil and gas operations or pipelines. Currently, oil and gas wells cannot be drilled within 300 feet of a school, but that does not preclude other oil and gas activities from occurring within 300 feet of a school, such as the installation of pipelines or other operational activities. Although state and federal regulations safeguard the handling of acutely hazardous materials during routine operations and these should prevent releases, accidents do occur. Schools and other locations where people congregate are particularly vulnerable to accidents. Therefore, impacts could be significant.

**Health Risk Assessment**

A Health Risk Assessment (HRA) was completed to assess the potential health effects of the Project. A detailed discussion of the risk assessment and its results are included in Impact 4.3-4 and a copy of the risk assessment in included in Appendix M.

The HRA shows that the potential cancer risk exceeds the CEQA significance thresholds of 10 in 1 million for drilling a 10,000-foot well in 2015 to a distance 367 feet, and for drilling a 5,000-foot well in year 2015 to a distance of 116 feet, and for operations of the oil processing equipment to a distance of 701 feet. By 2018, due to emission reductions resulting from compliance deadlines occurring from CARB current diesel regulations, the risks associated with drilling a 5,000-foot (or shallower) well would not exceed the 10 in one million threshold. This analysis suggests that at 0.25 mile, risks from construction activities would be less than the CEQA significance threshold; however, there could be health risks for schools located less than 700 feet from oil processing equipment and located less than 367 feet from drilling of a 10,000-foot well. Therefore, impacts could be significant. Implementation of the setback requirements in Sections 4.3, Air Quality would ensure that oil and gas activities would not occur in close proximity to schools and, therefore, the impact would be less than significant with mitigation.

## Mitigation Measures

Implement toxic air contaminant setback mitigation measures, as described in Section 4.3, Air Quality, and

**MM 4.8-15** The Applicant who intends to use acutely hazardous chemicals, including chemicals at or above the specified threshold quantities or a process which involves a Category 1 flammable gas or a flammable liquid with a flashpoint below 100 degrees Fahrenheit (37.8 degrees Celsius) on site in one location, in a quantity of 10,000 pounds (4535.9 kilograms) or more according to 8 California Code of Regulations Section 5189, Appendix A, within 0.25 mile from a school must:

a. Evaluate whether other alternative chemicals that are less hazardous could be used.

b. Ensure that the smallest quantity of necessary acutely hazardous materials are stored on site.

c. Notify the occupants of the buildings when and where acutely hazardous materials would be used.

d. Notify Kern County Fire Department about the details of the use of acutely hazardous materials (e.g., when, where, how much).

e. Ensure that all employees who would contact the acutely hazardous materials are trained on the handling, transport, storage, and disposal of the materials.

f. Ensure that all employees who would contact the acutely hazardous materials are trained and are provided the proper personal protective equipment.

g. Ensure that all employees who would contact the acutely hazardous materials are trained and have exercised on the Spill Prevention, Control, and Countermeasures P Plan that addresses these chemicals.

### Level of Significance After Mitigation

Impacts would be less than significant with mitigation.

## Impact 4.8-4: Create a Hazard to the Public or the Environment as a Result of Being a Site that is Included on a List of Hazardous Materials Sites Compiled Pursuant to Government Code Section 65962.5

Government Code Section 65962.5 requires CalEPA to compile a hazardous materials release sites called the Cortese List. This list is housed in a database called ENVIROSTOR. The list for the Project Area includes locations that are under evaluation, need evaluation, active, inactive, undergoing closure, closed, and closed with land use restrictions. Most of the current sites are located within Bakersfield or other municipalities, but some are located within or near oilfields (see Figure 4.8-6). The list of sites changes as sites are cleaned up or are designated hazardous waste sites. Appendix R contains the list as of January 21, 2015. In addition, there are multiple locations where there has been petroleum product contamination including within oilfield operating areas.

Oil and gas activities, such as preparation of new sites; exploratory drilling; drilling of production wells; excavation of onsite soils for building foundations, pits, sumps, or other facilities, have the potential to disturb soils or cross aquifers. Unearthing of pre-existing contaminated soil at an identified hazardous waste site, causing pre-existing contamination in one groundwater aquifer to enter another, or disturbing formerly contaminated areas that have been capped has the potential to expose the public or the environment to contamination and therefore impacts could be a significant impact.

## Mitigation Measures

Implement MM 4.8-14, as described above, and MM 4.8-17 and MM 4.8-18, as described under Impact 4.8-5.

## Level of Significance after Mitigation

Impacts would be less than significant with mitigation.

## Impact 4.8-5: For a Project Located within the Adopted Kern County Airport Land Use Compatibility Plan, Result in a Safety Hazard for People Residing or Working in the Area

Currently, 10 oilfields are located within 2 miles of a public use airport (see Figure 4.8-7). The proposed amended ordinance does not have any specific restrictions associated with land use restrictions near airports or private airstrips; therefore, additional oil and gas activities could occur within close proximity of public use airport or private airstrip.

The Kern County ALUCP specifies restrictions within designated zones surrounding airports to ensure that activities within those zones are compatible with the safe operation of the airport. If oil and gas-related development activities are proposed in the vicinity of one of the 16 airports identified in the Kern County ALUCP, some activities may not be compatible with the ALUCP and, therefore, would have a significant impact. Drilling rigs and storage tanks could exceed height limits in certain airport influence zones. Lighting on drilling rigs, tanks, roads, pumps, and other facilities could exceed restrictions on lighting type, design, and placement in certain airport influence zones. Whether oil and gas activities would pose a hazard to navigation would be determined by the FAA in response to notification of that agency of a proposed project. Therefore, oil and gas development related equipment heights and lighting placement/design could create a significant hazard to aviation safety, with attendant potential impacts to people and the environment, in the vicinity of a public use airport.

## Mitigation Measures

**MM 4.8-17** The Applicant shall determine whether any proposed construction or alteration meets requirements for notification of the Federal Aviation Administration. If a proposed construction or alteration is found to require notification, the Applicant shall notify the Federal Aviation Administration and request that the Federal Aviation Administration issue a Determination of No Hazard to Air Navigation. If the Federal Aviation Administration determines that the construction or alteration would result in a potential hazard to air navigation, the Applicant would be required to work with the Federal Aviation Administration to resolve any adverse effects or airport operations. The Applicant shall notify the Federal Aviation Administration and the nearest Airport, by completing and submitting Federal Aviation Administration Form 7460-1 if oil and gas related exploration, production, or associated development activities are planned that meet one or more of the following

criteria:

a. Any construction or alteration exceeding 200 feet above ground level.

b. Any construction or alteration within 20,000 feet of all public use airports except Poso-kern Airport which exceeds a 100:1 surface from any point on the runway.

c. Any construction or alteration within 10,000 feet of the Poso-Kern Airport which exceeds a 50:1 surface from any point on the runway.

d. Any construction or alteration within 5,000 feet of a public use heliport which exceeds a 25:1 surface.

e. When requested by the Federal Aviation Administration.

f. Any construction or alteration located on a public use airport or heliport regardless of height or location.

**MM 4.8-18** The Applicant shall determine the distance from the proposed operation to the nearest boundary of the Joint Service Restricted R-2508 Complex, using a map of this Complex provided by the County. The Applicant shall notify the Joint Service Restricted R2508 Complex representative identified by the County if oil and gas related exploration, production, or associated development activities are planned that meet one or more of the following criteria:

a. Any structure within 75 miles of the R-2508 Complex that is greater than 50 feet tall.

b. Any project within 50 miles of the R-2508 Complex that emit radio and communication frequencies.

c. Any project that would create environmental impacts such as visibility or elevated obstructions within 25 miles of the R-2508 Complex.

**MM 4.8-19** All oil and gas related development activities shall review the Kern County Airport Land Use Compatibility Plan for compliance with all applicable policies.

### Level of Significance After Mitigation

Impacts would be less than significant with mitigation

## Impact 4.8-6: For a Project within the Vicinity of a Private Airstrip, Result in a Safety Hazard for People Residing or Working in the Project Area

Oil and gas activities occur near private airstrips, such as the Di Giorgio Ranch Landing Strip. No known accidents have occurred. However, similar to the above discussion, oil and gas activities proposed in the vicinity of a private airstrip could affect the safety of operations at the airstrip. Drilling rigs and storage tanks can be of heights that could represent a hazard to navigation. In

addition, lighting on drilling rigs, tanks, roads, pumps, and other facilities may not be consistent with navigation lighting. Because oil and gas development related equipment heights and lighting placement/design could create a significant hazard to aviation safety, with attendant potential impacts to people residing or working in the Project Area in the vicinity of a private airstrip, the impact would be less than significant.

### Mitigation Measures

None required.

### Level of Significance

Impacts would be less than significant.

## Impact 4.8-7: Impair Implementation of, or Physically Interfere with, an Adopted Emergency Response Plan or Emergency Evacuation Plan

The only emergency response plan in place in the Project Area is for evacuation if the Lake Isabella Dam fails. The plan specifies evacuation routes and evacuation zones. Lake Isabella is located approximately 21 miles northeast of the point where the Eastern Subarea crosses the Kern River. The Lake Isabella inundation zone includes most of the city of Bakersfield; most of the Bowerbank oil and gas field near its northwestern extent, most of the Coles Levee oil and gas fields near its western extent, abutting the northern boundary of the Rio Viejo field at its southern extent, a small northwestern portion of the Mountain View oil and gas field near its eastern extent, and most of the Rio Bravo oil and gas field near its northern extent.

Oil and gas-related development activities are unlikely to result in a significant impact to the implementation of or to interfere with the only emergency response or evacuation plan affecting the Project Area. While oil and gas development-related equipment may be present along emergency evacuation routes, setback distances from public roadways, residences, and other structures in the vicinity of oil and gas-related development would ensure that oil and gas activities would not impair the implementation of or physically interfere with this emergency response plan. The potential impact would be less than significant and no mitigation measures would be required.

### Mitigation Measures

None required.

### Level of Significance

Impacts would be less than significant.

## Impact 4.8-8: Expose People or Structures to a Significant Risk of Loss, Injury, or Death Involving Wildland Fires, Including Where Wildlands are Adjacent to Urbanized Areas or Where Residences are Intermixed with Wildlands

The Project Area is characterized by the mostly agricultural floor of the San Joaquin Valley, forest or grassland covered hills, and urban environments, each of which has an associated fire risk. The combination of seasonally hot weather, dry climate, wind, and fuel load result in areas of moderate to very high fire severity as indicated in the Kern Multi-Jurisdiction Hazard Mitigation Plan. According to the Kern Multi Jurisdiction Hazard Mitigation Plan, areas of the San Joaquin Valley are mostly mapped as having a fire severity rating of less than moderate due to the lack of fuel. Hills surrounding the San Joaquin Valley are rated with mostly moderate and high severity with areas of very high severity near the southern and northwestern boundary of the Project Area. Most oilfields are located in areas with moderate fire hazard severity or are located in non-wildland/non-urban areas.

Construction and operational activities, such as brush clearing, welding, cutting, grinding, and blasting, could occur anywhere in the Project Area. In certain locations, these activities could increase the potential for wildland fires. Although the exact location of future oil and gas development is not known within the Project Area, activities associated with the implementation of the Project could result in a significant risk of wildland fires that could result in loss, injury, or death.

### Mitigation Measures

**MM 4.8-20** The Applicant is required to implement the following measures:

a. Comply with Kern County Fire Codes.

b. Maintain firefighting apparatus and supplies required by the Kern County Fire Department.

c. Maintain of a list of all relevant fire-fighting authorities for each work site.

d. Have available equipment to extinguish incipient fires and or construction of a fire break, such as: chemical fire extinguishers, shovels, axes, chain saws, etc.

e. Carry water or fire extinguishers and shovels in non-passenger vehicles in the field.

f. Have and maintain an adequate supply of fire extinguishers for welding, grinding, and brushing crews.

g. Protect individual safety to contain any fire that occurs and notify local emergency response personnel.

h. Remove any flammable wastes generated during oil and gas activities regularly.

i. Store all flammable materials used in oil and gas activities away from ignition sources and in approved containers.

j. Allow smoking only in designated smoking areas.

k. Prohibit smoking where flammable products are present and when the fire hazard is high. Train personnel regarding potential fire hazards and their prevention.

l. All internal combustion engines, stationary and mobile, shall be equipped with spark arresters. Spark arresters shall be in good working order.

m. Light trucks and cars with factory-installed (type) mufflers shall be used only on roads where the roadway is cleared of vegetation. Said vehicle types shall maintain their factory-installed (type) muffler in good condition.

n. Fire rules shall be posted on the Project bulletin board at the contractor's field office and areas visible to employees.

o. Equipment parking areas and small stationary engine sites shall be cleared of all extraneous flammable materials.

p. Personnel shall be trained in the practices of the Fire Safety Plan relevant to their duties. Construction and maintenance personnel shall be trained and equipped to extinguish small fires in order to prevent them from growing into more serious threats.

**MM 4.8-21** The Applicant should restrict the use of chainsaws, chippers, vegetation masticators, grinders, tractors, torches, and explosives at its locations, and ensure the sites where this equipment is used are equipped with portable or fixed fire extinguishers and/or a water tank, with hoses, fire rakes, and other tools to extinguish and or control incipient stage fires. The Worker Environmental Awareness Program shall include fire prevention and response training for workers using these tools.

### Level of Significance After Mitigation

Impacts would be less than significant with mitigation.

## Impact 4.8-9: Generate Vectors or Have a Component that Includes Agricultural Waste Exceeding Adopted Qualitative Thresholds

Oil and gas activities that would be authorized under this project do not involve the generation of agricultural or food waste; however, implementation of the Project would involve construction and operations that could result in standing water, trash piles, or open containers that could provide breeding areas for mosquitoes, flies, or rodents. These potential disease vectors could pose a potential hazard to personnel or the public.

Construction of the Project would occur in an area favorable to the growth of the Valley Fever vector, the fungus *Coccidioides immitis*, which grows in soils in areas of low rainfall, high summer temperatures, and moderate winter temperatures. Project construction would disturb the soil and cause the fungal spores to become airborne, potentially putting construction personnel and wildlife at risk of contracting Valley Fever; however, most Valley Fever cases are very mild, and more than half of infected people either have no symptoms or experience flu-like symptoms and never seek medical attention. In addition, mitigation for dust control, as described in Section 4.3, Air Quality, would minimize the spread of fungal spores. Oil and gas activities that would be authorized under this project have the potential to generate disease vectors which could pose a hazard to personnel or the public, therefore, impacts could be significant.

### Mitigation Measures

Implement dust control and Valley Fever education and mask measures as described in Section 4.3, Air Quality, and.

**MM 4.8-22** Applicants shall ensure that trash is stored in closed containers and removed from the site at regular intervals. Open containers shall be inverted and construction ditches shall not be allowed to accumulate water. Construction and maintenance operations shall not generate standing water. Naturally occurring depressions, drainages, or pools at the site shall not be drained or filled without consulting with the appropriate resource agency (Kern County, United States Army Corps of Engineers, United States Fish and Wildlife Service, California Department of Fish and Wildlife) as applicable, and obtaining the appropriate permits.

### Level of Significance After Mitigation

Impacts would be less than significant with mitigation.

## 4.8.5 Cumulative Setting, Impacts, and Mitigation Measures

The geographic scope for cumulative impacts associated with hazards and hazardous materials is the Project Area. Because incidents with hazardous materials are, in general, confined to location where that has been a release or spill, the cumulative impact analysis considers the combined hazardous materials impacts associated with the Project and with nearby related projects. The potential hazards associated with the operation of oil and gas activities are only expected to occur in close proximity within oilfields or where distributions lines exist. Due to the nature of oil and gas operations, upset conditions at one oilfield could affect operations at adjacent oilfield, but are unlikely to extend beyond oilfield boundaries. Therefore, the hazard impacts associated with the Proposed Project are not expected to overlap with other hazards.

The regional plans and projections evaluated in this cumulative analysis are described in Section 3.7 Cumulative Projects. Implementation of these plans and any projects associated with these plans would be required to comply with the goals, policies, and implementation measures of applicable federal and local laws and land use standards imposed by the respective jurisdictions

within with each related project is located. This includes the possibility of being required to undergo environmental review, in compliance with the requirements of the CEQA and/or the NEPA. Should potential impacts be identified, appropriate mitigation would be prescribed.

## Impact 4.8-10: Contribute to Cumulative Hazards and Hazardous Materials Impacts

Since oil and gas activities could occur anywhere in the Project Area, it is not possible to analyze what would the combined impacts of hazards or a release of hazardous materials and wastes from the Project and existing or reasonably foreseeable projects at a specific location.

With regard to the creation of a hazard through the routine transport, use, or disposal of hazardous materials (Impact 4.8-1), a potentially significant impact could result if a spill or leak were to occur during oil and gas construction or operation activities; however, compliance with state and county regulations and the mitigation measures outlined above would ensure that impacts would remain less than significant. This impact does not have the potential to combine with contamination from spills from other projects within 0.5 mile of the site to result in a cumulative impact due to the site-specific nature of soil contamination and the mitigation measures that would ensure proper cleanup and disposal of contaminated soil. Cumulative contamination of groundwater is discussed in Section 4.9, Hydrology and Water Quality. Therefore, impacts of the Project would not be expected to make a cumulatively considerable contribution, in combination with impacts from past, present, or reasonably foreseeable projects, to result in a cumulative impact.

With regard to creation of a hazard through upset or accident conditions involving a hazardous material release (Impact 4.8-2), the potential exists for oil and gas activities through the implementation of the Project to result in the release of hazardous materials in the soil resulting in exposure of personnel and other sensitive receptors to contaminant levels that could result in short-term and/or long-term health effects. Additionally, releases from pipelines could pose a hazard to personnel and the public; however, conformance with existing state and county regulations, project safety design features, and implementation of the mitigation measures identified above would render this impact less than significant. This impact does not have the potential to combine with impacts of other projects because of the localized nature of the impacts, and because appropriate safety, cleanup, and disposal methods would be implemented to reduce the impact to a level that would not combine with impact of other projects. Therefore, impacts of the Project would not have the potential to make a cumulatively considerable contribution in combination with impacts from past, present, or reasonably foreseeable projects to result in a cumulative impact.

With regard to creation of a hazard to the public or the environment as a result of being located on a site that is included on a list of hazardous material sites compiled pursuant to government code section 65962.5, although the exact location of new oil and gas development is not known, implementation of MM 4.8-3 and 4.8-15 would ensure that the Applicant not only has a method to address unanticipated contamination, but they have also proactively evaluated whether there is a potential hazardous waste site where they would be operating and have made measure to avoid disturbing it. Therefore, impacts of the Project would not have the potential to combine with impacts from past, present, or reasonably foreseeable projects to result in a cumulative impact.

With regard to the creation of a safety hazard for a project located within the Kern County ALUCP, oil and gas activities could occur within the Kern County ALUCP, and therefore, do have the potential to result in creation of a safety hazard to air navigation. However, the Project would be required to comply with County zoning requirements and FAA regulations to ensure that impacts remain less than significant (Impact 4.8-4). With the implementation of MM 4.8-14, 4.8-17, and 4.8-18, in conjunction with compliance with existing rules, the Project does not have the potential to combine with impacts of other projects. Therefore, impacts of the Project would not have the potential to make a cumulatively considerable contribution, in combination with impacts from past, present, or reasonably foreseeable projects, to result in a cumulative impact.

With regard to interference with an adopted emergency response plan or emergency evacuation plan (Impact 4.8-5), it would be unlikely that Project-related activities would interfere with the Lake Isabella emergency response/evacuation. The Project's less-than-significant impact has the potential to combine with other current and future projects that would generate high volumes of traffic on area roadways by creating a cumulative traffic burden on regional roadways; however, given the overall rural nature of the Project Area, and the fact that the Kern Council of Governments Regional Transportation Plan took in account traffic volumes from anticipated projects, the potential for a considerable contribution to a cumulative impact to emergency response is unlikely to occur, and would therefore be less than significant.

With regard to exposing people or structures to a wildland fire hazard (Impact 4.8-6), construction and maintenance would increase the likelihood of wildfire ignition; however, implementation of MM 4.8-19 outlined above would substantially reduce the possibility of a Project-related ignition, rendering this impact less than significant. Mitigation would reduce this impact to a level that would not combine with other projects. Therefore, impacts of the Project would not have the potential to make a cumulatively considerable contribution, in combination with impacts from past, present, or reasonably foreseeable projects, to result in a cumulative impact.

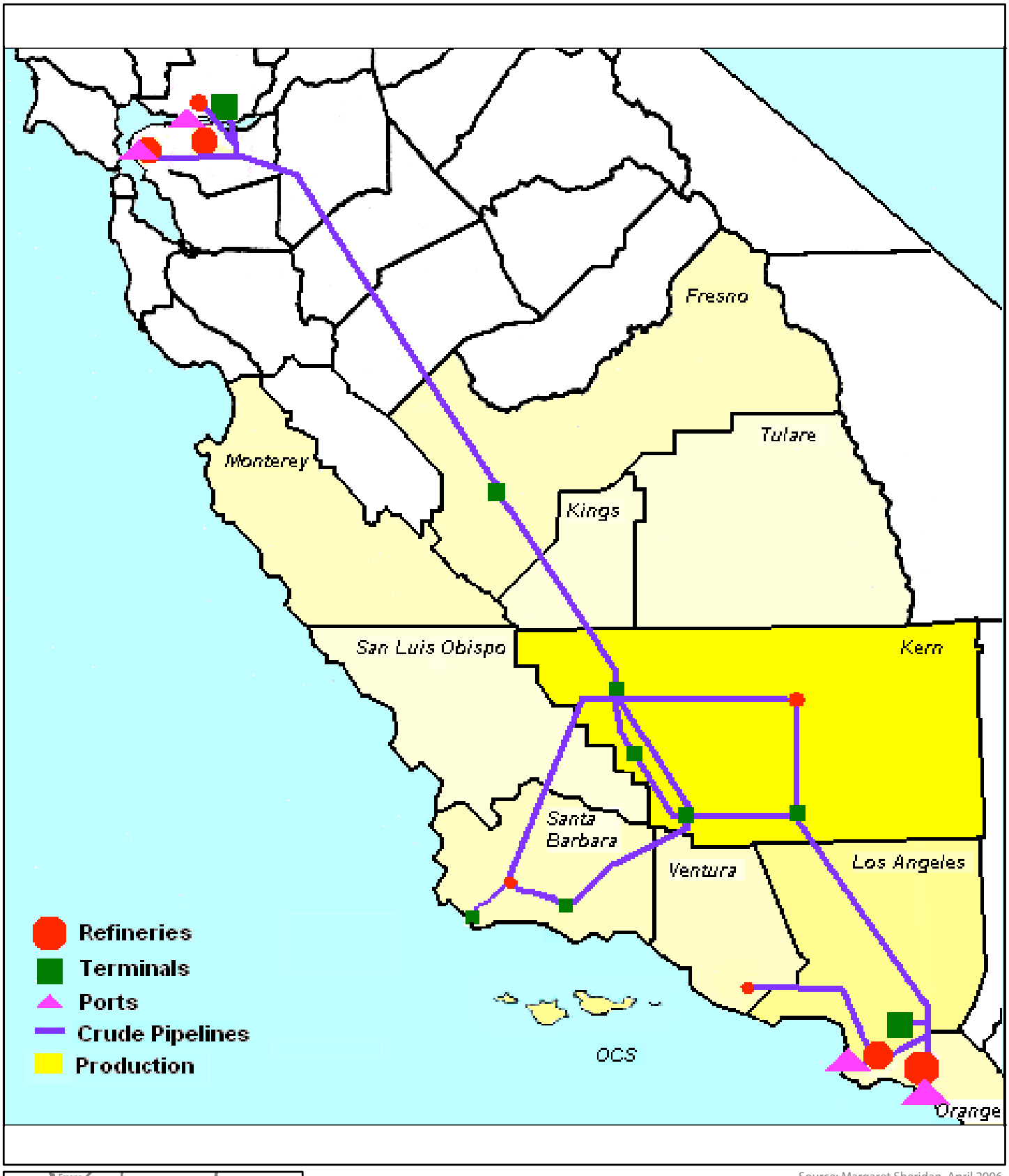
With regard to generating disease vectors (Impact 4.8-7), oil and gas construction activities could disturb the Valley Fever vector or attract other disease vectors by allowing standing water, trash piles, or open containers to accumulate at the Project site, potentially resulting in a hazard to construction personnel or the general public. However, implementation of the MM 4.8-20 described above would reduce this impact to a less than significant level. Mitigation would reduce this impact to a level that would not combine with other projects, therefore, impacts of the Project would not have the potential to make a cumulatively considerable contribution, in combination with impacts from past, present, or reasonably foreseeable projects, to result in a cumulative impact.

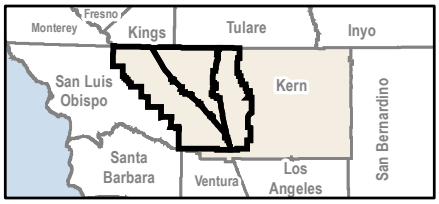
## Mitigation Measures

Implement MM 4.8-1 through MM 4.8-22, as described above, and dust control and toxic air contaminant setback mitigation measure, as described in Section 4.3, Air Quality, risk reduction measures, as described in Section 4.6, Geology and Soils, , and mitigation measures to maintain water quality, as described in Section 4.9, Hydrology and Water Quality.

## Level of Significance After Mitigation

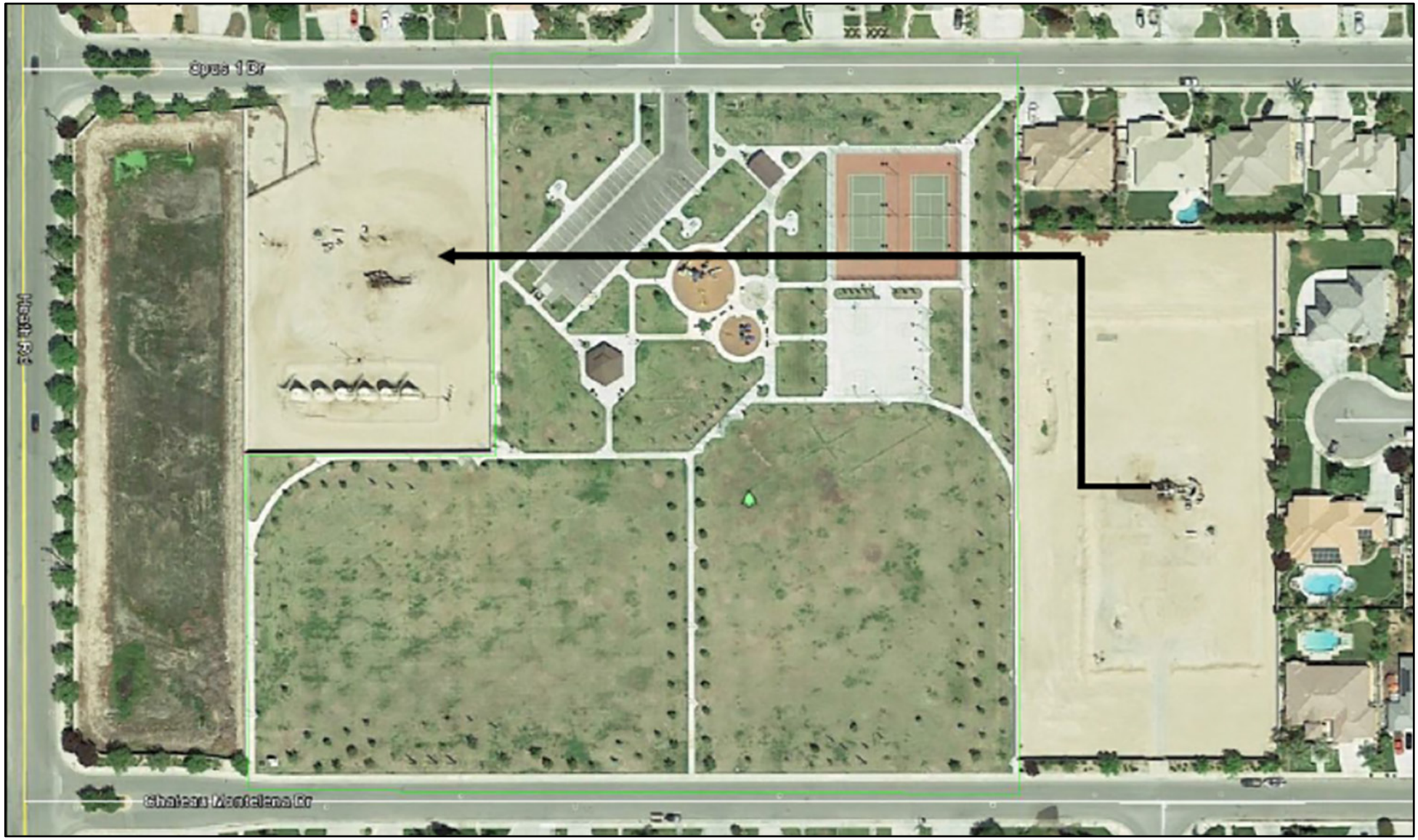
Impacts would be less than significant with mitigation.

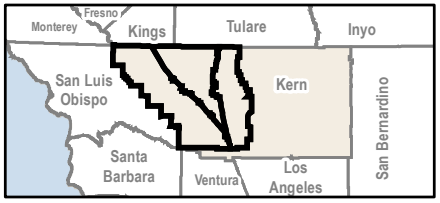



Source: Margaret Sheridan, April 2006.

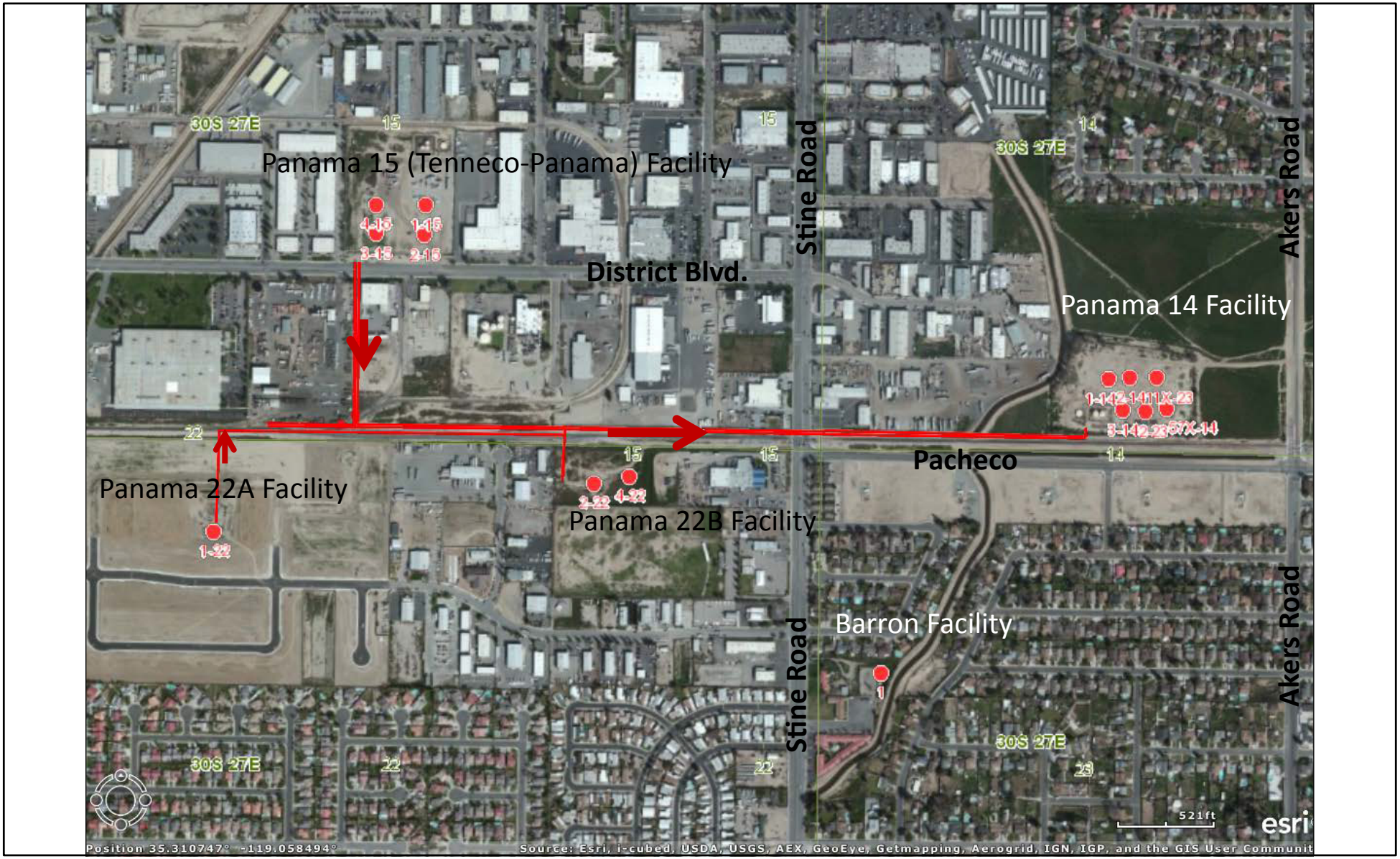
Figure 4.8-1
Major Crude Oil Pipelines and Northern and Southern California Refineries




Sources:

Figure 4.8-2
Fluid Flow Line from a Well to a Tank Battery at San Joaquin Facilities Management




Source: CRIMSON Resource Management Corp.

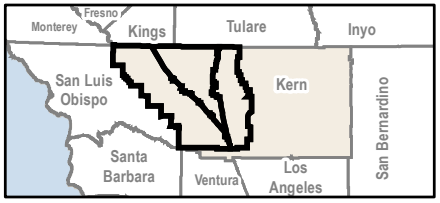
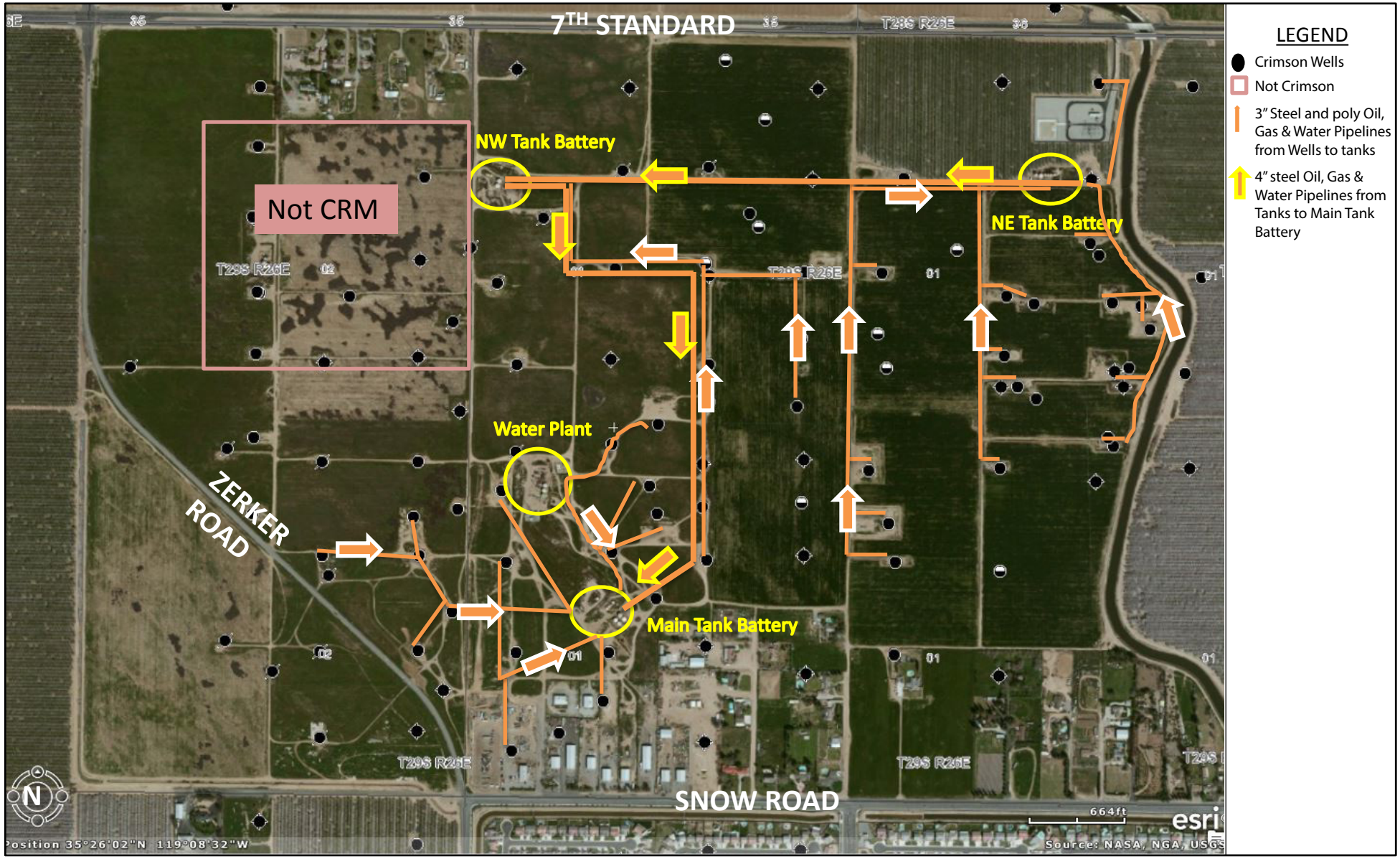



Figure 4.8-3
Pipelines and Oil and Gas Flow Between Stockdale Field Facilities




Source: CRIMSON Resource Management Corp.

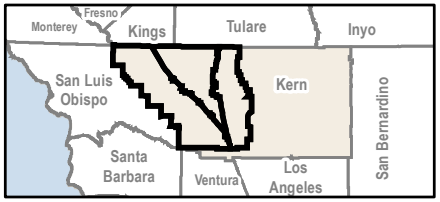
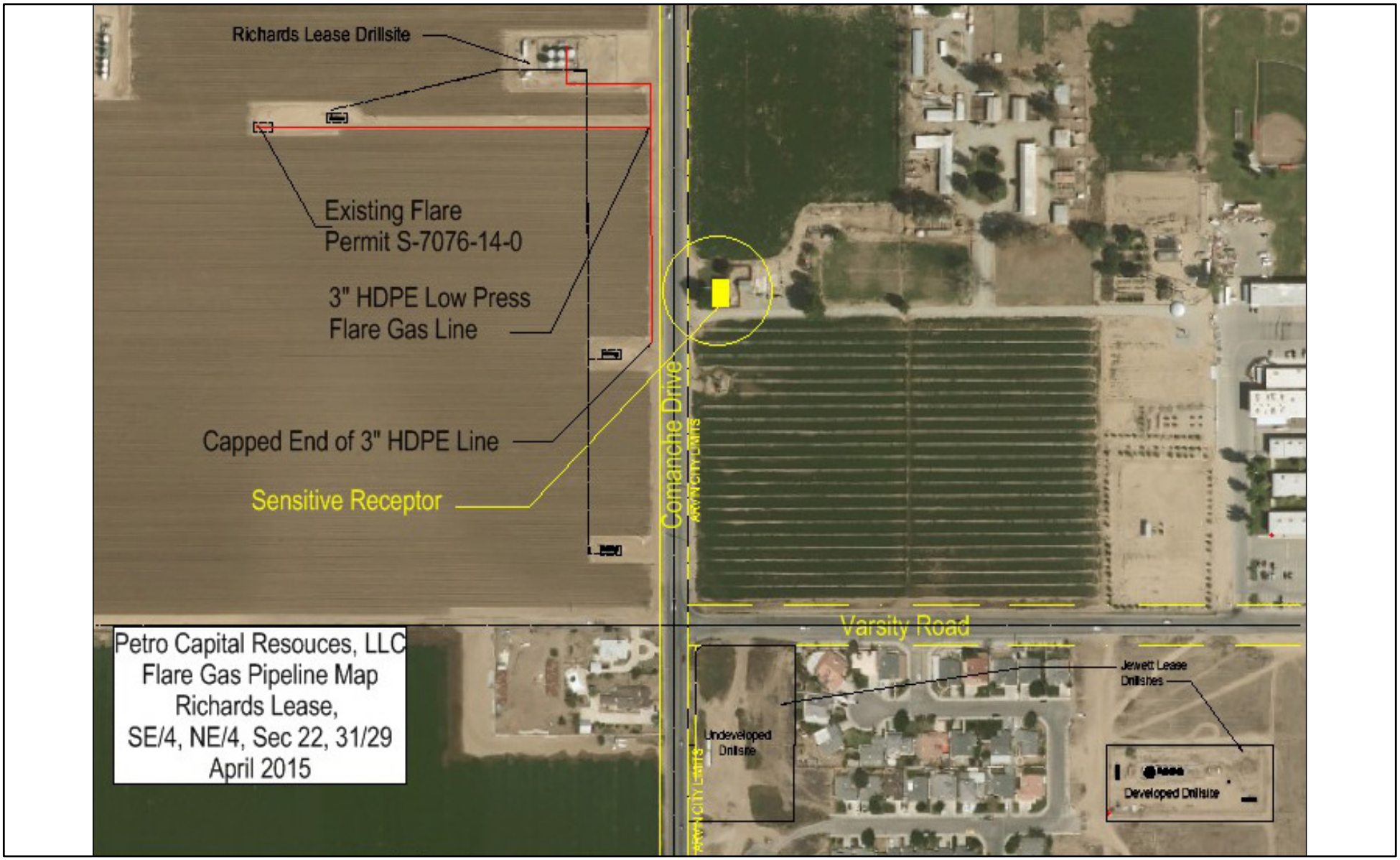
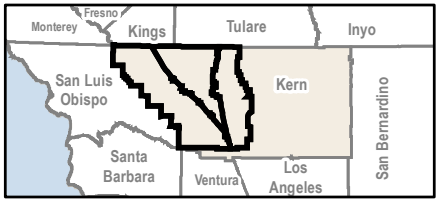



Figure 4.8-4
Oil, Gas, and Water Pipelines Between Wells, Tank Batteries, and Water Plant - Rosedale Ranch Facility




Source: Petro Capital Resources, LLC, April 2015.

Figure 4.8-5
Flare Gas Pipeline

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Delano
McFarland
Wasco
Shafter
Western Subarea
Central Subarea
Eastern Subarea
KERN COUNTY
Bakersfield
Arvin
Tehachapi
Taft
Maricopa
SAN LUIS OBISPO COUNTY
SANTA BARBARA COUNTY

Fresno
Kings
Tulare
Inyo
Monterey
San Luis Obispo
Kern
San Bernardino
Santa Barbara
Ventura
Los Angeles

Data Sources: California Department of Toxic Substances Control 2007, California Geological Survey 2009, DOGGR 2013, ESRI 2010, esps.kerndsa.com
Service Layer Credits: Copyright:© 2014 Esri

0 10
Miles

Project Area
Kern County
City Limits
Subarea
County Boundary
Highways
Cortese List Sites
DOGGR Administrative Well Field Boundaries
DOGGR Administrative Well Field Boundaries (Abandoned - Abd)

Tiers
Tier 1
Tier 2
Tier 3
Tier 4
Tier 5
Non-jurisdictional

Figure 4.8-6
Cortese List Sites
in the Project Area

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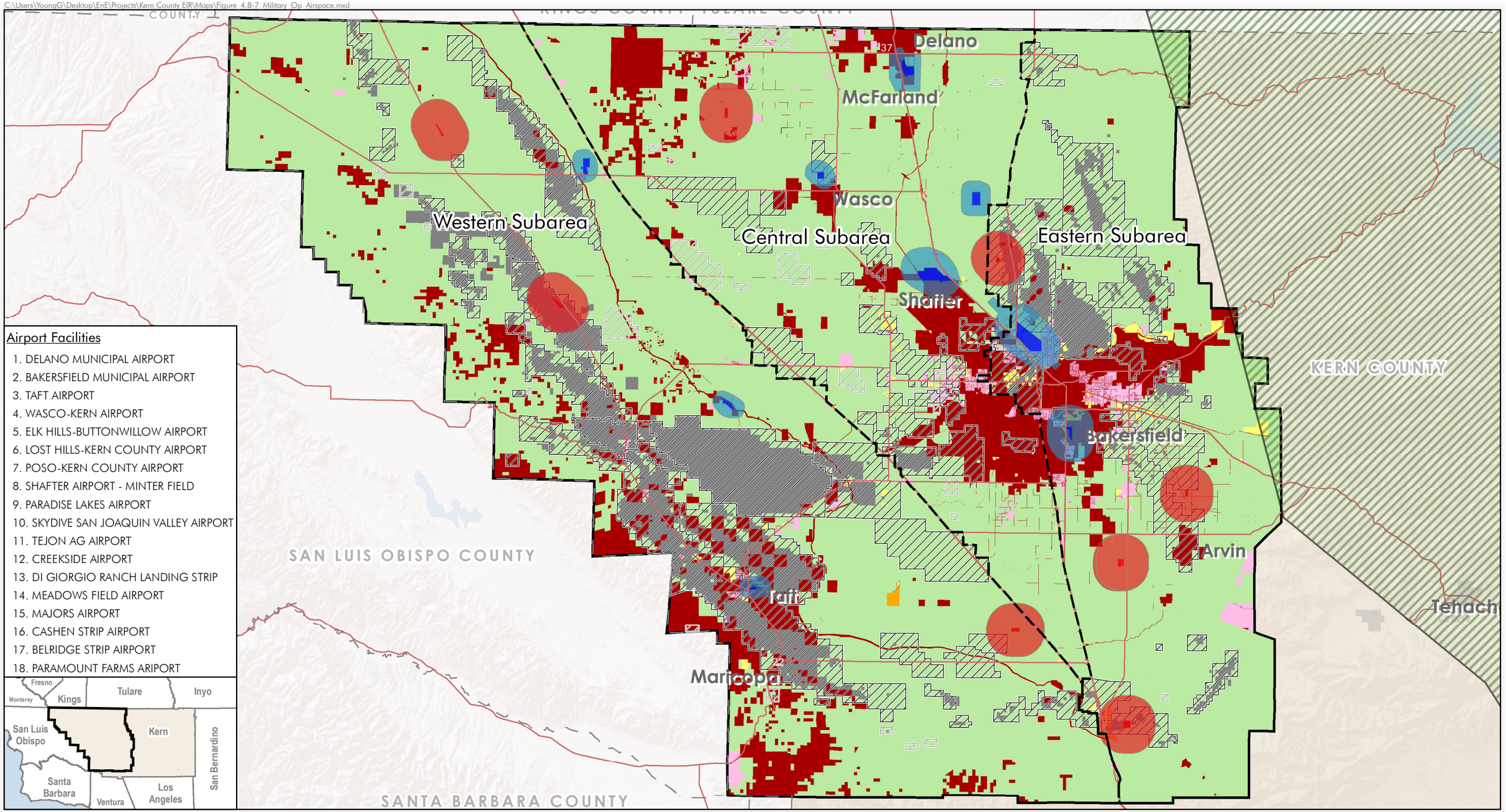


Data Sources: Caltrans Division of Aeronautics 2013, California Geological Survey 2009, DOGGR 2013, ESRI 2010, esps.kerndsa.com
Service Layer Credits: Copyright:© 2014 Esri

Figure 4.8-7
Airports and Military Operation Airspace Located in the Project Area

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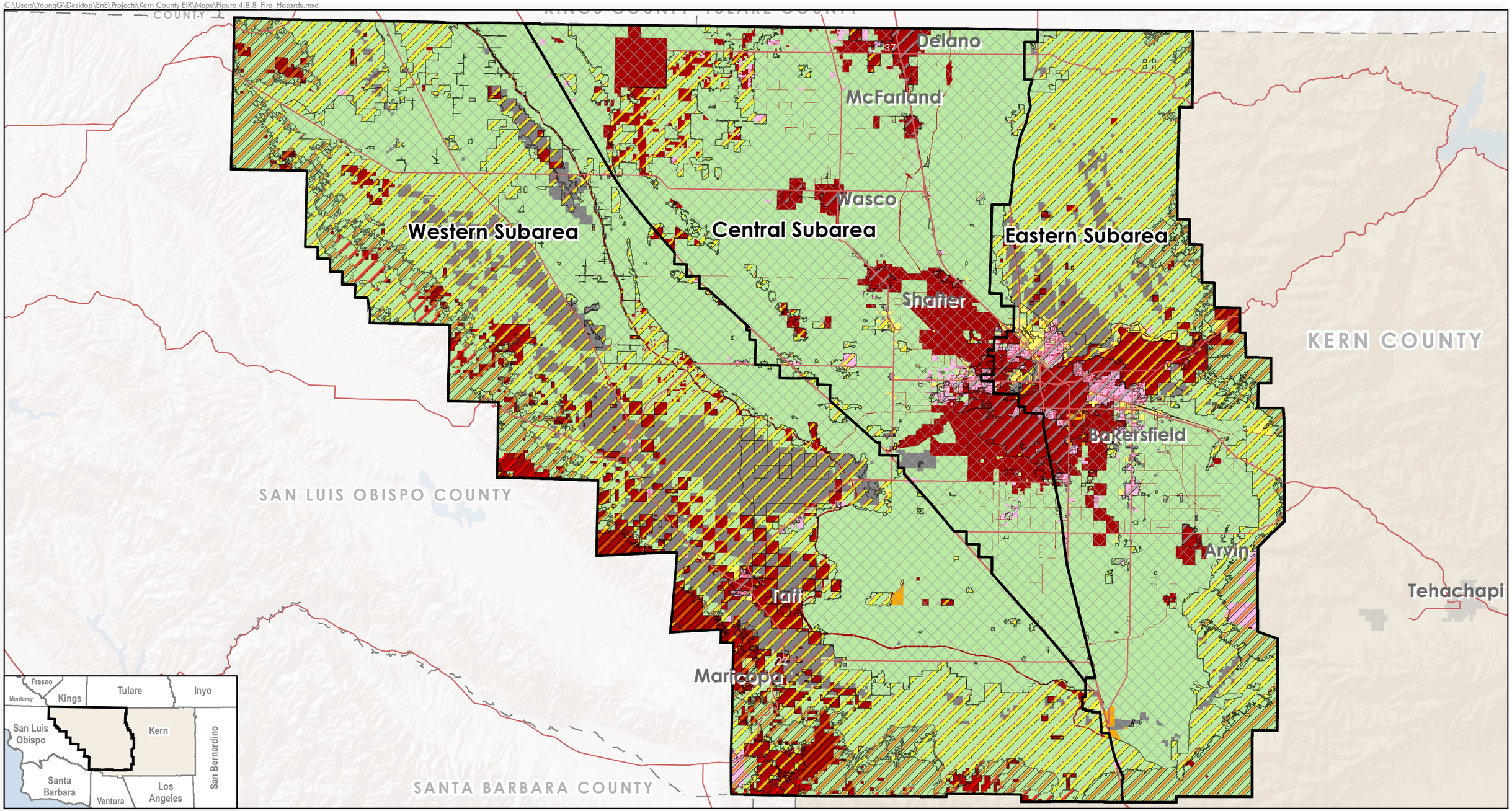



Data Sources: Cal Fire FRAP 2007, California Geological Survey 2009, DOGGR 2013, ESRI 2010, esps.kerndsa.com
Service Layer Credits: Copyright:© 2014 Esri

0 10
Miles

Project Area
Kern County
City Limits
County Boundary
Highways

Fire Hazard Level
Moderate
High
Very High
Non-Wildland/Non-Urban
Urban Unzoned

Tiers
Tier 1
Tier 2
Tier 3
Tier 4
Tier 5
Non-jurisdictional

Figure 4.8-8
Fire Hazards in the Project Area

C:\Users\YoungG\Desktop\EnE\Projects\Kern County EIR\Maps\Figure 4.8.9 LakeIssabellaInindationZone.mxd

KINGS COUNTY TULARE COUNTY

Delano

McFarland

Wasco

Shafter

Western Subarea

Central Subarea

Eastern Subarea

Lake Isabella

KERN COUNTY

Bakersfield

Arvin

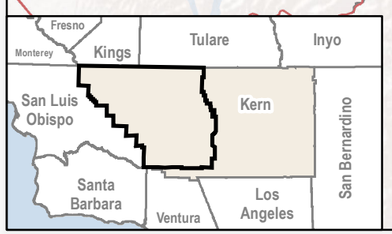
Tehachapi

Taft

Maricopa

SAN LUIS OBISPO COUNTY

SANTA BARBARA COUNTY




Data Sources: Lake Isabella Dam Failure Evacuation Failure Plan 2009, California Geological Survey 2009, DOGGR 2013, ESRI 2010, esps.kerndsa.com

Service Layer Credits: Copyright:© 2014 Esri

0 10 Miles

Project Area
Kern County
City Limits

Subarea
County Boundary
Highways

Dam Failure Inundation Zone
Waterbodies
Water Courses

DOGGR Administrative Well Field Boundaries
DOGGR Administrative Well Field Boundaries (Abandoned - Abd)

Tiers
Tier 1
Tier 2
Tier 3
Tier 4
Tier 5
Non-jurisdictional

Figure 4.8-9
Lake Isabella Dam Failure Inundation Zone

Section 4.9

# Hydrology and Water Quality

Section 4.9

# Hydrology and Water Quality

## 4.9.1 Introduction

This section describes the affected environment and regulatory setting for hydrology and water resources. It also describes the impacts on water resources that would result from implementation of the Amendment to Chapter 19.98 (Oil and Gas Production) and related amendments to the Kern County Zoning Ordinance together with future oil and gas development activities pursuant to the Amended Ordinance (Project), and mitigation measures that would reduce these impacts, if necessary.

This section was informed, in part, by the Hydrology and Water Quality Technical Report (see Appendix S) and Water Supply Assessment (see Appendix T), both prepared by Kennedy/Jenks Consultants. Additional information was obtained from the Water Quality Control Plan for the Tulare Lake Basin (CVRWQCB 2004), Groundwater Quality in the Kern County Subbasin, California (Burton and Belitz 2012), Status and Understanding of Groundwater Quality in the Two Southern San Joaquin Valley Study Units, 2005-2006: California GAMA Priority Basin Project (Burton et al. 2012), and California's Groundwater Bulletin (DWR 2006).

## 4.9.2 Environmental Setting

Kern County is California's third largest county, encompassing 8,202 square miles at the southern end of the Central Valley. The 3,700-square-mile Project Area is defined on Figure 3-1 (see Chapter 3, Project Description) and is predominantly located in the western portion of the County in the San Joaquin Valley bounded by Kings and Tulare counties to the north; Santa Barbara and San Luis Obispo counties to the west; the Tehachapi Mountains and the Sierra Nevada Mountains to east; and the northern boundary of the Los Padres National Forest to the south.

The environmental setting section describes the current hydrology, hydrogeology, and water quality within the Project Area, including the primary watersheds and surface water and groundwater quality data. In general, the Project Area includes most of the San Joaquin Valley floor within Kern County up to an elevation of 2,000 feet. The Project Area is described in detail in Chapter 3 of this Environmental Impact Report (EIR).

## Climate

The Project Area is characterized by low rainfall. On average, the valley floor receives 8.32 inches of precipitation per year, most of which falls between November and April (Appendix T). Average temperatures are relatively high, and total evaporation exceeds total precipitation. Winter is generally mild, but an occasional freeze does occur and may cause substantial agricultural damage. The majority of rainfall occurs between January and March. Summers are characterized as dry, with high temperatures and low humidity. Average high temperatures range

from 57.4 degrees Fahrenheit (°F) in January to 98.6°F in July. Average low temperatures range from 38.5°F in December and January to 69.2°F in July (Western Regional Climate Center 2015).

A "water year" in California runs from September 30 to October 1 of the following year. According to the California Department of Water Resources (DWR), precipitation in water years 2012 and 2013 was drier than normal, and the 2014 water year was one of the driest on record (DWR 2014). California typically receives 50% of its precipitation in the months of December, January, and February in the form of snow in the Sierras. The snowpack in the Sierras typically stores water throughout the winter months and then releases it beginning in the spring.

# Topography and Hydrology

The major topographic feature in the Project Area is the southern San Joaquin Valley, where the topography is generally flat. Steeper, mountainous topography is present in the Sierra Nevada Mountains to the east, the San Emigdio and Tehachapi Mountains to the south, and the Coast Range Mountains to the west.

The Project Area is located within the Tulare Lake Basin. The Tulare Lake Basin comprises the drainage area of the San Joaquin Valley south of the San Joaquin River and encompasses 17,650 square miles. The DWR periodically publishes maps and information regarding specific groundwater basins within California (DWR 2006). The DWR has identified 12 distinct groundwater basins in the Tulare Lake Basin, and there are seven watershed management areas or subbasins in the Southern San Joaquin Valley: Kings, Westside, Pleasant Valley, Kaweah, Tulare Lake, Tule, and Kern County. Each area is defined by the DWR as a designated groundwater basin (Figure 4.9-1).

The natural hydrology of the Tulare Lake Basin has been extensively modified over the last 150 years by irrigation, flood control, and land reclamation. Dams and reservoirs have been constructed on all of the large rivers that drain into the basin for flood control, water supply, and hydroelectric generation. State, federal, local, and privately-owned water conveyance facilities, such as aqueducts, pipelines, ditches, and canals, have also been constructed throughout the region to facilitate the movement of water into and out of the Tulare Lake Basin (EPA 2007).

The Kern River is the southernmost of the four major rivers in the Tulare Lake Basin and is the major surface water feature in the Kern River Basin, flowing from the Sierra Nevadas in the northeast to the Central Valley in the southwest (Figure 4.9-2). The riverbed extends through urban Bakersfield and is typically dry except during storm events and under wet hydrologic conditions when water is being released upstream from Lake Isabella for flood management or local water banking purposes. Lake Isabella was created by a dam completed by the U.S. Army Corps of Engineers (USACE) in 1953. The Lake Isabella dam consists of the main dam and an auxiliary dam, which are located 2,000 feet apart. The dam is located 33 miles east of the valley floor in at the junction of the mainstem and south fork of the Kern River. The main earthfill dam is 185 feet high and 1,725 feet long, while the auxiliary earthfill structure is 100 feet high and 3,275 feet long. The gross storage capacity of both dams is 568,100 acre-feet (AF). The total capacity may be operated to control snowmelt floods. As discussed below, the dam is being

managed by the USACE to reduce potential structural failure risks during an ongoing safety modification program that is scheduled to be completed in 2022.

From the Lake Isabella dam, the Kern River flows southwest until it emerges from a deep canyon northeast of Bakersfield. Water flowing from the canyon is diverted into canals by several weirs for use in the city of Bakersfield. During wetter conditions, surface water is released downstream for groundwater recharge operations. Depending on the amount and timing of rainfall and snowmelt, surface water from the Kern River that is not diverted or used for groundwater recharge may ultimately flow into the Buena Vista lakebed, the Kern River Intertie, and the California Aqueduct, or north towards the historical Tulare Lake Basin via the flood canals. The westerly portions of the Kern River, and several of the diversion, recharge, and flood facilities that capture or convey river flows, are located within the Project Area.

Poso Creek is located to the north of the Kern River and intermittently conveys rainfall and snowmelt from the Greenhorn Mountains to the valley floor. The creek flows west through portions of the Project Area and terminates at the federally-owned Kern National Wildlife Refuge in the northwest portion of the County. The primary constructed water conveyance facilities in and near the Project Area are: (1) federally owned and operated facilities associated with the Central Valley Project (CVP), including the Friant-Kern Canal, which transports water from Sierra Nevada streams, the Sacramento Delta, and other sources to Kern County; and (2) facilities associated with the California owned and operated State Water Project (SWP), including portions of the California Aqueduct, which transport water south to Kern County and other locations from the Sacramento Delta. Major groundwater recharge and storage facilities include the 30-square-mile Kern Water Bank, owned and operated by the Kern Water Bank Authority, the Pioneer Project, owned by the Kern County Water Agency, and storage and banking facilities that are owned and operated by several incorporated water districts in the Project Area.

# Hydrogeology

The San Joaquin Valley is filled with thousands of feet of marine and continental sediments of Tertiary and Quaternary age derived from the surrounding Sierra Nevada Range and Coast Ranges, and their southern extensions. The sediment thickness increases from the valley margins toward the center. The sequence of sediments forming the basin is asymmetrical, with the thickest sediments occurring along the western side of the valley where up to 30,000 feet of sediments are found in the southwestern portion of Kern County (Page 1986).

Figure 4.9-3 provides the general geologic map for the Project Area. Two structural blocks, the Sierra Nevada Range on the east and the Coast Ranges on the west, have contributed mineralogically-distinct sediments that interfinger in the subsurface (Bartow and McDougall 1984; Bartow 1991; Page 1986; Wood and Dale 1964). The valley floor is underlain by coalescing Quaternary alluvial fans that have formed along the mountain fronts, resulting in heterogeneous and discontinuous lenses of gravels and sands with increasing silt and clay content towards the center of the basin. The metamorphic and igneous rocks of the Sierra Nevada Batholith are exposed to the east. To the west are the faulted and folded Tertiary-aged sediments that comprise the Coast Ranges (shown as Pliocene, Miocene, Oligocene, Eocene and Paleocene

sediments on Figure 4.9-3). Along the southern boundary, the metamorphic and igneous rocks underlie the Tehachapi Mountains (Sierra Nevada block) whereas faulted and folded sedimentary rocks underlie the San Emigdio Mountains (Coast Ranges block).

Basin sedimentation in the southern San Joaquin Valley began in the Jurassic Period, with the erosion of the rising Sierra Nevadas in the east. Sediments were deposited onto the shelf edge of a shallow sea. Because the Coast Ranges orogeny had not yet begun, lands to the west were open to the ocean. Deposits accumulated in the deeper water to the west, resulting in the very thick Franciscan Formation that was later uplifted, forming the Coast Ranges. Deposition proceeded throughout the Mesozoic Era, which is represented by more continuous units and an absence of deformation (Wood and Dale 1964; Croft 1972).

Tectonic activity associated with the uplift of the Coast Ranges began in the Tertiary Period and resulted in folding and faulting of sediments along the west side and a deepening of the valley floor. Thick sequences of marine sediments were deposited as the Coast Ranges orogeny continued. By the late Tertiary Period (Pliocene Epoch), the mountains had cut off the connection to the sea and marine waters had been drained from the valley. As deposition continued, non-marine (continental) sediments were deposited across the valley (Bartow and McDougall 1984; Bartow 1991).

The Pleistocene Epoch was dominated by brackish and freshwater lakes resulting in thick deposits of clay, as represented throughout the upper Tulare Formation. These include the widespread Corcoran Clay, which has been mapped over much of the San Joaquin Valley, and its equivalents, which have been correlated to clays beneath the Kern and Buena Vista dry lake beds in the southern Project Area as well as the Tulare Lake sediments on the northern boundary of the County (Wood and Dale 1964; Croft 1972).

The San Joaquin Valley is an asymmetrical syncline (Figure 4.9-3) or trough that runs north-south with the center along the western side of the valley. Although the San Joaquin Valley constitutes part of a discrete geomorphic province, the geology is internally variable in both stratigraphy and style of deformation. Stratigraphically, the greatest variation is the thick section of marine sediments in the southern part of the basin that grades to thinner, non-marine sediments north of Kern County. Structurally, the greatest differences are between the highly-folded sedimentary layers on the west and the little-deformed sedimentary cover on the east side of the valley (Bartow 1991).

Tectonic activity in the area has produced numerous geologic faults, many of which remain active today. Notable faults and folds are shown on Figure 4.9-3. Figure 4.9-3 also illustrates the position of the major oilfields in the Project Area relative to major structural features, such as the Bakersfield Arch and the Cenozoic Basin depositional axis. Two generalized west-to-east cross-sections are presented on Figure 4.9-4 and Figure 4.9-5 to further illustrate the variability in geology across the Project Area.

The Bakersfield Arch (Figure 4.9-3) separates the San Joaquin Valley in the Project Area into northern and southern areas. The arch does not have appreciable structural relief, but does have an influence on sedimentation. The thickest sequences of Tertiary sediments of these basins occur

approximately coincident with the Pleistocene and Holocene Buena Vista and Kern Lake basins in the south and the Tulare Lake basin in the north. The Mesozoic and early Tertiary Great Valley sequence, on the other hand, thins southeastward and is apparently absent south of the Bakersfield Arch (Bartow 1991).

The highly-folded western margin of the valley north of the Bakersfield Arch is characterized by Cenozoic folds and faults that trend, for the most part, slightly oblique to the San Andreas Fault in the southwest. The southeast boundary of the fold belt is arbitrarily placed east and south of Elk Hills where the fold trends change from northwest to west (Figures 4.9-4 and 4.9-5). The east boundary deviates from the valley syncline axis to include the subdued anticlines that, although lying east of the valley axis, are structurally more akin to the west-side fold belt than to the less-deformed eastern margin (Figure 4.9-5). The intensity of deformation increases southeastward along the fold belt as well as southwestward across the belt toward the San Andreas Fault. The increased intensity is evidenced by tighter folds and an increased number of reverse and thrust faults (Bartow 1991).

Normal faults along the east side of the valley are concentrated in the area of the Bakersfield Arch. These faults generally trend northwest to north, although a secondary west to west-northwest trend is apparent (Figures 4.9-4 and 4.9-5). The net displacement is down to the southwest, although down-to-the-northeast faults are present (Bartow and McDougall 1984; Bartow 1991).

South of the Bakersfield Arch, the structural trends are variable, but there is a general west trend along the southern margin of the basin (Figure 4.9-3). The northwest fold trends of the west side change to west-northwest where that region merges with the deformed belt at the south end of the valley. The northeast-trending White Wolf fault is the dominant structure (Figure 4.9-3). The White Wolf fault and the smaller Springs fault to the southeast both trend approximately parallel to the Garlock fault, which lies along the southeast side of the Tehachapi Mountains. Both faults, like the Garlock, show some geologic evidence of left-lateral movement. Farther northeast, the northwest-to-west-trending Edison fault is an older Tertiary normal fault (Bartow and McDougall 1984; Bartow 1991).

For the purposes of this EIR, the Project Area is analyzed with reference to three Subareas, the Western, Central, and Eastern Subareas. The following paragraphs provide an overview of the hydrogeology in these areas:

- The Western Subarea is bounded by the Coast Range hills in western Kern County and by Interstate 5 on the east. As discussed below, due to the hydrogeology of this region, which includes marine sediments that readily dissolve into groundwater, water quality in the Western Subarea is relatively poor compared with the Central and Eastern Subareas). The Corcoran Clay, or an equivalent clay barrier separating aquifers into deeper and shallower zones, is present in the eastern portion of this Subarea and separates shallow and deep groundwater zones. The geologic cross-section presented on Figure 4.9-5 illustrates the occurrence of saline groundwater west of the Lost Hills (generally west of Interstate 5).

- The Central Subarea primarily includes the largely flat, gently sloping alluvial sediments located in the southern San Joaquin Valley floor portion of the Project Area east of Interstate 5 and west of Highway 65. Agriculture is the predominant land use, and groundwater production accounts for a substantial amount of the agricultural irrigation and municipal and industrial water use in this area. The Corcoran Clay is present throughout much of the Subarea and separates shallow and deep groundwater zones. The geologic cross-section presented on Figure 4.9-5 illustrates that the groundwater in the upper several hundred to over one thousand feet is relatively fresh, making this the primary aquifer for the region.

- The Eastern Subarea is bounded by the West Sierra Foothills, up to an elevation of approximately 2,000 feet above mean sea level, portions of the gently sloping alluvial sediments downslope of the West Sierra Foothills, and the valley floor up to Highway 65. The geologic cross-section included as Figure 4.9-5 illustrates that the sediments thin towards the east as they overlay onto the granitic basin. In the West Sierra Foothills, the local geology is characterized by tight, poorly draining, low-solubility igneous and metamorphic rocks, which tend to have less impact on water composition of streams draining the area as compared to the geology of the Western Subarea. Groundwater wells in this area do not produce at rates comparable with the Central Subarea and are mostly used to meet domestic (i.e., private well) and small community demand. The alluvial areas are similar geologically to the Central Subarea, but are distinguished from the Western and Central Subareas, in part, by the absence of the Corcoran Clay. Groundwater production in the alluvial portion of the Subarea is more substantial than in the foothill areas.

The Project Area is located in the southern extreme of the San Joaquin Valley structural trough, which is filled with marine and continental sediments deposited during periodic inundation by the Pacific Ocean and by erosion of the surrounding mountains. Continental deposits shed from the surrounding mountains form an alluvial wedge that thickens from the valley margins toward the axis of the structural trough to about 30,000 feet. The thickest alluvium occurs in the south-central portion of Kern County, including locations in the Project Area (DWR 2006). Freshwater generally occurs in the uppermost 3,000 feet of the alluvium, and brackish water is typically found in deeper locations (Shelton et al. 2008).

The Kern County Subbasin has the largest surface area of any basin designated by the DWR in California. The Kern County Subbasin is bounded to the north by the Kern County line and Tule Groundwater Subbasin, on the east and southeast by the Sierra Nevada Foothills and the Tehachapi Mountains, and on the southwest and west by the San Emigdio Mountains and Coast Ranges (Shelton et al. 2008). In the Kern County Subbasin, aquifers commonly occur in loosely compacted soil that is saturated with groundwater. These aquifers are generally characterized as unconfined or confined aquifers. Unconfined aquifers occur where the water table is exposed to the atmosphere through openings in overlying materials. Confined aquifers occur below a low permeability geologic unit that impedes vertical movement of groundwater. Groundwater in a confined aquifer is often under higher atmospheric pressure conditions. Geologic structures, such

as bedrock or faults, can also constrain the lateral or vertical movement of groundwater. Groundwater generally flows westward out of the Sierra Nevada and Tehachapi Mountains toward the center of the San Joaquin Valley. North of the Kern River, groundwater flows west then north toward the Tulare Lakebed. South of the Kern River, groundwater flows toward the southwest (Burton et al. 2012).

The primary aquifers in the Kern County Subbasin consist of alluvium in the shallower aquifers, and marine and continental deposits in the deeper aquifers. The public supply wells in the primary aquifers are generally screened from 275 to 450 feet to 600 to 800 feet below the ground surface (Burton and Belitz 2012).

## Water Bearing Formations

Sedimentary deposits in the San Joaquin Valley are divided, from oldest to youngest, into the Olcese and Santa Margarita formations, the Tulare (western subbasin) and Kern River formations (eastern subbasin), Older Alluvium/Stream and Terrace Deposits, and Younger Alluvium/Flood Basin Deposits (DWR 2006).

The Olcese and Santa Margarita formations are current or potential sources of drinking water only in the northeastern portion of the subbasin where they occur as confined aquifers. They are Miocene-age deposits that vary from continental to marine in origin from east to west across the subbasin. The Olcese Formation is primarily sand and ranges in thickness from 100 to 450 feet. The Santa Margarita Formation consists of coarse sand and ranges in thickness from 200 to 600 feet (DWR 2006).

Both the Tulare and Kern River formations are moderately to highly permeable and yield moderate to large quantities of water. These units are both Plio-Pleistocene age and represent a west/east facies change across the subbasin. The Tulare Formation (western subbasin) contains up to 2,200 feet of interbedded, oxidized to reduced sands; gypsiferous clays; and gravels derived predominantly from Coast Range sources. The Kern River Formation includes 500 to 2,000 feet of poorly sorted, lenticular deposits of clay, silt, sand, and gravel derived from the Sierra Nevadas (DWR 2006).

The Older Alluvium/Stream and Terrace Deposits are moderately to highly permeable and yield large quantities of groundwater. The deposits are composed of up to 250 feet of Pleistocene-age lenticular clay, silt, sand, and gravel that are loosely consolidated to cemented and are exposed mainly at the subbasin margins. This sedimentary unit is often indistinguishable from the lower Tulare and Kern formations. Most of the freshwater aquifers in the Kern County occur in the Older Alluvium/Stream and Terrace Deposits, and the Tulare and Kern formations (DWR 2006).

The Younger Alluvium/Flood Basin Deposits are Holocene in age and vary in character and thickness around the subbasin. At the eastern and southern subbasin margins, this unit is composed of up to 150 feet of interstratified and discontinuous beds of clay, silt, sand, and gravel. In the southwestern subbasin, it is finer-grained and less permeable as it grades into fine-grained flood basin deposits underlying the historic beds of Buena Vista and Kern lakes in the southern

subbasin. The flood basin deposits consist of silt, silty clay, sandy clay, and clay interbedded with poorly permeable sand layers. These flood basin deposits are difficult to distinguish from underlying fine-grained older alluvium and the total thickness of both units may be as much as 1,000 feet.

## Recharge and Storage

Natural groundwater recharge in the Project Area is primarily from the Kern River, but is also generated by infiltration from intermittent streams along the edge of the basin (DWR 2006; Burton and Belitz 2012). Conjunctive use and groundwater banking programs are widely used in the Kern County Subbasin area. Groundwater banking is the storage and recharge of excess water supplies into aquifers during wet periods for later withdrawal/recovery for use during dry periods. Historically, during wet periods, after surface water imports have been used to meet irrigation and urban water needs, imported water has been recharged to groundwater aquifers. The groundwater is pumped and extracted through private and publicly owned facilities wells during dry periods when local or imported surface water supplies are insufficient to meet regional water demand. Public and privately operated groundwater banking facilities, and infiltration from agricultural and municipal irrigations, much of which uses surface water imported to the Kern County Subbasin, currently accounts for a much larger amount of recharge than from natural sources (Burton et al. 2012; Burton and Belitz 2012). Groundwater banking programs are located throughout most of the central portion of the Kern County Subbasin (Figure 4.9-6).

The Kern Water Bank Authority (KWBA) owns and operates the Kern Water Bank (KWB), located to the southeast of Bakersfield along the Kern River. The KWB is the largest water banking program in the world and has stored over 2 million AF of water since operations began in 1995. Other water banking facilities in or near the Project Area include:

- City of Bakersfield 2800 Acre Ground Water Recharge Project;
- Berrenda Mesa Banking;
- Pioneer Banking;
- Semitropic Water Storage District Banking;
- Arvin-Edison Water Storage District Banking;
- Kern Tulare and Rag Gulch Water Districts Banking;
- Buena Vista Water Storage District Banking;
- Rosedale-Rio Bravo Water Storage District Banking;
- Kern Delta Water District Banking; and
- Cawelo Water District Banking.

The maximum annual recharge capacity in the Kern County Subbasin area has been estimated at 1.5 million AF per year (AFY), with a maximum recovery of 900,000 AFY (KCWA 2011a). The

KCWA estimates that 40,000,000 AF of groundwater is stored and that an additional 10,000,000 AF of groundwater storage capacity is located within and in the vicinity of the Project Area (DWR 2006). The region's total storage capacity is 50,000,000 AF, and 10,000,000 AF is available for conjunctive use and groundwater banking operations. As of 2011, approximately 5,400,000 AF was in managed groundwater storage in the Kern County Subbasin.

Between 1926 and 1970, groundwater extraction resulted in more than 8 feet of subsidence in the north-central portion of the subbasin, and 9 feet in the south-central area. The basin experienced a 15-foot decrease in water level from 1970 through 1978, a 15-foot increase from 1978 through 1988, and an 8-foot decrease from 1988 through 1997. The average subbasin water level, however, remained essentially unchanged from 1970 to 2000, subject to significant local variability ranging from increases of over 30 feet at the southeast valley margin and in the Lost Hills/Buttonwillow areas to decreases of over 25 and 50 feet in the Bakersfield area and McFarland/Shafter areas, respectively (DWR 2006). Data collected by the Kern County Water Agency (KCWA) indicate that average groundwater levels decreased by 2.5 feet in 2013 (KCWA 2013).

In 2009, the California Water Code was amended to require that the DWR develop and implement a new California statewide groundwater elevation monitoring (CASGEM) program. The CASGEM program collects data on groundwater levels and use for 515 designated basins in the state, including the Kern County Subbasin that underlies most of the Project Area. The program also ranks the severity of each basin's groundwater impacts on the basis of several factors, including subbasin population growth, reliance on groundwater, and level of extraction. Additional legislation enacted in 2014 requires that regional groundwater sustainability plans (GSPs) be adopted for state subbasins in accordance with a compliance schedule based on the severity of the CASGEM rankings. The Kern County Subbasin currently is considered to be the 21st most impacted of 515 subbasins in the state and a CASGEM "high" priority basin. Consequently, a GSP for the subbasin must be adopted by 2020.

In November 2014, the DWR prepared a Public Update for Drought Response (DWR 2014) pursuant to an April 2014 proclamation by Governor Jerry Brown of a continued state of emergency resulting from persistent drought conditions over much of the state. California's 2014 water year was one of the driest in decades and followed two consecutive dry years throughout the state. As a result of continued drought, groundwater use has increased to meet demand. With the increasing use of groundwater, notable decreases in water table elevations were observed. From the fall of 2013 to the fall of 2014, water table elevations declined substantially in the Tulare Lake Basin. Although the DWR's water table elevation data collected under the CASGEM program do not provide full coverage of Project Area aquifers, substantial portions of the Tulare Lake Basin show declines in water table elevation in the range of 25 to more than 50 feet. A number of water banking projects located in the Project Area are designed to recharge the aquifer for later use in dry years. Although groundwater in the Tulare Lake Basin is managed for withdrawal of groundwater during dry years, the magnitude of water table decline during the 2014 water year indicates the basin has experienced some of the largest withdrawals of

groundwater in the state and substantial withdrawals from groundwater that had been previously stored for future use.

The state of California obtains about one-third of its water supply from the snowmelt in the Sierra Nevada Mountains. Snow melt is the primary source for water that is delivered to the Project Area through state and federal canal projects. As of March 12, 2015, the Sierra snowpack stands at only 17% of the historical average for the time of year. With continued dry conditions as of March 12, 2015, reductions in groundwater storage are likely to continue in the Project Area. On January 17, 2014, the Governor Brown proclaimed a drought state of emergency and directed state officials to take all necessary actions to prepare for these drought conditions (State of California 2014). On April 1, 2015, the Governor issued an executive order requiring 25% cutbacks in potable water use statewide, additional water conservation and planning measures, and the potential installation of salinity barriers in the Sacramento Delta in response to historically low snowpack levels in the state (State of California 2015). The executive order also requires that CASGEM groundwater elevation monitoring be implemented throughout the state, including the Project Area, by the end of 2015. It is likely the drought will continue into a fourth year (DWR 2014, 2015a).

On April 1, 2015, Governor Brown issued an executive order directing the State Water Resources Control Board (SWRCB) to impose a 25% reduction on the state's 400 local water supply agencies. The agencies will be responsible for implementing restrictions to cut back on water use and for monitoring compliance. The order would impose varying degrees of cutbacks on water use affecting homeowners, farms, and other businesses, as well as the maintenance of cemeteries and golf courses.

# Oil and Gas Production and Water Resources

## Overview

Groundwater that naturally exists in oil and gas reservoirs is brought to the surface when oil and gas are extracted from these reservoirs. This water is known as "produced water." Water is also used for various purposes to conduct oil and gas exploration and production activities in the Project Area. This section summarizes the existing amounts, sources, and uses of water for oil and gas exploration and production. Urban and agricultural water supply and demand planning in California is generally analyzed with reference to AF, which is the amount of water that covers one acre to a depth of one foot and contains about 325,851 gallons. For clarity and comparison purposes, this EIR discusses oil and gas production and exploration water use and supply in terms of AF, although the industry typically reports fluid volumes in terms of "barrels." There are 42 gallons in a barrel, and about 7,758 barrels in an AF. Potential impacts to surface or groundwater quality and other hydrological resources that could occur from the extraction, conveyance, use, and disposal of water resources are discussed in Section 4.9.4, Impacts and Mitigation Measures. Potential water supply impacts are discussed in Section 4.17, Utilities and Service Systems, of this EIR. Potential subsidence, seismic, and other geological impacts are discussed in Section 4.6, Geology and Soils.

Oil-bearing formations in the Project Area include a mixture of usually saline or other poor-quality groundwater and hydrocarbons. Production wells extract a mixture of water and hydrocarbons that is separated in surface facilities, typically a series of tanks or "tank batteries," where lighter oil and gas compounds are isolated and skimmed from the heavier water. Residual water generated by the hydrocarbon separation process is generally referred to as "produced water" in the context of oil and gas exploration and production. As oilfields mature in the Project Area, the ratio of produced water to extracted hydrocarbon resources has tended to increase, in part because the volume of the hydrocarbon deposits remaining in the subsurface formations has been reduced by prior extraction, and also due to the injection of steam or water to mobilize heavier, more viscous deposits for pumping to the surface.

Figure 4.9-7 and Table 4.9-1 show the amount of oil and produced water generated in the Project Area from 2002 through 2013. Oil production in the Project Area declined from about 25,630 AF (198.8 million barrels) in 2002 to 18,260 AF (141.6 million barrels) in 2013. Over the same period, produced water increased from about 149,400 AF to 231,250 AF by 2013.

**Table 4.9-1: Project Area 2012 Oil and Gas Exploration and Production - Water Supply and Demand (acre-feet)**

| | |
|---|---|
| **Water Supplied** | |
| Produced Water | 234,959 |
| M&I Water | 8,778 |
| **TOTAL** | **243,737** |
| **Water Use** | |
| **Treated Produced Water** | |
| EOR Water and Steam Injections, Pressure Maintenance and Well Pulling | 88,668 |
| Coil Tubing, Dust Control, Surface Facility Construction | 144 |
| Oil and Gas Produced Water Reuse | 88,812 |
| Agricultural Reuse | 32,771 |
| **Subtotal: Produced Water Reuse** | **121,583** |
| **M&I Water** | |
| New Well Construction (Drill Mud + Well Stimulation) | 589 |
| Maintenance (Mud Services + Cementing) | 61 |
| Maintenance (Acidizing + Coil Tubing) | 52 |
| Maintenance (Well Pulling + Domestic Water) | 594 |
| Well Abandonment | 202 |
| Steam Production | 7,279 |
| Oil and Gas M&I Water Demand | 8,778 |
| **Subtotal: Oil and Gas Water Demand, M&I and Produced Water** | **97,590** |

**Table 4.9-1: Project Area 2012 Oil and Gas Exploration and Production - Water Supply and Demand (acre-feet)**

| | |
|---|---|
| Injection Well Disposal | 84,571 |
| Produced Water Land Disposal | 30,223 |
| **Subtotal: Oil and Gas Produced Water Waste Disposal** | **114,794** |
| **TOTAL** | **243,737** |

Source: Appendix T (WSA), Table 28

Notes:
Includes a water balance closure factor for the net difference between estimated water inputs and outputs of -1,418 AF.
All values subject to rounding and may vary slightly from Table 28.

Figure 4.9-7 shows that the ratio of produced water to oil recovered from Project Area oil and gas activities increased from just under 6 units (gallons, barrels, or AF) of produced water for each unit of oil recovered in 2002 to nearly 13 units of produced water for each unit of oil recovered in 2012 and 2013. The total amount of produced water extracted from hydrocarbon-bearing formations in the Project Area during 2012 was about 234,959 AF (Table 4.9-1).

Produced water comprises the single largest source of water supply for oil and gas exploration and production activities in the Project Area. After the hydrocarbons are separated from the mixture of oil and water that is pumped from a well, the produced water is conveyed by pipelines or by truck from the tanks and separation facilities for use in other oil and gas operations, including reinjection into oil-bearing formations in the form of steam or water to mobilize hydrocarbon deposits. Enhanced oil recovery (EOR) is a production technique used to increase the mobility of oil, most commonly through steam injection techniques that reduce the viscosity of the hydrocarbons and allow produced fluids to flow. There are three major types of EOR operations: thermal (steam-flood, cyclic steam, and in-situ combustion); carbon dioxide or other gas (miscible and immiscible); and chemical/polymer flooding (alkaline flooding or micellar-polymer flooding). Steam flooding involves injecting a continuous rate of steam into the reservoir through dedicated wells (steam injectors) to heat heavier oil to the point it can flow to the wellbore (producers). Cyclic steam involves intermittent injection of steam through producing wells. Water flooding is the process of injecting water into the reservoir via an injection well for the purposes of "sweeping" the hydrocarbons to a nearby production well where they can be recovered to the surface.

Produced water used for EOR purposes, particularly in the form of steam, is often subject to treatment in oilfield facilities to reduce certain constituent levels, such as calcium or magnesium, and to "soften" or reduce the hardness of the produced water prior to heating. Produced water is also used for well maintenance activities, including use of coil tubing spooled into a wellbore, dust control, and surface facility construction. About 89,000 AF of produced water was reinjected into oil-bearing formations for EOR or used for maintenance and construction purposes in the Project Area during 2012 (Table 4.9-1).

In addition, produced water is treated and conveyed to water districts and blended for irrigation purposes. About 32,771 AFY of treated produced water from wellfields in the Eastern Subarea was supplied to and reused for agricultural irrigation by the Cawelo Water District in 2012. The produced water is treated by oilfield facilities to remove residual hydrocarbons and certain other constituents, and is mixed with other district water supplies to reduce the total dissolved solid (TDS) or salt concentrations prior to irrigation use.

Produced water that is not reused for oilfield operations, including EOR, maintenance, or construction, or that is not treated and supplied to other users for agricultural irrigation, is disposed by oilfield operators in surface impoundments (ponds) in accordance with Waste Discharge Requirements (WDRs) issued by the Central Valley Regional Water Quality Control Board or is injected into Class II injection wells (discussed in more detail below) permitted by the California Department of Conservation, Division of Oil, Gas, and Geothermal Resources (DOGGR). About 30,223 AF of produced water was disposed into surface ponds and 84,500 AF of produced water was disposed by injection into Class II wells in the Project Area during 2012 (Table 4.9-1).

Certain oil and gas exploration and production activities require the use of higher-quality water supplies than can typically be obtained from produced water sources. Water for these activities comes from a variety of sources, including groundwater and imported or other surface water that could also be used for agricultural or municipal and industrial (M&I) purposes. These activities include supplemental steam generation for EOR use, drilling and cementing processes for new well construction, well stimulation treatments, and well maintenance and abandonment. Water sources (other than produced water) that are used for oil and gas exploration and production in the Project Area are referred to as "M&I water" in this EIR.

In 2012, about 8,778 AF of M&I water was used for oil and gas exploration and production in the Project Area. Most of these supplies were used for new well construction, well stimulation treatments, and supplemental EOR steam generation (Table 4.9-1). As discussed in Section 4.17, Utilities and Service Systems, oil and gas producers obtain M&I water from a variety of sources that vary from year to year, including private groundwater wells owned by oil and gas operators, Project Area water districts that have contracted to supply certain oil and gas operators with M&I or similar quality water, or by spot purchases from Project Area water users on an as-needed and as-available basis.

Table 4.9-1 summarizes the primary sources of oil and gas exploration and production water supply and water use in the Project Area during 2012.

Table 4.9-1 shows that total oil and gas production and exploration water demand in the Project Area during 2012 was about 97,590 AF, including 88,812 AF of produced water that was used for EOR and coil tubing, dust control, and surface facility construction purposes, and 8,778 AF of M&I water that was used for new well construction, well stimulation treatments, supplemental EOR steam generation, maintenance, abandonment, and oilfield domestic and sanitary water uses. Produced water accounted for about 91% and M&I water accounted for 9% of total oil and gas production and exploration demand in 2012. About 114,794 AF of produced water was disposed

of as waste in the Project Area during 2012, of which 74% (84,571 AF) was injected into Class II injection wells and 26% (30,223 AF) was discharged into percolation or evaporation ponds. About 32,771 AF of produced water generated primarily from the Kern River and adjacent oilfields in the Eastern Subarea was treated, blended with other water supplies, and used by the Cawelo Water District for agricultural irrigation in 2012.

## Project Subarea Overview

This section summarizes the primary sources of oil and gas exploration and production water supply and water use and disposal in each of the three Project Subareas during 2012.

### Western Subarea

Table 4.9-2 summarizes the primary sources of oil and gas exploration and production water supply and water use and disposal in the Western Subarea during 2012.

**Table 4.9-2: Western Subarea 2012 Oil and Gas Exploration and Production Water Supply and Demand**

| | |
|---|---|
| **Water Supplied** | |
| Produced Water | 131,341 |
| M&I Water | 8,358 |
| **TOTAL** | **139,699** |
| **Water Use** | |
| **Treated Produced Water** | |
| EOR Water and Steam Injections, Pressure Maintenance and Well Pulling | 75,322 |
| Coil Tubing, Dust Control, Surface Facility Construction | 97 |
| Oil and Gas Produced Water Reuse | 75,419 |
| Agricultural Reuse | 0 |
| **Subtotal: Produced Water Reuse** | **75,419** |
| **M&I Water** | |
| New Well Construction (Drill Mud + Well Stimulation) | 472 |
| Maintenance (Mud Services + Cementing) | 40 |
| Maintenance (Acidizing + Coil Tubing) | 35 |
| Maintenance (Well Pulling + Domestic Water) | 397 |
| Well Abandonment | 134 |
| Steam Production | 7,279 |
| Oil and Gas M&I Water Demand | 8,357 |
| **Subtotal: Oil and Gas Water Demand, M&I and Produced Water** | **83,776** |

**Table 4.9-2: Western Subarea 2012 Oil and Gas Exploration and Production Water Supply and Demand**

| | |
|---|---|
| Injection Well Disposal | 40,482 |
| Produced Water Land Disposal | 12,950 |
| **Subtotal: Oil and Gas Produced Water Waste Disposal** | **53,432** |
| **TOTAL** | **139,699** |

Source: Appendix T (WSA), Table 28
Notes:
Includes a water balance closure factor for the net difference between estimated water inputs and outputs of -2,490 AF.
All values subject to rounding and may vary slightly from Table 28.

Table 4.9-2 shows that total oil and gas production and exploration water demand in the Western Subarea during 2012 was about 83,776 AF, including 75,419 AF of produced water reused for EOR and coil tubing, dust control, and surface facility construction purposes and 8,358 AF of M&I water for new well construction, well stimulation treatments, supplemental EOR steam generation, maintenance, abandonment, and oilfield domestic and sanitary water uses. Produced water accounted for about 90% and M&I water accounted for 10% of total oil and gas production and exploration demand in the Western Subarea during 2012. About 53,432 AF of produced water was disposed as waste in the Western Subarea during 2012, of which 76% (40,482 AF) was injected into Class II injection wells and 24% (12,950 AF) was disposed into percolation or evaporation ponds. No treated produced water was used for agricultural irrigation in the Western Subarea.

## Central Subarea

Table 4.9-3 summarizes the primary sources of oil and gas exploration and production water supply and water use and disposal in the Central Subarea during 2012.

**Table 4.9-3: Central Subarea 2012 Oil and Gas Exploration and Production Water Supply and Demand**

| | |
|---|---|
| **Water Supplied** | |
| Produced Water | 2,884 |
| M&I Water | 63 |
| **TOTAL** | **2,947** |
| **Water Use** | |
| **Treated Produced Water** | |
| EOR Water and Steam Injections, Pressure Maintenance and Well Pulling | 818 |
| Coil Tubing, Dust Control, Surface Facility Construction | 2 |
| Oil and Gas Produced Water Reuse | 820 |

**Table 4.9-3: Central Subarea 2012 Oil and Gas Exploration and Production Water Supply and Demand**

| | |
|---|---|
| Agricultural Reuse | 0 |
| **Subtotal: Produced Water Reuse** | **820** |
| **M&I Water** | |
| New Well Construction (Drill Mud + Well Stimulation) | 42 |
| Maintenance (Mud Services + Cementing) | 2 |
| Maintenance (Acidizing + Coil Tubing) | 1 |
| Maintenance (Well Pulling + Domestic Water) | 12 |
| Well Abandonment | 6 |
| Steam Production | 0 |
| Oil and Gas M&I Water Demand | 63 |
| **Subtotal: Oil and Gas Water Demand, M&I and Produced Water** | **883** |
| Injection Well Disposal | 2,170 |
| Produced Water Land Disposal | 189 |
| **Subtotal: Oil and Gas Produced Water Waste Disposal** | **2,359** |
| **TOTAL** | **2,947** |

Source: Appendix T (WSA), Table 28

Notes:
Includes a water balance closure factor for the net difference between estimated water inputs and outputs of -294 AF.
All values subject to rounding and may vary slightly from Table 28.

Table 4.9-3 shows that total oil and gas production and exploration water demand in the Central Subarea during 2012 was about 883 AF, including 820 AF of produced water reused for EOR and coil tubing, dust control, and surface facility construction purposes, and 63 AF of M&I water for new well construction, well stimulation treatments, maintenance, abandonment, and oilfield domestic and sanitary water uses. Produced water accounted for about 93% and M&I water accounted for 7% of total oil and gas production and exploration demand in the Central Subarea during 2012. About 2,359 AF of produced water was disposed as waste in the Central Subarea Area during 2012, of which 92% (2,170 AF) was injected into Class II injection wells and 8% (189 AF) was disposed into percolation or evaporation ponds. No treated produced water was used for agricultural irrigation in the Central Subarea.

## Eastern Subarea

Table 4.9-4 summarizes the primary sources of oil and gas exploration and production water supply and water use and disposal in the Central Subarea during 2012.

**Table 4.9-4: Eastern Subarea 2012 Oil and Gas Exploration and Production Water Supply and Demand**

| | |
|---|---|
| **Water Supplied** | |
| Produced Water | 100,734 |
| M&I Water | 357 |
| **TOTAL** | **101,091** |
| **Water Use** | |
| **Treated Produced Water** | |
| EOR Water and Steam Injections, Pressure Maintenance and Well Pulling | 12,528 |
| Coil Tubing, Dust Control, Surface Facility Construction | 45 |
| Oil and Gas Produced Water Reuse | 12,573 |
| Agricultural Reuse | 32,771 |
| **Subtotal: Produced Water Reuse** | **45,344** |
| **M&I Water** | |
| New Well Construction (Drill Mud + Well Stimulation) | 74 |
| Maintenance (Mud Services + Cementing) | 19 |
| Maintenance (Acidizing + Coil Tubing) | 16 |
| Maintenance (Well Pulling + Domestic Water) | 186 |
| Well Abandonment | 62 |
| Steam Production | 0 |
| Oil and gas M&I water demand | 357 |
| **Subtotal: Oil and Gas Water Demand, M&I and Produced Water** | **12,930** |
| Injection Well Disposal | 41,919 |
| Produced Water Land Disposal | 17,084 |
| **Subtotal: Oil and Gas Produced Water Waste Disposal** | **59,003** |
| **TOTAL** | **101,091** |

Source: Appendix T (WSA), Table 28
Notes:
Includes a water balance closure factor for the net difference between estimated water inputs and outputs of -3,613 AF
All values subject to rounding and may vary slightly from Table 28.

Table 4.9-4 shows that total oil and gas production and exploration water demand in the Eastern Subarea during 2012 was about 12,931 AF, including 12,574 AF of produced water reused for EOR and coil tubing, dust control, and surface facility construction purposes, and 357 AF of M&I water for new well construction, well stimulation treatments, maintenance, abandonment, and oilfield domestic and sanitary water uses. Produced water accounted for about 97% and M&I water accounted for 3% of total oil and gas production and exploration demand in the Eastern Subarea during 2012. About 59,003 AF of produced water was disposed as waste in the Eastern Subarea Area during 2012, of which 71% (41,919 AF) was injected into Class II injection wells, and 29% (17,084 AF) was disposed into percolation or evaporation ponds. About 32,771 AF of treated produced water was used for agricultural irrigation in the Eastern Subarea by the Cawelo Water District, representing about 72% of the total amount of produced water recycled in the Eastern Subarea.

## Well Stimulation

Well stimulation treatments (including hydraulic fracturing, acid fracturing, and acid matrix stimulation) enhance oil and gas production or recovery by increasing the permeability of the geologic formation where hydrocarbons occur (California Code of Regulations [CCR] Section 1761(a)). Well stimulation treatments do not include routine well cleanout work, routine maintenance, routine removal of formation damage due to drilling, bottom hole pressure surveys, or routine activities that do not affect the integrity of the well or the formation. The well stimulation treatments fracture or chemically alter a geologic formation so that hydrocarbon deposits collect and concentrate for extraction. A single well may be subject to more than one stimulation treatment depending on the underlying formation and hydrocarbon deposit. Well stimulation treatments are subject to interim regulations under state law (Senate Bill [SB] -4) through June 2015 and will be subject to final regulations adopted by the state that become effective in July 2015. Well stimulation treatments subject to the interim and final state regulations include hydraulic fracturing, acid matrix stimulation, and acid fracturing. The use of acid for routine well cleanout, maintenance, and removal of formation damage is not regulated as a form of well stimulation under state law. Well stimulation may be conducted within new wells or during the reworking of an existing well to improve performance.

Hydraulic fracturing (also known as hydrofracturing, “fracking,” or “fracing”) is the injection of a mixture of water, chemicals, and substances (primarily silica sand) called “proppants” into a well at pressures greater than the fracturing pressure of the oil-bearing formation. Hydraulic fracturing causes microscopic fractures to propagate away from the well boring and increases the surface area of the geologic formation that is connected with the well. Proppants are deposited into the fractures during the stimulation process to ensure that the fractures remain open and collect oil or gas. Oil or natural gas flows through the fractures to the well for surface recovery (DOGGR 2013). As discussed below, the average fracturing operation in California uses about 0.38 AF of water compared with much greater amounts of water used in many other parts of the country. California operations require smaller volumes of water because operators in this state fracture in relatively shallow vertical wells (usually less than 2,000 feet deep), with shorter treatment intervals than the horizontal wells that are more common elsewhere. Hydraulic fracturing also uses cross-linked gels in California compared to less viscous gels and slick-water in other parts of

the country that require a greater volume of water to complete the fracturing process (CCST 2015).

Acid fracturing and acid matrix stimulation inject acid into the oil-bearing formation to increase permeability. An acid fracturing treatment involves pumping fluids into a well to enhance the flow and production of oil or gas by dissolving carbonate reservoir rock along existing fractures, thereby increasing permeability and fluid flow. An acid matrix stimulation involves pumping fluids into a siliciclastic reservoir formation utilizing the chemical properties of the pumped fluids to increase the permeability of the reservoir near the well. Increasing permeability in the reservoir increases the flow and production of oil and gas. The primary mechanism responsible for increasing permeability as a result of acid matrix stimulation is the dissolution of drilling mud in the pores of the reservoir near the well. Acid matrix stimulation is utilized in some oilfields in the Project Area on a limited basis (CCST 2014).

California's SB-4 well stimulation regulations require that all oil and gas well operators file notices with DOGGR and provide notice to neighboring landowners at least 30 days before a stimulation treatment is conducted. Within 60 days after a well stimulation treatment is completed, a disclosure must also be filed with DOGGR identifying the source, volume and composition, and disposition of well stimulation fluids, including, but not limited to, hydraulic fracturing fluids, acid well stimulation fluids, and flowback fluids. As of March 24, 2015, 1,367 notices of proposed well stimulation treatments and 673 disclosures for completed treatments were available on the online DOGGR database maintained under the new state regulations. As shown on Figure 4.9-8, almost all of the stimulation notices and treatment disclosures were located in the Western Subarea, except for 23 notices with disclosures in the Rose field, five notices in the Shafter North field, and one notice with one disclosure in the Stockdale field. The Rose, Schafter North, and Stockdale fields are located in the Central Subarea. No well stimulation notices or disclosures were filed for the Eastern Subarea.

In February 2015, the California Council on Science and Technology (CCST) published the first volume of a three-volume analysis of well stimulation activity and potential impacts in California (CCST 2015), as required by newly adopted California well stimulation laws and regulations. Appendix T of the CCST study summarized available information for 1,986 well stimulation notices and disclosures that occurred in the Project Area (DOGGR District 4) from March 2011 to May 2014. As shown in Table 4.9-5, during this period, hydraulic fracturing accounted for 1,687 well stimulation treatments, acid matrix treatments were used in 295 wells, and acid fracturing was used in four wells.

**Table 4.9-5: Summary of Well Stimulation Information Compiled by CCST for Project Area, March 2011-May 2014**

| | Number of Treatments | Average Water Use per Treatment (AF) |
|---|---|---|
| Hydraulic Fracturing | 1,687 | 0.40 |
| Acid Matrix | 295 | 0.24 |
| Acid Fracturing | 4 | 0.14 |
| **TOTAL** | **1,986** | **0.38** |

Source: CCST 2015, Appendix T

The CCST data also indicate that the average well stimulation treatment in the Project Area used about 0.38 AF (122,130 gallons) of water. Hydraulic fracturing treatments generally used more water (0.4 AF on average) than acid matrix or acid fracturing treatments (0.24 to 0.14 AF on average). About 744 AF of water was used in the Project Area for all well stimulation activities over March 2011 to May 2014, an average of less than 250 AFY. These estimates are consistent with statewide well stimulation data compiled by DOGGR for the period January to September 2014, which indicate that 433 treatments used 123.34 AF of water, an average of about 0.29 AF per treatment. The DOGGR data also estimated that 66% of the statewide well stimulation treatment water supply during January to September 2014 was obtained from surface water sources, including imported supplies, 25% was obtained from groundwater wells, and about 9% was obtained by reusing produced water (DOGGR 2015a, Table 10.14-7).

Kern County completed a study in June of 2015 with the following objectives:

- Identify differences in the most prominent plays across the nation,
- Identify the subsequent drilling and stimulation techniques that would apply to wells being drilled in Kern County as compared to those in other shale plays and conventional oil and gas operations conducted across the nations, and
- Highlight the differences between them.

The study is attached as Appendix U. Three general areas of impact (water quality, seismic, and radiological impacts) were examined in the study. One key factor identified in the study was that drilling in Kern County that is associated with hydraulic fracturing is vertical (or follows conventional methods). In the majority of other oil and gas fields in the Country where hydraulic fracturing takes place, the method is associated with horizontal drilling or unconventional methods. Horizontal drilling presents more vulnerabilities in drilling and well construction for a variety of reasons including the potential of intersecting existing fractures and faults that could serve as unintended fluid or gas pathways.

Water quality impacts, although limited in scope, have been identified associated with unconventional gas development in the Marcellus and Barnett Shales. Limited, detailed

investigation appears to associate impacts with well issues rather than through hydraulic fracturing, itself. Although characteristics of these plays vary with respect to the Monterey Shale and conventional oil and gas plays in Kern County it appears well construction may be a more important factor for potential impacts to water quality.

Other comparisons that speak to the likelihood of water quality impacts can be made between the Kern County plays and the Marcellus and Barnett Shales. The following bullets are categorized into factors that are more protective of water quality in the Kern County plays versus those that are less protective:

Comparison of factors influencing potential for water quality impacts:

- Distance between source shale and base of fresh water aquifer is greater in Kern County than in the Marcellus and Barnett Shale plays.

- Both oil and gas are being produced in Kern County. The Marcellus and Barnett Shales produce gas only, which is more mobile than oil.

- Significantly less water is used in conventional drilling and production in Kern County than in the Marcellus and Barnett Shales.

Several studies by a variety of authors indicate that induced-seismic events are more commonly associated with wastewater disposal/injection than with hydraulic fracturing. In addition, induced-seismic events appear to be more common when wastewater is injected into bedrock rather than in sedimentary formations with higher porosities and permeabilities. In California, wastewater disposal/injection is in sedimentary formations and, unlike other parts of the United States, increased induced-seismicity has not been observed with hydraulic fracturing and other unconventional drilling methods.

The development of unconventional natural gas in the Marcellus Shale in Pennsylvania was found to have the potential to exacerbate several pathways for entry of radon into buildings. The U.S. Geological Survey (USGS) reported 91,020 Becquerels per cubic meter ($Bq/^{m3}$) as the median radium concentration in produced water from Marcellus wells (Rowan et al. 2011), which is nearly 500 times the federal drinking water limit (185 $Bq/m^3$) and exceeds the industrial discharge limit of 2,220 $Bq/m^3$. Radon can collect in porous geological formations as well as in natural gas production wells (Gogolak 1980). Shales tend to contain higher concentrations of uranium (3.7-40 parts per million [ppm]) than other geologic formations. Natural gas production wells completed in shales would therefore be expected to have higher concentrations of radon in their natural gas (Gogolak 1980). This phenomenon was reported by USGS in preliminary data from 11 wellheads in Pennsylvania ranging from 37 to 2,923 Bq/m3 (Rowan and Kraemer 2012), which suggests that shale gas may have higher radon levels than other natural gas sources (Casey et al. 2015).

In Kern County, the DOGGR surveyed various oil and gas facilities for Naturally Occurring Radioactive Material (NORM) in 1994. In its 1996 report, DOGGR made the following conclusions:

- Facilities with radiation levels greater than 15 picocuries per gram (pCi/g) should be evaluated to determine if protective measures are necessary to control the ingestion or inhalation of NORM by workers;

- Simple protective measures should be taken, where necessary, to minimize exposures and keep exposures as low as reasonably achievable;

- In gas processing facilities where separation of the more volatile fractions occur, personnel should not remain for long periods near the propanizer reflux pumps while those pumps are in operation; and

- American Petroleum Institute Bulletin E2, Bulletin on Management of Naturally Occurring Radioactive Materials in Oil and Gas Production, should be adhered to by all operators, as necessary, and used as the primary guidance document. However, the appropriate State agency should be contacted before any disposal of NORM occurs.

The DOGGR found in its study of NORM that radiation readings exceeding 15 pCi/g (requiring further evaluation) were noted in District 4, which includes Kern County. Radium isotopes were detected at concentrations up to 1,182 pCi/g with the elevated results detected in pipe scale, soil, and spent resin (CA DOC 1996).

# Surface Water and Groundwater Quality

This section summarizes available information concerning existing surface water and groundwater quality and the effects of historical oil and gas exploration and production in the Project Area. As will be discussed in Section 4.9.3, Regulatory Setting, surface water and groundwater quality is subject to regulation under several federal, state, County, and local laws, regulations, and programs. Certain regulatory programs utilize different criteria to define "fresh" water supplies or "drinking water." Not all water that is identified as "fresh" water in certain regulatory contexts is suitable for use as drinking water. The federal Safe Drinking Water Act (SDWA) defines a groundwater aquifer with TDS concentrations of up to 10,000 milligrams per liter (mg/L) or ppm as an "underground source of drinking water" (USDW). The identification of the depth to the base of "fresh" water in many DOGGR summaries of active oilfields typically refers to groundwater with a TDS level of up to 3,000 mg/L. However, almost no drinking water supplied to urban consumers in California contains TDS levels above 500 mg/L, the secondary (recommended, but not mandatory) maximum contaminant level (MCL) applicable to drinking water under state and federal law. Water supplies with TDS levels significantly above 1,000 mg/L are also less commonly used for most non-potable and agricultural irrigation in the Project Area because of the risk that dissolved ions, commonly called "salts" in high TDS water, will accumulate in and degrade the productivity of agricultural topsoils.

USGS conducts periodic analyses of Project Area water quality in conjunction with state agencies and generally defines water quality in terms of the relative amount of TDS, or salt compounds. The USGS classifies water supplies as follows (USGS 2015):

- Fresh water as a supply with up to 1,000 ppm TDS;
- Slightly saline water as a supply with 1,000 ppm to 3,000 ppm TDS;
- Moderately saline water as a supply with 3,000 ppm to 10,000 ppm TDS; and
- Highly saline water as having 10,000 ppm to 35,000 ppm TDS.

In 1998, DOGGR conducted a study of potential oil and gas activity groundwater impacts that utilized a 1962 federal classification of water quality by use. As summarized in the study, "Class I" surface and subsurface waters are considered usable for all domestic and agricultural purposes and have TDS levels below 700 mg/L. "Class 2" waters are considered unfit for human consumption, possibly harmful to some crops, and have TDS levels ranging from 700 to 2,000 mg/L. "Class 3" surface and subsurface waters contain chemical concentrations that are unfit for human consumption and almost all crop use, and have TDS levels above 2,000 mg/L (DOGGR 1998). Seawater generally has a TDS content of 35,000 mg/L. Based on the USGS and DOGGR classifications, the 10,000 mg/L TDS criterion for identifying a potential USDW under the federal SDWA represents a conservative threshold that is within the range of "moderate" to "highly" saline water and could contain TDS at levels up to 20 times higher than the applicable secondary drinking water MCL. Significant treatment, potentially similar to industrial-scale water desalination facilities, would be required before water with TDS levels near 10,000 mg/L could be used for potable or most non-potable irrigation purposes.

The California SWRCB sets statewide policies for the protection of surface water and groundwater quality under federal and state laws that are implemented in specific regions of the state by nine Regional Water Quality Control Boards (RWQCBs) through the adoption and enforcement of water quality control plans, commonly called "basin plans" (CVRWQCB 2004). The Central Valley Regional Water Quality Control Board (CVRWQCB) regulates water quality in the Project Area under the Tulare Lake Basin Water Quality Control Plan (Tulare Lake Basin Plan or Basin Plan). The Tulare Lake Basin Plan designates existing and potential beneficial uses for surface waters and groundwater in the plan area, including municipal (drinking), agricultural, industrial, recreational, and fish and wildlife uses. A list of the beneficial use designations, and the acronyms that identify these uses in the Tulare Lake Basin Plan is provided in Table 4.9-6.

**Table 4.9-6: Tulare Lake Basin Plan Beneficial Use Summary**

| Abbreviation | Name | Description |
|---|---|---|
| MUN | Municipal and Domestic Supply | Uses of water for community, military, or individual water supply systems including drinking water supply |
| AGR | Agricultural Supply | Uses of water for farming, horticulture, or ranching, including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing |
| IND | Industrial Service Supply | Uses of water for industrial activities that do not depend primarily on water quality, including mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, and oil well repressurization |
| PRO | Industrial Process Supply | Uses of water for industrial activities that depend primarily on water quality |
| POW | Hydropower Generation | Uses of water for hydropower generation |
| REC-1 | Water Contact Recreation | Uses of water for recreational activities involving body contact with water where ingestion of water is reasonably possible, including swimming, wading, water-skiing, skin and scuba diving, surfing, white-water activities, fishing, and use of natural hot springs |
| REC-2 | Non-Contact Water Recreation | Uses of water for recreational activities involving proximity to water but where there is generally no body contact with water or any likelihood of ingestion of water, including picnicking, sunbathing, hiking, beachcombing, camping, boating, tide pool and marine life study, hunting, sightseeing, and aesthetic enjoyment in conjunction with the above activities |
| WARM | Warm Freshwater Habitat | Includes support for reproduction and early development of warm water fish |
| COLD | Cold Freshwater Habitat | Uses of water that support cold water ecosystems, including preservation or enhancement of aquatic habitats, vegetation, fish, and wildlife, including invertebrates |
| WILD | Wildlife Habitat | Uses of water that support terrestrial or wetland ecosystems, including preservation and enhancement of terrestrial habitats or wetlands, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), and wildlife water and food sources |
| RARE | Rare, Threatened, or Endangered Species | Uses of water that support aquatic habitats necessary, at least in part, for the survival and successful maintenance of plant and animal species established under state or federal law as rare, threatened, or endangered |
| SPWN | Spawning, Reproduction, and/or Early Development | Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish (limited to cold water fisheries) |

**Table 4.9-6: Tulare Lake Basin Plan Beneficial Use Summary**

| Abbreviation | Name | Description |
|---|---|---|
| GWR | Ground Water Recharge | Uses of water for natural or artificial recharge of groundwater for purposes of future extraction, maintenance of water quality, or halting of saltwater intrusion into freshwater aquifers |
| FRSH | Freshwater Replenishment | Uses of water for natural or artificial maintenance of surface water quantity or quality |

Source: CVRWQCB 2004

The Basin Plan also identifies applicable numerical and narrative water quality objectives that are necessary to protect each designated beneficial use and implementation programs that will achieve the applicable objectives. Commonly regulated constituents in the Tulare Lake Basin Plan include ammonia, oil and grease, salinity, suspended materials, and turbidity. The Tulare Lake Basin Plan incorporates state and federal anti-degradation policies, which require that whenever the existing quality of surface water or groundwater is higher than applicable objectives, existing water quality levels must be maintained unless it has been demonstrated that the change in water quality is consistent with the maximum benefit to the people of the state, will not unreasonably affect present and anticipated beneficial use of the water, and will not cause the water to exceed applicable water quality objectives (SWRCB Resolution No. 68-16 1968). Discharges that would reduce water quality must be specifically permitted by the CVRWQCB through the issuance of WDRs (CVRWQCB 2004).

The Tulare Lake Basin Plan identifies several watershed drainage areas, or hydrologic units that contain streams, ephemeral drainages and other surface waters in the Project Area. As shown on Figure 4.9-9, streams in the eastern Subarea are generally within hydrologic units 554 and 555. Western Subarea streams are included in hydrologic units 556 and 559, and valley floor waters, including surface water in the central Subarea, are located in hydrologic units 557 and 558.

The designated beneficial uses for surface waters in each hydrologic unit in the Project Area are summarized in Table 4.9-7. Several surface waters have been designated for more than one beneficial use.

Groundwater beneficial uses are designated in the Tulare Lake Basin Plan for detailed analysis units (DAUs), which are subunits that have been identified within the overall region. The locations of the DAUs as mapped by the CVRWQCB within the Project Area are shown on Figure 4.9-10.

The designated beneficial uses for each DAU groundwater unit in the Basin Plan are summarized in Table 4.9-8. Groundwater in several areas has been designated for more than one beneficial use.

Consistent with state drinking water policy (SWRCB 1988), the Tulare Lake Basin Plan designates all groundwater within the Project Area for municipal (MUN) beneficial use, subject

to the potential removal of, or exception to this designation in specific locations by means of a formal Basin Plan amendment process. The CVRWQCB considers the following criteria for making exceptions to the groundwater MUN beneficial use designation: (1) TDS levels in an aquifer must exceed 3,000 mg/L (or an equivalent measure of electrical conductivity) and the aquifer cannot be reasonably expected to supply a public water system; (2) there is contamination, either by natural processes or by human activity (unrelated to a specific pollution incident), that cannot reasonably be treated for domestic use using either best management practices (BMPs) or best economically achievable treatment practices; (3) the water source cannot provide sufficient water to supply a single well capable of producing an average, sustained yield of 200 gallons per day; or (4) the aquifer is regulated as a geothermal energy producing source or has been exempted administratively pursuant to the federal underground injection control (UIC) program for the production of hydrocarbon or geothermal energy, provided that injected fluids do not constitute a hazardous waste. Figure 4.9-11 shows approved groundwater beneficial use aquifer exemptions.

**Table 4.9-7: Tulare Lake Basin Plan Surface Water Beneficial Use Designations**

| Stream[a] | MUN | AGR | IND | PRO | POW | REC-1 | REC-2 | WARM | COLD | WILD | RARE | SPW | GWR | FRSH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **554, 557 Kern River** | | | | | | | | | | | | | | |
| Above Lake Isabella | ● | | | | ● | ● | ● | ● | ● | ● | ● | ● | | ● |
| Lake Isabella | ● | | | | | ● | ● | ● | ● | ● | | | | ● |
| **Lake Isabella to KR-1[b]** | ● | | | | | ● | ● | ● | ● | ● | ● | | | |
| **Below KR-1[b]** | ● | ● | ● | ● | ● | ● | ● | ● | | ● | ● | | ● | |
| **555, 558 Poso Creek** | ● | | | | | ● | ● | ● | ● | ● | | | ● | ● |
| 552 Mill Creek, Source to Kings River | ● | | | | | ● | ● | ● | | ● | | | ● | ● |
| **552, 553, 554, 555 Other East Side Streams** | ● | ● | | | | ● | ● | ● | ● | ● | | | ● | |
| **556, 559 West Side Streams** | ● | | ● | ● | | ● | ● | ● | | ● | ● | | ● | |
| **551, 557, 558 Valley Floor Waters** | ● | | ● | ● | | ● | ● | ● | | ● | ● | | ● | |

Notes:
Table is a partial reproduction of the Basin Plan Table II-1 for the Tulare Lake Hydrologic Basin (CVRWQCB 2004).
[a] **Bold** indicates surface waters that are in the Project Area.
[b] KR-1: Southern California Edison Kern River Powerhouse No. 1.

**Table 4.9-8: Tulare Lake Basin Plan Groundwater Beneficial Use Designations**

| Hydrologic Unit | DAU [a] | MUN | AGR | IND | PRO | REC-1 | REC | WILD |
|---|---|---|---|---|---|---|---|---|
| Kern County Basin | | | | | | | | |
| | 245 | ● | ● | ● | | | | |
| | 254 [b] | ● | ● | ● | ● | ● | ● | ● |
| | 255 | ● | ● | ● | | | | ● |
| | 256 | ● | ● | ● | ● | | | |
| | 257 | ● | ● | ● | | ● | | |
| | 258 | ● | ● | ● | ● | | | |
| | 259 [c] | ● | ● | ● | | | | |
| | 260 | ● | | ● | | | | |
| | 261 | ● | ● | ● | | | | |
| All Other Ground Waters [d] | | ● | | | | | | |

Source: Basin Plan Table II-2 for the Tulare Lake Hydrologic Basin (CVRWQCB 2004)
Notes:

[a] Ground water contained in the lower Transition Zone and Santa Margarita formation within 3,000 feet of the Kern Oil and Refining Company proposed injection wells in Section 25, T30S, R28E, MDB&M, is not suitable, or potentially suitable, for municipal or domestic supply (MUN).

[b] Ground water contained in the basal Etchegoin formation, Chanac formation, and Santa Margarita formation within, and extending to one-quarter mile outside the administrative boundary of the Fruitvale Oil Field, as defined by the State of California, Department of Conservation, Division of Oil and Gas in *Application for Primacy in the Regulation of Class II Injection Wells Under Section 1425 of the Safe Drinking Water Act*, dated April 1981, is not suitable, or potentially suitable, for municipal or domestic supply (MUN). However, the upper ground water zone (ground water to a depth of 3,000 feet) retains the MUN beneficial use.

[c] Ground water and spring water within 0.5-mile radius of the McKittrick Waste Treatment (formerly Liquid Waste Management) site in Section 29, T30S, R22E, MDB&M, have no beneficial uses.

[d] Ground water in the San Joaquin, Etchegoin, and Jacalitos formations within 0.5 mile of existing surface impoundments P-1, P-2, P-3, P-4, P-4 1/2, P-5, P-6, P-7, P-8, P-9, P-10, P-11, P-12/12A, P-13, P-14, P-15, P-16, P-17, P-18, P- 19, and P-20, and proposed surface impoundments P-21, P-24, P-25, P-27, P-28, and P-29 at the Kettleman Hills Facility (Sections 33 and 34, T22S, R18E, and Section 3, T23S, R18E, MDB&M) of Chemical Waste Management is not a municipal or domestic supply (MUN).

Key:
DAU = detailed analysis unit.

The SWRCB has adopted a "sources of drinking water" policy that states that all ground and surface waters of the state are considered suitable or potentially suitable for municipal or domestic water supply and should be so designated by each RWQCB, subject to certain exceptions. One exception listed in the policy includes an aquifer that "is regulated as a geothermal energy producing source or has been exempted administratively pursuant to 40 Code of Federal Regulations (CFR), Section 146.4 for the purpose of underground injection of fluids associated with the production of hydrocarbon or geothermal energy, provided that these fluids do not constitute a hazardous waste under 40 CFR 261.3" (SWRCB Resolution No. 88-63 [1988], as amended by Resolution No. 2006-0008 [2006]). As discussed below, state and federal agencies are currently updating the status of aquifer exemptions in the Project Area. Figure 4-9.11 identifies the locations in the Project Area where the groundwater MUN beneficial use has been removed by the CVRWQCB in the Basin Plan.

The Tulare Lake Basin Plan identifies waters that are not attaining applicable water quality standards, or impaired waters, after technology-based limits and the best available technology used for pollutant management have been implemented in accordance with Section 303(d) of the Clean Water Act (CWA). There are no impaired water bodies listed under Section 303(d) of the CWA in the Project Area.

Surface water resources in the Project Area primarily consist of rainfall and snowmelt flows in natural streams and watercourses, generally originating from the eastern side of the Tulare Lake Hydrologic Basin and springs and upland watersheds in the Sierra Nevada range, and imported water delivered to the region through the SWP and federal CVP water recovery and conveyance facilities. Ephemeral watercourses are located in the western portion of the Project Area and carry water for brief periods only during significant storm events. The distribution of surface waters within the Project Area is discussed in more detail in Section 4.4, Biological Resources, and is shown on Figure 4.4-3. The SWP and CVP systems are discussed in more detail in Section 4.17, Utilities and Service Systems. As shown in Table 4.9-1, in 2012, oil and gas production utilized about 8,358 AFY of M&I water in addition to 234,959 AF of produced water. In an average year, urban water demand is about 235,000 AFY, and agricultural demand is about 2.67 million AFY in the Project Area. The amount of Project Area surface water supplies that are used for oil and gas exploration and production varies from year to year in accordance with hydrologic conditions. In drier years, groundwater is used to a greater extent than surface supplies (see Section 4.17, Utilities and Service Systems).

In June 2015, U.S. Environmental Protection Agency (EPA) released a public review draft of a study titled Assessment of the Potential Impacts of Hydraulic Fracturing for Oil and Gas on Drinking Water Resources (EPA 2015a). The study is a public review draft and may be modified in response to public review comments.

The EPA study, focused on potential impacts to drinking water resources that could occur from the following above-ground and underground potential mechanisms associated with the hydraulic fracturing process or cycle: :

- Water withdrawals at times or in locations of low water availability;

- Spills of hydraulic fracturing fluid, chemicals, or produced water;
- Inadequate treatment and discharge of hydraulic fracturing wastewater;
- Movement of liquids and gases via the production well into underground drinking water resources; and
- Movement of liquids and gases from the fracture zone to underground drinking water resources via pathways in subsurface rock formations.

The study did not find evidence that these potential mechanisms have led to widespread, systemic drinking water impacts. The number of cases where drinking water resources were impacted was found to be small in relation to the number of hydraulically fractured oil and gas wells. The EPA study noted that this result could reflect the rarity of hydraulic fracturing effects on drinking water or may be an underestimate of these effects due to several limiting factors. Potentially limiting factors could include insufficient pre- and post-hydraulic fracturing water quality data, other causes of contamination, the short duration of existing studies, and inaccessible information related to hydraulic fracturing activities. As a result, while the study determined that hydraulic fracturing has not led to systemic and widespread drinking water impacts in the United States, information on the identity, frequency of use, physiochemical, and toxicological properties of the chemicals associated with the hydraulic fracturing water cycle is not complete, which limits the understanding of potential impacts (EPA 2015a).

## Surface Water Quality Data

Surface water quality data for the Project Area and each Subarea was obtained by identifying available analysis results for current and historical river, creek and stream sampling locations maintained by the state Surface Water Ambient Monitoring Program (SWAMP), the state Irrigated Lands Regulatory Program (ILRP) (SWRCB 2012), the California Environmental Data Exchange Network (SWRCB 2012), the USGS National Water Information System (NWIS) (USGS 2014), and the EPA Storage and Retrieval (STORET) Legacy Data Center (EPA 2014). Sampling data from agricultural canals or tile drains was not utilized because constructed facilities used in crop production are not representative of natural water quality conditions in the Project Area. The locations of the water sampling sites that were used in the surface water quality analysis are shown on Figure 4.9-12.

The extent of the available surface water quality data and coverage varies for each Project Subarea. There are 15 unique and 17 total sampling sites in the Eastern Subarea, and current water quality data are available for six of these locations. The remaining sampling sites are no longer in use, and historical data for these locations were obtained from the EPA STORET database. There are two unique and three total surface water sampling stations in the Central Subarea. Eleven surface water quality sample sites were identified in the Western Subarea, but none is currently in operation and historical data for these locations were obtained from the EPA STORET database.

Tables 4.9-9 and 4.9-10 summarize water quality data for the Kern River at four locations during 2004 through 2006 and for Deer Creek, Poso Creek, and El Paso Creek at four locations during 2009 through 2012.

Table 4.9-11 summarizes water quality data available during 2002 through 2012, and Table 4.9-12 summarizes historical water quality data from samples taken during 1951 through 1991 for each of the Project Subareas. Surface water quality data for the Western Subarea are not available after 1991, and information for the Western Subarea is not included in Table 4.9-11.

Stream, river and creek data for the period 2002 to 2012 (Tables 4.9-9 to 4.9-11) do not indicate significant differences between the Central and Eastern Subareas. Surface water results in both Subareas exhibit similar levels of dissolved salts (TDS), hardness, chloride, sodium, and specific conductivity. The data suggest that surface water quality based on TDS levels, specific conductance or hardness is slightly higher in the Eastern Subarea, most likely due to the Subarea's closer proximity to stream and spring flows from the Sierra Nevada. On average, surface waters in the Central and Eastern Subareas have TDS levels below the secondary drinking water MCL of 500 mg/L.

Data from 1951 to 1991 (Table 4.9-12) is generally consistent with more recent surface water quality sampling results, and indicates that surface water quality improves from west to east in the Project Area. As shown in Table 4.9-12, TDS, alkalinity, nitrate, hardness, chloride, sodium, specific conductivity, and boron levels were typically higher in the Western Subarea than in the Central or Eastern Subareas. These results likely reflect the fact that watercourses on the western side of the Project Area flow only during periods of sustained rainfall and traverse through marine rocks and soils that contain salts and other compounds that rapidly dissolve in water. Surface water in the eastern Project Area generally flows more frequently and through granitic channels that do not mobilize constituents to the same extent.

As discussed in Section 4.17, Utilities and Service Systems, the SWP and CVP supply systems import water pumped from the southern edge of the Sacramento Delta and collected in reservoirs located along the western face of the Sierra Nevada range to the Project Area. Water quality data for the CVP system is maintained by the KCWA, the region's primary imported water wholesale supplier. Water quality data for the SWP system is maintained by the DWR. Table 4.9-13 summarizes available water quality data for CVP supplies, and Table 4.9-14 summarizes water quality data for SWP imports in the Project Area.

The sampling results in Table 4.9-13 and 4.9-14 show that SWP and CVP supplies exhibit high levels of water quality. CVP supplies have an average specific conductance (an alternative measure of dissolved inorganic materials and ions) of 210 microSiemens per centimeter (µS/cm) and TDS of 130 mg/L. SWP water has a slightly higher average specific conductance of 460 µS/cm and TDS concentration of 260 mg/L. These levels are below the secondary drinking water MCL for TDS. Other constituents in Project Area imported water are below applicable primary and secondary drinking water MCLs.

**Table 4.9-9: Kern River Water Quality Data Summary 2004-2006**

| Water Quality Parameters | Units | Station Name: Ker MM14/MM15 (Station Code 554KER070) | | | | | | Station Name: Rancheria Road (Station Code 554KER080) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Avg. | Med. | Min[a] | Max[b] | N | Date Range | Avg. | Med. | Min[a] | Max[b] | N | Date Range |
| **General Water Quality** | | | | | | | | | | | | | |
| Alkalinity, Total | mg/L as $CaCO_3$ | 38 | | | | 1 | 06/26/03 | 40 | 40 | 39 | 40 | 2 | 6/26/03 – 06/26/03 |
| Ammonium | mg/L as N | 0.024 | 0.019 | 0.0086 | 0.053 | 8 | 12/12/02 - 05/26/04 | 0.065 | 0.018 | ND | 0.232 | 7 | 12/12/02- 05/26/04 |
| Calcium | mg/L | 10 | | | | 1 | 06/26/03 | 11 | | | | 1 | 6/26/03 |
| Chloride | mg/L | 3.7 | | | | 1 | 06/26/03 | 3.7 | | | | 1 | 6/26/03 |
| Dissolved oxygen | mg/L | 11 | 11 | 10 | 13 | 9 | 03/27/02 - 05/26/04 | 11 | 11 | 10 | 12 | 9 | 3/27/02- 05/26/04 |
| Magnesium | mg/L | 1.6 | | | | 1 | 06/26/03 | 1.6 | | | | 1 | 6/26/03 |
| Nitrate + Nitrite | mg/L as N | 0.11 | 0.073 | 0.026 | 0.28 | 6 | 12/12/02 - 05/26/04 | 0.12 | 0.088 | 0.037 | 0.28 | 6 | 12/12/02- 05/26/04 |
| Nitrate | mg/L as N | ND | | | | 1 | 06/26/03 | ND | | | | 1 | 6/26/03 |
| Nitrite | mg/L as N | ND | | | | 1 | 06/26/03 | ND | | | | 1 | 6/26/03 |
| Nitrogen, Total Kjeldahl (TKN) | mg/L | 0.36 | 0.33 | ND | 0.50 | 6 | 03/27/02 - 05/26/04 | 0.46 | 0.51 | ND | 0.57 | 6 | 12/12/02- 05/26/04 |
| Orthophosphate, Dissolved | mg/L as P | 0.036 | 0.034 | 0.01 | 0.073 | 5 | 12/12/02 - 05/26/04 | 0.037 | 0.034 | 0.0076 | 0.076 | 5 | 12/12/02- 05/26/04 |
| pH | pH units | 8.4 | 8.5 | 8.1 | 8.6 | 9 | 03/27/02 - 05/26/04 | 8.4 | 8.5 | 8.1 | 8.6 | 9 | 3/27/02-5/26/1904 |
| Phosphorus, Total | mg/L as P | 0.076 | 0.050 | 0.045 | 0.13 | 5 | 12/12/02 - 05/26/04 | 0.079 | 0.050 | 0.046 | 0.15 | 5 | 12/12/02 – 05/26/04 |
| Potassium | mg/L | 1.6 | | | | 1 | 06/26/03 | 1.6 | | | | 1 | 6/26/03 |
| Sodium | mg/L | 7.7 | | | | 1 | 06/26/03 | 8.3 | 8.3 | 8.2 | 8.3 | 2 | 6/26/03 – 06/26/03 |
| Specific conductivity | uS/cm | 139 | 130 | 96 | 178 | 9 | 03/27/02 - 05/26/04 | 150 | 137 | 114 | 195 | 8 | 6/20/02 – 05/26/04 |
| Sulfate | mg/L | 5.2 | | | | 1 | 06/26/03 | 6.5 | | | | 1 | 6/26/03 |
| Temperature | °C | 15 | 15 | 8.7 | 22 | 9 | 03/27/02 - 05/26/04 | 16 | 14 | 10 | 22 | 9 | 3/27/02 – 05/26/04 |
| Total dissolved solids (TDS) | mg/L | 76 | | | | 1 | 06/26/03 | 71 | | | | 1 | 6/26/03 |
| **Metals** | | | | | | | | | | | | | |
| Iron, Total | ug/L | 220 | | | | 1 | 06/26/03 | 185 | 185 | 172 | 198.5 | 2 | 06/26/03 – 06/26/03 |
| Manganese, Total | ug/L | 46 | | | | 1 | 06/26/03 | 44 | | | | 1 | 06/26/03 |

**Table 4.9-9: Kern River Water Quality Data Summary 2004-2006**

| Water Quality Parameters | Units | Station Name: Ker MM14/MM15 (Station Code 554KER070) | | | | | | Station Name: Rancheria Road (Station Code 554KER080) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Avg. | Med. | Min[a] | Max[b] | N | Date Range | Avg. | Med. | Min[a] | Max[b] | N | Date Range |
| **Other Water Quality Parameters** | | | | | | | | | | | | | |
| Boron | mg/L | 0.75 | | | | 1 | 06/26/03 | 0.0775 | 0.0775 | 0.0771 | 0.078 | 2 | 06/26/03 – 06/26/03 |
| **Microbial Indicators** | | | | | | | | | | | | | |
| Coliform, Fecal | MPN/100 mL | 20 | 8.0 | ND | 83 | 9 | 03/27/02 – 05/26/04 | 30 | 5.5 | 2.0 | 140 | 10 | 03/27/02 – 05/26/04 |
| Coliform, Total | MPN/100 mL | 130 | 80 | 28 | 276 | 9 | 03/27/02 – 05/26/04 | 133 | 125 | 8.0 | 273 | 10 | 03/27/02 – 05/26/04 |
| *E. Coli* | MPN/100 mL | 19 | 4.0 | ND | 83 | 9 | 03/27/02 – 05/26/04 | 32 | 7.0 | 2.0 | 151 | 9 | 03/27/02 – 05/26/04 |
| Fecal Streptococci | MPN/100 mL | 47 | 47 | 17 | 77 | 2 | 03/27/02 – 06/20/02 | 89 | 89 | 16 | 162 | 2 | 03/27/02 – 06/20/02 |

Source: Appendix S
Key:
Avg = Average
Med = Median
N = number of results

**Table 4.9-10: Deer Creek, Poso Creek, and El Paso Creek Water Quality Data Summary 2009-2012**

| Water Quality Parameters | Units | Station Name: Deer Creek at Road 120 (Station Code 558DCR120) | | | | | | Station Name: Deer Creek at Road 176 (Station Code 558DCR178) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Average | Median | Min[a] | Max[b] | N | Date Range | Average | Median | Min[a] | Max[b] | N | Date Range |
| **General Water Quality** | | | | | | | | | | | | | |
| Ammonia, Total | mg/L as N | ND | | | | 18 | 5/12/2009 - 4/18/2012 | ND | ND | ND | 0.16 | 19 | 5/12/2009 - 4/18/2012 |
| Calcium | mg/L | 8.0 | 4.3 | 2.0 | 21 | 18 | 5/12/2009 - 4/18/2012 | 7.2 | 4.0 | 1.9 | 19 | 19 | 5/12/2009 - 4/18/2012 |
| Color | color units | 41 | 15 | 8.4 | 108 | 18 | 5/12/2009 - 4/18/2012 | 33 | 13 | 7.7 | 150 | 19 | 5/12/2009 - 4/18/2012 |
| Dissolved Oxygen | mg/L | 8.7 | 8.4 | 7.7 | 10 | 19 | 5/12/2009 - 4/18/2012 | 8.9 | 8.5 | 7.7 | 11 | 19 | 5/12/2009 - 4/18/2012 |
| Hardness | mg/L as $CaCO_3$ | 26 | 14 | 6.5 | 70 | 18 | 5/12/2009 - 4/18/2012 | 24 | 13 | 6.0 | 66 | 19 | 5/12/2009 - 4/18/2012 |
| Magnesium, Total | mg/L | 1.54 | ND | ND | 4.4 | 18 | 5/12/2009 - 4/18/2012 | 1.5 | ND | ND | 4.36 | 19 | 5/12/2009 - 4/18/2012 |
| Nitrate + Nitrite, Total | mg/L as N | 0.15 | 0.050 | ND | 0.50 | 18 | 5/12/2009 - 4/18/2012 | 0.19 | 0.050 | ND | 0.56 | 19 | 5/12/2009 - 4/18/2012 |
| Nitrogen, Total Kjeldahl | mg/L | ND | ND | ND | 1.0 | 18 | 5/12/2009 - 4/18/2012 | ND | ND | ND | 0.83 | 19 | 5/12/2009 - 4/18/2012 |
| OrthoPhosphate as P, Dissolved | mg/L | 0.069 | 0.060 | ND | 0.16 | 18 | 5/12/2009 - 4/18/2012 | 0.062 | 0.041 | 0.011 | 0.15 | 19 | 5/12/2009 - 4/18/2012 |
| pH | pH units | 7.8 | 7.7 | 7.1 | 8.8 | 19 | 5/12/2009 - 4/18/2012 | 7.6 | 7.6 | 7.1 | 8.2 | 19 | 5/12/2009 - 4/18/2012 |
| Phosphorus, Total | mg/L as P | 0.041 | 0.018 | ND | 0.14 | 18 | 5/12/2009 - 4/18/2012 | 0.05 | 0.02 | ND | 0.20 | 19 | 5/12/2009 - 4/18/2012 |
| Specific Conductivity, Total | µS/cm | 74 | 50 | 21 | 200 | 19 | 5/12/2009 - 4/18/2012 | 76 | 49 | 20 | 192 | 19 | 5/12/2009 - 4/18/2012 |
| Temperature | °C | 21 | 22 | 15 | 29 | 19 | 5/12/2009 - 4/18/2012 | 18 | 19 | 11 | 25 | 19 | 5/12/2009 - 4/18/2012 |
| Total Dissolved Solids (TDS) | mg/L | 62 | 37 | 21 | 152 | 18 | 5/12/2009 - 4/18/2012 | 52 | 36 | 14 | 132 | 19 | 5/12/2009 - 4/18/2012 |
| Total organic carbon (TOC) | mg/L | 3.3 | 2.5 | 1.1 | 8.3 | 18 | 5/12/2009 - 4/18/2012 | 3.0 | 2.4 | 1.0 | 6.8 | 19 | 5/12/2009 - 4/18/2012 |
| Total Suspended Solids | mg/L | 8.2 | 6.3 | ND | 20 | 18 | 5/12/2009 - 4/18/2012 | 13 | 13 | ND | 33 | 19 | 5/12/2009 - 4/18/2012 |
| Turbidity, Total | NTU | 6.6 | 5.3 | 1.2 | 13 | 18 | 5/12/2009 - 4/18/2012 | 5.7 | 4.4 | 1.3 | 13 | 19 | 5/12/2009 - 4/18/2012 |
| **Metals** | | | | | | | | | | | | | |
| Arsenic, Total | µg/L | 1.5 | 1.7 | ND | 1.9 | 7 | 5/12/2009 - 8/17/2010 | 1.6 | 1.6 | 1.1 | 2.2 | 8 | 5/12/2009 - 8/17/2010 |
| Cadmium, Dissolved | µg/L | ND | | | | 7 | 5/12/2009 - 8/17/2010 | ND | ND | ND | 0.10 | 8 | 5/12/2009 - 8/17/2010 |
| Cadmium, Total | µg/L | ND | ND | ND | 0.14 | 7 | 5/12/2009 - 8/17/2010 | ND | | | | 8 | 5/12/2009 - 8/17/2010 |
| Copper, Dissolved | µg/L | 3.6 | 4.2 | 1.6 | 4.5 | 7 | 5/12/2009 - 8/17/2010 | 6.5 | 3.2 | 1.7 | 18 | 8 | 5/12/2009 - 8/17/2010 |

**Table 4.9-10: Deer Creek, Poso Creek, and El Paso Creek Water Quality Data Summary 2009-2012**

| Water Quality Parameters | Units | Station Name: Deer Creek at Road 120 (Station Code 558DCR120) | | | | | | Station Name: Deer Creek at Road 176 (Station Code 558DCR178) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Average | Median | Min[a] | Max[b] | N | Date Range | Average | Median | Min[a] | Max[b] | N | Date Range |
| Copper, Total | µg/L | 8.4 | 5.8 | 4.1 | 20 | 7 | 5/12/2009 - 8/17/2010 | 6.9 | 6.2 | 2.9 | 14 | 8 | 5/12/2009 - 8/17/2010 |
| Lead, Dissolved | µg/L | ND | | | | 7 | 5/12/2009 - 8/17/2010 | 0.24 | ND | ND | 0.80 | 8 | 5/12/2009 - 8/17/2010 |
| Lead, Total | µg/L | 0.57 | 0.60 | 0.40 | 0.79 | 7 | 5/12/2009 - 8/17/2010 | 1.3 | 0.68 | 0.37 | 4.2 | 8 | 5/12/2009 - 8/17/2010 |
| Molybdenum, Total | µg/L | 1.6 | ND | ND | 4.6 | 7 | 5/12/2009 - 8/17/2010 | 1.3 | ND | ND | 3.9 | 8 | 5/12/2009 - 8/17/2010 |
| Nickel, Dissolved | µg/L | ND | | | | 7 | 5/12/2009 - 8/17/2010 | ND | ND | ND | 1.6 | 8 | 5/12/2009 - 8/17/2010 |
| Nickel, Total | µg/L | 1.0 | ND | ND | 2.8 | 7 | 5/12/2009 - 8/17/2010 | ND | 1.0 | ND | 1.5 | 8 | 5/12/2009 - 8/17/2010 |
| Selenium, Total | µg/L | ND | | | | 7 | 5/12/2009 - 8/17/2010 | ND | | | | 8 | 5/12/2009 - 8/17/2010 |
| Zinc, Dissolved | µg/L | ND | | | | 7 | 5/12/2009 - 8/17/2010 | ND | ND | ND | 11 | 8 | 5/12/2009 - 8/17/2010 |
| Zinc, Total | µg/L | 11 | 11.2 | ND | 18 | 7 | 5/12/2009 - 8/17/2010 | 13 | ND | ND | 24 | 8 | 5/12/2009 - 5/12/2009 |
| **Microbial Indicators** | | | | | | | | | | | | | |
| Coliform, Fecal | MPN/100 mL | 165 | 80.0 | 22 | 500 | 20 | 5/12/2009 - 4/18/2012 | 138 | 80 | 13 | 300 | 21 | 5/12/2009 - 4/18/2012 |
| Coliform, Total | MPN/100 mL | 1667 | 2200 | 300 | 2420 | 35 | 5/12/2009 - 4/18/2012 | 1775 | 1700 | 166 | 2420 | 39 | 5/12/2009 - 4/18/2012 |
| *E. coli* | MPN/100 mL | 100 | 56 | 8.4 | 302 | 17 | 5/12/2009 - 4/18/2012 | 120 | 64 | 14 | 353 | 20 | 5/12/2009 - 4/18/2012 |
| **Other Water Quality Parameters** | | | | | | | | | | | | | |
| Boron, Total | µg/L | 17 | ND | ND | 43 | 7 | 5/12/2009 - 8/17/2010 | 13 | 10 | ND | 27 | 8 | 5/12/2009 - 8/17/2010 |
| **Pesticides [c]** | | | | | | | | | | | | | |
| Chlorpyrifos, Total | µg/L | ND | ND | ND | 0.020 | 6 | 5/12/2009 - 8/17/2010 | ND | | | | 7 | 5/12/2009 - 8/17/2010 |
| Diazinon, Total | µg/L | ND | | | | 9 | 5/12/2009 - 8/17/2010 | ND | | | | 10 | 5/12/2009 - 8/17/2010 |
| Dichlorvos, Total | µg/L | ND | | | | 6 | 5/12/2009 - 8/17/2010 | ND | | | | 7 | 5/12/2009 - 8/17/2010 |
| Phosmet, Total | µg/L | ND | | | | 6 | 5/12/2009 - 8/17/2010 | ND | | | | 7 | 5/12/2009 - 8/17/2010 |
| Trifluralin, Total | µg/L | ND | | | | 6 | 5/12/2009 - 8/17/2010 | ND | | | | 7 | 5/12/2009 - 8/17/2010 |
| **General Water Quality** | | | | | | | | | | | | | |
| Ammonia, Total | mg/L as N | ND | ND | ND | 0.20 | 9 | 3/24/2010 - 4/4/2012 | 0.53 | 0.53 | 0.22 | 0.827 | 2 | 3/26/2011 - 4/18/2011 |
| Calcium | mg/L | 27 | 26 | 22 | 33 | 9 | 3/24/2010 - 4/4/2012 | 62 | 62 | 57 | 67 | 2 | 3/26/2011 - 4/18/2011 |
| Color | color units | | | | | | | | | | | | |

**Table 4.9-10: Deer Creek, Poso Creek, and El Paso Creek Water Quality Data Summary 2009-2012**

| Water Quality Parameters | Units | Station Name: Deer Creek at Road 120 (Station Code 558DCR120) | | | | | | Station Name: Deer Creek at Road 176 (Station Code 558DCR178) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Average | Median | Min[a] | Max[b] | N | Date Range | Average | Median | Min[a] | Max[b] | N | Date Range |
| Oxygen, Dissolved, Total | mg/L | 8.8 | 9 | 7.8 | 9.7 | 9 | 3/24/2010 - 4/4/2012 | 8.3 | 8.3 | 7.6 | 8.9 | 2 | 3/26/2011 - 4/18/2011 |
| Hardness | mg/L as CaCO3 | 92 | 88 | 76 | 111 | 9 | 3/24/2010 - 4/4/2012 | 234 | 234 | 218 | 250 | 2 | 3/26/2011 - 4/18/2011 |
| Magnesium, Total | mg/L | 5.9 | 5.7 | 5.0 | 7.0 | 9 | 3/24/2010 - 4/4/2012 | 19 | 19 | 18 | 20 | 2 | 3/26/2011 - 4/18/2011 |
| Nitrate + Nitrite, Total | mg/L as N | 0.41 | 0.20 | 0.07 | 0.92 | 9 | 3/24/2010 - 4/4/2012 | 2.6 | 2.6 | 1.9 | 3.4 | 2 | 3/26/2011 - 4/18/2011 |
| Nitrogen, Total Kjeldahl | mg/L | ND | ND | ND | 1.10 | 9 | 3/24/2010 - 4/4/2012 | 1.3 | 1.3 | 0.61 | 1.9 | 2 | 3/26/2011 - 4/18/2011 |
| OrthoPhosphate as P, Dissolved | mg/L | 0.50 | 0.54 | 0.25 | 0.62 | 9 | 3/24/2010 - 4/4/2012 | 0.64 | 0.64 | 0.51 | 0.77 | 2 | 3/26/2011 - 4/18/2011 |
| pH | pH units | 8.2 | 8.2 | 7.4 | 8.6 | 9 | 3/24/2010 - 4/4/2012 | 8.6 | 8.6 | 8.5 | 8.7 | 2 | 3/26/2011 - 4/18/2011 |
| Phosphorus, Total | mg/L as P | 0.14 | 0.16 | 0.020 | 0.21 | 9 | 3/24/2010 - 4/4/2012 | 0.61 | 0.61 | 0.37 | 0.85 | 2 | 3/26/2011 - 4/18/2011 |
| Specific Conductivity, Total | µS/cm | 269 | 262 | 223 | 332 | 18 | 3/24/2010 - 4/4/2012 | 448 | 450 | 411 | 481 | 4 | 3/26/2011 - 4/18/2011 |
| Temperature | °C | 21 | 18 | 15 | 29 | 9 | 3/24/2010 - 4/4/2012 | 20 | 20 | 14 | 26 | 2 | 3/26/2011 - 4/18/2011 |
| Total Dissolved Solids (TDS) | mg/L | 191 | 184 | 155 | 226 | 9 | 3/24/2010 - 4/4/2012 | 297 | 297 | 282 | 312 | 2 | 3/26/2011 - 4/18/2011 |
| Total organic carbon (TOC) | mg/L | 5.6 | 5.8 | 4.0 | 7.0 | 9 | 3/24/2010 - 4/4/2012 | 6.0 | 6.0 | 5.9 | 6.1 | 2 | 3/26/2011 - 4/18/2011 |
| Total Suspended Solids, Particulate | mg/L | 29 | 28 | ND | 50 | 9 | 3/24/2010 - 4/4/2012 | 212 | 212 | 138 | 286 | 2 | 3/26/2011 - 4/18/2011 |
| Turbidity, Total | NTU | 17 | 16 | 3.3 | 33 | 9 | 3/24/2010 - 4/4/2012 | 171 | 171 | 97 | 245 | 2 | 3/26/2011 - 4/18/2011 |
| Metals | | | | | | | | | | | | | |
| Arsenic, Total | µg/L | 8.2 | 8.2 | 8.1 | 8.3 | 2 | 3/24/2010 - 4/27/2010 | | | | | | |
| Cadmium, Dissolved | µg/L | ND | | | | 2 | 3/24/2010 - 4/27/2010 | | | | | | |
| Cadmium, Total | µg/L | ND | | | | 2 | 3/24/2010 - 4/27/2010 | | | | | | |
| Copper, Dissolved | µg/L | 7.1 | 7.1 | 4.3 | 9.9 | 2 | 3/24/2010 - 4/27/2010 | | | | | | |
| Copper, Total | µg/L | 5.7 | 5.7 | 4.9 | 6.5 | 2 | 3/24/2010 - 4/27/2010 | | | | | | |
| Lead, Dissolved | µg/L | ND | | | | 2 | 3/24/2010 - 4/27/2010 | | | | | | |
| Lead, Total | µg/L | 0.78 | 0.78 | 0.64 | 0.93 | 2 | 3/24/2010 - 4/27/2010 | | | | | | |

**Table 4.9-10: Deer Creek, Poso Creek, and El Paso Creek Water Quality Data Summary 2009-2012**

| Water Quality Parameters | Units | Station Name: Deer Creek at Road 120 (Station Code 558DCR120) | | | | | | Station Name: Deer Creek at Road 176 (Station Code 558DCR178) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Average | Median | Min[a] | Max[b] | N | Date Range | Average | Median | Min[a] | Max[b] | N | Date Range |
| Molybdenum, Total | µg/L | 8.9 | | | | 1 | 4/27/2010 | | | | | | |
| Nickel, Dissolved | µg/L | 1.9 | 1.9 | ND | 3.1 | 2 | 3/24/2010 - 4/27/2010 | | | | | | |
| Nickel, Total | µg/L | 1.2 | 1.2 | 1.1 | 1.4 | 2 | 3/24/2010 - 4/27/2010 | | | | | | |
| Selenium, Total | µg/L | ND | | | | 2 | 3/24/2010 - 4/27/2010 | | | | | | |
| Zinc, Dissolved | µg/L | ND | | | | 2 | 3/24/2010 - 4/27/2010 | | | | | | |
| Zinc, Total | µg/L | 11 | 11 | ND | 12 | 2 | 3/24/2010 - 4/27/2010 | | | | | | |
| **Microbial Indicators** | | | | | | | | | | | | | |
| Coliform, Fecal | MPN/100 mL | 578 | 500 | 23 | 1700 | 9 | 3/24/2010 - 4/4/2012 | 2650 | 2650 | 535 | 4765 | 2 | 3/26/2011 - 4/18/2011 |
| Coliform, Total | MPN/100 mL | 2360 | 2419 | 331 | 5450 | 18 | 3/24/2010 - 4/4/2012 | 9960 | 3710 | 2419 | 26250 | 4 | 3/26/2011 - 4/18/2011 |
| *E. coli* | MPN/100 mL | 568 | 454 | 33 | 1760 | 9 | 3/24/2010 - 4/4/2012 | 833 | 833 | 412 | 1253 | 2 | 3/26/2011 - 4/18/2011 |
| **Other Water Quality Parameters** | | | | | | | | | | | | | |
| Boron, Total | µg/L | 63 | 63 | 54 | 73 | 2 | 3/24/2010 - 4/27/2010 | | | | | | |
| **Pesticides(c)** | | | | | | | | | | | | | |
| Chlorpyrifos, Total | µg/L | 0.036 | ND | ND | 0.084 | 3 | 3/24/2010 - 4/27/2010 | | | | | | |
| Diazinon, Total | µg/L | 0.026 | ND | ND | 0.053 | 3 | 3/24/2010 - 4/27/2010 | | | | | | |
| Dichlorvos, Total | µg/L | ND | ND | ND | 0.14 | 3 | 3/24/2010 - 4/27/2010 | | | | | | |
| Phosmet, Total | µg/L | ND | ND | ND | 0.10 | 3 | 3/24/2010 - 4/27/2010 | | | | | | |
| Trifluralin, Total | µg/L | ND | ND | ND | 0.047 | 3 | 3/24/2010 - 4/27/2010 | | | | | | |

**Table 4.9-10: Deer Creek, Poso Creek, and El Paso Creek Water Quality Data Summary 2009-2012**

| Water Quality Parameters | Units | Station Name: Deer Creek at Road 120 (Station Code 558DCR120) | | | | | | Station Name: Deer Creek at Road 176 (Station Code 558DCR178) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Average | Median | Min[a] | Max[b] | N | Date Range | Average | Median | Min[a] | Max[b] | N | Date Range |

Source: Appendix T (Central Valley RWQCB ILRP, data available from CEDEN (SWRCB 2012) and STORET Data Warehouse (EPA 2014))
Notes:
Avg
[a] Minimum value calculated as the 5th percentile. When one or more result is ND, the minimum is reported as ND.
[b] Maximum value calculated as the 95th percentile.
[c] For Deer Creek at Road 120 and Deer Creek at Road 176, 76 additional pesticides were measured (N = 2 to 9) between 2009 and 2010 and were not detected. For Poso Creek at Zerker Road, 53 additional pesticides were measured (N = 1 to 3) in 2010 and were not detected. No pesticides data is reported for El Paso Creek.
Where "ND", average, median, minimum, and maximum are calculated assuming a value equal to one-half the reporting limit (RL).

Key:
Avg = Average
ILRP = Irrigated Lands Regulatory Program
Med = Median
N = number of results
ND = not detected above the method reporting limit
RWQCB = Regional Water Quality Control Board

**Table 4.9-11: Project Subarea Surface Water Quality Data Summary 2002-2012**

| Water Quality Parameters | Units | Western | | | | | Central | | | | | Eastern | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Avg | Median | Min | Max | N[a] | Avg | Median | Min | Max | N[a] | Avg | Median | Min | Max | N[a] |
| **General Water Quality** | | | | | | | | | | | | | | | | |
| Alkalinity, Total | mg/L as $CaCO_3$ | *(no data available from SWAMP or ILRP for rivers and creeks in this sub-area)* | | | | | 61 | 63 | 57 | 64 | 1 | 39 | 39 | 38 | 40 | 2 |
| Ammonia, Total | mg/L as N | | | | | | 0.16 | 0.10 | ND | 0.8 | 4 | 0.033 | 0.018 | ND | 0.23 | 5 |
| Calcium | mg/L | | | | | | 28 | 20 | 2.0 | 67 | 4 | 9.4 | 10 | 1.9 | 19 | 3 |
| Chloride | mg/L | | | | | | 5.0 | 5.1 | 3.5 | 6.4 | 1 | 3.7 | 3.7 | 3.7 | 3.7 | 2 |
| Color | color units | | | | | | 31 | 18 | 8.4 | 108 | 2 | 33 | 13 | 7.7 | 150 | 1 |
| Dissolved oxygen | mg/L | | | | | | 8.8 | 8.7 | 7.7 | 10 | 2 | 10 | 10 | 7.6 | 13 | 6 |
| Hardness | mg/L as $CaCO_3$ | | | | | | 100 | 68 | 6.5 | 250 | 4 | 24 | 13 | 6.0 | 66 | 1 |
| Magnesium, Total | mg/L | | | | | | 7.3 | 5.7 | ND | 20 | 4 | 1.6 | 1.6 | ND | 4.4 | 3 |
| Nitrate | mg/L as N | | | | | | ND | 1 | | | | ND | ND | ND | ND | 2 |
| Nitrate + Nitrite | mg/L as N | | | | | | 0.80 | 0.13 | ND | 3.4 | 4 | 0.12 | 0.07 | ND | 0.56 | 5 |
| Nitrogen, Total Kjeldahl (TKN) | mg/L | | | | | | 0.25 | 0.25 | 0.25 | 1.1 | 2 | 0.53 | 0.46 | ND | 1.90 | 6 |
| Orthophosphate, Dissolved | mg/L as P | | | | | | 0.29 | 0.30 | ND | 0.62 | 2 | 0.141 | 0.036 | ND | 0.77 | 6 |
| pH | pH units | | | | | | 8.0 | 7.9 | 7.1 | 8.8 | 3 | 8.3 | 8.5 | 7.1 | 8.8 | 6 |
| Phosphorus, Total | mg/L as P | | | | | | 0.26 | 0.16 | ND | 0.85 | 3 | 0.070 | 0.050 | ND | 0.20 | 5 |
| Sodium | mg/L | | | | | | 14 | 14 | 12 | 17 | 1 | 8.0 | 8.0 | 7.7 | 8.3 | 2 |
| Specific conductivity | µS/cm | | | | | | 171 | 165 | 21 | 332 | 3 | 190 | 146 | 20 | 481 | 6 |
| Temperature | °C | | | | | | 21 | 20 | 15 | 29 | 2 | 17 | 16 | 9 | 26 | 6 |
| Total dissolved solids (TDS) | mg/L | | | | | | 118 | 101 | 21 | 226 | 3 | 124 | 167 | 14 | 312 | 4 |
| Total organic carbon (TOC) | mg/L | | | | | | 4.4 | 4.2 | 1.1 | 8.3 | 4 | 3.0 | 2.4 | 1.0 | 6.8 | 1 |
| Total Suspended Solids | mg/L | | | | | | 83 | 28 | ND | 286 | 3 | 13 | 13 | ND | 33 | 1 |
| Turbidity | NTU | | | | | | 50 | 11 | 1.2 | 245 | 4 | 5.7 | 4.4 | 1.3 | 13 | 1 |
| **Metals[b]** | | | | | | | | | | | | | | | | |
| Arsenic, Total | µg/L | | | | | | 4.5 | 4.0 | ND | 8.3 | 3 | 1.6 | 1.6 | 1.1 | 2.2 | 1 |
| Cadmium, Dissolved | µg/L | | | | | | ND | ND | ND | ND | 3 | ND | ND | ND | 0.10 | 1 |

**Table 4.9-11: Project Subarea Surface Water Quality Data Summary 2002-2012**

| Water Quality Parameters | Units | Western | | | | | Central | | | | | Eastern | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Avg | Median | Min | Max | N[a] | Avg | Median | Min | Max | N[a] | Avg | Median | Min | Max | N[a] |
| Cadmium, Total | µg/L | | | | | | ND | ND | ND | 0.14 | 2 | ND | | | | 1 |
| Copper, Dissolved | µg/L | | | | | | 3.6 | 4.2 | ND | 9.9 | 3 | 6.5 | 3.2 | 1.7 | 18.3 | 1 |
| Copper, Total | µg/L | | | | | | 7.0 | 5.8 | 4.1 | 20.3 | 2 | 6.9 | 6.2 | 2.9 | 13.8 | 1 |
| Iron, Total | µg/L | | | | | | | | | | | 203 | 203 | 172 | 220 | 2 |
| Lead, Dissolved | µg/L | | | | | | ND | ND | ND | ND | 3 | 0.24 | ND | ND | 0.80 | 1 |
| Lead, Total | µg/L | | | | | | 0.7 | 0.7 | 0.4 | 0.9 | 2 | 1.3 | 0.68 | 0.37 | 4.2 | 1 |
| Manganese, Total | µg/L | | | | | | | | | | | 45 | 45 | 44 | 46 | 2 |
| Molybdenum, Total | µg/L | | | | | | 5.2 | 4.5 | ND | 8.9 | 2 | 1.3 | ND | ND | 3.9 | 1 |
| Nickel, Dissolved | µg/L | | | | | | 0.9 | 0.9 | ND | 3.1 | 3 | ND | ND | ND | 1.6 | 1 |
| Nickel, Total | µg/L | | | | | | 1.1 | 1.2 | 1.1 | 2.8 | 2 | ND | 1.0 | ND | 1.5 | 1 |
| Selenium, Total | µg/L | | | | | | ND | ND | ND | ND | 3 | ND | | | | 1 |
| Zinc, Dissolved | µg/L | | | | | | ND | ND | ND | ND | 3 | ND | ND | ND | 11 | 1 |
| Zinc, Total | µg/L | | | | | | 10.6 | 10.9 | ND | 18.3 | 2 | 13 | ND | ND | 24 | 1 |
| **Microbial Indicators** | | | | | | | | | | | | | | | | |
| Coliform, Fecal | MPN/100 mL | | | | | | 372 | 290 | 22 | 1,700 | 2 | 496 | 26 | 2 | 4,765 | 5 |
| Coliform, Total | MPN/100 mL | | | | | | 2,013 | 2,310 | 300 | 5,450 | 2 | 2,059 | 180 | 8 | 26,250 | 5 |
| *E. Coli* | MPN/100 mL | | | | | | 334 | 255 | 8 | 1,760 | 2 | 189 | 17 | 2 | 1,253 | 5 |
| **Other Water Quality Parameters** | | | | | | | | | | | | | | | | |
| Boron | µg/L | | | | | | 62 | 63 | ND | 156 | 3 | 4.8 | 0.75 | ND | 27 | 3 |

Source: Appendix S (SWAMP and ILRP monitoring data available from CEDEN database (SWRCB 2012); KCWA 2011b, 2012, 2013, 2014)
Notes:
Statistics are calculated based on the composite historical results for each monitoring location, e.g., AVERAGE (average alkalinity for Station No. 1, average alkalinity for Station No. 2, etc.), MIN(minimum alkalinity for Station No. 1, minimum alkalinity for Station No. 2), etc.
MPN: Most Probable Number
For calculating statistics, ND is assumed to equal 1/2 RL if known or zero if unknown. Blank cells indicate data is not available.

[a] N is the number of monitoring stations on rivers or creeks in this geographic sub-area that have information on the indicated water quality parameter. In cases where N = 1, the average, median, minimum, and maximum are based on the historic results for the site from multiple sampling events. If N = 1 and there has been only one sampling event at the site, the (single) result is shown in place of the average (with no value for median, min, or max).

[b] Metals concentrations for Kern River reported by KCWA ( 2011b, 2012, 2013, 2014) are assumed to be dissolved metals except arsenic is assumed to be total arsenic (site located in Central Groundwater Basin sub-area).

**Table 4.9-12: Project Subarea Surface Water Quality Data Summary 1951-1991**

| Water Quality Parameters | Units | Western | | | | | Central | | | | | Eastern | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Avg | Median | Min | Max | N[a] | Avg | Median | Min | Max | N[a] | Avg | Median | Min | Max | N[a] |
| **General Water Quality** | | | | | | | | | | | | | | | | |
| Alkalinity, Total | mg/L as $CaCO^3$ | 190 | 192 | 99 | 305 | 8 | 139 | | | | 1 | 151 | 123 | 29 | 523 | 12 |
| Ammonia, Total | mg/L as N | 0.12 | 0.0 | 0.0 | 0.99 | 2 | | | | | | 0.0004 | 0.0002 | 0.0 | 0.001 | 3 |
| Calcium | mg/L | 339 | 469 | 14 | 591 | 8 | 45 | | | | 1 | 46 | 26 | 0.0 | 288 | 11 |
| Chloride | mg/L | 226 | 108 | 38 | 922 | 9 | 229 | | | | 1 | 76 | 41 | 2.0 | 382 | 11 |
| Dissolved oxygen | mg/L | 0.2 | 0.2 | 0.1 | 0.4 | 2 | | | | | | | | | | |
| Hardness | as $^3$ | 1282 | 1620 | 59 | 3590 | 9 | 135 | | | | 1 | 198 | 92 | 24 | 1102 | 11 |
| Magnesium, Total | mg/L | 136 | 80 | 4.4 | 589 | 8 | 5.7 | | | | 1 | 18 | 6.0 | 1.0 | 115 | 11 |
| Nitrate | mg/L as N | 4.2 | 1.3 | 0.2 | 21 | 8 | 0.1 | | | | 1 | 0.62 | 0.23 | 0.0 | 3.6 | 11 |
| Nitrate + Nitrite | mg/L as N | | | | | | | | | | | 0.16 | 0.17 | 0.01 | 0.47 | 5 |
| Nitrogen, Total Kjeldahl (TKN) | mg/L | 0.19 | 0.17 | 0.10 | 0.38 | 2 | | | | | | 0.38 | 0.30 | 0.21 | 0.60 | 3 |
| Orthophosphate, Dissolved | mg/L as P | 0.007 | 0.005 | 0.002 | 0.018 | 2 | | | | | | 0.04 | 0.03 | 0.0 | 0.13 | 5 |
| pH | pH units | 7.2 | 7.1 | 6.7 | 7.8 | 9 | 8.3 | | | | 1 | 7.7 | 7.7 | 7.0 | 8.4 | 12 |
| Phosphorus, Total | mg/L as P | 5.4 | 0.1 | 0.0 | 22 | 2 | | | | | | 0.10 | 0.05 | 0.02 | 0.27 | 5 |
| Sodium | mg/L | 519 | 422 | 96 | 1170 | 8 | 96 | | | | 1 | 84 | 28 | 6.3 | 365 | 11 |
| Specific conductivity | µS/cm | 3923 | 3875 | 628 | 8320 | 8 | 1050 | | | | 1 | 665 | 368 | 81 | 2652 | 12 |
| Temperature | °C | 6.1 | 6.2 | -0.6 | 12.9 | 2 | | | | | | 16 | 16 | 3.0 | 26 | 9 |
| Total dissolved solids (TDS) | mg/L | 49 | 43 | 10 | 108 | 2 | | | | | | | | | | |
| Turbidity | NTU | 5.2 | 2.6 | 1.0 | 22 | 2 | | | | | | | | | | |
| **Metals[b]** | | | | | | | | | | | | | | | | |
| Arsenic, Dissolved | µg/L | | | | | | *(no metals data available from EPA STORET for rivers and creeks in this sub-area)* | | | | | 5.0 | 0.0 | 0.0 | 16 | 1 |
| Arsenic, Total | µg/L | 2.9 | 2.5 | 0.0 | 6.8 | 3 | | | | | | | | | | |
| Cadmium, Dissolved | µg/L | | | | | | | | | | | 0.0 | 0.0 | 0.0 | 0.0 | 1 |
| Cadmium, Total | µg/L | 0.49 | 0.49 | 0.34 | 0.73 | 2 | | | | | | | | | | |
| Copper, Dissolved | µg/L | | | | | | | | | | | 0.9 | 0.0 | 0.0 | 5.0 | 1 |

**Table 4.9-12: Project Subarea Surface Water Quality Data Summary 1951-1991**

| Water Quality Parameters | Units | Western | | | | | Central | | | | | Eastern | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Avg | Median | Min | Max | N[a] | Avg | Median | Min | Max | N[a] | Avg | Median | Min | Max | N[a] |
| Copper, Total | µg/L | 1.4 | 0.85 | 0.29 | 4.7 | 2 | | | | | | 0.0 | 1 | | | |
| Iron, Dissolved | µg/L | | | | | | | | | | | 34 | 20 | 0.0 | 90 | 1 |
| Iron, Total | µg/L | 126 | 160 | 0.0 | 274 | 3 | | | | | | 335 | 335 | 331 | 340 | 1 |
| Lead, Dissolved | µg/L | | | | | | | | | | | 0.0 | 0.0 | 0.0 | 0.0 | 1 |
| Lead, Total | µg/L | 0.33 | 0.39 | 0.0 | 0.73 | 3 | | | | | | | | | | |
| Manganese, Dissolved | µg/L | | | | | | | | | | | 6.0 | 5.0 | 0.0 | 16 | 1 |
| Selenium, Total | µg/L | | | | | | | | | | | 6.0 | 0.0 | 0.0 | 20 | 1 |
| Zinc, Dissolved | µg/L | | | | | | | | | | | 3.3 | 0.0 | 0.0 | 15 | 1 |
| Zinc, Total | µg/L | | | | | | | | | | | 10 | | | | 1 |
| **Other Water Quality Parameters** | | | | | | | | | | | | | | | | |
| Boron | µg/L | 1500 | 1600 | 400 | 3200 | 8 | 900 | | | | 1 | 404 | 200 | 0.0 | 1560 | 11 |

Source: Appendix S (EPA STORET Legacy Data Center (for data before January 1, 1999))
Notes:
Statistics are calculated based on the composite historical results for each monitoring location, e.g., average alkalinity for Station No. 1, average alkalinity for Station No. 2, etc.), MIN(minimum alkalinity for Station No. 1, minimum alkalinity for Station No. 2, etc.).
Values of "0.0" are as shown in the data source and likely indicate non-detect (ND). Blank cells indicate data is not available.

[a] N is the number of monitoring stations on rivers or creeks in this geographic sub-area that have information on the indicated water quality parameter. In cases where N = 1, the average, median, minimum, and maximum are based on the historic results for the site from multiple sampling events. If N = 1 and there has been only one sampling event at the site, the (single) result is shown in place of the average (with no value for median, min, or max).

**Table 4.9-13: Central Valley Project Water Quality in Friant-Kern Canal and Kern River Water Quality near Bakersfield, CA, 2010-2013**

| Water Quality Parameters | Units | Friant-Kern Canal, 2010 – 2013[a] | | | | | Kern River, 2010 - 2013[a] | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Avg | Median | Min[b] | Max[c] | N[d] | Avg | Median | Min[b] | Max[c] | N[d] |
| **General Water Quality** | | | | | | | | | | | |
| Alkalinity, Total | mg/L as $CaCO_3$ | 49 | 45 | 20 | 83 | 4 | 61 | 63 | 57 | 64 | 4 |
| Ammonia | mg/Las N | ND | | | | 4 | 0.019 | 0.012 | ND | 0.050 | 4 |
| Bicarbonate | mg/L | 56 | 47 | 25 | 99 | 4 | 75 | 76 | 69 | 78 | 4 |
| Calcium | mg/L | 17 | 13 | 4.9 | 34 | 4 | 14 | 15 | 13 | 16 | 4 |
| Carbonate | mg/L | 3.0 | ND | ND | 10 | 4 | ND | | | | 4 |
| Chloride | mg/L | 25 | 16 | 2.2 | 61 | 4 | 5.0 | 5.1 | 3.5 | 6.4 | 4 |
| Color | Units | 17 | 15 | 11 | 24 | 4 | 21 | 20 | 16 | 29 | 4 |
| Hardness, Total | mg/L as | 51 | 46 | 13 | 94 | 4 | 47 | 48 | 42 | 51 | 4 |
| Magnesium | mg/L | 2.2 | 1.5 | 0.16 | 5.1 | 4 | 2.7 | 2.7 | 2.5 | 3.0 | 4 |
| Nitrate + Nitrite | mg/L as N | 0.66 | 0.31 | ND | 1.8 | 4 | ND | | | | 4 |
| Nitrate | mg/L as N | 0.7 | 0.3 | ND | 1.8 | 4 | ND | | | | 4 |
| Nitrite | mg/L as N | ND | | | | 4 | ND | | | | 4 |
| pH | Units | 8.1 | 8.0 | 7.6 | 8.9 | 4 | 7.9 | 7.9 | 7.8 | 7.9 | 4 |
| Phosphate | mg/L | ND | | | | 4 | ND | | | | 4 |
| Potassium | mg/L | 1.3 | 1.2 | 1.1 | 3.0 | 4 | 1.9 | 1.9 | 1.8 | 12.0 | 4 |
| Sodium | mg/L | 20 | 15 | 4.5 | 2.8 | 4 | 14 | 14 | 12 | 17 | 4 |
| Specific Conductance | µS/cm | 213 | 198 | 54 | 227 | 4 | 169 | 165 | 156 | 189 | 4 |
| Sulfate | mg/L | 16 | 14 | 1.3 | 34 | 4 | 13 | 13 | 8.5 | 18 | 4 |
| Total Dissolved Solids (TDS) | mg/L | 129 | 122 | 40 | 393 | 4 | 102 | 101 | 96 | 109 | 4 |
| Total Organic Carbon | mg/L | 2.0 | 2.3 | 0.72 | 41 | 4 | 2.6 | 2.5 | 2.1 | 3.3 | 4 |
| Turbidity | NTU | 1.6 | 1.4 | 0.56 | 1.7 | 4 | 6.1 | 6.4 | 3.4 | 8.4 | 4 |
| **Metals** | | | | | | | | | | | |
| Aluminum | µg/L | ND | 91 | 10 | 160 | 4 | 335 | 299 | 235 | 485 | 4 |
| Antimony | µg/L | 87 | | | | 4 | ND | | | | 4 |
| Arsenic | µg/L | 1.0 | ND | ND | 3.4 | 4 | 3.8 | 4.0 | 3.2 | 4.0 | 4 |
| Barium | µg/L | ND | | | | 4 | ND | | | | 4 |
| Beryllium | µg/L | ND | | | | 4 | ND | | | | 4 |
| Cadmium | µg/L | ND | | | | 4 | ND | | | | 4 |

**Table 4.9-13: Central Valley Project Water Quality in Friant-Kern Canal and Kern River Water Quality near Bakersfield, CA, 2010-2013**

| Water Quality Parameters | Units | Friant-Kern Canal, 2010 – 2013[a] | | | | | Kern River, 2010 - 2013[a] | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Avg | Median | Min[b] | Max[c] | N[d] | Avg | Median | Min[b] | Max[c] | N[d] |
| Chromium | µg/L | 0.25 | ND | ND | 0.85 | 4 | 0.25 | ND | ND | 0.85 | 4 |
| Chromium (Hexavalent) | µg/L | 0.25 | ND | ND | 0.85 | 4 | ND | | | | 4 |
| Copper | µg/L | ND | | | | 4 | ND | | | | 4 |
| Iron | µg/L | 79 | 69 | ND | 172 | 4 | 436 | 408 | 208 | 701 | 4 |
| Lead | µg/L | ND | | | | 4 | ND | | | | 4 |
| Manganese | µg/L | ND | | | | 4 | 37 | 38 | 33 | 41 | 4 |
| Mercury | µg/L | ND | | | | 4 | ND | | | | 4 |
| Nickel | µg/L | ND | | | | 4 | ND | | | | 4 |
| Selenium | µg/L | ND | | | | 4 | ND | | | | 4 |
| Silver | µg/L | ND | | | | 4 | ND | | | | 4 |
| Thallium | µg/L | ND | | | | 4 | ND | | | | 4 |
| Zinc | µg/L | ND | | | | 4 | ND | | | | 4 |
| **Other Water Quality Parameters** | | | | | | | | | | | |
| Asbestos | MFL | ND | | | | 4 | ND | | | | 4 |
| Boron | mg/L | 0.078 | 0.075 | ND | 0.16 | 4 | 0.11 | 0.13 | 0.02 | 0.16 | 4 |
| Bromide | mg/L | 0.088 | 0.055 | ND | 0.22 | 4 | 0.013 | 0.015 | 0.0015 | 0.020 | 4 |
| Cyanide | mg/L | ND | | | | 4 | ND | | | | 4 |
| Fluoride | mg/L | 0.10 | 0.08 | ND | 0.21 | 4 | .24 | 0.24 | 0.21 | 0.28 | 4 |
| Foaming Agents (MBAS) | mg/L | ND | | | | 4 | 0 | | | | 4 |
| Methyl tert-butyl ether | mg/L | ND | | | | 4 | ND | | | | 4 |
| Odor | Units | 5.3 | 6.0 | 3.5 | 6.0 | 4 | ND | 5.0 | 3.2 | 6.0 | 4 |
| Perchlorate | mg/L | ND | | | | 4 | 4.8 | | | | 4 |
| Silica | mg/L | 15 | 15 | 12 | 19 | 4 | ND | 5.7 | 4.2 | 16 | 4 |
| Thiobencarb | mg/L | ND | | | | 4 | 8.2 | | | | 4 |
| Unregulated Volatile Organics[e] | mg/L | ND | | | | 4 | ND | | | | 4 |
| Unregulated Non-Volatile Synthetic Organics[f] | mg/L | ND | | | | 4 | ND | | | | 4 |
| Gross Alpha | pCi/L | 0.91 | ND | ND | 3.1 | 4 | ND | ND | ND | 2.0 | 4 |
| Gross Beta | mrem/yr | ND | | | | 4 | 0.60 | | | | 4 |

**Table 4.9-13: Central Valley Project Water Quality in Friant-Kern Canal and Kern River Water Quality near Bakersfield, CA, 2010-2013**

| Water Quality Parameters | Units | Friant-Kern Canal, 2010 – 2013[a] | | | | | Kern River, 2010 - 2013[a] | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Avg | Median | Min[b] | Max[c] | N[d] | Avg | Median | Min[b] | Max[c] | N[d] |
| Radium 226 | pCi/L | 0.36 | ND | ND | 12 | 4 | ND | ND | ND | 0.88 | 4 |
| Radium 226 + Radium 228 | pCi/L | ND | | | | 4 | 0.26 | | | | 4 |
| Radium 228 | pCi/L | ND | | | | 4 | 0.46 | ND | ND | 1.5 | 4 |
| Strontium-90 | pCi/L | ND | | | | 4 | ND | | | | 4 |
| Tritium | pCi/L | ND | | | | 4 | ND | | | | 4 |
| Uranium | pCi/L | 0.77 | ND | ND | 2.6 | 4 | 1.6 | 1.5 | 1.5 | 1.9 | 4 |
| **SDWA Regulated Constituents[g]** | | | | | | | | | | | |
| Regulated Volatile Organics[h] | mg/L | ND | | | | 4 | ND | | | | 4 |
| Regulated Non-Volatile Synthetic Organics[i] | mg/L | ND | | | | 4 | ND | | | | 4 |

Sources: Appendix S from KCWA 2011b, 2012, 2013, 2014

Notes:

[a] Statistics calculated based on four years of reported data. Where "ND", average, median, minimum, and maximum assume a concentration of zero (no reporting limit provided by data source).

[b] Minimum values calculated as 5th percentile. When one or more result is ND, the minimum is reported as ND.

[c] Maximum values calculate as 95th percentile.

[d] N = 4 based on four reports (KCWA 2011b; 2012; 2013; 2014) that each reported a single value for each parameter. The reports did not indicate whether the result was based on multiple measurements.

[e] 35 compounds were measured and were not detected. Complete list available from KCWA ( 2011b; 2012; 2013; 2014).

[f] 20 compounds were measured and were not detected. Complete list available from KCWA ( 2011b; 2012; 2013; 2014).

[g] Some parameters listed under above categories are also regulated by the SDWA.

[h] 27 compounds were measured and were not detected. Complete list available from KCWA ( 2011b; 2012; 2013; 2014). (i) 33 compounds were measured and were not detected. Complete list available from KCWA ( 2011b; 2012; 2013; 2014).

Key:

MFL = million fibers per liter
mrem/yr = millirems per year
ND = not detected
NTU = nephelometric turbidity units
pCi/L = picocuries per liter
SDWA = Safe Drinking Water Act

**Table 4.9-14: State Water Project Water Quality in California Aqueduct at Kettleman City, CA, 2004-2014**

| Water Quality Parameters | Units | Station Code: KA017226/Kettleman CK-21 | | | | |
|---|---|---|---|---|---|---|
| | | Average | Median | Min[a] | Max[b] | N |
| **General Water Quality** | | | | | | |
| **Alkalinity, Total** | mg/L as $CaCO_3$ | 72 | 73 | 47 | 90 | 124 |
| Ammonium | mg/L as N | 0.016 | 0.010 | ND | 0.040 | 118 |
| Calcium | mg/L | 19 | 19 | 13 | 27 | 121 |
| Chloride | mg/L | 72 | 74 | 27 | 114 | 123 |
| Dissolved Organic Carbon | mg/L | 3.4 | 3.1 | 2.2 | 5.6 | 122 |
| Dissolved oxygen (field) | mg/L | 9.3 | 9.3 | 7.3 | 11.6 | 121 |
| Hardness | mg/L as $CaCO_3$ | 99 | 101 | 60 | 140 | 121 |
| Magnesium | mg/L | 12 | 13 | 7 | 18 | 121 |
| Nitrate + Nitrite | mg/L as N | 0.57 | 0.51 | 0.09 | 1.30 | 121 |
| Nitrate | mg/L as N | 0.56 | 0.53 | 0.11 | 1.26 | 123 |
| Nitrogen, Total Kjeldahl | mg/L as N | 0.37 | 0.40 | 0.200 | 0.70 | 118 |
| Orthophosphate, Dissolved | mg/L as P | 0.067 | 0.060 | 0.05 | 0.100 | 121 |
| pH (field) | pH units | NA | 7.8 | 7.0 | 8.4 | 123 |
| Phosphorus, Total | mg/L as P | 0.092 | 0.090 | 0.060 | 0.14 | 118 |
| Sodium | mg/L | 51 | 52 | 23 | 76 | 121 |
| Specific Conductivity | µS/cm | 455 | 477 | 244 | 623 | 124 |
| Sulfate | mg/L | 36 | 35 | 9 | 61 | 123 |
| Temperature (field) | ° C | 18 | 17 | 1 | 25 | 123 |
| Total dissolved solids (TDS) | mg/L | 257 | 272 | 9.5 | 361 | 127 |
| Total organic carbon | mg/L | 3.6 | 3.3 | 142 | 6.1 | 192 |
| Total suspended solids | mg/L | 5.0 | 4.0 | 2.3 | 15.0 | 128 |
| Turbidity (field) | NTU | 5.4 | 3.9 | ND | 13 | 123 |
| **Metals** | | | | | | |
| Aluminum, Total | µg/L | 104 | 87 | 24 | 248 | 33 |
| Antimony, Dissolved | µg/L | ND | | | | 118 |
| Antimony, Total | µg/L | ND | | | | 33 |
| Arsenic, Dissolved | µg/L | 2.1 | 2.0 | ND | 3.0 | 121 |
| Arsenic, Total | µg/L | 2.0 | 2.0 | ND | 3.0 | 33 |
| Barium, Total | µg/L | 30 | 29 | 25 | 39 | 33 |
| Beryllium, Dissolved | µg/L | ND | | | | 118 |
| Beryllium, Total | µg/L | ND | | | | 33 |

**Table 4.9-14: State Water Project Water Quality in California Aqueduct at Kettleman City, CA, 2004-2014**

| Water Quality Parameters | Units | Station Code: KA017226/Kettleman CK-21 | | | | |
|---|---|---|---|---|---|---|
| | | Average | Median | Min[a] | Max[b] | N |
| Cadmium, Total | µg/L | ND | | | | 33 |
| Chromium, Dissolved | µg/L | 1.1 | ND | ND | 3.0 | 121 |
| Chromium, Total | µg/L | ND | | | | 33 |
| Copper, Dissolved | µg/L | 1.6 | 2.0 | ND | 2.0 | 121 |
| Copper, Total | µg/L | 1.7 | 2.0 | ND | 2.0 | 33 |
| Iron, Dissolved | µg/L | 9.7 | ND | ND | 30 | 121 |
| Iron, Total | µg/L | 153 | 122 | 32 | 382 | 33 |
| Lead, Dissolved | µg/L | ND | | | | 121 |
| Lead, Total | µg/L | ND | | | | 33 |
| Manganese, Dissolved | µg/L | ND | ND | ND | 5.0 | 121 |
| Manganese, Total | µg/L | 20 | 16 | 6 | 49 | 33 |
| Nickel, Dissolved | µg/L | 1.1 | ND | ND | 2.0 | 118 |
| Nickel, Total | µg/L | 1.6 | 2.0 | 1.0 | 2.0 | 33 |
| Selenium, Dissolved | µg/L | ND | ND | ND | 2.0 | 122 |
| Selenium, Total | µg/L | ND | ND | ND | 2.0 | 33 |
| Silver, Total | µg/L | ND | | | | 33 |
| Zinc, Dissolved | µg/L | ND | | | | 121 |
| Zinc, Total | µg/L | ND | ND | ND | 8.2 | 33 |
| **Other Water Quality Parameters** | | | | | | |
| Boron | mg/L | 0.16 | 0.20 | 0.05 | 0.30 | 121 |
| Bromide | mg/ | 0.23 | 0.22 | 00.07 | 0.40 | 123 |
| Fluoride | L | ND | | | | 48 |
| **SDWA Regulated Constituents[c]** | | | | | | |
| ***Primary drinking water standards*** | | | | | | |
| Disinfection Byproducts (DBPs)[d] | µg/L | ND | | | | 30 |
| Organics[e] | µg/L | ND | | | | 30 |
| 2,4-D | µg/L | ND | ND | ND | 0.16 | 30 |
| Simazine | µg/L | 0.029 | ND | ND | 0.097 | 30 |

**Table 4.9-14: State Water Project Water Quality in California Aqueduct at Kettleman City, CA, 2004-2014**

| Water Quality Parameters | Units | Station Code: KA017226/Kettleman CK-21 | | | | |
|---|---|---|---|---|---|---|
| | | Average | Median | Min[a] | Max[b] | N |

Source: Appendix S from DWR 2014
Notes:
[a] Minimum value calculated as the 5th percentile. When one or more result is ND, the minimum is reported as ND.
[b] Maximum value calculated as the 95th percentile.
[c] Some parameters listed under General Water Quality and Metals are regulated by the SDWA.
[d] Trihalomethanes only.
[e] Results from regulated organics were below reporting limit except 2,4-D and Simazine.
Where "ND", average, median, minimum, and maximum are calculated assuming a value equal to one-half the reporting limit (RL).
Key:
N = number of results
NA = not applicable
ND = not detected above the method reporting limit
SDWA = Safe Drinking Water Act

Although TDS levels in SWP and CVP imported water are relatively low, the Tulare Lake Basin Plan states that the Project Area is a generally closed hydrological basin with little surface and subsurface outflow. As a result, salts contained in imported water remain and accumulate within due to imported water. The Basin Plan indicates that the paramount water quality problem in the Project Area is the accumulation of salts (CVRWQCB 2004).

## Surface Water Quality and Existing Oil and Gas Operations

There have been no studies or reports indicating that current oilfield activities significantly affect Project Area surface water quality. Several decades ago, produced water from major Project Area oilfields was discharged into local watercourses, including the Kern River (Christie 1999). Subsequently enacted state and federal laws prohibit the discharge of solid wastes or fluids associated with oil and gas exploration and production into surface waters, except as may be allowed by an applicable permit. A review of publicly available discharge permits issued by the CVRWQCB did not identify any currently applicable permitted direct discharges of produced water or other materials associated with oil and gas exploration or production into Project Area surface waters. In 2007, the CVRWQCB issued waste discharge requirements (WDRs), a form of discharge permit under state law, for the discharge of up to 1.68 million gallons per day of treated produced water into an ephemeral tributary of Poso Creek. The permit was rescinded in 2013, and the produced water is now injected into wells regulated under the UIC program for EOR purposes or disposal (CVRWQCB 2013c, Order R5-2013-0087).

As discussed in Section 4.9.3, Regulatory Setting, to address chronic water supply concerns in arid portions of the country, regulations adopted under the federal CWA allow produced water that meets specified criteria to be used for agricultural or wildlife propagation purposes in onshore locations west of the 98th meridian (which extends through central Texas, Oklahoma, Nebraska, Kansas, and North and South Dakota east of the Rock Mountains). In 2007, the CVRWQCB issued WDRs for the delivery and blending of treated produced water to the Cawelo Water District in the eastern project Subarea for agricultural irrigation. The 2007 WDRs allowed for the discharge of the blended and treated produced water into certain canals and reservoirs

regulated by the CVRWQCB, and also for discharge into the Poso Creek system when supplies exceeded irrigation demand. In 2011, the CVRWQCB determined that the blended produced water discharges into the Poso Creek system exceeded applicable WDR arsenic concentration limits (CVRWQCB Order R5-2011-0900). In response, discharges of blended produced water to the Poso Creek system were eliminated by routing any excess supplies by pipeline to percolation ponds managed by the Famoso Groundwater Banking Project. In 2012, the CVRWQCB issued revised WDRs for the use of the Famoso facilities and determined that arsenic in the blended produced water would be retained in the soil surfaces of the percolation facility, and would not change or degrade groundwater quality (CVRWQCB Order R5-2012-0058).

Produced water is not currently used for agriculture or wildlife propagation in the Western or Central portions of the Project Area. The Kern-Tulare Water District has proposed to use 8,000 AF per year of treated produced water in the Western Subarea. A California Environmental Quality Act (CEQA) notice of preparation (NOP) for an EIR that will address potential environmental impacts related to the proposed produced water use was published in 2015 (SCH Number: 2015021024) (CEQAnet.ca.gov).The EIR will be prepared by the district. Additional use of treated produced water has been considered, but has not yet been formally proposed, in other Project Area locations, partially in response to the prolonged drought that has affected California and other portions of the western United States.

Well installation, drilling and related construction activities can result in the discharge of drilling mud and fluids to land surfaces around and adjacent to a well if the construction does not utilize a closed-loop system that captures and recirculates muds and fluids in portable storage tanks. Drilling muds and fluids in other construction operations are typically impounded in unlined, shallow ponds constructed adjacent to a well. Several constituents are used during the drilling process for lubrication, well stability, and mud evacuation, among other purposes. Table 4.9-15 lists the common chemicals used in Project Area oil and during gas well drilling operations.

**Table 4.9-15: Chemicals Commonly Used in Drilling Fluid in Project Area**

| **Ingredients**[a] | |
|---|---|
| Water | Marble White |
| Asphsol Supreme | MDC |
| Barite | MI Gel |
| Calcium Carbonates | MI Wate |
| CF Desco II | Mix II F, M, C |
| Citric Acid | PolyPac |
| CleanFaze | PolyPlus |
| Cottonseed Hulls and Pellets | PolySwell |
| Defoam X and A | Potassium Chloride |
| DrilZone L | PowerVis |
| D-Solver | PrimaSeal |

**Table 4.9-15: Chemicals Commonly Used in Drilling Fluid in Project Area**

| **Ingredients**[a] | |
|---|---|
| DualFlo | SafeCarb |
| DuoVis | SAPP |
| FloVis Plus | Sawdust |
| Gelex | Soda Ash |
| Gelite | Sodium Bicarbonate |
| G-Seal Plus | Sodium Chloride |
| KlaStop | SP-101 |
| Kwik-Seal | Tannathin |
| Lime | ThruTrol |
| MagmaFiber | VinSeal |
| MagOx | Walnut Shell |
| | WellZyme A |

Source: Appendix S
Note:
[a] As reported by Chevron USA

For several years, the CVRWQCB included oil and gas well drilling discharges as one of several Project Area activities that were considered to pose a low threat to water quality and for which requirements to file a report of waste discharge were waived. In 2013, the CVRWQCB declined to extend the waiver for the discharge of oil and gas-related drilling muds and fluids (CVRWQCB Resolution R5-2013-0145). In response, oil and gas well construction in the Project Area either utilize closed-loop systems that avoid any discharge of drilling muds and fluids, or obtain regulatory coverage under SWRCB General Order 2003-0003-DWQ, which addresses low-threat discharges to land (SWRCB 2003). The SWRCB maintains a list of Project Area and other oil and gas operators enrolled under General Order 2003-0003-DWQ (SWRCB 2015a). DOGGR maintains online copies of the CEQA documentation for oil and gas well permits approved since 2010 that include closed loop drilling systems for several well construction projects in the Project Area (DOGGR 2015b).

The SWRCB has adopted a statewide General National Pollutant Discharge Elimination System (NPDES) Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (the General Construction General Permit) (WQ Order No. 2009-0009–DWQ, as modified by 2010-0014-DWQ and 2012-006-DWQ) and a statewide General NPDES Permit for Storm Water Discharges Associated with Industrial Activities (Industrial General Permit) (Order 97-03-DWQ, expiring June 30, 2015, and Order 2014-0057-DWQ [effective July 1, 2015]). Where applicable, the Construction General Permit and the Industrial General Permit require the preparation of a stormwater pollution prevention plan (SWPPP), the implementation of BMPs, and other monitoring and management measures to reduce water quality impacts that could result from discharges of contaminated stormwater from the covered activities. Oil and gas

exploration, construction and operational activities are subject to these general permits, with some exceptions as discussed below.

Under the CWA, stormwater runoff from oil and gas operations is exempt from the NPDES permitting requirements so long as: (1) it is composed entirely of "flows which are from conveyances or systems of conveyances" (i.e., pipes, conduits, ditches, and channels) used for the collection of runoff; and (2) it is not contaminated by and has not come into contact with "any overburden, raw material, intermediate products, finished product, byproduct, or waste products located on the site of such operations" CWA Section 402(*l*)(2). As a result of legislative and regulatory developments and related legal challenges over the past 10 years (described in Section 4.9.3, Regulatory Setting), the EPA interprets this exemption to apply only if there have been no reportable discharges of hazardous substances or of harmful quantities of oil from the facility; and the runoff does not contribute to a violation of a water quality standard, as determined through the application of best available technology. Based on these highly restrictive conditions for exemption, most construction–related stormwater discharges from oil and gas construction sites that are one acre in size or more are subject to the Construction General Permit. Sites that are very small (less than one acre in size and not part of a "common plan" disturbing more than one acre) and that are determined to have no potential to contribute to a water quality standards violation are exempt from the Construction General Permit. None of these exemptions is self-executing, meaning that a discharger in the Project Area must obtain a waiver or exemption from the CVRWQCB. The SWRCB summarizes stormwater construction activity associated with oil and gas exploration online (SWRCB 2015b). An EPA Fact Sheet addressing permitting requirements for oil and gas stormwater discharges is available online (EPA 2009).

Oil and gas production and exploration coverage under and compliance with the Construction General Permit varies significantly by individual operator and facility throughout the Project Area, depending on the size and nature of the construction activity and the physical setting of each site, including its proximity and hydrologic connection to waters of the United States). DOGGR maintains online copies of the CEQA documentation for several oil and gas well permits approved since 2010 showing that several permitted activities in the Project Area were considered to be exempt or subject to waiver from some or all of the Construction General Permit requirements (DOGGR 2015b).

Oil and gas operations are considered "industrial activities" and are subject to the Industrial General Permit. In appropriate circumstances, an operator may apply reduce or avoid compliance requirements by filing and certifying a notice of non-applicability (NONA) supported by No Discharge Technical Report prepared by a state-licensed engineer. Oil and gas facilities may qualify for a NONA if they are: (1) engineered and constructed to contain the maximum historic precipitation event (or series of events) so that there will be no discharge of industrial stormwater to waters of the United States; or (2) located in basins or other physical locations that are not hydrologically connected to waters of the United States. As discussed in Section 4.4, Biological Resources, the regulatory definition of "waters of the United States," in general, and the delineation of any such waters in the Project Area under the existing and proposed new rules, is also subject to significant and ongoing legal uncertainty. As a result, the extent to which oil and

gas production and exploration activities in the Project Area must obtain coverage under and comply with the Industrial General Permit is evolving.

## Groundwater Quality Data

Groundwater quality data for the Project Area and each Subarea was obtained by utilizing the most recent legislatively mandated study (SWRCB 2013) of impaired drinking water wells maintained by the California Department of Public Health, summaries of two Groundwater Ambient Monitoring and Assessment (GAMA) well water quality research reports prepared by the USGS (Shelton et al. 2008; Burton et al. 2012), and an analysis of available online water quality sampling results for shallower and deeper wells in the Project Area during 2007 through 2012. As discussed above, a generally impermeable clay layer located primarily in the Western and Central Subareas physically divides many Project Area groundwater resources from deeper oil-bearing reservoirs. According to the California Water Plan Update 2013 (DWR 2013), human activities have generally not affected water quality in the deeper San Joaquin valley aquifers, including groundwater located under the regional clay layer. Evidence of anthropogenically related constituents is more likely to be detected in shallower groundwater zones throughout the valley and above the clay layer.

Oil and gas activity groundwater impacts were analyzed in a 1989 DOGGR study, which concluded that many constituents know to occur in oilfield produced water and other wastes, such as carbonates, bicarbonates, hydroxides, borates, silicates, phosphates, and organic substances, are also associated with municipal sewage and many industrial wastes. Groundwater quality in the Project Area has been affected by the use of imported water, overdraft, and soil salt that increase net TDS loads to surface soils, present and past climate conditions, and by the rocks and sediments that come into contact with water. The DOGGR report noted that produced oilfield water seldom contains significant or detectable amounts of ammonia, nitrate, heavy metals or phosphate, while agricultural activity, including the application of fertilizers and pesticides, do not generally contain high amounts of boron or chloride. Consequently, elevated boron or chloride levels could indicate oil and gas production and exploration activity impacts to groundwater. However, the DOGGR study also found that these constituents were detected in high concentrations in locations where no historical groundwater injection or production has occurred (Mitchell 1989). As a result, the analysis concluded that elevated boron and chloride can occur in Kern County from sources other than oil and gas production and exploration activities.

The federal secondary MCL for chloride is 250 mg/L. Secondary MCLs are based on consumer acceptance and are not enforced by the federal government. No primary or secondary MCL has been established for boron. The California Department of Public Health (CDPH) has adopted health-based advisory notification levels for chemicals in drinking water that are not subject to an MCL. The notification level for boron is 1,000 micrograms per liter, or 1 mg/L.

California Water Code Section 10782 required the SWRCB to prepare and submit a report to the California legislature identifying communities that rely on contaminated groundwater as a primary source of drinking water. The SWRCB completed the report in January 2013, which included an analysis of wells within the Project Area that did not meet at least one drinking water

MCL on two occasions during 2002 through 2010 (SWRCB 2013). Appendix S, Table 3-10 summarizes the results of the study for wells in the Project Area. As noted by the SWRCB in the report, over 98% of Californians that are served by public water suppliers are provided with safe drinking water. Although many water suppliers draw from contaminated groundwater sources, most are able to treat or blend the water with cleaner supplies to meet applicable standards.

The report identified public water systems that draw from one or more contaminated groundwater wells prior to any treatment or blending. As a result, the report provides a conservative assessment of Project Area drinking water because it excludes all wells that met applicable MCLs prior to subsequent treatment or blending. As shown in Appendix S, Table 3-10 about 79 wells in the Project Area exceeded at least one drinking water MCL on two occasions during 2001 through 2010. The most commonly detected constituent above applicable MCLs in Project Area drinking water wells in the SWRCB study was arsenic, which occurs naturally in the regional aquifers. Radionucleatides, generally from natural sources, and nitrates and other chemicals, likely associated with agricultural activity, were also detected in several Project Area wells.

The USGS has prepared two studies of groundwater quality in the Project Area based on the results of the state GAMA program, which tests and provides water quality results for more than 200,000 wells located throughout the state. Data is reported for multiple groundwater levels, including: (1) shallow wells located in regulated cleanup sites or used for private domestic water; (2) intermediate depth water supply wells; and (3) deeper wells ranging from hundreds to thousands of feet below the ground used for public water supply and agricultural irrigation. The USGS developed summaries of water quality in the Project Area by identifying about 47 wells to facilitate a randomized grid-based statistical analysis of water quality testing results generated in 2006. The locations of the wells used in the two USGS studies are shown on Figure 4.9-13.

The first USGS analysis of the well data was published in 2008 to provide a statistically valid representation of groundwater quality parameters in the Project Area (Shelton et al. 2008). Table 4.9-16 summarizes the results of the 2008 study.

**Table 4.9-16: USGS GAMA Well Water Quality Data Summary**

| Water Quality Parameter | Units | Average | Median | Min[a] | Max[b] | N |
|---|---|---|---|---|---|---|
| **General Water Quality** | | | | | | |
| Alkalinity, Bicarbonate | mg/L | 86 | 84 | 26 | 144 | 14 |
| Ammonia | mg/L as N | 0.004 | ND | ND | 0.02 | 14 |
| Calcium | mg/L | 55 | 35 | 14 | 136 | 14 |
| Chloride | mg/L | 53 | 33 | 9 | 158 | 14 |
| Dissolved oxygen | mg/L | 3.4 | 3.0 | 0.1 | 8.2 | 14 |
| Magnesium | mg/L | 8.6 | 1.2 | 0.05 | 38 | 14 |
| Nitrite | mg/L as N | 0.05 | ND | ND | 0.27 | 14 |
| Nitrite + Nitrate | mg/L as N | 4.3 | 2.4 | 0.4 | 13 | 14 |
| pH | pH units | 8.2 | 8.0 | 7.7 | 9.3 | 14 |

**Table 4.9-16: USGS GAMA Well Water Quality Data Summary**

| Water Quality Parameter | Units | Average | Median | Min[a] | Max[b] | N |
|---|---|---|---|---|---|---|
| Phosphate | mg/L as P | 0.005 | 0.004 | ND | 0.01 | 14 |
| Potassium | mg/L | 3.0 | 1.8 | 0.5 | 8.3 | 14 |
| Silicon | mg/L | 19 | 20 | 14 | 23 | 14 |
| Sodium | mg/L | 71 | 42 | 21 | 180 | 14 |
| Specific Conductivity | µS/cm | 667 | 417 | 208 | 1,669 | 14 |
| Sulfate | mg/L | 151 | 42 | 20 | 649 | 14 |
| Temperature | C | 23 | 22 | 18 | 28 | 14 |
| Total Dissolved Solids | mg/L | 448 | 250 | 171 | 1,238 | 14 |
| Total Nitrogen | mg/L as N | 27 | 17 | 0.4 | 93 | 14 |
| Total Organic Carbon | mg/L | 0.5 | 0.4 | 0.3 | 0.8 | 14 |
| **Metals** | | | | | | |
| Antimony | µg/L | 0.2 | 0.2 | ND | 0.8 | 14 |
| Arsenic | µg/L | 5.5 | 2.3 | 1.3 | 18 | 14 |
| Barium | µg/L | 51 | 48 | 16 | 107 | 14 |
| Beryllium | µg/L | 0.03 | ND | ND | 0.2 | 14 |
| Cadmium | µg/L | 0.02 | ND | ND | 0.07 | 14 |
| Chromium, Total | µg/L | 1.2 | 1.0 | 0.03 | 3.2 | 14 |
| Cobalt | µg/L | 0.07 | 0.05 | ND | 0.16 | 14 |
| Copper | µg/L | 1.3 | 0.8 | 0.3 | 3.5 | 14 |
| Iron, Total | µg/L | 5.3 | 2.0 | ND | 16.2 | 14 |
| Lead | µg/L | 0.5 | 0.2 | ND | 1.6 | 14 |
| Lithium | µg/L | 10.6 | 5.0 | 2.5 | 46 | 14 |
| Manganese | µg/L | 5.9 | 0.5 | ND | 69 | 14 |
| Molybdenum | µg/L | 7.0 | 3.0 | 0.8 | 25 | 14 |
| Nickel | µg/L | 0.7 | 0.8 | 0.1 | 1.9 | 14 |
| Selenium | µg/L | 1.4 | 0.6 | ND | 6.7 | 14 |
| Strontium | µg/L | 599 | 391 | 155 | 2,360 | 14 |
| Tungsten | µg/L | 0.7 | 0.2 | 0.1 | 6.2 | 14 |
| Uranium | µg/L | 5.7 | 5.5 | 0.4 | 15 | 14 |
| Vanadium | µg/L | 11.8 | 6.5 | 1.3 | 53 | 14 |
| Zinc | µg/L | 8.4 | 7.5 | 0.9 | 19 | 14 |
| **Other Water Quality Parameters** | | | | | | |
| 1,2,3-Trichloropropane | µg/L | 0.03 | ND | ND | 0.2 | 14 |
| Boron | µg/L | 223 | 139 | 23 | 626 | 14 |

**Table 4.9-16: USGS GAMA Well Water Quality Data Summary**

| Water Quality Parameter | Units | Average | Median | Min[a] | Max[b] | N |
|---|---|---|---|---|---|---|
| Bromide | mg/L | 0.2 | 0.1 | 0.03 | 0.7 | 14 |
| Fluoride | mg/L | 0.3 | 0.2 | 0.1 | 0.8 | 14 |
| Iodide | mg/L | 0.01 | 0.002 | ND | 0.04 | 14 |
| Isopropylbenzene | µg/L | ND | ND | ND | 0.01 | 14 |
| **Radionuclides** | | | | | | |
| Gross Alpha; 72-hour Count | pCi/L | 6.2 | 5.2 | 1.4 | 11.5 | 10 |
| Gross Alpha; 30-day Count | pCi/L | 2.9 | 1.9 | 0.5 | 7.9 | 10 |
| Gross Beta; 72-hour Count | pCi/L | 3.2 | 2.1 | 1.1 | 8.9 | 10 |
| Gross Beta; 30-day Count | pCi/L | 4.1 | 3.0 | 1.3 | 8.9 | 10 |
| Radium-226 | pCi/L | 0.1 | 0.1 | 0.04 | 0.4 | 10 |
| Radium-228 | pCi/L | 2.5 | 0.4 | 0.2 | 12.1 | 10 |
| Radon-222 | pCi/L | 761 | 672 | 331 | 1,428 | 10 |
| Uranium-234 | pCi/L | 2.1 | 1.9 | 0.1 | 4.4 | 14 |
| Uranium-235 | pCi/L | 3.0 | 0.2 | 0.02 | 13.7 | 14 |
| Uranium-238 | pCi/L | 1.7 | 1.6 | 0.1 | 3.9 | 14 |
| **SDWA Regulated Constituents** | | | | | | |
| ***Primary Drinking Water Standards*** | | | | | | |
| Disinfection Byproducts (DBPs) | µg/L | | | | | |
| Chloroform | µg/L | 0.1 | ND | ND | 0.7 | 14 |
| Organics | µg/L | | | | | |
| 1,2-Dichloropropane | µg/L | 0.1 | 0.1 | ND | 0.4 | 14 |
| Benzene | µg/L | 0.01 | ND | ND | 0.02 | 14 |
| Dibromochloropropane | µg/L | 0.02 | ND | ND | 0.04 | 14 |
| Tetrachloroethene | µg/L | 0.04 | ND | ND | 0.15 | 14 |

Source: Appendix S (Shelton et al. 2008)
Notes:
[a] Minimum value calculated as the 5th percentile. When one or more result is ND, the minimum is reported as ND.
[b] Maximum value calculated as the 95th percentile.
[c] Some parameters listed under above categories are also regulated by the SDWA.
Where "ND", average, median, minimum, and maximum are calculated assuming a value equal to one-half the reporting limit (RL), or equal to zero if result reported as 0.0, i.e., no detection limit provided.
Key:
N = number of results (reported for a subset of grid wells as defined by Shelton et al., 2008)
ND = not detected above the method reporting limit, refer to Burton and Belitz (2012)
pCi/L= picocuries per liter

The 2008 USGS study found that the detections of most inorganic constituents were below health-based thresholds. Nitrate and arsenic were detected above MCL levels in two wells, and

vanadium was detected above California notification levels in one sample. The USGS found that volatile organic compounds (VOCs) and pesticides were detected in about 60% of the grid wells, and that all of these detections were below health-based thresholds except for a fumigant (1,2-dibromo-3-chloropropane [DBCP]) used in agriculture detected above the applicable MCL in one sample. None of the data for the wells in the USGS study reported chloride above the secondary MCL level (250 mg/L) or boron in concentrations above the state notifications level (1 mg/L). A second analysis of the Project Area well grid data was published by the USGS in 2012 and compared the concentration distributions for individual water quality parameters with applicable federal and state regulatory MCL thresholds for protecting human health, secondary MCLs, or human health advisory levels. The data from the grid was interpolated to approximate constituent concentrations in the primary aquifer underlying the analysis area (Burton et al. 2012). The USGS designated concentrations as "high" if they were greater than an applicable threshold, and "moderate" if they were greater than one-half of the applicable threshold or at least 10% of applicable thresholds for organic and special-interest constituents. The study characterized non-detections and concentrations less than moderate levels as "low." The primary findings of the 2012 USGS study included the following:

- TDS levels were estimated to be high in 14% and at moderate levels in 17% of the primary Project Area aquifer.
- Sulfate was estimated to occur in high concentrations in 8% and at moderate concentrations in 6% of the primary aquifer.
- Chloride was estimated to be present at high concentrations in 2% and at moderate concentrations in 4% of the primary aquifer.
- Iron and/or manganese were present at high concentrations in 13% and at moderate concentrations in 6% of the primary aquifer.
- Trace or minor elements were found to be present at high concentrations in 20% and at moderate concentrations in 27% of the primary aquifer. More specifically:
  - Fluoride was reported at high concentrations in 4% and at moderate concentrations in 2% of the primary aquifer.
  - Arsenic, antimony, boron, and vanadium occurred at high concentrations in 2% of the primary aquifer, mainly near the southern Tehachapi mountains.
  - Lead, thallium, and selenium were detected at high concentrations in less than 2% of the primary aquifer.
  - Nitrate was found at high concentrations in 5% and at moderate concentrations in 13% of the primary aquifer. The USGS study did not determine whether high and moderate nitrate detections were related to natural background conditions, agricultural and livestock operations, or septic tank systems.
  - Solvents, including carbon tetrachloride and trichloroethene, were reported at high concentrations in less than 1% and at moderate concentrations in 4% of the primary aquifer.

- Trihalomethanes, a constituent potentially attributable to municipal water disinfection and chlorinated landscape irrigation water were present at moderate concentrations in 4% of the primary aquifer.
- VOCs (e.g., organic synthesis reagents and gasoline hydrocarbons) were not detected at high concentrations and were found in moderate concentrations (specifically for benzene) in 2% of the primary aquifer.
- The fumigant DBCP was reported at high concentrations in 2% of the primary aquifer, and DBCP and other fumigants were found at moderate concentrations in 4% of the primary aquifer.
- Perchlorate, an inorganic constituent, and NDMA, a semi-volatile organic compound (SVOC), were not found at high concentrations in the primary aquifer, but perchlorate was detected at moderate concentrations in 6% of the aquifer.
- Naturally-occurring radioactive constituents, primarily radium and uranium, were detected at high concentrations in 6% and at moderate concentrations in 13% of the primary aquifer.

Water quality testing data available online from 2007 to 2013 were compiled for GAMA, CDPH, DWR, and other wells that are monitored for public drinking and M&I water supplies, agricultural irrigation, and other purposes in each of the Project Subareas. The dataset includes wells that are screened in shallower locations, generally above the depth of the impermeable clay layer in the region, and deeper wells screened below the clay boundary. The locations of the wells for which 2007 through 2012 water quality data were analyzed are shown on Figure 4.9-14.

Table 4.9-17 summarizes the data results for shallow wells in the 2007-2013 dataset. The shallower wells were generally installed above the level of the Corcoran Clay or equivalent clay layers in the Project Area.

The shallow well data for 2007 through 2013 shows that, in general, the Western Subarea has significantly lower groundwater quality than is typical of the Central and Eastern Subareas. TDS levels in the Western Subarea averaged 12,433 mg/L, compared with an average of 931 mg/L in the Central Subarea and 5,789 mg/L in the Eastern Subarea. Average chloride, bicarbonate, selenium, and vanadium levels were several times higher in the Western Subarea than in the Central and Eastern Subareas. Boron was detected in the Central Subarea, but not in the Western and Eastern Subareas where oil activities occur to a much greater extent. Arsenic levels were higher in the Eastern Subarea, a result consistent with the elevated arsenic levels detected in blended produced water supplied to the Cawelo Water District discussed above. Expanded monitoring of blended produced water and other irrigation water is also being required more generally in the Project area (Cart 2015a).

Table 4.9-18 summarizes the data results for the deeper wells in the 2007-2013 dataset. These wells were generally located at depths below the Corcoran Clay or equivalent clay layers in the Project Area.

The deeper well data for 2007 through 2013 exhibit less variation among the Project Subareas, although most constituent concentrations were higher in the Western Subarea. Average iron and bicarbonate levels were highest in the Eastern Subarea. Average and median chloride levels in the deeper well dataset were below the secondary MCL (250 mg/L) in all locations. Boron was detected in some Western Subarea wells above the California notification level of 1 mg/L.

The 2007-2013 groundwater quality data are generally consistent with the USGS data summaries and indicate that groundwater quality improves from west to east in the Project Area. The observed groundwater quality differences between the three Subareas are influenced, in part, by geologic factors. Streams recharging groundwater in the Eastern Subarea and in most of the Central Subarea originate in the Sierra Nevadas and flow for longer, more sustained periods of time through channels underlain by low-solubility igneous and metamorphic rocks. As a result, Eastern and Central Subarea water composition tends to exhibit a calcium-carbonate character, with lower TDS levels. Groundwater recharge in the Western Subarea is mainly a function of infrequent runoff carried by ephemeral channels incised into the Coast Ranges. The channels flow through marine-derived sedimentary materials that are more easily dissolved and mineralize surface flows and underlying groundwater. For example, sulfate is present at elevated concentrations in west subbasin groundwater due to contact with gypsum-containing sediments. Elevated sodium concentrations in the Western Subarea also reflect the exchange of calcium and magnesium ions for sodium and potassium ions initially bound to clay minerals in the marine sediments.

As of 2012, there were 235 sites had active federal NPDES permits issued under the CWA, and 167 facilities had active WDRs (56 general WDRs and 112 individual WDRs) issued under state law in the Project Area and in adjacent urban and other locations. A list of the NPDES permits and WDRs issued within the Project Area is provided in Appendix S [Appendix B, Tables B-1 and B-2].

**Table 4.9-17: Shallow Well Water Quality 2007-2013 Data Summary**

| Water Quality Parameters | Units | Western | | | | | | | Central | | | | | | | Eastern | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Average | Median | Min(a) | Max(b) | Number of Wells | Number of Samples | Number of Non-detects | Average | Median | Min(a) | Max(b) | Number of Wells | Number of Samples | Number of Non-detects | Average | Median | Min(a) | Max(b) | Number of Wells | Number of Samples | Number of Non-detects |
| **General Water Quality** | | | | | | | | | | | | | | | | | | | | | | |
| Alkalinity, Bicarbonate | mg/L | 2,002 | 2,650 | 69 | 11,342 | 11 | 186 | 0 | 239 | 220 | 55 | 647 | 23 | 39 | 0 | 222 | 240 | 93 | 443 | 18 | 113 | 0 |
| Chloride | mg/L | 3,880 | 3,700 | 981 | 10,100 | 23 | 203 | 0 | 201 | 180 | 41 | 576 | 40 | 223 | 0 | 292 | 200 | 39 | 946 | 20 | 121 | 0 |
| Magnesium | mg/L | 184 | 110 | 21 | 600 | 23 | 203 | 0 | 24 | 20 | 5.1 | 64 | 39 | 224 | 0 | 171 | 170 | 10 | 838 | 19 | 117 | 1 |
| Nitrite | mg/L | 0.0 | ND | ND | 0.0 | 12 | 12 | 7 | 0.1 | ND | 0.2 | 2.1 | 30 | 298 | 278 | - | - | - | - | 0 | - | 0 |
| Nitrate | mg/L | 50 | ND | 0.6 | 370 | 27 | 125 | 65 | 3.0 | 0.1 | 0.1 | 20 | 40 | 348 | 160 | ND | - | - | - | 1 | 5 | 5 |
| Potassium | mg/L | 35 | 28 | 5.8 | 109 | 23 | 203 | 0 | 4.9 | 4.7 | 2.7 | 8.1 | 39 | 225 | 0 | 38 | 38 | 3.5 | 171 | 19 | 116 | 6 |
| Sodium | mg/L | 3,541 | 4,200 | 684 | 10,361 | 23 | 203 | 0 | 59 | 54 | 30 | 100 | 39 | 225 | 0 | 2,127 | 580 | 42 | 7,679 | 19 | 117 | 0 |
| Conductivity | µS/cm | 17,000 | 17,768 | 6,083 | 39,299 | 11 | 191 | 0 | - | - | - | - | 0 | - | 0 | 9,300 | 10,171 | 2,120 | 28,039 | 6 | 7 | 0 |
| Sulfate | mg/L | 2,825 | 2,000 | 634 | 7,017 | 33 | 217 | 0 | 141 | 64 | 7.6 | 558 | 41 | 225 | 1 | 4,203 | 2,500 | 55 | 25,877 | 20 | 121 | 0 |
| **Total Organic Carbon** | **mg/L** | - | - | - | - | **0** | - | **0** | - | - | - | - | **0** | - | **0** | - | - | - | - | **0** | - | **0** |
| **Total Dissolved Solids** | **mg/L** | **12,433** | **12,000** | **4,458** | **26,827** | **23** | **198** | **0** | **961** | **830** | **273** | **2,274** | **40** | **203** | **0** | **5,793** | **4,050** | **341** | **21,485** | **20** | **120** | **0** |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | |
| Antimony | µg/L | 0.0 | ND | 0.0 | 0.0 | 12 | 12 | 0 | 0.0 | 0.0 | - | - | 6 | 4.0 | 0 | ND | 0.0 | | | 6 | 16 | 0 |
| Arsenic | µg/L | 10 | 7.8 | 4.7 | 38 | 18 | 19 | 7 | 19 | 5.0 | 2.5 | 97 | 46 | 62 | 38 | 173 | 5.9 | 0.7 | 494 | 10 | 31 | 11 |
| Barium | µg/L | 29 | 11 | 3.3 | 83 | 18 | 19 | 6 | 179 | 180 | 49 | 441 | 40 | 189 | 1 | 33 | 29 | 13 | 97 | 7 | 20 | 4 |
| Cadmium | µg/L | 0.7 | 0.4 | 0.2 | 3.0 | 18 | 19 | 8 | 0.7 | ND | - | - | 20 | 21 | 21 | 3.3 | 1.0 | 1.6 | 17 | 6 | 16 | 8 |
| Copper | µg/L | 2.1 | 3.0 | 2.5 | 4.4 | 18 | 19 | 7 | 2.5 | ND | 2.3 | 15 | 23 | 30 | 21 | 1.9 | ND | 3.1 | 15 | 6 | 16 | 12 |
| Chromium, Total | µg/L | 4.0 | ND | 5.5 | 12 | 18 | 19 | 10 | 2.3 | 2.5 | 1.5 | 7 | 46 | 62 | 50 | 0.2 | ND | 0.6 | 1.3 | 6 | 16 | 13 |
| Iron, Total | µg/L | ND | ND | - | - | 12 | 12 | 12 | 610 | 15 | 30 | 2,748 | 39 | 224 | 111 | 1,275 | 160 | 61 | 4,942 | 19 | 113 | 47 |
| Lead | µg/L | ND | ND | - | - | 18 | 19 | 19 | 2.0 | ND | 2.0 | 23 | 48 | 162 | 149 | ND | ND | | | 6 | 16 | 16 |
| Manganese | µg/L | 18 | 3.2 | 0.4 | 42 | 12 | 12 | 1 | 955 | 180 | 31 | 6,370 | 39 | 224 | 60 | 401 | 30 | 7.5 | 4,982 | 5 | 19 | 6 |
| Nickel | µg/L | 78 | 27 | 10 | 235 | 18 | 19 | 1 | 4.1 | 2.5 | 1.2 | 10 | 28 | 44 | 34 | 21 | 5.5 | 10 | 117 | 6 | 16 | 8 |
| Selenium | µg/L | 168 | 180 | 13 | 1,238 | 18 | 19 | 5 | 7.1 | ND | 5.9 | 53 | 20 | 21 | 15 | 39 | 4.4 | 4.4 | 341 | 6 | 16 | 8 |
| Uranium | pCi/L | - | - | - | - | 0 | 0 | 0 | - | - | - | - | 0 | 0 | 0 | - | - | - | - | 0 | 0 | 0 |
| Vanadium | µg/L | 7.5 | ND | 3.2 | 41 | 18 | 19 | 10 | 1.1 | ND | 2.3 | 3.0 | 20 | 21 | 18 | - | - | - | - | 0 | 0 | 0 |
| Zinc | µg/L | 13 | 19 | 13 | 32 | 18 | 19 | 7 | 35 | 24 | 8.8 | 153 | 23 | 30 | 9 | 3.3 | ND | 4.1 | 30 | 6 | 16 | 12 |
| **Other Water Quality Parameters** | | | | | | | | | | | | | | | | | | | | | | |
| 1,2-Dichloroethane | mg/L | 0.0 | ND | 0.0 | 0.0 | 35 | 278 | 235 | 0.0 | ND | 0.0 | 0.2 | 43 | 413 | 223 | 0.0 | ND | 0.0 | 0.2 | 16 | 102 | 82 |
| Boron | mg/L | - | - | - | - | 5 | - | 0 | 1.2 | 1.3 | 0.3 | 3.1 | 15 | 9 | 0 | - | - | - | - | 0 | - | 0 |
| Bromide | mg/L | 14 | 7.0 | 2.7 | 35 | 0 | 87 | 0 | 0.2 | 0.2 | 0.1 | 0.2 | 0 | 17 | 0 | - | - | - | - | 0 | - | 0 |
| Fluoride | mg/L | - | - | - | - | 0 | - | 0 | - | - | - | - | 3 | - | 0 | - | - | - | - | 0 | - | 0 |

**Table 4.9-17: Shallow Well Water Quality 2007-2013 Data Summary**

| Water Quality Parameters | Units | Western | | | | | | | Central | | | | | | | Eastern | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Average | Median | Min(a) | Max(b) | Number of Wells | Number of Samples | Number of Non-detects | Average | Median | Min(a) | Max(b) | Number of Wells | Number of Samples | Number of Non-detects | Average | Median | Min(a) | Max(b) | Number of Wells | Number of Samples | Number of Non-detects |
| **SDWA Regulated Constituents Primary drinking water standards** | | | | | | | | | | | | | | | | | | | | | | |
| **Disinfection Byproducts (DBPs)** | | | | | | | | | | | | | | | | | | | | | | |
| Trihalomethanes | mg/L | - | - | - | - | 0 | - | 0 | - | - | - | - | 0 | - | 0 | - | - | - | - | 0 | - | 0 |
| **Organics** | | | | | | | | | | | | | | | | | | | | | | |
| Benzene | mg/L | 0.1 | ND | 0.0 | 1.2 | 42 | 456 | 332 | 0.2 | ND | 0.0 | 0.4 | 292 | 3,070 | 2,367 | 0.0 | ND | 0.0 | 0.7 | 26 | 228 | 155 |

Source: Appendix S ( GAMA Database, Dataset EDF – assumed to be environmental monitoring wells screened above the Corcoran Clay (SWRCB 2014) )
Notes:
[a] Minimum value calculated as the 5th percentile. When one or more result is ND, the minimum is reported as ND.
[b] Maximum value calculated as the 95th percentile.
[c] Some of the constituents and parameters listed above (e.g., General Water Quality) may also be regulated under the SDWA
Key:
ND = not detected above the method reporting limit
pCi/L = picocuries per liter Where "ND", average, median, minimum, and maximum are calculated assuming a concentration of zero (no reporting limit provided by data source)

**Table 4.9-18: Deep Well Water Quality 2007-2013 Data Summary**

| Water Quality Parameters | Units | Western | | | | | | | Central | | | | | | | Eastern | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Average | Median | Min[a] | Max[b] | Number of Wells | Number of Samples | Number of Non-detects | Average | Median | Min[a] | Max[b] | Number of Wells | Number of Samples | Number of Non-detects | Average | Median | Min[a] | Max[b] | Number of Wells | Number of Samples | Number of Non-detects |
| **General Water Quality** | | | | | | | | | | | | | | | | | | | | | | |
| Alkalinity, Bicarbonate | mg/L | 89 | 83 | 19 | 270 | 22 | 38 | 3 | 96 | 90 | 33 | 218 | 223 | 446 | 2 | 157 | 150 | 76 | 279 | 71 | 117 | 0 |
| Calcium | mg/L | 64 | 36 | 12 | 180 | 22 | 38 | 2 | 37 | 30 | 8 | 103 | 225 | 461 | 0 | 72 | 52 | 15 | 189 | 72 | 122 | 0 |
| Chloride | mg/L | 118 | 39 | 8.3 | 366 | 22 | 38 | 2 | 34 | 23 | 7.4 | 85 | 224 | 466 | 1 | 81 | 41 | 10 | 252 | 73 | 130 | 0 |
| Magnesium | mg/L | 6.3 | 0.7 | 0.0 | 26 | 22 | 38 | 3 | 3.5 | 2.3 | 0.1 | 22 | 225 | 459 | 66 | 12 | 8.4 | 0.8 | 51 | 72 | 122 | 0 |
| Nitrite | mg/L | 0.0 | 0.0 | 0.0 | 0.2 | 25 | 43 | 40 | 0.0 | ND | 0.0 | 0.8 | 252 | 582 | 522 | 0.0 | 0.0 | 0.0 | 0.3 | 81 | 146 | 137 |
| Nitrate | mg/L | 12.4 | 6.9 | 0.4 | 85 | 28 | 150 | 33 | 20 | 16 | 1.3 | 109 | 285 | 2,665 | 182 | 22 | 16 | 1.3 | 127 | 90 | 1,146 | 49 |
| Potassium | mg/L | 1.7 | 0.7 | 0.2 | 4.8 | 22 | 38.0 | 15 | 1.5 | 1.4 | 0.6 | 3.9 | 216 | 430 | 178 | 3.8 | 3.3 | 1.4 | 8.5 | 69 | 112 | 8 |
| Sodium | mg/L | 107 | 76 | 25 | 274 | 22 | 38 | 2 | 43 | 31 | 14 | 90 | 225 | 451 | 0 | 63 | 52 | 23 | 131 | 72 | 122 | 0 |
| Conductivity | µS/cm | 603 | 946 | 233 | 2,362 | 22 | 42 | 1 | 360 | 434 | 186 | 797 | 229 | 566 | 0 | 588 | 693 | 268 | 1,375 | 75 | 190 | 0 |
| Sulfate | mg/L | 165 | 89 | 18 | 561 | 22 | 38 | 2 | 56 | 26 | 8.1 | 132 | 225 | 458 | 3 | 108 | 55 | 16 | 304 | 71 | 122 | 0 |
| **Total Organic Carbon** | **mg/L** | - | - | - | - | **0** | - | **0** | **1.0** | **0.4** | **0.1** | **1.3** | **94** | **219** | **90** | **0.2** | **0.1** | **0.1** | **1.0** | **12** | **12** | **7** |
| **Total Dissolved Solids** | **mg/L** | **593** | **510** | **138** | **1,568** | **22** | **36** | **0** | **266** | **210** | **105** | **491** | **224** | **454** | **0** | **449** | **310** | **138** | **985** | **73** | **125** | **0** |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | |
| Antimony | µg/L | 0.0 | 0.0 | 0.0 | 0.0 | 22 | 37.0 | 36 | 0.0 | 0.0 | 0.0 | 0.0 | 243 | 488 | 441 | 0.0 | 0.0 | 0.0 | 0.0 | 77 | 127 | 118 |
| Arsenic | µg/L | 9.0 | 4.9 | 1.6 | 28 | 27 | 253 | 37 | 8.0 | 4.9 | 0.9 | 35 | 251 | 1,228 | 317 | 8.7 | 6.4 | 1.3 | 30 | 83 | 929 | 73 |
| Barium | µg/L | 33 | 24 | 10 | 90 | 22 | 37 | 5 | 33 | 6.8 | 4.5 | 293 | 244 | 489 | 262 | 77 | 62 | 32 | 228 | 77 | 130 | 39 |
| Cadmium | µg/L | 0.2 | 0.1 | 0.3 | 0.8 | 22 | 37 | 37 | 0.2 | ND | 0.1 | 1.5 | 244 | 489 | 485 | 0.3 | 0.1 | 0.2 | 1.1 | 77 | 130 | 129 |
| Copper | µg/L | 3.6 | 1.0 | 0.9 | 17 | 21 | 47 | 40 | 6.2 | 0.6 | 0.9 | 40 | 228 | 500 | 421 | 11 | 5.0 | 1.3 | 46 | 72 | 135 | 115 |
| Chromium, Total | µg/L | 3.0 | 4.0 | 1.4 | 11 | 22 | 37 | 32 | 2.4 | 0.5 | 0.8 | 17 | 244 | 492 | 421 | 2.9 | 1.5 | 1.4 | 14 | 77 | 134 | 125 |
| Iron, Total | µg/L | 195 | 25 | 6.1 | 589 | 19 | 35 | 27 | 64 | 0.0 | 5.8 | 338 | 225 | 521 | 432 | 533 | 25 | 5.9 | 2,038 | 73 | 143 | 95 |
| Lead | µg/L | 0.5 | 0.5 | 0.2 | 1.7 | 21 | 42 | 36 | 0.9 | 0.1 | 0.1 | 4.2 | 237 | 508 | 418 | 1.0 | 0.5 | 0.1 | 4.5 | 76 | 138 | 117 |
| Manganese | µg/L | 9.2 | 5.0 | 1.9 | 48 | 19 | 35 | 28 | 5.8 | 0.1 | 0.5 | 49 | 225 | 513 | 453 | 18 | 5.0 | 1.0 | 98 | 73 | 136 | 103 |
| Nickel | µg/L | 2.7 | 5.0 | 1.5 | 12 | 22 | 37 | 36 | 2.2 | ND | 0.5 | 20 | 244 | 491 | 467 | 3.4 | 0.5 | 1.0 | 18 | 77 | 132 | 122 |
| Selenium | µg/L | 2.1 | 1.0 | 0.3 | 8.6 | 23 | 41 | 34 | 1.1 | 0.4 | 0.3 | 5.1 | 244 | 489 | 380 | 1.5 | 1.0 | 0.5 | 6.7 | 77 | 130 | 87 |
| Uranium | pCi/L | 15 | 15 | 4.5 | 36 | 9 | 22 | 0 | 7.6 | 2.4 | 0.2 | 49 | 109 | 304 | 26 | 15 | 7.6 | 0.3 | 129 | 27 | 82 | 3 |
| Vanadium | µg/L | 6.6 | 4.9 | 2.5 | 14 | 3 | 3 | 0 | 8.4 | 4.8 | 0.9 | 25 | 67 | 94 | 12 | 11 | 9.0 | 1.8 | 39 | 10 | 11 | 0 |
| Zinc | µg/L | 18 | 10 | 8.7 | 83 | 19 | 35 | 30 | 12 | ND | 2.6 | 83 | 224 | 453 | 396 | 25 | 10 | 3.1 | 180 | 71 | 119 | 100 |
| **Other Water Quality Parameters** | | | | | | | | | | | | | | | | | | | | | | |
| 1,2-Dichloroethane | mg/L | 0.0 | 0.0 | - | - | 20 | 28 | 28 | 0.0 | ND | 0.0 | 0.0 | 241 | 1,439 | 1,439 | 0.0 | ND | 0.0 | 0.0 | 68 | 167 | 167 |
| Boron | mg/L | 1.6 | 0.3 | 0.0 | 8.3 | 10 | 62 | 4 | 0.2 | 0.1 | 0.0 | 0.4 | 26 | 487 | 10 | 0.2 | 0.2 | 0.1 | 0.5 | 8 | 131 | 0 |
| Bromide | mg/L | 0.1 | 0.1 | 0.0 | 4.4 | 1 | 16 | 0 | 0.1 | 0.1 | 0.0 | 3.1 | 10 | 47 | 0 | 0.2 | 0.2 | 0.1 | 0.3 | 0 | 8 | 0 |
| Fluoride | mg/L | 0.1 | 0.1 | - | - | 22 | 1 | 5 | 0.1 | 0.1 | 0.0 | 0.2 | 244 | 18 | 73 | - | - | - | - | 77 | - | 15 |

**Table 4.9-18: Deep Well Water Quality 2007-2013 Data Summary**

| Water Quality Parameters | Units | Western | | | | | | | Central | | | | | | | Eastern | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Average | Median | Min[a] | Max[b] | Number of Wells | Number of Samples | Number of Non-detects | Average | Median | Min[a] | Max[b] | Number of Wells | Number of Samples | Number of Non-detects | Average | Median | Min[a] | Max[b] | Number of Wells | Number of Samples | Number of Non-detects |
| **SDWA Regulated Constituents** *Primary drinking water standards* | | | | | | | | | | | | | | | | | | | | | | |
| **Disinfection Byproducts (DBPs)** | | | | | | | | | | | | | | | | | | | | | | |
| Trihalomethanes | mg/L | 0.0 | 0.0 | 0.0 | 0.0 | 20 | 32 | 27 | 0.0 | ND | 0.0 | 0.0 | 233 | 1,434 | 1,252 | 0.0 | ND | 0.0 | 0.0 | 68 | 170 | 159 |
| **Organics** | | | | | | | | | | | | | | | | | | | | | | |
| Benzene | mg/L | 0.0 | 0.0 | - | - | 20 | 28 | 28 | 0.0 | ND | 0.0 | 0.0 | 241 | 1,440 | 1,440 | 0.0 | ND | 0.0 | 0.0 | 68 | 191 | 186 |

Source: Appendix S (GAMA Database, Dataset CDPH – assumed to be deep wells screened below the Corcoran Clay (SWRCB 2014) )
Notes
[a] Minimum value calculated as the 5th percentile. When one or more result is ND, the minimum is reported as ND.
[b] Maximum value calculated as the 95th percentile.
[c] Some of the constituents and parameters listed above (e.g., General Water Quality) may also be regulated under the SDWA
Where "ND", average, median, minimum, and maximum are calculated assuming a concentration of zero (no reporting limit provided by data source).
Key:
CDPH = California Department of Public Health
ND = not detected above the method reporting limit
pCi/L = picocuries per liter

## Groundwater Quality and Existing Oil and Gas Operations

Section IV of the Tulare Lake Basin Plan states that "[o]il field producers continue to use hundreds of sumps as oil/wastewater separators and as wastewater disposal sumps. Some oilfield wastewaters contain salts, oil and grease, metals, and organics which can present a threat to the beneficial uses of underlying good quality ground water." The Basin Plan also states that, "[d]ue to historical practices, degradation of ground water from oil field wastewater disposal occurred in some areas. The petroleum industry has been eliminating oilfield wastewater disposal sumps." In response, the Basin Plan indicates that "[w]ith the gradual elimination of the use of sumps for disposal, increased amounts of produced wastewater are being discharged to Class II injection wells" (CVRWQCB 2004).

Consistent with the Basin Plan summary of sump and pond use, since 1993, the volume of produced water and other permitted Class II well injection activities, including reuse and disposal in the Project Area, has nearly doubled from a low of about 104,900 AF in 2001 to 193,500 AF in 2013 (Figure 4.9-15).

As shown in Table 4.9-19, total Class II injection volumes in the Project Area rose by about 88,500 AF during 2001 through 2013. Produced water disposal accounted for over 61% of this increase (54,200 AF). About 38% of the net injection growth in the Project Area since 2001 was from increased cyclic steam and water flood EOR activities.

**Table 4.9-19: Project Area Injection Volumes, 2001-2013 (Acre-Feet)**

| | 2001 | 2013 | Net Increase | Percent of Increase |
|---|---|---|---|---|
| Cyclic Steam EOR | 9,727 | 19,712 | 9,985 | 11% |
| Steam Flood EOR | 38,641 | 38,801 | 160 | 0.2% |
| Water Flood EOR | 24,525 | 48,673 | 24,149 | 27% |
| Water Disposal | 32,059 | 86,294 | 54,235 | 61% |
| **TOTAL** | **104,952** | **193,480** | **88,528** | **100%** |

Source: DOGGR 2014
Note:
Data is for all District 4 fields and includes a small amount of production activity outside of the Project Area.

Water quality in hydrocarbon zones and other aquifers beneath existing oilfields is compiled by DOGGR based on subsurface logs and drilling information reported on field data sheets. In many cases, the sheets identify hydrocarbon pools and water quality information that are located in more than one geologic formation. The datasheets and geologic cross-sections for Project Area oilfields are included in DOGGR's summary of California Oil Fields, Volume 1 - Central California (DOGGR 1998). The datasheets for Project Area well fields include formation, pool, and associated water quality information developed during various periods since the early 1900s. Some of the datasheets also identify the presence and depth to the base of "fresh" water resources located above the hydrocarbon formation. As discussed above, the definition of fresh water is

subject to variation in different regulatory contexts. The DOGGR oilfield data generally identify fresh water as an aquifer with TDS levels of less than 3,000 mg/L.

A summary of the primary formations, hydrocarbon bearing pools, stratigraphic information, and average pool depth for Project Area oilfields by Subarea is included in Appendix S, Table 2.1. Table J-11 in the DOGGR draft EIR (DOGGR 2015a) summarizes available salinity data and TDS concentrations in the hydrocarbon-bearing zones and the depth to the base of freshwater for each of the oilfields in the Project Area. These data indicate that groundwater quality in hydrocarbon bearing zones that would generate produced water during oil and gas production varies from field to field and in different formations within a single field.

In 1989, DOGGR conducted a study of the effects of oilfield operations on USDWs in Kern County (Mitchell 1989). The study included water quality data derived from groundwater samples in 18 Project Area oilfields. Table 4.9-20 summarizes the water quality analysis results of the DOGGR study for the 18 fields.

The range of oilfield groundwater quality data in the 1989 study results was similar to the results summarized in the California oilfields datasheets maintained by DOGGR. Average TDS levels in some fields were below 10,000 mg/L; in others, TDS levels approached the salinity levels associated with seawater (35,000 mg/L).

In 2015, Kennedy-Jenks reviewed existing WDRs for surface water discharges of produced water in the Project Area. Sixteen WDRs issued over the period from 2002 to 2012 were found to report data on produced water quality data (see Appendix S). Table 4.9-21 summarizes the reported TDS, chloride, boron, and benzene, toluene, ethylbenzene, and xylene levels in produced water at each location.

In 2002, the California Department of Toxic Substances Control (DTSC) published a report on the findings of a field research analysis of oil exploration and production wastes conducted in 2000 and 2001. The purpose of the study was to obtain scientific data about the characteristics of oil exploration and production (E&P) wastes, and determine whether the wastes were being properly managed in accordance federal and state law. The study collected E&P waste samples at six oil production facilities in Los Angeles County and two oil production facilities in Kern County, including samples of produced water, drilling waste, oily sludge, and foam treatment waste. The DTSC concluded that none of the E&P waste streams sampled and analyzed during the study were hazardous under federal or state laws. Produced water and oily sludges were found in certain cases to meet federal toxicity characteristic for hazardous waste, but were exempted from regulation as a hazardous waste by law. Ten of 36 oily sludge samples—primarily the concentrated residue in the bottom of tanks and similar impoundments—exhibited other characteristics of hazardous waste under state law. The DTSC report concluded that, depending on formation characteristics or facility operations, certain E&P wastes, such as oily sludges, may be subject to management by the state as hazardous wastes even if they are exempted from hazardous waste regulations under federal law (DTSC 2002).

**Table 4.9-20: Produced Water Quality, 1989 DOGGR Analysis**

| Field | | TDS (ppm) | Sodium (ppm) | Calcium (ppm) | Magnesium (ppm) | Barium (ppm) | Bicarbonate (ppm) | Chloride (ppm) | Sulfate (ppm) | Boron (ppm) | Iodide (ppm) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Antelope Hills | Average | 7,142 | 2,431 | 14 | 10 | 2 | 2,162 | 2,291 | 58 | 20 | - | 8.3 |
| | Median | 7,807 | 2,485 | 11 | 10 | - | 2,379 | 2,048 | 29 | 20 | - | 8.4 |
| | Minimum | 2,394 | 710 | 5 | 4 | - | 1,098 | 483 | 0 | 12 | - | 8.0 |
| | Maximum | 10,699 | 3,784 | 29 | 15 | - | 3,223 | 4,300 | 173 | 27 | - | 8.4 |
| | *N* | *5* | *5* | *5* | *4* | *1* | *5* | *5* | *5* | *2* | - | *5* |
| Asphalto | Average | 24,282 | 8,587 | 86 | 28 | 9 | 3,611 | 11,604 | 61 | - | 6 | 7.9 |
| | Median | 27,605 | 9,957 | 104 | 21 | 5 | 3,908 | 13,330 | 36 | - | - | 7.9 |
| | Minimum | 15,296 | 3,674 | 15 | 11 | 5 | 2,001 | 5,510 | 15 | - | - | 7.2 |
| | Maximum | 29,293 | 10,949 | 149 | 61 | 17 | 4,652 | 15,602 | 218 | - | - | 8.6 |
| | *N* | *9* | *9* | *9* | *9* | *3* | *9* | *9* | *9* | - | *1* | *9* |
| Belgian Ant | Average | 13,043 | 4,663 | 200 | 44 | - | 1,291 | 6,203 | 25 | 159 | - | 7.9 |
| | Median | 15,353 | 5,611 | 178 | 43 | - | 1,354 | 6,800 | 17 | 126 | - | 7.9 |
| | Minimum | 3,610 | 935 | 87 | 32 | - | 644 | 1,050 | 10 | 96 | - | 7.3 |
| | Maximum | 16,334 | 6,040 | 324 | 60 | - | 1,830 | 9,367 | 61 | 256 | - | 8.4 |
| | *N* | *5* | *5* | *5* | *5* | - | *5* | *5* | *5* | *3* | - | *4* |
| Blackwells Corner | Average | 16,276 | 5,877 | 192 | 269 | - | 3,404 | 8,191 | 19 | - | - | 7.3 |
| | Median | - | - | - | - | - | - | - | - | - | - | - |
| | Minimum | - | - | - | - | - | - | - | - | - | - | - |
| | Maximum | - | - | - | - | - | - | - | - | - | - | - |
| | *N* | *1* | *1* | *1* | *1* | - | *1* | *1* | *1* | - | - | *1* |
| Buena Vista (Front) | Average | 30,809 | 9,865 | 980 | 400 | 9 | 222 | 17,827 | 202 | 10 | - | 7.7 |
| | Median | 34,623 | 11,695 | 1,107 | 415 | 9 | 224 | 21,161 | 4 | 10 | - | 7.6 |
| | Minimum | 22,848 | 6,061 | 685 | 350 | 8 | 192 | 10,975 | 2 | 10 | - | 7.5 |
| | Maximum | 34,956 | 11,839 | 1,147 | 434 | 9 | 249 | 21,345 | 600 | 10 | - | 7.9 |
| | *N* | *3* | *3* | *3* | *3* | *2* | *3* | *3* | *3* | *1* | - | *3* |
| Buena Vista (Hills) | Average | 14,971 | 4,980 | 349 | 294 | 18 | 381 | 8,920 | 29 | - | - | - |
| | Median | - | - | - | - | - | - | - | - | - | - | - |
| | Minimum | - | - | - | - | - | - | - | - | - | - | - |
| | Maximum | - | - | - | - | - | - | - | - | - | - | - |
| | *N* | *1* | *1* | *1* | *1* | *1* | *1* | *1* | *1* | - | - | - |
| Chico Martinez | Average | 22,183 | 7,508 | 197 | 277 | 5 | 3,472 | 10,716 | 7 | - | - | 6.9 |
| | Median | 22,183 | 7,508 | 197 | 277 | 5 | 3,472 | 10,716 | 7 | - | - | 6.9 |
| | Minimum | 21,984 | 7,455 | 174 | 242 | 4 | 3,148 | 10,299 | 1 | - | - | 6.9 |
| | Maximum | 22,381 | 7,560 | 220 | 312 | 6 | 3,795 | 11,132 | 13 | - | - | 7.0 |
| | *N* | *2* | *2* | *2* | *2* | *2* | *2* | *2* | *2* | - | - | *2* |

**Table 4.9-20: Produced Water Quality, 1989 DOGGR Analysis**

| Field | | TDS (ppm) | Sodium (ppm) | Calcium (ppm) | Magnesium (ppm) | Barium (ppm) | Bicarbonate (ppm) | Chloride (ppm) | Sulfate (ppm) | Boron (ppm) | Iodide (ppm) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cymric | Average | 7,541 | 2,362 | 92 | 102 | 0 | 2,303 | 2,688 | 31 | - | - | 7.1 |
| | Median | - | - | - | - | - | - | - | - | - | - | - |
| | Minimum | - | - | - | - | - | - | - | - | - | - | - |
| | Maximum | - | - | - | - | - | - | - | - | - | - | - |
| | *N* | *1* | *1* | *1* | *1* | *1* | *1* | *1* | *1* | - | - | *1* |
| Elk Hills | Average | 25,821 | 8,385 | 877 | 388 | 5 | 1,287 | 14,652 | 310 | 17 | 58 | 7.3 |
| | Median | 29,032 | 10,015 | 934 | 371 | 5 | 354 | 16,885 | 67 | 18 | 55 | 7.3 |
| | Minimum | 952 | 287 | 24 | 3 | 4 | 43 | 520 | 2 | 4 | 41 | 6.2 |
| | Maximum | 47,074 | 16,104 | 2,446 | 1,114 | 5 | 5,287 | 29,217 | 2,063 | 29 | 80 | 8.0 |
| | *N* | *21* | *21* | *21* | *21* | *2* | *21* | *21* | *21* | *3* | *4* | *20* |
| Lost Hills | Average | 22,840 | 7,050 | 284 | 170 | 10 | 1,779 | 12,842 | 793 | 114 | - | 7.4 |
| | Median | 22,869 | 6,467 | 240 | 144 | 9 | 1,026 | 13,967 | 26 | 110 | - | 7.4 |
| | Minimum | 7,247 | 115 | 16 | 5 | 6 | 232 | 3,829 | 0 | 36 | - | 6.7 |
| | Maximum | 31,886 | 12,469 | 810 | 531 | 15 | 3,485 | 17,340 | 7,570 | 202 | - | 8.0 |
| | *N* | *11* | *11* | *11* | *11* | *3* | *11* | *10* | *10* | *4* | - | *11* |
| McDonald Ant. | Average | 8,658 | 3,307 | 40 | 11 | - | 5,189 | 2,386 | 33 | 12 | - | 8.4 |
| | Median | 8,989 | 3,307 | 40 | 11 | - | 5,189 | 2,386 | 33 | - | - | 8.3 |
| | Minimum | 3,350 | 2,650 | 5 | 10 | - | 2,326 | 1,461 | 27 | - | - | 8.1 |
| | Maximum | 13,635 | 3,964 | 74 | 11 | - | 8,052 | 3,310 | 38 | - | - | 8.8 |
| | *N* | *3* | *2* | *2* | *2* | - | *2* | *2* | *2* | *1* | - | *3* |
| McKittrick | Average | 13,801 | 4,838 | 85 | 46 | - | 3,789 | 5,510 | 15 | 72 | - | 7.8 |
| | Median | 11,829 | 3,883 | 80 | 55 | - | 3,638 | 4,505 | 5 | 72 | - | 7.8 |
| | Minimum | 9,052 | 3,379 | 36 | 7 | - | 2,166 | 2,937 | 2 | 33 | - | 7.8 |
| | Maximum | 26,672 | 9,292 | 148 | 75 | - | 5,694 | 11,300 | 54 | 111 | - | 7.8 |
| | *N* | *6* | *5* | *5* | *5* | - | *5* | *5* | *5* | *2* | - | *2* |
| Midway Sunset | Average | 12,008 | 4,426 | 156 | 143 | - | 2,802 | 5,622 | 153 | 76 | - | 7.9 |
| | Median | 10,829 | 3,438 | 41 | 54 | - | 2,895 | 4,326 | 38 | 52 | - | 8.0 |
| | Minimum | 4,479 | 1,323 | 5 | 2 | - | 738 | 300 | 0 | 10 | - | 6.5 |
| | Maximum | 29,702 | 10,391 | 586 | 525 | - | 4,941 | 16,600 | 441 | 248 | - | 8.6 |
| | *N* | *13* | *14* | *14* | *14* | - | *14* | *14* | *11* | *7* | - | *12* |
| N. Antelope Hills | Average | 20,722 | 7,800 | 112 | 64 | - | 2,393 | 11,307 | - | 48 | - | - |
| | Median | 20,722 | - | - | - | - | 2,393 | 11,307 | - | 48 | - | - |
| | Minimum | 19,924 | - | - | - | - | 2,393 | 11,109 | - | 34 | - | - |
| | Maximum | 21,520 | - | - | - | - | 2,393 | 11,505 | - | 61 | - | - |
| | *N* | *2* | *1* | *1* | *1* | - | *1* | *2* | - | *2* | - | - |

**Table 4.9-20: Produced Water Quality, 1989 DOGGR Analysis**

| Field | | TDS (ppm) | Sodium (ppm) | Calcium (ppm) | Magnesium (ppm) | Barium (ppm) | Bicarbonate (ppm) | Chloride (ppm) | Sulfate (ppm) | Boron (ppm) | Iodide (ppm) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N. Belridge | Average | 19,287 | 6,899 | 367 | 61 | - | 653 | 10,713 | 605 | - | - | 7.0 |
| | Median | 21,829 | 7,938 | 357 | 46 | - | 656 | 12,184 | 477 | - | - | 7.1 |
| | Minimum | 360 | 137 | 27 | 4 | - | 233 | 121 | 9 | - | - | 6.2 |
| | Maximum | 42,523 | 14,915 | 971 | 185 | - | 1,227 | 24,375 | 1,298 | - | - | 7.8 |
| | *N* | *7* | *7* | *7* | *7* | - | *7* | *7* | *7* | - | - | *4* |
| Paloma | Average | 18,218 | 6,527 | 184 | 38 | - | 2,265 | 9,139 | 66 | - | - | 6.8 |
| | Median | 19,605 | 7,090 | 188 | 37 | - | 2,471 | 9,780 | 78 | - | - | 6.8 |
| | Minimum | 8,920 | 3,067 | 127 | 26 | - | 659 | 4,895 | 16 | - | - | 6.6 |
| | Maximum | 24,742 | 8,862 | 232 | 51 | - | 3,460 | 12,100 | 92 | - | - | 7.2 |
| | *N* | *4* | *4* | *4* | *4* | - | *4* | *4* | *4* | - | - | *4* |
| Pleito Ranch | Average | 11,958 | 3,896 | 488 | 86 | - | 634 | 6,674 | 125 | 43 | - | 7.5 |
| | Median | - | - | - | - | - | - | - | - | - | - | - |
| | Minimum | - | - | - | - | - | - | - | - | - | - | - |
| | Maximum | - | - | - | - | - | - | - | - | - | - | - |
| | *N* | *1* | *1* | *1* | *1* | - | *1* | *1* | *1* | *1* | - | *1* |
| S. Belridge | Average | 19,723 | 7,275 | 232 | 234 | - | 2,434 | 10,524 | 497 | 47 | - | 7.7 |
| | Median | 13,391 | 4,467 | 177 | 234 | - | 1,976 | 7,135 | 103 | 47 | - | 7.8 |
| | Minimum | 2,034 | 663 | 24 | 57 | - | 259 | 516 | 1 | 33 | - | 7.2 |
| | Maximum | 48,262 | 17,244 | 485 | 407 | - | 5,514 | 25,314 | 2,662 | 61 | - | 8.1 |
| | *N* | *7* | *7* | *7* | *7* | - | *7* | *7* | *7* | *2* | - | *4* |

Source: Appendix S (Data from Mitchell 1989)
Key:
*N* = number of analyses reported
Ppm = parts per million
TDS = Total Dissolved Solids

**Table 4.9-21: Produced Water Quality in CVRWQCB WDRs, 2002-2014**

| Permit ID | Permittee | Lease | Site | APN | Concentration, mg/L | | | Concentration, µg/L | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TDS | Chloride | Boron | Benzene | Toluene | Ethylbenzene | Xylene |
| R5-2002-0194 | Petro Resources, Inc. | Sp-Section 29 Lease | Midway-Sunset Oilfield | 220-080-29-5 | 24,000 | 12,600 | 37 | 170 | 11 | 180 | 250 |
| R5-2002-0195 | Petro Resources, Inc. | Sp–Section 33 Lease | Midway-Sunset Oilfield | 220-091-17-5 | 24,000 | 12,600 | 37 | 170 | 11 | 180 | 250 |
| R5-2002-0196 | Pyramid Oil Company | Section 28 Lease | Midway-Sunset Oilfield | 220-080-28-7 | 32,350 | 19,140 | 53 | | | | |
| R5-2002-0197 | Pyramid Oil Company | Pike Lease | Midway-Sunset Oilfield | 220-080-28-7 | 32,350 | 19,140 | 53 | | | | |
| R5-2004-0056 | Bob Ferguson – Independent | Government - Ferguson Lease | Asphalto Oilfield | 157-220-08-00-1 | 25,000 | 15,000 | 175 | 12.5 | <5 | <5 | <5 |
| R5-2004-0057 | Cather-Herley Oil Company | California Federal A Lease | Asphalto Oilfield | 157-220-06-00-5 | 25,000 | 15,000 | 175 | 12.5 | <5 | <5 | <5 |
| R5-2004-0058 | Crimson Resource Management Corp. | Asphalto Standard Lease | Asphalto Oilfield | 57-210-05-00-9 | 25,000 | 15,000 | 175 | 12.5 | <5 | <5 | <5 |
| R5-2005-0163 | Howard E. Caywood, Inc. | Section 19 & 24 Leases | Midway-Sunset Oilfield | 298-040-23-9 | 22,000 | 12,000 | 28 | | | | |
| R5-2006-0072 | Aera Energy LLC | South Wastewater Disposal Facility | South Belridge Oilfield | 098-113-04-6 | 13,000 | 68,000 | 90 | | | | |
| R5-2006-0073 | Aera Energy LLC | Row 4 / Lost Hills Wastewater Disposal Facility | South Belridge Oilfield | 085-220-31-7 | 24,000 | 13,000 | 80 | | | | |
| R5-2006-0134 | Aera Energy LLC | Highway 33 Wastewater Disposal Facility | South Belridge Oilfield | 085-210-45 | 33,000 | 13,000 | 78 | | | | |
| R5-2006-0135 | Aera Energy LLC | Reagan Wastewater Disposal Facility | South Belridge Oilfield | 085-210-18 | 33,000 | 14,000 | 83 | | | | |
| R5-2013-0054 | Aera Energy LLC | Post-Closure Maintenance And Corrective Action | North Belridge Oilfield | 069-220-36 | 29,000 | 7,800 | 23 | | | | |
| R5-2013-0056 | Chevron USA, Inc. | Post-Closure Maintenance And Corrective Action Section 29 Surface Impoundments | Lost Hills Oilfield | 058-180-18-3 | 11,000 | 4,200 | 15 | | | | |
| R5-2013-0061 | ExxonMobil Production Company Hill Lease Surface Impoundments | Post-Closure Maintenance And Corrective Action | South Belridge Oilfield | 085-210-10-2 | 15,000 | 7,500 | 40 | | | | |
| R5-2014-0019 | Aera Energy LLC | North Belridge Solid Waste Disposal Site | Post-Closure Maintenance | 085-110-10-01-9 | 3,300 | 750 | 1 | | | | |

Source: Appendix S
Key:
APN = Assessor's Parcel Number
µg/L = micrograms per liter
mg/L = milligrams per liter
TDS = Total Dissolved Solids

As shown in Table 4.9-1, about 30,223 AF of produced water was disposed in Project Area-produced water ponds in 2012. Almost all of these ponds were unlined, earthen ponds constructed in upland locations. The CVRWQCB and DOGGR are in the process of conducting an inventory of active and inactive ponds used for disposal of produced water in the Project Area and other locations in the San Joaquin Valley. Published reports indicate that, as of March 2015, the CVRWQCB had identified 355 inactive ponds previously used for produced water disposal, 370 ponds that are active and permitted, and 208 active ponds that were not issued WDRs or other disposal permits. According to the Project applicants, the CVRWQCB's initial list was based, in part, on outdated aerial maps, and the agency is currently updating this list of permitted and unpermitted ponds based on new information supplied by the oil and gas industry. The CVRWQCB has indicated that it intends to bring all active produced water ponds into regulatory compliance or require closure of any produced water ponds that cannot meet applicable water quality standards by December 2016 (BakersfieldNow.com 2015).

The Tulare Lake Basin Plan states that historical use of produced water ponds is known to have affected groundwater in the Project Area. The CVRWQCB has determined that produced water discharges into unlined ponds have impacted downgradient groundwater in several Project Area locations, including ponds adjacent to the North Belridge oilfield (Order No. R5-2013-0054), the Section 29 surface impoundments at the Lost Hills oilfield (Order No. R5-2013-0056) and ponds adjacent to the South Belridge oilfield (Order No. R5-2013-0061). The produced water disposal facilities in these instances have been closed and are no longer in operation. The applicable CVRWQCB closure orders require monitoring and reporting programs to evaluate the extent of the groundwater impacts and to document that affected groundwater constituent levels have returned to ambient conditions. Although downgradient water quality impacts have been documented from certain ponds, to date there is no confirmed instance documented by a regulatory agency in which the use of a produced water pond has impaired operational agricultural or drinking water wells. However, in 2001, an almond grower that owned orchards downgradient from unlined ponds located in the western Subarea filed a lawsuit asserting that produced water disposed to the unlined ponds had contaminated the groundwater underlying the orchard and killed the almond trees. In 2009, a jury ruled in the grower's favor and awarded the grower $8.5 million in damages, but subsequent efforts to obtain additional punitive damages were unsuccessful (Barrios 2013).

Small unlined surface impoundments have been, and continue to be, used in the Project Area to capture drilling muds and drilling fluids during well construction when closed-loop systems that avoid discharges to land are not utilized. Unless specifically permitted to accept additional discharges, the drilling sumps may not be used to discharge other types of oilfield wastes, including well completion or well stimulation fluids and materials, or produced water. In 2013, a video of a well drilling operation north of the city of Shafter in the Central Subarea showing the discharge of non-drilling fluids to a drilling sump was posted online. In response, the CVRWQCB investigated the drilling operation, and the operator agreed to an administrative civil liability payment for 12 days of unpermitted discharges (Administrative Civil Liability Order R5-2013-0587).

In November 2013, the CVRWQCB also issued an investigative order to 78 oil and gas production and exploration operators requiring the submission of well drilling and well workover (repair and improvement) information during the period January 2012 to November 2013. In 2014, the CVRWQCB reported that all of the companies had responded and provided drilling information for 6,381 new wells and 8,291 workovers of existing wells (CVRWQCB 2014).

Based on the information submitted by oil and gas operators, the CVRWQCB determined that unpermitted discharges of well completion fluids, produced water, or stimulation fluids had occurred to drilling sumps in other Project Area locations. Certain operators subsequently agreed to stipulated settlements and the payment of administrative civil liabilities related to unpermitted drilling sump violations, including unpermitted drilling sump discharges in the Western Subarea (Administrative Civil Liability Orders R5-2014-0535 and R5-2014-0536) and the Poso Creek oilfield (Administrative Civil Liability Order R5-2014-0566) and, as of March 2015, a proposed civil liability settlement (Proposed Administrative Civil Liability Order R5-2015-0510) for the unpermitted discharge of well stimulation fluids in the South Belridge oilfield. To date, there are no confirmed reports of impacts to surface water or groundwater quality associated with unpermitted discharges to drilling sumps in the Project Area.

As shown on Figure 4.9-15 and in Table 4.9-19, oil and gas operators in the Project Area have significantly increased the use of Class II injection wells regulated under the UIC program under the federal SDWA in order to reduce the use of unlined surface ponds for produced water and other permitted disposal. Since 1983, DOGGR has administered the UIC program in California under the terms of a primacy agreement with the EPA and regulates all oil and gas EOR-related and produced water disposal injection activities in the Project Area. DOGGR and the SWRCB executed a memorandum of agreement (MOA) in 1988 that establishes DOGGR as the primary state agency for the approval of oil and gas production and exploration discharges in Class II wells. The MOA has been incorporated into the Tulare Lake Basin Plan (CVRWQCB 2004).

The primary objective of the SDWA and the UIC program is to protect existing and potential USDWs, which are defined by federal law to include aquifers with TDS concentrations of up to 10,000 mg/L. Injection wells used in connection with oil and gas exploration and production operations are regulated as “Class II” facilities under the UIC program. The SDWA prohibits any Class II well from injecting into a USDW unless the aquifer has been exempted in accordance with applicable criteria and regulatory requirements. Class II injection wells must be constructed to avoid any discharges into a non-exempt USDW, including the installation of multiple cement and pipe barriers to isolate well fluids from contact with USDWs that may be traversed by a well in shallower geologic formations.

In February 2015, the CCST published the first of three studies required by state legislation evaluating well stimulation, including a description of well construction requirements and technology used in California (CCST 2015). Multiple steps are required to install and secure wells with protective cement and pipe casing. The initial step is to install a steel pipe, or casing, with diameter slightly smaller than the borehole diameter as a well is drilled. The space between the pipe and the borehole wall, or the annulus, is then filled with cement to secure the casing. The cemented casing is designed to limit fluid movement in the well solely to the interior of the pipe,

prevent borehole collapse, and hydraulically isolate, or ensure the zonal isolation of, all internal well flows from contact with adjacent rock formations or aquifers. Different types of cements are used to secure the casing, depending on the depth, temperature, pressure, and chemical environment of a well. A series of pressure tests and wireline logging using sonic and ultrasonic tools are performed to verify that the well has been correctly cemented and contains no locations where well fluids can leak to the surrounding formations.

Several layers of casing are installed in a well. As shown on Figure 4.9-16, the first is called the conductor casing and consists of a pipe with a diameter larger than other well casings. The conductor casing prevents surface materials from collapsing into the drill hole and is either driven into the ground by a pile driver or placed in the hole after drilling. The next layer of casing is called the surface casing and protects freshwater aquifers from drilling mud as well as well fluids carried during the life of the well. The surface casing is smaller in diameter than, and is installed inside, the conductor casing. The conductor casing extends from the bottom of the borehole to the ground surface. Depending on the depth of a well, a production casing or an intermediate casing may be installed. An intermediate casing is used in deeper wells for additional support. The production casing is a pipe that extends through at least part of the surface casing in shallow wells or the intermediate casing in deeper wells to the top of the oil or gas producing zone or to the bottom of the drilled hole. In some instances, a production liner may be sealed to a length of intermediate casing.

The cementing process is completed after each casing segment is installed into the borehole. Dispersants and spacers are pumped down the casing and to the bottom of the well and travel back to the surface in the borehole annulus to prepare the formation and case pipe for cement bonding. Cement that is designed to withstand the operational temperature and physical stresses associated with the well is added through the casing and fills the annulus to the surface. Once the cement sets, the residual cement and any remaining items from the cement operation that are at the bottom of the hole are drilled out to continue deepening the borehole.

The CCST study indicated that leakage due to casing and cement failures represents one of the most likely pathways for unintentional well fluid migration to underground formations (CCST 2015). Recent studies have indicated that well failure, or blowout rates, in the Project Area have been significantly reduced over time by improved well construction technologies. Blowout rates due to well operations in California Oil and Gas District 4 from 1991 to 2005 ranged from one per 10,000 to one per 60,000 well-years, depending on the oilfield activity taking place at the time of the blowout. In District 4, the well blowout rate was one in 20,000 well-years for all wells in operation, with a rate of one per 15,000 well-years in thermal-recovery fields and one per 60,000 well years in non-thermal-recovery fields during this period.

The number of blowouts per year in District 4 declined by about 80% between 1991 and 2005. The decline in some rates has been statistically significant, with the well construction blowout rate down from one per 1,500 operations in the 1990s to one per 5,200 operations in the 2000s, and the steam injection well blowout rate down from one per 6,000 well-years in the 1990s to one per 100,000 well-years in the 2000s. There is circumstantial evidence that rates decreased due to improvements in production practices, such as improved cementing of steam-injection wells and

management of geomechanical processes in reservoirs. These downward trends do not correlate with changes in production activity in the district. This demonstrates that risk in the hydrocarbon industry has and can be significantly reduced with focused effort (Jordan and Benson 2009).

As of August 2014, the DOGGR online database indicated that there were 11,970 active wells in the Project Area used for steam flood, water flood, cyclic steam, or disposal injection. About 1,093 active injection wells were used for produced water and other disposal purposes. DOGGR has indicated that a total of 613 spills and 87 well leaks were reported in the Project Area (DOGGR District 4) from 2009 through 2014 (DOGGR 2015a). There have been no confirmed reports of drinking or agricultural groundwater quality impacts as a result of injection activity in the Project Area, although at least one Project Area grower has alleged that crops have been damaged by underground injection. In September 2014, a cherry orchard grower near Rosedale in the Central Subarea filed a lawsuit against the operators of injection wells located near the orchard and other parties alleging that oil-related produced water and other injection activities had contaminated groundwater and killed several trees. As of June 2015, the lawsuit was reported to remain pending in the Kern County Superior Court, and no determination has been made in the case (Cox 2015).

In 2011, the EPA published an independent audit of the California UIC program that identified a number of potential compliance issues, including the possibility that injection wells had been permitted to discharge into aquifers that met the USDW criteria but that had not been exempted in accordance with applicable requirements (Horsely-Witten Group 2011). A March 2015 report by the California Environmental Protection Agency (Cal/EPA) indicated that discharges to nonexempt USDWs were apparently permitted due to: (1) inconsistencies in the records maintained by state and federal officials regarding the exempt status of 11 aquifers located under oilfields that were operational in 1983 when DOGGR was granted primacy for the UIC program; and (2) other permitting errors, including: (a) border confusion regarding the aerial extent of exemptions granted in conjunction with the documentation in the early 1980s compared with the larger extent of most oilfield administrative boundaries; (b) expanding productive limits over time beyond the production portions of oilfields at the time when an aquifer was exempted; (c) depth confusion regarding the formations that are subject to exemption which resulted in injection above or below the exempt aquifer and into non-exempt zones; and (d) the fact that, in certain cases, only portions of an aquifer were exempted and not the entire aquifer (Cal/EPA 2015).

Eight of the 11 aquifers for which exemption records reflect inconsistencies are located in the Project Area. These aquifers are listed in Table 4.9-22 by oilfield and with reference to the formation in which the aquifers occur.

**Table 4.9-22: Project Area Oilfields Subject to USDW Exemption Review**

| Oilfield | Geologic Formation |
|---|---|
| Blackwell's Corner | Tumey |
| Kern Bluff | Kern River |
| Kern Front | Santa Margarita |
| Kern River | Chanac |
| Kern River | Santa Margarita |
| Mount Poso | Walker |
| Round Mountain | Olcese |
| Round Mountain | Walker |

Source: CATC 2015

The SWRCB and DOGGR have initiated a work plan to address the UIC program issues identified by the EPA review and subsequent analysis of oilfield operations. In February 2015, DOGGR provided the EPA, and publicly released, a list of 2,553 wells in the state that were injecting into non-exempt aquifers. As of March 2015, the list included 1,721 wells in the Project Area that inject steam or water for EOR purposes into active hydrocarbon production zones. The SDWA criteria for exempting a USDW from the prohibition against injection include, among other considerations, whether the aquifer: (1) is not currently serving as a source of drinking water; and (2) is located in a formation that is mineral, hydrocarbon, or geothermal energy producing, or can be demonstrated by a permit applicant as part of a permit application for a Class II operation to contain minerals or hydrocarbons that considering their quantity and location are expected to be commercially producible. As a result, DOGGR has indicated that EOR wells under review have relatively low priority because these facilities inject into existing hydrocarbon-bearing zones that could qualify for EPA exemption. The state intends to seek SDWA exemptions for aquifers subject to EOR injection to reflect current geologic conditions and oilfield boundaries (DOGGR 2015c).

In May 2015, the SWRCB and DOGGR published a letter to the EPA stating that "approximately 3,600 cyclic steam wells that had some injection reported in 2014" had been identified, and that DOGGR databases show these wells "as not being associated to a permitted injection project." Almost all of these cyclic steam wells are located in the Project Area. The May 2015 letter states, because that most of the cyclic steam wells inject steam for a limited duration and volume into "zones laden with hydrocarbons" or formations with "little or essentially no permeability, the wells are "very unlikely" to pose a threat to water supply wells. The state review of the 3,600 cyclic steam wells described in the May 2015 letter will be completed by July 2015 (DOGGR 2015d).

The March 2015 list of wells injecting into non-exempt aquifers also identified 532 disposal wells injecting into non-hydrocarbon producing zones, including 388 in the Project Area. These wells

were referred to as "Category 1" for review because they were permitted to inject Class II fluid for disposal purposes "into non-exempt, non-hydrocarbon-bearing aquifers" or "into the 11 aquifers that have historically been treated as exempt." DOGGR determined that 176 of the 532 wells were injecting into zones containing water with TDS levels of less than 3,000 mg/L. About 163 of these wells are identified by DOGGR as located in Region 4, which generally comprises the Project Area (DOGGR 2015d). Due to their proximity to relatively high-quality groundwater, the UIC work plan developed by DOGGR has initially focused on these 176 wells and injection wells within one mile at the surface and within 500 vertical feet underground of a drinking or agricultural water supply. As of March 2015, 23 injection wells in the Project Area were ordered to cease operations due to proximity to drinking or agricultural water supplies. DOGGR has indicated that it will complete the review of the 176 highest priority injection wells by June 2015 (DOGGR 2015c).

In May 2015, the SWRCB and DOGGR published a letter to the EPA that provided updated information concerning the priority (Category 1) well review process. The letter indicated that 80 of the 532 Category 1 wells identified in February 2015 had been removed from the Category 1 list for various reasons, including injection into an aquifer that did not meet the criteria for a USDW, wells that had not been completed, or wells that were injecting into exempted aquifers. About 21 of the 176 wells identified in February 2015 as injecting into aquifers with less than 3,000 mg/L of TDS were removed from the Category 1 list. The May 2015 letter also indicated that SWRCB staff had determined that 53 of the remaining 155 wells injecting into aquifers with less than 3,000 mg/L of TDS were "potentially impacting drinking water supply wells." As discussed above, 23 of these wells had been ordered to cease operations due to proximity to drinking or agricultural water supplies. The May 2015 letter states that DOGGR and the SWRCB are "awaiting receipt of additional test data" before determining whether to order a shut-down of any of the other 30 wells by the October 15, 2015 compliance date (DOGGR 2015d).

In February 2015, DOGGR and the SWRCB provided the EPA with a schedule for completing the regulatory review of the state UIC program and, in March 2015, the EPA responded to the agencies and identified deadlines and deliverables for the review process. The letters grouped potentially affected wells into three categories. Category 1 includes all water disposal wells injecting into non-exempt, non-hydrocarbon bearing aquifers, including the 11 statewide aquifers (eight within the Project Area) historically treated as exempt. Category 2 wells include all EOR wells injecting into non-exempt, hydrocarbon-bearing aquifers. Category 3 wells include disposal and EOR wells located inside the surface boundaries of exempted aquifers, but that may be injecting into a geological formation or zone that was not subject to exemption. The March 2015 EPA letter requires completion of the Category 1 well review by May 15, 2015, the Category 2 wells by July 31, 2015, and the Category 3 wells by February 15, 2016. The letters also identify timelines for state rulemaking and public outreach, an aquifer exemption application process, and the potential inclusion of cyclic steam wells in the review process (EPA 2015b). All injection into aquifers with TDS levels of less than 3,000 mg/L must cease by October 15, 2015, unless the state applies for and the EPA approves USDW injection exemptions for these aquifers. Injection into any of these aquifers may be prohibited prior to October 15, 2015, if it is determined that drinking or agricultural water supplies are threatened. All injection into non-exempt aquifers with

TDS levels of 3,000 to 10,000 mg/L must cease by February 15, 2017, unless the state applies for and the EPA approves USDW injection exemptions for these locations. As of February 2015, no contamination of water used for drinking or agricultural purposes related to underground injection by the oil and gas industry had been detected in water supply wells tested by the SWRCB (DOGGR 2015c). DOGGR adopted emergency regulations codifying the compliance dates in the regulatory review schedule, which went into effect on April 20, 2015.

In May 2015, two environmental groups, the Sierra Club and the Center for Biological Diversity, filed a lawsuit contending that the DOGGR rules and the UIC program compliance schedule through 2017 violate state and federal laws. As of May 2015, the lawsuit remains pending in the Alameda County Superior Court and no determination has been made in the case (California Oil and Gas Report 2015).

There have been no confirmed impacts to groundwater in the Project Area related to well stimulation, although analyses conducted to date generally recommend that additional groundwater data be developed to further assess this issue. In August 2014, the CCST, the Lawrence Berkeley National Laboratory (LBNL), and the Pacific Institute (PI) published an assessment of well stimulation activities in California for the federal Bureau of Land Management (BLM) (CCST 2014). BLM leases land in California, including land located in Kern County, for oil and gas exploration and production. The study identified chemical constituents used in at least 2% of the reported well stimulation treatments in California, generally for the period of 2012 through 2014, and identified oral toxicity information where available for these constituents. The majority of the well stimulation chemicals considered in the CCST report, such as guar gum, a gelling agent, or ethanol a common solvent, were determined to have low hazard potential in terms of oral toxicity. Certain chemicals, such as biocides (e.g., tetrakis [hydroxymethyl] phosphonium sulfate, 2,2-dibromo-3-nitrilopropionamide, and glutaraldehyde), corrosion inhibitors (e.g., propargyl alcohol), and mineral acids (e.g., hydrofluoric acid and hydrochloric acid) were found to present concerns for acute toxicity. Oral toxicity information was not available for about 30% of the constituents used in California well stimulation treatments. Table 4.9-23 lists the chemicals used in at least 2% of the reported well stimulation treatment chemicals for which chemical abstract service (CAS) oral toxicity data could be identified by the CCST. Table 4.9-24 lists the chemicals used in at least 2% of the reported well stimulation treatment chemicals for which CAS oral toxicity data could not be identified by the CCST.

**Table 4.9-23: CCST (2014) Summary of Chemicals Used in California Well Stimulation (Hydraulic Fracturing and Acid Matrix) with CAS Data Hydraulic Fracturing Chemicals**

| Chemical/Ingredient Name | CAS Number | Count of Occurrence in Hydraulic Fracturing Fluid | % Occurrence in Fracturing Fluid | Count of Occurrence as Additive | Average Conc. in Fracturing Fluid (% mass) | Average Additive Conc. (% mass) | Oral Toxicity (LD50), Rat (mg/kg) | Oral Toxicity (LD50), Mouse (mg/kg) | Oral Toxicity (LD50), Rabbit (mg/kg) |
|---|---|---|---|---|---|---|---|---|---|
| Quartz (SiO2) | 14808-60-7 | 1384 | 99.9 | 4032 | 23.988 | 34.1 | 500 | Not Found | Not Found |
| Guar gum | 9000-30-0 | 1334 | 96.2 | 1339 | 0.198 | 55.0 | 6770 | 8100 | 7000 |
| Water | 7732-18-5 | 1209 | 87.2 | 2047 | 73.879 | 94.2 | >90000 | Not Found | Not Found |
| Diammonium peroxodisulphate | 7727-54-0 | 1182 | 85.3 | 1205 | 0.012 | 88.0 | 495-820 | Not Found | Not Found |
| Sodium hydroxide | 1310-73-2 | 1147 | 82.8 | 1148 | 0.010 | 10.8 | 140-340 | Not Found | Not Found |
| Diatomaceous earth, calcined | 91053-39-3 | 1068 | 77.1 | 1702 | 0.014 | 75.2 | Not Found | Not Found | Not Found |
| Ethylene glycol | 107-21-1 | 1052 | 75.9 | 1049 | 0.029 | 28.1 | 4700 | 7500 | Not Found |
| Cristobalite | 14464-46-1 | 1022 | 73.7 | 1022 | 0.009 | 1.1 | Not Found | Not Found | Not Found |
| Magnesium nitrate | 10377-60-3 | 1015 | 73.2 | 1015 | 0.000 | 9.8 | 5440 | Not Found | Not Found |
| 5-Chloro-2-methyl-3(2H)-isothiazolone | 26172-55-4 | 1015 | 73.2 | 1015 | 0.000 | 9.8 | 481 | Not Found | Not Found |
| 2-Methyl-3(2H)-isothiazolone | 2682-20-4 | 1015 | 73.2 | 1015 | 0.000 | 4.9 | Not Found | Not Found | Not Found |
| Magnesium chloride | 7786-30-3 | 1015 | 73.2 | 1015 | 0.000 | 4.9 | 2800 | 4700 | Not Found |
| Isotridecanol, ethoxylated | 9043-30-5 | 1014 | 73.2 | 959 | 0.016 | 5.0 | Not Found | Not Found | Not Found |
| Distillates, petroleum, hydrotreated light | 64742-47-8 | 1000 | 72.2 | 1003 | 0.097 | 30.2 | >15000 | Not Found | Not Found |
| Hemicellulase enzyme concentrate | 9025-56-3 | 992 | 71.6 | 658 | 0.002 | 3.0 | Not Found | Not Found | Not Found |
| Distillates, petroleum, hydrotreated light paraffinic | 64742-55-8 | 973 | 70.2 | | 0.098 | 30.4 | >5000 | Not Found | Found |
| 2-butoxypropan-1-ol | 15821-83-7 | 962 | 69.4 | | 0.000 | | Not Found | Not Found | Not Found |
| 1-butoxypropan-2-ol | 5131-66-8 | 962 | 69.4 | 966 | 0.016 | 5.3 | 5.66mL/kg~4 920mg/kg | Not Found | Not Found |
| 1,2-Ethanediaminium | 138879-94-4 | 939 | 67.7 | 943 | 0.057 | 60.0 | Not Found | Not Found | Not Found |
| Phosphonic acid | 13598-36-2 | 680 | 49.1 | 680 | 0.000 | 1.0 | 1500-1895 | 1700-2172 | Not Found |
| Boron sodium oxide | 1330-43-4 | 676 | 48.8 | 677 | 0.030 | 27.6 | 2660 | Not Found | Not Found |

**Table 4.9-23: CCST (2014) Summary of Chemicals Used in California Well Stimulation (Hydraulic Fracturing and Acid Matrix) with CAS Data Hydraulic Fracturing Chemicals**

| Chemical/Ingredient Name | CAS Number | Count of Occurrence in Hydraulic Fracturing Fluid | % Occurrence in Fracturing Fluid | Count of Occurrence as Additive | Average Conc. in Fracturing Fluid (% mass) | Average Additive Conc. (% mass) | Oral Toxicity (LD50), Rat (mg/kg) | Oral Toxicity (LD50), Mouse (mg/kg) | Oral Toxicity (LD50), Rabbit (mg/kg) |
|---|---|---|---|---|---|---|---|---|---|
| Methanol | 67-56-1 | 368 | 26.6 | 485 | 0.068 | 52.5 | 5628 - 6970 | 7300 | 14400 |
| Borax | 1303-96-4 | 364 | 26.3 | 364 | 0.033 | 25.3 | 5660 | 2000 | Not Found |
| Carbonic acid, dipotassium salt | 584-08-7 | 245 | 17.7 | 252 | 0.191 | 59.2 | 1870 | 2570 | Not Found |
| Sodium chloride | 7647-14-5 | 223 | 16.1 | 92 | 0.005 | 6.3 | 3000 | 4000 | Not Found |
| Potassium hydroxide | 1310-58-3 | 201 | 14.5 | 179 | 0.015 | 0.6 | 273 - 1230 | Not Found | Not Found |
| Phenol, polymer with formaldehyde | 9003-35-4 | 197 | 14.2 | 199 | 0.529 | 3.1 | >5000 | Not Found | Not Found |
| Glycerin, natural | 56-81-5 | 160 | 11.5 | 108 | 0.037 | 0.2 | 5570-12600 | 4100 | 27000 |
| Acetic acid | 64-19-7 | 157 | 11.3 | 101 | 0.008 | 49.8 | 3310-3530 | 4960 | 1200 |
| Silica | 7631-86-9 | 149 | 10.8 | 139 | 0.174 | 1.7 | >20000 | Not Found | Not Found |
| Isopropanol | 67-63-0 | 148 | 10.7 | 150 | 0.072 | 18.3 | 4710-5840 | 3600-4475 | 5030-7990 |
| Alcohols, C11-14-iso-, C13-rich, ethoxylated | 78330-21-9 | 114 | 8.2 | 109 | 0.003 | 0.0 | Not Found | Not Found | Not Found |
| Naphthalene | 91-20-3 | 114 | 8.2 | 76 | 0.001 | 0.8 | 490-2600 | 350 - 710 | Not Found |
| Potassium chloride | 7447-40-7 | 113 | 8.2 | 111 | 0.003 | 100.0 | 2600 | 383 | Not Found |
| Talc | 14807-96-6 | 109 | 7.9 | 109 | 0.000 | 0.0 | Not Found | Not Found | Not Found |
| Tetrakis(hydroxymethyl)phosphonium sulfate | 55566-30-8 | 109 | 7.9 | 109 | 0.003 | 0.0 | 248-333 | Not Found | Not Found |
| Vinylidene chloride/methylacrylate copolymer | 25038-72-6 | 105 | 7.6 | 105 | 0.004 | 0.0 | Not Found | Not Found | Not Found |
| Alcohols, C7-9-iso-, C8-rich, ethoxylated | 78330-19-5 | 103 | 7.4 | 103 | 0.056 | 0.2 | Not Found | Not Found | Not Found |
| Ethoxylated C14-15 alcohols | 68951-67-7 | 99 | 7.1 | 99 | 0.018 | 18.9 | Not Found | Not Found | Not Found |
| Zirconium oxychloride | 7699-43-6 | 94 | 6.8 | 94 | 0.017 | 0.1 | 2950-3500 | 1227 | Not Found |

**Table 4.9-23: CCST (2014) Summary of Chemicals Used in California Well Stimulation (Hydraulic Fracturing and Acid Matrix) with CAS Data Hydraulic Fracturing Chemicals**

| Chemical/Ingredient Name | CAS Number | Count of Occurrence in Hydraulic Fracturing Fluid | % Occurrence in Fracturing Fluid | Count of Occurrence as Additive | Average Conc. in Fracturing Fluid (% mass) | Average Additive Conc. (% mass) | Oral Toxicity (LD50), Rat (mg/kg) | Oral Toxicity (LD50), Mouse (mg/kg) | Oral Toxicity (LD50), Rabbit (mg/kg) |
|---|---|---|---|---|---|---|---|---|---|
| Glutaraldehyde | 111-30-8 | 91 | 6.6 | 80 | 0.008 | 35.3 | 134-1470 | 100 | 1.59 ml/kg (50% aqueous solution) ~ 843 mg/kg |
| Methenamine | 100-97-0 | 90 | 6.5 | 92 | 0.118 | 0.6 | Not Found | 569-1853 | Not Found |
| Quaternary ammonium compounds, bis(hydrogenated tallow alkyl)dimethyl, salts with bentonite | 68953-58-2 | 90 | 6.5 | 4 | 0.015 | 0.1 | >8000 | Not Found | Not Found |
| Solvent naphtha, petroleum, heavy arom. | 64742-94-5 | 83 | 6.0 | 86 | 0.010 | 8.9 | 7050 | Not Found | Not Found |
| Acetic anhydride | 108-24-7 | 81 | 5.8 | 82 | 0.015 | 100.0 | 1780 | Not Found | Not Found |
| Poly(oxy-1,2-ethanediyl), alpha-hexyl-omega-hydroxy | 31726-34-8 | 81 | 5.8 | 81 | 0.017 | 0.1 | Not Found | Not Found | Not Found |
| Glyoxal | 107-22-2 | 79 | 5.7 | 80 | 0.065 | 30.0 | 200-7070 | 400-1280 | >3175 |
| D-Glucitol | 50-70-4 | 79 | 5.7 | 80 | 0.022 | 10.0 | 15900 | 17800 | Not Found |
| Monoethanolamine borate (1:x) | 26038-87-9 | 78 | 5.6 | 78 | 0.041 | 60.0 | Not Found | Not Found | Not Found |
| 2,2-Dibromo-3-nitrilopropionamide | 10222-01-2 | 77 | 5.6 | 77 | 0.004 | 100.0 | 178-235 | Not Found | 118 |
| 2-Bromo-3-nitrilopropionamide | 1113-55-9 | 77 | 5.6 | 77 | 0.000 | 5.0 | Not Found | Not Found | Not Found |
| Triethanolamine | 102-71-6 | 74 | 5.3 | 74 | 0.042 | 0.2 | 4200-11300 | 5400-7800 | 2200 |
| Boric acid | 10043-35-3 | 70 | 5.1 | 71 | 0.016 | 30.0 | 2660-4000 | 3450 | Not Found |
| Diethylene glycol | 111-46-6 | 70 | 5.1 | 68 | 0.000 | 0.1 | 12565-16600 | 13300-26500 | 26900 |
| Trimethyl borate | 121-43-7 | 70 | 5.1 | 70 | 0.015 | 30.0 | 6140 | 1290 | Not Found |
| Sodium persulfate | 7775-27-1 | 70 | 5.1 | 70 | 0.005 | 100.0 | Not Found | Not Found | Not Found |
| 2-ethylhexan-1-ol | 104-76-7 | 69 | 5.0 | 69 | 0.000 | 0.0 | 2049-3730 | 2500 | 1180-1470 |

**Table 4.9-23: CCST (2014) Summary of Chemicals Used in California Well Stimulation (Hydraulic Fracturing and Acid Matrix) with CAS Data Hydraulic Fracturing Chemicals**

| Chemical/Ingredient Name | CAS Number | Count of Occurrence in Hydraulic Fracturing Fluid | % Occurrence in Fracturing Fluid | Count of Occurrence as Additive | Average Conc. in Fracturing Fluid (% mass) | Average Additive Conc. (% mass) | Oral Toxicity (LD50), Rat (mg/kg) | Oral Toxicity (LD50), Mouse (mg/kg) | Oral Toxicity (LD50), Rabbit (mg/kg) |
|---|---|---|---|---|---|---|---|---|---|
| Oleic acid | 112-80-1 | 69 | 5.0 | 69 | 0.000 | 0.0 | 25000-74000 | 28000 | Not Found |
| Potassium acetate | 127-08-2 | 69 | 5.0 | 68 | 0.000 | 0.0 | 3250 | Not Found | Not Found |
| Potassium cis-9-octadecenoic acid | 143-18-0 | 69 | 5.0 | 69 | 0.000 | 0.0 | >5000 | >5000 | Not Found |
| Propylene glycol | 57-55-6 | 69 | 5.0 | 69 | 0.000 | 0.0 | 20000-37000 | 22000-31800 | 18000-19000 |
| Bis(2-ethylhexyl) sodium sulfosuccinate | 577-11-7 | 69 | 5.0 | 69 | 0.001 | 0.0 | 1900-4620 | 2640 | Not Found |
| Dicoco dimethyl ammonium chloride | 61789-77-3 | 69 | 5.0 | 69 | 0.001 | 0.0 | 960 | Not Found | Not Found |
| Alcohols, C10-14, ethoxylated | 66455-15-0 | 69 | 5.0 | 69 | 0.002 | 0.0 | Not Found | Not Found | Not Found |
| Phenol, 4,4'-(1-methylethylidene)bis-, polymer with 2- (chloromethyl)oxirane, 2-methyloxirane and oxirane | 68123-18-2 | 69 | 5.0 | 69 | 0.007 | 0.0 | Not Found | Not Found | Not Found |
| Poloxalene | 9003-11-6 | 69 | 5.0 | 69 | 0.002 | 0.0 | 5700 | 3000-45000 | Not Found |
| Calcium chloride anhydrous | 10043-52-4 | 68 | 4.9 | 66 | 0.001 | 0.0 | 1000-4179 | 1940-2045 | 100-1000 |
| 2-Propenoic acid, polymer with sodium phosphinate (1:1), sodium salt | 129898-01-7 | 66 | 4.8 | 66 | 0.011 | 0.1 | Not Found | Not Found | Not Found |
| 2-Butoxyethanol | 111-76-2 | 62 | 4.5 | 32 | 0.028 | 40.9 | 470-3000 | 1200-1519 | 320 |
| Acetyltriethyl citrate | 77-89-4 | 59 | 4.3 | | 0.024 | | 7000 | 1150 | Not Found |
| Citric acid | 77-92-9 | 56 | 4.0 | 58 | 0.022 | 60.9 | 3000- 6730 | 5040 | 7000 |
| Boric acid, dipotassium salt | 1332-77-0 | 53 | 3.8 | 53 | 0.099 | 0.4 | Not Found | Not Found | Not Found |
| Tryptones | 73049-73-7 | 47 | 3.4 | 6 | 0.002 | 5.0 | Not Found | Not Found | Not Found |
| Extract of yeast | 08013-01-2 | 47 | 3.4 | 6 | 0.002 | 5.0 | Not Found | Not Found | Not Found |
| Teflon | 9002-84-0 | 47 | 3.4 | 47 | 0.000 | 0.0 | Not Found | Not Found | Not Found |
| Polyethylene glycol | 25322-68-3 | 44 | 3.2 | 44 | 0.001 | 0.0 | 600-51310 | 28915-36000 | 14000-76000 |

**Table 4.9-23: CCST (2014) Summary of Chemicals Used in California Well Stimulation (Hydraulic Fracturing and Acid Matrix) with CAS Data Hydraulic Fracturing Chemicals**

| Chemical/Ingredient Name | CAS Number | Count of Occurrence in Hydraulic Fracturing Fluid | % Occurrence in Fracturing Fluid | Count of Occurrence as Additive | Average Conc. in Fracturing Fluid (% mass) | Average Additive Conc. (% mass) | Oral Toxicity (LD50), Rat (mg/kg) | Oral Toxicity (LD50), Mouse (mg/kg) | Oral Toxicity (LD50), Rabbit (mg/kg) |
|---|---|---|---|---|---|---|---|---|---|
| Formaldehyde, polymer with 4-nonylphenol and oxirane | 30846-35-6 | 44 | 3.2 | 44 | 0.005 | 0.0 | Not Found | Not Found | Not Found |
| Quaternary ammonium compounds, benzyl-C10- 16alkyldimethyl, chlorides | 68989-00-4 | 44 | 3.2 | 44 | 0.003 | 0.0 | 400-900 | Not Found | Not Found |
| Alcohols, C9-11-iso-, C10-rich, ethoxylated | 78330-20-8 | 44 | 3.2 | 44 | 0.006 | 0.0 | Not Found | Not Found | Not Found |
| Cellulase | 9012-54-8 | 44 | 3.2 | 58 | 0.008 | 21.2 | Not Found | Not Found | Not Found |
| Sodium sulfate | 7757-82-6 | 43 | 3.1 | | 0.001 | | 5989 | 193-6346 | Not Found |
| Naphtha, petroleum, hydrotreated heavy | 64742-48-9 | 42 | 3.0 | 42 | 0.304 | 60.0 | >15000 | Not Found | Not Found |
| Mannanase, endo-1,4-beta- | 37288-54-3 | 41 | 3.0 | | 0.001 | | Not Found | Not Found | Not Found |
| Ampicillin | 69-53-4 | 41 | 3.0 | | 0.001 | | 10000 | 15200 | Not Found |
| Cellulose, microcrystalline | 9004-34-6 | 41 | 3.0 | | 0.001 | | >5000 | Not Found | Not Found |
| Ethanol | 64-17-5 | 39 | 2.8 | 41 | 0.031 | 27.7 | 7060-10600 | 3450 | 63000 |
| Hydrogen peroxide | 7722-84-1 | 39 | 2.8 | 39 | 0.000 | 0.3 | 376-1617 | 2000 | 820 |
| Decyldimethylamine | 1120-24-7 | 38 | 2.7 | 38 | 0.000 | 0.0 | Not Found | Not Found | Not Found |
| N,N-Dimethyldecylamine oxide | 2605-79-0 | 38 | 2.7 | 38 | 0.020 | 0.1 | Not Found | Not Found | Not Found |
| Ammonium chloride | 12125-02-9 | 37 | 2.7 | 30 | 0.061 | 50.3 | 1650 | 1300 | Not Found |
| Solvent naphtha, petroleum, light arom. | 64742-95-6 | 33 | 2.4 | 33 | 0.012 | 16.8 | 3500-14000 | Not Found | Not Found |
| Hydrogen chloride | 7647-01-0 | 33 | 2.4 | 46 | 0.799 | 22.5 | 238-277 | Not Found | 900 |
| Sodium bicarbonate | 144-55-8 | 32 | 2.3 | | 0.065 | | 4220 | 3360 | Not Found |
| Poly(oxy-1,2-ethanediyl), alpha-tridecyl-omega-hydroxy | 24938-91-8 | 31 | 2.2 | | | | Not Found | Not Found | Not Found |
| 1,2,4-Trimethylbenzene | 95-63-6 | 31 | 2.2 | 33 | 0.001 | 2.8 | 3280-6000 | Not Found | Not Found |

**Table 4.9-23: CCST (2014) Summary of Chemicals Used in California Well Stimulation (Hydraulic Fracturing and Acid Matrix) with CAS Data Hydraulic Fracturing Chemicals**

| Chemical/Ingredient Name | CAS Number | Count of Occurrence in Hydraulic Fracturing Fluid | % Occurrence in Fracturing Fluid | Count of Occurrence as Additive | Average Conc. in Fracturing Fluid (% mass) | Average Additive Conc. (% mass) | Oral Toxicity (LD50), Rat (mg/kg) | Oral Toxicity (LD50), Mouse (mg/kg) | Oral Toxicity (LD50), Rabbit (mg/kg) |
|---|---|---|---|---|---|---|---|---|---|
| Propargyl alcohol | 107-19-7 | 29 | 2.1 | 31 | 0.001 | 7.7 | 20 -110 | 50 | Not Found |
| Thiourea, polymer with formaldehyde and 1- phenylethanone | 68527-49-1 | 29 | 2.1 | 20 | 0.003 | 19.5 | Not Found | Not Found | Not Found |
| Oral Toxicity: LD50 (mgchemical/kganimal) | | | | | | | | | |
| Category 1: x<5 | | | | | | | | | |
| Category 2: 5<x<50 | | | | | | | | | |
| Category 3: 50<x<300 | | | | | | | | | |
| Category 4: 300<x<2000 | | | | | | | | | |
| Category 5: 2000<x<5000 | | | | | | | | | |
| Category >5: x>5000 | | | | | | | | | |

| Acid Matrix Chemicals | | | | | | |
|---|---|---|---|---|---|---|
| **Chemical/Ingredient Name** | **CAS Number** | **# of Wells** | **% of Wells** | **Oral Toxicity ($LD_{50}$), Rat (mg/kg)** | **Oral Toxicity ($LD_{50}$), Mouse (mg/kg)** | **Oral Toxicity ($LD_{50}$), Rabbit (mg/kg)** |
| 2-Ethylhexanol | 104-76-7 | 36 | 100% | 2049-3730 | 2500 | 1180-1470 |
| Ethylene glycol | 107-21-1 | 36 | 100% | 4200 | 7500 | Not Found |
| 2-butoxyethanol | 111-76-2 | 36 | 100% | 470-3000 | 1200-1519 | 320 |
| Dodecylbenzene sulfonic acid | 27176-87-0 | 36 | 100% | 500-2000 | Not Found | Not Found |
| Methanol | 67-56-1 | 36 | 100% | 5628-6970 | 7300 | 14400 |
| Isopropanol | 67-63-0 | 36 | 100% | 4710-5840 | 3600-4475 | 5030-7990 |
| Hydrochloric Acid | 7647-01-0 | 36 | 100% | 238-277 | Not Found | 900 |
| Water | 7732-18-5 | 36 | 100% | >900000 | Not Found | Not Found |
| Poly(oxy-1,2-ethanediyl), alpha-hexyl-omega-hydroxy(C2H4O)n(c6H140) or Polyethylene glycol monohexyl ether | 31726-34-8 | 36 | 100% | Not Found | Not Found | Not Found |
| Acetic acid | 64-19-7 | 29 | 81% | 3310-3530 | 4960 | 1200 |
| Benzaldehyde | 100-52-7 | 19 | 53% | 800-1600 | 28-1600 | Not Found |
| Cinnamaldehyde | 104-55-2 | 19 | 53% | 2220-3400 | 200-3400 | Not Found |
| Diethylene glycol | 111-46-6 | 19 | 53% | 12565-16600 | 13300-26500 | 26900 |
| Ammonium bifluoride | 1341-49-7 | 19 | 53% | 130 | Not Found | Not Found |
| Hydroxylamine hydrochloride | 5470-11-1 | 19 | 53% | 141 | 408 | Not Found |
| Amine oxides, cocoalkyldimethyl | 61788-90-7 | 19 | 53% | Not Found | Not Found | Not Found |
| Formic Acid | 64-18-6 | 19 | 53% | 1100 | 700 | Not Found |
| Ethoxylated hexanol | 66439-45-2 | 19 | 53% | Not Found | Not Found | Not Found |
| Alcohols, C12-16, ethoxylated | 68551-12-2 | 19 | 53% | Not Found | Not Found | Not Found |
| Copper dichloride | 7447-39-4 | 19 | 53% | 140-584 | 190-233 | Not Found |
| Ethylene oxide | 75-21-8 | 19 | 53% | 72-330 | 280-365 | Not Found |
| Slica, amorphous – fumed | 7631-86-9 | 19 | 53% | >20000 | Not Found | Not Found |
| Sodium iodide | 7681-82-5 | 19 | 53% | 4340 | 1000 | Not Found |
| Citric Acid | 77-92-9 | 19 | 53% | 3000-5730 | 5040 | 7000 |
| Poly(oxy-1,2-ethanediyl), a(mony phenyl)-w-hydroxy | 9016-45-9 | 19 | 53% | 1310-16000 | >50000 | Not Found |

| Acid Matrix Chemicals | | | | | | |
|---|---|---|---|---|---|---|
| **Chemical/Ingredient Name** | **CAS Number** | **# of Wells** | **% of Wells** | **Oral Toxicity ($LD_{50}$), Rat (mg/kg)** | **Oral Toxicity ($LD_{50}$), Mouse (mg/kg)** | **Oral Toxicity ($LD_{50}$), Rabbit (mg/kg)** |
| Magnesium nitrate | 10377-60-3 | 17 | 47% | 5440 | Not Found | Not Found |
| Prop-2-yn-1-ol | 107-19-7 | 17 | 47% | 20-110 | 50 | Not Found |
| Oleic acid | 112-80-1 | 17 | 47% | 25000-74000 | 28000 | Not Found |
| Dodecylbenzene (impunity) | 123-01-3 | 17 | 47% | >5000 | Not Found | Not Found |
| Linear/branched alcohol ethoxylate (11eo) | 127036-24-2 | 17 | 47% | Not Found | Not Found | Not Found |
| Acetic acid, potassium salt | 127-08-2 | 17 | 47% | 3250 | Not Found | Not Found |
| Sodium hydroxide | 1310-73-2 | 17 | 47% | 140-340 | Not Found | Not Found |
| Disodium ethylene diamine tetra-acetate (impurity) | 139-33-3 | 17 | 47% | 2000-3700 | 400-2050 | 2300 |
| Potassium oleate | 143-18-0 | 17 | 47% | >5000 | >5000 | Not Found |
| Cristobalite | 14464-46-1 | 17 | 47% | Not Found | Not Found | Not Found |
| Crystalline silica | 14808-60-7 | 17 | 47% | 500 | Not Found | Not Found |
| Trisodium ethylene diaminetetracetate (Impurity) | 150-38-9 | 17 | 47% | 2150 | 2150 | Not Found |
| Pol(oxy-1,2-ethanediyl) | 25322-68-3 | 17 | 47% | 600-51310 | 28915-36000 | 14000-76000 |
| 5-chloro-2-methyl-2h-isothiazolol-3-one | 26172-55-4 | 17 | 47% | 481 | Not Found | Not Found |
| 2-methyl-2h-isothiazol-3-one | 2682-20-4 | 17 | 47% | Not Found | Not Found | Not Found |
| Sodium glycolate (impurity) | 2836-32-0 | 17 | 47% | 7110 | 6700 | Not Found |
| Ethoxylated propoxylated 4-nonylphenol-formaldehyde resin | 30846-35-6 | 17 | 47% | Not Found | Not Found | Not Found |
| Alcohol, C11 linear, ethoxylated | 34398-01-1 | 17 | 47% | Not Found | Not Found | Not Found |
| Trisodium nitrilotiacetate (impurity) | 5064-31-3 | 17 | 47% | 1100-3500 | 681-3160 | >3500 |
| Glycerol | 5681-5 | 17 | 47% | 5570-12600 | 4100 | 27000 |
| Propylene glycol | 57-55-6 | 17 | 47% | 20000-37000 | 22000-31800 | 18000-19000 |
| Dioctyl sulfosuccinate sodium salt | 577-11-7 | 17 | 47% | 1900-4620 | 2640 | Not Found |
| Dicoco dimethyl quatetnary ammonium chloride | 61789-77-3 | 17 | 47% | 960 | Not Found | Not Found |
| Fatty acids, tall–oil | 61790-12-3 | 17 | 47% | 3200-74000 | 4600 | Not Found |
| Sodium erythorbate | 6381-77-7 | 17 | 47% | >5000 | Not Found | Not Found |
| Tetrasodium ethylenediaminetetraacetate | 64-02-8 | 17 | 47% | 1658-4500 | 20-5-30 | Not Found |
| Heavy aromatic naphtha | 64742-94-5 | 17 | 47% | 7050 | Not Found | Not Found |

| Acid Matrix Chemicals | | | | | | |
|---|---|---|---|---|---|---|
| **Chemical/Ingredient Name** | **CAS Number** | **# of Wells** | **% of Wells** | **Oral Toxicity ($LD_{50}$), Rat (mg/kg)** | **Oral Toxicity ($LD_{50}$), Mouse (mg/kg)** | **Oral Toxicity ($LD_{50}$), Rabbit (mg/kg)** |
| Alkenes, C>10a- | 64743-02-8 | 17 | 47% | Not Found | Not Found | Not Found |
| Alkyl (C10-C14) alcohols, ethoxylated | 66455-15-0 | 17 | 47% | Not Found | Not Found | Not Found |
| Crosslinked PO/EO-block polymer | 68123-18-2 | 17 | 47% | Not Found | Not Found | Not Found |
| Coco-amido-propylamine oxide | 68155-09-9 | 17 | 47% | Not Found | Not Found | Not Found |
| Alcohol C9-C11, Ethoxylated | 68439-46-3 | 17 | 47% | 1378 | Not Found | Not Found |
| Thiurea, polymer with formaldehyde and 1-phenylethanone | 68527-49-1 | 17 | 47% | Not Found | Not Found | Not Found |
| Alcohols, C14-15, ethoxylated (7ED) | 68951-67-7 | 17 | 47% | Not Found | Not Found | Not Found |
| Quaternary ammonium compounds chlorides derivatives | 68989-00-4 | 17 | 47% | 400-900 | Not Found | Not Found |
| Hydrofluoric acid | 7664-39-3 | 17 | 47% | Not Found | Not Found | Not Found |
| Sulfuric acid (impurity) | 7664-93-9 | 17 | 47% | 2140 | Not Found | Not Found |
| Magnesium chloride | 7786-30-3 | 17 | 47% | 2800 | 4700 | Not Found |
| Alcohol, C7-9-iso, C8, ethoxylated | 78330-19-5 | 17 | 47% | Not Found | Not Found | Not Found |
| Alcohol, C9-11-iso, C10, ethoxylated | 78330-20-8 | 17 | 47% | Not Found | Not Found | Not Found |
| Alcohol, C11-14, ethoxylated | 78330-21-9 | 17 | 47% | Not Found | Not Found | Not Found |
| Methyl oxirane polymer with oxirane | 9003-11-6 | 17 | 47% | 2300-5700 | 1830-45000 | 35000 |
| Diatomaceous earth, calcined | 91053-39-3 | 17 | 47% | Not Found | Not Found | Not Found |
| Naphthalene (impurity) | 91-20-3 | 17 | 47% | 490-2600 | 350-710 | Not Found |
| Ammonium chloride | 12125-02-9 | 1 | 3% | 1650 | 1300 | Not Found |
| Oral Toxicity: LD50 (mgchemical/kganimal) | | | | | | |
| Category 1: x<5 | | | | | | |
| Category 2: 5<x<50 | | | | | | |
| Category 3: 50<x<300 | | | | | | |
| Category 4: 300<x<2000 | | | | | | |
| Category 5: 2000<x<5000 | | | | | | |
| Category >5: x>5000 | | | | | | |

**Table 4.9-24: CCST (2014) Summary of Chemicals Used in California Well Stimulation without CAS Data**

| | Occurrence in Hydraulic Fracturing Fluid | % Occurrence in Fracturing Fluid | Count of Occurrence as Additive | Average Conc. in Fracturing Fluid (% mass) | Average Additive Conc. (% mass) |
|---|---|---|---|---|---|
| Amino Alkyl Phosphonic Acid | 679 | 49 | 679 | 0.006 | 30 |
| Contains non-hazardous ingredients which are listed in the non-MS DS section of the report | 253 | 18.3 | 182 | 0.068 | 100 |
| No Hazardous Ingredients | 135 | 9.7 | 136 | 0.048 | 100 |
| Water (Including Mix Water Supplied by Client) | 131 | 9.5 | n/a | 74.68 | n/a |
| Petroleum Distillate Blend | 127 | 9.2 | 127 | 0.549 | 70 |
| Hemicellulase Enzyme | 111 | 8 | 111 | 0.01 | 100 |
| N.A. | 89 | 6.4 | 89 | 0.069 | 100 |
| Mixture of Surfactant | 80 | 5.8 | 80 | 0.081 | 60 |
| EDTA/Copper chelate | 62 | 4.5 | 62 | 0.008 | 30 |
| Carbohydrates | 44 | 3.2 | 58 | 0.035 | 97.1 |
| Non-hazardous Ingredients | 41 | 3 | 41 | 0.067 | 100 |
| Cured Acrylic Resin | 38 | 2.7 | n/a | 0.001 | n/a |
| Alkanes /Alkenes | 33 | 2.4 | 33 | 0.291 | 45 |
| Proprietary | 33 | 2.4 | 33 | 0.03 | 61.2 |
| Sulfonate | 29 | 2.1 | 29 | 0.007 | 9.8 |
| Ethoxylated nonylphenol | 28 | 2 | 38 | 0.104 | 35.8 |
| Non-Hazardous Ingredient | 28 | 2 | 31 | 0.04 | 100 |

The BLM study reached 11 conclusions regarding well stimulation activities in California:

1. Present-day well stimulation practices in California differ significantly from practices used for unconventional shale reservoirs in states such as North Dakota and Texas, and the impacts of hydraulic fracturing observed in other states are not necessarily applicable to California.

2. Acid fracturing has comprised a small fraction of reported well stimulation to date in California, is usually applied in relatively rare carbonate reservoirs, and is not expected to lead to major increases in oil and gas development in the state.

3. The most likely scenario for expanded well stimulation in California is production in and near reservoirs that are currently using well stimulation and that contain oil migrated from source rocks and not from the Monterey Formation shales.

4. Current water demand for well stimulation operations is a small fraction of statewide water use and ranges from 450 to 1,200 AF per year. Ninety-five percent of water currently used for well stimulation is fresh water; the remainder is produced water, and most of the demand occurs in the southwestern San Joaquin Valley.

5. Most chemicals used in reported well stimulation treatments for which toxicity information is available are considered to be of low toxicity or non-toxic. However, a few reported chemicals present concerns for acute toxicity, including biocides and mineral acids. Potential risks posed by chronic exposure to most chemicals used in well stimulation activities remain unknown.

6. There are no publicly recorded instances of subsurface release of contaminated fluids into potable groundwater in California; additional studies and data collection are needed to fully evaluate this potential concern.

7. Current well stimulation practices could allow flowback water containing stimulation chemicals to be mixed with produced water for use in irrigation.

8. Estimated marginal criteria air emissions (e.g., NOx, $PM_{2.5}$, and VOCs [see Section 4.3, Air Quality]) directly related to well stimulation are a small portion of the overall emissions in the San Joaquin Valley, where the vast majority of hydraulic fracturing takes place.

9. Fugitive methane emissions from direct well stimulation in oil wells are likely to be small compared to the total greenhouse gas (GHG) emissions from oil and gas production in California.

10. Current hydraulic fracturing for oil and gas production in California is not considered to pose a significant seismic hazard. The disposal of produced water from oil and gas production in deep injection wells has caused felt seismic events in several states and could increase seismic hazards in California under certain conditions if similar deep disposal wells were permitted.

11. Overall, the direct impacts of current well stimulation practices appear to be limited and will likely be limited in the future if proper management practices are followed. Existing or as yet unidentified technologies might be developed to extract oil and gas from new locations, such as the Monterey Formation, and could generate different environmental impacts compared with the impacts associated with current well stimulation activities.

In 2015, Kennedy-Jenks (see Appendix S) analyzed the chemicals reported in hydraulic fracturing and acid matrix well stimulation interim notices compiled by DOGGR through March 2014. Table 4.9-25 summarizes the chemicals and estimated concentrations of each constituent identified in the hydraulic fracturing well stimulation notices. Table 4.9-26 summarizes the chemicals and estimated concentrations of each constituent identified in the acid matrix well stimulation notices.

**Table 4.9-25: Representative Chemicals Listed in Hydraulic Fracturing Notices Through March 2014**

| Ingredients | CAS | Estimated Ingredient Concentration in Fluid (% by mass)[b] |
|---|---|---|
| Water | 7732-18-5 | 55.41% |
| Crystalline Silica | 14808-60-7 | 41.80% |
| Guar Gum | 9000-30-0 | 0.4387% |
| Petroleum Distillates | 64742-47-8 | 0.2193% |
| Paraffinic Petroleum Distillates | 64742-55-8 | 0.2193% |
| Isotridecanol, ethoxylated | 9043-30-5 | 0.0366% |
| 1-buloxy-2-propanol | 5131-66-8 | 0.0366% |
| Crystalline Silica-Quartz | 14808-60-7 | 0.0366% |
| Hemicellulase Enzyme Concentrate | 9025-56-3 | 0.0021% |
| Sodium Tetraborate Decahydrate | 1303-96-4 | 0.0732% |
| Ethylene Glycol | 107-21-1 | 0.0732% |
| Sodium Hydroxide | 1310-73-2 | 0.0244% |
| Oxyakylated Amine Quat | 138879-94-4 | 0.397% |
| Ammonium persulphate | 7727-54-0 | 0.0083% |
| Diatomaceous Earth, Calcined | 91053-39-3 | 0.01% |
| 5-Chloro-2-Methyl-4-Isothiazolin-3-One | 26172-55-4 | 0.0020% |
| Magensium Nitrate | 10377-60-3 | 0.0020% |
| Magensium Chloride | 7786-30-3 | 0.001% |
| 2-Methyl-4-Isothiazolin-3-One | 2682-20-4 | 0.001% |
| Crystalline Silica: Cristobalite | 14464-46-1 | 0.0002% |
| Crystalline Silica: Quartz (SiO2) | 14808-60-7 | 0.0002% |

**Table 4.9-25: Representative Chemicals Listed in Hydraulic Fracturing Notices Through March 2014**

| Ingredients | CAS | Estimated Ingredient Concentration in Fluid (% by mass)[b] |
|---|---|---|
| Citric Acid | 77-92-9 | 0.109049% |
| Ethylene glycol monobutyl ether | 111-76-2 | 0.060756% |
| Xylene | 1330-20-7 | 0.357930% |
| Ethyl Benzene | 100-41-4 | 0.107938% |
| Hydrochloric Acid | 7647-01-0 | 0.576579% |
| Hydrogen fluroide (hydrofluoric acid) | 7664-39-3 | 0.27228% |
| Formic Acid | 64-18-6 | 0.10553% |
| Carboxylic Acid Salt | 127-08-2 | 0.00009% |
| Methanol | 67-56-1 | 0.003482% |
| Morpholine | 110-91-8 | 0.000769% |
| Organic Acid | 64-19-7 | 0.000006% |
| Organic sulfonic acid amine salt | 12068-08-5 | 0.030652% |
| oxyalkylated Alcohole | 66455-15-0 | 0.025637% |
| Isopropanol | 67-63-0 | 0.013346% |
| Oxyakylated alkylphenolic resin | 63428-92-2 | 0.005358% |
| Polyoxyalkylenes | 68439-45-2 | 0.001076% |
| Light aromatic naphtha | 64742-95-6 | 0.000837% |
| 1,2,4-TMB | 95-63-6 | 0.000544% |
| 1,3,5-TMB | 108-67-8 | 0.00017% |
| 1,2,3-TMB | 526-73-8 | 0.000085% |
| Xylene | 1330-20-7 | 0.000043% |
| Alkylaryl sulfonate | 68584-27-0 | 0.000034% |
| Cumene | 98-82-8 | 0.000019% |
| Potassium hydroxide | 1310-58-3 | 0.000011% |
| Cocamidopropyl betaine | 61789-40-0 | Not Reported |
| Caprylamidopropyl betaine | 73772-46-0 | Not Reported Sodium |
| Chloride | 7647-14-5 | Not Reported |
| Glycerol | 56-81-5 | Not Reported |
| Isotridecanol, ethoxylated | 9043-30-5 | 0.016542% |
| 1-Butoxy-2-Propanol | 5131-66-8 | 0.016542% |
| 2-Butoxy -1-Propanol | 15821-83-7 | 0.000331% |
| Potassium carbonate | 584-08-7 | 0.144146% |

**Table 4.9-25: Representative Chemicals Listed in Hydraulic Fracturing Notices Through March 2014**

| Ingredients | CAS | Estimated Ingredient Concentration in Fluid (% by mass)[b] |
|---|---|---|
| Potassium Bicarbonate | 298-14-6 | 0.004805% |
| Methyl Borate | 121-43-7 | 0.010093% |
| Boric Acid | 10043-35-3 | 0.010093% |
| Ammonium chloride | 12125-02-9 | 0.087395% |
| Erythorbic Acid | 89-65-6 | 0.610957% |
| Phenolic resin | 9003-35-7 | 0.16499% |
| Potassium borate | 1332-77-0 | 0.06493% |
| 2,2,2"-nitrilotriethanol | 102-71-6 | 0.03495% |
| Zirconium dichlooride oxide | 7699-43-6 | 0.01888% |
| Polyethylene glycol monhexyl ether | 31726-34-8 | 0.01575% |
| Alcohol, C7-9-iso, C8, ethoxylated | 78330-19-5 | 0.01404% |
| 2-Propenoic acid, polymer with sodium phosphinate | 129898-01-7 | 0.00864% |
| Crosslinked PO/EO-block polymer | 68123-18-2 | 0.00615% |
| Vinylidene chloride/methylacrylate copolymer | 25038-72-6 | 0.0047% |
| Non-crystalline silica | 7631-86-9 | 0.00245% |
| Alcohol, C11-14, ethoxylated | 78330-21-9 | 0.00204% |
| Tetrakis(hydroxymethyl)phosphonium sulfate | 55566-30-8 | 0.00203% |
| Methyl oxirane polymer with oxirane | 9003-11-6 | 0.00203% |
| Dioctyl sulfosuccinate sodium salt | 577-11-7 | 0.00096% |
| Calcium chloride | 10043-52-4 | 0.00082% |
| Dicoco dimethyl quaternary ammonium chloride | 61789-77-3 | 0.00069% |
| Magnesium silicate hydrate (talc) | 14807-96-6 | 0.00025% |
| Propylene glycol | 57-55-6 | 0.0002% |
| 2,2'-oxydiethanol | 111-46-6 | 0.00009% |
| 2-ethylhexan-1-ol | 104-76-7 | 0.00003% |
| Potassium oleate | 143-18-0 | 0.00001% |
| Oleic acid | 112-80-1 | 0.00001% |
| Alcohols, C10-12, ethoxylated | 67254-71-1 | 0.00155% |
| Monoethanolamine borate | 26038-87-9 | 0.09738% |

**Table 4.9-25: Representative Chemicals Listed in Hydraulic Fracturing Notices Through March 2014**

| Ingredients | CAS | Estimated Ingredient Concentration in Fluid (% by mass)[b] |
|---|---|---|
| 2,2 Dibromo-3-nitrilopropionamide | 10222-01-2 | 0.00122% |
| 2-Monobromo-3-nitrilopropionamide Bentonite, benyzl(hydrogenated tallow alkyl) | 1113-55-9 | 0.00006% |
| dimethylammonium stearate complex | 121888-68-4 | 0.00773% |
| Sodium Persulfate | 7775-27-1 | 0.00782% |
| disodium octaborate tetrahydrate | 12008-41-2 | 0.1623% |
| Sodium polyacrylate | 9003-04-7 | 0.15451% |
| Sodium bisulfite | 7631-90-5 | 0.00097% |
| Hemicellulase enzyme | 9012-54-8 | 0.00315% |
| Lactose | 63-42-3 | 0.01051% |
| Polydimethyl diallyl ammonium chloride | 26062-79-3 | 0.07228% |
| Polyethelene glycol oleate ester | 56449-46-8 | 0.00155% |
| Silica gel | 112926-00-8 | 0.00155% |
| Sodium sulfate | 7757-82-6 | 0.00001% |

Source: Appendix S

Notes:

[a] Chemicals lists were observed on DOGGR Interim Well Stimulation Notices, accessed March 13, 2014. This listing shows chemicals found in a sampling of hydraulic fracture notices from different fields. A chemical is only listed once, even if it shown on multiple notices.

[b] The estimated concentration listed is representative of a "typical" use, based on the information reviewed, and will vary between wells.

**Table 4.9-26: Representative Chemicals Listed in Acid Matrix Notices**

| Ingredients[a] | CAS | Max Ingredient Concentration in Fluid (% by mass)[b] |
|---|---|---|
| Fresh water | 7732-18-5 | 44.83% |
| Acetic acid | 64-19-7 | 1.63806% |
| Citric acid | 77-92-9 | 1.38132% |
| Hydrochloric acid | 7647-01-0 | 25.5402% |
| Methanol | 67-56-1 | 0.2650% |
| Diethylene glycol | 111-46-6 | 0.5226% |
| Cinnamaldehyde | 104-55-2 | 0.5226% |
| Formic acid | 64-18-6 | 0.8317% |
| Isopropanol | 67-63-0 | 0.2678% |

**Table 4.9-26: Representative Chemicals Listed in Acid Matrix Notices**

| Ingredients[a] | CAS | Max Ingredient Concentration in Fluid (% by mass)[b] |
|---|---|---|
| Dodecylbenzene sulfonic acid | 27176-87-0 | 0.4780% |
| Isopropanol | 67-63-0 | 0.1434% |
| Ethylene glycol monobutyl ether | 111-76-2 | 1.6826% |
| Ethoxylated hexanol | 68439-45-2 | 0.5048% |
| Ethylene glycol monobutyl ether | 111-76-2 | 0.5282% |
| Ethylene glycol | 107-21-1 | 0.0440% |
| Poly(oxy-12-ethandiyl) a-(nonylphenyl)-w-hydroxy- | 9016-45-9 | 0.0880% |
| 2-Ethyl hexanol | 104-76-7 | Not Reported |
| Alcohols C12-16 ethoxylated | | 68551-12-2 |
| Not Reported Amine oxides cocoalkyldimethyl | 61788-90-7 | Not Reported |
| Benzaldehyde | 100-52-7 | Not Reported |
| Copper dichloride | 7447-39-4 | Not Reported |
| Ethylene oxide | 75-21-8 | Not Reported |
| Methanol | 67-56-1 | Not Reported |
| Poly(oxy-1,2-ethanediyl); alpha-hexyl-omega-hydroxy(C2H4O)N(C6H14O) | 31726-34-8 | Not Reported |
| Sodium iodide | 7681-82-5 | Not Reported |
| Ammonium bifluoride | 1341-49-7 | 2.21% |
| Hydroxylamine hydrochloride | 5470-11-01 | 0.07% |
| Silica amorphous fumed | 7631-86-9 | 0.01% |
| Hydrofluoric acid | 7664-39-3 | <1% |
| Tetrasodium Ethylenediaminetetraacetate | 64-2-8 | <0.1% |
| Sodium Erythorbate | 6381-77-7 | <0.1% |
| Fatty acids, tall-oil | 61790-12-3 | <0.1% |
| Thiourea, polymer with formaldehyde and 1-Phenylethanone | 68527-49-1 | <0.1% |
| Linear/branched alcohol ethoxylate | 127036-24-2 | <0.1% |
| Alcohols, C14-15, ethoxylated | 68951-67-7 | <0.1% |
| Prop-2-yn-1-ol | 107-19-7 | <0.1% |
| Sodium glycolate | 2836-32-0 | <0.01% |
| Alkenes | 64743-02-8 | <0.01% |
| Alcohols, C11-14-iso, ethoxylated | 78330-20-8 | <0.01% |
| Alcohols, C7-9-iso, ethoxylated | 78330-19-5 | <0.01% |

**Table 4.9-26: Representative Chemicals Listed in Acid Matrix Notices**

| Ingredients[a] | CAS | Max Ingredient Concentration in Fluid (% by mass)[b] |
|---|---|---|
| Glycerol | 56-81-5 | <0.01% |
| Ethoxylated resin | 30846-35-6 | <0.01% |
| Alcohol, C11-14, ethoxylated | 78330-21-9 | <0.01% |
| Crosslinked PO/EO Polymer | 68123-18-2 | <0.01% |
| Alcohol, C11 linear | 34398-01-1 | <0.01% |
| Heavy aromatic naphtha | 64742-94-5 | <0.01% |
| Quaternary ammonium compounds | 68989-00-4 | <0.01% |
| Sodium hydroxide | 1310-73-2 | <0.01% |
| Disodium Ethylene Diamine tetra acetate (impurity) | 139-33-3 | <0.01% |
| Trisodium Ethylene Diamine tetra acetate (impurity) | 150-38-9 | <0.01% |
| Alcohol, C9-C11, ehoxylated | 68949-46-3 | <0.01% |
| Alkyl (c10-c14) alcohols, ethoxylated | 66455-15-0 | <0.01% |
| Methyl oxirane polymer | 9003-11-6 | <0.01% |
| Poly(oxy-1,2-ethaediyl) | 25322-68-3 | <0.01% |
| Trisodium nitrilotriacetate (impurity) | 5064-31-3 | <0.01% |
| Coco-amido-proplyamine oxide | 68155-09-9 | <0.01% |
| Diatomaceous earth, calcined | 91053-39-3 | <0.001% |
| Dicoco dimethyl quaternary ammonium chloride | 61789-77-3 | <0.001% |
| Dioctyl sulfosuccinate sodium salt | 577-11-7 | <0.001% |
| Naphthale (impurity) | 91-20-3 | <0.001% |
| Dodecyl benzene | 123-01-3 | <0.001% |
| Sulfuric acid (impurity) | 7664-93-9 | <0.001% |
| Magnesium nitrate | 10377-60-3 | <0.001% |
| Propylene glycol | 57-55-6 | <0.001% |
| 5-chloro2-2methyl-2h-isothiazol-3-one | 26172-55-4 | <0.001% |
| Magnesium chloride | 7786-30-3 | <0.0001% |
| 2-ethylhexan-1-ol | 2682-20-4 | <0.0001% |
| Crystalline silica | 14808-60-7 | <0.0001% |
| Cristobalite | 14464-46-1 | <0.0001% |

**Table 4.9-26: Representative Chemicals Listed in Acid Matrix Notices**

| Ingredients[a] | CAS | Max Ingredient Concentration in Fluid (% by mass)[b] |
|---|---|---|

Source: Appendix S
Notes:

[a] Chemicals lists were observed on DOGGR Interim Well Stimulation Notices, accessed March 13, 2014. This listing shows chemicals found in a sampling of hydraulic fracture notices from different fields. A chemical is only listed once, even if it shown on multiple notices.

[b] The estimated concentration listed is representative of a "typical" use, based on the information reviewed, and will vary between wells.

California has enacted several new laws pertaining to well stimulation, including significantly expanded pre- and post-treatment notice and disclosure requirements under SB-4. The notices and disclosures must include estimates of total water use by source, the types and amounts of chemicals used in each treatment, and an analysis of constituent levels in treatment flowback water recovered at the well head. In February 2015, the Los Angeles Times reported that high levels of benzene had been detected in produced water samples, based on flowback water test results reported in publicly available well stimulation notices and disclosures submitted to DOGGR (Cart 2015b). A 1993 DOGGR study of benzene in produced water generated by oil and gas activities in Kern County found that hydrocarbon-bearing formations contain benzene, and that the benzene concentrations tend to increase with the incidence of heavier (lower API gravity) oil deposits (Gamache 1993). A 2012 USGS study of geogenic sources of benzene in aquifers used for public supply generally concluded that benzene levels in state drinking water were low and that benzene occurs in groundwater mainly from geological factors, including proximity to hydrocarbon bearing formations (Landon and Belitz 2012). As shown in Table 4.9-21, and consistent with the USGS and DOGGR studies, benzene has been detected in produced water drawn from hydrocarbon bearing formations.

## Floodplains and Drainages

A Federal Insurance Rate Map (FIRM) was developed by the Federal Emergency Management Agency (FEMA) for Kern County, California (unincorporated areas). The map identifies locations in the Project Area that are subject to a 100-year flood hazard risk, or inundation from flooding at least once over 100 years. Figure 4.9-17 shows the locations that are subject to a 100-year flood hazard risk and to undetermined but potential risks of flooding within the Project Area. Mapped and potential flood risk areas overlie several existing oilfields.

Portions of the Project Area could also be subject to inundation by upstream dam failures, particularly the potential failure of Lake Isabella dam. Lake Isabella is 35 miles northeast of Bakersfield. Lake Isabella was created by a dam completed by the USACE in 1953. The Lake Isabella dam consists of a main dam and an auxiliary dam, which are located 2,000 feet laterally apart. The main earthfill dam is 185 feet high and 1,725 feet long, while the auxiliary earthfill structure is 100 feet high and 3,275 feet long. The gross capacity of both dams is 568,100 AF.

The dam facilities have been determined to be substandard by the USACE, and a safety modernization program has been implemented to upgrade the dam by 2022. During the review process, the USACE prepared flood inundation maps identifying the potential inundation area and time-step of flood arrival, assuming both a full reservoir and complete failure of both dams (Kern County, n.d.). Figure 4.9-18 shows the potential peak elevation inundation depths that could occur from a dam failure under these highly conservative assumptions within the Project Area.

Additional information concerning Project Area drainages and wetland resources, and maps showing the locations of these resources in each Subarea, are provided in Section 4.4, Biological Resources.

## 4.9.3 Regulatory Setting

# Federal

### Clean Water Act (33 U.S.C. §1321 et seq.)

The 1972 Federal Water Pollution Control Act and its 1977 amendments, collectively known as the CWA, established national water quality goals and the basic structure for regulating discharges of pollutants into the waters of the United States. Section 402 of the CWA establishes the NPDES to regulate the discharge of pollutants into waters of the United States. Section 404 of the CWA regulates the discharge of fill or dredged materials to waters of the United States. (see Section 4.4, Biological Resources). Permits issued under the CWA limit the composition and, in some cases, the volume of a discharge and the concentrations of individual pollutants. Discharge requirements are based on available technology (technology-based effluent limits) and on the quality of the receiving waters (water quality-based effluent limits).

The CWA allows for the delegation of implementation authority to the states. Under the federal or delegated program, all the information required for permit application and monitoring for permit compliance are considered public, with the exception of certain confidential business information which may be considered "trade secret." In addition, the program requires delegated states to establish water quality standards for specific water bodies and to designate the types of pollutants to be regulated, including total suspended solids and oil and grease. In California, NPDES permitting authority is delegated to the SWRCB and nine RWQCBs. The Project Area is within the jurisdiction of the CVRWQCB.

Under the NPDES program, all point sources that discharge directly into waters of the United States are required to obtain a permit regulating their discharge. Each NPDES permit specifies effluent limitations for particular pollutants as well as monitoring and reporting requirements for the proposed discharge. Construction activities in the Project Area that could result in a discharge to waters of the U.S. are subject to the California NPDES General Permit for Stormwater Associated with Construction Activities (Construction Activity NPDES Storm Water General Permit, 2009-0009-DWQ and 2010-0014-DWQ). Other stormwater discharges could be subject to the Industrial General Permit issued under the NPDES program, or to a municipal separate

storm sewer system (MS4) NPDES permit issued for municipal locations, or to individual NPDES permits issued to specific landowners or land use operators. More information about NPDES permits that apply to oil and gas operations is provided in the discussion of state permitting below.

Section 401 of the CWA requires that an applicant requesting a federal permit for an activity that may result in a discharge into a water of the U.S. obtain state certification that the proposed activity will not violate state and federal water quality standards. State water quality standards are discussed below. The CVRWQCB implements Section 401 of the CWA in the Project Area.

## Total Maximum Daily Loads

Under section 303(d) of the CWA, states, territories, and authorized tribes are required to develop lists of impaired waters (i.e., waters that exceed applicable water quality standards). The law requires that these jurisdictions establish priority rankings for waters on the lists and develop TMDLs for these waters. A TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards.

On December 5, 2013, the EPA announced a new collaborative framework for implementing the CWA Section 303(d) Program with States — A Long-Term Vision for Assessment, Restoration, and Protection under the Clean Water Act Section 303(d) Program. This Vision reflects collaboration among states and the EPA, which began in August 2011. While the Vision provides a new framework for implementing the CWA 303(d) Program, it does not alter state and EPA responsibilities or authorities under the CWA 303(d) regulations. There are no impaired waters listed within the Project Area, and no TMDLs have been established for surface waters in the Project Area.

## Other Clean Water Act Programs Related to Oil and Gas Production

Several federal programs and regulations have been implemented under the authority of the CWA to regulate oil and gas production activities that could affect surface water quality.

The Oil Pollution Act of 1990 (33 United States Code [U.S.C.] §2701-2761) amended the CWA and established a single uniform federal system of liability and compensation for damages caused by oil spills in navigable waters, which are defined as waters of the United States. The Act requires the removal of spilled oil and establishes a national system of planning for and responding to oil spill incidents, including: improved national oil-spill prevention, preparedness, and response capabilities; limitations on liability for damages resulting from oil pollution; funding for natural resource damage assessments; a fund for damage compensation payments; and the establishment of an oil pollution research and development program.

Regulations promulgated under the Oil Pollution Act (40 CFR 112) require that a spill prevention control and countermeasures (SPCC) plan must be prepared for most facilities with a total aboveground oil storage capacity greater than 1,320 gallons or a total underground oil storage capacity of greater than 42,000 gallons. The purpose of an SPCC plan is to prevent oil from reaching waters of the United States and adjoining shorelines, and to contain discharges of oil.

SPCC plans must be prepared and certified by a professional engineer, and implemented for facilities that store, process, transfer, distribute, use, drill, produce, or refine oil or oil production. At a minimum, an SPCC plan must include: (1) procedures and methods for proper installation of equipment to prevent an oil release; (2) a training and drill program for all personnel addressing oil spill response; and (3) a plan that outlines steps to contain, clean up, and mitigate any effects that an oil spill may have on waterways. Facilities that could substantially harm waters of the United States are also required to prepare a facility response plan (FRP) to prevent and respond to discharges of oil or other materials.

Other CWA regulations specifically address discharges of point source effluents from offshore and onshore oil and gas extraction activities (40 CFR 435). There are no offshore facilities in the Project Area. The regulations prohibit any "discharge of waste pollutants into navigable waters from any source, other than produced water, associated with production, field exploration, drilling, well completion, or well treatment (i.e., drilling muds, drill cuttings, and produced sands)" unless authorized by other regulatory provisions. Section 435.50 allows for the discharge of produced water from oil and gas extraction in onshore locations west of the 98th meridian (which extends through central Texas, Oklahoma, Nebraska, Kansas, and North and South Dakota east of the Rock Mountains) of sufficient quality for use in agricultural or wildlife propagation. Any such discharge must be limited to produced water and not arise from other sources, such as drilling muds, drill cuttings, and produced sands. The discharge must not exceed a daily maximum oil and grease concentration of 35 mg/L. In 2012, about 32,771 AF of produced water was used for agriculture in the Eastern Subarea, pursuant to this regulation.

Additional regulations adopted under the CWA include the National Oil and Hazardous Substance Pollution Contingency Plan (NCP) (codified at 40 CFR 300). The NCP provides national guidance for responding to oil spills and hazardous substance releases, including response capability coordination among emergency responders and applicable contingency plans.

## The Safe Drinking Water Act of 1974 (42 U.S.C. §300f et seq.)

The SDWA was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. The law was amended in 1986 and 1996, and requires many actions to protect drinking water and its sources: rivers, lakes, reservoirs, springs, and ground water wells. The SDWA authorizes the EPA to set national health-based standards for drinking water to protect against both naturally occurring and man-made contaminants that may be found in drinking water.

The EPA has authority under the SDWA to regulate the subsurface injection of fluids below, into, and above USDW and has established a UIC program by regulations promulgated under the Act (40 CFR 144-147). A USDW is defined as: (1) any aquifer that supplies a public water system; or (2) contains enough groundwater to supply a public water system and either currently supplies drinking water for human consumption or contains less than 10,000 mg/L of TDS. Injection wells are separated into six classes. Class I wells inject hazardous and non-hazardous wastes into deep, isolated rock formations that are separated from the lowest USDW by layers of impermeable clay and rock. Class II wells inject fluids associated with oil and natural gas production operations.

Class III wells inject super-heated steam, water, or other fluids into formations to extract minerals. Class IV wells inject hazardous or radioactive wastes into underground sources of drinking water and are prohibited under the UIC program. Class V injection wells include wastewater disposal wells used by the geothermal industry and shallow septic system and cesspool wells that drain liquid waste into the ground. Class VI wells include wells used for carbon sequestration and storage.

Class II wells are used for oil and gas production throughout the Project Area, including for enhanced oil recovery through the injection of brine, water, steam, polymers, or carbon dioxide into oil-bearing formations to recover oil and natural gas. Class II wells are also used to dispose of fluids associated with oil and gas production by injection into the same underground formation from which they were recovered, a similar formation, or other confined subsurface formations. In certain locations, Class II wells inject liquid hydrocarbons in underground formations (such as salt caverns) for storage. Production wells solely used to bring oil and gas to the surface, and well stimulation treatments, such as hydraulic fracturing, that do not use diesel fuels in fluids or propping agents, are not regulated under the UIC program. Class II wells allow for the disposal of briny produced water in deep underground formations to prevent surface contamination of soil and water and are increasingly used in lieu of surface ponds in the Project Area. In 2014, there were 10,952 active Class II water disposal, cyclic steam, steam flood, and water flood wells in the Project Area, including 8,916 wells in the Western Subarea, 99 wells in the Central Subarea, and 1,937 wells in the Eastern Subarea.

The regulations allow for disposal into aquifers that would otherwise meet the criteria for a USDW if the aquifers are determined to be exempt by the EPA in accordance with an exemption application and review process (40 CFR 146.4). For oil and gas production and Class II well operations, an aquifer may be designated as "exempted" if it does not currently serve as a source of drinking water and cannot currently or in the future serve as a source of drinking water because it is: (1) mineral, hydrocarbon, or geothermal energy producing, or can be demonstrated to contain commercially producible minerals or hydrocarbons; (2) situated at a depth or location which makes recovery of water for drinking water purposes economically or technologically impractical; or (3) so contaminated that it would be economically or technologically impractical to render the water fit for human consumption. Alternatively, an aquifer may be exempted from SDWA protection if the TDS content of the ground water is more than 3,000 and less than 10,000 mg/L and the aquifer is not reasonably expected to supply a public water system. Aquifers containing TDS greater than 10,000 mg/L are not considered underground sources of drinking water under the SDWA and do not need to be exempted in order for injection to occur.

In 1983, California was granted primacy to regulate Class II wells under the SDWA and must meet federal requirements for the UIC program, including construction, operating, monitoring and testing, reporting, and closure requirements for well owners or operators. All UIC injection activity in the state must be permitted by DOGGR. Class II well operators must meet well construction and conversion standards and perform regular testing and inspection to ensure well integrity. In general, the UIC regulations (40 CFR 146 et seq.) require that owners and operators of new Class II injection wells: (1) site wells in locations free of faults and other adverse

geological features; (2) drill to a depth that allows the injection into formations that do not contain USDWs, or that contain only exempt aquifers, and that are confined from any other formation that may contain potential drinking water sources; (3) inject fluids through an internal pipe (tubing) that is located inside another pipe (casing), with cement placed between the outside pipe and the well borehole; (4) test well integrity at the time of completion and at least every five years thereafter; and (5) continuously monitor well integrity. The DOGGR administers the UIC program for Class II wells in California (see below for more information about the state Class II well regulation program).

### National Flood Insurance Program

The National Flood Insurance Program (NFIP) was enacted in 1968 to provide a federal program for participating communities to purchase flood insurance. The program is administered by FEMA, and applicable flood insurance rates are based on the flood hazards identified on FIRMs produced and updated by FEMA. A FIRM identifies the estimated limits of the 100-year flood hazard risk, and to participate in the NFIP, local communities must adopt regulations for floodplain development to reduce flood damage, including flood proofing, elevation on fill, or floodplain avoidance. Kern County participates in the NFIP. The currently applicable flood risks in the Project Area based on the FEMA maps are shown on Figure 4.9-17.

## State

### Porter-Cologne Water Quality Control Act (California Water Code §13000 et seq.)

The Porter-Cologne Water Quality Control Act (Porter-Cologne) provides the state and nine RWQCBs with the authority to regulate discharges of waste into waters of the state. Section 13050(e) of the Water Code defines waters of the state to mean "any surface water or groundwater, including saline waters, within the boundaries of the state." Porter-Cologne is administered in the Project Area by the CVRWQCB under the Water Quality Control Plan for the Tulare Lake Basin (Basin Plan) (CVRWQCB 2004). The Basin Plan identifies existing and future beneficial uses for surface water and groundwater within the Planning Area, such as municipal water supply or recreation, and numeric or narrative water quality objectives that will reasonably protect beneficial uses and prevent nuisances. Beneficial uses and water quality objectives in the Basin Plan also meet applicable federal regulatory criteria for water quality standards and are used to evaluate compliance with state and federal water quality requirements. The Basin Plan includes standards for ground waters that are not subject to federal regulation (CVRWQCB 2004). Tables 4.9-7 and 4.9-8 summarize the beneficial uses designated in the Basin Plan for surface and groundwater in the Project Area.

California Water Code §13260 requires that any person discharging waste, proposing to discharge waste, or operating or proposing to construct an injection well within any region that could affect the quality of the waters of the state, other than into a community sewer system, must submit a report of waste discharge to the applicable RWQCB. The CVRWQCB reviews reports of waste discharge submitted under Porter-Cologne and issues waste discharge requirements (WDRs) that

regulate the discharge unless such requirements are waived in accordance with the Water Code or regulations adopted thereunder. For example, discharges of waste into underground injection wells that are regulated under the UIC program are exempt from the requirement to submit a report of waste discharge and are exempt from SWRCB regulations applicable to discharges of waste to land (23 Cal. Code Regs. Section 2511(c)). As discussed above, the CVRWQCB also administers the federal NPDES permit system and, where required, issues water quality certifications for federal permits in the Project Area. If a discharge is also subject to a federal permit, the CVRWQCB will commonly incorporate state WDRs with the issuance of an NPDES permit or a water quality certification.

## Stormwater Discharge Regulations

The State Board has adopted a general NPDES permit for construction activities that disturb more than one acre of land (NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities [2012]), Construction General Permit, Order No. 2012-0006-DWQ, NPDES No. CAS000002). The general permit applies to discharges of sediment from construction activities associated with oil and gas exploration, production, processing, or treatment operations or transmission facilities. To comply with the general permit, a Notice of Intent (NOI) must be filed with the RWQCB, and a SWPPP must be implemented at the commencement of grading and remain in effect until construction is completed. Construction-related pollutants must be controlled with the best available technology economically achievable and best conventional pollutant control technology (the BAT/BCT standard). The Construction General Permit also requires effluent monitoring and reporting, receiving water monitoring and reporting, a rain event action plan, project site soil characteristics and monitoring, new and redevelopment performance standards for water quality and hydromodification impacts, technology-based numeric action levels, and risk-based permitting.

The 1987 federal Water Quality Act (WQA) amended the federal CWA to provide that federal and state agencies may not require federal NPDES permits for uncontaminated storm water discharges from oil and gas exploration, production, processing or treatment operations, or transmission facilities. In 2005, the Energy Policy Act added a new provision to the CWA defining the term "oil and gas exploration, production, processing, or treatment operations or transmission facilities" to mean "all field activities or operations associated with exploration, production, processing, or treatment operations, or transmission facilities, including activities necessary to prepare a site for drilling and for the movement and placement of drilling equipment, whether or not such field activities or operations may be considered to be construction activity" (33 U.S.C. §1362(24)).

On June 12, 2006, the EPA published a final rule to address the CWA amendments made by the 2005 Energy Policy Act. The regulation effectively exempted from NPDES permit requirements stormwater discharges of sediment from construction activities associated with oil and gas exploration, production, processing, or treatment operations or transmission facilities unless stormwater from a facility resulted in a discharge of a reportable quantity of oil or hazardous substances. Shortly thereafter, the Natural Resources Defense Council (NRDC) petitioned the Ninth Circuit Court of Appeals (Ninth Circuit) for direct review of the rule, and on May 23, 2008,

the Ninth Circuit vacated the 2006 oil and gas construction stormwater regulation (Natural Resources Defense Council v. United States Environmental Protection Agency, 526 F.3d 591 [9th Cir. 2008]). The Ninth Circuit denied the EPA's request for a rehearing of the decision.

The EPA has indicated that, in the aftermath of the Ninth Circuit ruling, oil and gas operators are subject to the stormwater permitting requirements that existed prior to the 2006 rule, subject to the additional legislative provisions added to the CWA by the 2005 Energy Policy Act, and including the following provisions (EPA 2009):

- 40 CFR 122.26(a)(2): The Director may not require a permit for discharges of storm water runoff from mining operations or oil and gas exploration, production, processing or treatment operations or transmission facilities, composed entirely of flows which are from conveyances or systems of conveyances (including but not limited to pipes, conduits, ditches, and channels) used for collecting and conveying precipitation runoff and which are not contaminated by contact with or that has not come into contact with, any overburden, raw material, intermediate products, finished product, byproduct or waste products located on the site of such operations.

- 40 CFR 122.26(e)(8): For any storm water discharge associated with small construction activity identified in paragraph (b)(15)(i) of this section, see 122.21(c)(1). Discharges from these sources, other than discharges associated with small construction activity at oil and gas exploration, production, processing, and treatment operations or transmission facilities, require permit authorization by March 10, 2003, unless designated for coverage before then. Discharges associated with small construction activity at such oil and gas sites require permit authorization by June 12, 2006.

- 40 CFR 122.26(c)(1)(iii): The operator of an existing or new discharge composed entirely of storm water from an oil or gas exploration, production, processing, or treatment operation, or transmission facility is not required to submit a permit application in accordance with paragraph (c)(1)(i) of this section, unless the facility: (A) Has had a discharge of storm water resulting in the discharge of a reportable quantity for which notification is or was required pursuant to 40 CFR 117.21 or 40 CFR 302.6 at any time since November 16, 1987; or (B) Has had a discharge of storm water resulting in the discharge of a reportable quantity for which notification is or was required pursuant to 40 CFR 110.6 at any time since November 16, 1987; or (C) Contributes to a violation of a water quality standard.

The Construction General Permit includes a Rainfall Erosivity Waiver process for sites that are between 1 and 5 acres and that demonstrate that construction activities will have no adverse water quality impacts. Site operators that meet the acreage requirements may seek a Rainfall Erosivity Waiver by submitting a NOI and Sediment Risk analysis to the applicable RWQCB certifying that the construction activity will take place during a period when the value of the rainfall erosivity factor is less than five. Compliance with permit requirements is generally waived in the event that an NOI is approved by the RWQCB.

The SWRCB has also adopted an Industrial General Permit for stormwater. The current permit (Industrial General Permit 97-03-DWQ) expires on June 30, 2015, and a new permit (Industrial General Permit 2014-0057-DWQ) becomes effective July 1, 2015. The Industrial General Permit includes new online reporting, monitoring, minimum BMPs, numerical action levels and response actions, and other new requirements. Attachment A to the new permit states that "Oil and Gas/Mining Facilities," including "oil and gas exploration, production, processing, or treatment operations, or transmission facilities that discharge storm water contaminated by contact with or that has come into contact with any overburden, raw material, intermediate products, finished products, by-products, or waste products located on the site of such operations" are subject to coverage. Potentially covered facilities can file a notice of nonapplicability (NONA) supported by a technical report prepared by a qualified engineer demonstrating that permit coverage is not required because: (a) the facility is designed to contain and avoid any discharge of storm water to waters of the United States; or (b) the facility is located in a basin or other location that is not hydrologically connected to waters of the United States. Facilities subject to coverage may also file a No Exposure Certification (NEC) and seek to obtain conditional exclusion from certain permit requirements for facilities that have no exposure of industrial activities and materials to storm water (40 CFR 122.26(g)).

## Drilling Mud and Drilling Fluid Discharges to Land

Prior to 2013, discharges of drilling muds and fluids from oil and gas-related well drilling and reworking activity were subject to Central Valley Water Board Resolution No. R5-2003-0008 (General Waiver), which covered a number of low-threat wastes, including drilling mud and fluid discharges. In 2013, the CVRWQCB declined to extend the waiver for oil and gas-related drilling mud and fluid discharges (CVRWQCB Resolution R5-2013-0145). In response, oil and gas well construction in the Project Area must either utilize closed-loop systems that avoid any discharge of drilling muds and fluids into sumps, or obtain regulatory coverage under SWRCB General Order 2003-0003-DWQ, which addresses low-threat discharges to land, including:

- Wells/boring waste, well development discharge, monitoring well purge water discharge, boring waste discharge;
- Clear water discharges, water main/water storage tank/water hydrant flushing, pipelines/tank hydrostatic testing discharge, commercial and public swimming pools;
- Small/temporary dewatering projects (such as excavations during construction); and
- Miscellaneous, small inert solid waste disposal operations, and cooling discharge.

The general order allows the discharge of boring waste, drilling mud, and cuttings from well-drilling operations to onsite drilling sumps, but prohibits, among other activities, the discharge of: (a) any waste to surface waters; (b) waste classified as "hazardous" or "designated" as defined in Title 22 CCR Section 66261 and the California Water Code Section 13173; and (c) waste that causes, by itself or in combination with any other discharge, an exceedance of applicable Regional Board Basin Plan objectives for ground or surface waters. The general order also

provides that the boring waste, drilling mud, and cuttings may not contain halogenated solvents. At the end of drilling operations, the discharger is required to: (a) remove all wastes from the sump; or (b) remove all free liquid from the sump and cover residual solid and semi-solid wastes, provided that representative sampling of the sump contents after liquid removal shows residual solid wastes to be nonhazardous. Residual wastes must be disposed at a proper Title 27 CCR classified waste disposal facility or onsite. Residual wastes discharged onsite must meet the following requirements: (1) the discharge must be located greater than 5 feet above local groundwater level; (2) the discharge must be covered by a minimum of 1 foot of clean soil; and (3) the discharge must be located at least 100 feet from the nearest surface water. If a drilling sump has appropriate containment features, it may be reused.

On November 15, 2013, the CVRWQCB issued an order pursuant to California Water Code (CWC) §13267 requiring a large number of operators of oil and gas wells to provide information about discharges of drilling muds into sumps from January 1, 2012, to present. CWC §13267 authorizes the regional water board to require any person who has discharged waste to submit technical or monitoring program reports to assist the staff in its assessment of potential water quality impacts resulting from the discharge. The order identified for reporting those companies that had produced more than 1,000 barrels of oil or 10 million cubic feet of natural gas in a month or those companies that may have drilled exploratory wells. These operators were required to describe the procedures used to close unlined drilling sumps at new wells and to close smaller temporary operational sumps next to existing wells. If waste was solidified during closure of a sump, then the company was required to describe that solidification process in the report. The CVRWQCB staff reported on its progress to the Board on June 5-6, 2014, and again on February 5-6, 2015. According to the project applicant, both reports were informational and no written report has yet been issued. The CVRWQCB staff has indicated to the project applicants that it intends to prepare general WDRs for drilling sumps, but has not yet proposed tentative WDRs. If adopted, the general WDRs would supersede the need for coverage under the SWRCB General Order.

## Produced Water Percolation and Evaporation Ponds

Produced water has been historically disposed of in unlined ponds (surface impoundments), in reliance on an exemption contained in the SWRCB regulations applicable to "discharges of [nonhazardous] wastewater to land, including but not limited to evaporation ponds, percolation ponds, or subsurface leachfields" where the discharge was in compliance with an adopted water quality control plan, including the Tulare Lake Basin Plan (23 CCR §2511(b)). According to the RWQCB's website, there are an estimated 933 produced water ponds in the CVRWQCB, many of which are located in the Project Area. Over 500 of these ponds have been issued WDRs.

The CVRWQCB is evaluating current and past discharges of produced water into surface ponds to determine whether they are permitted and operating in compliance with state regulations. In the future, unpermitted facilities will be required to obtain WDRs and to comply with other applicable requirements designed to protect groundwater quality. According to the Project Applicant, the CVRWQCB may adopt new general orders that could cover low threat facilities, moderate threat facilities, and no threat facilities. Other facilities may be required to obtain

individual WDRs based on site-specific circumstances. The CVRWQCB has indicated that it will issue enforcement orders to oil and gas disposal pond facilities as necessary to bring them into compliance with applicable laws and regulations. If beneficial uses of groundwater have been impaired as a result of historical usage of an unlined pond, investigation and remediation may be required. The CVRWQCB prepared a work plan for the review of Project Area and other central valley disposal ponds, and the review program is scheduled to be completed by November 2016.

In April 2015, the RWQCB issued orders under Water Code §13267 to a large number of operators. This section of the Water Code authorizes the RWQCB to require any person who has discharged waste to submit technical or monitoring program reports to assist the staff in its assessment of potential water quality impacts resulting from the discharge. The orders vary among sites but, generally, require the collection and analysis of wastewater samples from each of the listed ponds within the operator's control to characterize the discharge. The RWQCB also issued inspection reports and notices of violation to some operators in April 2015, which require the operators to file reports of waste discharge, submit closure plans where applicable, or take corrective actions.

Depending on the characteristics of the formation from which the water is produced, produced water could be classified either as "nonhazardous solid waste" or "designated waste" under the SWRCB's waste classifications applicable to discharges of waste to land. "Nonhazardous solid waste" includes "all putrescible and nonputrescible solid, semi-solid, and liquid wastes, including . . . industrial wastes" so long as they are not required to be managed as hazardous wastes and do not contain soluble pollutants in concentrations which exceed applicable water quality objectives, or could cause degradation of waters of the state" (27 CCR §20220(a)). "Designated waste" is defined as "nonhazardous waste that consists of, or contains, pollutants that, under ambient environmental conditions at a waste management unit, could be released in concentrations exceeding applicable water quality objectives or that could reasonably be expected to affect beneficial uses of the waters of the state as contained in the appropriate state water quality control plan" (27 CCR §20210; Water Code §13173).

Produced water that contains concentrations of constituents that exceed water quality objectives will likely be classified as designated waste and will be required to be managed in Class II surface impoundments. Class II surface impoundments must generally be constructed in locations where site characteristics and containment structures isolate wastes from waters of the state. CVRWQCB general orders or WDRs concerning such wastes will require compliance with the design, operating, monitoring, and reporting requirements included in Title 27 CCR §20200 et seq. for Class II surface impoundments. Exceptions to the containment standards may be made where groundwater with actual or reasonably foreseeable beneficial uses is not present or is present in insufficient quantities to serve as a source of water. Where waters with beneficial uses are present and could be adversely impacted, unlined impoundments may have to be retrofitted with liner systems consisting of low permeability natural geological materials (clay) or constructed base materials, such as high-density polyethylene.

## Discharges to Injection Wells

Injection wells are subject to regulation under both the groundwater protection provisions of the Porter-Cologne Act and by DOGGR through the implementation of the federal UIC program in accordance with a 1983 primacy agreement with the EPA. In March 1988, the State Board and DOGGR entered into a MOA that outlines procedures for reporting proposed oil, gas, and geothermal field discharges and for prescribing permit requirements. The procedures are intended to provide a coordinated approach resulting in a single permit satisfying the statutory obligations of both agencies. The purpose of the MOA is to ensure that the construction or operation of Class II injection disposal wells and the land disposal of wastewaters from oil, gas, and geothermal production facilities does not cause degradation of waters of the state. The MOA provides that DOGGR has primary permit authority, subject to review and comment by the state and applicable regional boards, for injection activities regulated by the UIC program. Consistent with the MOA, SWRCB regulations exempt injection wells that are permitted by DOGGR from requirement to file a report of waste discharge or to obtain WDRs that are applicable to other discharges under state law Title 27 CCR §20090(c). The state and regional boards have primary permit authority, subject to review and comment by DOGGR, for all other oil and gas exploration and production regulated discharges. The MOA provides that the agencies will work together to review, prepare and coordinate permits and enforcement. The MOA is included as Appendix 15 of the Tulare Lake Basin Plan.

In 1983 DOGGR and the EPA entered into a primacy agreement which implements the federal UIC program in California for Class II wells. DOGGR regulates underground injection wells under 14 CCR §1724 et seq. and other regulations adopted in compliance with the state Public Resources Code and the grant of primacy from the EPA for the UIC program. All underground injection activities, whether for EOR or waste disposal, are subject to regulation under the UIC program. With the exception of hydraulic fracturing that uses diesel fuels, well stimulation activities are specifically excluded from the UIC program under federal law and are regulated under state law (see below). 14 CCR §1724.6 requires that DOGGR approve "any subsurface injection or disposal project," including all UIC Class II wells. 14 CCR §§1724.7 and 1724.8 lists the data an injection well operator must submit to DOGGR to obtain approval for cyclic steam projects. 14 CCR §1724.10 lists the filing, notification, operating, and testing requirements for underground injection projects.

In general, an injection well application must include a detailed engineering study that includes a statement of the primary purpose of the project; the reservoir and fluid characteristics of each injection zone; and the planned well drilling and plugging and abandonment program to complete the project, including a flood-pattern map showing all injection, production, and plugged and abandoned wells, and unit boundaries. The engineering study must also include casing diagrams for all idle, plugged and abandoned, and deeper-zone producing wells within the area affected by the project. The casing diagrams in the engineering study must provide evidence that plugged and abandoned wells in the area will not have an adverse effect on the project or cause damage to life, health, property, or natural resources (14 CCR § 1724.7(a)).

The area affected by a project is defined by the Area of Review (AOR) requirements in the federal UIC regulations, which include a minimum fixed radius of 0.25 mile from a well bore, unless an approved mathematical model, such as a modified "This equation" is used (40 CFR 146.6(a)). When the AOR is determined by using a 0.25-mile fixed radius, the analysis must consider the chemistry of the injected and formation fluids, hydrogeology, population, ground water use, and dependence and historical injection practices (40 CFR 146.6(b)). DOGGR nominally defines an AOR boundary for a proposed injection well as a ¼ mile perimeter around the portion of the well's path that lies within the approved zone of injection as projected on a horizontal plane at ground level. This boundary may be reduced or expanded based on pertinent information regarding a well's completion, the local geology, and other injection parameters, including approved mathematical modeling.

A geologic study and injection plan must also be submitted in support of an injection well application. The geologic study must include a structural and isopach map, a cross section, and a representative electric log that identifies all geologic units, formations, freshwater aquifers, and oil or gas zones (14 CCR §1724.7(b)). The injection plan must include a map showing all injection facilities, maximum anticipated injection pressure and volumes, monitoring system or method used to ensure that injection fluid is confined to the intended zone or zones of injection, method of injection, corrosion protective measures, the source, analysis, and treatment of the injection fluid, and the location and depth of water-source wells to be used in conjunction with the project (14 CCR §1724.7(c)). DOGGR may require additional information for projects that may be hazardous, large, unusual, or particularly complex (14 CCR §1724.7(e)). DOGGR must also approve any desired change or modification of originally-approved injection project operating methods or conditions, such as an increase in size, changed injection intervals, or injection pressure increases (14 CCR §1724.10 (a)).

The injection plan must ensure that injection fluids will be confined to the intended zone or zones of injection (14 CCR §1724.7(c)(3)). To confirm that injection fluid is confined to the approved zone or zones, and will not leak to other formations or zones during injection, mechanical integrity testing must be performed on each injection well when the project begins and periodically thereafter (14 CCR §1724.10(j)). The analysis must consider whether abandoned wells within the AOR could act as a conduit for injection fluid by determining whether adjacent wells include at least 100 linear feet of cement above the approved zone of injection, or a calculated 150 linear feet of cement above the approved zone of injection. When abandoning a well, injection well operators are also required to use every effort and endeavor to protect underground or surface water suitable for irrigation or domestic purposes from the infiltration of detrimental substances (Public Resources Code §3228).

All new wells must fill the annular space to at least 500 feet above oil and gas zones and anomalous pressure intervals (14 CCR §1722.4). All perforations in plugged and abandoned wells must be cemented across and plugged at least 100 feet above the top of a landed liner, the uppermost perforations, the casing cementing point, the water shutoff holes, or the oil and gas zone, whichever is highest (14 CCR §1723.1(b)). A minimum 200-foot plug is required across all fresh-saltwater interfaces. An interface plug may be placed wholly within a thick shale if the

shale separates the freshwater from the brackish or saltwater sands. If there is cement behind the casing across the fresh-saltwater interface, then a 100-foot plug is required inside the casing across the interface. Squeeze-cementing, a cavity shot, or other special plugging procedures may be required in certain circumstances (14 CCR §1723.2).

Injection well operators are required to maintain data establishing the performance and safety of an injection project and make that data available for periodic review by DOGGR (14 CCR §1724.10(h)). It is DOGGR's policy to review the data for each project on an annual basis to: (1) determine if the injection project is consistent with the permit conditions stated purpose; (2) ensure that all required testing has been performed; (3) determine if there have been any changes to the project, including any drilled, reworked, or abandoned, wells in the AOR, and that any such work was properly completed; (4) confirm that injection fluid is confined to the permitted zone of injection; and (5) confirm that no damage is occurring from the injection project.

The maximum allowable sustained surface injection pressure (MASP) for an injection project must be below the fracture pressure. Prior to sustained injection, a step-rate test must be conducted to determine the MASP (14 CCR §1724.10(i)). DOGGR must be notified in advance of the step-rate test so that it may be witnessed by DOGGR staff. Test pressure must be from hydrostatic to the pressure required to fracture the injection zone or the proposed injection pressure, whichever occurs first. Operators must monitor all injection wells to confirm that injection is at or below the approved MASP. If the injection pressure is above the approved MASP, the operator must immediately reduce the injection pressure. In March 2015, the Supervisor of the DOGGR published a letter in response to inquiries from and a hearing held by the state Senate Committee on Natural Resources and Water confirming that certain steam injections in brittle diatomite formations were known to fracture the diatomite. The letter indicated that DOGGR regulations concerning steam injection were outdated and would be subject to further review and revision in conjunction with other revisions to the UIC program in response to aquifer exemption concerns raised by the EPA (Bohlen 2015).

A Standard Annular Pressure Test (SAPT) must be performed for each injection well prior to commencement of injection and at least once every five years thereafter (14 CCR §1724.10(j)(1)). In addition, all injection piping, valves, and facilities must meet or exceed design standards for the maximum anticipated injection pressure, and must be maintained in a safe and leak-free condition (14 CCR §1724.10(f)). Where there is only a single string of casing across water protected by the SDWA (10,000 mg/L TDS or less), the SAPT must be tested at the approved MASP for the well. All tests shall be evaluated to ensure that there are no leaks in the casing and that the fluid is confined to the permitted zone.

The regulations for well construction include standards for the use of casing, mud, and cement and prevent fluid migration and the comingling of lesser quality fluids. In addition to cement above the oil and gas zones, injection wells must be cemented across and at least 100 feet above a base freshwater interface (BFW) (14 CCR §1723.2). The hole and casing annulus space between the top of the cement isolating the oil and gas zones and the base of the cement covering the BFW interface should include heavy mud to prevent the movement of fluids (14 CCR §§1722.6 and 1723(b)). For water disposal wells with proposed injection into a non-hydrocarbon zone, well

construction should be consistent with disposal well completed into depleted oil and gas zones. In order to ensure that injected fluids are confined to the intended zone, there must be 100 feet of cement across and above the top of the intended injection zone.

In 2011, the EPA published an independent audit of the California UIC program that identified a number of potential compliance issues, including the possibility that injection wells had been permitted to discharge into 11 oilfield aquifers or other locations that met the USDW criteria but that had not been exempted in accordance with applicable requirements (Horsely-Witten Group 2011). The May 2015 letter from DOGGR and the SWRCB to the EPA refers to these aquifers as "aquifers that had historically been treated as exempt" (DOGGR 2015d). The SWRCB and DOGGR initiated a work plan to address the UIC program issues identified by the EPA review and subsequent analysis of oilfield operations. In February 2015, DOGGR and the SWRCB provided the EPA with a schedule for completing the regulatory review of the state UIC program and, in March 2015, the EPA responded to the agencies and identified deadlines and deliverables for the review process. The letters grouped potentially affected wells into three categories. Category 1 includes all disposal wells injecting into non-exempt, non-hydrocarbon bearing aquifers and into the 11 aquifers (eight of which are within the Project Area) that have historically been treated as exempt. Category 2 wells include all EOR wells injecting into non-exempt, hydrocarbon-bearing aquifers. Category 3 wells include disposal and EOR wells located inside the surface boundaries of exempted aquifers, but that may be injecting into a zone that was not subject to exemption.

The EPA letter requires completion of the Category 1 well review by May 15, 2015, the Category 2 wells by July 31, 2015, and the Category 3 wells by February 15, 2016. The letters also identify timelines for state rulemaking and public outreach, an aquifer exemption application process, and the potential inclusion of cyclic steam wells in the review process (EPA 2015b). All injection into aquifers with TDS levels of less than 3,000 mg/L must cease by October 15, 2015 unless the state applies for and the EPA approves an aquifer exemption for these locations. Operators may be required to cease injection at an earlier date if it is determined that drinking or agricultural water supplies are threatened. All injection into non-exempt aquifers with TDS levels of 3,000 to 10,000 mg/L must cease by February 15, 2017, unless the state applies for and the EPA approves aquifer exemptions for these locations. On April 2, 2015, DOGGR issued draft emergency regulations that implemented these requirements and require that all injection activity into the 11 aquifers that were historically treated as exempt must cease by December 31, 2016 unless the state applies for and the EPA approves aquifer exemptions for these locations. DOGGR's emergency regulations went into effect on April 20, 2015. As of March 2015, no contamination of water used for drinking or agricultural purposes related to underground injection by the oil and gas industry had been detected in water supply wells tested by the SWRCB (DOGGR 2015c)

DOGGR and the SWRCB provided additional information about the well review process in a May 2015 letter to the EPA. The May letter indicated that: (a) 80 of the 532 Category 1 wells identified in the February 2015 letter had been removed from the Category 1 list for various reasons, including injection into an aquifer that did not meet the criteria for a USDW, wells that had not been completed, or wells that were injecting into exempted aquifers. About 21 of the 176

wells identified in February 2015 as injecting into aquifers with less than 3,000 mg/L of TDS were also removed from the Category 1 list. The May 2015 letter also indicated that SWRCB staff had determined that 53 of the remaining 155 wells injecting into aquifers with less than 3,000 mg/L of TDS were "potentially impacting drinking water supply wells." As discussed above, 23 of these wells had been ordered to cease operations due to proximity to drinking or agricultural water supplies, and the May 2015 letter states that DOGGR and the SWRCB were "awaiting receipt of additional test data" before determining whether to order a shut-down of any of the other 30 wells by the October 15, 2015 compliance date (DOGGR 2015d). In May 2015, two environmental groups, the Sierra Club and the Center for Biological Diversity, filed a lawsuit contending that the DOGGR rules and the UIC program compliance schedule through 2017 violate state and federal laws. As of May 2015, the lawsuit remains pending in the Alameda County Superior Court and no determination has been made in the case (California Oil and Gas Report 2015).

DOGGR directly regulates the exploration and production of oil and gas in Kern County for conformance with California's conservation laws. Pursuant to CCR, Title 14, Division 2, Chapter 4, Section 1722 (k), DOGGR establishes Field Rules which supplement more broadly applicable statutory and regulatory requirements regarding well operations in order to protect California's water resources and health and safety. Each Field Rule is specific to an administrative well field and, in many cases, to Areas and Zones or Pools within a field; the rules identify downhole conditions and well construction information to be considered by the oil and gas operators when drilling and completing oil and gas wells. Field Rules have been adopted for most zones and fields in Kern County and are available online.

## California Toxics Rule

In 2000, the EPA promulgated federal water quality standards for the state of California after previously adopted water quality objectives for toxic pollutants were overturned in a court proceeding. These federal water quality standards are known as the California Toxics Rule (CTR) and have since been incorporated into regional basin plans, where applicable. The State Board has adopted a policy implementing the CTR (Resolution 2000-015, as amended by Resolution 2000-30). The CTR specifies water quality criteria for 128 priority pollutants based on toxicity to aquatic species, which are used as a basis for the establishment of effluent limitations in NPDES permits. The CTR is applicable to surfaced waters only.

## Senate Bill 4 (Well Stimulation Treatment)

Section 1421(d) of the federal SDWA excludes "the underground injection of fluids or propping agents (other than diesel fuels) pursuant to hydraulic fracturing operations related to oil, gas, or geothermal production activities" from regulation under the UIC program. Effective January 1 2014, California adopted several new and amended provisions of the Public Resources Code and Water Code to regulate any oil or gas well stimulation activity designed to enhance oil or gas production or recovery by increasing the permeability of the geologic formation that contains hydrocarbon deposits. Well stimulation activities covered by the new legislation include hydraulic fracturing and acid well stimulation treatments. The legislation, commonly referred to

as SB-4, amended Sections 3213, 3215, 3236.5, and 3401 of and added Article 3 to Chapter 1 of Division 3 of the Public Resources Code, and added Section 10783 to the Water Code. SB-4 requires that DOGGR: (1) promulgate emergency interim and adopt permanent regulations regulating well stimulation treatments by January, 2015, to take effect no later than July 1, 2015; (2) complete a statewide EIR on well stimulation treatments by July 2015; (3) complete an independent scientific study of well stimulation by January 2015; and (4) consult and reach formal agreements with other regulatory agencies to provide regulatory accountability for, and public transparency to, well stimulation treatments by January 2015. SB-4 also requires that the SWRCB develop model criteria for oil and gas-related groundwater monitoring by July 2015. The regulations, studies, and interagency agreements required by SB-4 are intended to regulate water quality and potential geological hazards that could be associated with well stimulation, such as earthquakes or ground instability resulting from bedrock fracturing or acidization. Geology and soils regulatory requirements associated with SB-4 are described in further detail in Section 4.6, Geology and Soils.

DOGGR adopted interim well stimulation regulations in January 2014, and readopted the interim regulations in July 2014. Proposed permanent regulations were circulated for public review and comment in October 2014, and were finalized in January 2015. The final regulations will become effective in July 2015. A draft program EIR for well stimulation in California was published by DOGGR on January 14, 2015. The public comment period for the draft EIR ended on March 16, 2015, and the EIR is scheduled to be finalized by July 2015 in accordance with SB-4.

SB-4 and the related interim and proposed permanent regulations require that certain physical well inspections, documentation, and public notices and disclosures be completed prior to and after completing a well stimulation process. The proposed regulations define well stimulation to include "a treatment of a well designed to enhance oil and gas production or recovery by increasing the permeability of the formation. Well stimulation is a short-term and non-continual process for the purposes of opening and stimulating channels for the flow of hydrocarbons. Examples of well stimulation treatments include hydraulic fracturing, acid fracturing, and acid matrix stimulation" (14 CCR §1761(a)(1)(A)). This definition "does not include routine well cleanout work; routine well maintenance; routine treatment for the purpose of removal of formation damage due to drilling; bottom hole pressure surveys; routine activities that do not affect the integrity of the well or the formation; the removal of scale or precipitate from the perforations, casing, or tubing; a gravel pack treatment that does not exceed the formation fracture gradient; or a treatment that involves emplacing acid in a well and that uses a volume of fluid that is less than the Acid Volume Threshold for the operation and is below the formation fracture gradient" (14 CCR §1761(a)(1)(B)).

Each well operator must obtain a permit from DOGGR in advance of performing a well stimulation treatment and must submit an application that includes the following information: the identification and location of the well; the time period during which the well stimulation treatment is planned to occur; a water management plan; a list of the anticipated identity and concentration of the chemical constituents of the well stimulation treatment fluids the operator plans to use; modeling of the well stimulation treatment axial dimensional stimulation area

(ADSA) and identification of plugged and abandoned wells and geologic faults within the modeled treatment area; indication that the operator is developing a groundwater monitoring plan meeting the criteria of the applicable Regional Water Quality Control Board (operations cannot commence unless a plan has been approved); an estimate of treatment- generated waste materials that are not addressed in the water management plan; identification and contact information of the operator; the depth of the base of fresh water; the results of specified evaluation and modeling; casing designs (14 CCR §§1783, 1783.1, 1784).

Once an application has been deemed complete by DOGGR, a well operator must hire an independent entity or person to provide notification to every tenant and owner of neighboring property within a specified distance from the wellhead and horizontal projection of the applicable well at least 30 days prior to commencing a well stimulation treatment. Notified property owners may request baseline and follow-up water quality testing at the operator's expense, and prior notice of any such testing must be provided to the applicable RWQCB to allow for the opportunity to observe the water sampling process. Well operators must also pressure-test a well and meet certain integrity requirements prior to commencing a well stimulation treatment. An operator may conduct the stimulation activity identified in an approved application and notice within one year from DOGGR approval (14 CCR §§1783.2-1783.3).

The regulations require that, prior to conducting well stimulation, an operator must perform a pressure test after all facilities that could be affected by a proposed well stimulate are in place (14 CCR §1784.1). In addition, a cement evaluation or remediation procedure must be performed to ensure that the cement outside of the well production casing meets applicable regulatory requirements and is sufficient to ensure the geologic and hydrologic isolation of the oil and gas formation during and following the well stimulation treatment (14 CCR §1784.2).

The regulations require the operator to monitor the surface injection pressure, slurry rate, proppant concentration, fluid rate, and pressure of each annuli of the well during a well stimulation treatment. The operator must terminate the well stimulation treatment, report the incident to the Division, and conduct diagnostics in event certain performance and pressure thresholds are exceeded. Notices of any termination must be provided to DOGGR and other state agencies, including the RWQCB (14 CCR §1785) Finally, the proposed regulations require operators to perform ongoing monitoring of a well after a stimulation treatment and to immediately inform DOGGR and the Regional Water Quality Control Board, conduct diagnostics, and take all appropriate measures to prevent contamination of protected water or loss of hydrocarbon resources. Tracking of seismic activity during and after well stimulation treatment must be performed using the California Integrated Seismic Network and require evaluation if an earthquake larger than magnitude 2.7 occurs within the vicinity of a well stimulation treatment (14 CCR §1785.1). Materials used in well stimulation are subject to storage, handling and reporting requirements (14 CCR §1786). Well monitoring must be performed after each well stimulation treatment is completed, including pressure data and diagnostic testing, to verify that the well has not been breached (17 CCR §1787).

Each well operator must disclose, within 60 days after a well stimulation treatment is completed, information regarding the source, volume and composition and disposition of well stimulation

fluids, including, but not limited to, hydraulic fracturing fluids, acid well stimulation fluids, and flowback fluids (14 CCR §1788). The disclosures are provided to DOGGR and must be available online in a format that allows for searching and aggregating the information. A well stimulation treatment report must also be filed with DOGGR, including any information concerning stimulation treatments that differ from what was anticipated in the well stimulation treatment design submitted to DOGGR under Section 1784(b) and whether the actual location of the well stimulation treatment differs from what was indicated in the stimulation permit application.

## Senate Bill 1281, Disclosure of Oil and Gas Water Use and Disposal

Senate Bill 1281 (SB 1281), effective January 2015, amended Sections 3226.3 and 3227 of the Public Resources Code to require that: (1) DOGGR provide the SWRCB with an annual "inventory of all unlined oil and gas field sumps"; and (2) well operators provide DOGGR with quarterly information regarding the source and disposition of water produced by or used in oil and gas production in addition to existing obligations to report gas and oil production and produced water information on a monthly basis. The new quarterly reporting requirements include information regarding: (a) the source and volume of any water, including produced water (also subject to monthly reporting) used to generate or make up the composition of any injected fluid or gas, identified by water source if more than one water source is used; (b) the volume of untreated water suitable for domestic or irrigation purposes used in oil and gas operations; (c) the treatment of water and the use of treated or recycled water in oil and gas field activities, including, but not limited to, exploration, development, and production; and (d) the specific disposition of all water used in or generated by oil and gas field activities, including water produced from each well as reported in an operator's monthly reports, and separated by volume of disposition if more than one disposition method is used. The amendments retain certain previous monthly reporting requirements in Section 3227, including: (1) the amount and gravity of oil, gas and water, and the number of days fluid was produced from each well; (2) the number of drilling, producing, injecting, or idle wells owned or operated by a person subject to reporting requirements; (3) the disposition of gas produced from each field; (4) the disposition of produced water in each field; and (5) the amount of fluid or gas injected into each well used for enhanced recovery, underground storage of hydrocarbons, or wastewater disposal. DOGGR has collected and reported the monthly data described in Section 3227 for several years. The first quarterly reports pursuant to SB 1281 are due to be filed by well operators by June 1, 2015 (DOGGR 2015e). DOGGR has indicated that the new information required by SB 1281 would be published after the close of each quarterly reporting period. SB 1281 and associated water quality regulations are described in further detail in Section 4.6, Geology and Soils.

## Sustainable Groundwater Management Act

In 2014, California enacted the Sustainable Groundwater Management Act (Water Code §10720 et seq.). The Act, and related amendments to California law, require that all groundwater basins designated as high or medium priority in the DWR CASGEM program, and that are subject to critical overdraft conditions, must be managed under a new GSP, or a coordinated set of GSPs, by January 31, 2020. High- and medium-priority basins that are not subject to critical overdraft conditions must be managed under a GSP by January 31, 2022. Where GSPs are required, one or

more local groundwater sustainability agencies (GSAs) must be formed to cover the basin and prepare and implement applicable GSPs. The Act does not apply to basins that are managed under a court-approved adjudication, or to low- or very low-priority basins.

A GSA has the authority to require registration of groundwater wells, measure and manage extractions, require reports and assess fees, and to request revisions of basin boundaries, including establishing new subbasins. The preparation of a GSP by a GSA is exempt from CEQA. Each GSP must include a physical description of the covered basin, such as groundwater levels, groundwater quality, subsidence, information on groundwater-surface water interaction, data on historical and projected water demands and supplies, monitoring and management provisions, and a description of how the plan will affect other plans, including city and county general plans.

The Sustainable Groundwater Management Act defines groundwater as "water beneath the surface of the earth within the zone below the water table in which the soil is completely saturated with water, but does not include water that flows in known and definite channels." A groundwater extraction facility is defined as "a device or method for extracting groundwater from within a basin" (Water Code §10721(g-h)). GSPs are reviewed by the DWR and to ensure that, over a period of 20 years, "sustainable groundwater management" is achieved. As defined by the Act, sustainable groundwater management means that groundwater use within basins managed by a GSP will not cause any of the following "undesirable results":

- Chronic lowering of groundwater levels (not including overdraft during a drought, if a basin is otherwise managed);
- Significant and unreasonable reductions in groundwater storage;
- Significant and unreasonable seawater intrusion;
- Significant and unreasonable degradation of water quality;
- Significant and unreasonable land subsidence; and
- Surface water depletions that have significant and unreasonable adverse impacts on beneficial uses (Water Code Section 10721(w)).

The DWR must adopt regulations for the preparation of a GSP by January 2016, and GSAs must be formed for high and medium priority basins by June 2017. The current CASGEM maps identify virtually all of the valley floor groundwater basins in the Project Area as "high priority" basins (DWR 2015b). Unless subsequently revised, GSPs must be implemented for these basins by January 2020 where critical overdraft conditions have been identified, or by 2022. At present, no GSA has been formed and no GSP has been adopted for any portion of the Project Area. In April 2015, Governor Brown issued an executive order requiring that the CASGEM groundwater level monitoring requirements identified in Water Code §10933 be implemented by local agencies by the end of 2015 (State of California 2015).

As described further in Chapter 3, Project Description, under applicable provisions of the California Constitution and state law, as interpreted by the California Attorney General, the County's authority to regulate subsurface activities relating to oil and gas exploration and production is preempted by state and federal laws and regulations. As a result, the County neither directly regulates nor can it impose mitigation measures that directly regulate subsurface activities by oil and gas operators, including those that could affect water quality. The County retains jurisdiction to regulate and require mitigation for oil and gas exploration activities that are conducted at the surface, including those that may affect subsurface water quality.

# Local

## Kern County General Plan

The Project Area is located within the Kern County General Plan (KCGP) area and, therefore, would be subject to applicable policies and measures of the KCGP. The Land Use, Conservation, and Open Space Element and the Safety Element of the KCGP include goals, policies, and implementation measures related to hydrology and water quality that apply to the Project, as described below.

### Chapter 1. Land Use, Conservation, and Open Space Element

#### 1.3. Physical and Environmental Constraints

##### Policies

**Policy 1.** Kern County will ensure that new developments will not be sited on land that is physically or environmentally constrained ((Map Code 2.1 (Seismic Hazard), Map Code 2.2 (Landslide), Map Code 2.3 (Shallow Groundwater), Map Code 2.5 (Flood Hazard), Map Codes from 2.6 – 2.9, Map Code 2.10 (Nearby Waste Facility), and Map Code 2.11 (Burn Dump Hazard)) to support such development unless appropriate studies establish that such development will not result in unmitigated significant impact.

**Policy 2.** In order to minimize risk to Kern County residents and their property, new development will not be permitted in hazard areas in the absence of implementing ordinances and programs. These ordinances will establish conditions, criteria, and standards for the approval of development in hazard areas.

**Policy 3**. Zoning and other land use controls will be used to regulate and, in some instances, to prohibit development in hazardous areas.

**Policy 6.** Regardless of percentage of slope, development on hillsides will be sited in the least obtrusive fashion, thereby, minimizing the extent of topographic alteration required and reducing soil erosion while maintaining soil stability.

**Policy 7.** Ensure effective slope stability, wastewater drainage, and sewage treatments in areas with steep slopes are adequate for development.

**Policy 8.** Encourage the preservation of the floodplain's flow conveyance capacity, especially in floodways, to be open space/passive recreation areas throughout the County.

**Policy 9.** Construction of structures that impede water flow in a primary floodplain will be discouraged.

**Policy 10.** The County will allow lands which are within flood hazard areas, other than primary floodplains, to be developed in accordance with the General Plan and Floodplain Management Ordinance, if mitigation measures are incorporated so as to ensure that the proposed development will not be hazardous within the requirements of the Safety Element (Chapter 4) of this General Plan.

**Policy 11.** Protect and maintain watershed integrity within Kern County.

### Implementation Measures

**Implementation Measure H.** Development within areas subject to flooding, as defined by the appropriate agency, will require necessary flood evaluations and studies.

**Implementation Measure I.** Designated flood channels and water courses, such as creeks, gullies, and riverbeds, will be preserved as resource management areas or in the case of urban areas, as linear parks whenever practical.

**Implementation Measure J.** Compliance with the Floodplain Management Ordinance prior to grading or improvement of land for development or the construction, expansion, conversion or substantial improvements of a structure is required.

**Implementation Measure M.** The State Water Resources Control Board and the Local Enforcement Agency (Environmental Health Services) shall be consulted when discretionary development has been proposed near a known burn dumpsite.

**Implementation Measure N.** Applicants for new discretionary development should consult with the appropriate Resource Conservation District and the California Regional Water Quality Control Board regarding soil disturbances issues.

## 1.4. Public Facilities and Services

### Goals

**Goal 5.** Ensure that adequate supplies of quality (appropriate for intended use) water are available to residential, industrial, and agricultural users within Kern County.

**Goal 9.** Serve the needs of industries and Kern County residents in a manner that does not degrade the water supply and the environment and protect the public health and safety by

avoiding surface and subsurface nuisances resulting from the disposal of hazardous wastes, irrespective of the geographic origin of the waste.

### 1.9. Resource

#### Goals

**Policy 10.** To encourage effective groundwater resource management for the long-term economic benefit of the County the following shall be considered:

(a) Promote groundwater recharge activities in various zone districts.

(b) Support for the development of Urban Water Management Plans and promote Department of Water Resources grant funding for all water providers.

(c) Support the development of groundwater management plans.

(d) Support the development of future sources of additional surface water and groundwater, including conjunctive use, recycled water, conservation, additional storage of surface water and groundwater and desalination.

**Policy 11.** Minimize the alteration of natural drainage areas. Require development plans to include necessary mitigation to stabilize runoff and silt deposition through utilization of grading and flood protection ordinances.

**Policy 12.** Areas identified by the Natural Resource Conservation Service (formerly Soil Conservation Service) as having high range-site value should be conserved for Extensive Agriculture uses or as Resource Reserve, if located within a County water district.

#### Implementation Measures

**Implementation Measure C.** The County Planning Department will seek review and comment from the County Engineering and Survey Services Department on the implementation of the National Pollution Discharge Elimination System for all discretionary projects.

**Policy 2.** Design discretionary critical facilities in the potential dam inundation area used for the storage, or use of hazardous materials to prevent onsite hazards from affecting surrounding communities in the event of inundation.

### 1.10. General Provisions

#### 1.10.6. Surface Water and Groundwater

#### Policies

**Policy 34.** Ensure that water quality standards are met for existing users and future development.

**Policy 39.** Encourage the development of the County's groundwater supply to sustain and ensure water quality and quantity for existing users, planned growth, and maintenance of the natural environment.

**Policy 43.** Drainage shall conform to the Kern County Development Standards and the Grading Ordinance.

**Policy 44.** Discretionary projects shall analyze watershed impacts and mitigate for construction-related and urban pollutants, as well as alterations of flow patterns and introduction of impervious surfaces as required by the California Environmental Quality Act (CEQA), to prevent the degradation of the watershed to the extent practical.

### Implementation Measures

**Implementation Measure U.** The Kern County Environmental Health Services Department will develop guidelines for the protection of groundwater quality which will include comprehensive well construction standards and the promotion of groundwater protection for identified degraded watersheds.

**Implementation Measure X.** Encourage effective groundwater resource management for the long-term benefit of the County through the following:

i. Promote groundwater recharge activities in various zone districts.

iii. Support the development of Groundwater Management Plans.

iv. Support the development of future sources of additional surface water and groundwater, including conjunctive use, recycled water, conservation, additional storage of surface water, and groundwater and desalination.

**Implementation Measure Y.** Promote efficient water use by utilizing measures such as:

i. Requiring water-conserving design and equipment in new construction.

ii. Encouraging water-conserving landscaping and irrigation methods.

## Chapter 4. Safety Element

### 4.4. Dam Failure, Flooding, and Inundation

### Policies

**Policy 1.** Design discretionary critical facilities located within the potential inundation area for dam failure in order to mitigate the effects of inundation on the facility; promote orderly shutdown and evacuation (as appropriate); and prevent onsite hazards from affecting building occupants and the surrounding communities in the event of dam failure.

**Policy 2.** Design discretionary critical facilities in the potential dam inundation area used for the storage, or use of hazardous materials to prevent onsite hazards from affecting surrounding communities in the event of inundation.

**Policy 3.** Require emergency response plans for the planning area to include specific procedures for the sequential and orderly evacuation of the potential dam inundation area.

**Policy 4.** Encourage critical and high occupancy facilities as well as facilities for the elderly, handicapped, and other special care occupants, located in the potential inundation area below the dam to develop and maintain plans for the orderly evacuation of their occupants.

### Implementation Measures

**Implementation Measure A.** Facilities used for the manufacture, storage, and use of hazardous materials shall comply with the Uniform Fire Code, with requirements for siting or design to prevent onsite hazards from affecting surrounding communities in the event of inundation.

**Implementation Measure B.** Discretionary critical facilities within potential inundation areas shall be designed to mitigate or prevent effects of inundation.

### 4.5. Landslides, Subsidence, Seiche, and Liquefaction

### Policies

**Policy 3.** Reduce potential for exposure of residential, commercial, and industrial development to hazards of landslide, land subsidence, liquefaction, and erosion.

### Implementation Measures

**Implementation Measure B.** Require liquefaction investigations in all areas of high groundwater potential and appropriate foundation design to mitigate potential damage to buildings on sites with liquefaction potential.

**Implementation Measure D.** Discretionary actions will be required to address and mitigate impacts from inundation, land subsidence, landslides, high groundwater areas, liquefaction and seismic events through the CEQA process.

## Metropolitan Bakersfield General Plan

The MBGP, a joint effort between the Kern County Planning Department and the City of Bakersfield Planning Division, was last adopted on December 11, 2007. The MBGP includes both city and unincorporated County lands. The MBGP describes the community's physical development as well as its economic, social and environmental goals and is currently undergoing an update. The Project Area includes a total of 152,040 acres of unincorporated County lands that are covered under the MBGP (7.41%). Project-related development on unincorporated lands within the MBGP Planning Area would be subject to the following applicable policies and implementation measures of the MBGP, with respect to hydrology and water quality.

## Chapter V. Conservation Element

### A. Biological Resources

#### Policies

**Policy 2.** Preserve areas of riparian vegetation and wildlife habitat within floodways along rivers and streams, in accordance with the Kern River Plan Element and channel maintenance programs designed to maintain flood flow discharge capacity (I-4).

### B. Mineral Resources

#### Goals

**Goal 4.** Protect land, water, air quality and visual resources from environmental damage resulting from mineral and energy resource development.

### C. Soils and Agriculture

#### Policies

**Policy 7.** Land use patterns, grading, and landscaping practices shall be designed to prevent soil erosion while retaining natural watercourses when possible (I-4).

**Policy 12.** Prohibit premature removal of ground cover in advance of development and require measures to prevent soil erosion during and immediately after construction (I-4).

### D. Water Resources

#### Goals

**Goal 1.** Conserve and augment the available water resources of the planning area.

**Goal 2.** Assure that adequate groundwater resources remain available to the planning area.

**Goal 3.** Assure that adequate surface water supplies remain available to the planning area.

**Goal 4**. Continue cooperative planning for and implementation of programs and projects which will resolve water resource deficiencies and water quality problems.

**Goal 5.** Achieve a continuing balance between competing demands for water resource usage.

**Goal 6.** Maintain effective cooperative planning programs for water resource conservation and utilization in the planning area by involving all responsible water agencies in the planning process.

#### Policies

**Policy 6.** Protect planning area groundwater resources from further quality degradation (I-7).

**Policy 8.** Consider each proposal for water resource usage within the context of total planning area needs and priorities-major incremental water transport, groundwater recharge, flood control, recreational needs, riparian habitat preservation and conservation (I-9).

**Policy 9.** Encourage and implement water conservation measures and programs (I-11).

### Implementation Measures

**Implementation Measure 6.** Support the provision of adequate wastewater collection systems and treatment reclamation and disposal facilities which will prevent groundwater degradation by onsite wastewater systems.

**Implementation Measure 7.** Maintain industrial waste discharge regulation and monitoring programs which protect the planning area groundwater from contaminants.

**Implementation Measure 10.** Support additional water conservation measures and programs of benefit to the planning area.

## Chapter VIII. Safety Element

### A. Seismic Safety

### Goals

**Goal 7.** Protect land uses from the risk of dam failure inundation including the assurances that: the functional capabilities of essential facilities are available in the event of a flood; hazardous materials* are not released; effective measures for mitigation of dam failure inundation are incorporated into the design of critical facilities; and the rapid and orderly evacuation of populations in the inundation area will occur.

### Critical Facilities Policies

### Policies

**Policy 4.** Encourage critical facilities in dam inundation areas to develop and maintain plans for safe shut-down and efficient evacuation from their facilities, as appropriate to the degree of flood hazard for each facility (I-26, I-31).

### Liquefaction Policies

### Policies

**Policy 13.** Determine the liquefaction potential at sites in areas of high groundwater prior to development and determine specific mitigation to be incorporated into the foundation design, as necessary to prevent or reduce damage from liquefaction in an earthquake (I-17 through I-19).

**Policy 14.** Route major lifeline installations around potential liquefaction areas or otherwise protect them against significant damage from liquefaction in an earthquake (I-20).

### Dam Failure Inundation Risk Policies

#### Policies

**Policy 18.** Design discretionary critical facilities located within the potential inundation area for dam failure in order to: mitigate the effects of inundation on the facility; promote orderly shut-down and evacuation (as appropriate); and, prevent onsite hazards from affecting building occupants and the surrounding communities in the event of dam failure (I-26).

**Policy 19.** Design discretionary facilities in the potential dam inundation area used for the manufacture, storage or use of hazardous materials to prevent onsite hazards from affecting surrounding communities in the event of inundation (I-27).

**Policy 20.** Require emergency response plans for the planning area to include specific procedures for the sequential and orderly evacuation of the potential dam inundation area (I-28).

#### Implementation Measures

**Implementation Measure 2.** Require detailed site studies for ground shaking characteristics, liquefaction potential, dam failure inundation and flooding potential, and fault rupture potential, as background to the design process for critical facilities under city and county discretionary approval.

**Implementation Measure 17.** Require liquefaction investigations in all areas of high groundwater potential and appropriate foundation designs to mitigate potential damage to buildings on sites with liquefaction potential.

**Implementation Measure 20.** Route major lifeline components such as for Highways, utilities and petroleum or chemical pipelines around areas of high groundwater wherever possible. Where they must cross an area of high groundwater, plans and permits shall require design features to accommodate extensive ground rupture without prolonged disruption of an essential service or threat to health and safety.

**Implementation Measure 26.** Develop procedures for the discretionary review of critical facilities proposed in an area of potential dam inundation. Approvals shall include requirements that emergency shut-down and facility evacuation plans be developed, maintained and exercised for each facility, and the potential effects of inundation on essential facility functions and the safety of occupants and the community in general are addressed.

**Implementation Measure 27.** Facilities used for the manufacture, storage or use of hazardous materials shall comply with the uniform fire code, with requirements for siting or design to prevent onsite hazards from affecting surrounding communities in the event of inundation.

**Implementation Measure 28.** Incorporate Specific Plans for the sequential and orderly evacuation of the potential dam inundation area into emergency response plans.

### B. Flooding

#### Goals

**Goal 1.** Minimize hazards to planning area residents resulting from flooding.

**Goal 2.** Reduce the risk of flooding to land uses.

#### Policies

**Policy 1.** Develop specific standards which apply to development located in flood hazard areas, as defined by Federal Flood Insurance maps and most recent information as adopted by the responsible agency (I-1, I-2).

#### Implementation Measures

**Implementation Measure 2.** Develop procedures for the review of proposed facilities which use, manufacture or store hazardous materials proposed in areas of identified flood hazard.

### D. Storm Drainage

#### Goals

**Goal 1.** Ensure the provision of adequate storm drainage facilities to protect planning area residents from flooding resulting from storm water excess.

## Kern County Specific Plans

Kern County has adopted 24 Specific Plans for properties within the Project Area. These Specific Plans are intended to be an amplification of the goals and policies of the KCGP and are, therefore, consistent therewith. As depicted in Figure 4.10-3, less than 8% of the Project Area is located wholly or partially within adopted Specific Plan areas. Future oil and gas exploration and production activities that would be authorized under the proposed Amendment to Chapter 19.98 (Oil & Gas Production) of the Kern County Zoning Ordinance that would be located within the boundary of an adopted Specific Plan would be regulated according to County zoning, with the exception of the Specific Plans identified as Tier 5.

## Kern River Plan Element

The Kern River Plan Element, which is included in both the KCGP and the MBGP, includes implementation measures related to hydrology and water quality. The implementation policies applicable to County land within the Kern River Plan Element area are outlined below.

### 3.2. Open Space Versus Development

#### Policies

**Policy 11.** New or relocated utility lines shall be placed underground, except in areas subject to intensive agricultural uses, areas designated as A.4 (Mineral and Petroleum) and electrical power

lines to oil wells, water wells, and water control devises in areas designated as 8.5 (Resource Management) unless otherwise required by law, and at River crossings, or where it can be shown that the specific nature of the facility is such that it is entirely infeasible to do so.

### 3.4. Floodplain Management

#### Policies

**Policy 9.** Oil and mineral exploration and production shall be allowed within the secondary floodway, provided that adverse effects on riparian vegetation and wildlife habitat are minimized. Appurtenant facilities, such as tank farms and steam generators, shall be located outside any floodway; except that they may be allowed within the 8.4/2.5 (Mineral and Petroleum/Secondary Floodway) upon showing by the operator that no other location is reasonably available for then, the proposed location and extent of construction is necessary for the operation of wells in the immediate vicinity, and the intent of this plan for the secondary floodway is followed.

**Policy 10.** Resource extraction activities, such as sand and gravel removal, shall comply with the "California Surface Mining and Reclamation Act of 1975."

### 3.5. Private Property and Public Use

#### Policies

**Policy 2.** Open space qualities of the Kern River primary and secondary floodway shall be protected consistent with policies of this plan, regardless of whether the land is in public or private ownership.

### 3.6. Mineral and Petroleum

#### Goals

**Goal.** To provide for the continued production of petroleum resources and to ensure that future exploration activities can take place, while ensuring that other open space values in the River area are reasonably protected. Utilize sand and gravel resources of the River in such a way as to ensure that floodway, groundwater recharge, and wildlife habitat values are protected.

#### Policies

**Policy 1.** Sand and gravel removal shall be done in such a manner as not to degrade, or otherwise adversely affect, the natural and scenic qualities of the Kern River, riparian vegetation, or wildlife habitat except as is necessary or appropriate to maintain the required channel capacity for flood control in the primary floodway.

**Policy 5.** Mineral and petroleum exploration and extraction activities are permitted in the primary and secondary floodways subject to regulations, to be adopted within a two-year period by the County and City to accomplish the goals and policies of this Element and to mitigate adverse impacts which may otherwise result from construction of facilities and access thereto. Such regulations shall include, but need not be limited to, requirements limiting the impact of access

and facilities construction upon adjacent areas, prohibiting activities creating obstructions to floodflow, establishing minimal standards for flood proofing all wells, pumps and associated equipment, specifying spill prevention control and counter-measure plans and emergency procedures, and specifying site and access restoration.

## Chapter IV. Map Provisions and Policies

The intent of this plan with regard to the Primary and Secondary Floodways of the Kern River is that:

- No development or physical improvements for uses in the Primary Floodway that would restrict flows, interfere with groundwater recharge, or increase the rise in water surface during high flows of the Kern River, or displace the primary floodway will be permitted.

- Limited development, with an emphasis on preserving open space within the area of the Secondary Floodway, with recognition of the potential flood hazard that exists therein, may be permitted.

## Chapter V. Implementation Policies

### B. Open Space and Development

#### Implementation Policies

**Implementation Policy 2.** Any new non-open space development, including projects by public agencies, shall not occur without prior city or County approval of a "Development Plan." The Development Plan shall be reviewed for completeness and consistency with the following guideline:

f. A certified delineation of the primary and secondary floodways, if applicable to the site, depicting both predevelopment conditions and future development conditions.

**Implementation Policy 4.** All new development and accessory uses, excepting wells, shall maintain a minimum setback of 90 feet from the primary floodway line. If not feasible to do so because of lot size or configuration, new development, including accessory uses, shall maintain a setback from the primary floodway line of 60% or greater of the distance between the primary floodway line and the point of the lot farthest from the primary floodway.

## Floodplain Management

Kern County has adopted a Floodplain Management Ordinance (Chapter 17.48 of the Building and Construction Code) that applies to "any man-made change to improved or unimproved real estate, including, but not limited to, buildings or other structures, mining, dredging, filling, grading, paving, excavation, drilling operations, or storage of equipment or materials." The purposes of the ordinance include the promotion of "public health, safety, and general welfare, and to minimize public and private losses due to flood conditions" and compliance "with the requirements of the NFIP Regulations." Among other implementation measures, the ordinance:

(a) restricts or prohibits certain uses that are susceptible to flood damage or increase erosion and flood heights or velocities; (b) requires that uses vulnerable to floods be protected against flood damage at the time of initial construction; (d) controls the alteration of natural floodplains, stream channels, and natural protective barriers that accommodate or channel flood waters; (e) controls filling, grading, dredging, and other development which may increase flood damage; and (f) prevents or regulated the construction of flood barriers which will unnaturally divert flood waters or which may increase flood hazards in other areas.

The KCGP Safety Element indicates that the Primary Floodplain illustrated on relevant FIRMs be mapped with respect to any proposed development. The Primary Floodplain is the area that has a 1% probability of occurrence in any given year (the 100-year floodplain). Chapter 19.50 of the Kern County Zoning Ordinance establishes a Floodplain Primary (FPP) and a combining Floodplain Secondary (FPS) district with associated restrictions on land use. The FPP District prohibits construction of storage tanks, sumps (ponds), processing equipment, or other similar facilities related to oil and gas production not expressly permitted pursuant to Section 19.50.020 and Subsection C of Section 19.50.130 of Chapter 19.50 of the Kern County Zoning Ordinance. Subsection C provides that oil or gas wells, including pumps and all other associated equipment, and feasible remedial work, improvements and floodproofing of facilities are permitted within the FPP district if they will not obstruct flows, will not cause peripheral flooding of other properties, will not cause any increase in flood levels during the occurrence of the base flood discharge, will be resistant to flotation and immune to extensive damage by flooding, and will not endanger life or property.

## 4.9.4 Impacts and Mitigation Measures

## Methodology and Assumptions

Potential project impacts to hydrological resources are primarily related to the volume and disposition of M&I and produced water and construction and operational activities that could affect surface water or groundwater quality. As discussed in Section 3.0, potential impacts are primarily evaluated in this EIR on the basis of the projected increase in production wells within each Subarea and Tier.

The project could result in the permitting of up to 2,697 new production wells each year, 64% of which would be located in the Western Subarea, 5% in the Central Subarea, and 31% in the Eastern Subarea. About 90.1% of all new production wells (2,430 wells) would be located in existing Tier 1 production areas, including 94.2% (1,630 of 1,730 new production wells) in the Western Subarea, 76.3% (100 of 131 new production wells) in the Central Subarea, and 83.7% (700 of 836 new production wells) in the Eastern Subarea. Up to 6.3% of the new production wells in the Project Area (169 wells per year) would be located in Tier 2 areas where agriculture is currently the predominant land use. Using the ground disturbance factors discussed in Appendix F, up to 4,856 acres of new disturbance could occur each year in the Project Area, of which 90.6% (4,400 acres) would occur in existing Tier 1 production areas, and 298 acres (6.13%) would occur in Tier 2 areas. About 158 acres of new disturbance could also occur in

Tiers 2 through 5. These estimates are conservative because new well construction and operations would likely utilize existing access roads and other oil and gas infrastructure to a greater extent than assumed in the impact projections, especially in more heavily developed Tier 1 areas.

The Applicant estimates that demand for water needed for oil and gas exploration and production activities would increase by about 37% from 2012 to 2035, based on anticipated increases in production activity. The methodology used to estimate future water demand is described in detail in Appendix T. The analysis indicates that M&I water demand would increase from 8,778 AF to 11,761 AF, and produced water demand for oil and gas uses would increase from 88,812 AF to 121,412 AF over this period. The Applicant's water demand estimates assume that 32,771 AF of treated produced water, the amount supplied for agricultural use in 2012, would continue to be supplied over the analysis period. As a result, total produced water demand in the Project Area for oil and gas and agricultural uses is anticipated to increase from 121,583 AF in 2012 (88,812 AF used for oil and gas activities plus 32,771 AF of agricultural reuse) to 154,183 AF in 2035 (121,412 AF used for oil and gas activities plus 32,771 AF of agricultural reuse) (Appendix T).

The extent to which future project-related M&I and produced water demand could affect surface water and groundwater quality, groundwater supply and hydrological resources is subject to several uncertainties, including: (1) the total amount of produced water that would be generated from future oil and gas exploration and production; (2) the amount of produced water reused for EOR and other oil and gas-related purposes and for agricultural irrigation; and (3) the amount of produced water that is disposed of in surface evaporation or percolation ponds or Class II injection wells. As shown on Figure 4.9.7, the ratio of produced water to recovered hydrocarbons has increased over time in the Project Area, but fell slightly between from 2012 to 2013. As existing oilfields become more depleted, it is generally expected that the volume of produced water per unit of extracted hydrocarbons would increase, but new technologies, or the potential development of new oil shale resources, may affect the future amount of produced water that is generated in the Project Area.

The amount of treated produced water available for agricultural or other non-oil and gas-related reuse, such as landscape irrigation, may also change over time in response the current drought, state policies to encourage water conservation and reuse, and in the event demand from agricultural or urban users increases. The amount of produced water disposed into surface ponds is also likely decrease in the future in response to the RWQCB and other efforts to reduce or eliminate disposal of produced water to surface ponds. As shown on Figure 4.9-15 and Table 4.9-19, the use of Class II injection wells for disposal increased since 2001, in part due to declining surface pond use.

Three projections of project-related water use in 2035 based on the Applicant's demand estimates were developed to analyze a range of potential water demand and supply outcomes. All of the scenarios assume that the amount of produced water generated by oil and gas exploration and production would increase by 38% by 2035 from 2012 levels. The three scenarios focus on potential variation in the amount of surface pond disposal, injection well disposal, and reuse of produced water that could occur under future conditions. The 2035 scenarios are summarized in Table 4.9-27.

**Table 4.9-27: Oil and Gas Exploration and Production Produced and M&I Water Supply and Demand 2012 and 2035 (Scenarios 1, 2 and 3)**

| | 2012 | Scenario 1 Pro-Rata Increase | Scenario 2 50% Surface Disposal Reduction | Scenario 3 Full M&I Water Use Offset and 90% Surface Disposal Reduction |
|---|---|---|---|---|
| **Water Supplied** | | | | |
| Produced Water | 234,959 | 321,894 | 321,894 | 321,894 |
| M&I Water | 8,778 | 11,761 | 11,761 | 11,761 |
| **TOTAL** | **243,737** | **333,655** | **333,655** | **333,655** |
| **Water Use** | | | | |
| **Treated Produced Water** | | | | |
| EOR water and steam injections, pressure maintenance and well pulling | 88,668 | 121,215 | 121,215 | 121,215 |
| Coil tubing, dust control, surface facility construction | 144 | 197 | 197 | 197 |
| Oil and gas produced water reuse | 88,812 | 121,412 | 121,412 | 121,412 |
| Agricultural reuse | 32,771 | 32,771 | 32,771 | 44,532 |
| **Subtotal: Produced Water Reuse** | **121,583** | **154,183** | **154,183** | **165,944** |
| **M&I Water** | | | | |
| New Well Construction (Drill Mud + Well Stimulation) | 589 | 789 | 789 | 789 |
| Maintenance (Mud Services + Cementing) | 61 | 82 | 82 | 82 |
| Maintenance (Acidizing + Coil Tubing) | 52 | 70 | 70 | 70 |
| Maintenance (Well Pulling + Domestic Water) | 594 | 796 | 796 | 796 |
| Well Abandonment | 202 | 271 | 271 | 271 |
| Steam Production | 7,279 | 9,754 | 9,754 | 9,754 |
| Oil and gas M&I water demand | 8,778 | 11,761 | 11,761 | 11,761 |
| **Subtotal: Oil and Gas Water Demand, M&I and Produced Water** | **97,590** | **133,173** | **133,173** | **133,173** |
| Injection Well Disposal | 84,571 | 125,905 | 152,600 | 152,928 |
| Produced Water Land Disposal | 30,223 | 41,806 | 15,112 | 3,022 |
| **Subtotal: Oil and Gas Produced Water Waste Disposal** | **114,794** | **167,711** | **167,711** | **155,950** |
| **TOTAL** | **243,737** | **333,655** | **333,655** | **333,655** |

Sources: Based on Appendix T, Table 28 for 2012, and projected values for Scenarios 1-3.
Note:
All values subject to rounding error and may vary slightly from Table 28

## Scenario 1

Scenario 1 assumes that produced and M&I water demand and use, and produced water disposal by injection and into surface ponds, would increase proportionately from 2012 levels. Agricultural use of treated produced water is assumed to remain at 32,771 AF per year. Under these assumptions, produced water generated in the Project Area would increase from 234,959 AF to 324,243 AF by 2035, and total demand for produced water for oil and gas activities and agricultural irrigation would increase from 121,583 AF to 154,183 AF per year, or about 48% of the available supply of produced water. The remaining 167,711 AF of produced water would be disposed into surface ponds and injection wells in the same proportion as in 2012. Surface disposal would increase from 30,223 AF to 41,806 AF, and injection well disposal would increase from 84,571 AF to 125,905 AF.

## Scenario 2

Scenario 2 includes the same water supply and demand results as Scenario 1 except that the amount of produced water disposed into surface ponds is assumed to fall by 50% from 2012 levels in response to Basin Plan and other policies that discourage unlined surface pond use. Produced water that was previously disposed into surface ponds would instead be disposed into Class II injection wells. As shown in Table 4.9-27, under these assumptions produced water surface disposal would fall from 30,223 AF to 15,112 AF, and injection well disposal would increase from 127,177 AF to 152,600 AF by 2035.

## Scenario 3

Scenario 3 analyzes the potential disposition of produced water assuming about 7% of the 168,983 AF of produced water subject to disposal in Scenarios 1 and 2 is treated and used for other purposes, including oil and gas operations, agricultural irrigation, or other M&I uses. This amount of additional produced water reuse would fully offset the projected oil and gas demand for 11,761 AF of M&I water in 2035. Scenario 3 also assumes that the volume of produced water disposed into surface ponds declines by 90% from 2012 levels as surface disposal is avoided except in relatively rare and unavoidable circumstances. Under these conditions, the amount of produced water that could be reused for agricultural purposes would rise from 32,771 AF to 444,532 AF, and total amount of produced water that could be used for oil and gas or agricultural activities would increase to 165,944 AF compared with 121,583 AF in 2012, and 154,183 AF by 2035 in Scenarios 1 and 2. The total amount of produced water subject to disposal would be reduced from 167,711 AF to 155,950 AF in 2035, and pond disposal would fall to 3,022 AF compared with 30,223 AF in 2012, 41,806 AF in Scenario 1, and 15,112 AF in Scenario 2. Produced water disposal by injection would be 152,928 AF, about the same as in in Scenario 2.

As discussed in Section 4.17, Utilities and Service Systems, the increased use of treated produced water to offset oil and gas M&I water use by 2035 might be pursued under the auspices of California's new Sustainable Groundwater Management Act, which requires that a groundwater sustainability plan be adopted for the project area by 2020, or by agreement between oilfield operators and other users. The feasibility of achieving the results in Scenario 3, and the extent to which additional produced water could be reused to offset oil and gas M&I water use in the

Project Area, depends on several factors, including produced water quality, treatment costs and requirements, the availability of conveyance capacity to route produced water to and from treatment facilities, and the availability of institutional mechanisms for managing produced water treatment and distribution. As discussed above, the CVRWQCB has determined that, in certain instances, even relatively high-quality produced water available from certain oilfields in the Eastern Subarea has, on occasion, not met applicable arsenic or oil and grease water quality standards. Additional management measures, including percolation into water banking facilities, have been required to address these water quality concerns (CVRWQCB Order R5-2011-0900 and CVRWQCB Order R5-2012-0058). The reuse of additional produced water, particularly supplies with lower quality than available in the Eastern Subarea, could require more intensive, technically demanding and more costly forms of treatment. It is possible that treatment requirements could have other environmental effects related to increased energy use and air quality and greenhouse gas emissions, or post-treatment waste stream disposal. Although the Kern-Tulare Water District has proposed to use 8,000 AF per year of treated produced water in the Western Subarea, no agreements to reuse produced water for agriculture other than with the CWD have been approved and implemented in the Project Area.

Oil and gas operators may be able to substitute additional produced water for M&I supplies to conduct certain oilfield activities, including EOR and steam production. EOR activities currently account for the largest share of oil and gas M&I water use. Certain EOR operations, such as steam generation, may require higher-quality water supplies than can be typically be obtained from treated produced water to avoid equipment corrosion or damage and potential chemical interactions. The use of produced water for other oilfield activities, such as discharge for dust suppression, would require additional permitting and approvals to avoid impacts to biological, water and other resources. The extent to which oilfield operators can feasibly increase produced water reuse and decrease M&I demand is uncertain. The Project Applicant has estimated that up to 1,200 well stimulation treatment operations subject to California's SB-4 regulations could occur per year, including 1,050 stimulations in the Western Subarea (88% of the total number of stimulations), 125 in the Central Subarea (10% of the total number of stimulations), and 25 in the Eastern Subarea (2% of the total number of stimulations). About 90.1% of all well stimulation treatments (1,081) would be located in existing Tier 1 production areas, and 6.3% (76) would be located in Tier 2. About 2,231 wells would be plugged and abandoned in accordance with DOGGR regulations each year, including 1,839 wells in the Western Subarea (82% of the total wells), 38 in the Central Subarea (2%), and 354 (16%) in the Eastern Subarea. About 90.1% of all new plugged and abandoned wells (2,010 wells) would be located in existing Tier 1 production areas, and 6.3% (141 wells) would be located in Tier 2.

The following sections evaluate potential project-related construction and operational impacts to hydrological resources, and identify appropriate mitigation where required and feasible, with reference to the thresholds of significance discussed below.

# Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist state that a project would have a significant impact on hydrology and water quality if it would:

- Violate any water quality standards or waste discharge requirements;
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted);
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on site or off site;
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on site or off site;
- Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff;
- Otherwise substantially degrade water quality;
- Place housing within a 100-year flood hazard area as mapped on a federal flood hazard boundary or flood insurance rate map or other flood hazard delineation map;
- Place within a 100-year flood hazard area structures that would impede or redirect flood flows;
- Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam;
- Contribute to inundation by seiche, tsunami, or mudflow.

# Project Impacts

## Impact 4.9-1: Violate Any Water Quality Standards or Waste Discharge Requirements

As discussed in Chapter 3, Project Description, project-related construction activities include geophysical surveys, well pad preparation, drilling, well completion, testing, construction and use of temporary drilling sumps, access road construction, distribution line construction, pipeline construction, spill prevention activities, and also well re-working, well plugging and abandonment, and revegetation. Operational activities include geophysical monitoring, oil production (including enhanced oil recovery using steam and water flood and well stimulation treatments), oil and gas treatment, produced water treatment, routine well maintenance (excluding reworking and plugging and abandonment which are considered as part of construction

activities), pipeline maintenance, distribution line maintenance, wastewater treatment and injection, waste treatment and disposal, access road maintenance, vegetation maintenance and spill prevention activities.

## Construction Impacts

### Stormwater and Runoff Impacts

Construction activities related to well drilling, reworking, and plugging and abandonment would modify site soils and vegetation during the clearance and grading of well and related structural pads, access roads, utility infrastructure for pipeline subsurface or surface installation. Based on the conservative impact estimates described in Appendix F, the potential development of 2,697 new production wells per year in the Project Area could disturb up to 4,856 acres per year. Over 90%, or 4,400 acres, of this disturbance would be located in existing Tier 1 areas that are currently subject to the highest level of existing disturbance from current and historical oil and gas exploration and production activities. New well development could disturb up to 298 acres in Tier 2 areas, where agriculture is the predominant land use, and up to 158 acres in Tiers 3 through 5, which generally include constructed landscapes. Construction period activities that disturb soils and surface vegetation could mobilize sediment, debris and other site constituents that may be transported to surface water or percolate into groundwater due to storm event runoff, nuisance flows, or to a lesser extent by vehicle tracking, potentially causing exceedances of water quality standards if not controlled and therefore, there could be significant impacts.

As discussed above, oil and gas operations that are located in proximity to or hydrologically connected to waters of the United States are generally subject to the requirements of the Construction General Permit and Industrial General Permit adopted by the SWRCB unless otherwise subject to an exemption or waiver. These permits require strict compliance with water quality standards through the implementation of BMPs and other measures. To the extent that some oil and gas activities are exempt from either the Construction General Permit (e.g., due to the small area of land disturbance) or the Industrial General Permit, BMPs may still be utilized to prevent or minimize pollutants from becoming entrained in stormwater. The American Petroleum Institute (API) and other sources of applicable industry engineering standards publishes and regularly updates oil and gas industry standards and criteria for stormwater and runoff management. Significant impacts to water quality standards or WDRs could occur without the implementation of mitigation measures, specifically MM 4.9-1 and MM 4.9-2, described below.

### Surface or Subsurface Discharges during Well Construction or Reworking Activities

Well construction and reworking utilize and generate drilling fluids and mud that could be accidentally discharged to surface water or groundwater, potentially causing exceedances of water quality standards if not controlled and therefore, there could be significant impacts. The primary potential well construction or reworking discharge risks include:

- Drilling mud or drilling fluid spills or equipment leaks at the surface from ruptured or leaking tanks, pipes, valves, hoses, and other process equipment;

- Temporary contact of drilling fluid, possibly comingled with oil or gas from oil-bearing formations, with subsurface aquifers prior to casing a well or in the event of a well failure or blowout during the drilling process or equipment leaks at the surface from ruptured or leaking tanks, pipes, valves, hoses, and other process equipment;

- Releases of drilling muds and fluids that are temporarily stored in drilling sumps or surface ponds when closed loop drilling systems are not utilized; and

- Corrosion inhibitor or scale inhibitors, lubricants, or surfactant chemical spills or equipment leaks during mixing, use or transport to the site from ruptured or leaking tanks, pipes, valves, hoses, and other process equipment.

As shown in Table 4.9-1, drilling and reworking construction activities consume the largest portion of the oil and gas production and exploration industry's M&I water demand in 2012 and utilized about 589 AF per year. By 2035, the industry has projected that M&I water use for drilling and reworking construction would increase to about 789 AF (Table 4.9-27).

Drilling muds and fluids are currently managed by either using a closed loop system of pumps, storage tanks and fluid and mud lines trucked to and temporarily staged on the construction site, or drilling mud sumps built near a well in accordance with the SWRCB low threat discharge general permit. Materials other than drilling muds and fluids may not be discharged into a drilling sump, and the sump must be dewatered and the dried mud either removed or compacted in place if nonhazardous upon completion of drilling operations. DOGGR regulations further require that all free fluids must be removed from drilling sumps within 30 days after a drill rig is disconnected from a well, that spill contingency plans be prepared (in addition to federal requirements, if applicable, to develop SPCC plans to prevent discharges to water of the United States), that secondary containment be provided for all onsite storage of hazardous materials, and that prompt notice of spills be provided to DOGGR. The API and other sources of applicable industry engineering standards publish and regularly update oil and gas industry standards and criteria for the operation, maintenance, and inspection of drilling fluid and mud storage, handling and conveyance equipment. DOGGR has reported that 613 spills were reported in the Project Area from 2009 through 2014, and the volume of the spills ranged from extremely small (0.025 of a gallon) to 63,000 gallons. Almost all of the spills (85%) were related to crude oil and produced water (DOGGR 2015a). These data indicate that the incidence of drilling mud and fluid related spills in the Project Area is low and that potential drilling-related spill volumes would be relatively small, but could be a significant impact if a spill occurred.

The potential for surface or subsurface discharges from well-construction and reworking activity could be significant without the implementation of mitigations, specifically MM 4.9-1, MM 4.9-2, and MM 4.9-3.

Drilling muds and fluids could also come into contact with groundwater prior to the installation of well casing and cement or in the event of a well failure during well construction or reworking. Discharges to groundwater could occur in the event of a well failure or blowout during construction. Recent estimates indicate that well construction blowout rates in the Project Area

have declined from one per 1,400 wells in the 1990s to one per 5,200 wells by 2008 (Jordan and Benson 2009). These data suggest that a well construction failure could occur about once every two years assuming future construction of about 2,600 new wells per annum. Blowouts during construction could result in a greater amount of drilling fluid and mud contact with groundwater until the well can be stabilized. Under certain circumstances, drilling muds and fluids may be comingled with oil and or gas from hydrocarbon-bearing formations and contact subsurface aquifers before the well casing and cementing process is completed or in the event of a blowout.

As shown in Table 4.9.1 and Table 4.9-15, drilling operations primarily use M&I water in combination with low concentrations of other lubricants, surfactants and other constituents and mud to complete the well drilling or reworking process. Well reworking may also involve the use of scale or corrosion inhibitors or similar chemicals to address well conditions from prior operations. M&I water is generally of higher quality than produced water, and drilling activities do not typically utilize high concentrations of potential constituents of concern or high water volumes. Typical well construction and reworking in the Project Area utilizes 0.065 to 0.25 AF of water depending on well depth and structure. Typical drilling water additives used in the Project Area are listed in Table 4.9-15.

DOGGR regulations and industry standards require the use of freshwater based drilling muds until the borehole has extended below the base of freshwater and the installation of cemented casings across water bearing zones. Drilling pressures and volumes are also monitored during boring operations to detect changes that would indicate potential contact with water-bearing formations or blowouts. Drilling personnel are trained to respond quickly to indications of contact with groundwater or potential well failure conditions. Under state law, well operators must use every effort and endeavor to prevent blowouts by installing and maintaining blowout prevention equipment. As discussed below (see well stimulation flowback impacts), and in Section 4.8, Hazards and Hazardous Materials, surface containment vessels and secondary containment facilities must be maintained to applicable standards to prevent the accidental discharge of fluids recovered from well operations, including drilling-related flowback. In certain cases, DOGGR has issued field rules for specific oilfields that address well failure and blowout risks and site-specific drilling requirements.

The use of higher quality M&I water and the generally low concentrations of drilling or rework-related constituents added to drilling fluids reduces the likelihood that temporary drilling fluid and mud contact with water-bearing formations would cause a significant impact to groundwater quality. As noted above, well construction blowout rates have substantially declined over time in the Project Area, and recent data indicates that a well construction failure could occur about once every two years assuming future construction of about 2,600 new wells per annum. MM 4.9-1 requires that all applicants comply with applicable laws, regulations, and standards, including well drilling management, construction, monitoring, blowout prevention, fluid and mud containment, and emergency response measures. Compliance with these laws, regulations, and standards would reduce potential groundwater quality impacts from contact with drilling muds or fluids during drilling and construction to less than significant levels.

Surface spills or leaks could occur during the conveyance, mixing and application of fluids and other chemicals during construction. M&I water and necessary drilling and well development chemicals, including corrosion scale inhibitors, are trucked to the construction site and pumped into a mixing tank in applicable concentrations. Drilling and reworking fluids may also be mixed offsite and trucked to the wellhead. The fluids are then pumped and piped from the mixing or delivery tanks into the well to complete the construction process.

DOGGR regulations require the preparation of spill contingency plans (in addition to federal requirements, if applicable, to develop SPCC plans to prevent discharges to waters of the United States), secondary containment for stored materials onsite, 24-hour notice of spills to the DOGGR, or immediate notification in certain circumstances, and fluid and chemical storage and handling equipment inspections and maintenance. As discussed in Section 4.8, Hazards and Hazardous Materials, surface containment vessels and secondary containment facilities must be maintained to applicable standards to prevent the accidental discharge of fluids recovered from well operations, including fluid and chemical transport and mixing operations. The API and other sources of applicable industry engineering standards publish and regularly update oil and gas industry standards and criteria for construction period fluid mixing, storage, handling, and conveyance equipment.

DOGGR has reported that 613 spills were reported in the Project Area from 2009 to 2014, and the volume of the spills ranged from extremely small (0.025 of a gallon) to 63,000 gallons. The Project Area accounted for about 54% of all reported oil spills in California from 2009 to 2014. According to DOGGR, 85% of the oilfield spills in the state were related to crude oil and produced water. About 15% of the reported oil spills included acids (hydrochloric, hydrofluoric, sulfuric), ammonia, antifreeze, chlorine, gasoline and diesel, ferric chloride, motor oil, hydraulic oil, transformer oil, hydrogen sulfide, diatomaceous earth, mineral oil, sewage, solvents, triethylene glycol, wastewater, paint, vegetable oil as well as drilling muds (DOGGR 2015a). Many of these constituents do not appear to be related to well drilling, reworking, and other construction activities. The reported spill data indicate that the incidence of drilling and reworking construction water and chemical mixing and conveyance is low and that potential mixing and conveyance-related spill volumes would typically be relatively small. MM 4.9-1 requires that all well drilling operations comply with applicable laws, regulations and standards, including construction period fluid and chemical conveyance, mixing and application activities, as well as DOGGR regulations. MM 4.9-2 further mitigates chemical mixing and conveyance spill risks related to stormwater and runoff.

### Surface or Subsurface Discharges during Well Plugging and Abandonment

Plugging and abandonment activities include purging and cleaning existing pipes and tanks and equipment dismantling and removal, and the installation of cement plugs across formations in the well bore as required to protect groundwater zones, isolate oil and gas production zones, prevent surface discharges, and avoid public health and safety risks. An open hole must be plugged with cement from at least 100 feet below the bottom to at least 100 feet above the top of each zone from which oil or gas was produced. A minimum 200-foot-thick cement plug must be placed across all fresh-brackish water interfaces or within a thick shale if such a formation separates the

fresh water sands from the brackish water sands. All perforations in a cased well must be plugged with cement. The cement plug must extend at least 100 feet above the top of the highest location of any perforations, casing cementing points, water shut-off holes, or producing zones in a well. Cement must also be placed in at least the top 25 feet inside and outside the casing strings at the surface. Discharges of residual petroleum products, other fluids in wells or related equipment, or water used for purging and cement preparation could occur during well plugging and abandonment.

The applicant has projected that up to 2,231 wells may be plugged and abandoned per year in the Project Area. As shown in Table 4.9-27, M&I water is primarily used for purging and other activities associated with plugging and abandonment, and the amount of water used for these purposes is projected to increase from about 202 AF per year in 2012 to 279 AF per year in 2035.

Well plugging and abandonment technical and safety requirements, and the handling and conveyance of purged materials generated during the closure process, are regulated under state law. DOGGR must issue a permit before any well may be plugged and abandoned, and state regulations require that water and oil and gas zones be protected by cement plugs and the installation of blowout protection equipment as necessary during the plugging process. Toxic or hazardous materials that may be generated by equipment purging must be disposed in accordance with California law, including the regulations adopted by the DTSC for any wastes that exhibit hazardous waste characteristics. Any auxiliary holes, such as "rat holes," must be filled and compacted properly, all construction materials, cellars, production pads, and piers must be removed and excavations filled with compacted earth, well locations must be graded and cleared of equipment, trash, or other waste materials, and the site must be restored to as near a natural state as practicable within 60 days after a well has been plugged and abandoned. The API and other sources of applicable industry engineering standards publish and regularly update oil and gas industry standards and criteria for well plugging and abandonment.

The relatively low volume of higher quality M&I water used for well plugging and abandonment, and the limited amount of potentially hazardous materials that could be purged during the closure process, reduces the risk that closure construction activities could significantly affect surface water or groundwater quality to less than significant with the mitigation described above. Inactive well blowout rates are extremely low, and have been recently been estimated to average about 1 per 150,000 well operation-years in the Project Area. Inactive well blowout rates fell from 1 per 83,000 well years in 1991 through 1998 to 1 per 520,000 well operation-years in 2001 through 2008 (Jordan and Benson 2009).

## Operational Period Impacts

### Stormwater and Runoff Impacts

Operational activities related to oil well and facility maintenance, oil or produced water conveyance by truck, the staging and completion of well stimulation treatments, including use of trucks, storage tanks, and pumps, and the conveyance and application of EOR-related steam or water, well reworking, and plugging and abandonment, could generate soils, debris or

constituents that could be mobilized by stormwater runoff, or vehicle tracking, and reach surface water or percolate into groundwater and could result in significant impacts to water quality. These activities would occur within the conservative estimated disturbance footprint of up to 4,856 acres per year in the Project Area derived by using the factors discussed in Appendix F, and assuming potential development of 2,697 new production wells per annum. Over 90% (4,400 acres) of the potential project-related operational activity disturbance would occur in existing Tier 1, 298 acres of disturbance could occur in Tier 2, and up to 158 acres of disturbance could occur in Tiers 3 through 5.

Significant adverse operational impacts could be mitigated through MM 4.9-1 and MM 4.9-2 requiring compliance with permits, BMPs, and standards to reduce potential stormwater and runoff impacts to less than significant levels.

### Oil, Produced Water, Maintenance and Production (including EOR and Well Stimulation) Chemicals, M&I Water and other Constituent Leaks and Surface Spills or Equipment Leaks at the Surface from Ruptured or Leaking Tanks, Pipes, Valves, Hoses, and other Process Equipment

Operational activities include the conveyance, storage and treatment of oil and gas and produced water extracted from production wells and M&I water used in operations, such as for supplemental EOR steam generation and maintenance purposes. As shown in Table 4.9-1 and Figure 4.9-7, over 234,000 AF of produced water was extracted, 8,778 AF of M&I water was used, and over 18,000 AF of oil was produced from the Project Area in 2012. As shown in Tables 4.9-23, 4.9-24, and 4.9-25, a number of well stimulation, scale, and corrosion inhibitors and other chemicals were transported to wells, mixed with produced or M&I water, and used for production and maintenance purposes throughout the Project Area. The Project Applicant has estimated that produced water and M&I water use would increase by about 37% from 2012, and up to 1,200 well stimulation treatments per year may occur by 2035. An extensive network of pipelines, treatment facilities, stationary and non-stationary tanks, mixing vessels, trucks and other equipment, valves, pumps, hoses and other process equipment is currently used to manage the surface storage, treatment, mixing and preparation and conveyance of oil, gas, produced water, M&I water and other operational constituents. These facilities would be expanded as necessary to accommodate the projected increase in fluid volumes over time.

Oil, gas, and water extracted from hydrocarbon-bearing formations in the Project Area are primarily conveyed by pipelines to separation facilities, usually tanks where lighter oil and gas are skimmed from the water or separated in free-water knockout tanks, heater-treaters, or wash tanks, often with added emulsion breakers. Once separated, oil and gas are collected for shipment via pipeline or truck to refiners or other users. Produced water is conveyed by pipelines or truck for subsequent reuse or disposal. Produced water is often treated to remove salts and other constituents prior to being used for steam or water EOR activities (e.g., by routing through sand filters or induced gas flotation units and the addition of scale and corrosion inhibitors). Produced water used for agricultural irrigation is also filtered through walnut shells to remove residual oil and grease. Treated water for EOR use is usually conveyed by pipeline to steam generation or water flood (heating) facilities, and then delivered to the applicable well for injection. Produced

water that is not reused is conveyed by pipeline or truck to surface ponds or waste disposal injection wells. M&I water may be conveyed by truck, pipelines, local groundwater well systems, or Project Area water district facilities to oilfields for operational use. Produced water, oil, gas, M&I water, and operational period chemicals may be stored in tanks and other containment vessels during conveyance, treatment reuse, or disposal activities throughout the Project Area.

Surface spills or leaks could occur from ruptured or leaking tanks, pipes, valves, hoses, and treatment and other process equipment used during operational oil, gas, produced water, M&I water, and chemical site treatment, conveyance, storage, and mixing and preparation activities. As discussed above, 613 spills were reported in the Project Area from 2009 to 2014, including 148 spills attributed to corrosion, 180 caused by mechanical problems, and 268 involving a leaking tank or pipe. DOGGR has estimated that 85% of the reported oilfield spills statewide during 2009 to 2014 involved discharges of crude oil, produced water, or a mixture of crude oil and produced water. The average volume of reported statewide oil and produced water spills was 1,344 gallons (42 barrels), and the mean spill volume was 210 gallons (5 barrels). About 15% of the reported oil spills included acids (hydrochloric, hydrofluoric, sulfuric), ammonia, antifreeze, chlorine, gasoline and diesel, ferric chloride, motor oil, hydraulic oil, transformer oil, hydrogen sulfide, diatomaceous earth, mineral oil, sewage, solvents, triethylene glycol, wastewater, paint, vegetable oil and drilling muds (DOGGR 2015a). Certain constituents are associated with oil and gas operational activities. If these spills occurred adjacent to or in a surface waterbody or were allowed to infiltrate into the ground and reach shallow aquifers, significant impacts to water quality could occur.

Oil and gas-related pipelines, tanks, mobile conveyances (trucks), storage, separation and treatment facilities are subject to state and federal laws and regulations, including regulations promulgated by DOGGR and engineering standards published and regularly updated by API and other sources of industry standards and operational criteria, including construction, operational, inspection, maintenance and repair standards. DOGGR regulations include tank, pipeline inspection and testing requirements, the preparation of spill contingency plans (in addition to federal SPCC plans, if applicable), secondary containment for stored materials onsite, notice of spills to the DOGGR, and fluid and chemical storage and handling equipment inspections and maintenance. As discussed in Section 4.8, Hazards and Hazardous Materials, other state and federal agencies regulate the storage, treatment, road transportation and other activities involving crude oil, produced water and M&I water, production chemicals, and other similar materials for health, safety and hazard prevention purposes. On average, about 100 oil and produced water leaks and spills were reported each year in the Project Area. The statewide data reported by DOGGR indicates that the total annual volume of these spills ranged from 0.06 acre-foot using a reported mean spill volume of 210 gallons, to 0.4 acre-foot based on the reported average spill volume of 1,344 gallons. (DOGGR 2015a)

Given the history of spills in the area, spills would be expected to continue to occur under the Project. Depending on the location of future spills, water quality could be significantly impacted. MM 4.9-1 requires compliance with all applicable laws and regulations, including spill prevention and response measures. With this mitigation, potential impacts related to oil, produced

water, maintenance and production (including EOR and well stimulation) chemicals, M&I water and other constituent leaks and surface spills or equipment leaks at the surface from ruptured or leaking tanks, pipes, valves, hoses, and other process equipment would be less than significant.

### Surface or Subsurface Discharges Related to Produced Water Reuse and Disposal

As shown in Table 4.9-1, produced water accounts for the largest volume of fluids generated by oil and gas exploration and production activities in the Project Area. Over 234,000 AF of produced water was extracted in 2012, and by 2035 the annual amount of produced water could increase to nearly 322,000 AF (Table 4.9-27). All three of the 2035 scenarios in Table 4.9-27 project that oil and gas industrial demand for produced water would increase from 88,812 AF to 121,412 AF over the same period. Most of this demand would be met by using treated produced water for EOR steam and water injection. Scenarios 1 and 2 assume that 32,771 AF per year of produced water, all in the Eastern Subarea, would continue to be treated and used for agricultural irrigation. Scenario 3 projects that agricultural reuse could increase to 44,532 AF if about 7% of the produced water that would otherwise be disposed in 2035 was treated and made available for reuse. As discussed above and in Section 4.17, Utilities and Service Systems, the increased use of produced water summarized in Scenario 3 could be pursued in part under the auspices of the groundwater sustainability planning process that must be completed for aquifers in the Project Area by 2020, but the feasibility of reusing significant additional amounts of produced water is uncertain due to potential water quality, treatment, conveyance and other potential constraints.

Disposed produced water volumes vary in each scenario depending on the extent to which surface disposal into ponds would be curtailed over time and, in Scenario 3, whether additional volumes of produced water are reused. Scenario 1 assumes that the relative volumes of produced water disposed to surface ponds and by underground injection, and the amount of agricultural reuse, remains constant over time. About 167,711 AF of produced water would be disposed under these assumptions compared with 114,794 AF in 2012, including 41,806 disposed to ponds, and 125,905 AF disposed by injection (Table 4.9-27). As discussed in the Basin Plan surface disposal is known to have impacted groundwater quality, and oil and gas operators have been utilizing injection for disposal to a much greater extent since 2001. Scenario 2 shows that if surface disposal volumes are reduced by 50% from 2012 levels, surface ponds would account for 15,112 AF of produced water disposal, and injection disposal would increase to 152,600 AF by 2035. Scenario 3 assumes surface disposal is reduced to 90% below 2012 levels and that additional produced water reuse would offset oil and gas industry M&I demand by 2035. Under these assumptions, surface disposal would fall to 3,022 AF and injection disposal would be 152,928 AF in 2035.

### Produced Water Reuse for EOR Activities

As shown in Table 4.9-27, the use of produced water for EOR purposes is expected to increase from about 88,668 AF in 2012 to over 121,215 AF per year in 2035, or by 32,547 AF. Most of this increase would likely occur in the Western Subarea, which accounted for about 85% of produced water EOR use compared with 56% of the total produced water generated in the Project Area in 2012 (Tables 4.9-2 to 4.9-4). The Eastern Subarea accounted for about 14% of all EOR

use in 2012 compared with 43% of total Project Area produced water in 2012. More than 70% of the Subarea's produced water was treated and provided for agricultural irrigation. The Central Subarea accounted for 1% of the Project Area produced water generation and EOR use in 2012.

The purpose of EOR activities in the Project Area is to mobilize crude oil by injecting steam or heated or unheated water at varying pressures into the hydrocarbon-bearing formations. Produced water is obtained from hydrocarbon-bearing formations, and is subject to treatment for many EOR applications, including steam generation. As shown in Table 4.9-27, about 7,279 AF of M&I water was also used as a supplemental EOR steam supply in 2012, and this supply is projected to increase to about 9,754 AF by 2035. As a result, the EOR activities cycle water from hydrocarbon-bearing formations through treatment and EOR preparation processes, including heating or steam generation, back to the same or similar hydrocarbon-bearing formations. In certain instances, the produced water is blended with higher-quality M&I water before reinjection. Cycling produced water from and back into hydrocarbon-bearing formations, often after treatment or blending that improves water quality, would not significantly change or adversely affect water quality in EOR injection zones.

EOR activities could result in unintended discharges to groundwater in the event of a casing or well failure, which might allow injected steam or produced water to migrate from breach locations to other water-bearing formations. EOR activities can expose internal well structures to significant heat and pressure, which could increase the risk of well failure and groundwater impacts. Recent studies indicate that, partially in response to improved well construction practices implemented in the mid-1990s, Project Area blowout rates for steam injection wells were reduced from 1 per 5,900 well years in 1991 through 1998 to 1 per 100,000 well years in 2001 through 2008 (Jordan and Benson, 2009). Well collapse has been documented to occur in the Project Area during the last five years. As discussed in Section 4.8, Hazards and Hazardous Materials, and in a March 2015 letter from DOGGR to the state Senate Committee on Natural Resources and Water, in 2011 an EOR steam well failure collapsed the ground at the well surface and caused a fatality in the South Belridge oilfield (DOGGR 2012).

EOR activities are regulated by DOGGR as Class II injection under the state's federally approved UIC program. The DOGGR UIC regulations require that all injections, including EOR steam and water injections, be permitted by DOGGR and that all wells subject to EOR injection be regularly inspected and tested for structural integrity. The regulations also include EOR safety and fluid management requirements. The federal SDWA prohibits Class II injection, including EOR activities, into any aquifer that qualifies as a USDW unless that aquifer has been specifically exempted by the EPA. One of the statutory criterion for USDW exemption is the presence of commercially producible hydrocarbons. As discussed above, in February 2015, DOGGR identified 1,721 wells in the Project Area that were injecting EOR-related steam or water into formations that may meet SDWA standards but were not clearly exempted. DOGGR indicated in a letter to the EPA that because these wells injected into commercially active hydrocarbon-bearing formations, DOGGR would apply to have the EPA exempt the affected formations. The EPA has set a deadline of February 15, 2017, for the cessation of all injections into non-exempt aquifers unless the state applies for USDW injection exemptions are approved for the affected

locations. DOGGR adopted emergency regulations codifying the compliance dates in the regulatory review schedule, which went into effect on April 20, 2015.

In May 2015, the SWRCB and DOGGR published a letter to the EPA stating that "approximately 3,600 cyclic steam wells that had some injection reported in 2014" had been identified, and that DOGGR databases show these wells "as not being associated to a permitted injection project." Almost all of these cyclic steam wells are located in the Project Area. The May letter states that because most of the cyclic steam wells inject steam for a limited duration and volume into "zones laden with hydrocarbons" or formations with "little or essentially no permeability, the wells are "very unlikely" to pose a threat to water supply wells. The state review of the 3,600 cyclic steam wells described in the May 2015 letter would be completed by July 2015 (DOGGR 2015d). Although produced water use for EOR generally cycles water from hydrocarbon-bearing formations to the surface for treatment and reinjection into the same or similar hydrocarbon-bearing formations, injection into a non-exempt USDW could significantly impact water quality in or near the affected zones.

### Produced Water Reuse for Agricultural Irrigation

As shown in Table 4.9-1, 32,771 AF of produced water was supplied to the Cawelo Water District (CWD) in the Eastern Subarea for agricultural irrigation in 2012. The water is treated by oil and gas operators prior to delivery to remove certain constituents, including oil and grease and dissolved solids. The treated water is conveyed through a system of canals and pipelines to CWD reservoirs, blended to further reduce constituent concentrations, and discharged for irrigation. As discussed above, the use of the treated produced water in the Project Area for agricultural irrigation is subject to permits issued by the CVRWQCB, and in certain instances, has exceeded allowable limits for arsenic and oil and grease. The permits require water quality monitoring, and corrective action, including percolation into water banking facilities to filter arsenic from the banked water, has been implemented to ensure compliance. Scenarios 1 and 2 are based on applicant projections that the current level of produced water use for agriculture would remain unchanged through 2035. Under these assumptions, the Project would not change, and would not result in any impacts to, existing produced water reuse for agriculture.

As discussed in more detail in Section 4.17, Utilities and Service Systems, California is experiencing a severe drought and has implemented unprecedented water use reduction measures to address historically low snowpack and rainfall levels. The drought has had substantial impacts in Kern County, which relies on imported surface water and groundwater to meet urban and agricultural demand. Due to drought-related reductions in surface water availability, regional aquifers have been depleted by extractions in lieu of surface water use to a substantial extent (DWR 2014). As shown in the regional water supply and demand projections, Project Area demand is projected to significantly exceed supplies in single dry and multiple dry years through 2035. The projections do not assume that the implementation of the new GSP process in the Project Area may reduce groundwater extraction levels to achieve legally applicable aquifer sustainability requirements. Should groundwater extractions be further limited by the GSP, the supply shortfalls could be greater than anticipated.

The amount of produced water that is not reused but is instead disposed to surface ponds or by injection in the Project Area is projected to increase from 114,794 AF in 2012 to 167,711 AF by 2035 in Scenarios 1 and 2 (Table 4.9-27). The feasibility of treating and reusing produced water that would otherwise be disposed of, in order to reduce regional demands for surface water and groundwater, varies throughout the Project Area due to such factors as the water quality of produced water from specific formations, the technical feasibility and cost of suitable treatment, the proximity of production wells to potential users, and the availability of storage, conveyance, treatment and related facilities. The reuse of about 7% of the amount of produced water that is projected to be disposed of in 2035 would fully offset all of the oil and gas industry's projected M&I water demand of 11,761 AF in that year. As discussed above and in Section 4.17, Utilities and Service Systems, however, the extent to which additional produced water can be reused is uncertain. It is possible that a regional approach for exploring the cost and feasibility of achieving this additional level of produced water reuse could be implemented as a component of the groundwater sustainability planning process. At least one Project Area water district has announced plans and has initiated the CEQA review process for the potential use of up to 8,000 AF of produced water in the Western Subarea. All produced water treatment and reuse for agricultural irrigation or other reuse that involves discharges to land is subject to regulation by the CVRWQCB.

### Produced Water Conveyance and Disposal in Earthen Disposal and Percolation Ponds

As discussed above, the Basin Plan states that the disposal of produced water to earthen, unlined ponds in Project Area has impacted groundwater quality. The CVRWQCB has issued closure and monitoring orders for several ponds, primarily in the Western Subarea, where water quality impacts have been detected from pond use. The CVRWQCB is currently evaluating the location, identification, status and use of unlined ponds within the Project Area and has announced that it would increase the inspection of, update applicable permits for, or potentially require closure of many of these facilities.

As shown in Table 4.9-1, 30,223 AF of produced water was disposed to surface ponds in the project area during 2012. As shown in Table 4.9-27, the total amount of produced water generated in the Project Area is projected to increase by about 37% by 2035.

Scenario 1 projects that if surface disposal volumes increase to the same extent, 41,806 AF would be disposed to surface ponds in 2035, an increase of over 10,000 AF from 2012. Water quality impacts from the increased use of ponds that the CVRWQCB has determined to have affected groundwater quality would be significant without mitigation.

Scenario 2 assumes that surface disposal volumes are reduced to 50% of 2012 levels, or to 15,112 AF by 2035. Potential water quality impacts from pond use would be lower than under Scenario 1, but not necessarily avoided.

Scenario 3 assumes that surface disposal is reduced to 90% below 2012 levels or to 3,022 AF in 2035. This level of sump disposal could reflect the limited use of surface facilities in relatively

rare and unavoidable circumstances in the future. Potential water quality impacts from pond use levels in Scenario 3 would be lower than under Scenario 1, and Scenario 2, but impacts to groundwater quality could still occur from the remaining disposal to unlined surface impoundments. The extent to which surface disposal can be reduced by 90% as projected in Scenario 3 is uncertain.

### Produced Water Conveyance and Disposal in Injection Wells

As discussed above, the Basin Plan states that, in lieu of ponds for disposal, oil and gas operators are increasingly discharging produced water to Class II injection wells. Table 4.9-19 shows that the volume of produced water disposed by injection wells in the Project Area rose from 32,059 AF in 2001 to 86,294 AF per year in 2013, a 269% increase.

The volume of produced water discharged to Class II injection wells is expected to increase by 2035 under all three scenarios. Scenario 1 shows that if 2012 surface and well injection disposal volumes increase by 37%, given the anticipated growth in total produced water generation for the Project Area, 125,905 AF would be injected in 2035, an increase of over 41,000 AF from 2012. Scenario 2 shows that, if surface disposal volumes are reduced to 50% of 2012 levels, produced water disposal by injection wells would increase to 152,600 AF by 2035. Scenario 3 shows that if surface disposal is reduced by 90% below 2012 levels, and produced water reuse increases to 44,532 AF, 152,928 AF of produced water would be disposed in injection wells by 2035.

The purpose of oil and gas-related waste injection is to safely dispose of produced water and other permitted Class II wastes into subsurface formations that are geologically isolated from, and that will contain and prevent potential future migration of the disposed materials to any USDW or other protected groundwater. Waste disposal wells may be located within oilfield boundaries, outside of active oilfields, and may be operated by oil and gas producers or independent entities on a commercial basis. As shown in Tables 4.9-2 to 4.9-4, due in part to conveyance costs, disposal injection volumes tend to, but may not necessarily occur, in the same general geographic locations where produced water and other injection wastes are generated. Injection well disposal formations can include the same or closely proximate zones from which produced water and other wastes were extracted, or in geologically distinct formations. In either case, the injection zone must be stable and prevent the migration of disposed materials to protected groundwater.

Injection well disposal could result in a discharge to groundwater in the event of a casing or well failure that allows injected materials to move from breach locations into other water-bearing formations. As the volume of waste disposal accumulates over time in specific zones, the discharge formation and portions of the well structure could become pressurized and subject to stresses that could increase the risk of well failure and groundwater impacts could increase. Recent studies have not specifically analyzed disposal injection well failure rates in the Project Area. Blowout rates for steam injection wells, which are often subject to pressurization as well as heated steam or water, fell from 1 per 5,900 well years in 1991 through 1998 to 1 per 100,000 well years in 2001 through 2008 (Jordan and Benson 2009). As discussed above, there is no data or confirmed evidence of drinking or agricultural well water contamination from current or historical oil and gas waste disposal by injection in the Project Area. As of May 2015, at least one

a lawsuit has been filed alleging injection well contamination to groundwater used by farm near Rosedale in the Central Subarea. The case is pending in the state Superior Court and no determination has yet been made in the matter.

Oil and gas waste disposal by well injection is regulated by DOGGR as a Class II injection under the federal UIC program. The DOGGR UIC regulations require that all injections, including waste disposal, be permitted by DOGGR and that all wells used for disposal be regularly inspected and tested for structural integrity. The regulations include injection well safety and fluid management requirements. The federal SDWA prohibits Class II injection, including waste disposal activities, into any aquifer that qualifies as a USDW unless the aquifer has been specifically exempted by the EPA.

As discussed above, in February 2015 DOGGR identified 532 Category 1 injection disposal wells, of which 388 were located in the Project Area, that were injecting into aquifers that could qualify as a USDW but were not clearly exempted. DOGGR also identified 176 wells, most of which were also in the Project Area, that were injecting into zones containing water with TDS levels of less than 3,000 mg/L. Due to their proximity to relatively high-quality groundwater, the UIC work plan developed by DOGGR initially focused on these 176 wells and identified injection wells within a mile at the surface and within 500 vertical feet underground of a drinking or agricultural water supply. As of March 2015, 23 injection wells in the Project Area or adjacent portions of Kern County were ordered to cease operations due to proximity to drinking or agricultural water supplies (DOGGR 2015c).

In March 2015, the EPA indicated that all injections into aquifers with TDS levels of less than 3,000 mg/L must cease by October 15, 2015, or sooner if it is determined that drinking or agricultural water supplies are threatened. Injection would only be allowed to continue into these sub-3,000 mg/L aquifers after October 15, 2015 if the aquifers were exempted by EPA. All injection into non-exempt aquifers with TDS levels of 3,000-10,000 mg/L will cease by February 15, 2017, unless the state applies for and the EPA approves USDW injection exemptions for these locations. On April 20, 2015, DOGGR emergency regulations went into effect, requiring that all injection activity into the 11 statewide and eight Project Area aquifers cease by December 31, 2016, unless the state applies for and the EPA approves USDW injection exemptions for these locations.

In May 2015, the SWRCB and DOGGR indicated that 80 of the 532 Category 1 wells identified in February 2015 had been removed from the Category 1 list for various reasons, including injection into an aquifer that did not meet the criteria for a USDW, wells that had not been completed, or wells that were injecting into exempted aquifers. About 21 of the 176 wells identified in February 2015 as injecting into aquifers with less than 3,000 mg/L of TDS were removed from the category 1 list. The May 2015 letter also indicated that SWRCB staff had determined that 53 of the remaining 155 wells injecting into aquifers with less than 3,000 mg/L of TDS were "potentially impacting drinking water supply wells." As discussed above, 23 of these wells had been ordered to cease operations due to proximity to drinking or agricultural water supplies. The May 2015 letter states that DOGGR and the SWRCB are "awaiting receipt of

additional test data" before determining whether to order a shut-down of any of the other 30 wells by the October 15, 2015 compliance date (DOGGR 2015d).

Waste disposal injection into a non-exempt USDW could significantly impact water quality in the affected zones. To reduce this potential impact to less than significant levels, MM 4.9-4 requires that for any activity for which Chapter 19.98 applies, the applicant shall not conduct any injection activity regulated by the UIC program, including EOR activities that discharge into any USDW unless the aquifer has been exempted by the EPA or injection has otherwise been authorized by the EPA or by DOGGR under delegated authority under the SDWA.

### Surface or Subsurface Discharges Related to Well Stimulation Activities

As discussed in Chapter 3, Project Description, the applicant has projected that up to 1,200 well stimulation treatments per year could occur in the future, of which 88% (1,050) treatments would occur in the Western Subarea, 10% (125 well stimulation treatments) in the Central Subarea, and 2% (25 per year) in the Eastern Subarea. The projected distribution reflects the fact that well stimulation technologies are most effective in existing Western Subarea oilfield formations, and could be utilized to recover oil or gas from shale formations that occur in the Western and Central Subareas. Well stimulation technology is generally less effective in existing Eastern Subarea oilfield formations, and the Subarea contains a relatively smaller share of shale oil deposits. Consequently, although the Eastern Subarea accounted for about 35% of the Project Area's total oil production in 2012, only a limited number of well stimulations are projected to occur in that location under future conditions. As shown on Figure 4.9-8, as of March 2015, no well stimulation disclosures or notices were filed with DOGGR in the Eastern Subarea.

Well stimulations in the Project Area have primarily consisted of hydraulic fracturing and acid matrix treatments. These technologies are expected to account for most forms of well stimulation in the future. The purpose of well stimulation is to increase the permeability of a hydrocarbon-bearing formation so that oil can flow towards the well and be recovered at the surface. According to the CCST, the average water use for over 1,800 well stimulations in the Project Area during 2011 through 2014 was 0.38 AF of water. Most of the stimulation water was obtained from M&I sources. Assuming average stimulation water demand in the future could range 1-2 times the average level reported by the CCST (0.38 to 0.76 AF per stimulation) or about 456 to 912 AF per year could be used for well stimulation in the Project Area.

Well stimulation activities include staging trucks, tanks and water and chemicals at a wellhead, mixing and preparing stimulation fluids for injection into the hydrocarbon zone, the injection of treatment fluids often under pressure through the well and into the hydrocarbon zone, and temporary capping of the treatment zone during the treatment period, cap removal, the recovery of injection fluids that flow back from the treatment zone to the surface, and returning the treated well to production. Tables 4.9-23, 4.9-24, and 4.9-25, list the chemical constituents and other additives that have been identified in well stimulation disclosures and notices for the Project Area and other California locations. Potential impacts from surface discharges of well stimulation chemicals or water due to leaks or ruptures are discussed above in subsection 2, ("Oil, produced water, maintenance and production (including EOR and well stimulation) chemicals, M&I water

and other constituent leaks and surface spills or equipment leaks at the surface from ruptured or leaking tanks, pipes, valves, hoses, and other process equipment"). Other potential water quality impacts include unpermitted discharges of stimulation flowback fluids to drilling sumps or other surface impoundments, and unintended contact with groundwater due to well failures or casing leaks.

Oil and gas well stimulation activities are not regulated as underground injection under the UIC program. California has recently adopted several new and amended provisions of the Public Resources Code and Water Code (SB 4) to comprehensively regulate well stimulation activities including hydraulic fracturing and acid well stimulation treatments. Well stimulation treatments do not include routine well cleanout work, routine maintenance, routine removal of formation damage due to drilling, bottom hole pressure surveys, or routine activities that do not affect the integrity of the well or the formation. DOGGR adopted permanent regulations for well stimulation treatments in January 2015 that will become effective in July 2015. DOGGR has also published a draft statewide EIR on well stimulation treatments that must be certified by July 2015 (DOGGR 2015a), and in January 2015 the CCST published the first of three volumes that independently study well stimulation activities in accordance with state law (CCST 2015). The SWRCB is required to develop model criteria for oil and gas-related groundwater monitoring by July 2015.

The new state laws and DOGGR well stimulation regulations require that certain physical well inspections, documentation, and public notices and disclosures be completed prior to and after completing a well stimulation process. Each well operator must apply for and obtain a permit from DOGGR in advance of performing a well stimulation treatment. The application must include: the identification and location of the well; the time period during which the well stimulation treatment is planned to occur; a water management plan; a list of the anticipated identity and concentration of the chemical constituents of the well stimulation treatment fluids the operator plans to use; modeling of the well stimulation treatment axial dimensional stimulation area (ASDA) and identification of plugged and abandoned wells and geologic faults within the modeled treatment area; indication that the operator is developing a groundwater monitoring plan meeting the criteria of the applicable RWQCB (operations cannot commence unless a plan has been approved); an estimate of treatment- generated waste materials that are not addressed in the water management plan; identification and contact information of the operator; the depth of the base of fresh water; the results of specified evaluation and modeling; and casing designs.

Once an application has been deemed complete by DOGGR, a well operator must hire an independent entity or person to provide notification to every tenant and owner of neighboring property within a specified distance from the wellhead and horizontal projection of the applicable well at least 30 days prior to commencing a well stimulation treatment. Notified property owners may request baseline and follow-up water quality testing at the operator's expense, and prior notice of any such testing must be provided to the applicable RWQCB to allow for the opportunity to observe the water sampling process. Well operators must also pressure-test a well and meet certain integrity requirements prior to commencing a well stimulation treatment. An

operator may conduct the stimulation activity identified in an approved application and notice within one year from DOGGR approval.

DOGGR regulations require the operator to monitor the surface injection pressure, slurry rate, proppant concentration, fluid rate, and pressure of each annuli of the well during a well stimulation treatment. The operator must terminate the well stimulation treatment, report the incident to the Division, and conduct diagnostics in event certain performance and pressure thresholds are exceeded. Notices of any termination must be provided to DOGGR and other state agencies, including the CVRWQCB. Well monitoring must continue after each stimulation treatment, including pressure data and diagnostic testing, to verify that the well has not been breached and that operators take all appropriate measures to prevent contamination of protected waters or the loss of hydrocarbon resources. Materials used in well stimulation are subject to storage, handling and reporting requirements.

Each well operator must disclose, within 60 days after a well stimulation treatment is completed, information regarding the source, volume and composition and disposition of well stimulation fluids, including, and flowback. A well stimulation treatment report must also be filed with DOGGR, including any information concerning stimulation treatments that differ from what was anticipated in the well stimulation treatment design submitted to DOGGR and whether the actual location of the well stimulation treatment differs from what was indicated in the stimulation permit application.

The volume of fluid that could be used for well stimulation in the Project Area could be over 900 AF per year if the average stimulation water use is double the consumption levels identified by the CCST for over 1,800 treatments in the Project Area. The level of activity amounts to substantially less than 1% of the volume of EOR and produced water disposal injections that are projected to occur in the Project Area. Well stimulation activities also would occur only in hydrocarbon-bearing zones that are not being used currently, and are unlikely to be used, in the future for M&I and other high-quality uses without significant treatment. DOGGR, the SWRCB and other state and federal agencies have developed comprehensive tools for monitoring and assessing the potential impacts well stimulation activities in the Project Area, and require that the stimulation process be continuously monitored and immediately terminated if there is any evidence of a well breach or other risk of an unintended discharge of stimulation fluids. As discussed above, stimulation fluids have been impermissibly discharged to drilling ponds, and certain recently posted flowback fluid testing results apparently indicate high levels of benzene and other chemicals returning to the wellhead after treatment. Although nearly 2,000 well stimulation treatments were performed in the Project Area during 2011 through 2014, there has never been a confirmed report of any well stimulation-related discharges to, or adverse effect, on surface or ground water although the potential exists for a release which could result in a significant impact.

## Summary

Significant impacts could occur during both construction and operations that could result in a violation of water quality standards waste discharge requirements. With the implementation of

mitigation measures, construction and operational period impacts would be less than significant with mitigation.

## Mitigation Measures

**MM 4.9-1** The Applicant shall comply with all applicable federal, state, regional and local agency water quality protection laws and regulations, and commonly utilized industry standards, including (where applicable) obtaining coverage under the stormwater construction general permit and industrial general permit issued by the State Water Resources Control Board and complying with industry stormwater management standards for construction and operational activities.

**MM 4.9-2** For any oil and gas activity that is not subject to state or federal stormwater management laws, regulations or general permits, the Applicant shall prepare a drainage plan that is designed to minimize runoff and minimize the potential for impeding or redirecting 100-year flood flows. The drainage plan shall be prepared in accordance with the Kern County Grading Code, the Green Code and approved by the Kern County Engineering, Surveying and Permit Services Department, Floodplain Management Section. The plan shall specify best management practices to prevent all construction pollutants from contacting stormwater, with the intent of keeping sedimentation or any other pollutants from moving offsite and into receiving waters. The requirements of the Plan shall be incorporated into design specifications. Recommended best management practices for the construction phase shall include the following:

a. Erosion Control -

    1. Scheduling of construction activities to avoid rain events.

    2. Limiting vegetation removal to the maximum extent practicable.

b. Sediment Control -

    1. Secure stockpiling of soil.

    2. Installation of a stabilized construction entrance/exit and stabilization of disturbed areas.

c. Non-stormwater Control -

    1. Proper fueling and maintenance of equipment and vehicles.

    2. Proper concrete handling techniques.

d. Waste and Material Management -

    1. Properly managing construction materials, designating construction staging areas in or around the Project site.

    2. Stockpiling and disposing of demolition debris, concrete, and soil properly.

    3. Aggressive control of litter.

4. Proper disposal of demolition debris, concrete and soil.
5. Proper protections for fueling and maintenance of equipment and vehicles.

e. Post-Construction Stabilization -

1. Ensuring the stabilization of all disturbed soils per revegetation or application of a soil binder.

**MM 4.9-3** All drilling operations must either use a closed loop system to avoid discharges of drilling muds and fluids, or obtain coverage under the State Water Resources Control Board low threat discharge General Order (Waste Discharge Requirements General Order 2003-0003-DEW), obtain individual Waste Discharge Requirements issued by the Central Valley Regional Water Quality Control Board for the unit, or obtain coverage under a general order issued by the Central Valley Regional Water Quality Control Board applicable to drilling ponds. Any surface ponds or sumps must be cleared of fluids and muds in accordance with the State Water Resources Control Board general order, applicable Water Discharge Requirements and Division of Oil Gas and Geothermal Resources regulations. Compliance with the State Water Resources Control Board or Central Valley Regional Water Quality Control Board low-threat discharge orders or Water Discharge Requirements, if closed-loop systems are not used, and applicable laws, regulations and standards will reduce potential surface water quality impacts from contact with drilling muds or fluids during drilling and construction to less than significant levels.

**MW 4.9-4** For any activity for which Chapter 19.98 applies, the Applicant shall not conduct any injection activity regulated by the Underground Injection Control program, including enhanced oil recovery activities that discharge into any underground source of drinking water unless the aquifer has been exempted by the United States Environmental Protection Agency or injection has otherwise been authorized by the U.S. Environmental Protection Agency or by Division of Oil Gas and Geothermal Resources under delegated authority under the Safe Drinking Water Act.

**MW 4.9-5** For any activity for which Chapter 19.98 applies, the Applicant shall not discharge produced water into any surface disposal facility unless the facility has received the Waste Discharge Requirements from the Central Valley Regional Water Quality Control Board, or the need for Water Discharge Requirements has been waived by the Central Valley Regional Water Quality Control Board.

**MM 4.9-6** For any oil and gas activity within a mapped 100-year floodplain, the Applicant shall ensure that all constructed facilities are protected from the maximum potential elevation of flooding during a 100-year flood by elevating structures or by implementing containment berms or other protective measures in compliance with the standards in the Kern County Floodplain Management Code and Chapters 19.50 and 19.70 of the Kern County Zoning Code.

### Level of Significance After Mitigation

Less than significant with mitigation

## Impact 4.9-2: Substantially Deplete Groundwater Supplies or Interfere Substantially with Groundwater Recharge such that there would be a Net Deficit in Aquifer Volume or a Lowering of the Local Groundwater Table Level (e.g., the production rate of pre-existing nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted)

### Potential Impacts to Groundwater Supply and Recharge from Produced Water Generation, Injection, and Well Stimulation

This section analyzes potential impacts to groundwater supplies and recharge that could be related to the generation and reinjection of produced water, the injection of other permitted Class II wastes, and well stimulation treatments. These activities represent the largest volume of subsurface water generation and reuse, and the oilfield activities that are most likely to introduce constituents of concern into groundwater, associated with Project Area oil and gas exploration and production activities. As shown in Table 4.9-28, produced water generation is projected to increase by 86,935 AF per year. As discussed in Section 4.17, Utilities and Service Systems, M&I water used for oil and gas exploration and production is supplied from varying sources each year. To provide a conservative assessment, this DEIR assumes that all oil and gas M&I water use is provided from Project Area groundwater. The Applicant has estimated that, in 2035, oil and gas exploration and production M&I water use would have increased by 2,983 AF from 2012 levels (Table 4.9-28).

**Table 4.9-28: Produced Water Generation and M&I Water Use, 2012-2035 (acre-feet)**

| | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| **Produced Water Generation** | | | | |
| 2012 | 131,341 | 2,884 | 100,734 | 234,959 |
| 2035 | 179,937 | 3,951 | 138,006 | 321,894 |
| **Increase from 2012 Levels** | **48,596** | **1,067** | **37,272** | **86,935** |
| **M&I Water Use** | | | | |
| 2012 | 8,358 | 63 | 357 | 8,778 |
| 2035 | 10,851 | 395 | 515 | 11,761 |
| **Increase from 2012 Levels** | **2,493** | **332** | **158** | **2,983** |

Source: Appendix T, Table 39
Note:
2035 total produced water volume assumed to be 37% above 2012 levels in each Subarea to reflect projected demand growth.

Produced water is extracted from oil-bearing formations in the Project Area and separated in tanks or other facilities to recover oil and gas. As shown in Tables 4.9-20 and 4.9-21, produced water quality varies throughout the Project Area and reflects formation- and site-specific chemical, hydrological, geological and other physical characteristics. Most produced water is saline and contains naturally-occurring hydrocarbon-related constituents, such as oil and grease, chloride, boron, benzene, toluene, ethylbenzene and xylene levels that preclude reuse for other purposes, including agricultural, residential, commercial or industrial uses, without substantial treatment. Produced water generated in the Eastern Subarea oilfields near the base of the Sierra Nevada foothills is generally higher in quality than in other Project Area locations, and 32,771 AF per year of treated produced water is supplied to the CWD for agricultural reuse under the terms of WDR permits issued by the CVRWQCB. Although the produced water is blended with other CWD supplies to further dilute post-treatment constituent levels, the CVRWQCB has required additional water quality control measures, including the infiltration of excess treated produced water supplies during winter months into a groundwater banking facility to remove naturally-occurring arsenic prior to irrigation use. Consequently, the reuse of even relatively high quality produced water requires significant treatment, blending, and continuous monitoring and management response to meet applicable water quality standards and requirements.

Other than reuse for oil and gas activities, and treated produced water used for agriculture in the Eastern Subarea, water resources in Project Area hydrocarbon-bearing formations do not support any existing land uses or planned uses in the Project Area. No drinking water, agricultural or other M&I water supply wells are located, or are likely to be installed in hydrocarbon-bearing formations due to the infeasibility and cost of treatment sufficient to render the water suitable for reuse. Oil and gas activities that cycle water from and to hydrocarbon-bearing formations are unlikely to impact the supply and recharge of groundwater that could be feasibly used for agricultural or M&I purposes.

Most of the water extracted from oil-bearing formations is also returned to the same or similar zones in the Project Area. As shown in Table 4.9-29, about 41% of the volume of produced water generated in the Project Area in 2012 was reinjected for EOR purposes. The same percentage of produced water is projected to be used for EOR purposes under future conditions. The percentage of produced water and other permitted wastes disposed by injection in 2035 is expected to increase from 2012 levels and could vary from 39% of the annual volume of produced water generated in the Project Area in Scenario 1, to 48% in Scenario 3. Consequently, depending on the reuse of produced water, oil and gas operations would re-inject 80 to 88% of the volume of produced water generated each year in the Project Area.

**Table 4.9-29: Produced Water Generation and M&I Water Use, 2012-2035 (AF)**

| | 2012 | Scenario 1 Pro-Rata Increase | Scenario 2 50% Surface Disposal Reduction | Scenario 3 Full M&I Water Use Offset and 90% Surface Disposal Reduction |
|---|---|---|---|---|
| **Total produced water generation** | **234,959** | **321,894** | **321,894** | **321,894** |
| **Total EOR Injection (produced water and M&I water sources)** | **95,947** | **130,969** | **130,969** | **130,969** |
| Produced water EOR | 88,668 | 121,215 | 121,215 | 121,215 |
| M&I water EOR | 7,279 | 9,754 | 9,754 | 9,754 |
| **Percent of Total Produced Water Generation** | **41%** | **41%** | **41%** | **41%** |
| **Injection Well Disposal** | **84,571** | **125,905** | **152,600** | **152,928** |
| **Percent of Total Produced Water Generation** | **36%** | **39%** | **47%** | **48%** |

Produced water EOR and disposal injections are regulated by DOGGR under the UIC program, which prohibits injection into an aquifer that meets the criteria for a USDW unless an exemption has been approved by the EPA. The UIC regulations provide that the EPA may only exempt an aquifer that meets the USDW criteria in the event that: (a) the aquifer does not currently serve as a source of drinking water; *and* (b) the aquifer cannot now and will not in the future serve as a source of drinking water because: (1) it is mineral, hydrocarbon or geothermal energy producing, or can be demonstrated to contain minerals or hydrocarbons that considering their quantity and location are expected to be commercially producible; (2) it is situated at a depth or location which makes recovery of water for drinking water purposes economically or technologically impractical; (3) it is so contaminated that it would be economically or technologically impractical to render that water fit for human consumption; or (4) it is located over a Class III well mining area subject to subsidence or catastrophic collapse; *or* (c) The total dissolved solids content of the ground water is more than 3,000 and less than 10,000 mg/L and it is not reasonably expected to supply a public water system (40 CFR 146.4).

As discussed above, in response to a program audit commissioned by the EPA, DOGGR and the SWRCB have determined that certain EOR and waste disposal injections in the Project Area were permitted in locations that may meet the USDW criteria but that were not clearly exempted by the EPA in accordance with UIC criteria. In February 2015, DOGGR and the SWRCB identified 2,021 EOR wells, including 1,721 wells in DOGGR District 4, which generally encompasses the Project Area that could be discharging into non-exempt aquifers (DOGGR 2015c). In May 2015, the SWRCB and DOGGR published a letter to the EPA indicating that "approximately 3,600 cyclic steam wells that had some injection reported in 2014" had been identified, and that DOGGR databases show these wells "as not being associated to a permitted injection project." Almost all of these cyclic steam wells are located in the Project Area. The May 2015 letter states, because that most of the cyclic steam wells inject steam for a limited duration and volume into "zones laden with hydrocarbons" or formations with "little or essentially no permeability, the wells are "very unlikely" to pose a threat to water supply wells. The state review of the 3,600

cyclic steam wells described in the May 2015 letter will be completed by July 2015 (DOGGR 2015d).

The May 2015 letter to the EPA also indicated that 53 Class II injection wells, most of which are in the Project Area, "are potentially impacting water supply wells." As discussed above, 23 of these wells have ceased operations pursuant to regulatory order or operator relinquishment, and the SWRCB has indicated that it is awaiting further test results to determine if any of the other 30 injection wells should cease operations prior to the October 15, 2015 compliance deadline (DOGGR 2015d). As of February 2015, DOGGR and the SWRCB indicated that, based water quality sampling results to date, there is no evidence that oil and gas-related injection regulated under the UIC program has affected any groundwater supplies used for drinking, agricultural or other M&I purposes in the Project Area (DOGGR 2015c).

Projected well stimulation activities in the Project Area could utilize from 456 AF of water based on the 2011 to 2014 average stimulation water use reported by the CCST (CCST 2015) to 912 AF if, on average, future stimulations use twice as much water as reported by the CCST. As shown in Table 4.9-30, 88% of all well stimulations are projected to occur in the Western Subarea. About 90.1% of all well stimulations in the Project Area would occur in existing Tier 1 areas.

**Table 4.9-30: Projected Annual Project Area Well Stimulations By Subarea and Tier**

| | Western | Central | Eastern | Total |
|---|---|---|---|---|
| Total Well Stimulations | 1,050 | 125 | 25 | 1,200 |
| Tier 1 | 946 | 113 | 23 | 1081 |
| Tier 2 | 66 | 8 | 2 | 76 |
| Tier 3 | 27 | 3 | 1 | 31 |
| Tier 4 | 9 | 1 | 0 | 11 |
| Tier 5 | 1 | 0 | 0 | 1 |

Water quality data compiled by the USGS (Tables 4.9-16 to 4.9-18) indicate that, due in part to the presence of marine rocks and soils and runoff from the coastal ranges, groundwater quality in the Western Subarea is typically lower than in the rest of the Project Area. Tier 1 areas are also subject to the most significant existing oil and gas-related surface and subsurface disturbance, including oilfields that have been in continuous operation for decades.

As discussed in Impact 4.9-1 above, California has recently adopted several new and amended provisions of the Public Resources Code and Water Code to comprehensively regulate well stimulation activities including hydraulic fracturing and acid well stimulation treatments and DOGGR adopted permanent regulations for well stimulation treatments in January, 2015 that will become effective in July 2015. DOGGR has also published a draft statewide EIR on well stimulation treatments that must be certified by July 2015 and, in January 2015, the CCST published the first of three volumes that independently study well stimulation activities in

accordance with state law. The SWRCB is required to develop model criteria for oil and gas-related groundwater monitoring by July 2015.

The new state laws and DOGGR well stimulation regulations require that certain physical well inspections, documentation, and public notices and disclosures be completed prior to and after completing a well stimulation process. Each well operator must obtain a permit from DOGGR in advance of performing a well stimulation treatment. Once an application has been deemed complete by DOGGR, a well operator must hire an independent entity or person to provide notification to every tenant and owner of neighboring property within a specified distance from the wellhead and horizontal projection of the applicable well at least 30 days prior to commencing a well stimulation treatment. Notified property owners may request baseline and follow-up water quality testing at the operator's expense, and prior notice of any such testing must be provided to the applicable RWQCB to allow for the opportunity to observe the water sampling process. Well operators must also pressure-test a well and meet certain integrity requirements prior to commencing a well stimulation treatment. An operator may conduct the stimulation activity identified in an approved application and notice within one year from DOGGR approval. DOGGR regulations require the operator to monitor the surface injection pressure, slurry rate, proppant concentration, fluid rate, and pressure of each annuli of the well during a well stimulation treatment. Well monitoring must continue after each stimulation treatment, including pressure data and diagnostic testing, to verify that the well has not been breached and operators take all appropriate measures to prevent contamination of protected waters. Materials used in well stimulation are subject to storage, handling and reporting requirements. The new regulations require that each well operator disclose, within 60 days after a well stimulation treatment is completed, information regarding the source, volume and composition and disposition of well stimulation fluids, including flowback fluids collected at the wellhead.

About 90% of all well stimulations are projected to occur in the Western Subarea and in existing Tier 1 locations. These areas are not currently, and are highly unlikely to become, significant sources of drinking, agricultural, or other M&I water supplies. The volume of fluids required to conduct the projected number of well stimulation per year in the Project Area is extremely small relative to groundwater supplies, extraction, and recharge in the Project Area.

According to the USGS, the primary sources of groundwater recharge in the Project Area include flows from the Kern River and artificial recharge within groundwater banking facilities (Figure 4.9-6). Secondary sources of recharge include return flows from agricultural and municipal irrigation and infiltration of flows from intermittent streams along the edge of the subbasin (USGS 2012). Using the ground disturbance factors discussed in Appendix F, up to 4,856 acres of new disturbance could occur each year in the Project Area. About 90.1% (4,400 acres) would occur in existing Tier 1 production areas, and 298 acres (6.13%) would occur in Tier 2 areas. About 158 acres of new disturbance could occur in Tiers 2 through 5, which generally include constructed landscapes. These estimates are conservative because new well construction and operations would likely utilize existing access roads and other oil and gas infrastructure to a

greater extent than assumed in the impact projections, especially in more heavily developed Tier 1 areas.

Potential project-related ground disturbance would not significantly affect the Project Area's primary sources of groundwater recharge from Kern River flows and water banking activities. As shown on Figure 3-4 (provided in Chapter 3, Project Description), existing Tier 1 areas are clustered in generally elevated portions of the Western and Eastern Subareas where little or no Kern River recharge or water bank percolation facilities are located. Except for relatively limited administrative or field-scale energy, treatment, storage and staging buildings and appurtenant structures, oil and gas exploration and production does not result in the urban-scale installation of permanent, impervious structures throughout a landscape. As discussed in Impacts 4.9-3 and 4.9-4, future oil and gas development in the Project Area would not significantly modify existing drainage patterns and infiltration and runoff rates or affect Project Area recharge activities and therefore would have a less than significant impact.

## Groundwater Levels and Aquifer Volumes

As shown in Table 4.9-27, M&I water use for oil and gas exploration and production was about 8,778 AF per year in 2012 and is projected to increase to 11,761 AF per year, or by more than 2,980 AF per year, by 2035. As discussed in Section 4.17, Utilities and Service Systems, oil and gas operators obtain M&I water from several sources that vary from year to year in accordance with hydrological conditions, price and availability. To provide a conservative assessment, this EIR assumes that all oil and gas exploration and production M&I water demand is met by using groundwater of sufficient quality to potentially be utilized for agricultural, urban or other M&I activities. In normal years, the applicant has estimated that about 1.319 million AF of groundwater is withdrawn for various uses within the Project Area. In single dry and multiple dry years, groundwater withdrawals are projected to increase to 1.63 to 1.673 million AF due to the curtailment of surface supplies (Appendix T). During the current drought, CASGEM program data indicate that the Tulare Lake basin has experienced water table elevation declines of 25 to 50 feet, and among the largest groundwater withdrawals and storage reductions in California. The Kern County subbasin is considered to be the 21$^{st}$ most impacted of 515 subbasins in the state.

In 2012, oil and gas exploration and production M&I water use accounted for less than 1% of all water use in the Project Area and is projected to increase to about 1.2% of total water use by 2035. Assuming all M&I use was obtained from groundwater, oil and gas consumption would account for about 2% of existing normal year groundwater use in 2012, and 2.8% by 2035. The Groundwater Sustainability Management Act requires that a GSP for the Project Area must be adopted by 2020 to ensure that, over a period of 20 years, "sustainable groundwater management" is achieved. As discussed above, a GSP process has never previously been implemented in California, and regulations for the preparation of a GSP have yet to be adopted by the DWR. It is possible that groundwater use in the Project Area may be reduced from historical levels in accordance with the GSP to achieve the sustainable groundwater management requirements mandated by the new state legislation.

As discussed in Section 4.17, Utilities and Service Systems, although oil and gas use of groundwater is relatively small compared with total water and groundwater use, the volume of the industry's 2012 M&I water consumption amounted to about 4% of the total urban water demand in 2012 (8,778 AF compared with 217,226 AF for Project Area urban uses) and would be about 3.9% of projected urban demand in 2035 (11,761 AF compared with 301,736 AF for Project Area urban uses). The analysis summarized in Appendix T indicates that normal year Project Area water demand is roughly equal to available supplies under current conditions. In single dry and multiple dry years, the Project Area would experience significant supply shortfalls that could range from -315,626 AF to -817,127 AF by 2035, depending on hydrologic conditions (see Section 4.17, Utilities and Service Systems). These projections assume current levels of groundwater extraction will continue in the future, although extraction rates may be reduced by the GSP to meet statutory groundwater sustainability requirements. If groundwater extractions are more limited in the future, the supply shortfalls could be larger than projected. Under these circumstances, oil and gas exploration and production groundwater use, including an increase from 2012 levels of over 2,980 AF per year by 2035, would significantly affect available groundwater supplies in the Project Area on a Project-level and cumulative basis.

As discussed in Section 4.17, Utilities and Service Systems, potential groundwater impacts would be mitigated to less than significant levels if sufficient amounts of produced water otherwise subject to disposal were treated and reused to offset the consumption of M&I water for oil and gas exploration and production. As shown in Table 4.9-27, the industry's M&I water use is projected to be 11,761 AF, and the total volume of disposed produced water in Scenarios 1 and 2 would be 167,711 AF in 2035. About 7% of the amount of produced water that is projected to be disposed of in 2035 would be required reuse to fully offset oil and gas M&I demand in that year. It is possible that a portion of this offset could be achieved by agreement between individual oilfield operators and Project Area water districts. As discussed above, the Kern-Tulare Water District is evaluating the possibility of using 8,000 AF per year of produced water supplied from the Western Subarea oilfields. In addition, a regional produced water reuse strategy that could identify and utilize higher quality produced water to minimize treatment requirements and maximize the use existing conveyance and other infrastructure could be implemented under the auspices of the GSP. The GSP could also facilitate a regional mechanism for allocating the costs and managing the construction and operation of treatment, conveyance or other facilities that would be required to significantly increase produced water reuse. Oilfield operators could also utilize more produced water for well construction and steam production purposes to reduce M&I demand.

As discussed above and in Section 4.17, Utilities and Service Systems, the feasibility of achieving additional produced water reuse to offset oil and gas M&I water use in the Project Area, depends on several factors, including produced water quality, treatment costs and requirements, the availability of conveyance capacity to route produced water to and from treatment facilities, and the availability of institutional mechanisms for managing produced water treatment and distribution. As discussed above, the CVRWQCB has determined that, in certain instances, even relatively high-quality produced water available from certain oilfields in the Eastern Subarea has, on occasion, not met applicable arsenic or oil and grease water quality standards. Additional

management measures, including percolation into water banking facilities, have been required to address these water quality concerns (CVRWQCB Order R5-2011-0900 and CVRWQCB Order R5-2012-0058). The reuse of additional produced water, particularly supplies with lower quality than available in the Eastern Subarea, could require more intensive, technically demanding and more costly forms of treatment. It is possible that treatment requirements could have other environmental effects related to increased energy use, air quality, and GHG emissions, or post-treatment waste stream disposal. Although the Kern-Tulare Water District has proposed to use 8,000 AF per year of treated produced water in the Western Subarea, no agreement to reuse produced water for agriculture other than with the CWD has been approved and implemented in the Project Area.

Oil and gas operators may be able to substitute additional produced water for M&I supplies to conduct certain oilfield activities, including EOR and steam production. EOR activities currently account for the largest share of oil and gas M&I water use. Certain EOR operations, such as steam generation, may require higher-quality water supplies than can be typically be obtained from treated produced water to avoid equipment corrosion or damage and potential chemical interactions. The use of produced water for other oilfield activities, such as discharge for dust suppression, would require additional permitting and approvals to avoid impacts to biological, water and other resources. As discussed in Section 4.17, Utilities and Service Systems, MM 4.17-2 to MM 4.17-4 encourage the additional reuse of produced water The extent to which oilfield operators can increase produced water reuse and decrease M&I demand is uncertain.

### Summary

Potential impacts to groundwater supply and recharge from produced water generation, injection, and well stimulation would be less than significant with the implementation of MM 4.9-1 through 4.9-6. However as discussed in Section 4.17, Utilities and Service Systems, while MM 4.17-2 through MM 4.17-4 would encourage the additional reuse of produced water, the extent to which oilfield operators can increase produced water reuse and decrease M&I demand is uncertain. As a result, potential impacts to groundwater levels and aquifer volumes would be significant and unavoidable with mitigation.

## Mitigation Measures

Implement MM 4.9-1 through MM 4.9-6, as described above, and the groundwater mitigation measures described in Section 4.17, Utilities and Service Systems.

## Level of Significance After Mitigation

Significant and unavoidable with mitigation.

## Impact 4.9-3: Substantially Alter the Existing Drainage Pattern of the Site or Area, Including through the Alteration of the Course of a Stream or River, in a Manner that would Result in Substantial Erosion or Siltation On Site or Off Site

Based on the conservative impact estimates described in Appendix F, the potential development of 2,697 new production wells per year in the Project Area could disturb up to 4,856 acres per year. Over 90%, or 4,400 acres, of this disturbance would be located in existing Tier 1 areas that are currently subject to the highest level of existing disturbance from prior oil and gas exploration and production activities. New well development could disturb up to 298 acres in Tier 2 areas where agriculture is the predominant land use, and up to 158 acres in Tiers 3 through 5. As discussed in Impact 4.9-1, construction and operational activities could alter new well site topography and soil and vegetation conditions in a manner that could affect drainage patterns. Site preparation and the installation of wells and related equipment would also change the amount of impervious surfaces and runoff retention rates within new development areas.

The concentration of new well activity within existing Tier 1 areas would reduce potential impacts to drainage patterns because existing roads and infrastructure would likely be used to a greater extent in these areas and in a manner that minimizes the extent of new land disturbance. Apart from relatively limited administrative or field-scale energy, treatment, storage, and staging buildings and appurtenant structures, oil and gas exploration and production does not result in the construction of impervious surfaces on an urban scale. Most Tier 1 areas have sparse vegetation and relatively compacted soils from decades of disturbance. The projected annual acreage of potential Tier 2 disturbance amounts to less than 0.017% of the 1.791 million acres of predominantly agricultural Tier 2 land in the Project Area. Over 50 years, the projected impacts would affect 0.83% of the total Tier 2 acreage. Projected annual disturbance in Tiers 3 through 5 would affect 0.3% of the largely constructed and previously disturbed landscapes in these areas and therefore impacts would be less than significant

As discussed above, oil and gas operations that are located in close proximity with or on sites that are hydrologically connected to waters of the United States are generally subject to the requirements of the Construction General Permit and Industrial General Permit adopted by the SWRCB, unless otherwise subject to exemption or waiver. These permits require strict compliance with water quality standards through the implementation of BMPs and other measures. The API and other sources of applicable industry engineering standards publish and regularly update oil and gas industry standards and criteria for stormwater and runoff management. MM 4.9-1 requires compliance with all applicable federal, state, regional and local agency water quality protection laws and regulations, and commonly utilized industry standards, including (where applicable) obtaining coverage under the stormwater construction general permit and industrial general permit issued by the SWRCB and complying with industry stormwater management standards for construction and operational activities. MM 4.9-2 requires that all applicants not otherwise subject to state or federal stormwater management laws, regulations or general permits implement a drainage plan as specified in the Kern County Grading Ordinance.

### Mitigation Measures

Implement MM 4.9-1 through MM 4.9-6, as described above, and the groundwater mitigation measures described in Section 4.17, Utilities and Service Systems.

### Level of Significance After Mitigation

Less than significant with mitigation.

## Impact 4.9-4: Substantially Alter the Existing Drainage Pattern of the Site or Area, Including through the Alteration of the Course of a Stream or River, or Substantially Increase the Rate or Amount of Surface Runoff in a Manner that would Result in Flooding On Site or Off Site

Based on the conservative impact estimates described in Appendix F, the potential development of 2,697 new production wells per year in the Project Area could disturb up to 4,856 acres per year. Over 90%, or 4,400 acres, of this disturbance would be located in existing Tier 1 areas that are currently subject to the highest level of existing disturbance from prior oil and gas exploration and production activities. New well development could disturb up to 298 acres in Tier 2 areas where agriculture is the predominant land use, and up to 158 acres in Tiers 3 through 5. Construction and operational activities, site preparation and installation of wells and related equipment could also change existing drainage patterns and runoff rates and result in on or offsite flooding.

As discussed in Impact 4.9-3, the concentration of new well activity within existing Tier 1 areas would reduce potential drainage-related flood risks because existing roads and infrastructure would be used to a greater extent in previously disturbed and actively operating oilfields. Apart from relatively limited administrative or field-scale energy, treatment, storage and staging buildings and appurtenant structures, oil and gas exploration and production does not result in the installation of urban-scale impervious structures throughout a site. Most Tier 1 areas also have sparse vegetation and relatively compacted soils from decades of disturbance. The projected annual acreage of potential Tier 2 disturbance amounts to less than 0.017% of the 1.791 million acres of predominantly agricultural Tier 2 land in the Project Area. Over 50 years, the projected impacts would affect 0.83% of the total Tier 2 acreage. New well construction in Tiers 3 through 5 would affect just 0.3% of the largely constructed and previously disturbed landscapes in these areas and therefore impacts would be less than significant

As discussed above, oil and gas operations that are located in close proximity with or on sites that are hydrologically connected to waters of the United States are generally subject to the requirements of the Construction General Permit and Industrial General Permit adopted by the SWRCB unless otherwise subject to exemption or waiver. These permits require strict compliance with water quality standards through the implementation of BMPs and other measures. The API and other sources of applicable industry engineering standards publish and regularly update oil and gas industry standards and criteria for stormwater and runoff management.

With the implementation of MM 4.9-1 and MM 4.9-2, any potential impact would be further reduced.

### Mitigation Measures

Implement MM 4.9-1 through MM 4.9-6, as described above, and the groundwater mitigation measures described in Section 4.17, Utilities and Service Systems.

### Level of Significance After Mitigation

Less than significant with mitigation.

## Impact 4.9-5: Create or Contribute Runoff Water that would Exceed the Capacity of Existing or Planned Stormwater Drainage Systems or Provide Substantial Additional Sources of Polluted Runoff

About 97.4% of the Project Area consists of Tier 1 lands (10.1%) in which oil and gas activities are the predominant land use, or Tier 2 lands (87.3%) where agriculture is the predominant use. In addition, 97% of the projected annual disturbance of up to 4,856 acres would occur in Tier 1 (4,400 acres) or Tier 2 (298 acres) areas. Urban-scale constructed stormwater drainage systems occur to a limited extent in Tier 1 and Tier 2 areas. Most drainage is managed on a site-specific basis in Project Area oilfields and agricultural locations. Potential Project-related development in Tiers 3 through 5 could produce runoff to existing or planned regional or constructed stormwater drainage systems. The extent of the potential new development would affect at most 0.3% of the acreage in Tiers 3 through 5 per year and would not generate new sources of runoff that could significantly impact existing or planned drainage systems in these locations; therefore, impacts would be less than significant

Runoff water and potential polluted runoff risks would be managed by site-specific stormwater and runoff management measures. As discussed above, oil and gas operations that are located in close proximity with or on sites that are hydrologically connected to waters of the United States are generally subject to the requirements of the Construction General Permit and Industrial General Permit adopted by the SWRCB unless otherwise subject to exemption or waiver. These permits require strict compliance with water quality standards through the implementation of BMPs and other measures. The API and other sources of applicable industry engineering standards publish and regularly update oil and gas industry standards and criteria for stormwater and runoff management.

With the implementation of MM 4.9-1 and MM 4.9-2, any potential impact would be further reduced.

### Mitigation Measures

Implement MM 4.9-1 through MM 4.9-6, as described above.

### Level of Significance After Mitigation

Less than significant with mitigation.

## Impact 4.9-6: Otherwise Substantially Degrade Water Quality

The Basin Plan incorporates the SWRCB anti-degradation policy (SWRCB Resolution No. 68-16) and requires that "high-quality waters of the state" be maintained consistent with the maximum benefit to the people of the state. The purpose of this policy is to prevent or minimize degradation of high quality surface waters and groundwater. The Basin Plan also incorporates the SWRCB sources of drinking water policy (SWRCB Resolution No. 88-63), which provides that all surface and ground waters of the state "are considered to be suitable, or potentially suitable, for municipal or domestic water supply and should be so designated by the RWQCBs with the exception of" waters in which: (a) TDS levels exceed 3,000 mg/L (5,000 µmhos/cm electrical conductivity) and the aquifer cannot be reasonably expected to supply a public water system; (b) there is contamination, either by natural processes or by human activity (unrelated to a specific pollution incident), that cannot reasonably be treated for domestic use using either BMPs or best economically achievable treatment practices; or (c) the water source cannot provide sufficient water to supply a single well capable of producing an average, sustained yield of 200 gallons per day. The Basin Plan defines "groundwater" to mean "subsurface water that occurs beneath the ground surface in fully saturated zones within soils and other geologic formations."

To implement the SWRCB sources of drinking water policy, the Basin Plan has designated all ground waters in the Tulare Lake region, including all groundwater in the Project Area, as suitable for municipal (MUN) beneficial uses unless specifically exempted by the CVRWCB and approved for exemption by the SWRCB. The MUN beneficial use includes drinking water and water for domestic purposes. As discussed in the Basin Plan, factors the CVRWQCB considers when making exemptions to the MUN ground water designation include the exception criteria listed in Resolution No. 88-63 (discussed above), and whether a specific aquifer has been exempted by the EPA under the UIC program. As shown on Figure 4.9-11, based on the list of approved groundwater MUN designations in the Table II-2 of the Basin Plan, most of the Project Area groundwater is subject to a MUN beneficial use designation. The SWRCB sources of drinking water policy includes an exception for an aquifer that "is regulated as a geothermal energy producing source or has been exempted administratively pursuant to 40 Code of Federal Regulations, Section 146.4 for the purpose of underground injection of fluids associated with the production of hydrocarbon or geothermal energy, provided that these fluids do not constitute a hazardous waste under 40 CFR, Section 261.3" (SWRCB Resolution No. 88-63 [1988], as amended by Resolution No. 2006-0008 [2006]). As discussed below, state and federal agencies are currently updating the status of aquifer exemptions in the Project Area. Figure 4-9.11 identifies the locations in the Project Area where the groundwater MUN beneficial use has been removed by the CVRWQCB in the Basin Plan.

Except for a limited number of injection wells that are the subject of the UIC program review and revision process being conducted by DOGGR, the SWRCB, and the EPA, and one case in which surface disposal was judicially determined to impair water supplies used in an adjacent orchard,

oil and gas activities in the Project Area primarily affect groundwater with TDS levels substantially above 3,000 mg/L and that cannot be reasonably expected to supply a public water system. Groundwater in hydrocarbon-bearing zones has also been impacted by natural processes, including substantial deposits of oil, gas and other hydrocarbons and related constituents, and by human activity, including decades of prior oil and gas exploration and production activity. A substantial amount of the water that could be derived from hydrocarbon-bearing formation cannot reasonably be treated for domestic use. With the possible exception of the eight oilfield aquifers in the Project Area that DOGGR has determined were not clearly exempted under the UIC, aquifers subject to oil and gas injection, stimulation treatment or other discharges that may affect water quality would usually not meet the SDWA criteria for protection as an underground source of drinking water, or have been exempted in accordance with the UIC program.

The Basin Plan also discusses the March 1988 MOA between the SWRCB and DOGGR, under which DOGGR permits Class II injection wells in California subject to review and comment by the CVRWQCB and SWRCB. The Basin Plan indicates that the purpose of the MOA "is to ensure that the construction or operation of Class II injection disposal wells and the land disposal of wastewaters from oil, gas, and geothermal production facilities does not cause degradation of waters of the state." The Basin Plan further states that the MOA "provides a coordinated approach that results in a single permit satisfying the statutory obligations of both agencies."

The Basin Plan description of the MOA process, and the inclusion of specific MUN designation exception criteria in the 1988 SWRCB sources of drinking water policy, indicate that even if a MUN designation is applicable to most groundwater in the Project Area, permitted oil and gas activities would not degrade high-quality waters that could feasibly be used for MUN purposes and therefore the Project would have a less than significant impact to the water sources.

### Mitigation Measures

Implement MM 4.9-1 through MM 4.9-6, as described above, and the groundwater mitigation measures described in Section 4.17, Utilities and Service Systems.

### Level of Significance After Mitigation

Less than significant with mitigation.

## Impact 4.9-7: Place Housing within a 100-Year Flood Hazard Area as Mapped on a Federal Flood Hazard Boundary or Flood Insurance Rate Map or other Flood Hazard Delineation Map

The proposed Zoning Code amendment would not affect the placement of housing within the Project Area, including within a mapped 100-year flood hazard area; therefore, the Project would result in no impacts.

### Mitigation Measures

No mitigation measures are required since the Project does not include housing development.

### Level of Significance

No impact.

## Impact 4.9-8: Place within a 100-Year Flood Hazard Area Structures that would Impede or Redirect Flood Flows

As shown on Figure 4.9-17, about 73,000 acres of existing oil and gas administrative fields within the Project Area are within a 100-year flood hazard area identified by FEMA on applicable FIRMs. The portions of the Project Area that are located in a mapped 100-year floodplain primarily include: (a) Tier 2 lands in the northern part of the Central Subarea between Highway 46, Highway 99, Interstate-5, and the northern border of Kern County; (b) Tier 1 and Tier 2 lands in the three Subareas between northern foothills of the Tehachapi range and Highway 223; (c) Tier 1 and Tier 2 lands in the Eastern Subarea south of Bakersfield between Highway 99, Highway 223, Highway 58, and the eastern Project Area border in the Sierra Nevada foothills; (d) Tier 1 and Tier 2 lands in the Central Subarea and Western Subarea that are located within portions of the historical Kern River drainage to the west and north of Bakersfield; and (e) Tier 1 and Tier 2 lands in the far northern portion of the Western Subarea between Highway 46 and the northern border of Kern County. Project-related oil and gas exploration and production activity, including new wells, infrastructure, and oil, gas, produced water and chemical treatment and storage facilities, could occur within Project Area land that is subject to a 100-year flood risk and impede or redirect flood flows in these areas. Flooding could also damage affected structures, or mobilize constituents of concern in floodwaters that are used in and gas exploration and production and could result in significant impacts

KCGP Physical and Environmental Constraints Policy 9 discourages the construction of structures that impede water flows in a primary floodplain. Policy 10 allows for development in flood hazard areas other than primary floodplains in accordance with the KCGP and County Floodplain Management Ordinance, provided that mitigation measures are incorporated to ensure that proposed development would not be hazardous within the requirements of the KCGP Safety Element. Implementation Measure J requires compliance with the Floodplain Management Ordinance prior to grading or improvement of land for development or the construction, expansion, conversion or substantial improvements of a structure.

The Kern County Floodplain Management Ordinance (Chapter 17.48 of the Building and Construction Code) requires compliance with the NFIP regulations and: (a) restricts or prohibits certain uses that are susceptible to flood damage or increase erosion and flood heights or velocities; (b) requires that uses vulnerable to floods be protected against flood damage at the time of initial construction; (d) controls the alteration of natural floodplains, stream channels, and natural protective barriers that accommodate or channel flood waters; (e) controls filling, grading, dredging, and other development which may increase flood damage; and (f) prevents or regulates the construction of flood barriers which will unnaturally divert flood waters or which may increase flood hazards in other areas.

Chapter 4.4 of the KCGP Safety Element Flood states that damage to undeveloped areas may be intensified by structures located within a floodplain and that any further development within recognized floodplains will be required to pass adopted floodplain regulations. The Safety Element also requires that the most intensive flood hazard areas on documented FIRM maps include mapped "Primary Floodplain" areas, which are defined as the area of the floodplain bounded by floodway encroachment lines, including the land necessary to carry the design flood under conditions of full encroachment based on a 100-year flood (areas with a 1% probability of flooding in any given year). Flood hazard zoning under Chapter 19.70 of the Kern County Zoning Ordinance is required for flood hazard locations. Chapter 19.50 of the Kern County Zoning Ordinance establishes a FPP district and a combining FPS district with associated restrictions on land use. The FPP district prohibits construction of storage tanks, sumps, processing equipment, or other similar facilities related to oil and gas production not expressly permitted in Section 19.50.130(C) of the Kern County Zoning Ordinance. Subsection C provides that oil or gas wells, including pumps and all other associated equipment, and feasible remedial work, improvements and flood proofing of facilities are permitted within the FPP district if they will not obstruct flows, will not cause peripheral flooding of other properties, will not cause any increase in flood levels during the occurrence of the base flood discharge, will be resistant to flotation and immune to extensive damage by flooding, and will not endanger life or property.

Implementation of MM 4.9-1 through 4.9-6 would reduce the level of impacts to less than significant. These mitigations would requires that the applicant to comply with all applicable federal, state, regional, and local agency laws and regulations, and commonly utilized industry standards, including the Kern County Floodplain Management Ordinance, and KCGP and Zoning Code provisions related to floodplain risks. In addition, the applicant would have to implement management practices to avoid causing any adverse stormwater discharges and address potential impacts from potential oil and gas development in a 100-year floodplain:

### Mitigation Measures

Implement MM 4.9-1 through MM 4.9-6, as described above.

### Level of Significance After Mitigation

Less than significant with mitigation.

## Impact 4.9-9: Expose People or Structures to a Significant Risk of Loss, Injury, or Death Involving Flooding, Including Flooding as a Result of the Failure of a Levee or Dam

Flood risks related to precipitation, runoff and floodplain management are discussed in Impact 4.9-8. As shown on Figure 4.9-18, about 93,400 acres of existing oil and gas administrative fields within the Project Area are subject to potential inundation in the event the Lake Isabella dam facilities, located in the Sierra Nevadas, 40 miles northeast of Bakersfield, experienced a catastrophic failure under full storage conditions. In the event of a catastrophic failure, released water would flow southeast along the Kern River towards Bakersfield and eventually flood downstream locations, including valley floor portions of the Eastern Subarea south of the river,

most of the Central Subarea, and valley floor portions of the Western Subarea extending north along Interstate 5 (Figure 4.9-18). Project-related oil and gas exploration and production activities, including new wells, infrastructure, and oil, gas, produced water, and chemical treatment and storage facilities, could occur and expose people or structures to a risk of harm within Project Area that is subject to inundation from a catastrophic failure of the Lake Isabella dam.

In December 2012, the USACE issued a Record of Decision (ROD) for the implementation of the Isabella Lake Dam Safety Modification Project. The project is designed to improve the dam structure and reduce failure risks, which the Environmental Impact Statement (EIS) prepared by the USACE characterized as "unacceptable" compared with a minimum failure risk of 1 in 10,000 years. Storage and flow restrictions have been implemented and will continue to be utilized to reduce failure-related inundation risks until the safety improvements are completed as planned in 2022 (USACE 2015).

In 2008, the USACE analyzed the length of time that would elapse before potentially affected locations in the Project Area would be inundated to a depth of one foot. The analysis assumed that a catastrophic failure of the dam facilities would occur under full capacity conditions. The analysis shows that areas located near the eastern portion of the Kern River plain, and near Bakersfield, would reach one foot of inundation within 6 to 8 hours (Figure 4.9-19). One foot of inundation in the other potentially affected portions of the Project Area would occur over a period of from 8 to 36 hours.

KCGP, Chapter 4.4, Dam Failure, Flooding, and Inundation, Policy 3, requires emergency response plans for the Planning Area to include specific procedures for the sequential and orderly evacuation of the potential dam inundation area. Oil and gas facilities subject to potential flooding from a dam failure at full capacity would have at least 6 hours, and in most cases 8 to 36 hours, to evacuate affected areas before inundation would reach one foot in height. Oil and gas personnel would have sufficient time to safely evacuate affected sites after a dam failure occurred under the 2008 analysis performed by the USACE. The flow and risk management measures currently implemented for the dam, and the planned safety improvements, reduce potential inundation and failure risks from the scenarios considered in the 2008 study. Failure and inundation risks from the Lake Isabella dam will be permanently reduced to levels considered to be acceptable by the USACE after the safety improvement project is completed in 2022.

KCGP Chapter 4.4, Dam Failure, Flooding, and Inundation, Implementation Measure A requires that facilities used for the manufacture, storage, and use of hazardous materials must comply with the Uniform Fire Code, with requirements for siting or design to prevent onsite hazards from affecting surrounding communities in the event of inundation. The greatest risks would be to business or residences located in close proximity to production facilities with tank farms or that store large quantities of hazardous materials. Risk would occur if these types of containers were breached during a flood event. Although unlikely, this could result in potentially significant impacts.

### Mitigation Measures

Implement MM 4.9-1 through MM 4.9-6, as described above, and the groundwater mitigation measures described in Section 4.17, Utilities and Service Systems.

### Level of Significance After Mitigation

Less than significant with mitigation.

## Impact 4.9-10: Contribute to Inundation by Seiche, Tsunami, or Mudflow

None of the oil and gas exploration and production activities occurs or would occur in locations where seiche, tsunami, or mudflow inundation would occur. Therefore, there would be no impact.

### Mitigation Measures

No mitigation measures are required.

### Level of Significance

No impact.

# 4.9.5 Cumulative Setting, Impacts, and Mitigation Measures

Kern County has and is expected to continue to grow, with or without the Project, consistent with the growth projections included in the 2013 Kern Council of Government's (COG's) Regional Transportation Plan (RTP)/Sustainable Communities Strategy (SCS) and accompanying EIR. This growth will be required to conform to all applicable federal, state, regional, and local agency laws and regulations that protect water quality, groundwater elevations and aquifer volumes (including the pending GSP development and implementation process), drainage patterns affecting siltation, erosion and flooding, the capacity of existing and planned stormwater drainage facilities, other water quality degradation, housing, people and structures in locations at risk of flood or dam-failure inundation, and other hydrological resources.

## Impact 4.9-11: Contribute to Cumulative Hydrology and Water Quality Impacts

As described above, the ongoing production of oil and gas in Kern County, with the additional mitigation measures and other substantive and procedural requirements included in the proposed revisions to the County's oil and gas ordinances included in the Project, is not expected to result in significant impacts to hydrology and water other than to groundwater elevations and aquifer volumes. On a cumulative basis, these impacts would also be less than significant because the Project would not incrementally contribute to water quality, erosion risks, flooding, and other hydrology impacts. As discussed above, Project Area aquifers are historically overdrafted, and recent monitoring data indicates that groundwater storage and elevations have been reduced to historically low levels in many Project Area locations during the current drought (Appendix T). Project Area aquifers are identified as high priority basins in the state CASGEM program and a sustainable level of groundwater use must be determined and implemented for the region by 2020 under recently enacted state law. Oil and gas M&I water use, and the increased level of M&I

water demand projected for oil and gas activities by 2035, contributes to significant Project Area cumulative impacts to groundwater elevations and aquifer volumes.

Project impacts could result in cumulatively considerable impacts that would be considered significant. Implementation of MM 4.9-1 through MM 4.9-6 would reduce potential cumulative impacts to water quality, erosion risks, flooding and other hydrologic resources to less than significant with mitigation. Although groundwater mitigation measures (as described in Section 4.17, Utilities and Service Systems) encourage the additional reuse of produced water, the extent to which oilfield operators can increase produced water reuse and decrease M&I demand is uncertain. As a result, cumulative impacts to groundwater would be significant and unavoidable.

The County lacks jurisdiction and control over land conversions, and actions or approvals by other agencies that may cause cumulatively significant impacts to hydrology or water quality in the region; accordingly, this impact remains significant and unavoidable.

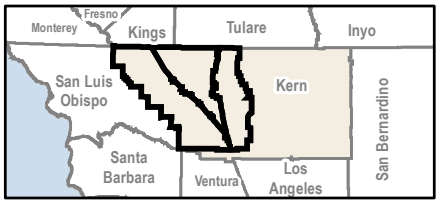
## Mitigation Measures

Implement MM 4.9-1 through MM 4.9-6, as described above, and the groundwater mitigation measures described in Section 4.17, Utilities and Service Systems. The County lacks jurisdiction and control over land conversions, and actions or approvals by other agencies that may cause cumulatively significant impacts to hydrology or water quality in the region; accordingly this impact remains significant and unavoidable.

## Level of Significance After Mitigation

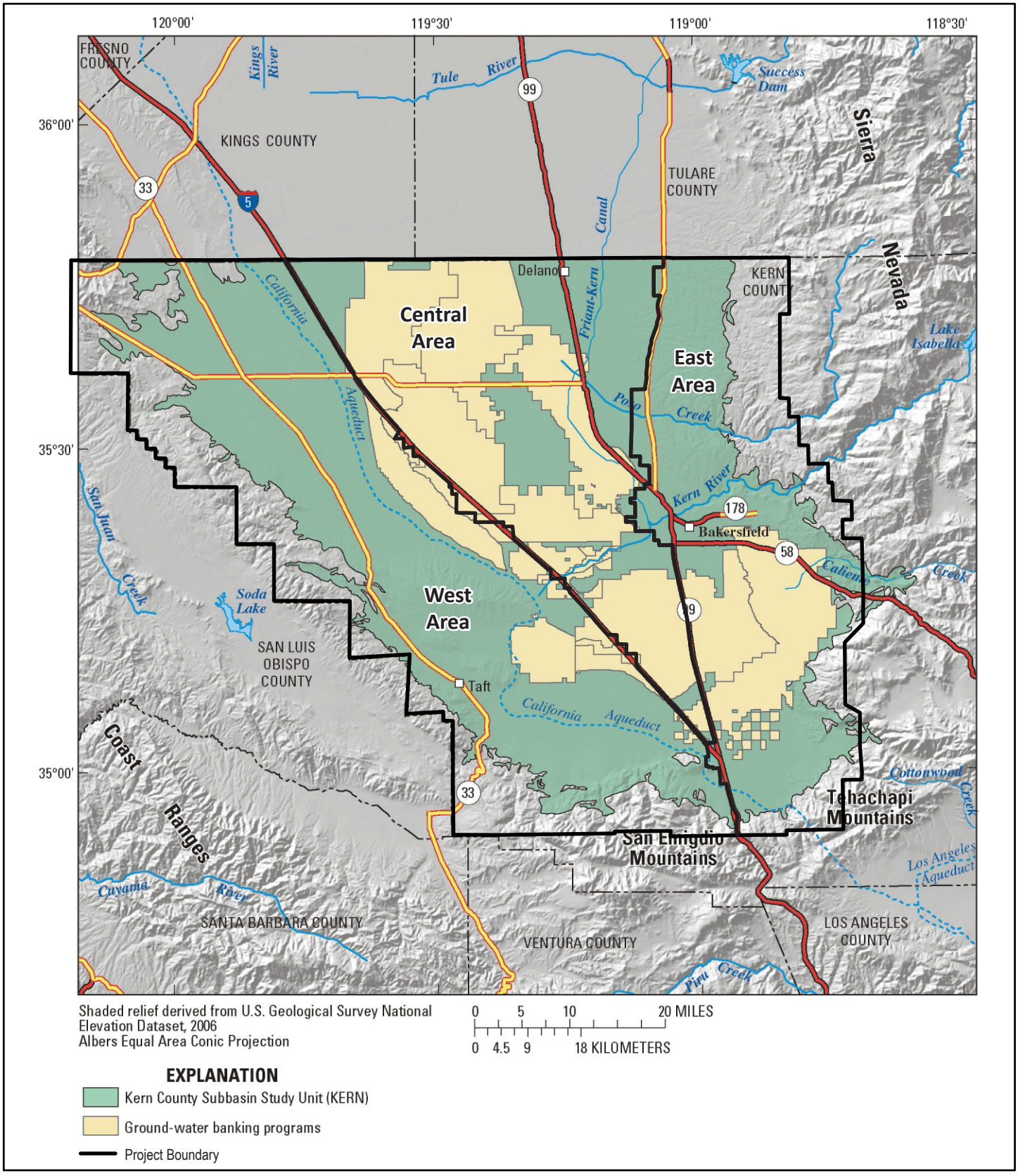
Significant and unavoidable with mitigation.




Base Map Source: Belitz, K., Dubrovsky, N.M., Burow, K., Jergens, B., and T. Johnson, 2003.

Figure 4.9-1
Kern County Subbasin with Respect to the Hydrogeologic Provinces of California Kern County, California



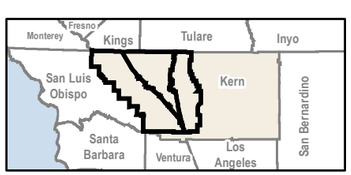

Base Map Source: Shelton, J.L., Pimentel, I., Fram, M.S., and K. Belitz, 2008.

Figure 4.9-2
Major Surface Water Features in Project Area Kern County, California

## Kern County Geologic Map

## Kern County Geologic Map with Administrative Boundaries of Oil and Gas Fields

*Source: Jennings, C.W. and Gutierrez, C.I. 2010. Geologic Map of California. California Geological Survey, Sacramento, CA. Geologic Data Map 2 2010.; Ludington, S., Moring, B.C., Miller, R.J., Stone, P.A., Bookstrom, A.A., Bedford, D.R., Evans, J.G., Haxel, G.A., Nutt, C.J., Flyn, K.S., and Hopkins, M.J. 2007. Preliminary Integrated Geologic Map Databases for the United States, Western States: California, Nevada, Arizona, Washington, Oregon, Idaho, and Utah, Version 1.3. U.S. Geological Survey, Reston, VA. USGS Open-File Report 2005-1305.; DOGGR. 2005. Data Set: Oil and Gas Fields. California Department of Conservation, Division of Oil, Gas, and Geothermal Resources, Sacramento, CA. [ftp://ftp.consrv.ca.gov/pub/oil/Data_Catalog/Oil_and_Gas/Oil_fields/, retrieved 1 May 2014]; ESRI 2010 Street Map.*




0 5 10
Scale: Miles

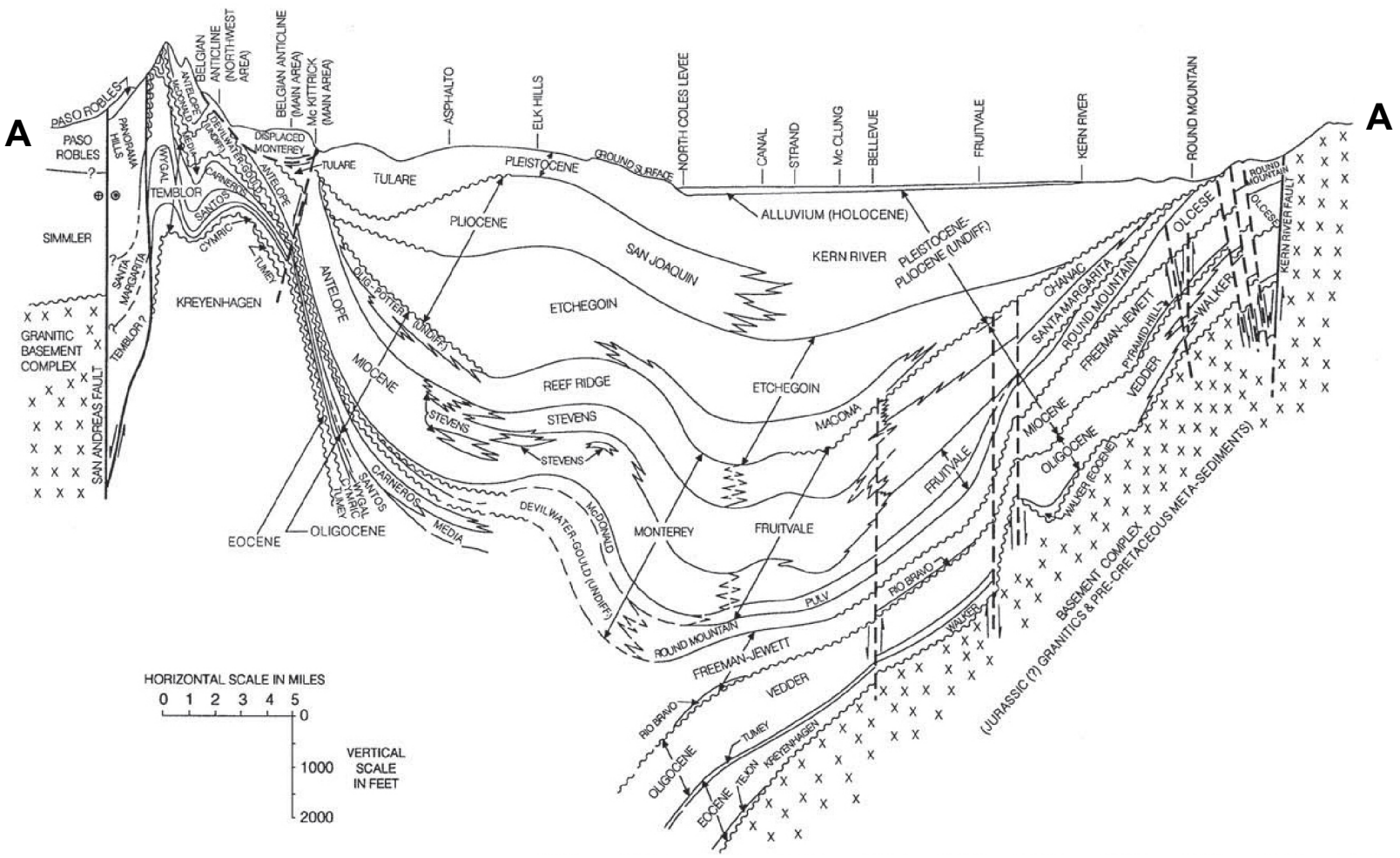
**Legend**

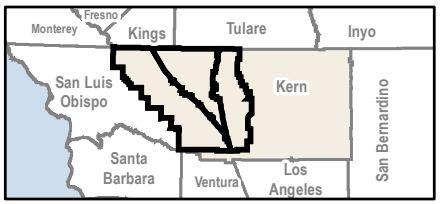
- Anticline
- Syncline
- Fault
- Project Boundary
- County Boundary
- Town
- Interstate Highway
- State Highway
- Oil Field Administrative Boundary

**Geology**

- Qp Alluvium
- Qls Landslide deposits
- QPc Plio-Pleistocene non-marine
- P Pliocene marine
- M Miocene marine
- Mc Miocene non-marine
- O Oligocene marine
- Oc Oligocene non-marine
- E Eocene marine
- Ep Paleocene marine
- Tc Tertiary non-marine (undivided)
- Metamorphic and igneous rocks

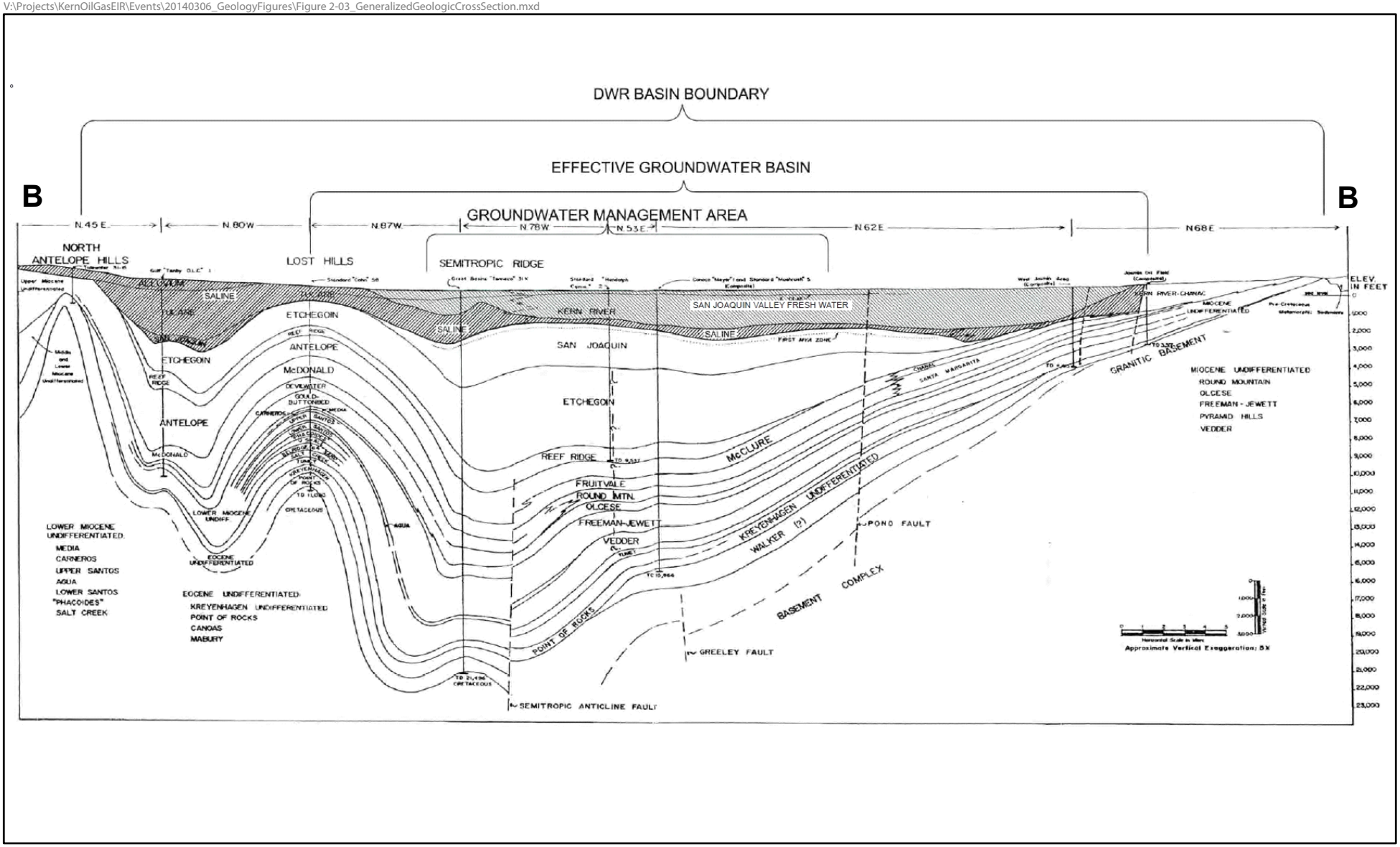
Figure 4.9-3
Geologic Map with Kern County Oil and Gas Fields

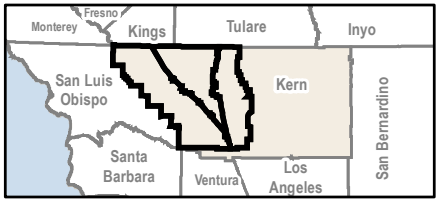



Source: DOGGR. 1998. California Oil & Gas Fields, volume 1 - Central California, contour maps, cross sections, and data sheets for California's oil and gas fields. California Department of Conservation, Division of Oil, Gas, and Geothermal Resources, Sacramento, CA.

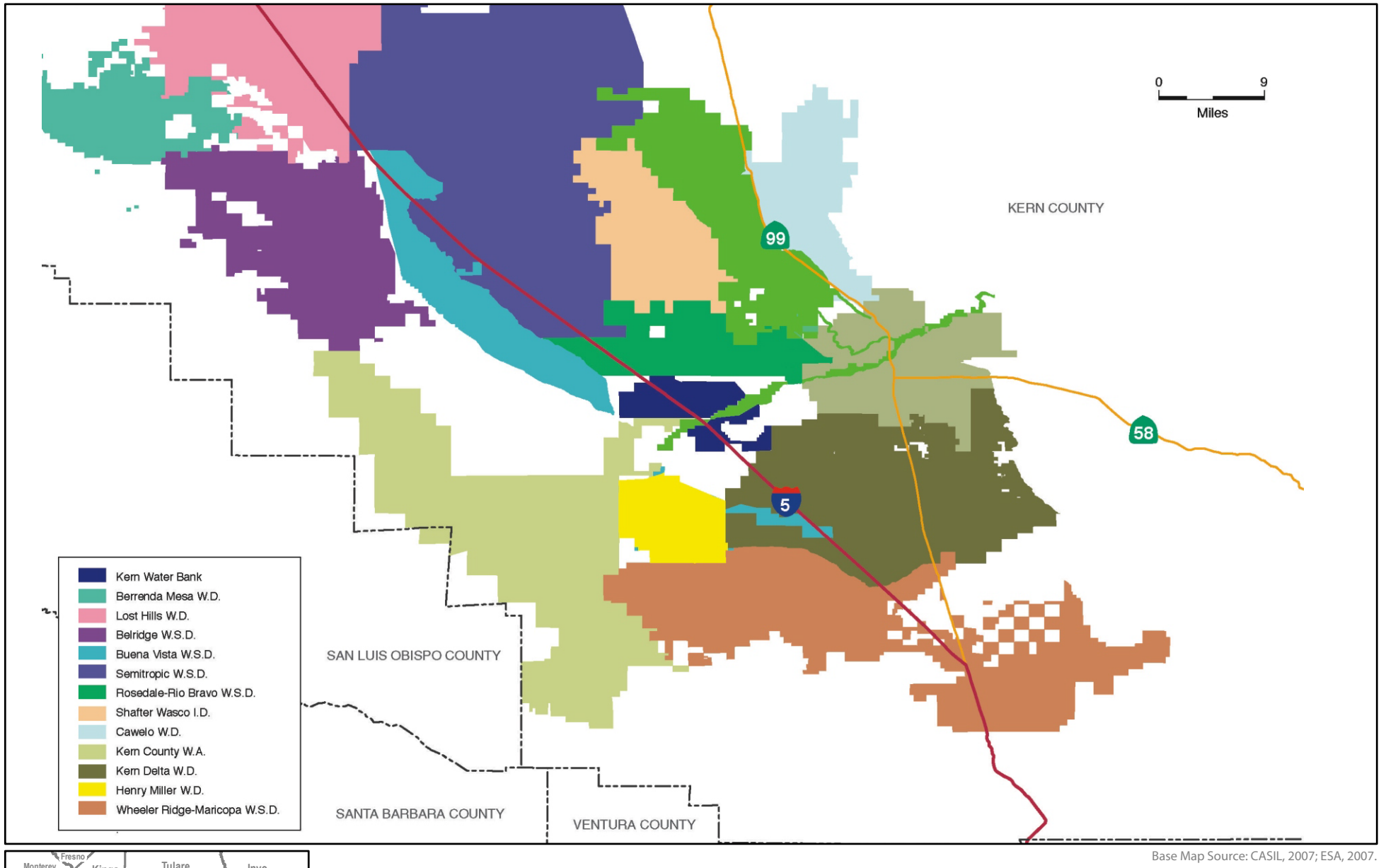
Figure 4.9-4
Generalized Geologic Cross Section across Southern San Joaquin Valley



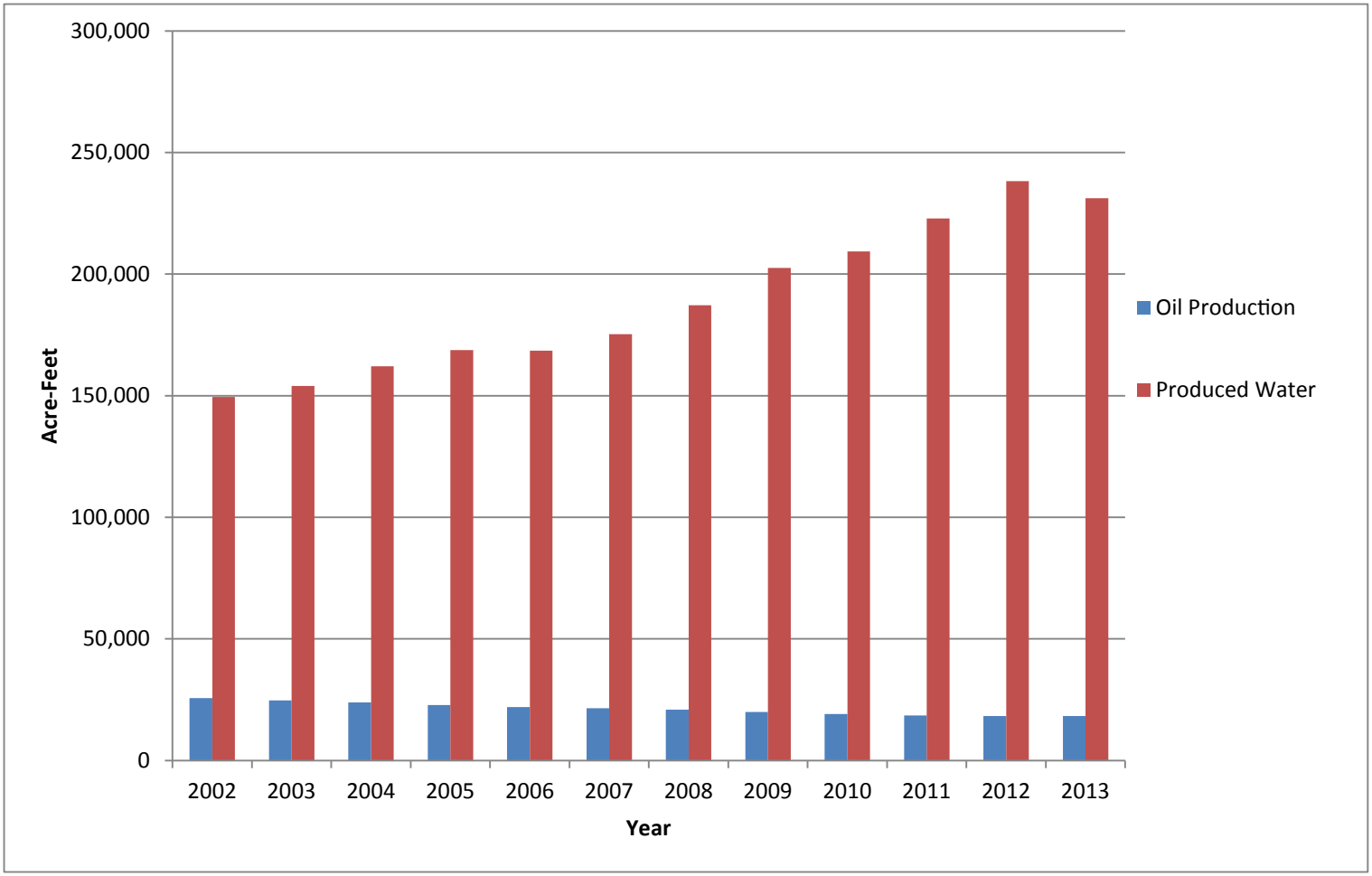

Source: SWSD. 2012. 2012 Groundwater Management Plan, Kern County, California. Semitropic Water Storage District., adapted from an original figure in Karp (1968).

Figure 4.9-5
Generalized Geologic Cross Section Showing Relation of Groundwater Aquifer




Base Map Source: CASIL, 2007; ESA, 2007.

Figure 4.9-6
Location of Kern County, California Water Banking Programs Kern County, California



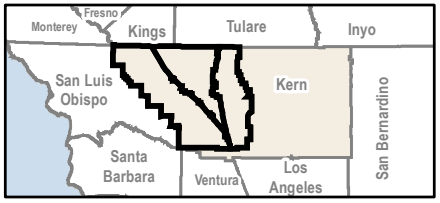
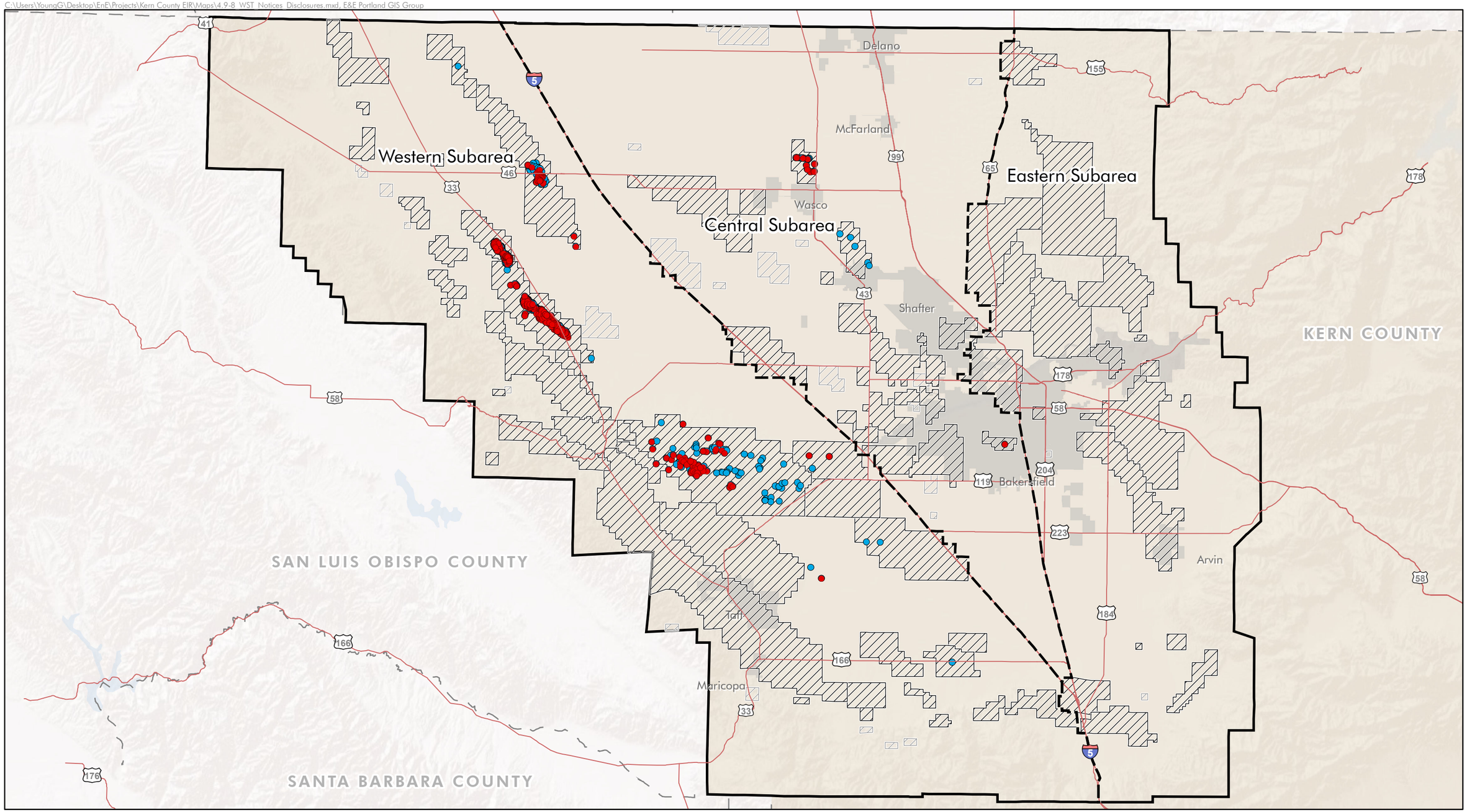
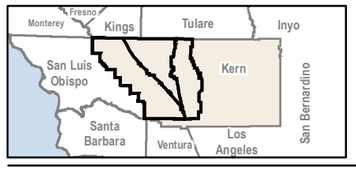




Figure 4.9-7
Project Area Oil and Produced Water Production
2002-2013 (acre-feet)

C:\Users\YoungG\Desktop\EnE\Projects\Kern County EIR\Maps\4.9-8_WST_Notices_Disclosures.mxd, E&E Portland GIS Group



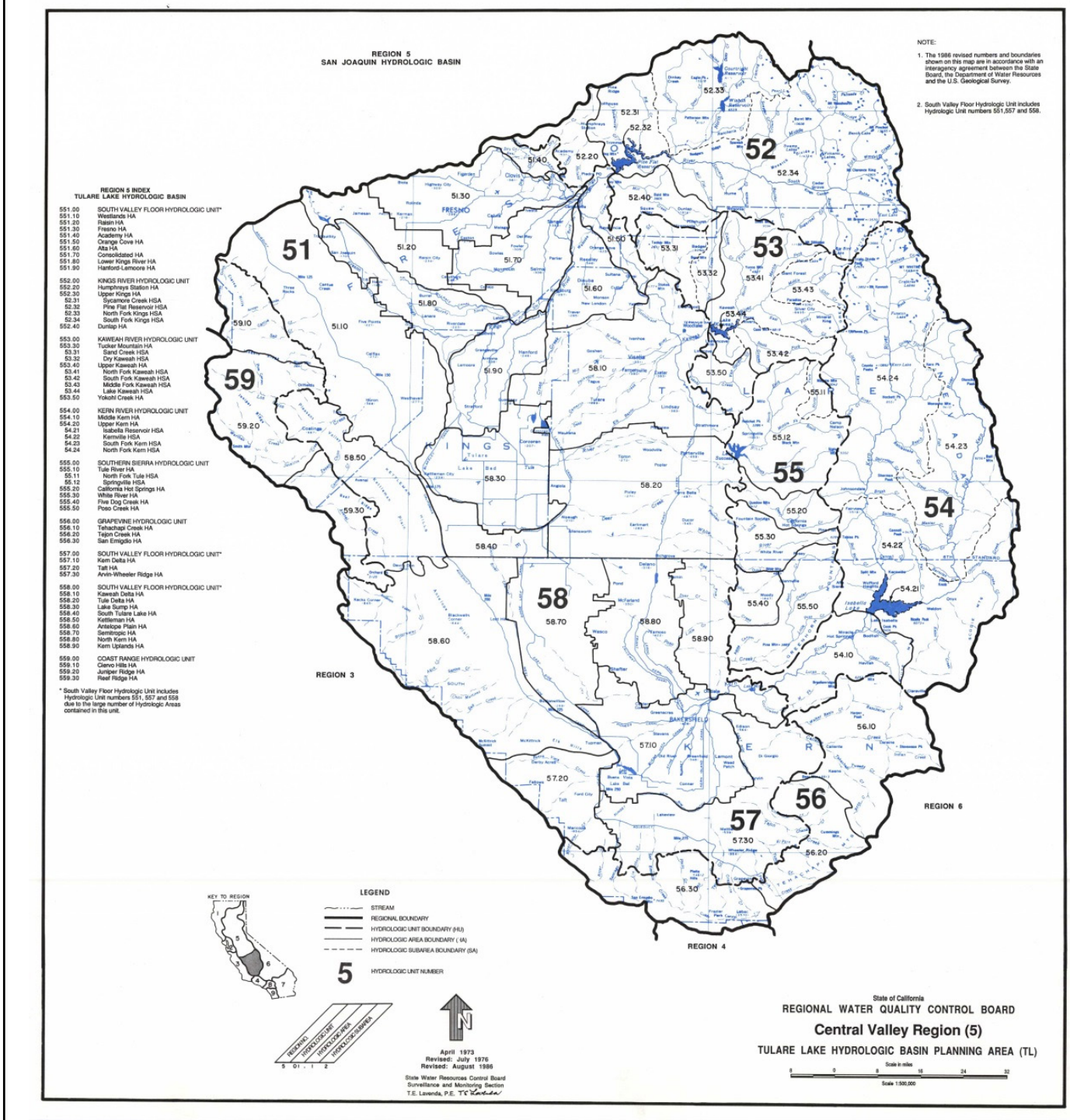



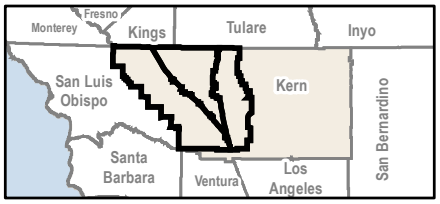

0 10
Miles

Project Area
Subarea
DOGGR Administrative Well Field Boundaries
DOGGR Administrative Well Field Boundaries (Abd)
Kern County
City Limits
Highways
County Boundary
WST Notices
WST Disclosures

Data Sources: Kern County, 2013, ESRI 2010; DOGGR, 2013;

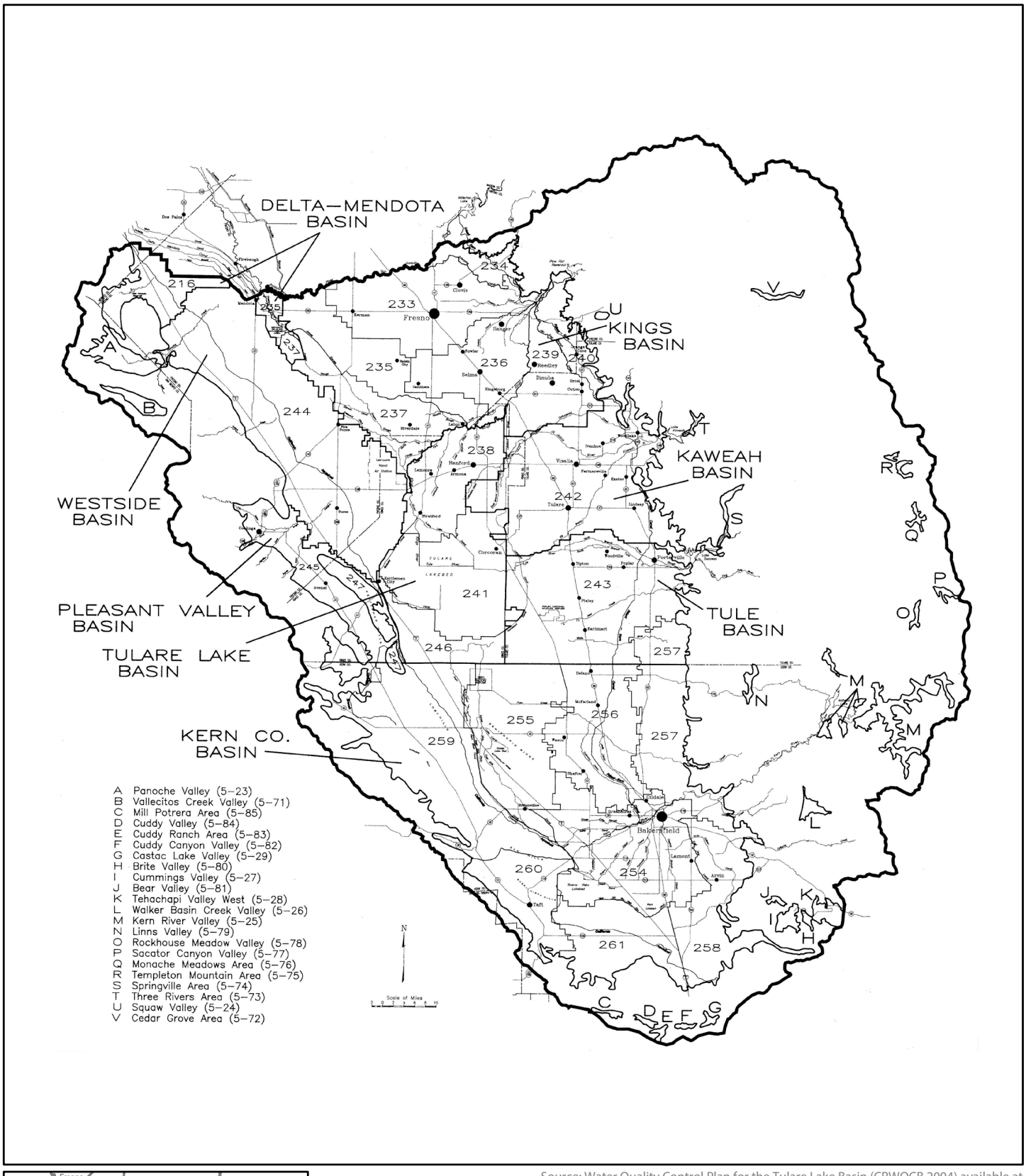
Figure 4.9-8
Well Stimulation Notices and Disclosures in the Project Area, December 2013 - March 2015

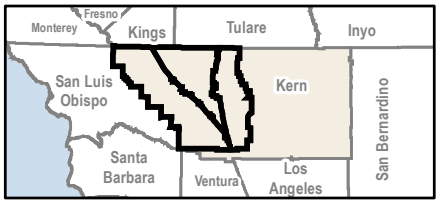



Source: Water Quality Control Plan for the Tulare Lake Basin (CRWQCB 2004) available at http://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/tlb_figll_1.pdf

Figure 4.9-9
Hydrologic Basins and Surface Waterbodies,
San Joaquin Hydrologic Basin

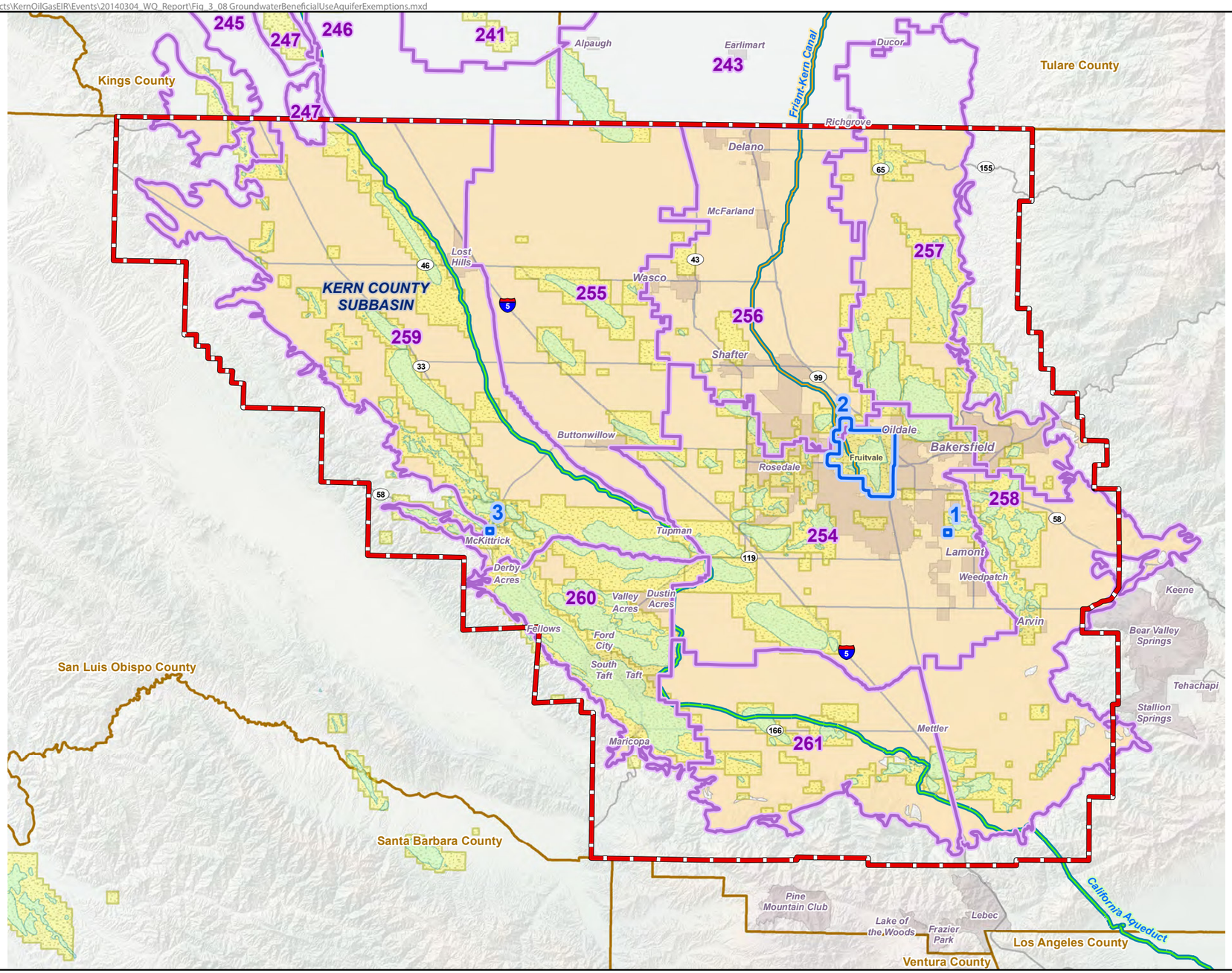



Source: Water Quality Control Plan for the Tulare Lake Basin (CRWQCB 2004) available at http://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/tlb_figll_2.pdf

Figure 4.9-10
Detailed Analysis Units, San Joaquin Hydrologic Basin

C:_Data\Projects\KernOilGasEIR\Events\20140304_WQ_Report\Fig_3_08 GroundwaterBeneficialUseAquiferExemptions.mxd

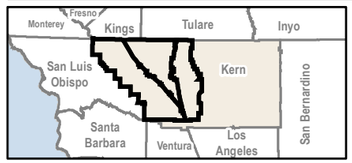



Notes:
Groundwater Beneficial Use Exemptions as defined in the Water Quality Control Plan (Basin Plan) for the Tulare Lake Basin (CA RWQCB. 2004. Water Quality Control Plan for the Tulare Lake Basin, Second Edition. California Regional Water Quality Control Board, Central Valley Region (Region 5). [Available at: http://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/index.shtml, retrieved 18 February 2014]), Table II-2:

1) Groundwater contained in the lower Transition Zone and Santa Margarita formation within 3,000 feet of the Kern Oil and Refining Company proposed injection wells in Section 25, T30S, R28E, MDB&M, is not suitable, or potentially suitable, for municipal or domestic supply (MUN).

2) Ground water contained in the basal Etchegoin formation, Chanac formation, and Santa Margarita formation within, and extending to one-quarter mile outside the administrative boundary of the Fruitvale Oil Field, as defined by the State of California, Department of Conservation, Division of Oil and Gas in Application for Primacy in the Regulation of Class II Injection Wells Under Section 1425 of the Safe Drinking Water Act, dated April 1981, is not suitable, or potentially suitable, for municipal or domestic supply (MUN). However, the upper ground water zone (ground water to a depth of 3,000 feet) retains the MUN beneficial use.

3) Ground water and spring water within 1/2 mile radius of the McKittrick Waste Treatment (formerly Liquid Waste Management) site in Section 29, T30S, R22E, MDB&M, have no beneficial uses.

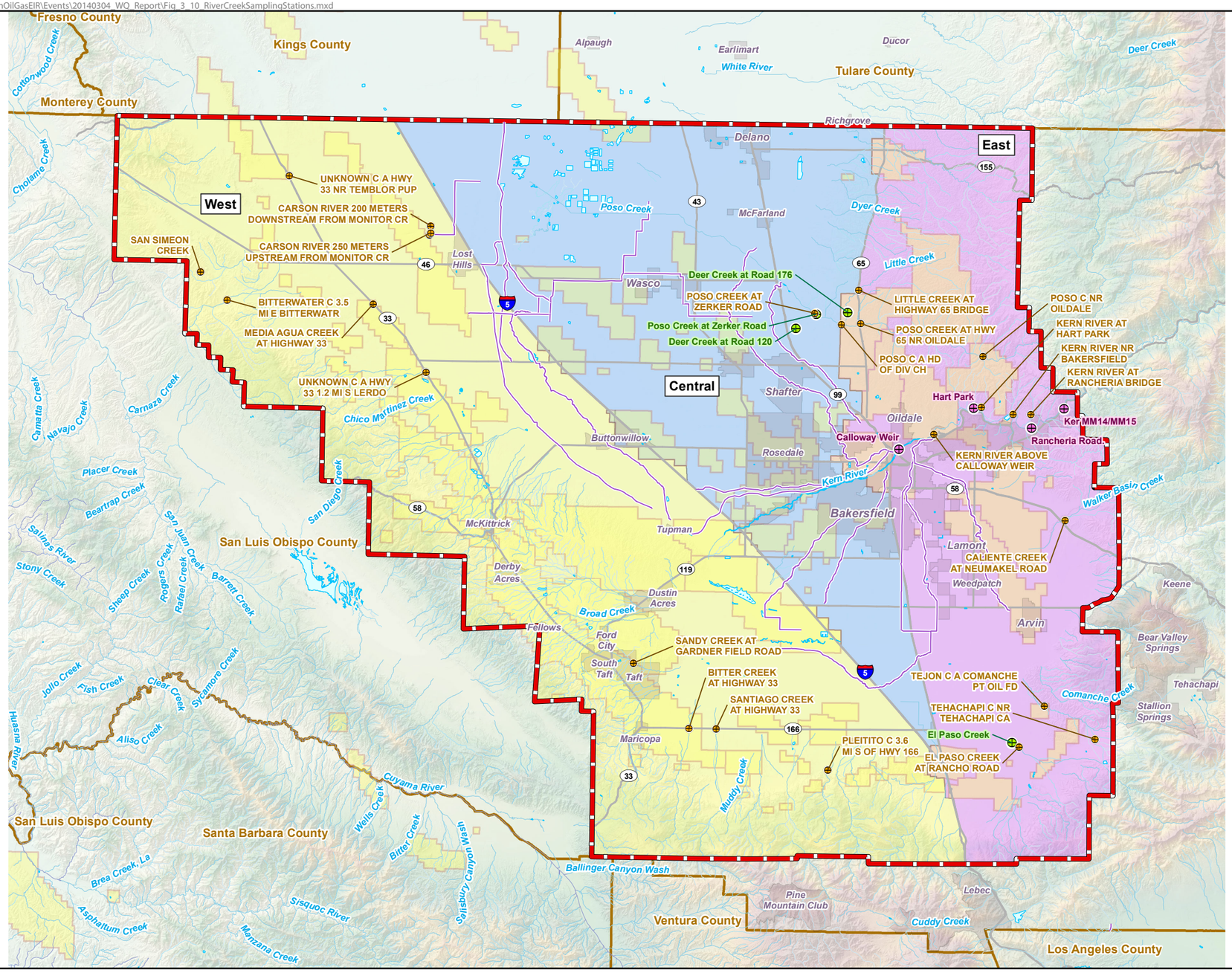



0 4 8
Miles

- Exempted Aquifers
- Groundwater Beneficial Use Exemptions (see notes)
- California Aqueduct
- Friant Kern Canal
- 254 Groundwater Detailed Analysis Unit
- Kern County Sub-basin
- Oil And Gas Field Boundaries
- Project Boundary
- County Boundaries

Figure 4.9-11
Approved Groundwater Beneficial Use Aquifer Exemptions

V:\Projects\KernOilGasEIR\Events\20140304_WQ_Report\Fig_3_10_RiverCreekSamplingStations.mxd




**Water Quality Sampling Stations**

- EPA Legacy Stations
- Irrigated Lands Regulatory Program
- SWAMP Stations
- Local Canals
- Rivers
- Water Bodies
- Oil And Gas Field Boundaries

**Water Quality Sub-Areas**

- West
- Central
- East
- Project Boundary
- County Boundaries

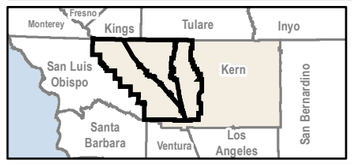
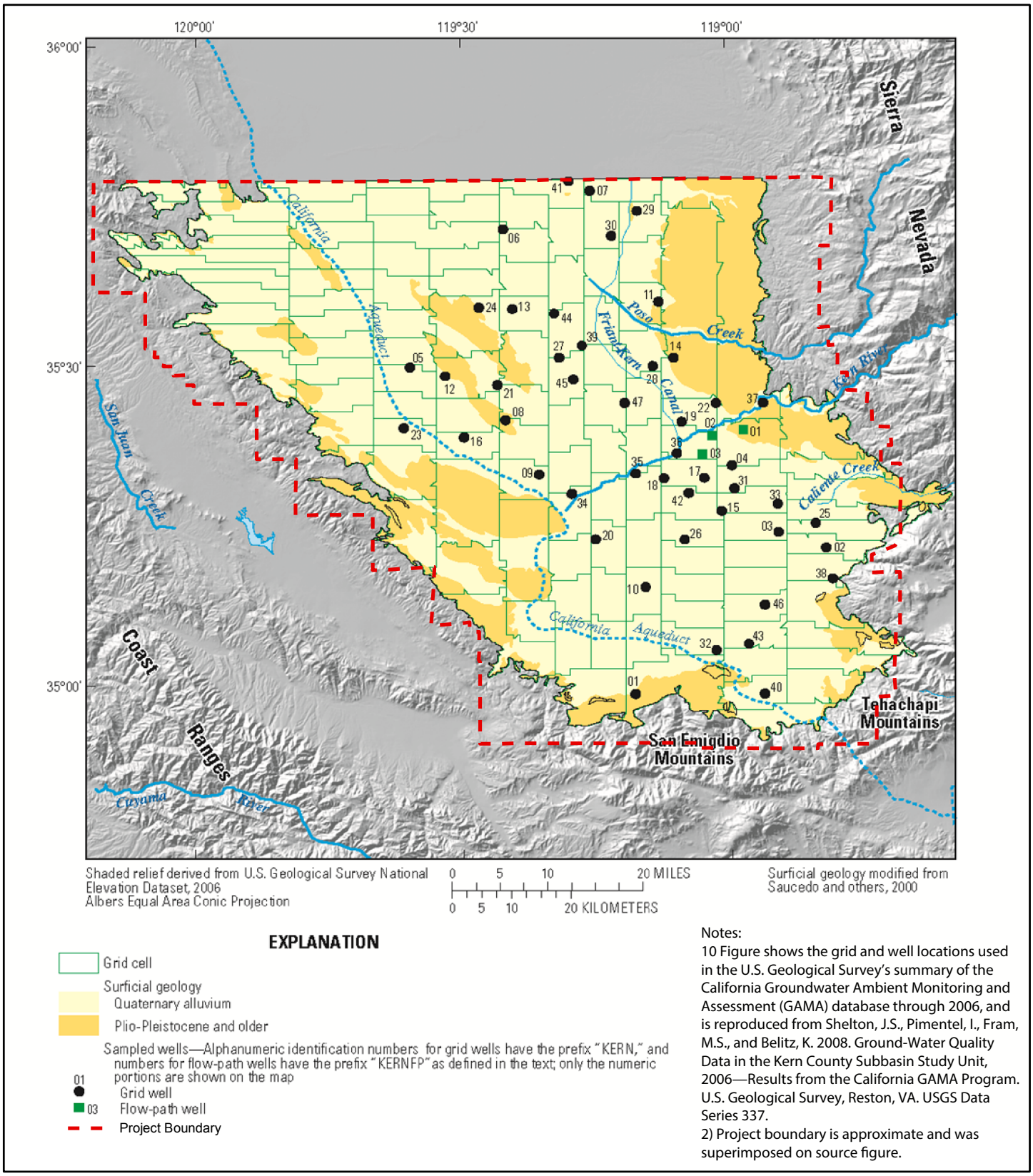



Figure 4.9-12
River, Creek and Stream Sampling Locations Used to Analyze Project and Subarea Surface Water Quality




Notes:
10 Figure shows the grid and well locations used in the U.S. Geological Survey's summary of the California Groundwater Ambient Monitoring and Assessment (GAMA) database through 2006, and is reproduced from Shelton, J.S., Pimentel, I., Fram, M.S., and Belitz, K. 2008. Ground-Water Quality Data in the Kern County Subbasin Study Unit, 2006—Results from the California GAMA Program. U.S. Geological Survey, Reston, VA. USGS Data Series 337.
2) Project boundary is approximate and was superimposed on source figure.

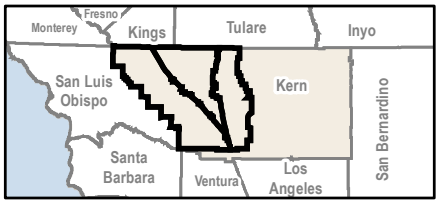
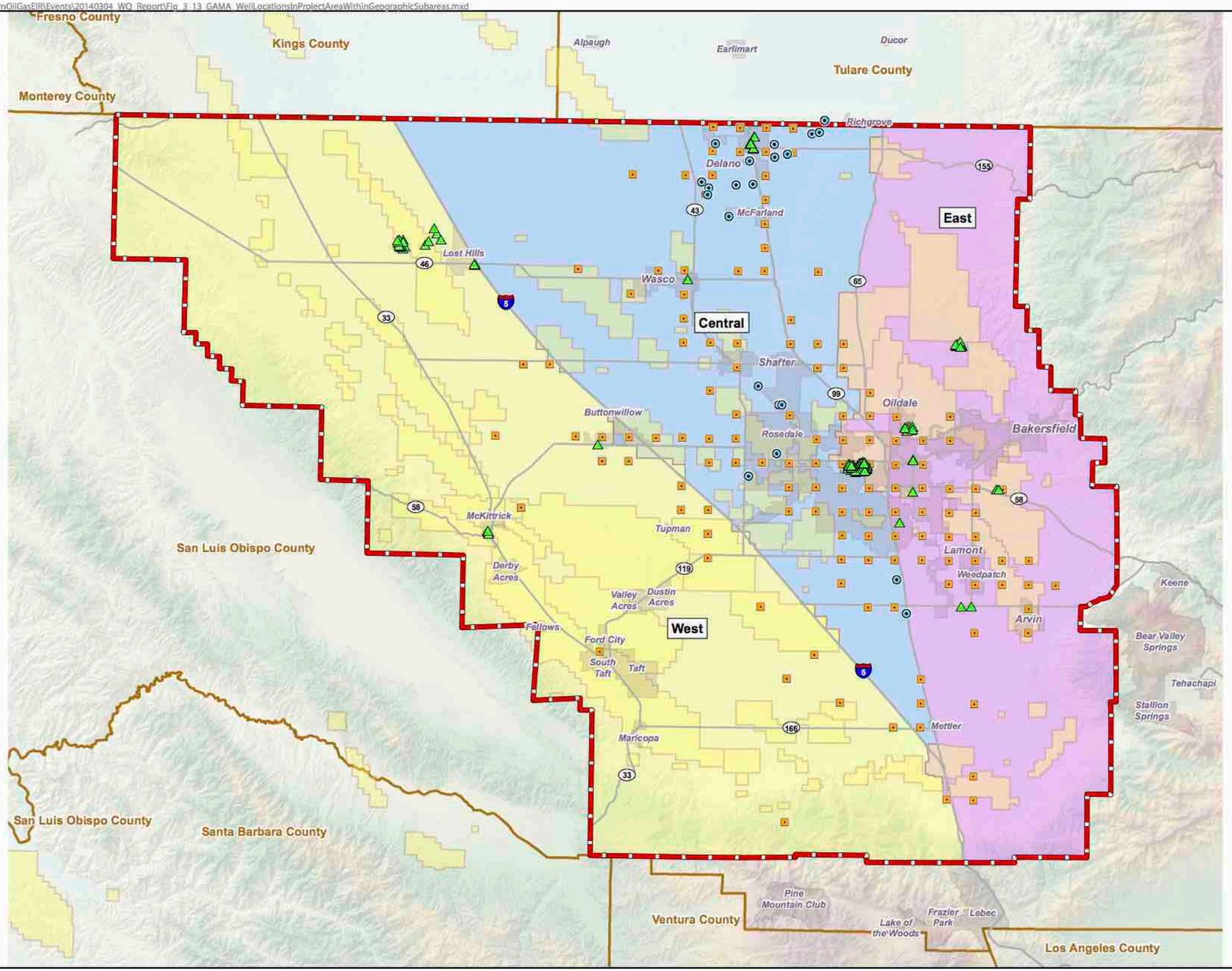



Figure 4.9-13
USGS Grid Well Locations Map

C:_Data\Projects\KernOilGasEIR\Events\20140304_WQ_Report\Fig_3_13_GAMA_WellLocationsInProjectAreaWithinGeographicSubareas.mxd




## Legend

**GAMA Wells**

- California Dept. of Pesticide Reg.
- California Dept. of Public Health
- Other GAMA-Reported Wells (e.g., Monitoring wells)
- Oil And Gas Field Boundaries

**Water Quality Sub-Areas**

- West
- Central
- East
- Project Boundary
- County Boundaries

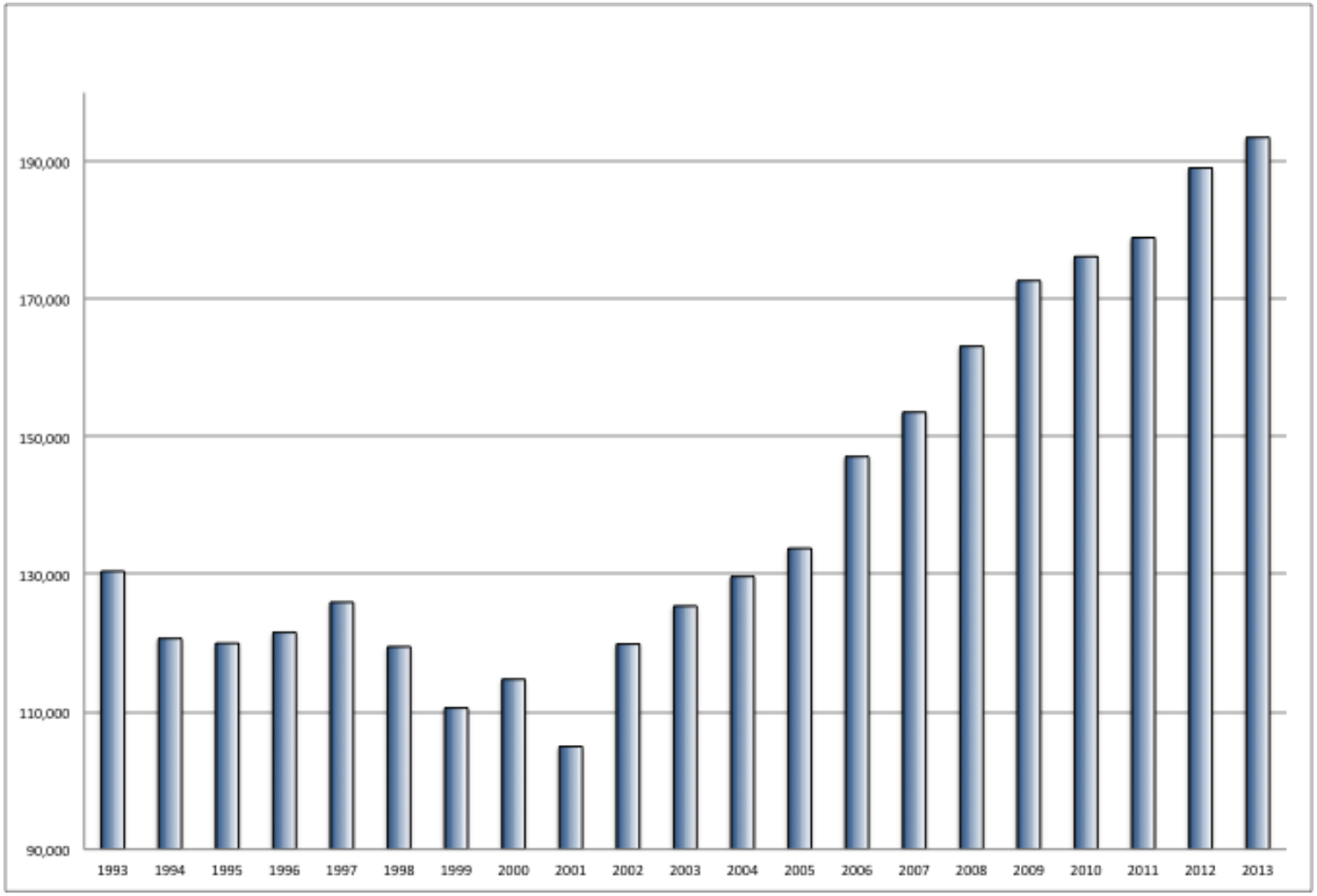


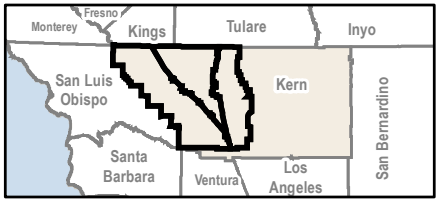

0 4 8
Miles

**Note:**

Approximate locations of various sets of groundwater wells (e.g., public water supply wells, environmental monitoring wells) included in the California Groundwater Ambient and Monitoring Assessment (GAMA) database, used to summarize groundwater quality in the study area between 2007 and 2013.

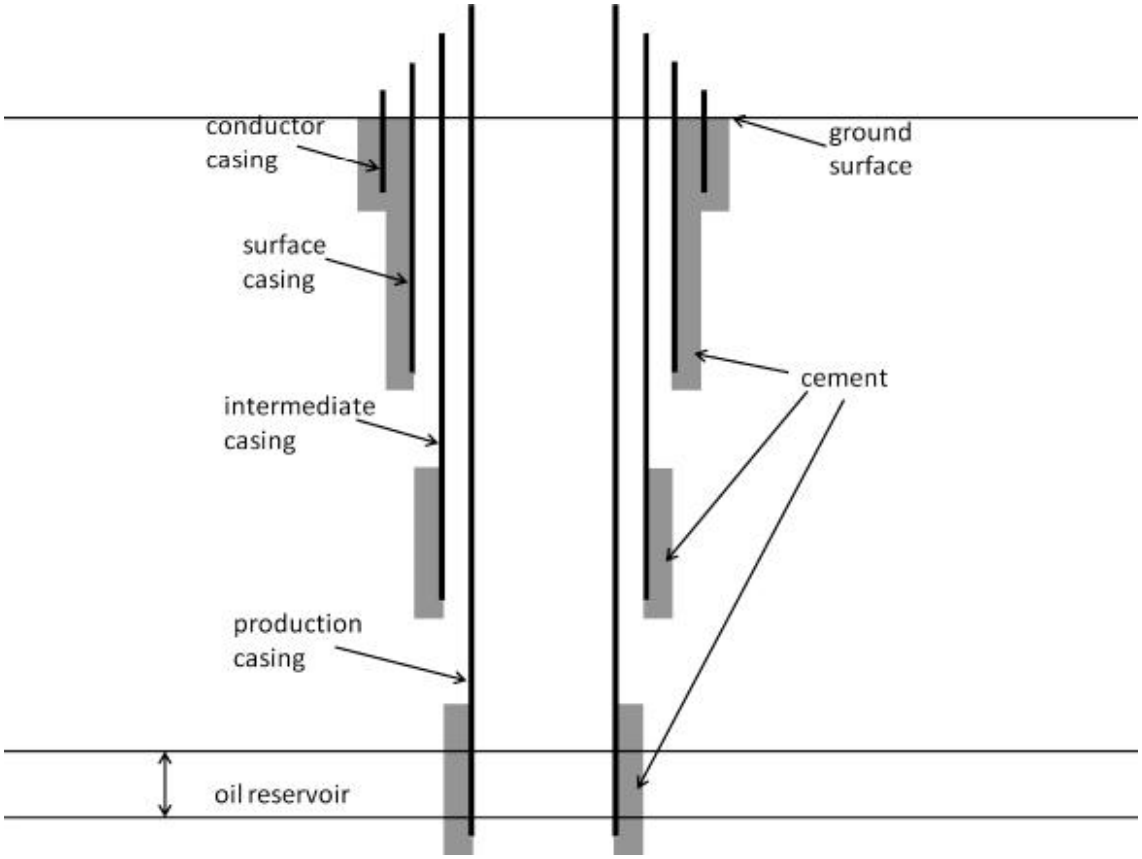
Figure 4.9-14
GAMA Well Locations in Project Area




Source: DOGGR Spreadsheet (10 Fluid) Results - Best Numbers - Annual and Monthly reports.xlsx
(Note: data is for all District 4 fields and includes a small amount of production activity outside of the Project Area)

Figure 4.9-15
Total Project Area Injection Volume, Acre-Feet 1993-2013



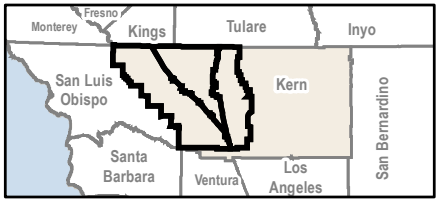
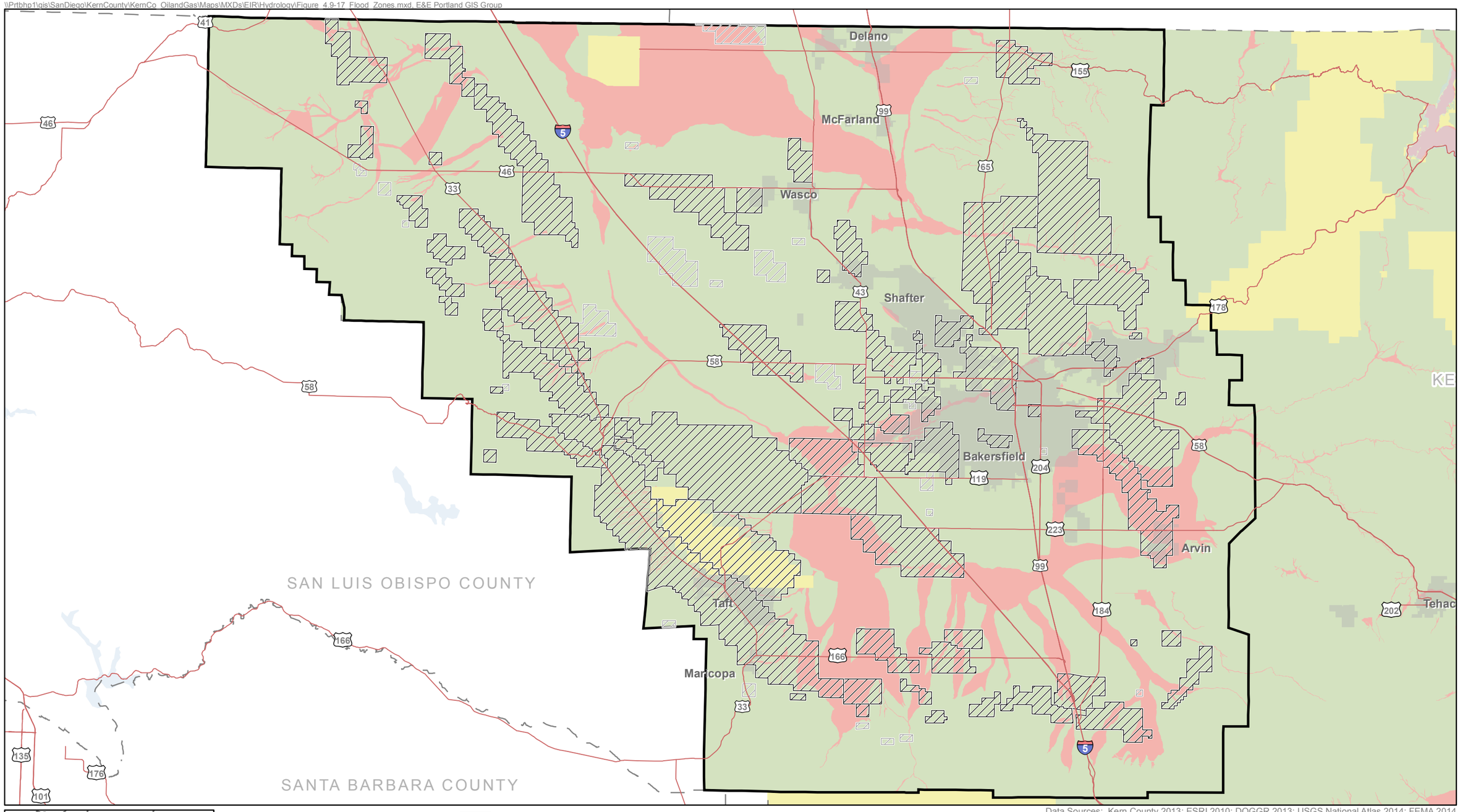



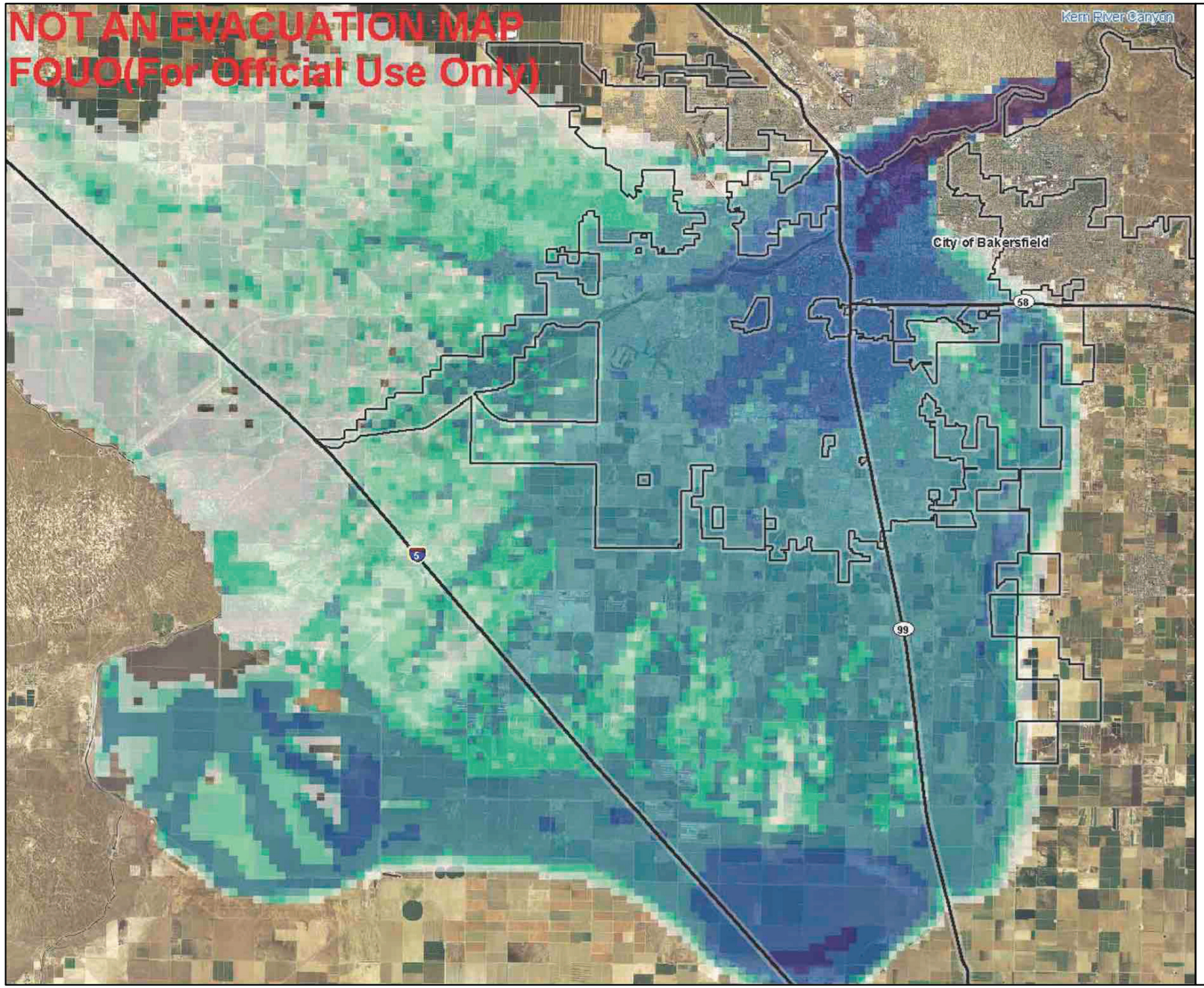

Figure 4.9-16
Schematic cross section of well casing and cement configuration. Casing extends above ground surface for connection to wellhead. (Redrawn and modified from API, 2009)




Data Sources: Kern County 2013; ESRI 2010; DOGGR 2013; USGS National Atlas 2014; FEMA 2014
Service Layer Credits:

**Figure 4.9-17**
**Flood Zones in the Project Area**

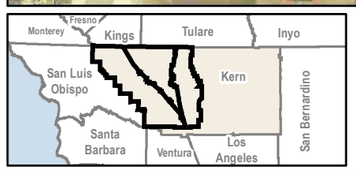
NOT AN EVACUATION MAP
FOUO(For Official Use Only)




Bakersfield City Limits
Roads

Depth (feet)
0 - 1 (white)
1 - 2
2 - 3
3 - 4
4 - 5
5 - 10
10 - 20
20 - 30
30 +

Data Sources:
USDA-FSA NAIP Color Orthoimagery, 2005.
City Limits courtesy of the City of Bakersfield, 2007.
ESRI StreetMap USA Roads, 2005.

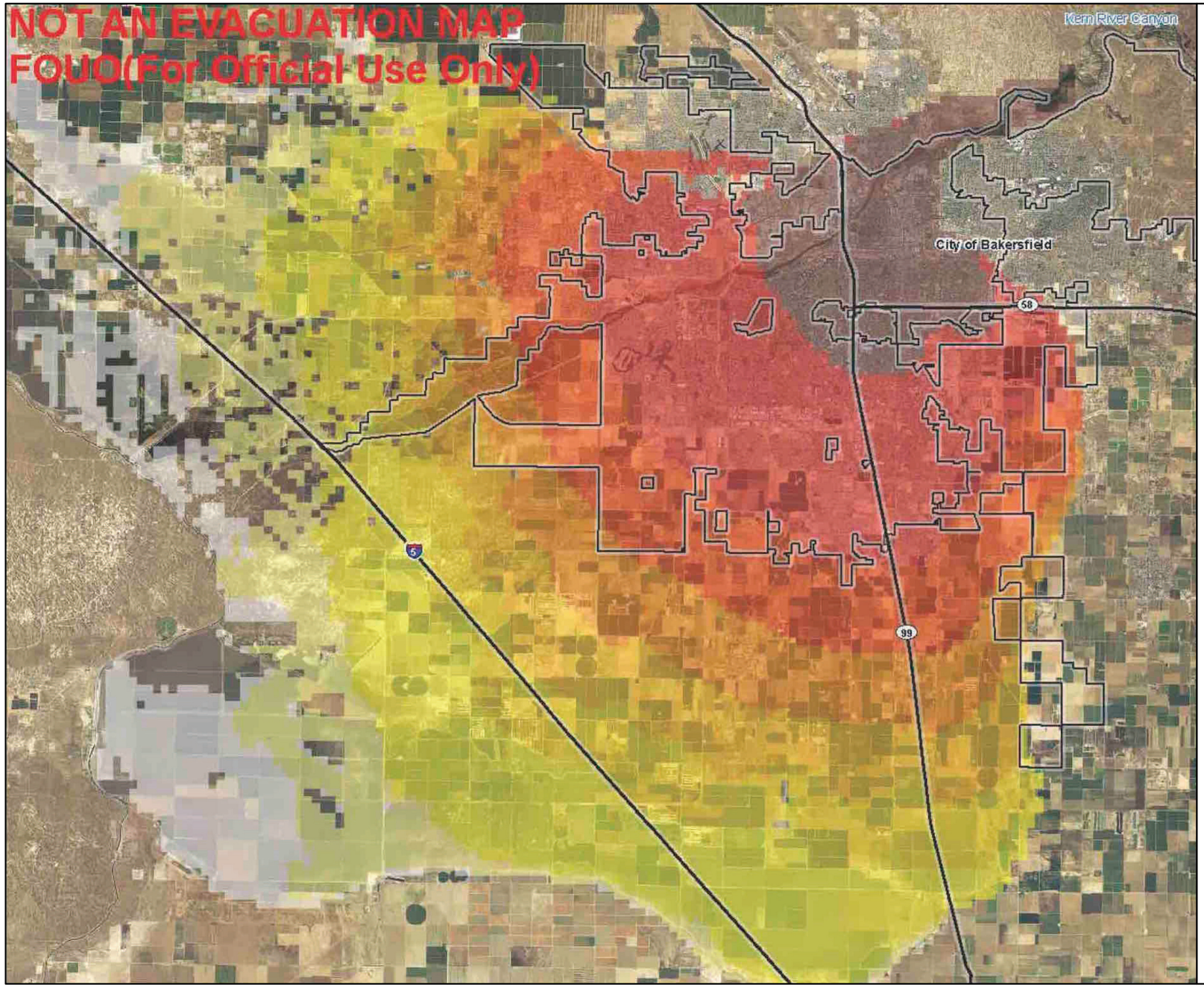



0 24,000
Feet

Source: Northwest Hydraulic Consultants, January 2008.

Figure 4.9-18
Potential Peak Elevation Inundation Depths

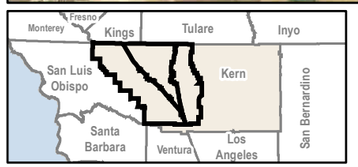
NOT AN EVACUATION MAP
FOUO(For Official Use Only)




Bakersfield City Limits
Roads

Time (in hours)
- 0 - 6
- 6 - 8
- 8 - 10
- 10 - 12
- 12 - 14
- 14 - 16
- 16 - 18
- 18- 24
- 24 - 36
- 36 +

Data Sources:
USDA-FSA NAIP Color Orthoimagery, 2005.
City Limits courtesy of the City of Bakersfield, 2007.
ESRI StreetMap USA Roads, 2005.




0 24,000
Feet

Source: Northwest Hydraulic Consultants, January 2008.

Figure 4.9-19
Hours to One-Foot Inundation From Failure of Lake Isabella Dam to Full Capacity

Section 4.10

# Land Use and Planning

Section 4.10

# Land Use and Planning

## 4.10.1 Introduction

This section describes the affected environment and regulatory setting for land use and planning. It also describes the impacts on land use and planning that would result from implementation of the Amendment to Chapter 19.98 (Oil and Gas Production) and related ordinance amendments to the Kern County Zoning Ordinance (Project), and mitigation measures that would reduce these impacts, if necessary.

## 4.10.2 Environmental Setting

## Kern County

Kern County is California's third largest county, encompassing 8,202 square miles at the southern end of the Central Valley. The 3,700-square-mile Project Area is predominantly located in the western portion of the County in the San Joaquin Valley, and is bounded by Kings and Tulare counties to the north, Santa Barbara and San Luis Obispo counties to the west, the Tehachapi Mountains and the Sierra Nevadas to east, and the northern boundary of the Los Padres National Forest to the south.

Lands analyzed under the Future Oil and Gas Development Scenario (see Chapter 3, Project Description) include all unincorporated County lands within the Project Area, including unincorporated County lands within the 409-square-mile Metropolitan Bakersfield Planning Area and covered under the Metropolitan Bakersfield General Plan (MBGP) (see Figure 3-2, Chapter 3, Project Description). Lands within the Metropolitan Bakersfield Planning Area that are under the jurisdiction of the City of Bakersfield are excluded from the Project Area. Lands under the jurisdiction of various state and federal agencies, including the Bureau of Land Management (BLM), the U.S. Fish and Wildlife Service (USFWS), and the California State Lands Commission (CSLC) are also excluded.

Kern County contains 11 incorporated cities, eight of which are adjacent to unincorporated County land within the Project Area, including Delano, Arvin, Shafter, McFarland, Wasco, Maricopa, Taft, and Bakersfield. The proposed Zoning Ordinance amendment would only be applicable to unincorporated County land. Therefore, land within the jurisdiction of incorporated cities is excluded from the Project Area. In addition to incorporated cities and towns, Kern County contains thousands of acres under the jurisdiction of various state and federal agencies. BLM manages more than 130 square miles (over 83,000 acres), USFWS manages 40 square miles (over 25,000 acres), and state agencies manage nearly 40 square miles (over 25,500 thousand acres). Federal and state lands are also excluded from the analysis.

# Project Subareas

In order to facilitate detailed analysis, the Project Area is divided into three Subareas (Western, Central, and Eastern), as depicted in Figure 3-2 (see Chapter 3, Project Description). In general, the Project Subareas are divided along the major transportation corridors; however, the boundary varies where the California Department of Conservation Division of Oil, Gas, and Geothermal Resources (DOGGR) Administrative Boundaries are located on both sides of a freeway or highway. Land uses within each Subarea are described below. While this discussion includes a description of cities and land uses in the area to provide context and give an overview of adjacent land uses throughout the Project Area, the Project would not apply to lands located outside of Kern County's jurisdiction (i.e., incorporated cities or state or federal land). Description of the adopted and proposed habitat conservation plans in the Project Area are provided in Section 4.10.3, Regulatory Setting.

## Western Subarea

The Western Subarea consists of 1,714 square miles (1,096,842 acres) and is generally bounded by the Kern County border on the north and west, Los Padres National Forest on the south, and by Interstate 5 on the east. The Western Subarea contains most of the large-scale, extraction-level operations in the County (Tier 1), including 47 administrative wellfields (39 active wellfields and eight abandoned wellfields). The Western Subarea also contains dispersed agricultural operations. The cities of Taft and Maricopa are located in the Western Subarea, along with the unincorporated communities of Buttonwillow, Lost Hills, South Taft, Ford City, Taft Heights, and McKittrick. Some of the largest producing oilfields in Kern County are located in the Western Subarea, including the Elk Hills, Midway Sunset, and Belridge Oil Fields. Land uses in the Western Subarea are predominantly based on oil extraction and production, but also include clay mineral extraction. Land uses also include agricultural operations interspersed with resource extraction activities (Tier 2) in both the northeastern and southeastern portions of this area. In addition, the Western Subarea contains several correctional facilities and the Tule Elks State National Reserve, along with a small portion of the Carrizo Plain National Monument (13,540 acres, or 5%).

## Central Subarea

The Central Subarea consists of 1,025 square miles (656,003 acres) and is generally bounded by the Kern County border on the North, by Interstate 5 on the west, and State Routes 65 and 223 on the east. The Central Subarea contains 30 administrative oil and gas fields (21 active and nine abandoned), fewer than both the Western and Eastern Subareas. It should be noted, however, that several large-scale extraction operations are located in the Central Subarea within Tier 1 areas. The Central Subarea contains mostly agricultural operations interspersed with resource extraction activities (Tier 2). In addition, the Central Subarea contains parts of the unincorporated Metropolitan Bakersfield area, unincorporated Rosedale, Old River, Pumpkin Center, and Greenfield, and unincorporated areas around the cities of Shafter, Delano, Wasco, and McFarland. The Kern National Wildlife Refuge is also located in the Central Subarea, although it is under the jurisdiction of the USFWS. The Central Subarea also includes several correctional

facilities, industrial development, and commercial developments, and includes dispersed parcels under the jurisdiction of the State of California.

### Eastern Subarea

The Eastern Subarea consists of 950 square miles (609,889 acres) and is generally bounded by the County border on the north, State Routes 65 and 223 on the west, and mountain ranges on the east and south. The Eastern Subarea contains 23 administrative oil and gas wellfields (20 active and three abandoned), including several large-scale oil and gas production areas, such as the Kern River Oil Field north of the city of Bakersfield (Tier 1) in the unincorporated Oildale area. The Eastern Subarea includes parts of the unincorporated Metropolitan Bakersfield Planning Area, and includes unincorporated areas around the city of Arvin and the unincorporated community of Lamont. The areas around Arvin and other unincorporated areas contain extraction operations interspersed with agricultural land (Tier 2).

## Tiers

Oil and gas production in Kern County varies in intensity, depending on historic uses, surrounding land uses and zoning designations, and quality of agricultural land. In order to facilitate discussion, operations were broken down into five Tiers ranging from greatest to least levels of intensity. Figure 3-4 (see Chapter 3, Project Description) depicts the location of Tiers 1, 2, 3, 4, and 5 in the Project Area. Total land acreage within each Tier is depicted in Table 4.10-1.

**Table 4.10-1: Tier Acreages Within the Project Area**

| Tier | Western Subarea | Central Subarea | Eastern Subarea | Total |
|---|---|---|---|---|
| Tier 1 | 163,227 | 3,002 | 40,518 | 206,747 |
| Tier 2 | 800,443 | 523,071 | 467,789 | 1,791,303 |
| Tier 3 | 2,043 | 2,801 | 11,359 | 16,203 |
| Tier 4 | 5,423 | 10,413 | 18,614 | 34,450 |
| Tier 5 | 772 | -0- | 1,740 | 2,512 |
| Non-Jurisdictional | 113,669 | 108,802 | 61,356 | 283,828 |
| Other Areas | 11,265 | 7,913 | 8,513 | 27,691 |
| **TOTAL** | **1,096,842** | **656,003** | **609,889** | **2,362,733** |

### Tier 1

Tier 1 areas are defined as the areas in which current oil and gas activity is the primary land use, and well and activity densities preclude almost all other uses. Ninety percent of all oil and gas production in Kern County is produced in these areas. To define Tier 1 areas, geographic information system (GIS) well data was obtained from DOGGR and quarter-quarter sections with

a minimum of four wells were identified. Although Tier 1 lands may be zoned for agricultural use, there are no agricultural uses onsite, and any Important Farmland was removed from Tier 1 for inclusion in Tier 2. Tier 1 areas also exclude sensitive land uses, such as cemeteries, schools, and hospitals.

Tier 1 areas are predominantly clustered in the Eastern and Western Subareas. Examples of Tier 1 operations in the Eastern Subarea include the Chevron Kern River Oil Field and surrounding oilfields near the Oildale Area. Examples of Tier 1 operations in the Western Subarea include the Midway Sunset and Belridge Oil Fields near Taft and McKittrick. These areas have historically included intensive oilfield development and include some of the largest oilfields in the lower 48 states.

## Tier 2

Tier 2 areas are defined as all lands zoned Exclusive Agriculture (A) and Limited Agriculture (A-1) that are not included in Tier 1. Tier 2 also includes Important Farmland (Prime Farmland, Farmland of Statewide Importance, Unique Farmlands, and Confined Animal Agriculture). Tier 2 areas are typically low- to medium-intensity, depending upon the quality of the agricultural land. Although more than 97% of unincorporated County land is zoned for agricultural purposes, including most of the land in Tier 1, an agricultural zoning designation does not necessarily indicate the presence of agricultural operations. Therefore, only 90% of A and A-1 land in the Project Area is included in Tier 2.

## Tier 3

Tier 3 areas are defined as all Zone Districts where historic drilling activity has been approved as "Unrestricted" or "Ministerial," and those areas that are not categorized as Tiers 1 or 2. Tier 3 operations are typically low- to medium-intensity. These Zone Districts include:

**Unrestricted**

- Medium Industrial (M-2)
- Heavy Industrial (M-3)
- Natural Resource (NR)
- Floodplain Primary District (FPP)
- Special Planning District (SP)

**Ministerial**

- Light Industrial (M-1)
- Recreation-Forestry (RF)
- Drilling Islands (DI)
- Zone Districts that have the Petroleum Extraction (PE) Combining District

## Tier 4

Tier 4 areas are defined as all Zone Districts where oil or gas exploration and production activities are currently allowed with a Conditional Use Permit (CUP). Tier 4 operations are low-intensity operations where oil and gas production is not the predominant land use. These Zone Districts include:

- Estate District (E)
- Low-density Residential (R-1)
- Medium-density Residential (R-2)
- High-density Residential (R-3)
- Commercial Office (CO)
- Neighborhood Commercial District (C-1)
- General Commercial District (C-2)
- Highway Commercial (CH)
- Platted Lands (PL)
- Mobile Home Park (MP)

### Tier 5

Tier 5 are areas including Tejon Mountain Village, Tejon Industrial Complex – East, South Kern Industrial Complex, and Casa Loma Specific Plans, and all future Specific Plan boundaries either adopted with a Special Plan Zone District or which include specific provisions for oil and gas operations. Oil or gas exploration and production activities are allowed with a CUP or as permitted by the regulations contained within the adopted Specific Plan(s) in Tier 5 areas.

## Core Areas

As described in Chapter 3, Project Description, Core Areas have been defined for the purposes of administering zoning requirements within and adjacent to DOGGR's Administrative Boundaries. Historically, more than 95% of oil and gas production has occurred within DOGGR's Administrative Boundaries; therefore, this EIR anticipates that this same percentage of production will occur in Core Areas, as defined below. The Core Areas within the Project Area are depicted in Figure 3-5 (see Chapter 3, Project Description).

In order to define the Core Areas in which oil and gas development would occur, the County made the following adjustments, as applicable, to each DOGGR Administrative Boundary:

1. Each DOGGR Administrative Boundary area was first defined as a "Core Area" for oil and gas production purposes;

2. Adjacent DOGGR Administrative Boundary areas were combined into a single Core Area;

3. Consistent with County zoning practice, the irregular boundaries of each Core Area were then "squared off" and defined by the nearest section and quarter section lines;

4. To accommodate the probability of continued expansion at the edges of these known producing areas, the Core Area was then extended at least one-half section from the DOGGR Administrative Boundary;

5. To accommodate known oil production activities that were adjacent to, but not yet within, a DOGGR Administrative Area, the Core Area was expanded to include adjacent sections that either contained at least two wells in the section, or contained two wells within a 640-acre area of the section; and

6. Where the Core Area mapping process described above left isolated islands or narrow strips of lands between Core Areas, the Core Area was combined to eliminate these orphaned areas.

# Existing Land Uses

Existing land uses in the Project Area were determined from a visual survey of the Project Area, publicly available GIS data, and a review of the Kern County General Plan (KCGP), the MBGP, and adopted and proposed habitat conservation plans. Land uses vary widely throughout the Project Area; however, predominant land uses include agriculture and oil and gas development. In general, land uses can be grouped as follows:

- **Agriculture**. A majority of the lands within the Project Area are zoned for agricultural uses. Agricultural lands may also be interspersed with smaller oil and gas operations, such as individual drilling rigs.
- **Oil and Gas Development**. Mineral and petroleum extraction is also a predominant land use within the Project Area and is an allowable use under most zoning designations, as described below (see Table 4.10-1). The Natural Resource (NR) Zoning District designates areas with petroleum, mineral, or timber resources, and limits uses in such areas to resource exploration, production, and transportation, or compatible uses.
- **Non-Jurisdictional Land**. These lands are federal and state agency-owned lands and incorporated cities. For example, the BLM Hollister Field Office manages more than 83,000 acres of land within the Project Area, which is scattered predominantly throughout the western portion of the County. Federal and state lands within the Project Area are outside of Kern County's jurisdiction.
- **Public Facilities.** Public facilities are generally sited within incorporated cities, which would not be subject to the proposed Zoning Amendment, or on unincorporated land near established incorporated and unincorporated communities. Public facilities include schools, solid waste facilities, hazardous waste disposal facilities, correctional facilities, and recreational facilities. Recreational facilities, such as regional parks and campgrounds, may be sited at a greater distance from populated areas and are dispersed throughout the Project Area, as described below under "Parks, Open Space, and Conservation."
- **Special Treatment Areas**. These unique areas and communities have established localized land use planning (e.g., County-approved Specific Plans or Interim Rural Community Plans). Section 4.10.3, Regulatory Setting, provides a list of Specific Plans within the Project Area and relevant language related to oil and gas development within those areas.
- **Residential**. Residential uses are scattered throughout the Project Area, and are predominantly clustered near the Metropolitan Bakersfield Planning Area. Areas zoned for residential uses have varying allowable densities for residential development. A CUP is required for oil and gas exploration and production activities in areas zoned for Estate

uses (E), Residential uses (R), and on Platted Lands (PL). Oil and gas exploration and production activities are prohibited in areas zoned for Mobile Home Parks (MP). Residences are also permitted on lands zoned for Agricultural uses (A) and are scattered throughout the Project Area.

- **Commercial**. Lands designated for commercial uses have varying degrees of intensity (Regional, General, and Highway Commercial) and are scattered throughout the Project Area. In general, County-designated commercial lands are predominantly located within or near the Metropolitan Bakersfield Planning Area or along transportation corridors.
- **Industrial**. Industrial areas with varying intensities of industrial use (Light, Service, and Heavy Industrial) are scattered throughout the Project Area. Areas designated for industrial development can be associated with oil and gas exploration and production activities, among other uses, such as manufacturing facilities.
- **Parks, Open Space, and Conservation**. Although lands zoned as Open Space occur in several locations within the Project Area, the majority of Open Space lands are outside of the Project Area in the eastern portion of the County. However, the Project Area does contain unincorporated County parks, which are designated for Recreation. Drilling is not prohibited on land designated or zoned for recreation land uses; however, it is excluded on land zoned as Open Space. Some land within the Project Area is also managed for conservation purposes, such as the Kern National Wildlife Refuge, a portion of the Bitter Creek National Wildlife Refuge, Tule Elk State Natural Reserve, Wind Wolves Preserve, and various areas managed under adopted or proposed Habitat Conservation Plans (HCPs).

# General Plan Land Use Designations

The KCGP provides the underlying land use designations within the Project Area. Table 4.10-2 lists the predominant land use designation applicable to the Project Area. The majority of the Project Area is subject to an agricultural land use designation (General Plan Designations 8.1 – 8.5). Figure 4.10-1 depicts County land use designations within the Project Area.

**Table 4.10-2: General Plan Classifications within the Project Area**

| GP Code | GP Name |
|---|---|
| 1.1 | State or Federal Land |
| 1.2 | Incorporated Cities |
| 3.1 | Public or Private Recreation Areas |
| 3.2 | Educational Facilities |
| 3.3 | Other Facilities |
| 3.4.1 | Solid Waste Disposal Facility Buffer |
| 3.4 | Solid Waste Facilities |

**Table 4.10-2: General Plan Classifications within the Project Area**

| GP Code | GP Name |
|---|---|
| 4.1 | Accepted County Special Plan |
| 4.3 | Special Plan Required |
| 5.1 | Maximum 29 Units/Net Acre |
| 5.2 | Maximum 16 Units/Net Acre |
| 5.3 | Maximum 10 Units/Net Acre |
| 5.4 | Maximum 4 Units/Net Acre |
| 5.5 | Maximum 1 Unit/Net Acre |
| 5.6 | Minimum 2.5 Gross Acres/Unit |
| 5.7 | Minimum 5 Gross Acres/Unit |
| 6.2 | General Commercial |
| 6.3 | Highway Commercial |
| 7.1 | Light Industrial |
| 7.2 | Service Industrial |
| 7.3 | Heavy Industrial |
| 8.1 | Intensive Agriculture (Min. 20 Acres) |
| 8.2 | Resource Agriculture (Min. 20 Acres) |
| 8.3 | Extensive Agriculture (Min. 20 Acres) |
| 8.4 | Mineral and Petroleum (Min. 5 Acres) |
| 8.5 | Resource Management (Min. 20 Acres) |

# Existing Zoning

The Kern County Zoning Ordinance regulates land uses within the Project Area, implements the underlying KCGP land use designations for applicable locations in the County, and is consistent with the KCGP. The zoning classifications in the Project Area are listed in Table 4.10-3. Exploration drilling and production activities related to oil, gas, and other hydrocarbon substances are either permitted uses or conditionally permitted with the issuance of a CUP in all zoning classifications with the exception of the Mobile Home Park District and Open Space District where drilling is prohibited. Figure 4.10-2 depicts zoning within the Project Area.

**Table 4.10-3: Kern County Zones where Oil and Gas Exploration Activities are Allowed**

| Zoning District | | Permitted | Conditionally Permitted (CUP) | Prohibited |
|---|---|---|---|---|
| **1. Agricultural Districts** | | | | |
| A | Exclusive Agriculture District | ● | | |
| A-1 | Limited Agriculture District | ● | | |
| **2. Residential Districts** | | | | |
| E | Estate District | | ● | |
| R-1 | Low-density Residential District | | ● | |
| R-2 | Medium-density Residential District | | ● | |
| R-3 | High-density Residential District | | ● | |
| MP | Mobile home Park District | | | ● |
| **3. Commercial Districts** | | | | |
| CO | Commercial Office District | | ● | |
| C-1 | Neighborhood Commercial District | | ● | |
| C-2 | General Commercial District | | ● | |
| CH | Highway Commercial District | | ● | |
| **4. Industrial Districts** | | | | |
| M-1 | Light Industrial District | ● | | |
| M-2 | Medium Industrial District | ● | | |
| M-3 | Heavy Industrial District | ● | | |
| **5. Special Purpose Districts** | | | | |
| RF | Recreation-Forestry District | ● | | |
| OS | Open Space District | | | ● |
| NR | Natural Resource District | ● | | |
| DI | Drilling Island District | ● | | |
| FPP | Floodplain Primary District | ● (1) | | |
| SP | Special Planning District | ● (2) | | |
| PL | Platted Lands District | | ● | |

**Table 4.10-3: Kern County Zones where Oil and Gas Exploration Activities are Allowed**

| Zoning District | Permitted | Conditionally Permitted (CUP) | Prohibited |
|---|---|---|---|

Source: Kern County Zoning Ordinance
Notes:
(1) Subject to Flood Damage Prevention Ordinance
(2) Allowed if use is consistent with General Plan Land Use designation and will not conflict with public health, safety or welfare.

## Surrounding Land Uses

The Project Area is bordered on the west by San Luis Obispo County. The border between the two counties approximates the San Andreas Fault line. The Temblor Range forms a general barrier between the more industrial oil drilling operations on the Kern County side of the border verses the more rural and agricultural nature of neighboring San Luis Obispo County, with the exception of the Midway Sunset Oil Field, which crosses into neighboring San Luis Obispo County. The portion of the Midway Sunset Oil Field located within San Luis Obispo County is outside of the Project Area and is not subject to Kern County jurisdiction. Other oil and gas uses exist to the west of the Project Area; however, such activities are less intensive in nature and dispersed throughout a rural area.

To the north, the Project Area is bordered by the San Emigdo Mountains and the Tehachapi Mountains. The Project Area extends to the border of the Los Padres National Forest. The unincorporated community of Frazier Park is located in the uplands several miles south of the Project Area and west of the Interstate 5.

To the north, the Project Area is bordered by Kings and Tulare counties. The bordering areas of these two counties contain agricultural and oil and gas operations, as well as dispersed rural residences. The incorporated city of Delano is located on the northern border of Kern County, and adjacent land uses in Tulare County consist of large lot residential, agriculture, and industrial uses.

To the east, the Project Area is bordered by the foothills of surrounding mountain ranges, such as the Greenhorn Mountains and Tehachapi Mountains, as well as the Tejon Hills southeast of the incorporated city of Arvin. The Project Area also borders the Sequoia National Forest northeast of Bakersfield. Land uses along the border are generally rural in nature.

# 4.10.3 Regulatory Setting

Land use and planning for federal lands adjacent to the Project Area are regulated by a variety of federal agencies and programs, including National Forest management plans, federal preserve management plans, and land use regulations adopted by federal agencies for airports and by the

BLM to regulate oil and gas leases. The following discussion summarizes federal land use plans applicable to airports and BLM oil and gas leasing in more detail.

# Federal

## Federal Aviation Administration, Federal Aviation Regulation Title 14, Part 77

The Federal Aviation Administration (FAA) issues and enforces regulations related to air traffic control and the assignment and use of airspace. The FAA's regulations are found in the Federal Aviation Regulations (FAR). FAR Title 14, Part 77, establishes the standards for determining obstructions in navigable airspace, including height limitations on structures taller than 200 feet or within 20,000 feet (3.8 miles) of an airport.

The standards and notification requirements of FAR Title 14 Part 77 are intended to: 1) evaluate the effect of the construction or alteration of structures on airport operating procedures; 2) determine if the construction or alteration would result in a potential hazard to air navigation; and 3) identify measures to enhance safety. The FAA requires notification through the filing of the two-part FAA Form 7460 (7460-1 Notice of Proposed Construction or Alteration, and 7460-2 Supplemental Notice), if any of the following criteria are met due to implementation of a proposed action (Title 14 Part 77.13):

- Any construction or alteration [of a structure or object] of more than 200 feet in height above the ground level at its site.
- Any construction or alteration [of a structure or object] of greater height than an imaginary surface extending outward and upward at one of the following slopes:
  - 100 to 1 for a horizontal distance of 20,000 feet from the nearest point of the nearest runway of each airport with at least one runway more than 3,200 feet in actual length, excluding heliports.
  - 50 to 1 for a horizontal distance of 10,000 feet from the nearest point of the nearest runway of each airport specified with its longest runway no more than 3,200 feet in actual length, excluding heliports.
  - 25 to 1 for a horizontal distance of 5,000 feet from the nearest point of the nearest landing and takeoff area of each heliport.
- Any proposed highway, railroad, or other traverse way for mobile objects, with a height which would exceed the standards of Part 77.13 (a) (1), (2), or (3).
- When requested by the FAA, any construction or alteration [of a structure or object] that would be in an instrument approach area (defined in the FAA standards governing instrument approach procedures) and available information indicates it might exceed a standard of subpart C of this Part [Part 77].

- Any construction or alteration of a structure or object located on a public use airport or heliport that meets the criteria of Part 77.13 (a) (5).

## Bureau of Land Management

The BLM leases federal land within the Project Area for oil and gas exploration and recovery. The County does not have jurisdiction to regulate oil and gas operations on federal land, and BLM or other federal agencies do not regulate land use associated with oil and gas operations on non-federal land in Kern County. BLM oil and gas leasing requirements in Kern County are summarized for informational purposes.

### Bureau of Land Management, Bakersfield Office Resource Management Plan (December 2014)

The Bakersfield Resource Management Plan (RMP) provides direction for the management of approximately 400,000 acres of public lands and 1.2 million acres of mineral estate in Ventura, Santa Barbara, San Luis Obispo, Kings, Tulare, Madera, eastern Fresno, and western Kern counties in accordance with principles of multiple use and sustained yield, as mandated by the provisions of the Federal Land Policy and Management Act (FLPMA). The RMP provides a framework for managing public lands within the Bakersfield Field Office for recreation, travel management, oil and gas development, threatened and endangered species, grazing, and other resources (BLM 2014a). The RMP also provides management direction for acquired lands including the Piedras Blancas Light Station, Naval Petroleum Reserve 2 (adjacent to Elk Hills Oil Field), Atwell Island, and Cyrus Canyon. The RMP guides the Bakersfield Field Office in the implementation of all its subsequent management actions and site-specific activities.

While the RMP Planning Area encompasses the entire area within the boundaries of the Bakersfield Field Office, regardless of jurisdiction or ownership, decisions in the approved RMP apply only to BLM-administered surface and federal mineral estate. The decisions do not apply to private lands, state lands, tribal lands, and federal lands not administered by the BLM; they will not change existing rights or authority of private land owners or other surface management agencies.

The Bakersfield Decision Area encompasses about 400,000 acres of public lands surface and minerals, and 750,000 acres of mineral estate only. BLM public lands and mineral estate are scattered across the Project Area in numerous parcels of various size. The larger blocks of surface public land lie adjacent to the Carrizo Plan National Monument and in the Lake Isabella-Chimney Peak-Walker Pass region of Kern and Tulare counties. The Decision Area also includes subsurface minerals on approximately 550,000 acres of “split estate” (areas where the BLM manages federal subsurface minerals, but the surface is owned by a non-federal entity) as well as subminerals on approximately 200,000 acres where the surface is managed by other federal agencies. These combined areas (about 1.2 million acres) constitute the area for which the BLM has authority and makes decisions.

The new RMP puts in place new best management practices for oil and gas leasing to address air quality and water resources and ensure safe and environmentally responsible development. It also contains an updated Reasonable and Foreseeable Development for oil and gas production on federal land under BLM jurisdiction and incorporates best available science to inform analysis on new leasing and decision making. Additionally, the new RMP carries forward 4:1 mitigation requirements for habitat disturbance as well as operational restrictions to avoid impacts to sensitive species (BLM 2014a).

The RMP also incorporates several recreation management objectives to address the changing needs of the area's diverse user groups and improve management of the existing trail system. A Travel Management Plan that directs road and trail uses, including the popular east Temblors and Keyesville areas, is also included in the decision, enabling the BLM to better manage current use and increase opportunities for recreation within the Bakersfield area. The Travel Management Plan includes routes for off-highway vehicles and other types of recreation.

In addition, the plan includes key conservation provisions to address important biological and cultural resources including the protection of over 100,000 acres under the Bureau's Areas of Critical Environmental Concern (ACEC) designation. Management direction in this part of the plan in particular incorporated comments and feedback received from the public during public scoping, helping the BLM identify important areas for protection.

A Record of Decision (ROD) for the RMP was signed by BLM's California State Director on December 19, 2014.

### Instruction Memorandum No. CA-2014-031

In August 2014, the BLM issued Instruction Memorandum No. CA-2014-031 (BLM 2014b) which modified the information required to process an Applications for Permit to Drill or Sundry Notice on federal land to include: (1) an air emissions inventory (and, if BLM identifies air quality concerns, a technical report on the impacts of the project on air quality written by an independent, third party air quality specialist); (2) a water management plan, including water sources, volumes, and proposed disposal/recycling of produced water (and if BLM identifies air quality concerns a technical report on the impacts of the project on water resources written by an independent, third party hydrologist or water quality specialist); and (3) a copy of state permit applications to perform well stimulation treatments and ground water monitoring plans submitted to state agencies, or state concurrence that no protected waters would be affected by the proposed activity.

# State

## Senate Bill 375

Senate Bill (SB) 375 requires the Air Resources Board to set regional targets for greenhouse gas (GHG) emission reductions from passenger vehicles and light duty trucks, and requires each regional Metropolitan Planning Organization (MPOs) to adopt a Sustainable Communities

Strategy (SCS) into its regional transportation plan that would allow the region to meet its GHG emission reduction target. The Kern County Council of Governments (COG) adopted the SCS for Kern County as part of its Regional Transportation Plan (RTP) in 2014. The RTP and SCS incorporate forecasted development patterns, modeling and measures designed to integrate land use and transportation planning to reduce local and regional GHG emissions. Oil and gas resources, as well as other land uses, are components of the SCS. While SB 375 does not require local governments to amend their General Plans to implement the SCS, it provides incentives for them to do so. Implementation of SB 375 is expected to substantially reduce GHG emissions in the County and throughout the state.

# Local

Land use and planning for areas within and adjacent to the Project Area are regulated by a variety of jurisdictional planning agencies and programs depending on the specific area. These planning agencies and programs include the KCGP, the MBGP, 24 Specific Plans, and the Kern County Zoning Ordinance. Regional land use decisions within the Project Area are also influenced by the Kern COG 2014 RTP/SCS.

The plans, briefly discussed below, are characterized by goals, objectives, and policies, and provide an overall foundation for establishing land use patterns. For purposes of impact analysis, all relevant goals, objectives, and policies related to the proposed Project are included in the discussion.

## Kern County General Plan

The Project Area is located within the KCGP area and, therefore, would be subject to applicable policies and measures of the KCGP. The Land Use, Conservation, and Open Space Element, Circulation Element, Noise Element, Safety Element, and Energy Element of the KCGP include goals, policies, and implementation measures related to land use and planning that apply to the Project, as described below.

### Chapter 1. Land Use, Conservation, and Open Space Element

#### 1.2. Non-Jurisdictional Land

##### Goals

**Goal 1.** To promote harmonious and mutually beneficial uses of land among the various jurisdictions and land management entities present in Kern County.

##### Policies

**Policy 3.** The County retains the maximum discretion allowed by law over land use issues of local concern, which impact the development of private and public property in the County.

**Policy 4**. The County will solicit comments and coordinate with local governments, the military, and other federal or state jurisdictions on projects which are proposed within a peripheral area established mutual agreement between the County and the jurisdiction.

**Policy 5**. The County land use regulations do not apply to property administered by the state or federal government in the absence of Memorandums of Understanding indicating otherwise. However, County land use regulations may apply to other public entities subject to provisions of state law.

**Policy 6.** The County will solicit a city's comments on land use planning proposals within the city's adopted sphere of influence or within one mile of the city limits, whichever is greater.

### 1.3. Physical and Environmental Constraints

#### Goals

**Goal 1.** To strive to prevent loss of life, reduce personal injuries, and property damage, minimize economic and social diseconomies resulting from natural disaster by directing development to areas which are not hazardous.

#### Policies

**Policy 1.** Kern County will ensure that new developments will not be sited on land that is physically or environmentally constrained ((Map Code 2.1 (Seismic Hazard), Map Code 2.2 (Landslide), Map Code 2.3 (Shallow Groundwater), Map Code 2.5 (Flood Hazard), Map Codes from 2.6 – 2.9, Map Code 2.10 (Nearby Waste Facility), and Map Code 2.11 (Burn Dump Hazard)) to support such development unless appropriate studies establish that such development will not result in unmitigated significant impact.

**Policy 2.** In order to minimize risk to Kern County residents and their property, new development will not be permitted in hazard areas in the absence of implementing ordinances and programs. These ordinances will establish conditions, criteria, and standards for the approval of development in hazard areas.

**Policy 3.** Zoning and other land use controls will be used to regulate and, in some instances, to prohibit development in hazardous areas.

**Policy 6.** Regardless of percentage of slope, development on hillsides will be sited in the least obtrusive fashion, thereby, minimizing the extent of topographic alteration required and reducing soil erosion while maintaining soil stability.

**Policy 7.** Ensure effective slope stability, wastewater drainage, and sewage treatments in areas with steep slopes are adequate for development.

**Policy 8.** Encourage the preservation of the floodplain's flow conveyance capacity, especially in floodways, to be open space/passive recreation areas throughout the County.

**Policy 9.** Construction of structures that impede water flow in a primary floodplain will be discouraged.

**Policy 10.** The County will allow lands which are within flood hazard areas, other than primary floodplains, to be developed in accordance with the General Plan and Floodplain Management Ordinance, if mitigation measures are incorporated so as to ensure that the proposed development will not be hazardous within the requirements of the Safety Element (Chapter 4) of this General Plan.

**Policy 11.** Protect and maintain watershed integrity within Kern County.

**Policy 13.** Development, which is located adjacent to a burn dumpsite and requires a discretionary permit, shall be reviewed for land use compatibility and possible soil contamination.

### Implementation Measures

**Implementation Measure B.** A seismic analysis may be required for those areas in Kern County which are susceptible to landslides.

**Implementation Measure E.** Development proposed in areas with steep slopes (Map Code 2.4) will be reviewed for conformity to Chapter 19.88 Hillside Development Ordinance or Chapter 19.52 Special Planning (SP) District to ensure that appropriate soil stability, drainage, and sewage treatment will result.

**Implementation Measure H.** Development within areas subject to flooding, as defined by the appropriate agency, will require necessary flood evaluations and studies.

**Implementation Measure I.** Designated flood channels and water courses, such as creeks, gullies, and riverbeds, will be preserved as resource management areas or in the case of urban areas, as linear parks whenever practical.

**Implementation Measure J.** Compliance with the Floodplain Management Ordinance prior to grading or improvement of land for development or the construction, expansion, conversion or substantial improvements of a structure is required.

**Implementation Measure M.** The State Water Resources Control Board and the Local Enforcement Agency (Environmental Health Services) shall be consulted when discretionary development has been proposed near a known burn dumpsite.

**Implementation Measure N.** Applicants for new discretionary development should consult with the appropriate Resource Conservation District and the California Regional Water Quality Control Board regarding soil disturbances issues.

## 1.4. Public Facilities and Services

### Goals

**Goal 1.** Kern County residents and businesses should receive adequate and cost effective public services and facilities. The County will compare new urban development proposals and land use changes to the required public services and facilities needed for the proposed Project.

**Goal 5.** Ensure that adequate supplies of quality (appropriate for intended use) water are available to residential, industrial, and agricultural users within Kern County.

**Goal 9.** Serve the needs of industries and Kern County residents in a manner that does not degrade the water supply and the environment and protect the public health and safety by avoiding surface and subsurface nuisances resulting from the disposal of hazardous wastes, irrespective of the geographic origin of the waste.

### Policies

**Policy 1.** New discretionary development will be required to pay its proportional share of the local costs of infrastructure improvements required to service such development.

**Policy 3.** Individual projects will provide availability of public utility service as per approved guidelines of the serving utility.

### Implementation Measures

**Implementation Measure C.** Project developers shall coordinate with the local utility service providers to supply adequate public utility services.

**Implementation Measure L.** Prior to the approval of development projects, the County shall determine the need for fire protection services. New development in the County shall not be approved unless adequate fire protection facilities and resources can be provided.

**Implementation Measure N.** Secure complete and accurate information on all hazardous wastes generated, handled, stored, treated, transported, and disposed of within or through Kern County.

**Implementation Measure O.** Reduce to the greatest degree possible the amount of waste to be disposed of by encouraging private industry to construct and manage a high quality system of transfer stations, recycling facilities, treatment plants, and incinerators located near the generators of hazardous waste.

**Implementation Measure R.** Roads and highways utilized for commercial shipping of hazardous waste destined for disposal will be designated as such pursuant to Vehicle Code Sections 31303 et seq. Permit applications shall identify commercial shipping routes they propose to utilize for particular waste streams.

## 1.8. Industrial

### Goals

**Goal 1.** Ensure that an adequate and geographically balanced supply of land is designated for a range of industrial purposes.

**Goal 2.** Promote the future economic strength and wellbeing of Kern County and its residents without detriment to its environmental quality.

**Goal 3.** Ensure compatibility with land use designations such as residential, commercial, or other land uses that may be affected by such activities.

### Policies

**Policy 1.** Locations for new industrial activities shall be provided with adequate infrastructure (water, sewage disposal systems, roads, drainage, etc.) to minimize effects on County services.

**Policy 3.** The land areas best suited for industrial activity by virtue of their location and other criteria will be protected from residential and other incompatible development.

**Policy 4.** Protect existing industrial designations from incompatible land use intrusion.

**Policy 5.** Provide for the clustering of new industrial development adjacent to existing industrial uses and along major transportation corridors.

**Policy 7.** Require that industrial uses provide design features such as screen walls, landscaping, increased height and/or setbacks, and lighting restrictions between the boundaries of adjacent residential land use designations so as to reduce impacts on residences due to light, noise, sound, and vibration.

**Policy 9.** Prior to approval, all new discretionary industrial projects located in the Airport Influence Areas will be reviewed for compatibility with the Airport Land Use Compatibility Plan.

**Policy 12.** All industrial development equal to or greater than 40 acres in a rural area will require the adoption of a Specific Plan prior to development approval.

**Policy 13.** Where feasible, locate future industrial activities in close proximity to railroad facilities and inter- and intra-State transportation corridors to minimize extensive travel through urban areas and to promote alternative transportation of goods.

### Implementation Measures

**Implementation Measure F.** All General Plan Amendments, zone changes, conditional use permits, discretionary industrial developments, and variations from height limits established by zoning for properties which are located in the Airport Influence areas or near a military airport

shall be reviewed by the Planning Department for compatibility with the Kern County Airport Land Use Compatibility Plan.

**Implementation Measure G.** Require a Specific Plan for industrial land projects (as defined in the Assumptions Section of the Special Treatment Areas) to identify site specific issues and implementation, such as infrastructure, circulation, compatibility, and public services and facilities.

**Implementation Measure I.** Discretionary projects located within an Extreme, High, or Moderate Fire Hazard Zone shall abide by building materials and construction requirements set forth by the Kern County Fire Department and Office of Emergency Services.

## 1.9. Resource

### Goals

**Goal 1.** To contain new development within an area large enough to meet generous protections of foreseeable need, but in locations that will not impair the economic strength derived from the petroleum, agriculture, rangeland, or mineral resources or diminish the other amenities that exist in the County.

**Goal 2**. Protect areas of important mineral, petroleum, and agricultural resource potential for future use.

**Goal 3.** Ensure the development of resource areas minimize effects on neighboring resource lands.

**Goal 4.** Encourage safe and orderly energy development within the County, including research and demonstration projects, and to become actively involved in the decision and actions of other agencies as they affect energy development in Kern County.

**Goal 5.** Conserve prime agriculture lands from premature conversion.

**Goal 6.** Encourage alternative sources of energy, such as solar and wind energy, while protecting the environment.

### Policies

**Policy 1.** Appropriate resource uses of all types will be encouraged as desirable and consistent interim uses in undeveloped portions of the County regardless of General Plan designation.

**Policy 2.** In areas with a resource designation on the General Plan map, only industrial activities which directly and obviously relate to the exploration, production, and transportation of the particular resource will be considered to be consistent with this General Plan.

**Policy 5.** Areas of low intensity agriculture use (Map Code 8.2 (Resource Reserve), Map Code 8.3 (Extensive Agriculture), and Map Code 8.5 (Resource Management)) should be of an

economically viable size in order to participate in the State Williamson Act Program/Farmland Security Zone Contract.

**Policy 7.** Areas designated for agricultural use, which include Class I and II and other enhanced agricultural soils with surface delivery water systems, should be protected from incompatible residential, commercial, and industrial subdivision and development activities.

**Policy 10.** To encourage effective groundwater resource management for the long-term economic benefit of the County the following shall be considered:

a. Promote groundwater recharge activities in various Zone Districts.

b. Support for the development of Urban Water Management Plans and promote Department of Water Resources grant funding for all water providers.

c. Support the development of groundwater management plans.

d. Support the development of future sources of additional surface water and groundwater, including conjunctive use, recycled water, conservation, additional storage of surface water and groundwater and desalination.

**Policy 11.** Minimize the alteration of natural drainage areas. Require development plans to include necessary mitigation to stabilize runoff and silt deposition through utilization of grading and flood protection ordinances.

**Policy 12.** Areas identified by the Natural Resource Conservation Service (formerly Soil Conservation Service) as having high range-site value should be conserved for Extensive Agriculture uses or as Resource Reserve, if located within a County water district.

**Policy 14.** Emphasize conservation and development of identified mineral deposits.

**Policy 15.** Agriculture and other resource uses will be considered a consistent use in areas designated for Mineral and Petroleum Resource uses on the General Plan.

**Policy 17.** Lands classified as MRZ-2, as designated by the State of California, should be protected from encroachment of incompatible land uses.

**Policy 21.** The County shall encourage qualifying agricultural lands to participate in the Williamson Act program or Farmland Security Zone program.

**Policy 25.** Discourage incompatible land use adjacent to Map Code 8.4 (Mineral and Petroleum) areas.

### Implementation Measures

**Implementation Measure B.** Areas designated as Resource Reserve (Map Code 8.2), Extensive Agriculture (Map Code 8.3), Resource Management (Map Code 8.5) that are under Williamson

Act Contracts or Farmland Security Zone Contracts will have a minimum parcel size of 80 acres until such time as a contract is expired or is cancelled, at which time the minimum parcel size will become 20 acres**.**

**Implementation Measure C.** The County Planning Department will seek review and comment from the County Engineering and Survey Services Department on the implementation of the National Pollution Discharge Elimination System for all discretionary projects.

**Implementation Measure F.** Prime agricultural lands, according to the Kern County Interim-Important Farmland map produced by the Department of Conservation, which have Class I or II soils and a surface delivery water system shall be conserved through the use of agricultural zoning with minimum parcel size provisions.

**Implementation Measure G.** Property placed under the Williamson Act/Farmland Security Zone Contract must be in a Resource designation**.**

**Implementation Measure H.** Use the California Geological Survey's latest maps to locate mineral deposits until the regional and statewide importance mineral deposits map has been completed, as required by the Surface Mining and Reclamation Act.

**Implementation Measure I.** Periodically review the Zoning Ordinance to reflect new technology and energy sources, and encourage these types of uses for new development.

**Implementation Measure J.** The County shall continue to monitor new legislation as it relates to energy production and periodically review the General Plan and Zoning Ordinance for any required updates.

**Implementation Measure K.** Protect oilfields and mineral extraction areas through the use of appropriate implementing Zone Districts: A (Exclusive Agriculture), DI (Drilling Island), NR (Natural Resource), or PE (Petroleum Extraction).

## 1.10. General Provisions

### Goals

**Goal 1.** Ensure that the County can accommodate anticipated future growth and development while maintaining a safe and healthful environment and a prosperous economy by preserving valuable natural resources, guiding development away from hazardous areas, and assuring the provision of adequate public services.

### Policies

**Policy 6.** The County shall ensure the fair treatment of people of all races, cultures, incomes and age groups with respect to the development, adoption, implementation and enforcement of land use and environmental programs.

**Policy 8.** The County shall ensure that new industrial uses and activities are sited to avoid or minimize significant hazards to human health and safety in a manner that avoids over concentrating such uses in proximity to schools and residents.

### 1.10.1. Public Services and Facilities

#### Policies

**Policy 9.** New development should pay its pro rata share of the local cost of expansions in services, facilities, and infrastructure which it generates and upon which it is dependent.

**Policy 16.** The developer shall assume full responsibility for costs incurred in service extensions or improvements that are required to serve the project. Cost sharing or other forms of recovery shall be available when the service extensions or improvements have a specific quantifiable regional significance.

#### Implementation Measures

**Implementation Measure E.** All new discretionary development projects shall be subject to the Standards for Sewage, Water Supply and Preservation of Environmental Health Rules and Regulations administered by the Environmental Health Services Department. Those projects having percolation rates of less than five minutes per inch shall provide a preliminary soils study and site specific documentation that characterizes the quality of upper groundwater in the project vicinity and evaluation of the extent to which, if any, the proposed use of alternative septic systems will adversely impact groundwater quality. If the evaluation indicates that the uppermost groundwater at the proposed site already exceeds groundwater quality objectives of the Regional Water Quality Control Board or would if the alternative septic system is installed, the applicant shall be required to supply sewage collection, treatment and disposal facilities.

### 1.10.2. Air Quality

#### Policies

**Policy 19.** In considering discretionary projects for which an Environmental Impact Report must be prepared pursuant to the California Environmental Quality Act, the appropriate decision making body, as part of its deliberations, will ensure that:

a. All feasible mitigation to reduce significant adverse air quality impacts have been adopted; and

b. The benefits of the proposed Project outweigh any unavoidable significant adverse effects on air quality found to exist after inclusion of all feasible mitigation. This finding shall be made in a statement of overriding considerations and shall be supported by factual evidence to the extent that such a statement is required pursuant to the California Environmental Quality Act.

**Policy 20.** The County shall include fugitive dust control measures as a requirement for discretionary projects and as required by the adopted rules and regulations of the San Joaquin

Valley Unified Air Pollution Control District and the Kern County Air Pollution Control District on ministerial permits.

**Policy 21.** The County shall support air districts' efforts to reduce PM10 and PM2.5 emissions.

**Policy 22.** Kern County shall continue to work with the San Joaquin Valley Unified Air Pollution Control District and the Kern County Air Pollution Control District toward air quality attainment with federal, state, and local standards.

**Policy 23.** The County shall continue to implement the local government control measures in coordination with the Kern Council of Governments and the San Joaquin Valley Unified Air Pollution Control District.

### Implementation Measures

**Implementation Measure F.** All discretionary permits shall be referred to the appropriate air district for review and comment.

**Implementation Measure G.** Discretionary development projects involving the use of tractor trailer rigs shall incorporate diesel exhaust reduction strategies including, but not limited to:

a. Minimizing idling time.
b. Electrical overnight plug-ins.

**Implementation Measure H.** Discretionary projects may use one or more of the following to reduce air quality effects:

a. Pave dirt roads within the development.
b. Pave outside storage areas.
c. Provide additional low Volatile Organic Compounds (VOC) producing trees on landscape plans.
d. Use of alternative fuel fleet vehicles or hybrid vehicles.
e. Use of emission control devices on diesel equipment.
f. Develop residential neighborhoods without fireplaces or with the use of Environmental Protection Agency certified, low emission natural gas fireplaces.
g. Provide bicycle lockers and shower facilities on site.
h. Increasing the amount of landscaping beyond what is required in the Zoning Ordinance (Chapter 19.86).
i. The use and development of park and ride facilities in outlaying areas.
j. Other strategies that may be recommended by the local Air Pollution Control Districts.

### 1.10.3. Archaeological, Paleontological, Cultural, and Historical Preservation

#### Policies

**Policy 25.** The County will promote the preservation of cultural and historic resources which provide ties with the past and constitute a heritage value to residents and visitors.

#### Implementation Measures

**Implementation Measure K.** Coordinate with the California State University, Bakersfield's Archaeology Inventory Center.

**Implementation Measure L.** The County shall address archaeological and historical resources for discretionary projects in accordance with the California Environmental Quality Act (CEQA).

**Implementation Measure M.** In areas of known paleontological resources, the County should address the preservation of these resources where feasible.

**Implementation Measure N.** The County shall develop a list of Native American organizations and individuals who desire to be notified of proposed discretionary projects. This notification will be accomplished through the established procedures for discretionary projects and CEQA documents.

**Implementation Measure O.** On a project specific basis, the County Planning Department shall evaluate the necessity for the involvement of a qualified Native American monitor for grading or other construction activities on discretionary projects that are subject to a CEQA document.

### 1.10.5. Threatened and Endangered Species

#### Policies

**Policy 27.** Threatened or endangered plant and wildlife species should be protected in accordance with state and federal laws.

**Policy 28.** County should work closely with state and federal agencies to assure that discretionary projects avoid or minimize impacts to fish, wildlife, and botanical resources.

**Policy 29.** The County will seek cooperative efforts with local, state, and federal agencies to protect listed threatened and endangered plant and wildlife species through the use of conservation plans and other methods promoting management and conservation of habitat lands.

**Policy 31.** Under the provisions of the California Environmental Quality Act (CEQA), the County, as lead agency, will solicit comments from the California Department of Fish and Game and the U.S. Fish and Wildlife Service when an environmental document (Negative Declaration, Mitigated Negative Declaration, or Environmental Impact Report) is prepared.

**Policy 32.** Riparian areas will be managed in accordance with United States Army Corps of Engineers, and the California Department of Fish and Game rules and regulations to enhance the drainage, flood control, biological, recreational, and other beneficial uses while acknowledging existing land use patterns.

### Implementation Measures

**Implementation Measure Q.** Discretionary projects shall consider effects to biological resources as required by the California Environmental Quality Act.

**Implementation Measure R.** Consult and consider the comments from responsible and trustee wildlife agencies when reviewing a discretionary project subject to the California Environmental Quality Act.

**Implementation Measure S.** Pursue the development and implementation of conservation programs with state and federal wildlife agencies for property owners desiring streamlined endangered species mitigation programs.

## 1.10.6. Surface Water and Groundwater

### Policies

**Policy 34.** Ensure that water quality standards are met for existing users and future development.

**Policy 35.** Ensure that adequate water storage, treatment, and transmission facilities are constructed concurrently with planned growth.

**Policy 36.** Ensure that appropriate funding mechanisms for water are in place to fund the needed improvements resulting from growth and subsequent development.

**Policy 38.** Encourage utilization of wastewater treatment facilities which provide for the reuse of wastewater.

**Policy 39.** Encourage the development of the County's groundwater supply to sustain and ensure water quality and quantity for existing users, planned growth, and maintenance of the natural environment.

**Policy 41.** Review development proposals to ensure adequate water is available to accommodate projected growth.

**Policy 43.** Drainage shall conform to the Kern County Development Standards and the Grading Ordinance.

**Policy 44.** Discretionary projects shall analyze watershed impacts and mitigate for construction-related and urban pollutants, as well as alterations of flow patterns and introduction of impervious surfaces as required by the California Environmental Quality Act (CEQA), to prevent the degradation of the watershed to the extent practical.

**Policy 45.** New high consumptive water uses, such as lakes and golf courses, should require evidence of additional verified sources of water other than local groundwater. Other sources may include recycled stormwater or wastewater.

### Implementation Measures

**Implementation Measure U.** The Kern County Environmental Health Services Department will develop guidelines for the protection of groundwater quality which will include comprehensive well construction standards and the promotion of groundwater protection for identified degraded watersheds.

**Implementation Measure X.** Encourage effective groundwater resource management for the long-term benefit of the County through the following:

i. Promote groundwater recharge activities in various Zone Districts.

iii. Support the development of Groundwater Management Plans.

iv. Support the development of future sources of additional surface water and groundwater, including conjunctive use, recycled water, conservation, additional storage of surface water, and groundwater and desalination.

**Implementation Measure Y.** Promote efficient water use by utilizing measures such as:

i. Requiring water-conserving design and equipment in new construction.

ii. Encouraging water-conserving landscaping and irrigation methods.

## 1.10.7. Light and Glare

### Policies

**Policy 48.** Encourage the use of low-glare lighting to minimize nighttime glare effects on neighboring properties.

### Implementation Measures

**Implementation Measure AA.** The County shall utilize CEQA Guidelines and the provisions of the Zoning Ordinance to minimize the impacts of light and glare on adjacent properties and in rural undeveloped areas.

## 1.10.9. Economic Development

### Policies

**Policy 58**. Support and work toward the elimination of disincentives for business and industry to prosper in Kern County, and create special economic development programs to encourage commerce and industry to locate in Kern County.

**Policy 62**. Periodically review and update procedures for granting development approvals and permits and facilitate the processing of land use entitlements.

### Implementation Measures

**Implementation Measure DD.** Utilize the County's Economic Strategy and the Economic Incentive Program to promote economic growth and to maintain a strong local economy.

### 1.10.10. Oak Tree Conservation

### Policies

**Policy 65**. Oak woodlands and large oak trees shall be protected where possible and incorporated into project developments.

**Policy 66.** Promote the conservation of oak tree woodlands for their environmental value and scenic beauty.

### Implementation Measures

**Implementation Measure LL.** The following applies to development of parcels having oak tree canopy cover of less than 10%, but containing individual oak trees equal to or greater than a 12-inch diameter trunk at 4.5 feet breast height.

a. Such trees shall be identified on plot plans.

b. Discretionary development shall avoid the area beneath and within the trees unaltered drip line unless approved by a licensed or certified arborist or botanist.

c. Specified tree removal related to the discretionary action may be granted by the decision making body upon showing that a hardship exists based on substantial evidence in the record.

## Chapter 2. Circulation Element

### Objective

**Objective 1.** To make certain that transportation facilities needed to support development are available. To ensure that these facilities occur in a timely manner so as to avoid traffic degradation.

**Objective 5**. Maintain a minimum Level Of Service (LOS) D for all roads throughout the County.

## 2.3. Highways

### 2.3.3. Highway Plan

#### Goals

**Goal 5.** Maintain a minimum Level of Service (LOS) D.

#### Implementation Measures

**Implementation Measure B**. Continuity and integrity of the arterial and collector system at the mountain/valley region and the mountain/desert region boundary must be reviewed and approved in conjunction with project adoption on an individual basis.

**Implementation Measure C.** Conformance to alignment minimum design standards, where roadways that deviate from section and mid-section lines intersect those lines, must be reviewed and approved in conjunction with project adoption on an individual basis.

### 2.3.4. Future Growth

#### Policies

**Policy 2.** The County should monitor development applications as they relate to traffic estimates developed for this plan. Mitigation is required if development causes affected roadways to fall below Level Of Service (LOS) D. Utilization of the CEQA process would help identify alternatives to or mitigation for such developments. Mitigation could involve amending the Land Use, Open Space and Conservation Element to establish jobs/housing balance if projected trips in any traffic zone exceed trips identified for this Circulation Element. Mitigation could involve exactions to build offsite transportation facilities. These enhancements would reduce traffic congestion to an acceptable level.

**Policy 4.** As a condition of private development approval, developers shall build roads needed to access the existing road network. Developers shall build these roads to County standards unless improvements along state routes are necessary then roads shall be built to Caltrans standards. Developers shall locate these roads (width to be determined by the Circulation Plan) along centerlines shown on the circulation diagram map unless otherwise authorized by an approved Specific Plan Line. Developers may build local roads along lines other than those on the circulation diagram map. Developers would negotiate necessary easements to allow this.

#### Implementation Measures

**Implementation Measure C.** Project development shall comply with the requirements of the Kern County Zoning Ordinance, Land Division Ordinance, and Development Standards.

### 2.3.7. Setback Deviation Studies

#### Implementation Measures

**Implementation Measure A.** A setback deviation request shall report proposed setback distance. The Kern County Zoning Ordinance gives setback distance for permanent structures located along surveyed section and mid-section lines. Setback deviations may be authorized where it is demonstrated that expressway, arterial or collector construction will not occur while the structure in question is usable, or valuable. An entity pursuing a setback deviation shall submit an application with necessary justification to support the request. The application shall include fees to defray costs to prepare staff reports and administering the application.

### 2.3.8. Safety Hazards of Fog and Dust

#### Goals

**Goal 2.** To relieve blowing dust influences on driving safety in Kern County.

### 2.4. Priority Focus Area Topics - Highways

### 2.4.7. Taft Area

#### Goals

**Goal 1.** Upgrade road circulation in and around Taft.

**Goal 2.** Reduce the speeds and amount of commuters and truck traffic through the centers of rural communities based on engineering and speed surveys.

#### Policies

**Policy 3**. The County should monitor development applications as they relate to traffic generation developed for this plan. If traffic resulting from projects such as General Plan amendment(s) would exceed current volume to capacity projections, mitigation is required if development causes roadways to fall below LOS D and LOS C for Caltrans roadways. Utilization of the CEQA process would help identify alternatives to, or mitigation for such developments. Mitigation could involve amending the Land Use, Open Space and Conservation Element to establish jobs - housing balance. This is triggered if projected trips in any traffic zone exceed trips identified for this Circulation Element. Mitigation could involve exactions to build offsite transportation facilities. These enhancements would reduce traffic congestion impacts.

**Policy 4.** Kern County should not allow new roads that serve low-density parcels to have unpaved surfaces. Any road capable of or now serving fifty average daily traffic trips or more should be paved.

### 2.4.8. Delano – McFarland Area

#### Policies

**Policy 5**. The County should monitor development applications as they relate to traffic generation developed for this plan. If traffic resulting from projects such as General Plan amendment(s) would exceed current volume to capacity projections, mitigation is required if development causes roadways to fall below LOS D and LOS C for Caldrons roadways. Utilization of the CEQA process would help identify alternatives to, or mitigation for such developments. Mitigation could involve amending the Land Use, Open Space and Conservation Element to establish jobs - housing balance. This is triggered if projected trips in any traffic zone exceed trips identified for this Circulation Element. Mitigation could involve exactions to build offsite transportation facilities. These enhancements would reduce traffic congestion impacts.

**Policy 6**. Kern County should not allow new roads that serve low-density parcels to have unpaved surfaces. Any road capable of or now serving fifty average daily traffic trips or more should be paved.

### 2.4.9. Lerdo Area

#### Goals

**Goal 3.** Improve traffic safety relative to farm vehicles and equipment.

**Goal 4.** Provide for improved traffic flow adjacent to existing communities.

#### Policies

**Policy 6**. The County should monitor development applications as they relate to traffic generation developed for this plan. If traffic resulting from projects such as General Plan amendment(s) would exceed current volume to capacity projections, mitigation is required if development causes roadways to fall below LOS D and LOS C for Caltrans roadways. Utilization of the CEQA process would help identify alternatives to, or mitigation for such developments. Mitigation could involve amending the Land Use, Open Space and Conservation Element to establish jobs - housing balance. This is triggered if projected trips in any traffic zone exceed trips identified for this Circulation Element. Mitigation could involve exactions to build offsite transportation facilities. These enhancements would reduce traffic congestion impacts.

**Policy 7.** Kern County should not allow new roads that serve low-density parcels to have unpaved surfaces. Any road capable of or now serving fifty average daily traffic trips or more should be paved.

### 2.4.10. Rosamond – Willow Springs

None of the goals, policies, or implementation measures contained in Section 2.4.10 are applicable to the proposed Project.

### 2.4.11. Boron

None of the goals, policies, or implementation measures contained in Section 2.4.11 are applicable to the proposed Project.

## 2.5. Other Modes

### 2.5.1. Trucks and Highways

#### Goals

**Goal 1**. Provide for Kern County's heavy truck transportation in the safest way possible.

**Goal 2.** Reduce potential overweight trucks.

### 2.5.2. Airport Land Use Compatibility Plan (ALUCP)

#### Policies

**Policy 2**. To the extent legally allowable, prevent encroachment on public airport and military base operations from incompatible, unmitigated land uses.

#### Implementation Measures

**Implementation Measure A.** Review discretionary land use development applications within the airports influence area and the military base operating area as shown in the ALUCP for consistency.

### 2.5.4. Transportation of Hazardous Materials

#### Goals

**Goal 1**. Reduce risk to public health from transportation of hazardous materials.

#### Policies

**Policy 1**. The commercial transportation of hazardous material, identification and designation of appropriate shipping routes will be in conformance with the adopted Kern County and Incorporated Cities Hazardous Waste Management Plan.

**Policy 2.** Kern County and affected cities should reduce use of County-maintained roads and city-maintained streets for transportation of hazardous materials.

# Chapter 3. Noise Element

## 3.2. Noise Sensitive Areas

### Goals

**Goal 1.** Ensure that residents of Kern County are protected from excessive noise and that moderate levels of noise are maintained.

**Goal 2.** Protect the economic base of Kern County by preventing the encroachment of incompatible land uses near known noise producing roadways, industries, railroads, airports, oil and gas extraction, and other sources.

### Policies

**Policy 2.** Require noise level criteria applied to all categories of land uses to be consistent with the recommendations of the California Division of Occupational Safety and Health (DOSH).

**Policy 3.** Encourage vegetation and landscaping along roadways and adjacent to other noise sources in order to increase absorption of noise.

**Policy 4.** Utilize good land use planning principles to reduce conflicts related to noise emissions.

**Policy 5**. Prohibit new noise-sensitive land uses in noise-impacted areas unless effective mitigation measures are incorporated into the project design. Such mitigation shall be designed to reduce noise to the following levels: a) 65 dB Ldn or less in outdoor activity areas; b) 45 dB Ldn or less within interior living spaces or other noise sensitive interior spaces.

**Policy 6.** Ensure that new development in the vicinity of airports will be compatible with existing and projected airport noise levels as set forth in the ALUCP.

**Policy 7.** Employ the best available methods of noise control.

### Implementation Measures

**Implementation Measure A**. Utilize zoning regulations to assist in achieving noise-compatible land use patterns.

**Implementation Measure F**. Require proposed commercial and industrial uses or operations to be designed or arranged so that they will not subject residential or other noise sensitive land uses to exterior noise levels in excess of 65 dB Ldn and interior noise levels in excess of 45 dB Ldn.

**Implementation Measure J.** Develop implementation procedures to ensure that requirements imposed pursuant to the findings of an acoustical analysis are conducted as part of the project permitting process.

# Chapter 4. Safety Element

## Goals

**Goal 1.** Minimize injuries and loss of life and reduce property damage.

**Goal 8.** Reduce the public's exposure to fire, explosion, blowout, and other hazards associated with the accidental release of crude oil, natural gas, and hydrogen sulfide gas.

## 4.2. General Policies and Implementation Measures, which Apply to More than One Safety Constraint

### Policies

**Policy 1.** That the County's program of identification, mapping, and evaluating the geologic, fire, flood safety hazard areas, and significant concentrations of hydrogen sulfide in oilfield areas, presently under way by various County departments, be continued.

**Policy 4.** The County shall encourage extra precautions be taken for the design of significant lifeline installations, such as highways, utilities, and petrochemical pipelines.

### Implementation Measures

**Implementation Measure F.** The adopted multi-jurisdictional Kern County, California Multi-Hazard Mitigation Plan, as approved by FEMA, shall be used as a source document for preparation of environmental documents pursuant to CEQA, evaluation of project proposals, formulation of potential mitigation, and identification of specific actions that could, if implemented, mitigate impacts from future disasters and other threats to public safety.

## 4.3. Seismically Induced Surface Rupture, Ground Shaking, and Ground Failure

### Implementation Measures

**Implementation Measure B.** Require geological and soils engineering investigations in identified significant geologic hazard areas in accordance with the Kern County Code of Building Regulations.

**Implementation Measure C.** The fault zones designated in the Kern County Seismic Hazard Atlas should be considered significant geologic hazard areas. Proper precautions should be instituted to reduce seismic hazard, whenever possible in accordance with state and County regulations.

**Implementation Measure G.** Route major lifeline components such as highways, utilities, petroleum or chemical pipelines around areas of high groundwater whenever possible. Where they must cross an area of high groundwater, plans, and permits shall require design features to accommodate extensive ground rupture without prolonged disruption of an essential service or threat to health and safety.

**Implementation Measure H.** Require that plans and permits for installation of major lifeline components such as highways, utilities, petroleum or chemical pipelines to incorporate design features to accommodate potential fault movement in areas of active faults without prolonged disruption of essential service or threat to health and safety.

**Implementation Measure I.** Design significant lifeline installations, such as highways, utilities, and petrochemical pipelines which cross an active fault, to accommodate potential fault movement without prolonged disruption of essential service or creating threat to health and safety.

### 4.4. Dam Failure, Flooding, and Inundation

#### Policies

**Policy 2.** Design discretionary critical facilities in the potential dam inundation area used for the storage, or use of hazardous materials to prevent onsite hazards from affecting surrounding communities in the event of inundation.

**Policy 3.** Require emergency response plans for the Planning Area to include specific procedures for the sequential and orderly evacuation of the potential dam inundation area.

#### Implementation Measures

**Implementation Measure A.** Facilities used for the manufacture, storage, and use of hazardous materials shall comply with the Uniform Fire Code, with requirements for siting or design to prevent onsite hazards from affecting surrounding communities in the event of inundation.

**Implementation Measure B.** Discretionary critical facilities within potential inundation areas shall be designed to mitigate or prevent effects of inundation.

### 4.5. Landslide, Subsidence, Seiche, and Liquefaction

#### Policies

**Policy 1.** Determine the liquefaction potential at sites in areas of shallow groundwater (Map Code 2.3) prior to discretionary development and determine specific mitigation to be incorporated into the foundation design, as necessary, to prevent or reduce damage from liquefaction in an earthquake.

**Policy 2.** Route major lifeline installations around potential areas of liquefaction or otherwise protect them against significant damage from liquefaction in an earthquake.

**Policy 3.** Reduce potential for exposure of residential, commercial, and industrial development to hazards of landslide, land subsidence, liquefaction, and erosion.

### Implementation Measures

**Implementation Measure B.** Require liquefaction investigations in all areas of high groundwater potential and appropriate foundation design to mitigate potential damage to buildings on sites with liquefaction potential.

**Implementation Measure C.** Develop and maintain maps, at an appropriate scale, showing the location of all geologic hazards, including active faults, Alquist-Priolo Earthquake Fault Zones, 100-year flood hazard boundary, the extent of projected dam failure inundation and time arcs, depth of inundation, land subsidence, slope failure and earthquake-induced landslides, high groundwater, and liquefaction potential.

**Implementation Measure D.** Discretionary actions will be required to address and mitigate impacts from inundation, land subsidence, landslides, high groundwater areas, liquefaction and seismic events through the CEQA process.

## 4.6. Wildland and Urban Fire

### Policies

**Policy 1.** Require discretionary projects to assess impacts on emergency services and facilities.

**Policy 3.** The County will encourage the promotion of fire prevention methods to reduce service protection costs and costs to taxpayers.

**Policy 5.** Require that all roads in wildland fire areas are well marked, and that homes have addresses prominently displayed.

**Policy 6.** All discretionary projects shall comply with the adopted Fire Code and the requirements of the Fire Department.

### Implementation Measures

**Implementation Measure A.** Require that all development comply with the requirements of the Kern County Fire Department or other appropriate agency regarding access, fire flows, and fire protection facilities.

## 4.8. Critical Facilities and Hazardous Buildings

### Policies

**Policy 5.** Incorporate planning for incidents affecting critical facilities into contingency plans for disaster response and recovery.

### Implementation Measures

**Implementation Measure L.** Require that plans and permits for installation of major lifeline components such as highways, utilities, and petroleum or chemical pipelines to incorporate

design features to accommodate potential fault movement in areas of active faults without prolonged disruption of essential service or threat to health and safety.

### 4.9. Hazardous Materials

#### Policies

**Policy 2.** Innovative technologies to manage hazardous waste streams generated in Kern County will be encouraged.

#### Implementation Measures

**Implementation Measure A.** Facilities used to manufacture, store, and use of hazardous materials shall comply with the Uniform Fire Code, with requirements for siting or design to prevent onsite hazards from affecting surrounding communities in the event of inundation.

**Implementation Measure B.** The proposed siting or expansion of hazardous waste facilities will be in conformance with the adopted Kern County and Incorporated Cities Hazardous Waste Management Plan.

### 4.10. Abandoned open Shafts and Wells

#### Policies

**Policy 2.** The County should protect residents from the hazards associated with development in areas where wells have been drilled and abandoned for exploration and/or production of oil and natural gas.

#### Implementation Measures

**Implementation Measure B.** Support the construction site review program of the Department of Oil, Gas, and Geothermal Resources that assures wells are precisely located, properly plugged and abandoned, and tested for leakage prior to development of the area.

## Chapter 5. Energy Element

### 5.2. Importance of Energy to Kern County

#### Goals

**General Goal:** To assert Kern County's position as California's leading energy producer, to encourage safe and orderly energy development within the County, including research and demonstration projects, and to become actively involved in the decisions and actions of other agencies as they affect energy development in Kern County.

#### Policies

**Policy 3.** The County shall continue to streamline energy permitting regulations.

**Policy 5.** The County shall work with other agencies to define regulatory responsibility concerning energy-related issues, and shall seek to eliminate, insofar as possible, duplicative regulations.

**Policy 7.** The processing of all discretionary energy project proposals shall comply with California Environmental Quality Act (CEQA) Guidelines directing that the environmental effects of a project must be taken into account as part of project consideration.

**Policy 8.** The County should work closely with local, state, and federal agencies to assure that energy projects (both discretionary and ministerial) avoid or minimize direct impacts to fish, wildlife, and botanical resources, wherever practical.

**Policy 9.** The County should develop and implement measures which result in long-term compensation for wildlife habitat, which is unavoidably damaged by energy exploration and development activities.

**Policy 10.** The County should require acoustical analysis for energy project proposals that might impact sensitive and highly-sensitive uses in accordance with the Noise Element of the General Plan.

## 5.3. Petroleum Resources and Development

### 5.3.1. Urban/Residential Development in Petroleum Resource Areas

#### Goals

**Goal.** To protect oil resource areas from unnecessary urban/suburban encroachment, and in instances of urban/suburban development in oil resource areas, to provide for the development of petroleum resources in a manner compatible with the surrounding environment to minimize adverse impacts and protect health and safety.

#### Policies

**Policy 1.** The County shall continue to assure adequate minimum setbacks between wells and from any existing structure, as permitted by the Kern County Zoning Ordinance.

**Policy 2.** The County shall assure adequate minimum setbacks between the construction of any structure and existing wells as permitted by the Kern County Fire Department and the State Division of Oil, Gas, and Geothermal Resources (DOGGR).

**Policy 3.** The County shall continue to provide the opportunity for establishing drilling islands prior to final maps subdivision approval of any proposal in a petroleum resource area or a waiver of surface entry rights by the applicable mineral rights holder.

**Policy 4.** All oilfield development shall take place in accordance with regulations administered by DOGGR.

**Policy 5.** New access roads to serve oilfield development should be sited to avoid traffic impacts.

**Policy 6.** In areas where petroleum production occurs close to urban development, oil companies shall be encouraged to site equipment so as to avoid unnecessary disturbance to urban uses.

**Policy 7.** The County should work in cooperation with incorporated cities of Kern County to establish compatible standards for oil development within urban areas.

**Policy 8.** Reduce the public's exposure to fires, explosions, blowouts, and other hazards associated with the accidental release of crude oil, natural gas, or hydrogen sulfide gas by ensuring that discretionary development projects have adequate separation from oil and natural gas production land uses.

### Implementation Measures

**Implementation Measure A.** The Drilling Island District of the Kern County Zoning Ordinance shall establish and maintain development standards to permit petroleum exploration and development on single lots and in small areas.

**Implementation Measure B.** The Petroleum Extraction Combining District of the Kern County Zoning Ordinance shall establish and maintain specific standards for ensuring compatibility with urban and petroleum development for the Estate (E), Commercial Office (CO), Neighborhood Commercial (C-1), General Commercial (C-2), and Highway Commercial (CH) zoning designations.

Oil and gas production shall be subject to provisions set forth in Chapter 19.98 of the Kern County Zoning Ordinance.

**Implementation Measure C.** The County shall monitor its regulations pertaining to petroleum exploration, production, and update such regulations as necessary.

## 5.3.2. Kern County's Economic Dependence on the Oil Marketplace

### Goals

**Goal.** To reduce the County's susceptibility to fluctuations in the petroleum production levels, and to encourage diversification of the economy.

### Policies

**Policy 3.** The County shall encourage the conversion of existing petroleum-related facilities to other productive uses when they are no longer needed or productive.

**Policy 4.** The County should encourage the development of renewable energy industries to diversify the energy economy in Kern County.

### 5.3.3. Waste Disposal in Petroleum Development

#### Goals

**Goal.** To encourage the safe recycling, transportation, and disposal of wastes associated with petroleum production and processing, and to provide for the siting of disposal facilities in locations with proper access, while minimizing adverse impacts on the environment and on public health and safety.

#### Policies

**Policy 1.** The County shall continue to acknowledge the necessity to site nonhazardous oilfield waste disposal sites near petroleum development to minimize transportation hazards and expenses, consistent with the provisions of the Kern County and Incorporated Cities Integrated Waste Management Plan.

**Policy 2.** The County shall encourage recycling and new treatment methods for hazardous and nonhazardous oilfield wastes.

**Policy 3.** The County shall work cooperatively with appropriate state and regional agencies to provide for the proper siting of oilfield waste disposal facilities.

#### Implementation Measures

**Implementation Measure A.** The County shall work with the California Department of Oil, Gas, and Geothermal Resources to maintain an inventory of onsite and offsite disposal facilities in order to identify the scope of oilfield waste disposal facilities in Kern County.

**Implementation Measure B.** The County shall address oilfield hazardous waste issues through the Kern County and Incorporated Cities Hazardous Waste Management Plan.

**Implementation Measure C.** The County shall continue to maintain provisions in the Zoning Ordinance to provide for oilfield waste disposal facilities.

**Implementation Measure D.** The County shall continue to maintain provisions in the Zoning Ordinance for the development of oilfield waste recycling and treatment facilities.

### 5.3.4. Petroleum Technology and Advancement

#### Goals

**Goal.** To encourage the continuing advancement of energy technology and to respond to the needs it creates on the work force.

#### Policies

**Policy 1.** The County should actively encourage research and demonstration projects which would be positive for Kern County and not in conflict with adopted plans and programs.

**Policy 2.** The County should encourage the energy resource industry to invest and research the practical advancement of technology, and allow for periodic updates or training sessions for industry workers.

### Implementation Measures

**Implementation Measure A.** The County should promote a continuing dialogue with petroleum industry representatives to monitor trends in technology and anticipate needed changes to development standards.

**Implementation Measure B.** The County shall review and revise, as necessary, the Zoning Ordinance to make provisions for experimental technologies.

## 5.3.5. Reuse of Nonproductive Petroleum Resource Areas

### Goals

**Goal.** To ensure the proper abandonment of petroleum production operations, in accordance with DOGGR requirements, when petroleum resource areas are depleted or are no longer productive, to provide for conversion of these areas to other land uses.

### Policies

**Policy 1.** The County shall promote safe well abandonment in accordance with DOGGR regulations through discretionary applications.

**Policy 2.** The County shall work with the DOGGR to ensure the removal of all surface equipment from abandoned petroleum development sites.

**Policy 3.** The County shall promote and encourage the safe reuse of former petroleum production lands by developments compatible with surrounding land use designations. The guidelines for site reestablishment include the following:

a. Removal of oil-laden soil
b. Shaping of disturbed lands back to natural grade and the elimination of pad areas, settling ponds, and similar disturbances.
c. Stabilization of sites by seedlings and plantings as appropriate.
d. Other measures as may be stipulated by the State Division of Oil, Gas and Geothermal Resources.
e. Proper identification and abandonment of all oil and natural gas wells.

### Implementation Measures

**Implementation Measure A.** Upon cessation of drilling and/or producing operations in drilling islands, the County will consider initiating zone changes for such drilling islands to zoning districts compatible with surrounding land uses, provided the owner/operator demonstrates proper

abandonment and cleanup in accordance with State Division of Oil, Gas and Geothermal Resources regulations.

### 5.3.6. Environmental Impacts of Petroleum Development

#### Goals

**Goal.** To clearly identify and mitigate any adverse impacts on the environment from new or continued petroleum development by establishing clear and workable methods for industry compliance.

#### Policies

**Policy 1.** The County should pursue programs to address oil production as it relates to state and federal threatened and endangered species protection laws.

**Policy 2.** The County shall work with affected state and federal agencies and special interest groups to establish consistent policies for environmental protection activities related to petroleum production and oilfield waste disposal.

**Policy 3.** The County should attempt to ensure that the petroleum industry does not bear a burden of environmental regulation in excess of its contribution to the problems.

**Policy 4.** The County should encourage the use of clean-burning technologies in petroleum production.

**Policy 5.** The County should encourage air pollution control policies which apply the burden equally to local and upwind sources and to all classes of air polluters.

**Policy 6.** The County should work closely with state and federal agencies to avoid or minimize direct impacts to threatened and endangered species.

#### Implementation Measures

**Implementation Measure B.** The County will continue to participate in programs, such as the proposed Kern County Valley Floor Habitat Conservation Plan program, which are intended to mitigate impacts of development on threatened or endangered species, including seeking state and federal funding for endangered species protection programs.

**Implementation Measure D.** Energy resource industries should participate in the Kern County Valley Floor Habitat Conservation Plan to mitigate impacts to threatened and endangered species.

### 5.3.7. Processing and Transportation of Petroleum Products

#### Goals

**Goal.** To ensure the siting of refining facilities and pipelines in locations to provide maximum health, safety, and environmental protection; and to encourage the necessary processing and transportation facilities for Kern County's petroleum production.

#### Policies

**Policy 1.** New refineries shall be sited in accordance with provisions of the Kern County Zoning Ordinance.

**Policy 2.** The County shall review proposed pipelines and their alignments for their conformity with the Land Use, Open Space, and Conservation Element of this General Plan.

**Policy 3.** The County shall encourage the development of new pipelines with alignments that provide for environmental and the public's health and safety protection.

#### Implementation Measures

**Implementation Measure A.** The County shall review and revise, as necessary, the Zoning Ordinance to provide for suitable sites for refinery construction and expansion.

**Implementation Measure B.** The County shall review and revise, as necessary, the Emergency Response Plan, to provide consistent and proper procedures to address refinery accidents and pipeline ruptures.

### 5.4. Electricity Resources and Generation

### 5.4.1. Cogeneration

#### Goals

**Goal.** To encourage the safe and orderly development of cogeneration facilities and increased utilization of cogeneration in oil production and other industries as a cleaner and more efficient means of generating both steam and electricity.

#### Policies

**Policy 1.** The County shall allow the continued development of cogeneration facilities in primary oil resource areas and industrial areas.

**Policy 3.** The County should encourage the construction of (an) interstate natural gas pipeline(s) to provide supplies of natural gas for cogeneration and thermally enhanced oil recovery in Kern County, provided that proposals are consistent with the goals and policies of the Land Use, Conservation, and Open Space Element of the Kern County General Plan.

### Implementation Measures

**Implementation Measure A.** The County shall continue to maintain provisions in the Zoning Ordinance to provide for the proper siting of cogeneration facilities in suitable areas.

### 5.4.7. Transmission Lines

### Goals

**Goal.** To encourage the safe and orderly development of transmission lines to access Kern County's electrical resources along routes, which minimize potential adverse environmental effects.

### Policies

**Policy 1.** The County should encourage the development and upgrading of transmission lines and associated facilities (e.g., substations) as needed to serve Kern County's residents and access the County's generating resources, insofar as transmission lines do not create significant environmental or public health and safety hazards.

**Policy 2.** The County shall review all proposed transmission lines and their alignments for conformity with the Land Use, Conservation, and Open Space Element of this General Plan.

**Policy 3.** In reviewing proposals for new transmission lines and/or capacity, the County should assert a preference for upgrade of existing lines and use of existing corridors where feasible.

**Policy 4.** The County should work with other agencies in establishing routes for proposed transmission lines.

**Policy 5.** The County should discourage the siting of above-ground transmission lines in visually sensitive areas.

**Policy 6.** The County should encourage new transmission lines to be sited/configured to avoid or minimize collision and electrocution hazards to raptors.

### Implementation Measures

**Implementation Measure B.** The County shall continue to maintain provisions in the Zoning Ordinance and update as necessary to provide for transmission line development.

## Metropolitan Bakersfield General Plan

The MBGP, a joint effort between the Kern County Planning Department and the City of Bakersfield Planning Division, was last adopted on December 11, 2007. The MBGP includes both city and unincorporated County lands. The MBGP describes the community's physical development as well as its economic, social and environmental goals and is currently undergoing an update. The Project Area includes a total of 152,040 acres of unincorporated County lands that are covered under the MBGP (7.41%). Project-related development on unincorporated lands

within the MBGP Planning Area would be subject to the following applicable policies and implementation measures of the MBGP, with respect to land use and planning.

## Chapter 2. Land Use Element

### Goals

**Goal 1.** Accommodate new development which captures the economic demands generated by the marketplace and establishes Bakersfield's role as the capital of the southern San Joaquin Valley.

**Goal 2.** Accommodate new development which provides a full mix of uses to support its population.

**Goal 3.** Accommodate new development which is compatible with and complements existing land uses.

**Goal 4.** Accommodate new development which channels land uses in a phased, orderly manner and is coordinated with the provision of infrastructure and public improvements.

### Policies

**Policy 31.** Allow for a variety of industrial uses, including land-extensive mineral extraction and processing, heavy manufacturing, light manufacturing, warehousing and distribution, transportation-related, and research and development uses (I-1).

**Policy 32.** Protect existing industrial designations from incompatible land use intrusions (I-1, I-6, I-8).

**Policy 33.** Encourage the efficient use of existing industrial land uses through consolidation of building and storage facilities (I-1, I-6, I-8).

**Policy 34.** Provide for the clustering of new industrial development adjacent to existing industrial uses and along major transportation corridors (I-1).

**Policy 35.** Encourage upgrading of visual character of heavy manufacturing industrial areas through the use of landscaping or screening-of visually unattractive buildings and storage areas (I-1, I-6, I-8).

**Policy 36.** Require that industrial uses provide design features, such as screen walls, landscaping and height, setback and lighting restrictions between the boundaries of adjacent residential land use designations so as to reduce impacts on residences due to light, noise, sound and vibration (I-1, I-6, I-8).

**Policy 37.** Street frontages along all new industrial development shall be landscaped (I-1, I-6, I-8).

**Policy 38.** Minimize impacts of industrial traffic on adjacent residential parcels through the use of site plan review and improvement standards (I-1, I-6).

**Policy 76.** Provide for a mix of land uses which meets the diverse needs of residents; offers a variety of employment opportunities; capitalizes, enhances, and expands upon existing physical and economic assets; and allows for the capture of regional growth (I-1).

**Policy 77.** Allow for the continuance of agricultural uses in areas designated for future urban growth (I-1).

**Policy 82.** Preserve existing significant sound residential neighborhoods, commercial districts, and industrial areas (I-1, I-6, I-8).

## Chapter III. Circulation Element

### A. Streets

#### Goals

**Goal 3.** Minimize the impact of truck traffic on circulation, and on noise sensitive land uses.

#### Policies

**Policy 6.** Design and locate site access driveways to minimize traffic disruption where possible considering items such as topography, past parcelization and other factors (I-7).

**Policy 7.** Minimize direct and uncontrolled property access from arterials (I-8).

**Policy 14.** Provide continuous truck routes within incorporated areas that provide access to designated industrial areas (I-13).

**Policy 15.** Prohibit trucks from non-truck routes within incorporated areas except as necessary for direct property access for pick-up and delivery (I-13).

**Policy 16.** Require that truck access to commercial and industrial properties be designed to minimize impacts on adjacent residential parcels (I-14).

**Policy 36.** Prevent streets and intersections from degrading below Level of Service "C" where possible due to physical constraints (as defined in a Level of Service Standard) or when the existing Level of Service is below "C" prevent where possible further degradation due to new development or expansion of existing development with a three part mitigation program: adjacent right-of-way dedication, access improvements and/or an area wide impact fee. The area-wide impact fee would be used where the physical changes for mitigation are not possible due to existing development and/or the mitigation measure is part of a larger project, such as freeways, which will be built at a later date (I-28, I-29).

**Policy 37.** Require new development and expansion of existing development to pay for necessary access improvements, such as street extensions, widenings, turn lanes, signals, etc., as identified in the transportation impact report as may be required for a project (I-30, I-31, I-32).

### Implementation Measures

**Implementation Measure 7.** Review all site plans for compliance with adopted drive approach design standards.

**Implementation Measure 8.** Review site plans, rezonings, and subdivision requests, with respect to access from arterials. Consider conditions of approval to minimize uncontrolled property access.

**Implementation Measure 14.** Amend the city and county Zoning Ordinances as needed to regulate truck access on properties adjacent to residential areas.

**Implementation Measure 25.** Maintain records of existing traffic volume and cumulative projections of traffic from new development to schedule projects for the Capital Improvement Program.

**Implementation Measure 26.** Establish guidelines for project design review based on traffic engineering standards (e.g., driveway design, onsite circulation) and the Level of Service Ordinance.

**Implementation Measure 28.** Periodic review and if needed, revision of adopted ordinances that includes a Level of Service standard for the city and county to include a definition of Level of Service "C", procedures for how it is measured, and mitigation measures to keep from exceeding the standard.

**Implementation Measure 29.** Periodic review and, if needed, revision of adopted guidelines for preparation of transportation impact reports, definition of undesirable impacts, and identification of mitigation procedures.

**Implementation Measure 33.** Periodic review and, if needed, revision of adopted Transportation Impact Fee Ordinance for the city and county, which specifies the area wide impact fee schedule and how the fees will be used.

## D. Parking

### Goals

**Goal 2.** Satisfy parking requirements in all new developments (residential, commercial, industrial, etc.) through off-street facilities.

### Policies

**Policy 3.** Ensure that adequate onsite parking supply and parking lot circulation is provided on all site plans in accordance with the adopted parking standards (1-3).

**Policy 4.** Discourage the intrusion of non-neighborhood parking in residential areas (1-4).

### Implementation Measures

**Implementation Measure** 3. Review all site plans for conformance with adopted parking standards.

## Chapter V. Conservation Element

### A. Biological Resources

### Goals

**Goal 1.** Conserve and enhance Bakersfield's biological resources in a manner which facilitates orderly development and reflects the sensitivities and constraints of these resources.

**Goal 2.** To conserve and enhance habitat areas for designated “sensitive” animal and plant species.

### Policies

**Policy 1.** Direct development away from “sensitive biological resource” areas, unless effective mitigation measures can be implemented (1·1, f-3, 1-4).

**Policy 2.** Preserve areas of riparian vegetation and wildlife habitat within floodways along rivers and streams, in accordance with the Kern River Plan Element and channel maintenance programs designed to maintain flood flow discharge capacity (1-4).

**Policy 3.** Discourage, where appropriate, the use of off-road vehicles to protect designated sensitive biological and natural resources (l-2).

**Policy 4.** Determine the feasibility of enhancing sensitive biological habitat and establishing additional wildlife habitat in the Project Area with state and/or federal assistance (1-3).

**Policy 5.** Determine the locations and extent of suitable habitat areas required for the effective conservation management of designated “sensitive” plant and animal species (1-3).

### Implementation Measures

**Implementation Measure 3.** Preserve habitat and avoid "take" of protected species as required in the Metropolitan Bakersfield Habitat Conservation Plan.

## B. Mineral Resources

### Goals

**Goal 1.** Protect areas of significant resource potential for future use.

**Goal 2.** Document areas of current mineral and energy resource extraction, as a basis for land use and conservation policies and programs.

**Goal 3.** Avoid conflicts between the productive use of mineral and energy resource lands and urban growth.

**Goal 4.** Protect land, water, air quality and visual resources from environmental damage resulting from mineral and energy resource development.

### Policies

**Policy 4.** Land use decisions shall recognize the importance of identified mineral resources and need for conservation of resources identified by the State Mining and Geology Board (I-2).

**Policy 7.** Promote development of compatible uses adjacent to mineral extraction areas (I-2).

**Policy 10.** Implement, as appropriate, the California Environmental Quality Act to minimize land use conflicts and reduce environmental impacts of all proposed resource extraction operations (I-2).

**Policy 11.** Prohibit incompatible development in areas which have a significant potential for harm to public health, safety and welfare due to mineral and petroleum extraction and processing (I-2).

**Policy 12.** Design resource extraction operations subject to discretionary permits to maintain the integrity of areas of "high environmental quality" and unique scenic value (I-2).

**Policy 14.** Review all discretionary mineral or petroleum development including renewal of existing authorizations, under the policies and procedures of the California Environmental Quality Act (I-4).

**Policy 15.** Require petroleum production sites in urban areas which are subject to discretionary permits, to install peripheral landscaping to help reduce the noise, dust and visual impacts to adjacent sensitive receptors and public ways (I-4).

**Policy 16.** Require all mineral development to be predicated on appropriate reclamation plans that meet the standards of the State Surface Mining and Reclamation Act and the implementing guidelines of the State Mines and Geology Board, and (or) the standards of the State Division of Oil and Gas. Reclamation/restoration of the sites shall be done as each phase of development or extraction is completed (I-4, I-5).

### Implementation Measures

**Implementation Measure 3.** Periodically review and update local Zoning Ordinances that have been amended to accommodate mineral extraction uses outside of mineral resource zones.

## C. Soils and Agriculture

### Goals

**Goal 1.** Provide for the planned management, conservation, and wise utilization of agricultural land in the Planning Area.

**Goal 2.** Promote soil conservation and minimize development of prime agricultural land as defined by the following criteria:

- capability Class I and/or II irrigated soils
- 80-100 Storie Index rating
- gross crop return of $200 or more per acre per year
- annual carrying capacity of 1 animal unit per acre per year

**Goal 3.** Establish urban development patterns and practices that promote soil conservation and that protect areas of agricultural production of food and fiber crops, and nursery products.

### Policies

**Policy 1.** Determine the extent and location of all prime agricultural land within the study area (I-1).

**Policy 2.** Review projects that propose subdividing or urbanizing prime agricultural land to ascertain how continued commercial agricultural production in the project vicinity will be-affected (I-2).

**Policy 4.** Monitor the amount of prime agricultural land taken out of production for urban uses or added within the plan area (I-3).

**Policy 7.** Land use patterns, grading, and landscaping practices shall be designed to prevent soil erosion while retaining natural watercourses when possible (I-4).

**Policy 12.** Prohibit premature removal of ground cover in advance of development and require measures to prevent soil erosion during and immediately after construction (I-4).

### Implementation Measures

**Implementation Measure 2.** Evaluate discretionary projects for their impact on agricultural resources.

**Implementation Measure 3.** Document urban expansion and changes in the amount of agricultural land for purposes of determining cumulative impacts to prime agricultural land.

## D. Water Resources

### Goals

**Goal 1.** Conserve and augment the available water resources of the Planning Area.

**Goal 2.** Assure that adequate groundwater resources remain available to the Planning Area.

**Goal 3.** Assure that adequate surface water supplies remain available to the Planning Area.

**Goal 4**. Continue cooperative planning for and implementation of programs and projects which will resolve water resource deficiencies and water quality problems.

**Goal 5.** Achieve a continuing balance between competing demands for water resource usage.

**Goal 6.** Maintain effective cooperative planning programs for water resource conservation and utilization in the Planning Area by involving all responsible water agencies in the planning process.

### Policies

**Policy 6.** Protect Planning Area groundwater resources from further quality degradation (I-7).

**Policy 8.** Consider each proposal for water resource usage within the context of total Planning Area needs and priorities-major incremental water transport, groundwater recharge, flood control, recreational needs, riparian habitat preservation and conservation (I-9).

**Policy 9.** Encourage and implement water conservation measures and programs (I-11).

### Implementation Measures

**Implementation Measure 6.** Support the provision of adequate wastewater collection systems and treatment reclamation and disposal facilities which will prevent groundwater degradation by onsite wastewater systems.

**Implementation Measure 7.** Maintain industrial waste discharge regulation and monitoring programs which protect the Planning Area groundwater from contaminants.

**Implementation Measure 10.** Support additional water conservation measures and programs of benefit to the Planning Area.

### E. Air Quality

#### Goals

**Goal 1.** Promote air quality that is compatible with health, wellbeing, and enjoyment of life by controlling point sources and minimizing vehicular trips to reduce air pollutants.

**Goal 2.** Continue working toward attainment of federal, state and local standards as enforced by the San Joaquin Valley Unified Air Pollution Control District.

**Goal 3.** Reduce the amount of vehicular emissions in the Planning Area.

#### Policies

**Policy 1.** Comply with and promote San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) control measures regarding Reactive Organic Gases (ROG). Such measures are focused on: (a) steam driven well vents, (b) Pseudo-cyclic wells, (c) natural gas processing plant fugitives, (d) heavy oil test stations, (e) light oil production fugitives, (f) refinery pumps and compressors, and (g) vehicle inspection and maintenance (I-1).

**Policy 2.** Encourage land uses and land use practices which do not contribute significantly to air quality degradation (I-1).

**Policy 3.** Require dust abatement measures during significant grading and construction operations (I-1).

**Policy 5.** Consider the location of sensitive receptors such as schools, hospitals, and housing developments when locating industrial uses to minimize the impact of industrial sources of air pollution (I-1).

## Chapter VI. Open Space Element

#### Goals

**Goal 3.** Locate and site development to minimize the disruption of open space areas.

#### Policies

**Policy 1.** Promote the establishment, maintenance and protection of the Planning Area's open space resources, including the following:

a. Conservation of natural resources (refer to Chapter II-Land Use, Chapter V-Conservation, and Chapter XII Kern River Plan Element).
    - Kern River corridor
    - Management of hillsides
b. Managed production of resources

- Agriculture (refer to Chapter V-Conservation/Soils and Agriculture)
- Oil production (refer to Chapter V-Conservation/Mineral Resources)

c. Outdoor recreation

- Parks (refer to Chapter XI-Parks)
- Kern River corridor (refer to Chapter II-Land Use, Chapter V Conservation, and Chapter XII-Kern River Plan Element)

d. Public health and safety

- Hazard avoidance (refer to Chapter VIII-Safety)

**Policy 5.** Development location and siting should be sensitive to its relationship to the Kern River (I-3).

**Policy 9.** Encourage depleted resource extraction sites to be restored as alternative open space or developed with uses compatible with those adjacent (I-5).

## Chapter VII. Noise Element

### Goals

**Goal 1.** Ensure that residents of the Bakersfield Metropolitan Area are protected from excessive noise and existing moderate levels of noise are maintained.

**Goal 2.** Protect the citizens of the Planning Area from the harmful effects of exposure to excessive noise, and protect the economic base of the area by preventing the encroachment of incompatible land uses near known noise-producing roadways, industries, railroads, airports and other sources.

### Policies

**Policy 1.** Identify noise-impact areas exposed to existing or projected noise levels exceeding 65 dB CNEL (exterior) or the performance standards described in Table VII-2. The noise exposure contour maps on file at the City of Bakersfield and County of Kern indicate areas where existing and projected noise exposures exceed 65 dB CNEL (exterior) for the major noise sources identified (I-1 ).

**Policy 2.** Prohibit new noise-sensitive land uses in noise-impacted areas unless effective mitigation measures are incorporated into project design to reduce noise to acceptable levels. (I-2, I-3, I-6, I-7).

**Policy 3.** Review discretionary industrial, commercial or other noise-generating land use projects for compatibility with nearby noise-sensitive land uses. Additionally, the development of new noise-generating land uses which are not preempted from local noise regulation will be reviewed

if resulting noise levels will exceed the performance standards contained within Table VII-2 in areas containing residential or other noise-sensitive land uses (I-3, I-6, I-7).

**Policy 5.** Encourage vegetation and landscaping along roadways and adjacent to other noise sources in order to increase absorption of noise (I-7).

### Implementation Measures

**Implementation Measure 2.** Review discretionary development plans, programs and proposals, including those initiated by both the public and private sectors, to ascertain and ensure their conformance to the policy framework outlined in this element.

**Implementation Measure 4.** Require proposed commercial and industrial uses or operations to be designed or arranged so that they will not subject residential or other noise sensitive land uses to exterior noise levels in excess of 65 dB CNEL and interior noise levels in excess of 45 dB CNEL and so that impacts on noise sensitive uses shall not exceed the performance standards in Table VII-2.

At time of any discretionary approval, such as a request for zone change or subdivision, the developer may be required to submit an acoustical report indicating the means by which the developer proposes to comply with the noise standards. The acoustical report shall:

a. Be the responsibility of the applicant.

b. Be prepared by a qualified acoustical consultant experienced in the fields of environmental noise assessment and architectural acoustics.

c. Include representative noise level measurements with sufficient sampling periods and locations to adequately describe local conditions.

d. Include estimated noise levels in terms of CNEL and the standards of Table VII-2 (if applicable) for existing and projected future (10-20 years hence) conditions, with a comparison made to the adopted policies of the Noise Element.

e. Include recommendations for appropriate mitigation to achieve compliance with the adopted policies and standards of the Noise Element.

f. Include estimates of noise exposure after the prescribed mitigation measures have been implemented. If compliance with the adopted standards and policies of the Noise Element will not be achieved, a rationale for acceptance of the project must be provided.

**Implementation Measure 10.** Standards for Project Noise Impacts for Mobile Sources. A significant increase of existing ambient noise levels affecting existing noise sensitive land uses (receptors), and requiring the adoption of practical and feasible mitigation measures, is deemed to occur where a project will cause:

- An increase of the existing ambient noise level by 5 dB or more, where the existing ambient level is less than 60 dB CNEL;

- An increase of the existing ambient noise level by 3 dB or more, where the existing ambient level is 60 to 65 dB CNEL;
- An increase of the existing ambient noise level by 1.5 dB or more, where the existing ambient level is greater than 65 dB CNEL.

Standards for Cumulative Noise Impacts for Mobile Sources. A project's contribution to noise increase would normally be considered cumulatively considerable and considered significant when ambient noise levels affect noise sensitive land uses (receptors) and when the following occurs.

- A project increases the ambient (cumulative without project) noise level by 1 dB or more; and
- The cumulative with project noise levels cause the following:
  - An increase of the existing ambient noise level by 5 dB or more, where the existing ambient level is less than 60 dB CNEL;
  - An increase of the existing ambient noise level by 3 dB or more, where the existing ambient level is 60 to 65 DB CNEL;
  - An increase on the existing ambient noise level by 1.5 dB or more, where the existing ambient level is greater than 65 dB CNEL.

## Chapter VIII. Safety Element

### A. Seismic Safety

### Goals

**Goal 1.** Substantially reduce the level of death, injury, property damage, economic and social dislocation and disruption of vital services that would result from earthquake damage.

**Goal 2.** Ensure the availability and effective response of emergency services following an earthquake.

**Goal 4.** Prevent loss of life from the failure of critical facilities in an earthquake and ensure the continued functioning of essential facilities following a disaster.

**Goal 5.** Protect essential lifelines and prevent casualties and major social and economic disruption due to liquefaction in an earthquake.

**Goal 7.** Protect land uses from the risk of dam failure inundation including the assurances that: the functional capabilities of essential facilities are available in the event of a flood; hazardous materials are not released; effective measures for mitigation of dam failure inundation are incorporated into the design of critical facilities; and the rapid and orderly evacuation of populations in the inundation area will occur.

### Critical Facilities Policies

#### Policies

**Policy 4.** Encourage critical facilities in dam inundation areas to develop and maintain plans for safe shut-down and efficient evacuation from their facilities, as appropriate to the degree of flood hazard for each facility (I-26, I-31).

**Policy 5.** Incorporate planning for incidents affecting critical facilities into contingency plans for disaster response and recovery (I-31).

### Fault Rupture Policies

#### Policies

**Policy 12.** Design significant lifeline installations such as highways, utilities and petrochemical pipelines which cross an active fault, to accommodate potential fault movement without prolonged disruption of an essential service or creating threat to health and safety (I-16).

### Liquefaction Policies

#### Policies

**Policy 13.** Determine the liquefaction potential at sites in areas of high groundwater prior to development and determine specific mitigation to be incorporated into the foundation design, as necessary to prevent or reduce damage from liquefaction in an earthquake (I-17 through I-19).

**Policy 14.** Route major lifeline installations around potential liquefaction areas or otherwise protect them against significant damage from liquefaction in an earthquake (I-20).

### Dam Failure Inundation Risk Policies

#### Policies

**Policy 18.** Design discretionary critical facilities located within the potential inundation area for dam failure in order to: mitigate the effects of inundation on the facility; promote orderly shut-down and evacuation (as appropriate); and, prevent onsite hazards from affecting building occupants and the surrounding communities in the event of dam failure (I-26).

**Policy 19.** Design discretionary facilities in the potential dam inundation area used for the manufacture, storage or use of hazardous materials to prevent onsite hazards from affecting surrounding communities in the event of inundation (I-27).

**Policy 20.** Require emergency response plans for the Planning Area to include specific procedures for the sequential and orderly evacuation of the potential dam inundation area (I-28).

### Implementation Measures

**Implementation Measure 2.** Require detailed site studies for ground shaking characteristics, liquefaction potential, dam failure inundation and flooding potential, and fault rupture potential, as background to the design process for critical facilities under city and county discretionary approval.

**Implementation Measure 3.** Require structures that are within the plan area and are subject to Building Department review to adhere to the most current seismic standards adopted as part of the Uniform Building Code.

**Implementation Measure 4.** Review existing critical facilities for any significant siting, design or construction problems that would make them vulnerable in an earthquake. The findings shall be incorporated into emergency operations plans as well as addressed in longer-term programs of facilities upgrading or relocation.

**Implementation Measure 10.** Develop appropriate criteria and procedures for third-party review of the seismic design of critical facilities.

**Implementation Measure 16.** Require plans and permits for installation of major lifeline components such as for highways, utilities and petroleum or chemical pipelines to incorporate design features to accommodate potential fault movement in areas of active faults without prolonged disruption of an essential service or threat to health and safety.

**Implementation Measure 17.** Require liquefaction investigations in all areas of high groundwater potential and appropriate foundation designs to mitigate potential damage to buildings on sites with liquefaction potential.

**Implementation Measure 20.** Route major lifeline components such as for highways, utilities and petroleum or chemical pipelines around areas of high groundwater wherever possible. Where they must cross an area of high groundwater, plans and permits shall require design features to accommodate extensive ground rupture without prolonged disruption of an essential service or threat to health and safety.

**Implementation Measure 26.** Develop procedures for the discretionary review of critical facilities proposed in an area of potential dam inundation. Approvals shall include requirements that emergency shut-down and facility evacuation plans be developed, maintained and exercised for each facility, and the potential effects of inundation on essential facility functions and the safety of occupants and the community in general are addressed.

**Implementation Measure 27.** Facilities used for the manufacture, storage or use of hazardous materials shall comply with the uniform fire code, with requirements for siting or design to prevent onsite hazards from affecting surrounding communities in the event of inundation.

**Implementation Measure 28.** Incorporate specific plans for the sequential and orderly evacuation of the potential dam inundation area into emergency response plans.

**Implementation Measure 29.** Maintain effective disaster response and earthquake response plans and update on a regular basis.

### B. Flooding

#### Goals

**Goal 1.** Minimize hazards to Planning Area residents resulting from flooding.

**Goal 2.** Reduce the risk of flooding to land uses.

#### Policies

**Policy 1.** Develop specific standards which apply to development located in flood hazard areas, as defined by federal Flood Insurance maps and most recent information as adopted by the responsible agency (I-1, I-2).

#### Implementation Measures

**Implementation Measure 2.** Develop procedures for the review of proposed facilities which use, manufacture or store hazardous materials proposed in areas of identified flood hazard.

### C. Pubic

#### Goals

**Goal 1.** Ensure that the Bakersfield metropolitan area maintains a high level of public safety for its citizenry.

**Goal 4.** Assure that fire, hazardous substance regulation and emergency medical service problems are continuously identified and addressed in a proactive way, in order to optimize safety and efficiency

#### Policies

**Policy 1.** Identify future site locations, projected facility expansions, projected site acquisition costs, construction costs and operational costs in a manner that would maximize the efficiency of new public safety services (I-1, I-2, I-3).

**Policy 2.** Require discretionary projects to assess impacts on police and fire services and facilities (I-3).

**Policy 7.** Enforce ordinances regulating the use/manufacture/sale, transport/disposal of hazardous substances, and require compliance with state and federal laws regulating such substances.

**Policy 8.** The Kern County and Incorporated Cities Hazardous Waste Management Plan and Final Environmental Impact Report serves as the policy document guiding all facets of hazardous waste.

**Policy 12.** Where recommended by appropriate local, state or federal agencies for discretionary projects, soils shall be tested for concentrations of agricultural chemicals prior to grading permit approval whenever feasible. Contaminated soils shall be excavated and disposed of at a certified hazardous waste disposal facility whenever necessary.

**Policy 16.** All new discretionary development projects shall be subject to environmental and design review on a site-specific, project-by-project basis, including but not limited to an assessment to determine whether hazardous materials present potential health effects to human health as required by the Department of Environmental Services.

### Implementation Measures

**Implementation Measure 2.** Funding for Police and Fire equipment and facilities will be facilitated through bond issues and/or development fees and/or land dedications and/or assessment districts.

## Chapter X. Public Services and Facilities Management Element

### A. General Utility Services

**Goal 4.** Develop funding principles and programs which will assure that all new development will pay for the incremental costs of the public facilities and services--utilities bridges, parks, and public safety facilities--both onsite and offsite, to serve such development.

### Policies

**Policy 5.** Require all new development to pay its pro rata share of the cost of necessary expansion in municipal utilities, facilities and infrastructure for which it generates demand and upon which it is dependent (I-3).

### Implementation Measures

**Implementation Measure 4.** Create benefit assessment districts or establish service fees for the distribution of costs to users for capital improvement replacement costs and maintenance, utilizing such districts for the financing of improvements which are essential to Planning Area development.

### B. Water Distribution

### Goals

**Goal 1.** Ensure the provision of adequate water service to all developed and developing portions of the Planning Area.

### Policies

**Policy 3.** Require that all new development proposals have an adequate water supply available (I-3, I-4).

### Implementation Measures

**Implementation Measure 3.** Review, and modify as required, existing fee structures and ordinances to assure desired system financing and policy implementation.

## C. Sewer Service

### Goals

**Goal 1.** Ensure the provision of adequate sewer service to serve the needs of existing and planned development in the Planning Area.

### Implementation Measures

**Implementation Measure 6.** Exclusive of County Service Area No. 71, developers shall be required to install dry sewer lines in streets and connections thereto for parcels less than 1 acre (net) in size in areas where a centralized sewer system is planned and imminent and where onsite systems can be proven to be temporarily satisfactory.

Within County Service Area No. 71, a proposed development at a density greater than one dwelling unit per three gross acres, as well as all commercial and industrial developments, shall be required to be served by a regional sewage collection and treatment system subject to the following provisions:

1. All new development (commercial, industrial and residential at densities greater than one dwelling unit per three gross acres}, including both discretionary and ministerial projects, shall be required to connect to public sewer when said development is located 1 ,000 feet or closer to available public sewer.

   If public sewer is more than 1 ,000 feet from development, a dry sewer system in conjunction with approved individual septic systems may be utilized for lots having an area of 10,000 square feet or larger. Dry sewer systems are not required for lots of three gross acres or larger. Single residential lots that require a ministerial permit shall connect to public sewer when located 200 feet or closer to available public sewer. Single residential lots less than three gross acres that are greater than 200 feet from available public sewer are required to install dry sewer in accordance with the requirements of the Engineering and survey.

2. All new development (commercial, industrial and residential at densities greater than one dwelling unit per three gross acres), including both discretionary and ministerial projects, shall pay a sewer development fee where the Board of Supervisors has adopted a planned sewer area and install dry sewer within the project development when located in excess of 1 ,000 feet from public sewer or where sewer service is not available as determined by the Engineering and Survey Services Department. The fee amount shall be based on the property's pro rata share of all conveyance, facility and capacity costs. Single residential lots that are greater than 200 feet from available public sewer are required to install dry

sewer in accordance with the requirements of the Engineering and Survey Services Department.

3. In those cases where sewer service will not be available as determined by the Sewer Master Plan, an exemption may be granted by the Engineering and Survey Services Department.

4. All new development (commercial, industrial, and residential at densities greater than one dwelling unit per three gross acres) shall be required to annex to an existing County Service Area (CSA) or form a new CSA if none is already in place. In conjunction with formation of, or annexation to, a CSA, applicants shall be required to form a Zone of Benefit for the purpose of constructing and maintaining a sewer trunk line.

### D. Storm Drainage

#### Goals

**Goal 1.** Ensure the provision of adequate storm drainage facilities to protect Planning Area residents from flooding resulting from storm water excess.

## Kern River Plan Element

The Kern River Plan Element governs land use within the Kern River Planning Area. The Element was prepared as a joint effort by the City of Bakersfield and Kern County. The following Kern River Plan Element policies are applicable to the proposed Project for all unincorporated county lands within the Kern River Planning Area.

## Chapter III. Issues, Goals, and Basic Plan Policies

### 3.2. Open Space Versus Development

#### Policies

**Policy 11.** New or relocated utility lines shall be placed underground, except in areas subject to intensive agricultural uses, areas designated as A.4 (Mineral and Petroleum) and electrical power lines to oil wells, water wells, and water control devises in areas designated as 8.5 (Resource Management) unless otherwise required by law, and at River crossings, or where it can be shown that the specific nature of the facility is such that it is entirely infeasible to do so.

### 3.4. Floodplain Management

#### Policies

**Policy 9.** Oil and mineral exploration and production shall be allowed within the secondary floodway, provided that adverse effects on riparian vegetation and wildlife habitat are minimized. Appurtenant facilities, such as tank farms and steam generators, shall be located outside any floodway; except that they may be allowed within the 8.4/2.5 (Mineral and Petroleum/Secondary

Floodway) upon showing by the operator that no other location is reasonably available for then, the proposed location and extent of construction is necessary for the operation of wells in the immediate vicinity, and the intent of this plan for the secondary floodway is followed.

**Policy 10.** Resource extraction activities, such as sand and gravel removal, shall comply with the "California Surface Mining and Reclamation Act of 1975."

### 3.5. Private Property and Public Use

#### Policies

**Policy 2.** Open space qualities of the Kern River primary and secondary floodway shall be protected consistent with policies of this plan, regardless of whether the land is in public or private ownership.

### 3.6. Mineral and Petroleum

#### Goals

**Goal.** To provide for the continued production of petroleum resources and to ensure that future exploration activities can take place, while ensuring that other open space values in the River area are reasonably protected. Utilize sand and gravel resources of the River in such a way as to ensure that floodway, groundwater recharge, and wildlife habitat values are protected.

#### Policies

**Policy 1.** Sand and gravel removal shall be done in such a manner as not to degrade, or otherwise adversely affect, the natural and scenic qualities of the Kern River, riparian vegetation, or wildlife habitat except as is necessary or appropriate to maintain the required channel capacity for flood control in the primary floodway.

**Policy 2.** Petroleum or sand and gravel activities proposed within the primary floodway shall conform to the specific requirements of the State Reclamation Board and other state and local regulatory agencies.

**Policy 3.** Petroleum extraction zone overlays and drilling island delineation shall be established in areas designated for resource uses for the purpose of protecting natural vegetation and wildlife. Brush clearing, moving of vegetation, and similar activities shall be permitted only to the extent required for those activities and a reclamation plan prepared.

**Policy 4.** Noise abatement measures shall be required of all resource management activities which would adversely affect adjacent land uses or wildlife habitat.

**Policy 5.** Mineral and petroleum exploration and extraction activities are permitted in the primary and secondary floodways subject to regulations, to be adopted within a two-year period by the County and City to accomplish the goals and policies of this Element and to mitigate adverse impacts which may otherwise result from construction of facilities and access thereto. Such

regulations shall include, but need not be limited to, requirements limiting the impact of access and facilities construction upon adjacent areas, prohibiting activities creating obstructions to floodflow, estab1ishing minimal standards for flood proofing all wells, pumps and associated equipment, specifying spill prevention control and counter-measure plans and emergency procedures, and specifying site and access restoration,.

## Chapter IV. Map Provisions and Policies

The intent of this plan with regard to the Primary and Secondary Floodways of the Kern River is that:

- No development or physical improvements for uses in the Primary Floodway which would restrict flows, interfere with groundwater recharge or increase the rise in water surface during high flows of the Kern River, or displace the primary floodway will be permitted.
- Limited development, with an emphasis on preserving open space within the area of the Secondary Floodway, with recognition of the potential flood hazard that exists therein, may be permitted.

### 4.8. Industrial

#### Policies

**Policy 5.** Industrial areas should be separate from residential areas to protect both homes and factories.

**Policy 6.** Industrial areas adjacent to the Kern River primary or secondary floodway should be buffered by landscaping or vegetation to provide the least possible conflict with open space values of the River.

## Chapter V. Implementation Policies

### B. Open Space and Development

#### Implementation Policies

**Implementation Policy 2.** Any new non-open space development, including projects by public agencies, shall not occur without prior City or County approval of a "Development Plan." The "Development Plan" shall be reviewed for completeness and consistency with the following guidelines:

a. Elevation drawings of all proposed structures and signs.

b. Landscaping plan which provides for screening of obnoxious uses and respects existing views of the Kern River channel.

c. Grading and revegetation plan.

d. Plot plan or recent aerial photograph depicting existing uses and natural vegetation cover.

e. A biota survey and analysis of effects which development would impose on any significant identified biota.

f. A certified delineation of the primary and secondary floodways, if applicable to the site, depicting both predevelopment conditions and future development conditions.

g. Other standard zoning and subdivision ordinance requirements in force at the time of application.

**Implementation Policy 4.** All new development and accessory uses, excepting wells, shall maintain a minimum setback of 90 feet from the primary floodway line. If not feasible to do so because of lot size or configuration, new development, including accessory uses, shall maintain a setback from the primary floodway line of 60% or greater of the distance between the primary floodway line and the point of the lot farthest from the primary floodway.

**Implementation Policy 5.** In order to preserve views of the River, reasonable height limits will be imposed through the "Development Plan" review process on any new non-open space development within any floodway. Criteria for height limits shall be based on existing site factors, such as surrounding land use, vegetation, and distance to the Kern River course.

**Implementation Policy 6.** Grading and filling for any new non-open space development shall not commence until approval under a "Development Plan."

**Implementation Policy 7.** New or relocated utility lines shall be placed underground, except in areas subject to intensive agricultural uses, 8.4 areas (Mineral and Petroleum), and at River crossings or where it can be shown that the specific nature of the facility is such that it is entirely infeasible to do so.

### C. Riparian Vegetation

### Implementation Measures

**Implementation Policy 1.** The City and County shall develop a master list of plant species for criteria to approve “Development Plans.” This list shall be considered for incorporation into this plan by General Plan Amendment. Revegetation or landscaping with native or compatible shrubs and trees shall be required as part of all public and private projects. Areas of unique habitat value, such as the Mesquite-Saltbush Association in the vicinity of Enos lane, shall be preserved in accordance with the City’s approved plan for use of the 2,800-acre recharge area and River channel maintenance.

**Implementation Policy 2.** Prior to any development within the Kern River Plan boundaries, including residential, commercial, industrial, recreational, water recharge, channel improvement, and resource recovery projects, a landscaping plan shall be submitted to the respective City or County Planning Department for review and approval.

**Implementation Policy 3.** For all new development in residentially, commercially, and industrially zoned properties within the plan boundaries, the River setback area shall be either landscaped or revegetated. Except as might be required by the City or County Fire Department, no clearing of shrubs or tree cutting will be allowed unless otherwise provided for by this plan.

### F. Mineral and Petroleum Extraction

#### Implementation Measures

**Implementation Policy 1.** The City and County shall revise, within two years from adoption of this plan, mineral and petroleum extraction regulations and provisions of their respective floodplain Zoning Ordinances consistent with all plan policies and incorporate the following features:

a. Strict limits on residential development.

b. Restrictions on the removal of riparian vegetation.

c. Noise limits when adjacent to highly sensitive and sensitive land uses.

d. Requirements for aesthetic treatment (painting, landscaping, screening) of production facilities (i.e., oil pump units, tanks, gravel crushers, etc.) located within the plan boundaries.

e. Allowance for sand and gravel operations necessary to the Kern River floodway or floodplain.

f. Allowances for petroleum extraction to occur with and without public hearing requirements and subject to a set of standard requirements, as in "a" through "d" above.

**Implementation Policy 2.** Mineral and petroleum extraction shall be encouraged on those lands designated “Mineral and Petroleum” on the Kern River Plan Map. Such use may also occur in other areas designated for recreation, resource, or industrial uses as long as the primary designated use is not significantly impaired and as long as such use is consistent with other provisions of this plan and in compliance with existing local, state, and federal regulations.

## Kern County Specific Plans

Kern County has adopted 24 Specific Plans for properties within the Project Area. These Specific Plans are intended to be an amplification of the goals and policies of the KCGP and are, therefore, consistent therewith. As depicted in Figure 4.10-3, less than 8% of the Project Area is located wholly or partially within adopted Specific Plan areas. Future oil and gas exploration and production activities that would be authorized under the proposed Amendment to Chapter 19.98 (Oil & Gas Production) of the Kern County Zoning Ordinance that would be located within the boundary of an adopted Specific Plan would be regulated according to County zoning, with the exception of the Specific Plans identified as Tier 5.

Each Specific Plan area has one of the following General Plan Map Codes:

**Map Code 4.1 (Accepted County Plan Areas)** - A designation of areas for which Specific Plans or Rural Community Plan have been adopted and incorporated into the Kern County General Plan.

**Map Code 4.2 (Interim Rural Community Plan)** - A designation used to identify area in the County for which Interim Rural Community Plan Maps have been prepared and are in effect until formal Specific Plans can be adopted for each respective community. No formal text plans have been adopted and the goals and policies of the Kern County General Plan govern any development within these areas.

**Map Code 4.3 (Specific Plan Required)** - A designation applied to areas wherein large-scale projects have been previously proposed by the project landowner(s) for which a specific plan has not yet been adopted. Areas designated Map Code 4.3 shall be subject to development, consideration, and adoption of a specific plan in accordance with all applicable local and state requirements.

Of the 24 designated Specific Plan Areas within the Project Area, 13 are designated General Map Code 4.3, meaning that the area has been designated as a Specific Plan Area for future development, but a Specific Plan has not yet been prepared. These areas are:

- Bear Trap
- Buena Vista Hills
- Commanche
- Grapevine Commercial
- Hudson Ranch
- Neumarkel
- Rancheria Specific Plan
- Tejon Creek No. 1
- Tejon Creek No. 2
- Tejon Hills
- Tunis Creek
- Tunis Ridge
- White Wolf

In addition, five of the 24 designated Specific Plan areas, which are designated General Map Code 4.2 include a map only and do not include an official Rural Community Plan. These areas are:

- Fellows
- Mettler
- Mexican Colony – Cherokee Strip
- Pond
- Smith's Corner

Of the remaining Specific and Rural Community Plans (General Map Code 4.1 and 4.2), the following plans contain no relevant policies related to oil and gas development:

- Blackwells Corner
- Beech Avenue Industrial Park
- Buttonwillow
- Kern River (Westside) Freeway
- I-5 and 58 Rural
- Oglesby
- Tejon Industrial Complex East
- Tejon Mountain
- Woody Rural

## Specific Plan Policies, Goals, and Implementation Measures

The following Specific and Rural Community Plans contain the relevant goals, policies, and implementation measures with respect to oil and gas development. Figure 4.10-3 depicts Specific and Rural Community Planning areas for which a Specific Plan or Rural Community Plan has been adopted.

### Lost Hills Specific Plan - 1978

### Open Space and Conservation Element

- Other lands contributing to open space are the natural resource lands in the southwest portion of the plan area. This oil and gas field should be maintained in open space to minimize activities that would restrict its production. As production of oil and gas decreases significantly (1990-2000), these lands should remain in open space as agriculture.

### Dustin Acres Rural Community Plan - 1983

The Final Environmental Impact Report (FEIR) prepared for the Dustin Acres Rural Community Plan identifies the following mitigation measures with regard to noise attenuation:

D. Location of oil wells should be sited so as not to create excessive noise or nuisance to adjacent residents.

### Section III, Plan Policies and Objectives

#### Subsection C, Open Space and Conservation Plan Policy

- To provide resource management and open space by directing development activities away from designated resource areas.

#### Objectives

2. In areas with a resource designation on the specific plan map, only industrial activities which directly and obviously relate to the exploration, production, and transportation of mineral or petroleum resources wi11 be considered to be consistent with this plan.

### Implementation

- Precisely zone intensive agriculture resource areas a minimum of twenty acres gross lot size. Mineral and Petroleum Resource areas shall be precisely zoned for a minimum of 5 acres gross lot size. Zoning for resource designated areas shall be consistent with the Land Use Consistency Matrix.

## Valley Acres Rural Community Specific Plan - 1983

The Final Environmental Impact Report (FEIR) prepared for the Valley Acres Rural Community Specific Plan identifies the following mitigation measures with regard to noise attenuation:

D. Location of oil wells should be sited so as not to create excessive noise or nuisance to adjacent residents.

## Section III, Plan Policies and Objectives

### Subsection C, Open Space and Conservation Plan Policy

- To provide resource management and open space by directing development activities away from designated resource areas.

### Objectives

2. In areas with a resource designation on the specific plan map, only industrial activities which directly and obviously relate to the exploration, production, and transportation of mineral or petroleum resources wi11 be considered to be consistent with this plan.

### Implementation

- Precisely zone intensive agriculture resource areas a minimum of twenty acres gross lot size. Mineral and Petroleum Resource areas shall be precisely zoned for a minimum of 5 acres gross lot size. Zoning for resource designated areas shall be consistent with the Land Use Consistency Matrix.

## Derby Acres Rural Community Specific Plan - 1984

## Section VIII. Resource

1. In areas with a resource designation, only industrial activities which directly and obviously relate to the exploration, production, and transportation of mineral and petroleum resources are consistent with this Plan. (Mineral and Petroleum [Map Code 8.4]).

B. Petroleum related Industrial activities are permitted in the 8.4 Map Code Area. Industrial uses, such as those permitted in Map Code 7.15, would be considered consistent if sited pursuant to Section 7188.3 (conditional use permit in the Natural Resource [NR] zone). Should actual and necessary industrial sites be proposed in the 8.4 Map code areas, provision for ample and safe access to State Highway 33 must be provided which does

not include the local residential street system of the community.

## McKittrick Rural Community Plan - 1984

- Due to the large number of hazardous old wells in the Plan area, the California Division of Oil and Gas must be consulted prior to entering or modifying any well encountered during future construction.

### Rural Community Plan Map

- Mineral and Petroleum (Map Code 8.4) Areas which contain producing or potentially productive petroleum fields and mineral deposits. Uses are limited to activities directly associated with the resource extraction. Minimum parcel size is five acres gross.

### Section VIII. Resource

1. In areas with a resource designation, only industrial activities which directly and obviously relate to the exploration, production, and transportation of mineral and petroleum resources are consistent with this Plan.

## Tupman Rural Community Specific Plan - 1984

### Section III, Plan Policies and Objectives

#### Subsection 3, Open Space and Conservation

#### Objective

- To provide resource management and open space by directing development activities away from designated resource areas.

#### Policy

1. In areas with a resource designation on the Specific Plan Map, only industrial activities which directly and obviously relate to the exploration, production, and transportation of mineral or petroleum resources will be considered to be consistent with this Plan.

#### Implementation

- Mineral and Petroleum Resource areas shall be precisely zoned for a minimum of 5 acres gross lot size. Zoning for resource designated areas shall be consistent with the Land Use Consistency Matrix.

## Casa Loma Specific Plan - 1986

Section 13.2.22 notes that the plan policies related to private oil pipelines and related construction facilities

- Shall not be construed to apply to the construction, installation, operation, and maintenance of pipelines for the transmission of crude oil operated by private enterprises; provided, however, before any right-of-way for transmission lines is acquired for regional or interstate facilities, the proposed route shall be submitted for Director review and recommendation

## Cal Centre Specific Plan - 1988

### Land Use Element under Agriculture

3. Oil well exploration drilling is permitted by right in the A Zone, and Map Code 3.3 (Pg. 14; Pg. 42 of document). [The A zone signifies Exclusive Agricultural Zone and Map Code 3.3 is areas zoned for Sewers Public Facilities.]

## Breckenridge Hills Specific Plan - 1989

### Circulation Element

In the A (Exclusive Agriculture) District, unrestricted drilling of oil wells is subject only to permit review by the Division of Oil and Gas and oil well placement nearby or within a planned road alignment is a concern.

### Land Use Element

#### Goals

2. To protect and conserve existing oilfields.
3. Protect Resource extraction activities and exploratory testing for oil and gas from premature urban encroachment and allow for land devoted to these uses to convert to other appropriate uses at such time as resource extraction is no longer feasible.

### Conservation and Open Space Element - Watershed and Drainage Plans

#### Policies

3. Petroleum exploration and extraction activities shall be confined to those areas currently under such uses (identified by land use Map Code 8.4 or 8.2 and 8.1).
4. The extraction of petroleum resources and future exploration or drilling activities should be allowed to continue while protecting areas planned for community development from significant adverse impacts.
5. Premature urban zoning, which may inhibit oil and/or gas extraction and/or exploration activities or preclude continued oil extraction activities, should be avoided.
9. Geotechnical and/or hazardous waste surveys will be conducted for oil extraction areas prior to residential development.

15. Require clearance from DOGGR for discretionary residential development projects within a designated oilfield.

## San Emidio Specific Plan – 1992

### Chapter 7.0: San Emidio New Town Specific Plan Document

4.7.3a-8: All development projects within the San Emidio Specific Plan shall comply with the provisions of the Oil and Gas Production Zoning Ordinance (Chapter 19.98)

4.7.3-10: Appropriate screening techniques shall be used and setbacks maintained to ensure compatibility between oil and gas wells and new development.

#### Section 2.6, Resource Conservation

#### Policies

Existing oil production and sand and gravel resources in San Emidio shall be able to continue as interim uses until the time that development occurs.

#### Implementation Measures

3. All producing oil wells shall be screened from proposed development by landscaping, shall be enclosed in structures or, shall be placed in underground vaults.
7. The current zoning for the leased land comprising the existing Kern Rock Sand and Gravel operation and areas of expansion of the lease into the designated Mineral Resource Zone (MRZ)-2 shall remain as Natural Resource [NR] District comprising 20 acres and Agricultural-I (A-1) as an interim use under this adopted Specific Plan.

## Kern River Specific Trails Plan - 1993

### Chapter 7-Trails Management and Maintenance

- All trails will be at least 50 feet from any active or abandoned well and all associated oilfield equipment in consultation with the DOGGR. Other than the section of trail system stated above, active or abandoned oils wells and all associated oilfields within 100 feet of the trails shall have a chain link fence placed around them in consultation with the owner/lessee of the equipment. At no times will pedestrians or equestrians be allowed on active oilfield maintenance roads. All trail development plans in and around oilfields will consult the oil and gas production operator for advisement.

## Cameron Point Specific Plan – 1994

#### 4.2.4. Implementation Measures

6. Existing and abandoned water and/or oil wells shall be identified in the field and plotted on land division maps.

### Negative Declaration

12. The mineral rights holder shall be consulted with each subsequent phase of the development to determine if a DI (Drilling Island) District or the PE (Petroleum Extraction Combining) District will be necessary for future resource exploration.

### Implementation Measures

2. Being located in an area with ongoing oil production, a "drill site" (Drilling Island Zone) may be established as a compatible zone and/or land use within this Specific Plan area without further amendments.

## Western Rosedale Specific Plan – 1994

## Chapter 1- Land Use Element

### Policies

15. Petroleum production sites may be included within a development if adequate measures are included to protect adjacent sensitive land uses.

## Chapter II- Open Space and Conservation Element

### Policies

3. Protect significant mineral and petroleum resource areas to assure their continued availability until their recovery is no longer feasible.

8. Ensure petroleum and mineral development projects provide processes and procedures for the capture, treatment, and disposal of all gases, fluids, wastes, and spoils in accordance with federal, state and local regulations.

9. Require petroleum production sites in urban areas to install perimeter landscaping to help reduce the noise, dust, and visual impacts to adjacent sensitive receptors and public ways.

## Chapter II- Mineral and Resource Policy Implementation

### Implementation Measures

3(a) All future zone changes to commercial districts shall contain the PE (Petroleum Extraction Combining) and PD (Precise Development Combining) Districts.

3(b) Future zone change applications to commercial and industrial Zone Districts shall be accompanied by a map which clearly depicts future drilling sites. All sites shall be located and distributed in a manner to allow for future exploration and production of hydrocarbons.

3(c) Future precise development plans in commercially and industrially zoned districts shall be subject to the following drill site measures:

(1) All precise development plans shall clearly show the drill sites agreed to during the zone change process.

(2) All drill sites shall contain a minimum of two acres.

(3) Access to all drill sites shall be clearly depicted on precise development plans.

(4) Drill sites may be relocated subsequent to approval of A precise development plan if, in the opinion of the Planning Director, a conflict exists between the proposed development and the drill site(s) location. However, the number of sites may not be reduced, and the general distribution pattern of the sites shall be followed to the greatest extent possible.

(5) If relocation of drill sites is proposed, the project developer shall provide the mineral rights holders with information related to the proposed relocation prior to the Planning Director taking any action. The mineral rights holders shall be provided a minimum of 15 business days for review of relocation proposal and shall submit related comments to the Planning Director. The Planning Director shall consider said comments when making a decision regarding drill site relocation proposals.

## South Kern Industrial Center Specific Plan – 2002

### Section VI, Environmental Resource Management Element

#### Implementation Measures

30. The potential for future hydrocarbon exploration shall be considered by the property owners for the mineral rights holders by the establishment of three drilling island easements.

31. Any applicants proposing future hydrocarbon exploration on parcel development plans shall be required to consult in advance with the DOGGR. Applicants proposing hydrocarbon exploration shall submit a copy of the response letter from the DOGGR to the Kern County Planning Department prior to the issuance of a building permit.

## Greater Tehachapi Area Specific Plan and Community Plan - 2010

#### Goals

8. To protect mineral resources from unnecessary urban/suburban encroachments, and in instances of urban/suburban development in mineral or oil resources areas, to provide for the development of such resources in a manner compatible with the surrounding environment to minimize adverse impacts and protect public health and safety.

#### Policies

31. Prohibit non mineral-resource related development in areas of the Greater Tehachapi Area that have been identified by the California Geological Survey “Mineral Land Classification of Southeastern Kern County” as MRZ-2a and MRZ-2b.

32. Ensure adequate minimum setbacks between the construction of any structure and existing mines or wells, as specified by the Kern County Fire Department and DOGGR.
33. Require any oilfield-related development to take place in accordance with DOGGR regulations and all mining-related development to take place in accordance with the requirements of the Surface Mining and Reclamation Act (SMARA).

### Implementation Measures

34. All proposals to amend this plan shall be reviewed to ensure that the proposal would not result in the potential for sensitive uses to occur within close proximity to an existing mining operation or oilfield-related development.
35. All development proposals which would place non-mineral resource development within one mile of a known mining operation shall be reviewed to ensure that the proposed use would not conflict with the existing mining operation. Should potential incompatibilities be identified, the County shall not support the project unless those potential impacts can be mitigated to a less than significant level.
36. The County shall discourage the rezoning of any state designated mineral resource areas to residential or commercial Zone Districts to protect them from loss to urban development.

## Kern County Zoning Ordinance – Chapter 19.98, Oil and Gas Production

The Kern County Zoning Ordinance contains 21 Zone Districts that function as base districts and are used to identify land uses in the unincorporated portions of the County. A "Lot Size Combining" district is also included in the code that provides for various lot sizes in the Estate (E) and Natural Resource (NR) base districts. These Zone Districts are applied to unincorporated properties both public and private.

The 21 Zone Districts can be broadly divided into five major categories:

1. Agriculture - includes A and A-1.
2. Residential - includes R-1, R-2, R-3, MP, and E.
3. Commercial - includes CO, C-1, C-2, and CH.
4. Industrial - includes M-1, M-2, and M-3.
5. Special - includes RF, OS, NR, DI, FPP, SP, and PL, each of which has a special application dealing with special limitations on land.

Chapter 19.98 (Oil and Gas Production) of the Kern County Zoning Ordinance contains the procedures and standards that apply to all exploration drilling and production activities related to oil, gas, and other hydrocarbon substances carried out in unincorporated Kern County. At present, Chapter 19.98's general development standards and conditions require the following:

## 19.98.020 Unrestricted Drilling

No review or permit shall be required for the drilling of any steam injection well, steam drive well, service well, or any well intended for the exploration for or development or production of oil, gas, and other hydrocarbon substances, or for any related accessory equipment, structure, or facility in the Exclusive Agriculture (A), Limited Agriculture (A-1), Medium Industrial (M-2), Heavy Industrial (M-3), or Natural Resource (NR) Districts, provided that:

A. All drilling installations and operations comply with the requirements of state law and with applicable fire and safety ordinances and regulations of the County of Kern.

B. Drilling shall not be commenced within 100 feet of any existing residence without the written consent of the owner thereof.

C. Signs shall be limited to directional, warning, and identification signs in connection with oil, gas, or other hydrocarbon drilling and development operations.

D. Disposal of nonhazardous oilfield liquid waste and production water is considered an accessory facility only if the facility complies with the following:

1. The nonhazardous oilfield liquid waste or production water is produced and disposed of within the same designated oilfield; or
2. The nonhazardous oilfield liquid waste or production water disposed of outside the designated oilfield of origin is produced by and disposed of solely and only by the same individual, corporation, or entity.

## 19.98.030 Drilling by Ministerial Permit

A. No well for use as an injection well and no well for the exploration for or development or production of oil or gas or other hydrocarbon substances may be drilled, and no related accessory equipment, structure, or facility may be installed in the Light Industrial (M-1) or Recreation-Forestry (RF) District until an application for plot plan review has been submitted to and approved by the Planning Director as consistent with the standards set out in Section 19.98.050 of this chapter and in accordance with the procedures set out in Sections 19.102.040 through 19.102.060 of this title. In approving an application for plot plan review, the Planning Director may waive any standards set out in Section 19.98.050 of this chapter if he/she determines that such waiver will not result in material detriment to the public welfare or to the property of other persons located in the vicinity.

B. Disposal of nonhazardous oilfield liquid waste and production water is considered an accessory facility only if the facility complies with the following:

1. The nonhazardous oilfield liquid waste or production water is produced and disposed of within the same designated oilfield; or

2. The nonhazardous oilfield liquid waste or production water disposed of outside the designated oilfield of origin is produced by and disposed of solely and only by the same individual, corporation, or entity.

## 19.98.040 Drilling by Conditional Use Permit

A. No well for use as an injection well and no well for the exploration for or development or production of oil, gas, or other hydrocarbon substances may be drilled, and no related accessory equipment, structure, or facility may be installed in any zoning district described in this title in which such uses are permitted as conditional uses until an application for a conditional use permit has been submitted to and approved by the Planning Commission as consistent with the standards set out in Section 19.98.050 of this chapter and in accordance with the standards and procedures set out in Sections 19.102.130 through 19.102.180 and Chapter 19.104 of this title. In approving a conditional use permit, the Planning Commission may waive any condition set out in Section 19.98.050 of this chapter if it determines that such waiver will not result in material detriment to the public welfare or the property of other persons located in the vicinity.

B. Disposal of nonhazardous oilfield liquid waste and production water is considered an accessory facility only if the facility complies with the following:

1. The nonhazardous oilfield liquid waste or production water is produced and disposed of within the same designated oilfield; or

2. The nonhazardous oilfield liquid waste or production water disposed of outside the designated oilfield of origin is produced by and disposed of solely and only by the same individual, corporation, or entity.

C. If a producing well or service well is not completed upon land subject to a conditional use permit issued pursuant to this chapter and Chapter 19.104 of this title within 12 months from the date of issuance of the permit, or within any extended period thereof, the conditional use permit shall expire and the premises shall be restored as nearly as practicable to their original condition. No permit shall expire while the permittee is continuously conducting drilling, redrilling, completing or abandoning operations, or related operations, in a well on the lands covered by such permit, which operations were commenced while said permit was otherwise in effect. Continuous operations are operations suspended not more than 30 consecutive days. If, at the expiration of the 12-month period, the permittee has not completed his drilling program on the lands covered by such permit, the Planning Commission may, upon a written request of the permittee, extend the permit for the additional time requested by permittee for the completion of such drilling program.

## 19.98.050 Development Standards and Conditions

All wells drilled, pursuant to Section 19.48.020 of this title and Sections 19.98.030 and 19.98.040 of this chapter, for the exploration for or development or production of oil, gas, and other

hydrocarbon substances and related facilities and activities shall comply with the following standards, unless otherwise provided in this chapter:

A. No oil or gas well shall be drilled within 100 feet of any public highway or building not necessary to the operation of the well, or within 150 feet of any dwelling, or within 300 feet of any building used as a place of public assembly, institution, or school, or within 50 feet of any building utilized for commercial purposes constructed prior to the commencement of such drilling, without the written consent of the owner of such structure.

B. All drilling and production activities shall conform to all applicable fire and safety regulations, and firefighting apparatus and supplies required by the Kern County Fire Department shall be maintained on the site at all times during drilling and production operations.

C. No signs, other than directional and warning signs and those required for identification of the well, shall be constructed, erected, maintained, or placed on the premises or any part thereof, except those required by law or ordinance to be displayed in connection with the drilling or maintenance of the well.

D. Sanitary toilet and washing facilities, if required by the Kern County Health Department or other governmental agencies, shall be installed and maintained in a clean and sanitary condition during drilling operations, and at such other times as specified by these agencies.

E. Proven technological improvements generally accepted and used in drilling and production methods shall be employed as they may become available if they are capable of reducing nuisances or annoyances.

F. All derricks, boilers, and other drilling equipment employed pursuant to this section to drill any well hole or to repair, clean out, deepen, or redrill any completed or drilling well shall be removed within 90 days after completion of production tests following completion of such drilling, or after abandonment of any well, unless such derricks, boilers, and drilling equipment are to be used within a reasonable time, as determined by the Planning Director, for the drilling of another well or wells on the premises.

G. Within 90 days after any well has been placed in production, or after its abandonment, earthen sumps used in drilling or production or both (unless such sumps are to be used within a reasonable time as determined by the Planning Director for the drilling of another well or wells) shall be filled and the drilling site restored as nearly as practicable to a uniform grade. Temporary earthen sumps may be used for cleanout or remedial work on an existing well or other production facility. However, these sumps shall be filled and the site restored as nearly as practicable to uniform grade within 90 days after the cleanout or other remedial work is completed. Such restoration work shall comply with all applicable regulations of the DOGGR.

H. Any derrick used for servicing operations shall be of the portable type, provided, however, that upon presentation of proof that the well is of such depth or has such other characteristics, or for other cause, that a portable type derrick will not properly service such well, the Planning Director may approve the use of a standard type of derrick.

I. Whenever oil or gas is produced into and shipped from tanks located on the premises, such tanks, whenever located within 500 feet of any dwelling or commercial building, shall be surrounded by shrubs or trees, planted and maintained so as to develop attractive landscaping or shall be fenced in such a manner as to, insofar as practicable, screen such tanks from public view. Such fencing shall comply with the requirements of the DOGGR.

J. Whenever a well is located within 500 feet from an existing dwelling unit, except in case of an emergency, no materials, equipment, tools, or pipe used for either drilling or production operations shall be delivered to or removed from the drilling site, except between the hours of 8:00 a.m. and 8:00 p.m., unless otherwise required by the DOGGR.

K. Pumping wells shall be operated by electric motors or muffled internal combustion engines.

L. The height of all pumping units shall not exceed 35 feet and shall be painted and kept in neat condition.

M. All vehicle parking and maneuvering areas shall be treated and maintained with oiled sand or a similar dust binding material.

N. After production begins and a pump is installed on the wellhead, a fence at least 6 feet in height shall be installed around the pump site or drilling island for public safety. This fence shall be constructed of chain link with wood or metal slats or other screening fence as may be approved by the Planning Director. This fencing and screening requirement shall apply only to those pump sites located within 500 feet of any dwelling. Such fencing shall comply with the requirements of the DOGGR.

O. All required federal, state, and County rules and regulations shall be complied with at all times, including, but not limited to, the rules and regulations of the following agencies:

1. DOGGR
2. Kern County Fire Department
3. Kern County Health Department
4. Regional Water Quality Control Board (RWQCB)
5. Air Pollution Control District (APCD)
6. Kern County Engineering and Survey Services Department

### 19.98.060 Plot Plan Review - Conditional Use Permit – Application Contents

An application for plot plan review pursuant to Section 19.98.030 of this chapter and an application for a conditional use permit pursuant to Section 19.98.040 of this chapter shall include the following:

A. Name and address of the applicant.

B. Name(s) and address(es) of the property owner(s).

C. Assessor's parcel number(s).

D. Legal description of the property.

E. A plot plan or site development plan (in the case of a conditional use permit) drawn at the scale specified by the Planning Director, which includes the following information:

1. Topography and proposed grading.
2. Location of all proposed well holes and related accessory equipment, structures, and facilities to be installed and any abandoned wells if such are known to exist.
3. Location of all existing dwellings and buildings used for other purposes, located within 300 feet of the proposed well holes, identification of the use of each structure, and distances between well holes and existing buildings.
4. North arrow.

F. Narrative description of the proposed development, including:

1. Acreage or square footage of the property.
2. Nature of hydrocarbon development activity.
3. Description of equipment to be used.
4. Distance to all existing buildings.
5. Phasing or development schedule.

### 19.98.070 Permit Revocation and Modification

Any permit issued pursuant to this chapter may be revoked or modified pursuant to Section 19.102.020 of this title.

## Kern County Zoning Ordinance – Chapter 19.81, Dark Skies Ordinance (Outdoor Lighting)

This chapter of the Kern County Zoning Ordinance provides requirements for outdoor lighting within specified unincorporated areas of Kern County in order to accomplish the following objectives:

1. Encourage a safe, secure, and less light-oriented nighttime environment for residents, businesses, and visitors.
2. Promote a reduction in unnecessary light intensity and glare, and to reduce light spillover onto adjacent properties.
3. Protect the ability to view the night sky by restricting unnecessary upward projections of light.
4. Promote energy conservation and a reduction in the generation of GHG by reducing wasted electricity that can result from excessive or unwanted outdoor lighting.

In accordance with Chapter 19.81.050 f the Kern County Zoning Ordinance, outdoor lighting in association with oil and gas exploration and production operations and related facilities are exempt from this chapter and are regulated by the provisions of Chapter 19.98 described above.

## Kern County Zoning Ordinance – Setback Requirements

The Kern County Zoning Ordinance includes a number of setback requirements for oil and gas wells per Table 4.10-4.

**Table 4.10-4: Summary of Kern County Existing Setback Requirements for Oil and Gas Wells**

| Zone Districts | | Required Setbacks (in feet) | | | |
|---|---|---|---|---|---|
| | | Dwelling | Public Highway or Building | Buildings Used as Places of Assembly, Institution or School | Any Building Used for Commercial Purposes |
| A | Exclusive Agriculture | 100 | N/A | N/A | N/A |
| A-1 | Limited Agriculture | 100 | N/A | N/A | N/A |
| M-2 | Medium Industrial | 100 | N/A | N/A | N/A |
| M-3 | Heavy Industrial | 100 | N/A | N/A | N/A |
| NR | Natural Resource | 100 | N/A | N/A | N/A |
| RF | Recreation Forestry | 150 | 100 | 300 | 50 (1) |
| M-1 | Light Industrial | 150 | 100 | 300 | 50 (1) |
| PE | Petroleum Extraction | 150 | 100 | 300 | 50 (1) |
| DI | Drilling Island | 150 | 100 | 300 | 50 (1) |
| | Zone Districts where CUPs are required | 150 | 100 | 300 | 50 (1) |

Notes:
(1) For wells within 50 feet of a building used for commercial purposes, written consent must be obtained from the structure's owner prior to the commencement of drilling.
(2) Fencing and screening is required for pumps sites within 500 feet of any dwelling. (19.98.050.N Development Standards)

## Habitat Conservation Plans and Natural Community Conservation Plans

Oil and gas exploration and production activities could take place in areas within the boundaries of an approved HCP or Natural Community Conservation Plan (NCCP). The following HCPs and NCCPs have been approved for portions of the Project Area and are summarized below. The locations of these HCPs are presented on Figure 4.4-12 (see Section 4.4, Biological Resources).

1. Freeport-McMoRan Oil and Gas HCP
2. CRC (formerly Occidental of Elk Hills, Inc.) Non-Unit HCP (formerly Nuevo/Torch HCP, 1999)
3. Aera Coles Levee HCP (previously Arco Western Energy)
4. Chevron Pipeline HCP
5. California Aqueduct - San Joaquin Field Division HCP
6. Kern County Waste Management Department HCP
7. Kern Water Bank HCP/NCCP
8. Pacific Gas and Electric (PG&E) San Joaquin Valley Operations and Maintenance Program HCP
9. Tehachapi Uplands Multiple Species HCP
10. Metropolitan Bakersfield HCP

Additional details on the activities and species covered under the HCPs is provided in Section 4.4, Biological Resources.

## 1. Freeport-McMoRan Oil and Gas HCP

Freeport-McMoRan Oil and Gas (formerly Nuevo Energy Company/Torch Operating Company then Plains Exploration and Production Company) HCP was adopted in 1999 and addresses ongoing oilfield exploration and production activities on oilfield properties located in western Kern County. The HCP a encompasses 21,900 acres, including an initial 839.9 acres of conservation area lands in the Lokern area that will be set aside incrementally to compensate for habitat disturbances from oilfield activities. The federal incidental take statement authorized up to 1,700 acres of incidental take on the plan area lands. When Plains Exploration and Production Company acquired the properties from Nuevo Energy Company/Torch Operating Company in 2005, an additional 4,905 acres of land and were added to the HCP (an additional 414 acres of conservation area lands). In 2009, 300 acres of the incidental take acreage and 15 acres of the conservation land acreage were transferred to CRC (formerly Occidental) of Elk Hills, Inc., and Freeport-McMoRan (then Plains Exploration and Production Company) retained 1,400 acres of take acreage.

## 2. CRC (formerly Occidental of Elk Hills, Inc.) Non-Unit HCP (formerly Nuevo/Torch HCP)

The CRC Non-Unit HCP is a conservation plan that covers 7,050 acres. The HCP was originally prepared for Nuevo Energy Company/Torch Operating Company in February 1999. Incidental take authorization and responsibilities under the HCP were transferred to Plains Exploration and Production Company (PXP) on May 9, 2005. PXP subsequently transferred 300 acres of authorized incidental take and 15 acres of conservation lands to CRC on August 3, 2009. PXP retained take authorization and responsibilities on the remaining 1,400 acres of the original 1,700 acres authorized for incidental take, and these interests were subsequently conveyed to Freeport-McMoRan. In December 2009, USFWS approved the inclusion of 3,504 acres of new properties located in the vicinity of McKittrick Valley and the Elk Hills oilfield into the CRC Non-Unit HCP. 1,134 acres of the 3,504 acres were designated for use as mitigation land. No increase in the initially authorized 1,700 acres of take was included in the 2009 approval.

## 3. Aera Coles Levee HCP (previously Arco Western Energy)

The Aera Coles Levee HCP was approved in 1996 and covers 120,320 acres (188 sections) of land used for oil and gas exploration and production and a 6,059-acre preserve area. Only Aera's activities would be covered under this HCP. Covered activities include routine oil production operations, such as oil well removal, oil well workovers, and new oil well construction. Covered activities also include road maintenance and construction, vehicle traffic, unintentional fires, oil spills, water discharge and spills, vehicle accidents, and other unforeseen circumstances.

## 4. Chevron Pipeline HCP

The Chevron Pipeline HCP includes 25.5 acres near Taft, California, and covers Chevron activities related to the construction and operation of the 4.25-mile 27G Pipeline Project. Oil and gas drilling activities and other activities described in Chapter 3, Project Description, are not covered under this HCP.

## 5. California Aqueduct - San Joaquin Field Division HCP

The proposed California Aqueduct San Joaquin Field Division HCP would cover 11,816 acres adjacent to 121 miles of the California Aqueduct from Kettleman City to the Edmonston Pumping Plant at the base of the Tehachapi Mountains. The HCP also includes 4 pumping plants, two Operations and Maintenance Centers, and the initial 14.8 miles of the Coastal Branch Phase 1, a smaller canal that branches off from the California Aqueduct. The California Aqueduct - San Joaquin Field Division HCP would allow for routine and non-routine maintenance activities, minor new construction, and emergency procedures for these facilities. Oil and gas operators cannot receive take coverage under this HCP, although oil and gas activities are allowable within the HCP area.

## 6. Kern County Waste Management Department HCP

The Kern County Waste Management Department is responsible for the construction and management of 14 sanitary solid waste facilities (landfills) in Kern County, including seven closed or inactive sites where transfer stations may be operated. The Kern County Waste Management Department HCP, adopted in 1997, covers landfill operations (routine waste acceptance and management, facility maintenance, transfer station operation, and eventual facility closure) and is in the process of being amended to cover expansion at the remaining active landfills and the closure of historic burn dumps. In October 2005, the USFWS published a Notice of Intent to prepare an EIS for an amendment of the take statement and the Kern County Waste Management Department HCP. Oil and gas activities are not prohibited in the HCP Permit Area; however, oil and gas operators cannot receive take coverage under this HCP. This HCP applies only to the covered landfill activities and expansions within the Permit Area.

## 7. Kern Water Bank HCP/NCCP

The Kern Water Bank HCP/NCCP is managed by the Kern Water Bank Authority and covers 19,900 acres. The HCP was approved in 1997 and covers water conservation by developing water recharge and recovery facilities, the conservation and restoration of upland, intermittent wetland/rangeland, and other sensitive habitat, and the San Joaquin kit fox (*Vulpes macrotis mutica*), Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*), giant kangaroo rat (*Dipodomys ingens*), San Joaquin antelope squirrel (*Ammospermophilus nelsoni*), and Bakersfield cactus (*Opuntia basilaris* var.). The HCP also includes a conservation bank that allows for conservation credit sales to third parties under certain conditions and subject to USFWS and California Department of Fish and Wildlife (CDFW) approval. In 1997, 5,592 acres of the HCP/NCCP area were permanently preserved in the HCP area, and 3,267 acres were included in the conservation bank. Developers with projects within the Master Permit Credit Area can purchase mitigation credits from the Kern Water Bank Authority. USFWS and CDFW will authorize incidental take for developers that acquire conservation credits if they determine that such authorization is appropriate. Although there are oil and gas activities within the HCP/NCCP area, the HCP/NCCP was designed so that it does not interfere with those operations. Take authorization for oil and gas activities can only be obtained by holders of pre-existing mineral rights and would be authorized by the Master Permits/Authorizations. Take authorization for any other oil and gas activities cannot be obtained under this HCP/NCCP.

## 8. Pacific Gas and Electric (PG&E) San Joaquin Valley Operations and Maintenance Program HCP

The PG&E San Joaquin Valley region HCP was approved in early 2008 and covers routine operations and maintenance and minor new construction activities related to PG&E's electrical system in the San Joaquin Valley for 30 years. The HCP covers 23 wildlife and 42 plant species, including the San Joaquin kit fox, California red-legged frog (*Rana draytonii*), vernal pool fairy shrimp (*Branchinecta lynchi*), and Western burrowing owl (*Athene cunicularia hypugea*). PG&E facilities that are covered by the HCP occur throughout the Project Area, generally within

existing rights of way (ROWs) owned by the company. Oil and gas operators cannot receive take coverage under this HCP. This HCP applies only to PG&E operations and maintenance programs.

### 9. Tehachapi Uplands Multiple Species HCP

The Tehachapi Uplands Multiple Species HCP was approved in 2013 and includes 141,886 acres within Tejon Ranch and 25 species, including the California condor (*Gymnogyps californianus*). The HCP term is 50 years. The northern boundary of this HCP is largely defined by the 2,000-foot elevation level above the valley floor. Portions of the Project Area extends above 2,000 feet and include lands that are covered by the HCP. As discussed in greater detail in Section 4.4, Biological Resources, pre-construction surveys and avoidance mandates for Project activities above 2,000 feet have been modified to address the different species of concern at higher elevations. Oil and gas operators cannot receive take coverage under this HCP. This HCP applies only to commercial and residential development activities and ongoing ranch activities.

### 10. Metropolitan Bakersfield HCP

Implemented in 1994, the Metropolitan Bakersfield HCP covers both federal and state listed species in the 408-square-mile Metropolitan Bakersfield Planning Area, which includes both city land and unincorporated County land. The goal of the HCP is to allow urban development per the MBGP and offset habitat loss by acquiring, preserving, and enhancing habitat for sensitive species. Oil drilling activities are not prohibited in the HCP area, but oil and gas operators cannot receive take coverage under the HCP.

## 4.10.4 Impacts and Mitigation Measures

## Methodology

For the purposes of this analysis, relevant documents (particularly the KCGP, MBGP, the Kern County Zoning Ordinance, and HCPs) were consulted and a visual survey of the Project Area was performed. A discussion of the Project's consistency with plans and policies for each environmental topic area is summarized below and is described in greater detail in each of the relevant environmental topic sections (Sections 4.1 through 4.17) of this Environmental Impact Report (EIR).

## Thresholds of Significance

The Kern County California Environmental Quality Act (CEQA) Implementation Document and Kern County Environmental Checklist state that a project would normally be considered to have a significant impact if it would:

- Physically divide an established community;
- Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to, the general plan, specific plan,

local coastal program, or Zoning Ordinance) adopted for the purpose of avoiding or mitigating an environmental effect; or

- Conflict with any applicable habitat conservation plan or natural community conservation plan.

Based on these standards, the effects of the Project have been categorized as either a "less than significant impact" or a "potentially significant impact." Mitigation measures are recommended for potentially significant impacts. If a potentially significant impact cannot be reduced to a less than significant level through the application of mitigation, it is categorized as a "significant unavoidable impact."

# Impacts and Mitigation Measures

## Impact 4.10-1: Physically Divide an Established Community

### Construction

Established residential communities are dispersed throughout the Project Area on unincorporated County land. However, the majority of wells in Kern County would be constructed in Tier 1 areas (90%), which, by definition, are areas in which oil and gas activity is currently the primary land use. In contrast, residences are predominantly located on Tier 4 land. Although residences may be located on Tier 2 land, such residences are dispersed over large agricultural parcels and do not represent established communities. Finally, Tiers 3 and 5, while they might include residences, do not presently include residential communities. Therefore, there are no established communities located within Tiers 1, 2, 3, or 5.

Tier 4 areas make up less than 35,000 acres of the Project Area. Of this total, 26,160 acres are zoned for residential uses (Residential, Estate, or Mobile Park), the majority of which are clustered near the Metropolitan Bakersfield Planning Area in the Central and Eastern Subareas. However, because communities comprise a variety of uses, including commercial and industrial uses, the total acreage of 34,450 has been used to calculate impacts, even though, in some cases, these lands represent Commercial Highway areas or Industrial uses located outside of established communities.

Using the total acreage of Tier 4 land, the Applicant conservatively proposes to drill up to 25 wells in Tier 4 areas on an annual basis, representing 47 acres, or 0.14% of Tier 4 lands, as depicted in Table 4.10-5.

**Table 4.10-5: Tier 4 Maximum Disturbance/Year**

| Subarea | Total Acres | Projected Well Count | Disturbance Factor (Acres/Well) | Total Acres Disturbed | Disturbance/ Year |
|---|---|---|---|---|---|
| Western | 5,423 | 10 | 2 | 20 | 0.37% |
| Central | 10,413 | 5 | 3 | 15 | 0.14% |
| Eastern | 18,614 | 10 | 1.2 | 12 | 0.06% |
| **TOTAL** | **34,450** | **25** | | **47** | **0.14%** |

Per County setback requirements, any well, regardless of Tier, would maintain a minimum 150-foot setback from residences and a 300-foot setback from buildings used as places of assembly, institutions, or schools. Many Tier 4 lands are also located in Specific Plan areas, which often contain provisions for Drilling Islands. Drilling Islands are intended to protect the rights of mineral rights holders within residential and urban areas, while protecting the surrounding community from incompatible uses. While drilling is not prohibited outside of areas zoned Drilling Island, in order to permit a well in Tier 4, the Applicant must apply for a CUP, which would necessitate an additional level of review and would further ensure that residential communities are protected.

Unlike a linear project, such as a proposed highway, which has the potential to create a physical barrier in the middle of an existing community, wells drilled in Tier 4 areas would be dispersed over 34,450 acres throughout the 3,700-square-mile Project Area. Drilling activities, such as those described in the Future Development Scenario, have historically existed in the Project Area and, in some cases, residential uses have been constructed near historic drilling operations, encroaching upon oil and gas operations. As a result, KCGP policies and zoning setbacks are intended to protect both residential uses as well as oil and gas drilling operations, as described in Table 4.10-7. Therefore, the disturbance of less than 1% of total Tier 4 land per year would not result in the physical division of an established community, and impacts under this criterion would be less than significant. In addition, mitigation measures would further ensure that impacts on adjacent land uses, including established communities, are reduced, and impacts during construction would remain less than significant.

## Operation

Impacts during operation would be similar to construction; however, during operation, fewer pieces of equipment and fewer workers would be located onsite, which would result in fewer impacts to the community. In addition, wells are only viable so long as the reservoir remains viable in a particular location. Therefore, although it is estimated that 25 new wells would be constructed per year, a portion of the existing wells are likely to be decommissioned and abandoned each year throughout the life of the Project. Also, the acreage conversion conservatively assumes that all land disturbed during construction would be disturbed throughout the life of the well when, in reality, the permanent footprint of most wells would be less than what

is projected. Even so, assuming that a total of 47 acres of land were to be permanently converted each year, in 25 years, a total of 1,175 acres would be disturbed. This total represents less than 3.5% of Tier 4 land in the Project Area as it exists today. Similar to construction, this disturbance would be dispersed throughout the Project Area and would not result in the physical division of an established community. Therefore, impacts during operation would be less than significant.

### Mitigation Measures

Implement specified mitigation measures, including those that are applicable from Section 4.1, Aesthetics and Visual Resources, Section 4.3, Air Quality, Section 4.4 Biological Resources, Section 4.12, Noise, Section 4.15, Recreation, and Section 4.17, Utilities and Service Systems.

### Level of Significance After Mitigation

Impacts would be less than significant with mitigation.

## Impact 4.10-2: Conflict with any Applicable Land Use Plan, Policy, or Regulation of an Agency with Jurisdiction over the Project

The proposed Project would be consistent with plans, policies, and goals of both the KCGP and MBGP, as analyzed in Table 4.10-7 at the end of this section and as described below.

**Tier 1:** Tier 1 consists of areas where oil and gas development is the predominant land use. Although sensitive land uses such as residential houses are not prohibited in all Tier 1 areas (e.g., in areas zoned Exclusive Agriculture and other zoning) such uses are limited in size (e.g., to 2.5 acre minimum lot sizes for A-1 zoning), and are generally not sited due to their inherent conflict with the industrial nature of intensive oil and gas production. and ownership patterns. Ownership patterns in the area are predominately oil companies. Regardless of whether a sensitive land use exists within or adjacent to a Tier 1 area, mitigation measures intended to protect sensitive receptors, such as setbacks, traffic mitigation fees, and measures intended to reduce noise, would still apply. In addition, measures intended to protect environmental resources, such as sensitive species and water quality, would also apply, regardless of whether the species or hydrological feature is located within or outside of a Tier 1 area. In addition, although in many cases oil developers own both surface and subsurface rights within Tier 1 areas, there may be some cases where a split estate could cause land use conflicts. For example, land use conflicts between a surface owner, such as a property owner who has historically owned land in a Tier 1 area, and subsurface mineral rights owners, such as oil and gas developers, would result in a significant impact. Revisions to the Zoning Ordinance would reduce these impacts to less than significant.

**Tier 2:** Tier 2 consists of areas that are zoned for agricultural uses that are not within a Tier 1 area. Tier 2 includes differing intensities of agricultural uses depending upon various factors, such as the quality of soil and availability of water, but also includes dispersed residences and other uses. Although oil and gas activities occur within Tier 2 areas and, therefore, occur in proximity to sensitive receptors, such as residences, mitigation measures intended to protect sensitive receptors, such as setbacks, traffic mitigation fees, and measures intended to reduce noise, would still apply. In addition, measures intended to protect environmental resources, such

as sensitive species and hydrological features, would also apply, and impacts on protected farmland would require mitigation as described in Section 4.2, Agricultural and Forest Resources. However, land use conflicts between surface owners, such as agricultural producers, and subsurface mineral rights owners, such as oil and gas developers, would result in a significant impact. Revisions to the Zoning Ordinance would reduce these impacts to less than significant.

**Tier 3:** Tier 3 consists of areas where historic drilling activity has been approved as "Unrestricted" or "Ministerial," that are not categorized as Tiers 1 or 2. Tier 3 areas include industrial uses and uses that are not necessarily associated with oil and gas development but could be associated with other uses, such as mining or forestry. In addition, Tier 3 includes Drilling Islands, which are primarily adjacent to sensitive land uses such as residences or schools as they are used in the subdivision process to ensure access to minerals. Regardless of whether oil and gas activities are located within a Tier 3 area, if there are sensitive uses within Tier 3 or adjacent to Tier 3, the same mitigation measures would apply, such as measures to increase setbacks and reduce noise, hazards, traffic, and aesthetic impacts. In addition, any environmental resources, such as sensitive habitat or species, would be protected by mitigation measures intended to reduce impacts. However, land use conflicts between surface owners, such as industrial plant owners/operators, and subsurface mineral rights owners, such as oil and gas developers, would result in a significant impact. Revisions to the Zoning Ordinance would reduce these impacts to less than significant.

**Tier 4:** Tier 4 predominantly consists of residential, commercial, and other uses. Tier 4 lands are more likely than other Tiers to contain sensitive receptors, such as homes, schools, hospitals, and churches, and a CUP would be required to obtain a drilling permit. Any CUP processed in Tier 4 would be subject to review under CEQA and include the mitigation measures described in this EIR along with any additional mitigations identified under a separate CEQA review. Implementing additional mitigation measures above those required in the EIR would provide greater protection for sensitive receptors and environmental resources. However, due to potential land use conflicts between surface owners, such as residents, and subsurface mineral rights owners, such as oil and gas developers, even with a CUP, impacts would be significant. Revisions to the Zoning Ordinance would reduce these impacts to less than significant.

**Tier 5:** Tier 5 includes Specific Plans adopted with a Special Plan Zone District or which include specific provisions for oil and gas operations. Specific Plan areas would either rely on the permit process proposed for the Oil Conformity Review and incorporate all mitigation measures or establish, through the processing of a Specific Plan or Site plan for Special Plan Zoning, replacement or additional mitigation measures and environmental protections. Any adoption of a Specific Plan or Special Plan zoning is subject to an EIR under CEQA and consideration through a public process with an advisory recommendation from the Planning Department and final consideration by the Board of Supervisors. As the cumulative impacts would not be reduced by a Specific Plan or Special Plan or relocated from the Valley, the environmental impacts would be similar due to potential land use conflicts with adjacent properties and potential split estate conflicts. Revisions to the Zoning Ordinance would reduce these impacts to less than significant.

### Mitigation Measures

No mitigation measures are required.

### Level of Significance r Mitigation

Impacts would be less than significant.

## Impact 4.10-3: Conflict with any applicable Habitat Conservation Plan or Natural Community Conservation Plan

The proposed Project would not conflict with any existing approved HCP or NCCP in the Project Area. Project activities are not prohibited in any of the approved HCP or NCCP areas; however, several HCPs do not cover oil and gas production activities, or only cover the oil and gas production activities of the permittees specified in Section 4.10.3, Regulatory Setting, (see Table 4.10-6). In addition, only impacts on species covered under the specific HCP would be covered. Section 4.4, Biological Resources, describes the species covered under each HCP.

If a developer drills a well or conducts any of the activities described in the Future Development Scenario in Chapter 3, Project Description, within one of the HCP areas described above and depicted on Figure 4.4-12 (see Section 4.4, Biological Resources), the developer may obtain take coverage for the species covered under the HCP (described in Section 4.4, Biological Resources), provided that oil and gas activities are covered under the HCP and the developer is named as a permittee in the HCP program or the HCP provides a mechanism for oil and gas operators to obtain coverage (Table 4.10-6). As a result, the proposed Project would be consistent with existing approved HCPs and NCCPs in the Project Area. Therefore, impacts would be less than significant.

Consistency with proposed HCPs and NCCPs is also addressed in Section 4.4, Biological Resources.

**Table 4.10-6: Project Consistency with Approved HCPs and NCCPs in the Project Area**

| Plan Name | Covered Entity(ies) | O/G Activities Allowed within the HCP Area? | O/G Activities Covered by HCP? |
|---|---|---|---|
| 1. Freeport-McMoRan Oil and Gas HCP | Freeport-McMoRan | Yes | Yes |
| 2. CRC Non-Unit HCP | CRC | Yes | Yes |
| 3. Aera Coles Levee HCP | Aera | Yes | Yes |
| 4. Chevron Pipeline HCP | Chevron | Yes | No[1] |
| 5. California Aqueduct – San Joaquin Field Division HCP | Department of Water Resources | Yes | No |

**Table 4.10-6: Project Consistency with Approved HCPs and NCCPs in the Project Area**

| Plan Name | Covered Entity(ies) | O/G Activities Allowed within the HCP Area? | O/G Activities Covered by HCP? |
|---|---|---|---|
| 6. Kern County Waste Management Department HCP | Kern County Waste Management Department | Yes | No |
| 7. Kern Water Bank HCP/NCCP | Kern Water Bank and O/G operators with existing leases in the HCP/NCCP area | Yes | Yes[2] |
| 8. PG&E San Joaquin Valley O&M Program HCP | PG&E | Yes | No |
| 9. Tehachapi Uplands Multiple Species | Tejon Ranch Corporation | Yes | No |
| 10. Metropolitan Bakersfield HCP | City of Bakersfield, individuals, and organizations | Yes | No |

Notes:
[1] Only activities related to the 27G Pipeline Project construction, operation, and maintenance are covered. The HCP does not cover O/G well drilling or other activities described in Chapter 3, Project Description.
[2] Only O/G operators with existing leases and activities in the HCP/NCCP area can obtain coverage.

### Mitigation Measures

No mitigation measures are required.

### Level of Significance

Impacts would be less than significant.

## 4.10.5 Cumulative Setting, Impacts, and Mitigation Measures

The geographic scope for cumulative impacts to land use and planning includes the area within 6 miles of the external Project Area. While projects in a larger area may affect some of the same resources as the Project, by focusing on projects within the Project Area and 6 miles outside of the Project Area, the analysis of cumulative impacts includes those projects that would most comparably affect the same resources as the Project.

The regional plans and projections evaluated in this cumulative analysis are described in Section 3.7, Discretionary Actions/Entitlements/Necessary Approvals.

### Impact 4.10-4: Contribute to Cumulative Land Use Impacts

Oil and gas development activities, as described in the Future Development Scenario in Chapter 3, Project Description, are ongoing throughout the Project Area on both jurisdictional and nonjurisdictional land, such as city land within the Metropolitan Bakersfield Planning Area, BLM land, and land within the jurisdiction of other incorporated cities. If the proposed Project is

approved, all oil and gas development activities in the Project Area would continue; however, on land within Kern County's jurisdiction, mitigation proposed throughout this EIR would be incorporated into the County Zoning Ordinance as development standards. These additional development standards would only apply to activities on unincorporated Kern County land, but the effects of the development standards would reduce impacts on adjacent land uses, regardless of whether those uses are located on County jurisdictional or nonjurisdictional land. For example, oil and gas developers would be required to adhere to residential setbacks and setbacks to other sensitive land uses regardless of whether a nearby residence or other sensitive use is located on County or City land. As a result, the proposed Project would be consistent with planning efforts within the Project Area, such as the 2013 Kern COG RTP/SCS, the KCGP, MBGP, and other planning efforts on nonjurisdictional land.

In addition, the proposed Project would be consistent with adjacent BLM activities. Although Kern County development standards would only be applicable on County land, some parcels under County jurisdiction in the Western Subarea have private surface ownership and BLM subsurface mineral rights ownership. In order to develop wells on these lands, anyone leasing from the BLM would be required to file a permit request with the County, which would reduce impacts associated with BLM leasing on County jurisdictional land. Therefore, the Project would not result in a cumulatively considerable contribution to cumulative impacts on land use and planning.

## Mitigation Measures

No mitigation measures are required.

## Level of Significance

Impacts would be less than significant.

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| **KERN COUNTY GENERAL PLAN** | |
| **CHAPTER 1. LAND USE, OPEN SPACE, AND CONSERVATION ELEMENT** | |
| **1.2 NON JURISDICTIONAL LAND** | |
| **Goal 1.** To promote harmonious and mutually beneficial uses of land among the various jurisdictions and land management entities present in Kern County. | CONSISTENT. The proposed Project promotes harmonious and mutually beneficial uses among various jurisdictions because the proposed Project proposes new development standards that would mitigate impacts, which would have a beneficial impact on neighboring jurisdictions as well as County land. Therefore, the proposed Project would be consistent with Goal 1. |
| **Policy 3.** The County retains the maximum discretion allowed by law over land use issues of local concern, which impact the development of private and public property in the County. | CONSISTENT. The proposed Project maintains the County's authority over land use issues. The County is exercising its discretion over resource extraction land use issues by implementing new development standards for permitting oil and gas drilling permits within their jurisdiction. Therefore, the project would be consistent with Policy 3. |
| **Policy 4**. The County will solicit comments and coordinate with local governments, the military, and other federal or State jurisdictions on projects which are proposed within a peripheral area established mutual agreement between the County and the jurisdiction. | CONSISTENT. With the publication of the NOP, the County notified all local governments and federal and state entities with jurisdictions within the Project Area in order to solicit input. In addition, the County held meetings and teleconferences with a number of stakeholder agencies. The County also solicited input from neighboring jurisdictions outside of the Project Area. Therefore, the proposed Project would be consistent with Policy 4. |
| **Policy 5**. The County land use regulations do not apply to property administered by the State or federal Government in the absence of Memorandums of Understanding indicating otherwise. However, County land use regulations may apply to other public entities subject to provisions of State law. | CONSISTENT. The proposed Project covers County land only and does not include State or Federal Government land in the absence of Memorandums of Understanding stating otherwise. Therefore the proposed Project would be consistent with Policy 5. |
| **Policy 6.** The County will solicit a city's comments on land use planning proposals within the city's adopted sphere of influence or within one mile of the city limits, whichever is greater. | CONSISTENT. With the publication of the NOP, the County notified all local governments within the Project Area to solicit comments. Therefore, the proposed Project would be consistent with Policy 6. |
| **1.3 PHYSICAL AND ENVIRONMENTAL CONSTRAINTS** | |
| **Goal 1.** To strive to prevent loss of life, reduce personal injuries, and property damage, minimize economic and social diseconomies resulting from natural disaster by directing development to areas which are not hazardous. | CONSISTENT. As described in the Future Development Scenario, the majority of new wells would be drilled in existing well fields in Tier 1 areas, which are located outside of populated areas and have historically been devoted to oil and gas |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| | development. The implementation of new development standards would further reduce risks associated with loss of life, personal injury, property damage, and economic and social diseconomies resulting from natural disaster. Therefore, the proposed Project would be consistent with Goal 1. |
| **Policy 1.** Kern County will ensure that new developments will not be sited on land that is physically or environmentally constrained ((Map Code 2.1 (Seismic Hazard), Map Code 2.2 (Landslide), Map Code 2.3 (Shallow Groundwater), Map Code 2.5 (Flood Hazard), Map Codes from 2.6 – 2.9, Map Code 2.10 (Nearby Waste Facility), and Map Code 2.11 (Burn Dump Hazard)) to support such development unless appropriate studies establish that such development will not result in unmitigated significant impact. | CONSISTENT. The proposed Project would be consistent with underlying zoning and would be subject to the development standards of the amended Ordinance. Therefore, the proposed Project would be consistent with Policy 1. |
| **Policy 2.** In order to minimize risk to Kern County residents and their property, new development will not be permitted in hazard areas in the absence of implementing ordinances and programs. These ordinances will establish conditions, criteria, and standards for the approval of development in hazard areas. | CONSISTENT. In order to minimize risk in hazard areas, developers would comply with the Kern County Fire Code, Kern County Multi-Hazard Mitigation Plan, Kern County Hazardous Waste Management Plan, Lake Isabella Dam Failure Evacuation Plan, Kern County Airport Land Use Compatibility Plan (ALUCP), and Kern County Code of Ordinances Chapter 19.76 – Airport Approach Height (H) Combining District. Developers would also be required to implement mitigation measures outlined in Section 4.8, Hazards and Hazardous Materials. Compliance with existing policies and plans and new mitigation measures would reduce impacts due to oil and gas development in hazard areas. Therefore, the proposed Project would be consistent with Policy 2. |
| **Policy 3.** Zoning and other land use controls will be used to regulate and, in some instances, to prohibit development in hazardous areas. | CONSISTENT. While residential, commercial, and other development are not expressly prohibited in Tier 1 areas, in general, only oil and gas uses would be constructed within these areas due to compatibility issues. The development standards proposed as part of this project would be required regardless of where a sensitive receptor is located and would reduce impacts both within wellfields and near adjacent land uses. Therefore, the proposed Project would be consistent with Policy 3. |
| **Policy 6.** Regardless of percentage of slope, development on hillsides will be sited in the least obtrusive fashion, thereby, minimizing the extent of topographic alteration required and reducing soil erosion while maintaining soil stability. | CONSISTENT. As discussed in Section 4.6, Geology and Soils, the operator shall implement a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP would include an Erosion Control Plan, the implementation of which would reduce topographic alteration and soil erosion. In addition, per Section 4.9, Hydrology and Water Quality, the operator would also comply with mitigation measures related to |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| | reducing hydrological and water quality impacts. Therefore, the proposed Project would be consistent with Policy 6. |
| **Policy 7.** Ensure effective slope stability, wastewater drainage, and sewage treatments in areas with steep slopes are adequate for development. | CONSISTENT. The proposed Project does not include the construction of wastewater drainage or sewage treatment facilities. As discussed in Section 4.6, Geology and Soils, the operator shall implement a SWPPP. The SWPPP would include an Erosion Control Plan, the implementation of which would reduce slope instability. In addition, operators would avoid siting new project components on steep slopes to the extent feasible and would follow California Building Code standards and Kern County Code of Building Regulations and adhere to the requirements of mitigation measures. In addition, per Section 4.9, Hydrology and Water Quality, the operator would also comply with hydrological and water quality related mitigation measures. Therefore, the proposed Project would be consistent with Policy 7. |
| **Policy 8.** Encourage the preservation of the floodplain's flow conveyance capacity, especially in floodways, to be open space/passive recreation areas throughout the County. | CONSISTENT. As discussed in Section 4.6, Geology and Soils, the operator shall implement a SWPPP. Implementation of a SWPPP would reduce the potential to impact a floodplain's flow conveyance capacity. In addition, per Section 4.9, Hydrology and Water Quality, the operator would also comply with mitigation measures. Therefore, the proposed Project would be consistent with Policy 8. |
| **Policy 9.** Construction of structures that impede water flow in a primary floodplain will be discouraged. | CONSISTENT. As discussed in Section 4.6, Geology and Soils, the operator shall implement a SWPPP. Implementation of a SWPPP would reduce the potential to impede water flow in a primary floodplain. In addition, per Section 4.9, Hydrology and Water Quality, the operator would also comply with mitigation measures. Therefore, the proposed Project would be consistent with Policy 9. |
| **Policy 10.** The County will allow lands which are within flood hazard areas, other than primary floodplains, to be developed in accordance with the General Plan and Floodplain Management Ordinance, if mitigation measures are incorporated so as to ensure that the proposed development will not be hazardous within the requirements of the Safety Element (Chapter 4) of this General Plan. | CONSISTENT. As discussed in Section 4.9, Hydrology and Water Quality, the operator shall implement a SWPPP and comply with stormwater regulations per mitigation measures. The applicant would also construct project components according to California Building Code standards and Kern County Code of Building Regulations and adhere to the requirements of mitigation measures in Section 4.6, Geology and Soils. Therefore, the proposed Project includes measures that would ensure that the project would not cause hazardous conditions within a flood hazard area. The proposed Project would be consistent with Policy 10. |
| **Policy 11.** Protect and maintain watershed integrity within Kern County. | CONSISTENT. As discussed in Section 4.6, Geology and Soils, the operator shall implement a SWPPP. In addition, as discussed in Section 4.9, Hydrology and |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| | Water Quality, the operator shall comply with all applicable federal, state, regional, and local agency water quality protection laws and regulations, and commonly utilized industry standards, including obtaining all applicable stormwater construction permits from the Central Valley Regional Water Quality Control Board (CVRWQCB) per mitigation measures. The operator would also implement best management practices, such as those set forth in the Kern County Grading Ordinance. Finally, all drilling operations would use either a closed loop system to avoid discharges of drilling muds and fluids or would obtain coverage under the State Water Resources Control Board (SWRCB) low threat discharge General Order (WDR General Order 2003-0003-DWQ). Therefore, project runoff would not impact watershed integrity, and the proposed Project would be consistent with Policy 11. |
| **Policy 13.** Development, which is located adjacent to a burn dumpsite and requires a discretionary permit, shall be reviewed for land use compatibility and possible soil contamination. | CONSISTENT. Future activities located next to a burn dumpsite in Tier 4 areas would be subject to a CUP. All other wells proposed adjacent to a burn dumpsite would be subject to development standards. Therefore, the proposed Project would be consistent with Policy 13. |
| **Implementation Measure B.** A seismic analysis may be required for those areas in Kern County which are susceptible to landslides. | CONSISTENT. An analysis of seismic hazards is included in Section 4.6, Geology and Soils. Therefore, the proposed Project would be consistent with Implementation Measure B. |
| **Implementation Measure E.** Development proposed in areas with steep slopes (Map Code 2.4) will be reviewed for conformity to Chapter 19.88 Hillside Development Ordinance or Chapter 19.52 Special Planning (SP) District to ensure that appropriate soil stability, drainage, and sewage treatment will result. | CONSISTENT. The Hillside Development Ordinance does not apply to oil and gas development. In the future, a CUP would be required for oil and gas development in areas designated Tier 5. Therefore, the proposed Project would be consistent with Implementation Measure E. |
| **Implementation Measure H.** Development within areas subject to flooding, as defined by the appropriate agency, will require necessary flood evaluations and studies. | CONSISTENT. As discussed in Section 4.9, Hydrology and Water Quality, the operator shall implement a SWPPP and comply with all stormwater requirements per mitigation measures. The operator would also construct project components according to California Building Code standards and Kern County Code of Building Regulations and adhere to the requirements of mitigation measures described in Section 4.6, Geology and Soils. Therefore, the proposed Project includes measures that would ensure that the project would not cause hazardous conditions within a flood hazard area. The proposed Project would be consistent with Implementation Measure H. |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| **Implementation Measure I.** Designated flood channels and water courses, such as creeks, gullies, and riverbeds, will be preserved as resource management areas or in the case of urban areas, as linear parks whenever practical. | CONSISTENT. Construction and operation of the proposed Project would not interfere with resource management area preservation. Components would be sited to reduce impacts on flood channels and would follow applicable building laws as described in 4.9, Hydrology and Water Quality. Linear parks in urban areas are generally located on Tier 4 land. Oil and gas development on Tier 4 land would require a CUP. Other oil and gas development in designated flood channels and water courses would be subject to development standards. Therefore, the proposed Project would be consistent with Implementation Measure I. |
| **Implementation Measure J.** Compliance with the Floodplain Management Ordinance prior to grading or improvement of land for development or the construction, expansion, conversion or substantial improvements of a structure is required. | CONSISTENT. Operators would be required to comply with all laws, regulations, and ordinances, including the Floodplain Management Ordinance. Therefore, the proposed Project would be consistent with Implementation Measure J. |
| **Implementation Measure M.** The State Water Resources Control Board and the Local Enforcement Agency (Environmental Health Services) shall be consulted when discretionary development has been proposed near a known burn dumpsite. | CONSISTENT. The County solicited input from both the SWRCB and the Kern County Public Health Services Department, Environmental Health Services Division. Both entities received the NOP and have been given the opportunity to provide input into the proposed Project throughout the EIR process. Therefore, the proposed Project would be consistent with Implementation Measure M. |
| **Implementation Measure N.** Applicants for new discretionary development should consult with the appropriate Resource Conservation District and the California Regional Water Quality Control Board regarding soil disturbances issues. | CONSISTENT. The County solicited input from local jurisdictions with publication of the NOP. All local agencies have been given the opportunity to provide input into the proposed Project throughout the EIR process. Therefore, the proposed Project would be consistent with Implementation Measure N. |
| **1.4 PUBLIC FACILITIES AND SERVICES** | |
| **Goal 1.** Kern County residents and businesses should receive adequate and cost effective public services and facilities. The County will compare new urban development proposals and land use changes to the required public services and facilities needed for the proposed project. | CONSISTENT. As described in Section 4.14, Public Services, and Section 4.13, Population and Housing, nominal population growth in the Project Area would not stress certain existing public services, such as schools, parks, and libraries; however, the anticipated new oil and gas activity may tax services, such as police and fire services in the vicinity of the new oil and gas wells. With implementation of mitigation measures in Section 4.14, these impacts would be reduced to less than significant. Therefore, the proposed Project would be consistent with Goal 1. |
| **Goal 5.** Ensure that adequate supplies of quality (appropriate for intended use) water are available to residential, industrial, and agricultural users within Kern County. | CONSISTENT. As described in Section 4.9, Hydrology and Water Quality, with the implementation of mitigation and the adherence to existing laws and regulations, the proposed Project would not impact surface and groundwater |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| | quality that is currently available for other uses. In addition, operators that currently provide produced water to municipal water districts for agricultural uses would continue to do so, which would help ensure that water continues to be available for such uses. Therefore, the proposed Project would be consistent with Goal 5. |
| **Goal 9.** Serve the needs of industries and Kern County residents in a manner that does not degrade the water supply and the environment and protect the public health and safety by avoiding surface and subsurface nuisances resulting from the disposal of hazardous wastes, irrespective of the geographic origin of the waste. | CONSISTENT. As discussed in Section 4.6, Geology and Soils, the operator shall implement a SWPPP. In addition, as discussed in Section 4.9, Hydrology and Water Quality, the operator shall comply with all applicable federal, state, regional, and local agency water quality protection laws and regulations, and commonly utilized industry standards, including obtaining all applicable stormwater construction permits from the Central Valley Regional Water Quality Control Board (CVRWQCB) per mitigation measures. The operator would also implement best management practices, such as those set forth in the Kern County Grading Ordinance. Finally, all drilling operations would use either a closed loop system to avoid discharges of drilling muds and fluids or would obtain coverage under the State Water Resources Control Board (SWRCB) low threat discharge General Order (WDR General Order 2003-0003-DWQ). Therefore, the proposed Project would be consistent with Goal 9. |
| **Policy 1.** New discretionary development will be required to pay its proportional share of the local costs of infrastructure improvements required to service such development. | CONSISTENT. As described in Section 4.16, Transportation and Traffic, developers would be required to pay traffic impact mitigation fees per traffic mitigation measures. Therefore the project would be consistent with Policy 1. |
| **Policy 3.** Individual projects will provide availability of public utility service as per approved guidelines of the serving utility. | CONSISTENT. As described in Section 4.14, Public Services, developers would comply with mitigation measures. Therefore the project would be consistent with Policy 3. |
| **Implementation Measure C.** Project developers shall coordinate with the local utility service providers to supply adequate public utility services. | CONSISTENT. As described in Section 4.14, Public Services, developers would comply with mitigation measures. Therefore the project would be consistent with Implementation Measure C. |
| **Implementation Measure L.** Prior to the approval of development projects, the County shall determine the need for fire protection services. New development in the County shall not be approved unless adequate fire protection facilities and resources can be provided. | CONSISTENT. As described in Section 4.14, Public Services, developers would comply with mitigation measures. Therefore the project would be consistent with Implementation Measure L. |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| **Implementation Measure N.** Secure complete and accurate information on all hazardous wastes generated, handled, stored, treated, transported, and disposed of within or through Kern County. | CONSISTENT. Section 4.8, Hazards and Hazardous Materials, describes hazardous wastes generated, handled, stored, treated, transported, and disposed of with respect to oil and gas development in the Project Area. Therefore, the proposed Project would be consistent with Implementation Measure N. |
| **Implementation Measure O.** Reduce to the greatest degree possible the amount of waste to be disposed of by encouraging private industry to construct and manage a high quality system of transfer stations, recycling facilities, treatment plants, and incinerators located near the generators of hazardous waste. | CONSISTENT. As described in Section 4.17, Utilities, operators currently recycle produced water for reuse in enhanced oil recovery and treat some water for agricultural purposes. Such activities would continue under the Future Development Scenario. Therefore, the proposed Project would be consistent with Implementation Measure N. |
| **Implementation Measure R.** Roads and highways utilized for commercial shipping of hazardous waste destined for disposal will be designated as such pursuant to Vehicle Code Sections 31303 et seq. Permit applications shall identify commercial shipping routes they propose to utilize for particular waste streams. | CONSISTENT. Commercial truck routes used by oil and gas operators in the Project Area are described in Section 4.16, Transportation and Traffic. Therefore, the proposed Project would be consistent with Implementation Measure R. |
| **1.8 INDUSTRIAL** | |
| **Goal 1.** Ensure that an adequate and geographically balanced supply of land is designated for a range of industrial purposes. | CONSISTENT. The proposed Project ensures that an adequate and geographically balanced supply of land is designated for a range of industrial purposes. Land that has historically been available for oil and gas development would continue to be available, and adherence to setbacks and proposed development standards would ensure that land continues to be available for a range of industrial purposes. Therefore, the proposed Project would be consistent with Goal 1. |
| **Goal 2.** Promote the future economic strength and wellbeing of Kern County and its residents without detriment to its environmental quality. | CONSISTENT. The proposed Project would enact new oil and gas development standards, which would both protect the economic strength of the oil and gas industry by streamlining the permitting process and provide greater protection for the environment than exists under current County standards. Therefore the proposed Project would be consistent with Goal 2. |
| **Goal 3.** Ensure compatibility with land use designations such as residential, commercial, or other land uses that may be affected by such activities. | CONSISTENT. The proposed Project would not alter currently established land use designations such as residential, commercial, or other land uses. The new development standards are intended to provide greater environmental protection with respect to oil and gas development in the Project Area. Additionally, oil and gas development in residential and commercial areas (Tier 4) would still require the acquisition of a CUP prior to drilling new wells. Therefore, the proposed Project would be consistent with Goal 3. |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| **Policy 1.** Locations for new industrial activities shall be provided with adequate infrastructure (water, sewage disposal systems, roads, drainage, etc.) to minimize effects on County services. | CONSISTENT. As described in Section 4.16, Transportation and Traffic, developers would be required to pay traffic impact mitigation fees per mitigation measures. As described in Section 4.14, Public Services, developers would also comply with mitigation measures to reduce impacts on public services. As described in Section 4.17, Utilities, the applicant would comply with mitigation measures to reduce impacts on Utilities. Therefore, impacts on County services would be reduced, and the project would be consistent with Policy 1. |
| **Policy 3.** The land areas best suited for industrial activity by virtue of their location and other criteria will be protected from residential and other incompatible development. | CONSISTENT. Residential uses and other incompatible development are not likely to be constructed in Tier 1 areas, where oil and gas activity are currently the primary land use. Therefore the proposed Project would be consistent with Policy 3. |
| **Policy 4.** Protect existing industrial designations from incompatible land use intrusion. | CONSISTENT. Lands zoned for industrial uses that are not otherwise included in Tier 1 are included in Tier 3. Oil and gas development is considered a compatible use in industrial areas. The proposed Project does not alter the zoning code such that residential or commercial or other incompatible uses would be allowed in lands zoned for industrial uses without a CUP. Therefore the proposed Project would be consistent with Policy 4. |
| **Policy 5.** Provide for the clustering of new industrial development adjacent to existing industrial uses and along major transportation corridors. | CONSISTENT. The majority of wells developed under the Future Development Scenario (90%) would be constructed in Tier 1 areas. Tier 1 areas are defined as areas in which oil and gas activity is currently the primary land use. Therefore, future wells would be clustered in areas containing intensive oil field development. Therefore the proposed Project would be consistent with Policy 5. |
| **Policy 7.** Require that industrial uses provide design features such as screen walls, landscaping, increased height and/or setbacks, and lighting restrictions between the boundaries of adjacent residential land use designations so as to reduce impacts on residences due to light, noise, sound, and vibration. | CONSISTENT. As described in Section 4.1, Aesthetics, new development standards would be adopted that would reduce aesthetic impacts according to mitigation measures contained within this EIR. Therefore, the proposed Project would be consistent with Policy 7. |
| **Policy 9.** Prior to approval, all new discretionary industrial projects located in the Airport Influence Areas will be reviewed for compatibility with the Airport Land Use Compatibility Plan. | CONSISTENT. Any structures taller than 200 feet would require FAA approval. Also, developers would be required to adhere to mitigation measures. Therefore, the proposed Project would be compatible with the ALUCP, and the proposed Project would be consistent with Policy 9. |
| **Policy 12.** All industrial development equal to or greater than 40 acres in a rural area will require the adoption of a Specific Plan prior to development approval. | CONSISTENT. As described in the Future Development Scenario, 90% of future oil and gas activity would be located in Tier 1 areas. Although wells could be |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
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| | drilled outside of Tier 1 areas in rural Tier 2 areas, such development would be dispersed and therefore would not meet the intended definition of an "industrial development" under this policy. Any future proposals to construct industrial-type ancillary facilities, such as cogeneration facilities over 50 MW, that would be greater than 40 acres, are not covered under the proposed Project and would require a separate approval process. Therefore, the proposed Project would be consistent with Policy 12. |
| **Policy 13.** Where feasible, locate future industrial activities in close proximity to railroad facilities and inter- and intra-State transportation corridors to minimize extensive travel through urban areas and to promote alternative transportation of goods. | CONSISTENT. It is not feasible to require that new oil and gas wells be located in close proximity to railroad facilities and transportation corridors because wells are sited according to the location of subsurface resources. However, as described in Section 4.16, Transportation and Traffic, future well activity would predominantly use existing transportation corridors to transport workers and equipment to and from well locations. Therefore, the proposed Project would be consistent with Policy 13. |
| **Implementation Measure F.** All General Plan Amendments, zone changes, conditional use permits, discretionary industrial developments, and variations from height limits established by zoning for properties which are located in the Airport Influence areas or near a military airport shall be reviewed by the Planning Department for compatibility with the Kern County Airport Land Use Compatibility Plan. | CONSISTENT. Any structures taller than 200 feet would require FAA approval. Also, developers would be required to adhere to mitigation measures. Therefore, the proposed Project would be compatible with the ALUCP, and the proposed Project would be consistent with Implementation Measure F. |
| **Implementation Measure G.** Require a Specific Plan for industrial land projects (as defined in the Assumptions Section of the Special Treatment Areas) to identify site specific issues and implementation, such as infrastructure, circulation, compatibility, and public services and facilities. | CONSISTENT. The proposed Project does not meet the definition of an "industrial land project." Any future proposals to construct industrial-type ancillary facilities that would meet this definition are not covered under the proposed Project and would require a separate approval process. Therefore, the proposed Project would be consistent with Implementation Measure G. |
| **Implementation Measure I.** Discretionary projects located within an Extreme, High, or Moderate Fire Hazard Zone shall abide by building materials and construction requirements set forth by the Kern County Fire Department and Office of Emergency Services. | CONSISTENT. Operators would be required to comply with all laws, regulations, and ordinances, including existing building materials and construction requirements set forth by the Kern County Fire Department and Office of Emergency Services. Therefore, the proposed Project would be consistent with Implementation Measure I. |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
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| **1.9 RESOURCE** | |
| **Goal 1.** To contain new development within an area large enough to meet generous protections of foreseeable need, but in locations that will not impair the economic strength derived from the petroleum, agriculture, rangeland, or mineral resources or diminish the other amenities that exist in the County. | CONSISTENT. The majority of wells developed under the Future Development Scenario (90%) would be constructed in Tier 1 areas, which are defined as areas in which oil and gas activity is currently the primary land use. However, oil and gas activities are also an allowable use in Tiers 2, 3, 4, and 5 with additional mitigation as described throughout the EIR. Therefore, the proposed Project, through seeking to balance the needs of different land uses and industries, would ensure that the economic strength derived from the petroleum, agriculture, rangeland, or mineral resources industries would not be impaired. Therefore, the proposed Project would be consistent with Goal 1. |
| **Goal 2.** Protect areas of important mineral, petroleum, and agricultural resource potential for future use. | CONSISTENT. The majority of wells developed under the Future Development Scenario (90%) would be constructed in Tier 1 areas, which are defined as areas in which oil and gas activity is currently the primary land use. However, oil and gas activities are also an allowable use in Tiers 2 with additional mitigation as described in Section 4.2, Agriculture and Forestry. Therefore, future development standards would protect areas of important mineral, petroleum, and agricultural resources for future use and would be consistent with Goal 2. |
| **Goal 3.** Ensure the development of resource areas minimize effects on neighboring resource lands. | CONSISTENT. The purpose of the EIR is to analyze the impacts of future oil and gas development on all land within the County's jurisdiction within the Project Area as well as analyzing impacts on neighboring resource lands. Mitigation designed to reduce and avoid impacts on lands associated with resource area development would also have the indirect effect of reducing impacts on neighboring areas. Therefore, the proposed Project would be consistent with Resource Goal 3. |
| **Goal 4.** Encourage safe and orderly energy development within the County, including research and demonstration projects, and to become actively involved in the decision and actions of other agencies as they affect energy development in Kern County. | CONSISTENT. The proposed Project is designed to encourage safe and orderly oil and gas development through the implementation of County-wide development standards and a new oil and gas permitting process. These new standards are intended to meet the needs of other agencies with jurisdiction over oil and gas development and resource protection, such as DOGGR. Therefore, by developing this EIR and implementing the proposed development standards, the County has been actively involved in the decisions and actions of other agencies with respect to oil and gas development. Therefore, the proposed Project would be consistent with Resource Goal 4. |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
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| **Goal 5.** Conserve prime agriculture lands from premature conversion. | CONSISTENT. The County considers oil and gas development to be consistent with agricultural operations. However, the proposed Project would nonetheless conserve prime agricultural lands through implementation of mitigation measures. Therefore, the proposed Project would be consistent with Resource Goal 5. |
| **Goal 6.** Encourage alternative sources of energy, such as solar and wind energy, while protecting the environment. | CONSISTENT. The proposed Project includes development standards and a new permitting process for oil and gas development activities within Kern County that provide a streamlined ministerial review process for oil and gas projects. This process does not preclude or discourage alternative sources of energy, such as wind or solar, and a number of unrelated wind and solar projects are under development or have been recently developed within Kern County. Therefore, this project would not conflict with Resource Goal 6. |
| **Policy 1.** Appropriate resource uses of all types will be encouraged as desirable and consistent interim uses in undeveloped portions of the County regardless of General Plan designation. | CONSISTENT. The majority of wells developed under the Future Development Scenario (90%) would be constructed in Tier 1 areas, which are defined as areas in which oil and gas activity is currently the primary land use. Although these areas do not contain Important Farmlands and have not historically supported agricultural activities, many parcels are located in rural areas and are designated for agricultural uses. In addition, while Tier 2 areas include areas that are designated for agricultural uses and contain Important Farmland, not all land within Tier 2 has historically been used for agriculture. Therefore, with the implementation of proposed development standards, drilling wells in rural Tier 1 and Tier 2 areas would be consistent with Policy 1, regardless of General Plan designations in these areas. |
| **Policy 2.** In areas with a resource designation on the General Plan map, only industrial activities which directly and obviously relate to the exploration, production, and transportation of the particular resource will be considered to be consistent with this General Plan. | CONSISTENT. The proposed Project does not encourage activities that are unrelated to the exploration, production, and transportation of oil and gas resources in areas with a General Plan resource designation. Areas with a Resource designation are located in Tier 1. Therefore, the proposed Project would be consistent with Resource Policy 2. |
| **Policy 5.** Areas of low intensity agriculture use (Map Code 8.2 (Resource Reserve), Map Code 8.3 (Extensive Agriculture), and Map Code 8.5 (Resource Management)) should be of an economically viable size in order to participate in the State Williamson Act Program/Farmland Security Zone Contract. | CONSISTENT. As discussed in Section 4.2, Agricultural and Forestry Resources, the Kern County Agricultural Preserve Standard Rules identify oil and gas drilling and production activities as a compatible use on Williamson Act land. Therefore, the project would be consistent with Policy 5. |
| **Policy 7.** Areas designated for agricultural use, which include Class I and II and other enhanced agricultural soils with surface delivery water systems, should be | CONSISTENT. Lands designated as Tier 2 are zoned either A or A-1 and may contain Important Farmland with Class I and II soils. As discussed in Section 4.2, |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
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| protected from incompatible residential, commercial, and industrial subdivision and development activities. | Agricultural and Forestry Resources, the Kern County Zoning Ordinance identifies oil and gas drilling and production activities as a compatible use on A and A-1 lands. Therefore, the proposed Project would be consistent with Policy 7. |
| **Policy 10.** To encourage effective groundwater resource management for the long-term economic benefit of the County the following shall be considered:<br>(a) Promote groundwater recharge activities in various zone districts.<br>(b) Support for the development of Urban Water Management Plans and promote Department of Water Resources grant funding for all water providers.<br>(c) Support the development of groundwater management plans.<br>(d) Support the development of future sources of additional surface water and groundwater, including conjunctive use, recycled water, conservation, additional storage of surface water and groundwater and desalination. | CONSISTENT. As discussed in Section 4.6, Geology and Soils, the operator shall implement a Storm Water Pollution Prevention Plan (SWPPP), which would reduce impacts on groundwater. In addition, the project would not hinder County efforts to develop Urban Water Management Plans, promote Department of Water Resources grant funding, develop groundwater management plans, or develop future sources of additional surface and groundwater. As described in Section 4.17, Utilities, oil and gas operators currently recycle produced water for reuse in enhanced oil recovery and sell some water to municipal providers for agricultural uses. These practices would continue in the future. Therefore, the proposed Project would be consistent with Policy 10. |
| **Policy 11.** Minimize the alteration of natural drainage areas. Require development plans to include necessary mitigation to stabilize runoff and silt deposition through utilization of grading and flood protection ordinances. | CONSISTENT. As discussed in Section 4.6, Geology and Soils, and Section 4.9, Hydrology and Water Quality, the operator shall implement a SWPPP, which would include an Erosion Plan. The SWPPP and Erosion Plan, as well as the implementation of mitigation measures described in these sections, would minimize the alteration of natural drainage areas and stabilize runoff and silt deposition. Therefore, the proposed Project would be consistent with Policy 11. |
| **Policy 12.** Areas identified by the Natural Resource Conservation Service (formerly Soil Conservation Service) as having high range-site value should be conserved for Extensive Agriculture uses or as Resource Reserve, if located within a County water district. | CONSISTENT. Lands designated as Tier 2 contain land designated Exclusive Agriculture and Resource Reserve and may contain land designated by the Natural Resource Conservation Service as having high range-site value. As discussed in Section 4.2, Agricultural and Forestry Resources, the Kern County Zoning Ordinance identifies oil and gas drilling and production activities as a compatible use on lands zoned for agricultural purposes. In addition, mitigation measures would reduce impacts on agriculture. Therefore, the proposed Project would be consistent with Policy 12. |
| **Policy 14.** Emphasize conservation and development of identified mineral deposits. | CONSISTENT. The proposed Project would streamline the permitting process for oil and gas development on unincorporated County land and implement new development standards, which would reduce future impacts on the environment. Therefore, the implementation of the project would emphasize both conservation and development of mineral deposits and would be consistent with Policy 14. |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
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| **Policy 15.** Agriculture and other resource uses will be considered a consistent use in areas designated for Mineral and Petroleum Resource uses on the General Plan. | CONSISTENT. Lands designated as Tier 2 have historically contained dispersed oil and gas development activities. Such activities are considered compatible with agricultural activities. Under the Future Development Scenario, agricultural and oil and gas activities are proposed to continue as a compatible use. Therefore, the proposed Project would be consistent with Policy 15. |
| **Policy 17.** Lands classified as MRZ-2, as designated by the State of California, should be protected from encroachment of incompatible land uses. | CONSISTENT. Lands classified as MRZ-2 by the State of California include lands within DOGGR well fields. Current County zoning standards allow unrestricted drilling in areas zoned Natural Resource, Medium Industrial, and Heavy Industrial. The County also considers drilling a compatible use on land zoned Agriculture. Tier 1 areas include lands designated by the State of California as MRZ-2 and zoned Natural Resource, Medium Industrial, Heavy Industrial, and Agriculture by the County. Tier 1 areas are defined as areas that include intensive oil field development. According to the Future Development Scenario, 90% of future drilling would occur within Tier 1 areas. These areas would continue to be used for oil and gas development in the future. Incompatible land uses, such as residential and commercial uses are unlikely to be constructed in these areas. Therefore, the proposed Project would be consistent with Policy 17. |
| **Policy 21.** The County shall encourage qualifying agricultural lands to participate in the Williamson Act program or Farmland Security Zone program. | CONSISTENT. As discussed in Section 4.2, Agricultural and Forestry Resources, the Kern County Agricultural Preserve Standard Rules identify oil and gas drilling and production activities as a compatible use on Williamson Act and Farmland Security Zone land. Therefore, the proposed Project does not discourage qualifying agricultural lands to participate in the Williamson Act or Farmland Security Zone program. The project would be consistent with Policy 21. |
| **Policy 25.** Discourage incompatible land use adjacent to Map Code 8.4 (Mineral and Petroleum) areas. | CONSISTENT. The proposed Project does not encourage incompatible land uses adjacent to lands designated Map Code 8.4. According to the Future Development Scenario, future oil and gas production would continue in a manner similar to current operations with the implementation of additional development standards intended to protect the community and environmental resources. Lands designated Map Code 8.4 are predominantly located in Tier 1 areas. Tier 1 areas are defined as areas that include intensive oil field development. These areas would continue to be used for oil and gas development in the future. Incompatible land uses, such as residential and commercial uses are unlikely to be constructed in these areas. Therefore, the proposed Project would be consistent with Policy 25. |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
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| **Implementation Measure B.** Areas designated as Resource Reserve (Map Code 8.2), Extensive Agriculture (Map Code 8.3), Resource Management (Map Code 8.5) that are under Williamson Act Contracts or Farmland Security Zone Contracts will have a minimum parcel size of 80 acres until such time as a contract is expired or is cancelled, at which time the minimum parcel size will become 20 acres**.** | CONSISTENT. As discussed in Section 4.2, Agricultural and Forestry Resources, the Kern County Agricultural Preserve Standard Rules identify oil and gas drilling and production activities as a compatible use on Williamson Act land. Therefore, the proposed Project would not reduce the size of a Williamson or Farmland Security Zone parcel. The project would be consistent with Implementation Measure B. |
| **Implementation Measure C.** The County Planning Department will seek review and comment from the County Engineering and Survey Services Department on the implementation of the National Pollution Discharge Elimination System for all discretionary projects. | CONSISTENT. As discussed in Section 4.9, Hydrology and Water Quality, construction activities in the Project Area that could result in a discharge to waters of the U.S. are subject to the California NPDES General Construction Permit (General Construction Activity NPDES Storm Water Permit, 2009-0009-DWQ and 2010-0014-DWQ). Therefore, the proposed Project would be consistent with Implementation Measure C. |
| **Implementation Measure F.** Prime agricultural lands, according to the Kern County Interim- Important Farmland map produced by the Department of Conservation, which have Class I or II soils and a surface delivery water system shall be conserved through the use of agricultural zoning with minimum parcel size provisions. | CONSISTENT. Lands designated as Tier 2 are zoned either A or A-1. Some parcels contain Important Farmland with Class I and II soils and also contain surface delivery water systems. As discussed in Section 4.2, Agricultural and Forestry Resources, the Kern County Zoning Ordinance identifies oil and gas drilling and production activities as a compatible use on A and A-1 lands. Therefore, the proposed Project would be consistent with Implementation Measure F. |
| **Implementation Measure G.** Property placed under the Williamson Act/Farmland Security Zone Contract must be in a Resource designation**.** | CONSISTENT. The proposed Project does not alter the zoning or General Plan designation of any lands within the Project Area. Therefore, the proposed Project would be consistent with Implementation Measure G. |
| **Implementation Measure H.** Use the California Geological Survey's latest maps to locate mineral deposits until the regional and Statewide importance mineral deposits map has been completed, as required by the Surface Mining and Reclamation Act. | CONSISTENT. The locations of oil and gas deposits were identified using the best available GIS data from DOGGR. Therefore, the proposed Project would be consistent with Implementation Measure H. |
| **Implementation Measure I.** Periodically review the Zoning Ordinance to reflect new technology and energy sources, and encourage these types of uses for new development. | CONSISTENT. The proposed Project includes an update of the language of the County Zoning Ordinance. The project does not preclude the use new technology or energy sources. Therefore, the proposed Project would be consistent with Implementation Measure I. |
| **Implementation Measure J.** The County shall continue to monitor new legislation as it relates to energy production and periodically review the General Plan and Zoning Ordinance for any required updates. | CONSISTENT. The County monitored new legislation related to oil and gas production throughout the production of this EIR and the preparation of the new development standards. The proposed Project includes an update to the portions of |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
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| | the County Zoning Ordinance related to oil and gas development. Therefore, the proposed Project would be consistent with Implementation Measure J. |
| **Implementation Measure K.** Protect oilfields and mineral extraction areas through the use of appropriate implementing zone districts: A (Exclusive Agriculture), DI (Drilling Island), NR (Natural Resource), or PE (Petroleum Extraction). | CONSISTENT. The proposed Project does not alter the zoning or General Plan designation of any lands within the Project Area. Therefore, the proposed Project would be consistent with Implementation Measure K. |
| **1.10 GENERAL PROVISIONS** | |
| **Goal 1.** Ensure that the County can accommodate anticipated future growth and development while maintaining a safe and healthful environment and a prosperous economy by preserving valuable natural resources, guiding development away from hazardous areas, and assuring the provision of adequate public services. | CONSISTENT. The proposed Project would enact new oil and gas development standards, which would both protect the economic strength of the oil and gas industry by streamlining the permitting process and provide greater protection for the environment than exists under current County standards, thus maintaining a safe and healthful environment and prosperous economy. In addition, in the future it is unlikely that development such as residential and commercial projects would be constructed in Tier 1 areas. Also, according to Section 4.14, Public Services, mitigation measures would ensure that new oil and gas development contribute its fair share to the provision of public services. Therefore, the proposed Project would be consistent with Goal 1. |
| **Policy 6.** The County shall ensure the fair treatment of people of all races, cultures, incomes and age groups with respect to the development, adoption, implementation and enforcement of land use and environmental programs. | CONSISTENT. The proposed Project would enact new oil and gas development standards, which would provide greater protection for the public than exists under current County standards. The new development standards would protect all people in the vicinity of new oil and gas development equally regardless of race, culture, income, or age group. Therefore, the proposed Project would be consistent with Policy 6. |
| **Policy 8.** The County shall ensure that new industrial uses and activities are sited to avoid or minimize significant hazards to human health and safety in a manner that avoids over concentrating such uses in proximity to schools and residents. | CONSISTENT. The Kern County Zoning Ordinance contains setback requirements with respect to oil and gas development near schools, residences, and other sensitive land uses. These setback requirements would continue to be enforced under the Future Development Scenario. In addition, the majority of new development (90%) would be constructed within Tier 1 areas, which are defined as areas where oil and gas development is the primary land use. Sensitive land uses, such as residential developments and schools, are unlikely to be constructed in these areas. Therefore, the proposed Project would be consistent with Policy 8. |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
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| **1.10.1 PUBLIC SERVICES AND FACILITIES** | |
| **Policy 9.** New development should pay its pro rata share of the local cost of expansions in services, facilities, and infrastructure which it generates and upon which it is dependent. | CONSISTENT. As described in Section 4.16, Transportation and Traffic, and Section 4.14, Public Services, developers would be required to comply with mitigation measures to reduce impacts on traffic and public services. Implementation of these mitigation measures would ensure that new oil and gas development contribute its fair share to the provision of public services. Therefore, the proposed Project would be consistent with Policy 9. |
| **Policy 16.** The developer shall assume full responsibility for costs incurred in service extensions or improvements that are required to serve the project. Cost sharing or other forms of recovery shall be available when the service extensions or improvements have a specific quantifiable regional significance. | CONSISTENT. Service extensions, such as new water or sewer pipelines, are not included in the proposed Project. Distribution lines are included in the proposed Project and would be paid for and constructed by developers, as necessary. As described in Section 4.16, Transportation and Traffic, Section 4.14, Public Services, and Section 4.17, Utilities, requires implementation of mitigation measures. Implementation of these mitigation measures would ensure that new oil and gas development contribute its fair share to the provision of public services and utilities. Therefore, the proposed Project would be consistent with Policy 16. |
| **Implementation Measure E.** All new discretionary development projects shall be subject to the Standards for Sewage, Water Supply and Preservation of Environmental Health Rules and Regulations administered by the Environmental Health Services Department. Those projects having percolation rates of less than five minutes per inch shall provide a preliminary soils study and site specific documentation that characterizes the quality of upper groundwater in the project vicinity and evaluation of the extent to which, if any, the proposed use of alternative septic systems will adversely impact groundwater quality. If the evaluation indicates that the uppermost groundwater at the proposed site already exceeds groundwater quality objectives of the Regional Water Quality Control Board or would if the alternative septic system is installed, the applicant shall be required to supply sewage collection, treatment and disposal facilities. | CONSISTENT. New sewer pipelines and septic systems, are not included in the proposed Project. In addition, Section 4.17, Utilities, requires implementation of mitigation measures. Therefore, the proposed Project would be consistent with Implementation Measure E. |
| **1.10.2 AIR QUALITY** | |
| **Policy 19.** In considering discretionary projects for which an Environmental Impact Report must be prepared pursuant to the California Environmental Quality Act, the appropriate decision making body, as part of its deliberations, will ensure that:<br>(a) All feasible mitigation to reduce significant adverse air quality impacts have been adopted; and | CONSISTENT. As described in Section 4.3, Air Quality, the applicant would be subject to the terms of applicable air quality permits, which would be approved by the San Joaquin Valley Air Pollution Control District (APCD). In addition, the County has incorporated feasible mitigation to reduce impacts to the greatest extent feasible, but air quality impacts remain significant after mitigation. The |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
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| (b) The benefits of the proposed project outweigh any unavoidable significant adverse effects on air quality found to exist after inclusion of all feasible mitigation. This finding shall be made in a statement of overriding considerations and shall be supported by factual evidence to the extent that such a statement is required pursuant to the California Environmental Quality Act. | County will consider the benefits of the proposed Project and whether they outweigh the unavoidable significant adverse effects of the proposed Project and, depending upon their findings, may prepare a statement of overriding considerations. Therefore, the proposed Project would be consistent with Policy 19. |
| **Policy 20.** The County shall include fugitive dust control measures as a requirement for discretionary projects and as required by the adopted rules and regulations of the San Joaquin Valley Unified Air Pollution Control District and the Kern County Air Pollution Control District on ministerial permits. | CONSISTENT. As described in Section 4.3, Air Quality, the proposed Project includes best management practices and mitigation measures intended to reduce impacts due to fugitive dust as required by the San Joaquin Valley APCD. Therefore, the proposed Project would be consistent with Policy 20. |
| **Policy 21.** The County shall support air districts' efforts to reduce PM10 and PM2.5 emissions. | CONSISTENT. As described in Section 4.3, Air Quality, the proposed Project includes mitigation measures intended to reduce impacts due to fugitive dust (i.e., PM10 and PM2.5) as required by the San Joaquin Valley APCD. Therefore, the proposed Project would be consistent with Policy 20. |
| **Policy 22.** Kern County shall continue to work with the San Joaquin Valley Unified Air Pollution Control District and the Kern County Air Pollution Control District toward air quality attainment with federal, State, and local standards. | CONSISTENT. The San Joaquin Valley Unified APCD received a copy of the NOP in 2013, and the County has had discussions with the district during the preparation of this EIR. The proposed Project is located outside of Kern County APCD jurisdiction. Therefore, the proposed Project would be consistent with Policy 22. |
| **Policy 23.** The County shall continue to implement the local government control measures in coordination with the Kern Council of Governments and the San Joaquin Valley Unified Air Pollution Control District. | CONSISTENT. The Kern Council of Governments and the San Joaquin Valley Unified APCD received a copy of the NOP in 2013 and were given the opportunity to provide input into the EIR. Therefore, the proposed Project would be consistent with Policy 23. |
| **Implementation Measure F.** All discretionary permits shall be referred to the appropriate air district for review and comment. | CONSISTENT. As described in Section 4.3, Air Quality, the applicant would be subject to the terms of applicable air quality permits, which would be prepared and approved by the San Joaquin Valley APCD after the completion of this EIR. In addition, implementation of mitigation measures detailed in Section 4.3 would reduce impacts on air quality to the extent feasible. Therefore, the proposed Project would be consistent with Implementation Measure F. |
| **Implementation Measure G.** Discretionary development projects involving the use of tractor trailer rigs shall incorporate diesel exhaust reduction strategies including, but not limited to:<br>• Minimizing idling time. | CONSISTENT. described in Section 4.3, Air Quality, the applicant would be subject to the terms of applicable air quality permits, which would be prepared and approved by the San Joaquin Valley APCD after the completion of this EIR. In addition, implementation of mitigation measures detailed in Section 4.3 would |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
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| • Electrical overnight plug-ins. | reduce impacts on air quality to the extent feasible. Therefore, the proposed Project would be consistent with Implementation Measure G. |
| **Implementation Measure H.** Discretionary projects may use one or more of the following to reduce air quality effects:<br>a. Pave dirt roads within the development.<br>b. Pave outside storage areas.<br>c. Provide additional low Volatile Organic Compounds (VOC) producing trees on landscape plans.<br>d. Use of alternative fuel fleet vehicles or hybrid vehicles.<br>e. Use of emission control devices on diesel equipment.<br>f. Develop residential neighborhoods without fireplaces or with the use of Environmental Protection Agency certified, low emission natural gas fireplaces.<br>g. Provide bicycle lockers and shower facilities on site.<br>h. Increasing the amount of landscaping beyond what is required in the Zoning Ordinance (Chapter 19.86).<br>i. The use and development of park and ride facilities in outlaying areas.<br>j. Other strategies that may be recommended by the local Air Pollution Control Districts. | CONSISTENT. As described in Section 4.3, Air Quality, the applicant would be subject to the terms of applicable air quality permits, which would be prepared and approved by the San Joaquin Valley APCD after the completion of this EIR. In addition, implementation of mitigation measures detailed in Section 4.3 would reduce impacts on air quality to the extent feasible. Therefore, the proposed Project would be consistent with Implementation Measure F. |
| **1.10.3 ARCHAEOLOGICAL, PALEONTOLOGICAL, CULTURAL, AND HISTORICAL PRESERVATION** | |
| **Policy 25.** The County will promote the preservation of cultural and historic resources which provide ties with the past and constitute a heritage value to residents and visitors. | CONSISTENT. Mitigation measures described in Section 4.5, Cultural Resources, would reduce impacts on cultural and historic resources. Therefore, the proposed Project would be consistent with Policy 25. |
| **Implementation Measure K.** Coordinate with the California State University, Bakersfield's Archaeology Inventory Center. | CONSISTENT. Mitigation measures described in Section 4.5, Cultural Resources would reduce impacts on cultural and historic resources. These measures require coordination with the CSU Bakersfield among other measures. Therefore, the proposed Project would be consistent with Policy 25. |
| **Implementation Measure L.** The County shall address archaeological and historical resources for discretionary projects in accordance with the California Environmental Quality Act (CEQA). | CONSISTENT. Archaeological and historical resources are analyzed in Section 4.5, Cultural Resources, of this EIR. Therefore, the proposed Project would be consistent with Implementation Measure L. |
| **Implementation Measure M.** In areas of known paleontological resources, the County should address the preservation of these resources where feasible. | CONSISTENT. Impacts on paleontological resources would be preserved to the greatest extent feasible as described in Section 4.5, Cultural Resources. Implementation of mitigation measures would reduce impacts on paleontological |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
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| | resources. Therefore, the proposed Project would be consistent with Implementation Measure M. |
| **Implementation Measure N.** The County shall develop a list of Native American organizations and individuals who desire to be notified of proposed discretionary projects. This notification will be accomplished through the established procedures for discretionary projects and CEQA documents. | CONSISTENT. Native American organizations and individuals were notified of the preparation of this EIR as outlined in Section 4.5, Cultural Resources. In addition, mitigation measures would ensure that the County would consult with the appropriate Native American individuals in determining appropriate treatment for unearthed cultural resources if the resources are prehistoric or Native American in nature. Therefore, the proposed Project would be consistent with Implementation Measure N. |
| **Implementation Measure O.** On a project specific basis, the County Planning Department shall evaluate the necessity for the involvement of a qualified Native American monitor for grading or other construction activities on discretionary projects that are subject to a CEQA document. | CONSISTENT. Native American organizations and individuals were notified of the preparation of this EIR as outlined in Section 4.5, Cultural Resources. In addition, mitigation measures would ensure that the County would consult with the appropriate Native American individuals in determining appropriate treatment for unearthed cultural resources if the resources are prehistoric or Native American in nature. Therefore, the proposed Project would be consistent with Implementation Measure O. |
| **1.10.5 THREATENED AND ENDANGERED SPECIES** | |
| **Policy 27.** Threatened or endangered plant and wildlife species should be protected in accordance with State and federal laws. | CONSISTENT. As described in Section 4.4, Biological Resources, the applicant would be required to comply with State and federal laws. Therefore, the proposed Project would be consistent with Policy 27. |
| **Policy 28.** County should work closely with State and federal agencies to assure that discretionary projects avoid or minimize impacts to fish, wildlife, and botanical resources. | CONSISTENT. The County solicited the feedback of and received input from both the USFWS and CDFW during the preparation of this EIR. Therefore, the proposed Project would be consistent with Policy 28. |
| **Policy 29.** The County will seek cooperative efforts with local, State, and federal agencies to protect listed threatened and endangered plant and wildlife species through the use of conservation plans and other methods promoting management and conservation of habitat lands. | CONSISTENT. The County solicited the feedback of and received input from both the USFWS and CDFW during the preparation of this EIR. Impacts of the proposed Project on all HCPs within the Project Area are analyzed in Section 4.10, Land Use and Planning, and Section 4.4, Biological Resources. Therefore, the proposed Project would be consistent with Policy 29. |
| **Policy 31.** Under the provisions of the California Environmental Quality Act (CEQA), the County, as lead agency, will solicit comments from the California Department of Fish and Game and the U.S. Fish and Wildlife Service when an environmental document (Negative Declaration, Mitigated Negative Declaration, or | CONSISTENT. The County solicited the feedback of and received input from both the USFWS and CDFW during the preparation of this EIR. Therefore, the proposed Project would be consistent with Policy 31. |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
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| Environmental Impact Report) is prepared. | |
| **Policy 32.** Riparian areas will be managed in accordance with United States Army Corps of Engineers, and the California Department of Fish and Game rules and regulations to enhance the drainage, flood control, biological, recreational, and other beneficial uses while acknowledging existing land use patterns. | CONSISTENT. Future developers are required to adhere to all rules and regulations, including those regarding riparian areas. In addition, Section 4.9, Hydrology and Water Quality, and Section 4.6, Geology and Soils, describe the implementation of a SWPPP, which would help protect riparian areas. In addition, mitigation measures would further reduce impacts on riparian areas. Therefore, the proposed Project would be consistent with Policy 32. |
| **Implementation Measure Q.** Discretionary projects shall consider effects to biological resources as required by the California Environmental Quality Act. | CONSISTENT. Effects to biological resources are analyzed in Section 4.4, Biological Resources, of this EIR. Therefore, the proposed Project would be consistent with Implementation Measure Q. |
| **Implementation Measure R.** Consult and consider the comments from responsible and trustee wildlife agencies when reviewing a discretionary project subject to the California Environmental Quality Act. | CONSISTENT. The County solicited the feedback of and received input from both responsible and trustee wildlife agencies during the preparation of this EIR. Therefore, the proposed Project would be consistent with Implementation Measure R. |
| **Implementation Measure S.** Pursue the development and implementation of conservation programs with State and federal wildlife agencies for property owners desiring streamlined endangered species mitigation programs. | CONSISTENT. The proposed Project would streamline the drilling permit process, which would consequently streamline endangered species mitigation programs within the County. All drilling permits within Kern County jurisdiction would be subject to biological species mitigation outlined in this EIR. Therefore, the proposed Project would be consistent with Implementation Measure S. |
| **1.10.6 SURFACE WATER AND GROUNDWATER** | |
| **Policy 34.** Ensure that water quality standards are met for existing users and future development. | CONSISTENT. As discussed in Section 4.6, Geology and Soils, the operator shall implement a SWPPP. In addition, as discussed in Section 4.9, Hydrology and Water Quality, the operator shall comply with all applicable federal, state, regional, and local agency water quality protection laws and regulations, and commonly utilized industry standards, including obtaining all applicable stormwater construction permits from the CVRWQCB per mitigation measures. In addition, all drilling operations would use either a closed loop system to avoid discharges of drilling muds and fluids or would obtain coverage under the SWRCB low threat discharge General Order (WDR General Order 2003-0003-DWQ). Implementation of the aforementioned compliance with laws and regulations, as well as the implementation of mitigation measures, would ensure that water quality standards are met for existing users and future development. Therefore, the |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| | proposed Project would be consistent with Policy 34. |
| **Policy 35.** Ensure that adequate water storage, treatment, and transmission facilities are constructed concurrently with planned growth. | CONSISTENT. The proposed Project does not include the construction of water storage, treatment, or transmission facilities with the exception of those required for oil and gas development. In addition, although the proposed Project may cause nominal population growth in the Project Area as described in Section 4.13, Population and Housing, the majority of workers would be drawn from the existing population. Thus, implementation of the proposed Project would not require that new water storage, treatment, and transmission facilities be constructed to support growth. Therefore, the proposed Project would be consistent with Policy 35. |
| **Policy 36.** Ensure that appropriate funding mechanisms for water are in place to fund the needed improvements resulting from growth and subsequent development. | CONSISTENT. Although the proposed Project may cause nominal population growth in the Project Area as described in Section 4.13, Population and Housing, the majority of workers would be drawn from the existing population. In addition, the applicant would use reclaimed water to the extent possible per mitigation measures. Use of reclaimed water would reduce the oil and gas industry's need for municipal water, which would reduce the need for funding mechanisms to provide water infrastructure improvements. Thus, implementation of the proposed Project would not require funding mechanisms for water infrastructure. Therefore, the proposed Project would be consistent with Policy 36. |
| **Policy 38.** Encourage utilization of wastewater treatment facilities which provide for the reuse of wastewater. | CONSISTENT. Produced water is currently reused to the greatest extent practicable in oil field operations and would continue to be reused in the future per mitigation measures. In addition, some produced water in the Eastern Subarea is treated and sold for use in agricultural operations. This, too, would continue in the future. Therefore, the proposed Project would be consistent with Policy 38. |
| **Policy 39.** Encourage the development of the County's groundwater supply to sustain and ensure water quality and quantity for existing users, planned growth, and maintenance of the natural environment. | CONSISTENT. The proposed Project does not impact the County's ability to develop its groundwater supply. According to the Future Development Scenario, the proposed Project would continue to reuse produced water in oil field operations and sell treated produced water for agricultural uses. Therefore, the proposed Project would be consistent with Policy 39. |
| **Policy 41.** Review development proposals to ensure adequate water is available to accommodate projected growth. | CONSISTENT. Although the proposed Project may cause nominal population growth in the Project Area as described in Section 4.13, Population and Housing, the majority of workers would be drawn from the existing population. In addition, implementation of public services and utilities mitigation measures would further |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| | reduce dependency on municipal water supplies. Therefore, the proposed Project would be consistent with Policy 41. |
| **Policy 43.** Drainage shall conform to the Kern County Development Standards and the Grading Ordinance. | CONSISTENT. Developers would conform to all local laws and ordinances and would comply with the Kern County Grading Ordinance. The applicant would also comply with mitigation measures. Therefore, the proposed Project would be consistent with Policy 43. |
| **Policy 44.** Discretionary projects shall analyze watershed impacts and mitigate for construction-related and urban pollutants, as well as alterations of flow patterns and introduction of impervious surfaces as required by the California Environmental Quality Act (CEQA), to prevent the degradation of the watershed to the extent practical. | CONSISTENT. As discussed in Section 4.6, Geology and Soils, the operator shall implement a SWPPP. In addition, as discussed in Section 4.9, Hydrology and Water Quality, the operator shall comply with all applicable federal, state, regional, and local agency water quality protection laws and regulations, and commonly utilized industry standards, including obtaining all applicable stormwater construction permits from the Central Valley Regional Water Quality Control Board (CVRWQCB) per mitigation measures. The operator would also comply with the Kern County Grading Ordinance. Finally, all drilling operations would use either a closed loop system to avoid discharges of drilling muds and fluids or would obtain coverage under the State Water Resources Control Board (SWRCB) low threat discharge General Order (WDR General Order 2003-0003-DWQ). Although areas would be graded during construction and soil may be compacted, impervious services would be minimal. Therefore, impacts on watershed integrity would be reduced, and the proposed Project would be consistent with Policy 11. |
| **Policy 45.** New high consumptive water uses, such as lakes and golf courses, should require evidence of additional verified sources of water other than local groundwater. Other sources may include recycled stormwater or wastewater. | CONSISTENT. Treated oil and gas process water is not used for lakes and golf course but for agricultural purposes and other oil field uses. However, oil and gas developers would be required to implement mitigation measures per Section 4.9, Hydrology and Water Quality, and Section 4.17, Utilities and Service Systems. Therefore, the proposed Project would be consistent with Policy 45. |
| **Implementation Measure U.** The Kern County Environmental Health Services Department will develop guidelines for the protection of groundwater quality which will include comprehensive well construction standards and the promotion of groundwater protection for identified degraded watersheds. | CONSISTENT. The proposed Project includes the development of comprehensive well construction standards, including standards that protect groundwater. In addition, all County departments have been given the opportunity to provide input into the EIR process and will be given the opportunity to provide comments on the EIR, including comments on mitigation measures. Therefore, the proposed Project would be consistent with Implementation Measure U. |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
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| **Implementation Measure X.** Encourage effective groundwater resource management for the long-term benefit of the County through the following:<br>Promote groundwater recharge activities in various zone districts.<br>Support the development of Groundwater Management Plans.<br>Support the development of future sources of additional surface water and groundwater, including conjunctive use, recycled water, conservation, additional storage of surface water, and groundwater and desalination. | CONSISTENT. The applicant would be required to comply with mitigation measures that encourage groundwater resource management and use of recycled water. Therefore, the proposed Project would be consistent with Implementation Measure X. |
| **Implementation Measure Y.** Promote efficient water use by utilizing measures such as:<br>Requiring water-conserving design and equipment in new construction.<br>Encouraging water-conserving landscaping and irrigation methods. | CONSISTENT. The applicant would be required to comply with mitigation measures that encourage groundwater resource management and use of recycled water. Therefore, the proposed Project would be consistent with Implementation Measure Y. |
| **1.10.7 LIGHT AND GLARE** | |
| **Policy 48.** Encourage the use of low-glare lighting to minimize nighttime glare effects on neighboring properties. | CONSISTENT. Implementation of mitigation measures would reduce glare associated with nighttime lighting. Therefore, the proposed Project would be consistent with Policy 48. |
| **Implementation Measure AA.** The County shall utilize CEQA Guidelines and the provisions of the Zoning Ordinance to minimize the impacts of light and glare on adjacent properties and in rural undeveloped areas. | CONSISTENT. The development would be required to comply with all applicable laws and ordinances related to light and glare, including mitigation measures. Therefore, the proposed Project would be consistent with Implementation Measure AA. |
| **1.10.9 ECONOMIC DEVELOPMENT** | |
| **Policy 58**. Support and work toward the elimination of disincentives for business and industry to prosper in Kern County, and create special economic development programs to encourage commerce and industry to locate in Kern County. | CONSISTENT. The proposed Project is intended to streamline the permit review process for oil and gas developers as well as encourage the safe development of mineral resources within the County. Streamlining the permit review process would eliminate disincentives for the oil and gas industry to prosper in Kern County while simultaneously maintaining a balance between economic development and the environment. Therefore, the proposed Project would be consistent with Policy 58. |
| **Policy 62**. Periodically review and update procedures for granting development approvals and permits and facilitate the processing of land use entitlements. | CONSISTENT. The proposed Project includes a review of the development approval and permit process for oil and gas development within Kern County. If the proposed Project is approved, procedures for granting development approvals for oil and gas wells and associated infrastructure would be updated in order to |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
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| | facilitate the processing of land use entitlements. In order to ensure that conflicts between surface and subsurface entitlements are reduced, developers would be required to conform with mitigation measures, which includes the new Oil and Gas Conformity Review Process. Therefore, the proposed Project would be consistent with Policy 62. |
| **Implementation Measure DD.** Utilize the County's Economic Strategy and the Economic Incentive Program to promote economic growth and to maintain a strong local economy. | CONSISTENT. The proposed Project is intended to streamline the permit review process for oil and gas developers as well as encourage the safe development of mineral resources within the County. Streamlining the permit review process would eliminate disincentives for the oil and gas industry to prosper in Kern County while simultaneously maintaining a balance between economic development and the environment. Therefore, the proposed Project would be consistent with Implementation Measure DD. |
| **1.10.10 OAK TREE CONSERVATION** | |
| **Policy 65**. Oak woodlands and large oak trees shall be protected where possible and incorporated into project developments. | CONSISTENT. Developers would be required to implement mitigation measures, which would reduce impacts on oak trees and oak woodlands. Therefore, the proposed Project would be consistent with Policy 65. |
| **Policy 66.** Promote the conservation of oak tree woodlands for their environmental value and scenic beauty | CONSISTENT. Developers would be required to implement mitigation measures, which would reduce impacts on oak trees and oak woodlands. Therefore, the proposed Project would be consistent with Policy 66. |
| **Implementation Measure LL.** The following applies to development of parcels having oak tree canopy cover of less than ten percent (10%), but containing individual oak trees equal to or greater than a 12-inch diameter trunk at 4.5 feet breast height.<br>Such trees shall be identified on plot plans.<br>Discretionary development shall avoid the area beneath and within the trees unaltered drip line unless approved by a licensed or certified arborist or botanist.<br>Specified tree removal related to the discretionary action may be granted by the decision making body upon showing that a hardship exists based on substantial evidence in the record. | CONSISTENT. Developers would be required to implement mitigation measures, which would reduce impacts on oak trees and oak woodlands. Therefore, the proposed Project would be consistent with Implementation Measure LL. |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| **CHAPTER 2. CIRCULATION ELEMENT** | |
| **Objective 1.** To make certain that transportation facilities needed to support development are available. To ensure that these facilities occur in a timely manner so as to avoid traffic degradation. | CONSISTENT. As described in Section 4.16, Transportation and Traffic, developers would be required to pay traffic impact mitigation fees per mitigation measures. Therefore, the proposed Project does not conflict with Circulation Element Objective 1. |
| **Objective 5**. Maintain a minimum Level Of Service (LOS) D for all roads throughout the County. | CONSISTENT. According to the Future Development Scenario, activity levels, and therefore traffic levels, would be generally consistent with historical norms. Regardless, as described in Section 4.16, Transportation and Traffic, developers would be required to pay traffic impact mitigation fees per mitigation measures. Therefore, the proposed Project would be consistent with Objective 5. |
| **2.3.3 HIGHWAY PLAN** | |
| **Goal 5.** Maintain a minimum Level of Service (LOS) D. | CONSISTENT. According to the Future Development Scenario, activity levels, and therefore traffic levels, would be generally consistent with historical norms. Regardless, as described in Section 4.16, Transportation and Traffic, developers would be required to pay traffic impact mitigation fees per mitigation measures. Therefore, the proposed Project would be consistent with Goal 5. |
| **Implementation Measure B**. Continuity and integrity of the arterial and collector system at the mountain/valley region and the mountain/desert region boundary must be reviewed and approved in conjunction with project adoption on an individual basis. | CONSISTENT. The proposed Project boundary includes most of the San Joaquin Valley Floor portion of Kern County up to an elevation of 2,000 feet. The mountain/valley region and mountain/desert region interface area is outside the boundary of the proposed Project. Therefore, the proposed Project does not conflict with Circulation Element Implementation Measure B. |
| **Implementation Measure C.** Conformance to alignment minimum design standards, where roadways that deviate from section and mid-section lines intersect those lines, must be reviewed and approved in conjunction with project adoption on an individual basis. | CONSISTENT. As described in Section 4.16, Transportation and Traffic, developers would be required to pay traffic impact mitigation fees per mitigation measures. Therefore, the proposed Project would be consistent with Goal 5. |
| **2.3.4 FUTURE GROWTH** | |
| **Policy 2.** The County should monitor development applications as they relate to traffic estimates developed for this plan. Mitigation is required if development causes affected roadways to fall below Level Of Service (LOS) D. Utilization of the CEQA process would help identify alternatives to or mitigation for such developments. Mitigation could involve amending the Land Use, Open Space and Conservation | CONSISTENT. The proposed Project includes development standards that would reduce the adverse impacts associated with resource extraction. The County is utilizing the CEQA process to identify the proposed Project's impacts on traffic within the Project Area and has concluded that mitigation measures are required to reduce traffic impacts. As described in Section 4.13, Population and Housing, |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| Element to establish jobs/housing balance if projected trips in any traffic zone exceed trips identified for this Circulation Element. Mitigation could involve exactions to build off-site transportation facilities. These enhancements would reduce traffic congestion to an acceptable level. | workers are expected to be drawn from the existing workforce within Kern County. Therefore, the project would not result in a large influx of workers into the Project Area that would necessitate additional housing. Therefore, the proposed Project would be consistent with Future Growth Policy 2. |
| **Policy 4.** As a condition of private development approval, developers shall build roads needed to access the existing road network. Developers shall build these roads to County standards unless improvements along State routes are necessary then roads shall be built to Caltrans standards. Developers shall locate these roads (width to be determined by the Circulation Plan) along centerlines shown on the circulation diagram map unless otherwise authorized by an approved Specific Plan Line. Developers may build local roads along lines other than those on the circulation diagram map. Developers would negotiate necessary easements to allow this. | CONSISTENT. As described in Section 4.16, Transportation and Traffic, developers would be required to pay traffic impact mitigation fees per mitigation measures. Therefore, the proposed Project would be consistent with Policy 4. |
| **Implementation Measure C.** Project development shall comply with the requirements of the Kern County Zoning Ordinance, Land Division Ordinance, and Development Standards. | CONSISTENT. The proposed Project includes an amendment to the current Zoning Ordinance Chapter 19 and development standards to mitigate impacts associated with resource extraction. In addition, the proposed Project includes a new Oil and Gas Conformity Review Process per MM 4.10-1. Therefore, the proposed Project would be consistent with Implementation Measure C. |
| **2.3.7 SETBACK DEVIATION STUDIES** | |
| **Implementation Measure A.** A setback deviation request shall report proposed setback distance. The Kern County Zoning Ordinance gives setback distance for permanent structures located along surveyed section and mid-section lines. Setback deviations may be authorized where it is demonstrated that expressway, arterial or collector construction will not occur while the structure in question is usable, or valuable. An entity pursuing a setback deviation shall submit an application with necessary justification to support the request. The application shall include fees to defray costs to prepare staff reports and administering the application. | CONSISTENT. Oil and gas developers are required to comply with all setback requirements outlined in the Kern County Ordinance. Setback deviations would be reviewed by the Kern County Planning Department as part of the new Oil and Gas Conformity Review Process (MM 4.10-1). Therefore, the proposed Project would be consistent with Implementation Measure A. |
| **2.3.8 SAFETY HAZARDS OF FOG AND DUST** | |
| **Goal 2.** To relieve blowing dust influences on driving safety in Kern County. | CONSISTENT. Developers would be required to comply with mitigation measures, which would reduce dust. Therefore, the proposed Project would be consistent with Goal 2. |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
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| **2.4 PRIORITY FOCUS AREA TOPICS – HIGHWAYS** | |
| **2.4.7 TAFT AREA** | |
| **Goal 1.** Upgrade road circulation in and around Taft. | CONSISTENT. As described in Section 4.16, Transportation and Traffic, developers would be required to pay traffic impact mitigation fees per mitigation measures. In addition, a Construction Traffic Control Plan would be required. Therefore, the proposed Project would be consistent with Goal 1. |
| **Goal 2.** Reduce the speeds and amount of commuters and truck traffic through the centers of rural communities based on engineering and speed surveys. | CONSISTENT. As described in Section 4.16, Transportation and Traffic, mitigation measures requires the preparation of a Construction Traffic Control Plan. Implementation of such a plan would reduce impacts associated with construction traffic in rural communities. Therefore, the proposed Project would be consistent with Goal 1. |
| **Policy 3**. The County should monitor development applications as they relate to traffic generation developed for this plan. If traffic resulting from projects such as General Plan amendment(s) would exceed current volume to capacity projections, mitigation is required if development causes roadways to fall below LOS D and LOS C for Caltrans roadways. Utilization of the CEQA process would help identify alternatives to, or mitigation for such developments. Mitigation could involve amending the Land Use, Open Space and Conservation Element to establish jobs - housing balance. This is triggered if projected trips in any traffic zone exceed trips identified for this Circulation Element. Mitigation could involve exactions to build off-site transportation facilities. These enhancements would reduce traffic congestion impacts. | CONSISTENT. As described in Section 4.16, Transportation and Traffic, developers would be required to pay traffic impact mitigation fees per mitigation measures. In addition, a Construction Traffic Control Plan would be required. As described in Section 4.13, Population and Housing, workers are expected to be drawn from the existing workforce within Kern County. Therefore, the project would not result in a large influx of workers into the Project Area that would necessitate additional housing. Therefore, the proposed Project would be consistent with Priority Focus Areas Topics Policy 3. |
| **Policy 4.** Kern County should not allow new roads that serve low-density parcels to have unpaved surfaces. Any road capable of or now serving fifty average daily traffic trips or more should be paved. | CONSISTENT. Mitigation measures require the applicant to prepare a Fugitive Dust Control Plan if required by the San Joaquin APCD. Therefore, the proposed Project would be consistent with Policy 4. |
| **2.4.8 DELANO – MCFARLAND AREA** | |
| **Policy 5**. The County should monitor development applications as they relate to traffic generation developed for this plan. If traffic resulting from projects such as General Plan amendment(s) would exceed current volume to capacity projections, mitigation is required if development causes roadways to fall below LOS D and LOS C for Caldrons roadways. Utilization of the CEQA process would help identify | CONSISTENT. As described in Section 4.16, Transportation and Traffic, developers would be required to pay traffic impact mitigation fees per mitigation measures. In addition, a Construction Traffic Control Plan would be required. As described in Section 4.13, Population and Housing, workers are expected to be drawn from the existing workforce within Kern County. Therefore, the project |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| alternatives to, or mitigation for such developments. Mitigation could involve amending the Land Use, Open Space and Conservation Element to establish jobs - housing balance. This is triggered if projected trips in any traffic zone exceed trips identified for this Circulation Element. Mitigation could involve exactions to build offsite transportation facilities. These enhancements would reduce traffic congestion impacts. | would not result in a large influx of workers into the Project Area that would necessitate additional housing. Therefore, the proposed Project would be consistent with Priority Focus Areas Topics Policy 5. |
| **Policy 6**. Kern County should not allow new roads that serve low-density parcels to have unpaved surfaces. Any road capable of or now serving fifty average daily traffic trips or more should be paved. | CONSISTENT. Mitigation measures require that the applicant prepare a Fugitive Dust Control Plan if required by the SJVAPCD. Therefore, the proposed Project would be consistent with Policy 6. |
| **2.4.9 LERDO AREA** | |
| **Goal 3.** Improve traffic safety relative to farm vehicles and equipment. | CONSISTENT. As described in Section 4.16, Transportation and Traffic, mitigation measures require that developers prepare a Construction Traffic Control Plan. Implementation of this plan would improve safety relative to farm vehicles and equipment. Therefore, the proposed Project would be consistent with Goal 3. |
| **Goal 4.** Provide for improved traffic flow adjacent to existing communities. | CONSISTENT. As described in Section 4.16, Transportation and Traffic, developers would be required to pay traffic impact mitigation fees per mitigation measures. In addition, a Construction Traffic Control Plan would be required. Therefore, the proposed Project would be consistent with Goal 4. |
| **Policy 6**. The County should monitor development applications as they relate to traffic generation developed for this plan. If traffic resulting from projects such as General Plan amendment(s) would exceed current volume to capacity projections, mitigation is required if development causes roadways to fall below LOS D and LOS C for Caltrans roadways. Utilization of the CEQA process would help identify alternatives to, or mitigation for such developments. Mitigation could involve amending the Land Use, Open Space and Conservation Element to establish jobs - housing balance. This is triggered if projected trips in any traffic zone exceed trips identified for this Circulation Element. Mitigation could involve exactions to build off-site transportation facilities. These enhancements would reduce traffic congestion impacts. | CONSISTENT. As described in Section 4.16, Transportation and Traffic, developers would be required to pay traffic impact mitigation fees per mitigation measures. In addition, a Construction Traffic Control Plan would be required. As described in Section 4.13, Population and Housing, workers are expected to be drawn from the existing workforce within Kern County. Therefore, the project would not result in a large influx of workers into the Project Area that would necessitate additional housing. Therefore, the proposed Project would be consistent with Priority Focus Areas Topics Policy 6. |
| **Policy 7.** Kern County should not allow new roads that serve low-density parcels to have unpaved surfaces. Any road capable of or now serving fifty average daily traffic trips or more should be paved. | CONSISTENT. Per mitigation measures, if required by the San Joaquin APCD, the applicant would prepare a Fugitive Dust Control Plan. Therefore, the proposed Project would be consistent with Policy 7. |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
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| **2.5 OTHER MODES** | |
| **2.5.1 TRUCKS AND HIGHWAYS** | |
| **Goal 1**. Provide for Kern County's heavy truck transportation in the safest way possible. | CONSISTENT. As described in Section 4.16, Transportation and Traffic, mitigation measures require that developers prepare a Construction Traffic Control Plan. Implementation of this plan would improve safety relative to heavy truck transportation. Therefore, the proposed Project would be consistent with Goal 1. |
| **Goal 2.** Reduce potential overweight trucks. | CONSISTENT. As described in Section 4.16, Transportation and Traffic, mitigation measures require that developers prepare a Construction Traffic Control Plan. Implementation of this plan would improve safety relative to potential overweight trucks. In addition, developers would be required to pay traffic impact mitigation fees per mitigation measures. Therefore, the proposed Project would be consistent with Goal 2. |
| **2.5.2 AIRPORT LAND USE COMPATIBILITY PLAN (ALUCP)** | |
| **Policy 2**. To the extent legally allowable, prevent encroachment on public airport and military base operations from incompatible, unmitigated land uses. | CONSISTENT. As described in Section 4.16, Transportation and Traffic, developers would be required to pay traffic impact mitigation fees per mitigation measures. In addition, a Construction Traffic Control Plan would be required. Therefore, the proposed Project would be consistent with Policy 2. |
| **Implementation Measure A.** Review discretionary land use development applications within the airports influence area and the military base operating area as shown in the ALUCP for consistency. | CONSISTENT. Any structures taller than 200 feet would require FAA approval. In addition, developers would be required to comply with mitigation measures. Therefore, the proposed Project would be compatible with the ALUCP, and the proposed Project would be consistent with Implementation Measure A. |
| **2.5.4 TRANSPORTATION OF HAZARDOUS MATERIALS** | |
| **Goal 1**. Reduce risk to public health from transportation of hazardous materials. | CONSISTENT. Implementation of mitigation measures would require that the Applicant arrange for transportation, storage and disposal of all hazardous materials in compliance with the Hazardous Materials Transportation Act. Therefore, the proposed Project would be consistent with Goal 1. |
| **Policy 1**. The commercial transportation of hazardous material, identification and designation of appropriate shipping routes will be in conformance with the adopted Kern County and Incorporated Cities Hazardous Waste Management Plan. | CONSISTENT. With implementation of mitigation measures, hazards resulting from the commercial transportation of hazardous materials would be reduced. In addition, the applicant would be required to comply with all laws, regulations, policies, and ordinances with respect to hazardous materials transport. Therefore, |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| | the proposed Project would be consistent with Policy 1. |
| **Policy 2.** Kern County and affected cities should reduce use of County-maintained roads and city-maintained streets for transportation of hazardous materials. | CONSISTENT. Implementation of mitigation measures would require that the Applicant arrange for transportation, storage and disposal of all hazardous materials in compliance with the Hazardous Materials Transportation Act. In addition, transport routes identified in this EIR are consistent with historic transport routes in the County for oil and gas development materials and wastes. The proposed Project does not result in an increase in the use of County-maintained roads or city-maintained streets above current levels. Therefore, the proposed Project does not conflict with Policy 2. |
| **CHAPTER 3. NOISE ELEMENT** | |
| **3.2 NOISE SENSITIVE AREAS** | |
| **Goal 1.** Ensure that residents of Kern County are protected from excessive noise and that moderate levels of noise are maintained. | CONSISTENT. Noise mitigation measures would ensure that residents of Kern County are protected from excessive noise and that moderate levels of noise are maintained. Therefore, the proposed Project would be consistent with Goal 1. |
| **Goal 2.** Protect the economic base of Kern County by preventing the encroachment of incompatible land uses near known noise producing roadways, industries, railroads, airports, oil and gas extraction, and other sources. | CONSISTENT. The majority of new wells would be drilled in existing well fields in Tier 1 areas, which are located outside of populated areas. Additionally, as described in Section 4.12, Noise, the applicant shall implement mitigation measures to ensure that residents of the Project Area will be protected from the harmful effects of exposure to excessive noise caused by oil and gas drilling and production activities. Therefore, the proposed Project would be consistent with Goal 2. |
| **Policy 2.** Require noise level criteria applied to all categories of land uses to be consistent with the recommendations of the California Division of Occupational Safety and Health (DOSH). | CONSISTENT. Implementation of mitigation measures would ensure that noise levels near sensitive receptors do not exceed noise level criteria recommended by State and federal agencies. Therefore, the proposed Project would be consistent with Policy 2. |
| **Policy 3.** Encourage vegetation and landscaping along roadways and adjacent to other noise sources in order to increase absorption of noise. | CONSISTENT. The proposed Project does not impact the County's ability to use vegetation and landscaping as sound buffers between noise sensitive land uses and roadways or other noise-generating sources. As described in Section 4.12, Noise, new oil and gas development standards set by the proposed Project would require the use of berms, sound attenuation walls, and/or other methods, as necessary, in order to increase the absorption of noise from future oil and gas development |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| | projects, per mitigation measures. Therefore, the proposed Project would be consistent with Policy 3. |
| **Policy 4.** Utilize good land use planning principles to reduce conflicts related to noise emissions. | CONSISTENT. The majority of new wells would be drilled in existing well fields in Tier 1 areas, which are located outside of populated areas. Residential uses and other sensitive uses are unlikely to be constructed in these areas; however, mitigation measures related to sensitive land uses would apply regardless of whether such uses were located within Tier 1 areas or any other areas. As described in Section 4.12, Noise, the applicant would implement mitigation measures to reduce conflicts related to noise emissions caused by oil and gas drilling and production activities. Therefore, the proposed Project would be consistent with Policy 4. |
| **Policy 5**. Prohibit new noise-sensitive land uses in noise-impacted areas unless effective mitigation measures are incorporated into the project design. Such mitigation shall be designed to reduce noise to the following levels: a) 65 dB Ldn or less in outdoor activity areas; b) 45 dB Ldn or less within interior living spaces or other noise sensitive interior spaces. | CONSISTENT. The majority of new wells would be drilled in existing well fields in Tier 1 areas, which are located outside of populated areas. Residential uses and other sensitive uses are unlikely to be constructed in these areas; however, mitigation measures related to sensitive land uses would apply regardless of whether such uses were located within Tier 1 areas or any other areas. Additionally, as described in Section 4.12, Noise, the applicant would implement mitigation measures to reduce conflicts related to noise emissions caused by oil and gas drilling and production activities. Therefore, the proposed Project would be consistent with Policy 4. |
| **Policy 6.** Ensure that new development in the vicinity of airports will be compatible with existing and projected airport noise levels as set forth in the ALUCP. | CONSISTENT. The proposed Project will comply with all mitigation measures, including those intended to reduce noise impacts on sensitive receptors and mitigation related to ALUCP compliance. Therefore, the proposed Project is consistent with Policy 6. |
| **Policy 7.** Employ the best available methods of noise control. | CONSISTENT. Implementation of mitigation measures outlined in Section 4.12, Noise, would ensure that noise levels near sensitive receptors do not exceed noise level criteria recommended by State and federal agencies. Therefore, the proposed Project would be consistent with Policy 7. |
| **Implementation Measure A**. Utilize zoning regulations to assist in achieving noise-compatible land use patterns. | CONSISTENT. The proposed Project includes an amendment to the County's Zoning Ordinance and introduces new development standards to mitigate oil and gas development impacts on the environmental resources, including mitigation to assist in achieving noise-compatible land use patterns. Therefore, the proposed Project would be consistent with Implementation Measure A. |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| **Implementation Measure F**. Require proposed commercial and industrial uses or operations to be designed or arranged so that they will not subject residential or other noise sensitive land uses to exterior noise levels in excess of 65 dB Ldn and interior noise levels in excess of 45 dB Ldn. | CONSISTENT. The majority of new wells would be drilled in existing well fields in Tier 1 areas, which are located outside of populated areas. Residential uses and other sensitive uses are precluded in these areas. Additionally, as described in Section 4.12, Noise, the applicant shall implement mitigation measures to reduce conflicts related to noise emissions caused by oil and gas drilling and production activities. Therefore, the proposed Project would be consistent with Implementation Measure F. |
| **Implementation Measure J.** Develop implementation procedures to ensure that requirements imposed pursuant to the findings of an acoustical analysis are conducted as part of the project permitting process. | CONSISTENT. As described in Section 4.12, Noise, noise levels associated with oil and gas production activities were measured by the applicant's consultant in 2014. The EIR analysis includes recommendations based on the findings of the applicant's noise study. The applicant shall implement mitigation measures to reduce noise emissions caused by oil and gas drilling and production activities on sensitive receptors. Therefore, the proposed Project would be consistent with Implementation Measure J. |
| **CHAPTER 4. SAFETY ELEMENT** | |
| **Goal 1.** Minimize injuries and loss of life and reduce property damage. | CONSISTENT. The applicant would comply with all laws, regulations, and ordinances. In addition, the applicant would implement mitigation measures outlined in Section 4.8, Hazards and Hazardous Materials. With the implementation of these measures, the proposed Project would be consistent with Goal 1. |
| **Goal 8.** Reduce the public's exposure to fire, explosion, blowout, and other hazards associated with the accidental release of crude oil, natural gas, and hydrogen sulfide gas. | CONSISTENT. The Applicant would implement mitigation measures outlined in Section 4.8, Hazards and Hazardous Materials, which would reduce the public's exposure to fire, explosion, blowout, and other hazards associated with accidental release of crude oil, natural gas, and hydrogen sulfide gas. In addition, the Applicant would be required pay mitigation fees that would mitigate impacts on police and fire protection services in the Project Area as outlined in Section 4.14, Public Services. Therefore, the proposed Project would be consistent with Goal 8. |
| **4.2 GENERAL POLICIES AND IMPLEMENTATION MEASURE, WHICH APPLY TO MORE THAN ONE SAFETY CONSTRAINT** | |
| **Policy 1.** That the County's program of identification, mapping, and evaluating the geologic, fire, flood safety hazard areas, and significant concentrations of hydrogen sulfide in oilfield areas, presently under way by various County departments, be continued. | CONSISTENT. The proposed Project does not interfere with County-wide programs related to identification, mapping, and evaluation of geologic, fire, flood safety hazard areas, and hydrogen sulfide concentrations in oilfield areas. The programs would continue regardless of the approval of the proposed Project. |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| | Therefore, the proposed Project would be consistent with Policy 1. |
| **Policy 4.** The County shall encourage extra precautions be taken for the design of significant lifeline installations, such as highways, utilities, and petrochemical pipelines. | CONSISTENT. The proposed Project is not a significant lifeline installation; however, all pipelines and other project components would be constructed according to County development standards. Therefore, the proposed Project would be consistent with Policy 4. |
| **Implementation Measure F.** The adopted multi-jurisdictional Kern County, California Multi- Hazard Mitigation Plan, as approved by FEMA, shall be used as a source document for preparation of environmental documents pursuant to CEQA, evaluation of project proposals, formulation of potential mitigation, and identification of specific actions that could, if implemented, mitigate impacts from future disasters and other threats to public safety. | CONSISTENT. Section 4.8, Hazards and Hazardous Materials consults the 2012 multi-jurisdictional Kern County, California Multi-Hazard Mitigation Plan. This document was considered in the design of mitigation measures described in Section 4.8, Hazards and Hazardous Materials. Therefore, the proposed Project would be consistent with Implementation Measure F. |
| **4.3 SEISMICALLY INDUCED SURFACE RUPTURE, GROUND SHAKING, AND GROUND FAILURE** | |
| **Implementation Measure B.** Require geological and soils engineering investigations in identified significant geologic hazard areas in accordance with the Kern County Code of Building Regulations. | CONSISTENT. As described in Section 4.6, Geology and Soils, the applicant would be required to follow all laws, regulations, and ordinances, including those related to geological and soils engineering investigations outlined in the Kern County Code of Building Regulations. Therefore, the proposed Project would be consistent with Implementation Measure B. |
| **Implementation Measure C.** The fault zones designated in the Kern County Seismic Hazard Atlas should be considered significant geologic hazard areas. Proper precautions should be instituted to reduce seismic hazard, whenever possible in accordance with State and County regulations. | CONSISTENT. As described in Section 4.6, Geology and Soils, the Kern County Seismic Hazard Atlas was consulted during the preparation of this EIR. Implementation of mitigation measures would reduce impacts due to seismic hazards and other geologic hazards. Therefore, the proposed Project would be consistent with Implementation Measure C. |
| **Implementation Measure G.** Route major lifeline components such as highways, utilities, petroleum or chemical pipelines around areas of high groundwater whenever possible. Where they must cross an area of high groundwater, plans, and permits shall require design features to accommodate extensive ground rupture without prolonged disruption of an essential service or threat to health and safety. | CONSISTENT. The proposed Project is not a major lifeline installation; however, all pipelines and other project components would be constructed according to County development standards. Therefore, the proposed Project would be consistent with Implementation Measure G. |
| **Implementation Measure H.** Require that plans and permits for installation of major lifeline components such as highways, utilities, petroleum or chemical pipelines to incorporate design features to accommodate potential fault movement in areas of active faults without prolonged disruption of essential service or threat to health and safety. | CONSISTENT. The proposed Project is not a major lifeline installation; however, all pipelines and other project components would be constructed according to County development standards. Therefore, the proposed Project would be consistent with Implementation Measure H. |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
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| **Implementation Measure I.** Design significant lifeline installations, such as highways, utilities, and petrochemical pipelines which cross an active fault, to accommodate potential fault movement without prolonged disruption of essential service or creating threat to health and safety. | CONSISTENT. The proposed Project is not a major lifeline installation; however, all pipelines and other project components would be constructed according to County development standards. Therefore, the proposed Project would be consistent with Implementation Measure I. |
| **4.4 DAM FAILURE, FLOODING, AND INUNDATION** | |
| **Policy 2.** Design discretionary critical facilities in the potential dam inundation area used for the storage, or use of hazardous materials to prevent on-site hazards from affecting surrounding communities in the event of inundation. | CONSISTENT. The proposed Project does not include the design of discretionary critical facilities; however, all project components would be constructed according to County development standards, including measures that would reduce impacts associated with hazardous materials in dam inundation areas. The implementation of these measures would reduce the proposed Project's potential to affect surrounding communities in the event of inundation. Therefore, the proposed Project would be consistent with Policy 2. |
| **Policy 3.** Require emergency response plans for the planning area to include specific procedures for the sequential and orderly evacuation of the potential dam inundation area. | CONSISTENT. The proposed Project would not interfere with the City's ability to incorporate specific procedures for the sequential and orderly evacuation of the potential dam inundation area into emergency response plans. Therefore, the proposed Project would be consistent with Policy 3. |
| **Implementation Measure A.** Facilities used for the manufacture, storage, and use of hazardous materials shall comply with the Uniform Fire Code, with requirements for siting or design to prevent on-site hazards from affecting surrounding communities in the event of inundation. | CONSISTENT. As described in Section 4.14, Public Services, construction and operation of all future oil and gas exploration and production activities that would be authorized under the proposed Project would be subject to the provisions of the Uniform Fire Code and local amendments; Titles 19, 22, and 27 of the California Safety Code Regulations; the Kern County Ordinance Code; and the National Fire Protection Association Standards. In addition, the proposed Project would comply with applicable development standards. Therefore, the proposed Project would be consistent with Implementation Measure A. |
| **Implementation Measure B.** Discretionary critical facilities within potential inundation areas shall be designed to mitigate or prevent effects of inundation. | CONSISTENT. The proposed Project does not include the design of discretionary critical facilities; however, all project components would be constructed according to County development standards, including measures that would mitigate impacts for components constructed in dam inundation areas. Therefore, the proposed Project would be consistent with Implementation Measure B. |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| **4.5 LANDSLIDES, SUBSIDENCE, SEICHE, AND LIQUEFACTION** | |
| **Policy 1.** Determine the liquefaction potential at sites in areas of shallow groundwater (Map Code 2.3) prior to discretionary development and determine specific mitigation to be incorporated into the foundation design, as necessary, to prevent or reduce damage from liquefaction in an earthquake. | CONSISTENT. Section 4.6, Geology and Soils, of this EIR identifies areas of high groundwater and determines the liquefaction potential of those areas. Implementation of mitigation measures would reduce the potential of the project to result in significant damage from liquefaction in an earthquake Therefore, the proposed Project would be consistent with Policy 1. |
| **Policy 2.** Route major lifeline installations around potential areas of liquefaction or otherwise protect them against significant damage from liquefaction in an earthquake. | CONSISTENT. The proposed Project does not meet the definition of a major lifeline installation; however, implementation of mitigation measures would reduce the potential of the project to result in significant damage from liquefaction in an earthquake. Therefore, the proposed Project would be consistent with Policy 2. |
| **Policy 3.** Reduce potential for exposure of residential, commercial, and industrial development to hazards of landslide, land subsidence, liquefaction, and erosion. | CONSISTENT. Implementation of mitigation measures would reduce the potential of the project to expose residential, commercial, and industrial development to hazards of landslide, land subsidence, liquefaction, and erosion. Therefore, the proposed Project would be consistent with Policy 3. |
| **Implementation Measure B.** Require liquefaction investigations in all areas of high groundwater potential and appropriate foundation design to mitigate potential damage to buildings on sites with liquefaction potential. | CONSISTENT. Section 4.6, Geology and Soils, of this EIR describes the potential for liquefaction on sites in the Project Area. As described in Section 4.6, Geology and Soils, the applicant would be required to design all project buildings in accordance with applicable California Building Code seismic design standards and the Kern County Building Code. Implementation of mitigation measures would also ensure that impacts are reduced. Therefore, the proposed Project would be consistent with Implementation Measure B. |
| **Implementation Measure C.** Develop and maintain maps, at an appropriate scale, showing the location of all geologic hazards, including active faults, Alquist-Priolo Earthquake Fault Zones, 100-year flood hazard boundary, the extent of projected dam failure inundation and time arcs, depth of inundation, land subsidence, slope failure and earthquake-induced landslides, high groundwater, and liquefaction potential. | CONSISTENT. The EIR and its appendices include maps showing the location of geologic hazards that are present in the Project Area. Therefore, the proposed Project would be consistent with Implementation Measure C. |
| **Implementation Measure D.** Discretionary actions will be required to address and mitigate impacts from inundation, land subsidence, landslides, high groundwater areas, liquefaction and seismic events through the CEQA process. | CONSISTENT. Section 4.9, Hydrology and Water Quality, addresses inundation, and Section 4.6, Geology and Soils, addresses land subsidence, landslides, liquefaction and seismic events. Therefore, the proposed Project would be consistent with Implementation Measure D. |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| **4.6 WILDLAND AND URBAN FIRE** | |
| **Policy 1.** Require discretionary projects to assess impacts on emergency services and facilities. | CONSISTENT. As part of this EIR, impacts on police and fire services and facilities from the proposed Project were evaluated and mitigation was suggested, as appropriate (refer to Section 4.14, Public Services). As described in Section 4.14, Public Services, the applicant would be required to address the project's demand for additional police and fire protection services through the payment of mitigation fees. Therefore, with implementation of mitigation measures, impacts to police and fire protection services would be reduced, and the proposed Project would be consistent with Policy 1. |
| **Policy 3.** The County will encourage the promotion of fire prevention methods to reduce service protection costs and costs to taxpayers. | CONSISTENT. As part of this EIR, impacts on fire services and facilities from the proposed Project were evaluated and mitigation was suggested, as appropriate (refer to Section 4.14, Public Services). As described in Section 4.14, Public Services, the applicant would be required to address the project's demand for additional police and fire protection services through the payment of mitigation fees. Therefore, with implementation of these measures, impacts to police and fire protection services would be reduced, and the proposed Project would be consistent with Policy 3. |
| **Policy 5.** Require that all roads in wildland fire areas are well marked, and that homes have addresses prominently displayed. | CONSISTENT. As described in Section 4.8, Hazards and Hazardous Materials, the majority of the Project Area falls within a Local Responsibility Area and is not classified within the State's Fire Hazard Severity Zones. Also, the proposed Project does not include the construction of homes. Mitigation measures would require the applicant to pay impact mitigation fees, which would ensure that impacts related to fire are reduced. Therefore, the proposed Project would be consistent with Policy 5. |
| **Policy 6.** All discretionary projects shall comply with the adopted Fire Code and the requirements of the Fire Department. | CONSISTENT. The proposed Project would comply with all laws and regulations, including the Fire Code and requirements of the Fire Department. See Impact 4.14.5 in Section 4.14, Public Services. Therefore, the proposed Project would be consistent with Policy 6. |
| **Implementation Measure A.** Require that all development comply with the requirements of the Kern County Fire Department or other appropriate agency regarding access, fire flows, and fire protection facilities. | CONSISTENT. The proposed Project would comply with all laws and regulations, including the requirements of the Kern County Fire Department and other appropriate agencies. See Impact 4.14.5 in Section 4.14, Public Services. Therefore, the proposed Project would be consistent with Implementation Measure A. |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| **4.8 CRITICAL FACILITIES AND HAZARDOUS BUILDINGS** | |
| **Policy 5.** Incorporate planning for incidents affecting critical facilities into contingency plans for disaster response and recovery. | CONSISTENT. Although the proposed Project does not include the development of contingency plans for incidents that would specifically affect critical facilities (e.g., unforeseen natural disasters that would affect police stations, fire stations, hospitals, etc.), Mitigation measures require the applicant to pay mitigation fees for fire and police protection services. Ensuring that funds are available to reduce public services impacts related to the proposed Project would ensure that adequate levels of police and fire protection services are available in the event of an emergency affecting critical facilities. In addition, the proposed Project does not interfere with the County's ability to prepare contingency plans for disaster response and recovery that would affect county-wide critical facilities. Therefore, the proposed Project would be consistent with Policy 5. |
| **Implementation Measure L.** Require that plans and permits for installation of major lifeline components such as highways, utilities, and petroleum or chemical pipelines to incorporate design features to accommodate potential fault movement in areas of active faults without prolonged disruption of essential service or threat to health and safety. | CONSISTENT. The proposed Project does not meet the definition of a major lifeline installation; however, all components of the proposed Project would be constructed according to County development standards. Therefore, the proposed Project would be consistent with Implementation Measure L. |
| **4.9 HAZARDOUS MATERIALS** | |
| **Policy 2.** Innovative technologies to manage hazardous waste streams generated in Kern County will be encouraged. | CONSISTENT. As described in Section 4.8, Hazards and Hazardous Materials, implementation of mitigation measures would reduce impacts associated with the management of hazardous waste streams. Therefore, the proposed Project would be consistent with Policy 2. |
| **Implementation Measure A.** Facilities used to manufacture, store, and use of hazardous materials shall comply with the Uniform Fire Code, with requirements for siting or design to prevent on-site hazards from affecting surrounding communities in the event of inundation. | CONSISTENT. As described in Section 4.8, Hazards and Hazardous Materials, the proposed Project would comply with the Uniform Fire Code and other requirements for siting and design that would prevent on-site hazards from affecting surrounding communities. Also, see Section 4.9, Hydrology and Water Quality, for impacts related to inundation. Therefore, the proposed Project would be consistent with Implementation Measure A. |
| **Implementation Measure B.** The proposed siting or expansion of hazardous waste facilities will be in conformance with the adopted Kern County and Incorporated Cities Hazardous Waste Management Plan. | CONSISTENT. The proposed Project does not include the siting or expansion of hazardous waste facilities. The disposal of hazardous waste is described in Section 4.8, Hazards and Hazardous Materials. The applicant would comply with all applicable laws regarding the disposal of wastes and with mitigation measures |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| | related to hazardous materials and waste. Therefore, the proposed Project would be consistent with Implementation Measure B. |
| **4.10 ABANDONED OPEN SHAFTS AND WELLS** | |
| **Policy 2.** The County should protect residents from the hazards associated with development in areas where wells have been drilled and abandoned for exploration and/or production of oil and natural gas. | CONSISTENT. The applicant would comply with all DOGGR rules related to well abandonment. Therefore the proposed Project would be consistent with Policy 2. |
| **Implementation Measure B.** Support the construction site review program of the Department of Oil, Gas, and Geothermal Resources that assures wells are precisely located, properly plugged and abandoned, and tested for leakage prior to development of the area. | CONSISTENT. The proposed Project provides a project-level CEQA review for wells drilled within the Project Area. In addition, the applicant would comply with all DOGGR requirements. Therefore the proposed Project would be consistent with Implementation Measure B. |
| **CHAPTER 5. ENERGY ELEMENT** | |
| **General Goal:** To assert Kern County's position as California's leading energy producer, to encourage safe and orderly energy development within the County, including research and demonstration projects, and to become actively involved in the decisions and actions of other agencies as they affect energy development in Kern County. | CONSISTENT. The proposed Project would establish a new Oil and Gas Conformity Review Process. This process would streamline the oil and gas permit process and encourage safe and orderly energy development in Kern County. The County has actively engaged with other agencies during the preparation of this EIR to solicit feedback. Therefore, the proposed Project would be consistent with this General Goal. |
| **Policy 3.** The County shall continue to streamline energy permitting regulations. | CONSISTENT. The proposed Project would establish a new Oil and Gas Conformity Review process. This process would streamline the oil and gas permit process and encourage safe and orderly energy development in Kern County. Therefore, the proposed Project would be consistent with Policy 3. |
| **Policy 5.** The County shall work with other agencies to define regulatory responsibility concerning energy-related issues, and shall seek to eliminate, insofar as possible, duplicative regulations. | CONSISTENT. The proposed Project would establish a new Oil and Gas Conformity Review process. This process would streamline the oil and gas permit process and encourage safe and orderly energy development in Kern County. The County has actively engaged with other agencies during the preparation of this EIR to solicit feedback. Therefore, the proposed Project would be consistent with Policy 5. |
| **Policy 7.** The processing of all discretionary energy project proposals shall comply with California Environmental Quality Act (CEQA) Guidelines directing that the environmental effects of a project must be taken into account as part of project consideration. | CONSISTENT. The proposed Project would establish a new Oil and Gas Conformity Review process. This process would streamline the oil and gas permit process and encourage safe and orderly energy development in Kern County. This project-level EIR analyzes the impacts associated with the Future Development |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| | Scenario and proposes mitigation measures to reduce environmental impacts. Therefore, the proposed Project complies with the requirements of CEQA and would be consistent with Policy 7. |
| **Policy 8.** The County should work closely with local, State, and federal agencies to assure that energy projects (both discretionary and ministerial) avoid or minimize direct impacts to fish, wildlife, and botanical resources, wherever practical. | CONSISTENT. The proposed Project will continue Kern County's ongoing commitment to consult with and cooperate with Federal, State, regional, and local agencies. Section 4.4, Biological Resources, analyzes impacts on species and habitat in the Project Area and proposes mitigation measures to reduce impacts. Therefore the proposed Project would be consistent with Policy 8. |
| **Policy 9.** The County should develop and implement measures which result in long-term compensation for wildlife habitat, which is unavoidably damaged by energy exploration and development activities. | CONSISTENT. Implementation of biological mitigation measures would reduce impacts on wildlife and habitat. In addition, several HCPs provide take for oil and gas development activities in the Project Area, which would result in long-term compensation for wildlife habitat. Therefore, the proposed Project would be consistent with Policy 9. |
| **Policy 10.** The County should require acoustical analysis for energy project proposals that might impact sensitive and highly-sensitive uses in accordance with the Noise Element of the General Plan. | CONSISTENT. As described in Section 4.12, Noise, noise levels associated with oil and gas production activities were measured by the applicant's consultant in 2014. The EIR analysis includes recommendations based on the findings of the applicant's noise study. The applicant shall implement mitigation measures to reduce noise emissions caused by oil and gas drilling and production activities on sensitive receptors. Therefore, the proposed Project would be consistent with Implementation Measure J. |
| **5.3 PETROLEUM RESOURCES AND DEVELOPMENT** | |
| **5.3.1 URBAN/RESIDENTIAL DEVELOPMENT IN PETROLEUM RESOURCE AREAS** | |
| **Goal.** To protect oil resource areas from unnecessary urban/suburban encroachment, and in instances of urban/suburban development in oil resource areas, to provide for the development of petroleum resources in a manner compatible with the surrounding environment to minimize adverse impacts and protect health and safety. | CONSISTENT. Under the Future Development Scenario, 90% of new wells would be drilled in Tier 1 areas. Tier 1 areas are defined as areas where oil and gas development is the primary land use. Future residential and commercial development projects are unlikely to be constructed in Tier 1 areas. In addition, County setbacks from sensitive uses, such as residences and schools, would continue to be enforced, as modified by mitigation measures outlined in this EIR. Mitigation measures would ensure that petroleum resources are developed in a manner compatible with the surrounding environment and would minimize adverse impacts. Therefore, the proposed Project would be consistent with this Goal. |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| **Policy 1.** The County shall continue to assure adequate minimum setbacks between wells and from any existing structure, as permitted by the Kern County Zoning Ordinance. | CONSISTENT. County setbacks would continue to be enforced under the proposed Project, as modified by mitigation measures. Therefore, the proposed Project would be consistent with Policy 1. |
| **Policy 2.** The County shall assure adequate minimum setbacks between the construction of any structure and existing wells as permitted by the Kern County Fire Department and the State Division of Oil, Gas, and Geothermal Resources (DOGGR). | CONSISTENT. County setbacks would continue to be enforced under the proposed Project, as modified by mitigation measures. Therefore, the proposed Project would be consistent with Policy 2. |
| **Policy 3.** The County shall continue to provide the opportunity for establishing drilling islands prior to final maps subdivision approval of any proposal in a petroleum resource area or a waiver of surface entry rights by the applicable mineral rights holder. | CONSISTENT. The proposed Project does not affect the establishment of drilling islands during the subdivision approval process. Therefore, the proposed Project would be consistent with Policy 3. |
| **Policy 4.** All oilfield development shall take place in accordance with regulations administered by DOGGR. | CONSISTENT. DOGGR field rules would continue to be applicable under the Future Development Scenario, and all DOGGR regulations would continue to apply to future wells drilled in the Project Area. Therefore the proposed Project would be consistent with Policy 4. |
| **Policy 5.** New access roads to serve oilfield development should be sited to avoid traffic impacts. | CONSISTENT. MM 4.16-1 and MM 4.16-2 would reduce traffic impacts associated with the proposed Project. Therefore, the proposed Project would be consistent with Policy 5. |
| **Policy 6.** In areas where petroleum production occurs close to urban development, oil companies shall be encouraged to site equipment so as to avoid unnecessary disturbance to urban uses. | CONSISTENT. County setbacks would continue to be enforced under the proposed Project, as modified by mitigation measures. Therefore, the proposed Project would be consistent with Policy 6. |
| **Policy 7.** The County should work in cooperation with incorporated cities of Kern County to establish compatible standards for oil development within urban areas. | CONSISTENT. With the publication of the NOP, the County notified all local governments within the Project Area in order to solicit input. The intent of the proposed Project is to streamline the oil and gas conformity review process and to develop mitigation measures to ensure the safe development of oil and gas resources within the Project Area. Therefore, the proposed Project would be consistent with Policy 7. |
| **Policy 8.** Reduce the public's exposure to fires, explosions, blowouts, and other hazards associated with the accidental release of crude oil, natural gas, or hydrogen sulfide gas by ensuring that discretionary development projects have adequate separation from oil and natural gas production land uses. | CONSISTENT. County setbacks would continue to be enforced under the proposed Project, as modified by mitigation measures. In addition, 90% of future oil and gas development would occur within Tier 1 areas. Incompatible uses, such as residential development, are unlikely to be constructed in Tier 1 areas. Mitigation measures proposed throughout this EIR would reduce the public's |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| | exposure to hazards associated with oil and gas development. Therefore, the proposed Project would be consistent with Policy 8. |
| **Implementation Measure A.** The Drilling Island District of the Kern County Zoning Ordinance shall establish and maintain development standards to permit petroleum exploration and development on single lots and in small areas. | CONSISTENT. Under the proposed Project, Drilling Island Districts would be classified as Tier 3. Future drilling on Tier 3 land would be allowed via ministerial permit. Therefore, the proposed Project would be consistent with Implementation Measure A. |
| **Implementation Measure B.** The Petroleum Extraction Combining District of the Kern County Zoning Ordinance shall establish and maintain specific standards for ensuring compatibility with urban and petroleum development for the Estate (E), Commercial Office (CO), Neighborhood Commercial (C-1), General Commercial (C-2), and Highway Commercial (CH) zoning designations. Oil and gas production shall be subject to provisions set forth in Chapter 19.98 of the Kern County Zoning Ordinance. | CONSISTENT. The proposed Project includes a revision of the Kern County Zoning Ordinance to establish standards that would ensure the compatibility of future oil and gas development with various land uses in Kern County. The proposed Project would amend Chapter 19.98, and other sections of the Zoning Ordinance, to include new development standards for oil and gas development in order to streamline the permit process and mitigate the impacts of development on the environment. Therefore, the proposed Project would be consistent with Implementation Measure B. |
| **Implementation Measure C.** The County shall monitor its regulations pertaining to petroleum exploration, production, and update such regulations as necessary. | CONSISTENT. The County monitored new legislation related to oil and gas production throughout the production of this EIR and the preparation of the proposed development standards contained herein. The proposed Project includes an update to the County Zoning Ordinance with respect to oil and gas development. Therefore, the proposed Project would be consistent with Implementation Measure C. |
| **5.3.2 KERN COUNTY'S ECONOMIC DEPENDENCE ON THE OIL MARKETPLACE** | |
| **Goal.** To reduce the County's susceptibility to fluctuations in the petroleum production levels, and to encourage diversification of the economy. | CONSISTENT. The proposed Project would streamline the oil and gas conformity review process and does not discourage other types of economic development in the County. Therefore, the proposed Project would be consistent with this goal. |
| **Policy 3.** The County shall encourage the conversion of existing petroleum-related facilities to other productive uses when they are no longer needed or productive. | CONSISTENT. The proposed Project would streamline the oil and gas conformity review process and does not discourage the conversion of existing petroleum-related facilities to other productive uses when they are no longer needed or productive. Therefore, the proposed Project would be consistent with Policy 3. |
| **Policy 4.** The County should encourage the development of renewable energy industries to diversify the energy economy in Kern County. | CONSISTENT. Kern County has permitted a number of solar and wind projects in the past 5 years. The proposed Project does not discourage future renewable energy development within the County. Therefore, the proposed Project does not conflict with and would be consistent with Policy 4. |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
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| **5.3.3 WASTE DISPOSAL IN PETROLEUM DEVELOPMENT** | |
| **Goal.** To encourage the safe recycling, transportation, and disposal of wastes associated with petroleum production and processing, and to provide for the siting of disposal facilities in locations with proper access, while minimizing adverse impacts on the environment and on public health and safety. | CONSISTENT. The proposed Project does not include the siting or expansion of hazardous waste facilities. The disposal of hazardous waste is described in Section 4.8, Hazards and Hazardous Materials. The applicant would comply with all applicable laws regarding the disposal of wastes and would comply with all mitigation measures related to hazardous materials and waste. With implementation of mitigation measures, impacts related to the safe transportation of petroleum wastes would be reduced. Therefore, the proposed Project would be consistent with this goal. |
| **Policy 1.** The County shall continue to acknowledge the necessity to site nonhazardous oil field waste disposal sites near petroleum development to minimize transportation hazards and expenses, consistent with the provisions of the Kern County and Incorporated Cities Integrated Waste Management Plan. | CONSISTENT. The disposal of hazardous waste is described in Section 4.8, Hazards and Hazardous Materials. The applicant would comply with all applicable laws regarding the disposal of wastes and would comply with all mitigation measures related to hazardous materials and waste. With implementation of mitigation measures, impacts related to the safe transportation of petroleum wastes would be reduced. Therefore, the proposed Project would be consistent with Policy 1. |
| **Policy 2.** The County shall encourage recycling and new treatment methods for hazardous and nonhazardous oil field wastes. | CONSISTENT. Produced water is currently reused to the greatest extent practicable in oil field operations and would continue to be reused in the future per mitigation measures outline in Section 4.17, Utilities and Service Systems. In addition, some produced water in the Eastern Subarea is treated and sold for use in agricultural operations. This, too, would continue in the future. Approval of the proposed Project would not preclude the introduction of new improved treatment methods that may be developed in the future. Therefore, the proposed Project would be consistent with Policy 2. |
| **Policy 3.** The County shall work cooperatively with appropriate State and regional agencies to provide for the proper siting of oilfield waste disposal facilities. | CONSISTENT. The disposal of hazardous waste is described in Section 4.8, Hazards and Hazardous Materials. The applicant would comply with all applicable laws regarding the disposal of wastes and would comply with all mitigation measures related to hazardous materials and waste disposal. Therefore, the proposed Project would be consistent with Policy 3. |
| **Implementation Measure A.** The County shall work with the California Department of Oil, Gas, and Geothermal Resources to maintain an inventory of on-site and off-site disposal facilities in order to identify the scope of oil field waste disposal facilities in Kern County. | CONSISTENT. The disposal of hazardous waste is described in Section 4.8, Hazards and Hazardous Materials. The applicant would comply with all applicable laws regarding the disposal of wastes and would comply with all mitigation measures related to hazardous materials and waste disposal. Therefore, the |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| | proposed Project would be consistent with Implementation Measure A. |
| **Implementation Measure B.** The County shall address oilfield hazardous waste issues through the Kern County and Incorporated Cities Hazardous Waste Management Plan. | CONSISTENT. See Section 4.8, Hazards and Hazardous Materials, for a discussion of the Kern County and Incorporated Cities Hazardous Waste Management Plan. The proposed Project would be consistent with this plan. Therefore, the proposed Project would be consistent with Implementation Measure B. |
| **Implementation Measure C.** The County shall continue to maintain provisions in the Zoning Ordinance to provide for oilfield waste disposal facilities. | CONSISTENT. The disposal of hazardous waste is described in Section 4.8, Hazards and Hazardous Materials. The proposed Project does not include the construction of new hazardous waste facilities and does not alter existing provisions in the Zoning Ordinance that provide for oilfield waste disposal facilities. Therefore, the proposed Project would be consistent with Implementation Measure C. |
| **Implementation Measure D.** The County shall continue to maintain provisions in the Zoning Ordinance for the development of oilfield waste recycling and treatment facilities. | CONSISTENT. Produced water is currently reused to the greatest extent practicable in oil field operations and would continue to be reused in the future per mitigation measures outlined in Section 4.17, Utilities and Service Systems. In addition, some produced water in the Eastern Subarea is treated and sold for use in agricultural operations. This, too, would continue in the future. If the proposed Project is approved, these mitigation measures would be adopted into the Zoning Ordinance as new development standards. Therefore, the proposed Project would be consistent with Implementation Measure D. |
| **5.3.4 PETROLEUM TECHNOLOGY AND ADVANCEMENT** | |
| **Goal.** To encourage the continuing advancement of energy technology and to respond to the needs it creates on the work force. | CONSISTENT. The proposed Project includes a Zoning Ordinance amendment and the implementation of a new, streamlined permitting process for oil and gas development. Approval of the proposed Project would not preclude the continuing advancement of energy technology that could be developed in the future. Therefore, the proposed Project would be consistent with this goal. |
| **Policy 1.** The County should actively encourage research and demonstration projects which would be positive for Kern County and not in conflict with adopted plans and programs. | CONSISTENT. The proposed Project is designed to encourage safe and orderly oil and gas development through the implementation of County-wide development standards and a new oil and gas permitting process. The proposed Project does not discourage research and demonstration projects that would be positive for Kern County. Therefore, the proposed Project would be consistent with Policy 1. |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| **Policy 2.** The County should encourage the energy resource industry to invest and research the practical advancement of technology, and allow for periodic updates or training sessions for industry workers. | CONSISTENT. The proposed Project includes a Zoning Ordinance amendment and the implementation of new development standards for the oil and gas industry in Kern County. These new standards do not discourage industry research or training sessions for industry workers. Therefore, the proposed Project does not conflict and is consistent with Policy 2. |
| **Implementation Measure A.** The County should promote a continuing dialogue with petroleum industry representatives to monitor trends in technology and anticipate needed changes to development standards. | CONSISTENT. The proposed Project includes the implementation of a new, streamlined permitting process for oil and gas development. The new process is designed to provide for economically feasible and environmentally responsible growth of the industry in Kern County and the development of industry-wide best practices. Throughout the Project the County has maintained dialogue with the petroleum industry and anticipated changing needs for the next 20 years. The Project was proposed due to needed changes to development standards. Therefore, the proposed Project would be consistent with Implementation Measure A. |
| **Implementation Measure B.** The County shall review and revise, as necessary, the Zoning Ordinance to make provisions for experimental technologies. | CONSISTENT. The proposed Project includes a Zoning Ordinance amendment and the implementation of new development standards for the oil and gas industry in Kern County. These new standards do not discourage the proliferation of future experimental technologies. It is possible that over the time horizon of the Future Development Scenario, future technological advances could further reduce environmental impacts. Therefore, the proposed Project does not conflict and would be consistent with Implementation Measure B. |
| **5.3.5 REUSE OF NONPRODUCTIVE PETROLEUM RESOURCE AREAS** | |
| **Goal.** To ensure the proper abandonment of petroleum production operations, in accordance with DOGGR requirements, when petroleum resource areas are depleted or are no longer productive, to provide for conversion of these areas to other land uses. | CONSISTENT. The proposed Project would streamline the oil and gas conformity review process and does not discourage the conversion of existing petroleum-related facilities to other productive uses when they are no longer needed or productive. Wells would be abandoned according to DOGGR requirements. Therefore, the project would be consistent with this Goal. |
| **Policy 1.** The County shall promote safe well abandonment in accordance with DOGGR regulations through discretionary applications. | CONSISTENT. The applicant would comply with DOGGR regulations related to well abandonment. Therefore, the proposed Project would be consistent with Policy 1. |
| **Policy 2.** The County shall work with the DOGGR to ensure the removal of all surface equipment from abandoned petroleum development sites. | CONSISTENT. The applicant would comply with DOGGR regulations related to the removal of surface equipment from abandoned petroleum development sites. Therefore, the proposed Project would be consistent with Policy 2. |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
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| **Policy 3.** The County shall promote and encourage the safe reuse of former petroleum production lands by developments compatible with surrounding land use designations. The guidelines for site reestablishment include the following:<br>a. Removal of oil-laden soil<br>b. Shaping of disturbed lands back to natural grade and the elimination of pad areas, settling ponds, and similar disturbances.<br>c. Stabilization of sites by seedlings and plantings as appropriate.<br>d. Other measures as may be stipulated by the State Division of Oil, Gas and Geothermal Resources.<br>e. Proper identification and abandonment of all oil and natural gas wells. | CONSISTENT. The applicant would comply with DOGGR regulations related to the abandonment of petroleum development sites. In addition, the applicant would implement mitigation measures, which would reduce impacts associated with contaminated soil. Therefore, the proposed Project would be consistent with Policy 3. |
| **Implementation Measure A.** Upon cessation of drilling and/or producing operations in drilling islands, the County will consider initiating zone changes for such drilling islands to zoning districts compatible with surrounding land uses, provided the owner/operator demonstrates proper abandonment and cleanup in accordance with State Division of Oil, Gas and Geothermal Resources regulations. | CONSISTENT. The proposed Project does not alter the zoning designation of any land in the Project Area. However, approval of the project would not prevent the County from initiating zoning changes for inactive drilling islands. Therefore, the proposed Project would be consistent with Implementation Measure A. |
| **5.3.6 ENVIRONMENTAL IMPACTS OF PETROLEUM DEVELOPMENT** | |
| **Goal 1.** To clearly identify and mitigate any adverse impacts on the environment from new or continued petroleum development by establishing clear and workable methods for industry compliance. | CONSISTENT. The proposed Project would streamline the review process for future oil and gas projects in Kern County, and would enact new oil and gas development standards to provide greater protection for the environment than exists under current County standards. Therefore, the proposed Project would be consistent with Goal 1. |
| **Policy 1.** The County should pursue programs to address oil production as it relates to State and federal threatened and endangered species protection laws. | CONSISTENT. As described in Section 4.4, Biological Resources, the applicant would be required to comply with State and federal threatened and endangered species protection laws during future oil production operations. Therefore, the proposed Project would be consistent with Policy 1. |
| **Policy 2.** The County shall work with affected State and federal agencies and special interest groups to establish consistent policies for environmental protection activities related to petroleum production and oilfield waste disposal. | CONSISTENT. The County solicited the feedback of and received input from State and federal agencies and special interest groups during the preparation of this EIR. Consistent with this policy, this EIR includes mitigation measures to reduce the impacts associated with future oil production operations and oilfield waste disposal. Therefore, the proposed Project would be consistent with Policy 2. |
| **Policy 3.** The County should attempt to ensure that the petroleum industry does not bear a burden of environmental regulation in excess of its contribution to the | CONSISTENT. The proposed Project contains development standards for oil and gas projects that would mitigate only what is impacted by the applicant as |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| problems. | described in the Future Development Scenario. Therefore, the proposed Project would be consistent with Policy 3. |
| **Policy 4.** The County should encourage the use of clean-burning technologies in petroleum production. | CONSISTENT. The proposed Project includes development standards that would reduce impacts of oil and gas production. Development standards do not discourage the use of clean-burning technologies in oil and gas production; therefore, the proposed Project would be consistent with Policy 4. |
| **Policy 5.** The County should encourage air pollution control policies which apply the burden equally to local and upwind sources and to all classes of air polluters. | CONSISTENT. The proposed Project includes development standards that would reduce the air quality impacts of oil and gas production. Refer to Section 4.3, Air Quality. Therefore, the proposed Project would be consistent with Policy 5. |
| **Policy 6.** The County should work closely with State and federal agencies to avoid or minimize direct impacts to threatened and endangered species. | CONSISTENT. The County solicited the feedback of and received input from both the USFWS and CDFW during the preparation of this EIR. All drilling permits within Kern County jurisdiction would be subject to biological species mitigation outlined in Section 4.4, Biological Resources, of this EIR. Therefore, the proposed Project would be consistent with Policy 6. |
| **Implementation Measure B.** The County will continue to participate in programs, such as the proposed Kern County Valley Floor Habitat Conservation Plan program, which are intended to mitigate impacts of development on threatened or endangered species, including seeking State and federal funding for endangered species protection programs. | CONSISTENT. The potential for the proposed Project to affect sensitive biological resources, including species protected by the Valley Floor HCP, is described in Section 4.4, Biological Resources of this EIR. The implementation of mitigation measures described in this section will minimize the impacts of future oil and gas development to sensitive biological resources in accordance with the Kern County Valley Floor HCP and other applicable HCPs. Additionally, the proposed Project would not hinder the County's ability to seek State and federal funding for endangered species protection programs. Therefore, the proposed Project would be consistent with Implementation Measure B. |
| **Implementation Measure D.** Energy resource industries should participate in the Kern County Valley Floor Habitat Conservation Plan to mitigate impacts to threatened and endangered species. | CONSISTENT. All oil and gas drilling permits within Kern County jurisdiction would be subject to biological species mitigation outlined in Section 4.4, Biological Resources, of this EIR. The implementation of mitigation measures described in this section will minimize the impacts of future oil and gas development to sensitive biological resources in accordance with the Kern County Valley Floor HCP and other applicable HCPs. Therefore, the proposed Project would be consistent with Implementation Measure D. |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
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| **5.3.7 PROCESSING AND TRANSPORTATION OF PETROLEUM PRODUCTS** | |
| **Goal.** To ensure the siting of refining facilities and pipelines in locations to provide maximum health, safety, and environmental protection; and to encourage the necessary processing and transportation facilities for Kern County's petroleum production. | CONSISTENT. The proposed Project does not include the construction of new refining facilities, and would not discourage the building/modification of necessary processing and transportation facilities for Kern County's petroleum production. Additionally, development standards established by the proposed Project would maximize health, safety, and environmental protection during the installation of collection pipelines for future oil and gas production operations. Therefore, the proposed Project would be consistent with this goal. |
| **Policy 1.** New refineries shall be sited in accordance with provisions of the Kern County Zoning Ordinance. | CONSISTENT. The proposed Project does not include the construction of new refineries. Therefore, the project would be consistent with Policy 1. |
| **Policy 2.** The County shall review proposed pipelines and their alignments for their conformity with the Land Use, Open Space, and Conservation Element of this General Plan. | CONSISTENT. The proposed Project does not include the construction of new distribution pipelines, which are intended to pipe crude oil to offsite refineries. The Project includes onsite collection pipelines to transport oil, water, and steam. Such pipelines, as well as other components, would be constructed according to proposed development standards. Therefore, the proposed Project would be consistent with Policy 2. |
| **Policy 3.** The County shall encourage the development of new pipelines with alignments that provide for environmental and the public's health and safety protection. | CONSISTENT. Collection pipelines for future oil and gas operations would be installed in accordance with the proposed Project's new development standards, which are designed to maximize public health and safety and environmental protection. Therefore, the proposed Project would be consistent with Policy 3. |
| **Implementation Measure A.** The County shall review and revise, as necessary, the Zoning Ordinance to provide for suitable sites for refinery construction and expansion. | CONSISTENT. The Project does not include the construction or expansion of refineries. The Project does not conflict with the County's ability to review and revise the Zoning Ordinance with respect to refinery construction and expansion. Therefore the proposed Project would be consistent with Implementation Measure A. |
| **Implementation Measure B.** The County shall review and revise, as necessary, the Emergency Response Plan, to provide consistent and proper procedures to address refinery accidents and pipeline ruptures. | CONSISTENT. The proposed Project would not inhibit the County's ability to review and revise the Emergency Response Plan, as necessary, to provide consistent and proper procedures to address refinery accidents and pipeline ruptures. Therefore, the proposed Project would be consistent with Implementation Measure B. |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| **5.4 ELECTRICITY RESOURCES AND GENERATION** | |
| **5.4.1 COGENERATION** | |
| **Goal.** To encourage the safe and orderly development of cogeneration facilities and increased utilization of cogeneration in oil production and other industries as a cleaner and more efficient means of generating both steam and electricity. | CONSISTENT. The proposed Project does not include the construction of new cogeneration facilities. Cogeneration facilities that are currently used in oil extraction operations would continue to be used in the future. Therefore, the project would be consistent with this goal. |
| **Policy 1.** The County shall allow the continued development of cogeneration facilities in primary oil resource areas and industrial areas. | CONSISTENT. Although the construction of new cogeneration facilities are not included in the list of activities covered under this EIR, this Project does not prevent the development of cogeneration facilities under a separate EIR process. Therefore, the project does not conflict with Policy 1. |
| **Policy 3.** The County should encourage the construction of (an) interstate natural gas pipeline(s) to provide supplies of natural gas for cogeneration and thermally enhanced oil recovery in Kern County, provided that proposals are consistent with the goals and policies of the Land Use, Conservation, and Open Space Element of the Kern County General Plan. | CONSISTENT. Although the construction of new cogeneration facilities are not included in the list of activities covered under this EIR, this project does not prevent the development of cogeneration facilities under a separate EIR process and does not prevent the County from encouraging the construction of an interstate natural gas pipeline. Therefore, the project would be consistent with Policy 3. |
| **Implementation Measure A.** The County shall continue to maintain provisions in the Zoning Ordinance to provide for the proper siting of cogeneration facilities in suitable areas. | CONSISTENT. No changes to Zoning Ordinance requirements related to cogeneration facilities would occur under this Project. Therefore, the proposed Project would be consistent with Implementation Measure A. |
| **5.4.7 TRANSMISSION LINES** | |
| **Goal.** To encourage the safe and orderly development of transmission lines to access Kern County's electrical resources along routes, which minimize potential adverse environmental effects. | CONSISTENT. The proposed Project does not include the construction of high voltage transmission lines. Distribution lines associated with the Project would be constructed according to proposed development standards. Therefore, the Project would be consistent with this goal. |
| **Policy 1.** The County should encourage the development and upgrading of transmission lines and associated facilities (e.g., substations) as needed to serve Kern County's residents and access the County's generating resources, insofar as transmission lines do not create significant environmental or public health and safety hazards. | CONSISTENT. The proposed Project does not include the construction of high voltage transmission lines or substations. Transmission line development and upgrades to serve Kern County's residents is not discouraged or otherwise hindered by the proposed Project. Distribution lines associated with the Project would be constructed according to proposed development standards. Therefore, the Project would be consistent with the Policy 1. |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| **Policy 2.** The County shall review all proposed transmission lines and their alignments for conformity with the Land Use, Conservation, and Open Space Element of this General Plan. | CONSISTENT. The proposed Project includes a zoning amendment that addresses oil and gas production in the County and establishes new development standards. Transmission lines, their alignment, and their process for review will remain unaffected by the implementation of this Project. Distribution lines associated with the Project would be constructed according to proposed development standards. Therefore, the proposed Project does not conflict with Policy 2. |
| **Policy 3.** In reviewing proposals for new transmission lines and/or capacity, the County should assert a preference for upgrade of existing lines and use of existing corridors where feasible. | CONSISTENT. The proposed development standards apply to activities described in the Future Development Scenario. Transmission lines, their alignment, and their process for review will remain unaffected by the implementation of this Project. Distribution lines associated with the Project would be constructed according to proposed development standards. Therefore, the proposed Project would be consistent with Section Policy 3. |
| **Policy 4.** The County should work with other agencies in establishing routes for proposed transmission lines. | CONSISTENT. The proposed development standards apply to activities described in the Future Development Scenario. Transmission lines, their alignment, and their process for review would remain unaffected by the implementation of this Project. Distribution lines associated with the Project would be constructed according to proposed development standards. Therefore, the proposed Project would be consistent with Policy 4. |
| **Policy 5.** The County should discourage the siting of above-ground transmission lines in visually sensitive areas. | CONSISTENT. The proposed development standards apply to activities described in the Future Development Scenario. Transmission lines, their alignment, and their process for review would remain unaffected by the implementation of this Project. Distribution lines associated with the Project would be constructed according to proposed development standards. Therefore, the proposed Project would be consistent with Policy 5. |
| **Policy 6.** The County should encourage new transmission lines to be sited/configured to avoid or minimize collision and electrocution hazards to raptors. | CONSISTENT. The proposed development standards apply to activities described the Future Development Scenario. Transmission lines, their alignment, and their process for review would remain unaffected by the implementation of this Project. Distribution lines associated with the Project would be constructed according to proposed development standards. Therefore, the proposed Project would be consistent with Policy 6. |
| **Implementation Measure B.** The County shall continue to maintain provisions in the Zoning Ordinance and update as necessary to provide for transmission line development. | CONSISTENT. The proposed Project contains an amendment to the County Zoning Ordinance. Proposed changes to the Zoning Ordinance would not affect provisions related to transmission line development. The current provisions for |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| | transmission lines will remain. Distribution lines associated with the Project would be constructed according to proposed development standards. Therefore, the proposed Project would be consistent with Implementation Measure B. |
| **METROPOLITAN BAKERSFIELD GENERAL PLAN** | |
| **CHAPTER 2. LAND USE, OPEN SPACE, AND CONSERVATION ELEMENT** | |
| **1.3 PHYSICAL AND ENVIRONMENTAL CONSTRAINTS** | |
| **Goal 1.** Accommodate new development which captures the economic demands generated by the marketplace and establishes Bakersfield's role as the capital of the southern San Joaquin Valley. | CONSISTENT. The proposed Zoning Ordinance amendment and related development standards would streamline the regulatory process for oil and gas production within the County. This new process would encourage economic development that creates high quality jobs and promotes capital investment in Kern County. Bakersfield's role as capital of the southern San Joaquin Valley is not precluded, discouraged, or jeopardized by the proposed Project; therefore, the Project would be consistent with Goal 1. |
| **Goal 2.** Accommodate new development which provides a full mix of uses to support its population. | CONSISTENT. The proposed Zoning Ordinance amendment and new development standards would not preclude or otherwise deter the development of other uses within the Metropolitan Bakersfield Area. Therefore, the proposed Project would be consistent with Goal 2. |
| **Goal 3.** Accommodate new development which is compatible with and complements existing land uses. | CONSISTENT. The proposed Project's new development standards would reduce adverse impacts associated with oil and gas production. 90% of new development would occur in Tier 1 areas, by definition, are areas in which oil and gas development is the primary land use. New development standards described throughout this EIR would ensure that oil and gas development in all Tiers is compatible with existing land uses. Therefore, the proposed Project would be consistent with Goal 3. |
| **Goal 4.** Accommodate new development which channels land uses in a phased, orderly manner and is coordinated with the provision of infrastructure and public improvements. | CONSISTENT. Currently, drilling in Kern County in concentrated in Tier 1 areas while more spread out, less industrial-scale drilling takes place throughout the County on Tiers 2, 3, 4, and 5 land. The historic patterns of oil and gas development would continue under the proposed Project; however, the proposed Project would implement a more streamlined permitting process to ensure that oil and gas development occurs in an orderly and coordinated manner. Therefore, the proposed Project would be consistent with Goal 4. |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| **Policy 31.** Allow for a variety of industrial uses, including land-extensive mineral extraction and processing, heavy manufacturing, light manufacturing, warehousing and distribution, transportation-related, and research and development uses (I-1). | CONSISTENT. The proposed Project would not change existing zoning designations that allow for oil and gas development. Zones where land-extensive mineral extraction and processing occurs would continue in the future (Tier 1 areas). In addition, oil and gas development would continue in Tiers 2, 3, 4, and 5, and development in all Tiers would be required to conform to proposed development standards. Therefore, the proposed Project would be consistent with Goal 31. |
| **Policy 32.** Protect existing industrial designations from incompatible land use intrusions (I-1, I-6, I-8). | CONSISTENT. Changes to existing industrial designations are not included in the proposed Project. 90% of future oil and gas development is projected to occur in Tier 1 areas. Tier 1 areas are areas in which oil and gas development is the dominant land use. Incompatible uses, such as residential development, are unlikely to be constructed in these areas. Therefore, the proposed Project would be consistent with Policy 32. |
| **Policy 33.** Encourage the efficient use of existing industrial land uses through consolidation of building and storage facilities (I-1, I-6, I-8). | CONSISTENT. As described in the Future Development Scenario, central storage facilities serve multiple wells, particularly in Tier 1 areas where large storage facilities serve densely developed well fields. Consolidated central storage facilities would continue to be used under the Future Development Scenario. Expansions to such facilities would be constructed according to proposed development standards. Therefore, the proposed Project would be consistent with Policy 33. |
| **Policy 34.** Provide for the clustering of new industrial development adjacent to existing industrial uses and along major transportation corridors (I-1). | CONSISTENT. It is not feasible to require that new oil and gas wells be clustered along transportation corridors because wells are sited according to the location of subsurface resources. However, drilling in Kern County is generally concentrated in Tier 1 areas. The historic patterns of oil and gas development would continue under the proposed Project, and 90% of future oil and gas development is projected to occur in Tier 1 areas. Therefore, future oil and gas development would be largely clustered near existing development. Therefore, the proposed Project would be consistent with Policy 34. |
| **Policy 35.** Encourage upgrading of visual character of heavy manufacturing industrial areas through the use of landscaping or screening-of visually unattractive buildings and storage areas (I-1, I-6, I-8). | CONSISTENT. Per Section 4.1, Aesthetics, mitigation measures would reduce impacts of visually unattractive components near sensitive receptors. Therefore, the proposed Project would be consistent with Policy 35. |
| **Policy 36.** Require that industrial uses provide design features, such as screen walls, landscaping and height, setback and lighting restrictions between the boundaries of | CONSISTENT. Per Section 4.1, Aesthetics, mitigation measures would reduce impacts of visually unattractive components near sensitive receptors. In addition, |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
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| adjacent residential land use designations so as to reduce impacts on residences due to light, noise, sound and vibration (I-1, I-6, I-8). | per Section 4.12, Noise, mitigation measures would reduce impacts of sound and vibration. Therefore, the proposed Project would be consistent with Policy 36. |
| **Policy 37.** Street frontages along all new industrial development shall be landscaped (I-1, I-6, I-8). | CONSISTENT. Per Section 4.1, Aesthetics, mitigation measures would reduce impacts of visually unattractive components near sensitive receptors. Therefore, the proposed Project would be consistent with Policy 37. |
| **Policy 38.** Minimize impacts of industrial traffic on adjacent residential parcels through the use of site plan review and improvement standards (I-1, I-6). | CONSISTENT. Per Section 4.16, Transportation and Traffic, mitigation measures would reduce impacts of project-related traffic in the Project Area. Therefore, the proposed Project would be consistent with Policy 38. |
| **Policy 76.** Provide for a mix of land uses which meets the diverse needs of residents; offers a variety of employment opportunities; capitalizes, enhances, and expands upon existing physical and economic assets; and allows for the capture of regional growth (I-1). | CONSISTENT. The proposed Zoning Ordinance amendment and new development standards would not preclude or otherwise deter the development of a variety of employment opportunities in the Project Area. The proposed amendment would streamline the permitting process for oil and gas development, thus capitalizing on the County's mineral resources while ensuring that new development standards reduce the industry's environmental impact. Therefore, the proposed Project would be consistent with Policy 76. |
| **Policy 77.** Allow for the continuance of agricultural uses in areas designated for future urban growth (I-1). | CONSISTENT. As described in Section 4.13, Population and Housing, the proposed Project would result in nominal population growth in the Project Area; however, such growth would not prevent the continuance of agricultural uses. Impacts of oil and gas development on Tier 2 land would be mitigated by implementation of mitigation measures. Therefore, the proposed Project would be consistent with Policy 77. |
| **Policy 82.** Preserve existing significant sound residential neighborhoods, commercial districts, and industrial areas (I-1, I-6, I-8). | CONSISTENT. The proposed Project would not alter currently established land use designations such as residential, commercial, or other land uses. The new development standards are intended to provide greater environmental protection with respect to oil and gas development in the Project Area. Additionally, oil and gas development in residential and commercial areas (Tier 4) would still require the acquisition of a CUP prior to drilling new wells. In addition, the Kern County Zoning Ordinance contains setback requirements with respect to oil and gas development near schools, residences, and other sensitive land uses. These setback requirements would continue to be enforced under the Future Development Scenario as amended by proposed development standards. The majority of new development (90%) would be constructed within Tier 1 areas, which are defined as areas where oil and gas development is the primary land use. Therefore, the |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| | proposed Project would be consistent with Policy 82. |
| **CHAPTER 3. CIRCULATION ELEMENT** | |
| **STREETS** | |
| **Goal 3.** Minimize the impact of truck traffic on circulation, and on noise sensitive land uses. | CONSISTENT. As described in Section 4.16, Transportation and Traffic, under MM 4.16-1, developers would be required to prepare a Construction Traffic Control Plan. Implementation of this plan would reduce impacts of project-related truck traffic on circulation and noise sensitive land uses. Therefore, the proposed Project would be consistent with Goal 3. |
| **Policy 6.** Design and locate site access driveways to minimize traffic disruption where possible considering items such as topography, past parcelization and other factors (I-7). | CONSISTENT. As described in Section 4.16, Transportation and Traffic, mitigation measures would reduce traffic impacts in the Project Area. For example, mitigation measures would require a Construction Traffic Control Plan which would detail how the applicant would maintain access to adjacent properties and outline any temporary lane closures during development, among other requirements. Therefore, the proposed Project would be consistent with Policy 6. |
| **Policy 7.** Minimize direct and uncontrolled property access from arterials (I-8). | CONSISTENT. As described in Section 4.16, Transportation and Traffic, developers would be required to prepare a Construction Traffic Control Plan. Implementation of this plan would minimize direct and uncontrolled property access from arterials. Therefore, the proposed Project would be consistent with Policy 7. |
| **Policy 14.** Provide continuous truck routes within incorporated areas that provide access to designated industrial areas (I-13). | CONSISTENT. See Section 4.16, Transportation and Traffic, regarding truck routes in the Project Area. Mitigation measures would reduce project-related traffic impacts in the Project Area. Therefore, the proposed Project would be consistent with Policy 14. |
| **Policy 15.** Prohibit trucks from non-truck routes within incorporated areas except as necessary for direct property access for pick-up and delivery (I-13). | CONSISTENT. As described in Section 4.16, Transportation and Traffic, mitigation measures would reduce traffic impacts in the Project Area. For example, developers would be required to prepare a Construction Traffic Control Plan. Therefore, the proposed Project would be consistent with Policy 15. |
| **Policy 16.** Require that truck access to commercial and industrial properties be designed to minimize impacts on adjacent residential parcels (I-14). | CONSISTENT. As described in Section 4.16, Transportation and Traffic, mitigation measures would reduce traffic impacts in the Project Area. For example, developers would be required to prepare a Construction Traffic Control Plan and pay traffic mitigation fees. These measures would minimize impacts on adjacent |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| | residential parcels. Therefore, the proposed Project would be consistent with Policy 16. |
| **Policy 36.** Prevent streets and intersections from degrading below Level of Service "C" where possible due to physical constraints (as defined in a Level of Service Standard) or when the existing Level of Service is below "C" prevent where possible further degradation due to new development or expansion of existing development with a three part mitigation program: adjacent right-of-way dedication, access improvements and/or an area wide impact fee. The area-wide impact fee would be used where the physical changes for mitigation are not possible due to existing development and/or the mitigation measure is part of a larger project, such as freeways, which will be built at a later date (I-28, I-29). | CONSISTENT. As described in Section 4.16, Transportation and Traffic, mitigation measures would reduce traffic impacts in the Project Area. For example, developers would be required to prepare a Construction Traffic Control Plan and pay traffic mitigation fees. These measures would reduce impacts on Level of Service and road degradation. Therefore, the proposed Project would be consistent with Policy 36. |
| **Policy 37.** Require new development and expansion of existing development to pay for necessary access improvements, such as street extensions, widenings, turn lanes, signals, etc., as identified in the transportation impact report as may be required for a project (I-30, I-31, I-32). | CONSISTENT. As described in Section 4.16, Transportation and Traffic, mitigation measures would require that the applicant pay traffic mitigation fees. Therefore, the proposed Project would be consistent with Policy 37. |
| **Implementation Measure 7.** Review all site plans for compliance with adopted drive approach design standards. | CONSISTENT. MM 4.10-1 details the County's new Oil and Gas Conformity Review Process, which would ensure that all well permit applications are reviewed for compliance with applicable standards. Therefore, the proposed Project would be consistent with Implementation Measure 7. |
| **Implementation Measure 8.** Review site plans, rezonings, and subdivision requests, with respect to access from arterials. Consider conditions of approval to minimize uncontrolled property access. | CONSISTENT. The proposed Project does not include rezonings or subdivision requests. MM 4.10-1 details the County's new Oil and Gas Conformity Review Process, which would ensure that all well permit applications are reviewed for compliance with applicable standards. Therefore, the proposed Project would be consistent with Implementation Measure 8. |
| **Implementation Measure 14.** Amend the city and county zoning ordinances as needed to regulate truck access on properties adjacent to residential areas. | CONSISTENT. As described in Section 4.16, Transportation and Traffic, mitigation measures would reduce traffic impacts in the Project Area. If the proposed Project is approved, mitigation measures described herein would be adopted into the County Zoning Ordinance. Therefore, the proposed Project would be consistent with Implementation Measure 14. |
| **Implementation Measure 25.** Maintain records of existing traffic volume and cumulative projections of traffic from new development to schedule projects for the Capital Improvement Program. | CONSISTENT. Existing traffic volume and cumulative traffic projections are detailed in Section 4.16, Transportation and Traffic. Per mitigation measures, developers would be required to pay traffic mitigation fees. Therefore, the |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
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| | proposed Project would be consistent with Implementation Measure 25. |
| **Implementation Measure 26.** Establish guidelines for project design review based on traffic engineering standards (e.g., driveway design, on-site circulation) and the Level of Service Ordinance. | CONSISTENT. MM 4.10-1 details the County's new Oil and Gas Conformity Review Process, which would ensure that all well permit applications are reviewed for compliance with applicable standards. As described in Section 4.16, Transportation and Traffic, mitigation measures would reduce traffic impacts in the Project Area. If the proposed Project is approved, mitigation measures described herein would be adopted into the County Zoning Ordinance. Therefore, the proposed Project would be consistent with Implementation Measure 26. |
| **Implementation Measure 28.** Periodic review and if needed, revision of adopted ordinances that includes a Level of Service standard for the city and county to include a definition of Level of Service "C", procedures for how it is measured, and mitigation measures to keep from exceeding the standard. | CONSISTENT. As described in Section 4.16, Transportation and Traffic, mitigation measures would reduce traffic impacts in the Project Area. If the proposed Project is approved, mitigation measures described herein would be adopted into the County Zoning Ordinance. Therefore, the proposed Project would be consistent with Implementation Measure 14. |
| **Implementation Measure 29.** Periodic review and, if needed, revision of adopted guidelines for preparation of transportation impact reports, definition of undesirable impacts, and identification of mitigation procedures. | CONSISTENT. As described in Section 4.16, Transportation and Traffic, mitigation measures would reduce traffic impacts in the Project Area. If the proposed Project is approved, mitigation measures described herein would be adopted into the County Zoning Ordinance. Therefore, the proposed Project would be consistent with Implementation Measure 29. |
| **Implementation Measure 33.** Periodic review and, if needed, revision of adopted Transportation Impact Fee Ordinance for the city and county, which specifies the area wide impact fee schedule and how the fees will be used. | CONSISTENT. As described in Section 4.16, Transportation and Traffic, per mitigation measures, the applicant pay traffic mitigation fees. Therefore, the proposed Project would be consistent with Implementation Measure 33. |
| **CHAPTER 3. CIRCULATION ELEMENT** | |
| **PARKING** | |
| **Goal 2.** Satisfy parking requirements in all new developments (residential, commercial, industrial, etc.) through off-street facilities. | CONSISTENT. No new standards related to parking are being developed as part of this EIR. Project components requiring parking would conform to existing parking standards outlined in the County Zoning Ordinance. Therefore, the proposed Project is consistent with Goal 2. |
| **Policy 3.** Ensure that adequate on-site parking supply and parking lot circulation is provided on all site plans in accordance with the adopted parking standards (1-3). | CONSISTENT. No new standards related to parking are being developed as part of this EIR. Project components requiring parking would conform to existing parking standards outlined in the County Zoning Ordinance. Therefore, the proposed Project is consistent with Policy 3. |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
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| **Policy 4.** Discourage the intrusion of non-neighborhood parking in residential areas (1-4). | CONSISTENT. As described in Section 4.16, Transportation and Traffic, developers would be required to prepare a Construction Traffic Control Plan. Implementation of this plan would minimize the intrusion of non-neighborhood parking in residential areas. Therefore, the proposed Project would be consistent with Policy 4. |
| **Implementation Measure** 3. Review all site plans for conformance with adopted parking standards. | CONSISTENT. MM 4.10-1 details the County's new Oil and Gas Conformity Review Process, which would ensure that all well permit applications are reviewed for compliance with applicable standards. As described in Section 4.16, Transportation and Traffic, mitigation measures would reduce traffic impacts in the Project Area. If the proposed Project is approved, mitigation measures described herein would be adopted into the County Zoning Ordinance. Therefore, the proposed Project would be consistent with Implementation Measure 3. |
| **CHAPTER 5. CONSERVATION ELEMENT** | |
| **A. BIOLOGICAL RESOURCES** | |
| **Goal 1.** Conserve and enhance Bakersfield's biological resources in a manner which facilitates orderly development and reflects the sensitivities and constraints of these resources. | CONSISTENT. This EIR serves to comply with this goal. For reasons described in Section 4.4, Biological Resources, the proposed Project would aid in the conservation and enhancement of Bakersfield's sensitive biological resources. Therefore, the proposed Project would be consistent with Goal 1. |
| **Goal 2.** To conserve and enhance habitat areas for designated "sensitive" animal and plant species. | CONSISTENT. As described in Section 4.4, Biological Resources, the proposed Project would enhance or restore existing habitat or establish a new conservation easement in the Project Area per mitigation measures. These measures are designed to reduce or offset impacts related to oil and gas exploration and extraction operations. Therefore, the proposed Project would be consistent with Goal 2. |
| **Policy 1.** Direct development away from "sensitive biological resource" areas, unless effective mitigation measures can be implemented (1·1, f-3, 1-4). | CONSISTENT. The proposed Project would enact new oil and gas development standards, which would provide greater protection for sensitive biological resource areas than exists under current County standards. Upon approval of the proposed Project, sensitive biological resources would be avoided or impacts would be reduced through the use of mitigation, as described in Section 4.4, Biological Resources Therefore, the proposed Project would be consistent with Policy 1. |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| **Policy 2.** Preserve areas of riparian vegetation and wildlife habitat within floodways along rivers and streams, in accordance with the Kern River Plan Element and channel maintenance programs designed to maintain flood flow discharge capacity (1-4). | CONSISTENT. As described in Section 4.4, Biological Resources, the Applicant would implement mitigation measures, which would require pre-disturbance surveys to identify and map sensitive natural communities and riparian habitat that could occur within the Project Area. In addition, the Applicant would be required to avoid sensitive natural areas or obtain the necessary state or federal permits/approvals for disturbance in these areas. Therefore, the proposed Project would be consistent with Policy 2. |
| **Policy 3.** Discourage, where appropriate, the use of off-road vehicles to protect designated sensitive biological and natural resources (l-2). | CONSISTENT. As described in Section 4.4, Biological Resources, off-road traffic would be prohibited outside of designated access routes. Therefore, the proposed Project would be consistent with Policy 3. |
| **Policy 4.** Determine the feasibility of enhancing sensitive biological habitat and establishing additional wildlife habitat in the Project Boundary with State and/or Federal assistance (1-3). | CONSISTENT. The proposed development standards would provide greater protection for sensitive biological habitat than exists under current County standards. Additionally, Section 4.4, Biological Resources, describes mitigation strategies that would enhance or restore habitat or establish a new conservation easement for the purpose of wildlife habitat preservation. Therefore, the proposed Project would be consistent with Policy 4. |
| **Policy 5.** Determine the locations and extent of suitable habitat areas required for the effective conservation management of designated “sensitive” plant and animal species (1-3). | CONSISTENT. As described in Section 4.4, Biological Resources, preconstruction surveys would be conducted to determine the locations and extent of suitable habitat areas required for effective conservation management of designated sensitive plant and animal species in the Project Area. Therefore, the proposed Project would be consistent with Policy 5. |
| **Implementation Measure 3.** Preserve habitat and avoid "take" of protected species as required in the Metropolitan Bakersfield Habitat Conservation Plan. | CONSISTENT. The potential for the proposed Project to affect sensitive biological resources, including species protected by the Metropolitan Bakersfield HCP, is described in Section 4.4, Biological Resources. The implementation of mitigation measures described in Section 4.4 would minimize the impacts of future oil and gas development to sensitive biological resources in accordance with the Metropolitan Bakersfield HCP and other HCPs. Therefore, the proposed Project would be consistent Implementation Measure 3. |
| **B. MINERAL RESOURCES** | |
| **Goal 1.** Protect areas of significant resource potential for future use. | CONSISTENT. Proposed development standards would protect areas with significant resource potential for future use. Therefore, the proposed Project would be consistent with Goal 1. |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| **Goal 2.** Document areas of current mineral and energy resource extraction, as a basis for land use and conservation policies and programs. | CONSISTENT. Chapter 3 of this EIR documents areas of highly concentrated resource extraction activity (Tier 1), areas where resource extraction occurs in tandem with agricultural activities (Tier 2), as well as areas where resource extraction occurs on a lesser scale (Tiers 3, 4, and 5). Therefore, the proposed Project would be consistent with Goal 2. |
| **Goal 3.** Avoid conflicts between the productive use of mineral and energy resource lands and urban growth. | CONSISTENT. Adherence to proposed development standards would reduce conflicts between the productive use of mineral and energy resource lands and urban growth. Therefore, the proposed Project would be consistent with Goal 3. |
| **Goal 4.** Protect land, water, air quality and visual resources from environmental damage resulting from mineral and energy resource development. | CONSISTENT. The proposed Project would enact new oil and gas development standards, which would streamline the permitting process and provide greater protection for environmental resources (land, water, air quality, and visual resources) than exists under current County standards. Therefore, the proposed Project would be consistent with Goal 4. |
| **Policy 4.** Land use decisions shall recognize the importance of identified mineral resources and need for conservation of resources identified by the State Mining and Geology Board (I-2). | CONSISTENT. The development standards proposed as part of this Project are intended to both streamline the permit review process for oil and gas development while at the same time providing a higher level of environmental protection than exists under the existing Zoning Ordinance. Therefore, the proposed Project would be consistent with Policy 4. |
| **Policy 7.** Promote development of compatible uses adjacent to mineral extraction areas (I-2). | CONSISTENT. The proposed Project promotes development of compatible uses adjacent to mineral extraction areas through the implementation of new development standards. Implementation of the proposed standards would reduce the impacts of oil and gas development on surrounding land uses. Therefore, the proposed Project would be consistent with Policy 7. |
| **Policy 10.** Implement, as appropriate, the California Environmental Quality Act to minimize land use conflicts and reduce environmental impacts of all proposed resource extraction operations (I-2). | CONSISTENT. Proposed development standards are intended to minimize land use conflicts and reduce environmental impacts of future oil and gas exploration and production activities. MM 4.10-1 would implement a new Oil and Gas Conformity Review Process, which includes a system of surface owner sign off and notification in order to reduce land use conflicts. Therefore, the proposed Project would be consistent with Policy 10. |
| **Policy 11.** Prohibit incompatible development in areas which have a significant potential for harm to public health, safety and welfare due to mineral and petroleum extraction and processing (I-2). | CONSISTENT. Implementation of proposed development standards would reduce environmental impacts by ensuring that current County regulations reflect the County's interest in protecting the health, safety, and general welfare of residents |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| | and visitors. Therefore, the proposed Project would be consistent with Policy 11. |
| **Policy 12.** Design resource extraction operations subject to discretionary permits to maintain the integrity of areas of "high environmental quality" and unique scenic value (I-2). | CONSISTENT. Implementation of proposed development standards would provide greater protection for the environment than exists under current County standards. Therefore, the proposed Project would encourage the maintenance and protection of areas of "high environmental quality" and unique scenic value during future oil and gas development in the Project Area. Therefore, the proposed Project would be consistent with Policy 12. |
| **Policy 14.** Review all discretionary mineral or petroleum development including renewal of existing authorizations, under the policies and procedures of the California Environmental Quality Act (I-4). | CONSISTENT. This EIR analysis has been prepared to identify and evaluate the potential environmental impacts associated with future oil and gas exploration, development, and production activities that are expected to occur in the Project Area, within the next 25 years, pursuant to the project's Amended Zoning Ordinance. In accordance with CEQA, Kern County will consider information contained in this EIR in their decision to approve, conditionally approve, or deny approval of the proposed Project. Therefore, the proposed Project would be consistent with Chapter 5, Section B, Policy 14. |
| **Policy 15.** Require petroleum production sites in urban areas which are subject to discretionary permits, to install peripheral landscaping to help reduce the noise, dust and visual impacts to adjacent sensitive receptors and public ways (I-4). | CONSISTENT. As described in Section 4.1, Aesthetics, mitigation measures would require that the visual impacts of oil and gas development be reduced near sensitive receptors. Therefore, the proposed Project would be consistent with Policy 15. Similar mitigation measures would be used to reduce the noise and dust impacts on adjacent receptors where new wells would be located outside Tier 1 areas. Therefore, the proposed Project is consistent with Policy 15. |
| **Policy 16.** Require all mineral development to be predicated on appropriate reclamation plans that meet the standards of the State Surface Mining and Reclamation Act and the implementing guidelines of the State Mines and Geology Board, and (or) the standards of the State Division of Oil and Gas. Reclamation/restoration of the sites shall be done as each phase of development or extraction is completed (I-4, I-5). | CONSISTENT. All future oil and gas development is required to meet DOGGR standards. Therefore, the proposed Project would be consistent with Policy 16. |
| **Implementation Measure 3.** Periodically review and update local zoning ordinances that have been amended to accommodate mineral extraction uses outside of mineral resource zones. | CONSISTENT. The proposed Project includes an update to the Kern County Zoning Ordinance related to oil and gas development. The proposed development standards would apply to future oil and gas extraction activities that may occur on unincorporated County land. Therefore, the proposed Project would be consistent with Implementation Measure 3. |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
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| **C. SOILS AND AGRICULTURE** | |
| **Goal 1.** Provide for the planned management, conservation, and wise utilization of agricultural land in the planning area. | CONSISTENT. As discussed in Section 4.2, Agricultural and Forestry Resources, oil and gas drilling and production activities are an allowable use in Tier 2 areas, where agricultural lands (Important Farmland with Class I and II soils) exist. Proposed development standards would provide greater protection for agricultural lands than currently exists and would require compensation for loss of Important Farmland. Therefore, the proposed Project would be consistent with Goal 1. |
| **Goal 2.** Promote soil conservation and minimize development of prime agricultural land as defined by the following criteria:<br>• capability Class I and/or II irrigated soils<br>• 80-100 Storie Index rating<br>• gross crop return of $200 or more per acre per year<br>• annual carrying capacity of 1 animal unit per acre per year | CONSISTENT. As discussed in Section 4.2, Agricultural and Forestry Resources, oil and gas drilling and production activities are an allowable use in Tier 2 areas, where agricultural lands (Important Farmland with Class I and II soils) exist. Proposed development standards would provide greater protection for agricultural lands than currently exists and would require compensation for loss of Important Farmland. Therefore, the proposed Project would be consistent with Goal 2. |
| **Goal 3.** Establish urban development patterns and practices that promote soil conservation and that protect areas of agricultural production of food and fiber crops, and nursery products. | CONSISTENT. As discussed in Section 4.2, Agricultural and Forestry Resources, oil and gas drilling and production activities are an allowable use in Tier 2 areas, where agricultural lands (Important Farmland with Class I and II soils) exist. Proposed development standards would provide greater protection for agricultural lands than currently exists and would require compensation for loss of Important Farmland. Therefore, the proposed Project would be consistent with Goal 3. |
| **Policy 1.** Determine the extent and location of all prime agricultural land within the study area (I-1 ). | CONSISTENT. To support the EIR analysis, all prime agricultural land within the Project Area was identified. Therefore, the proposed Project would be consistent with Policy 1. |
| **Policy 2.** Review projects that propose subdividing or urbanizing prime agricultural land to ascertain how continued commercial agricultural production in the project vicinity will be-affected (I-2). | CONSISTENT. Refer to Section 4.2, Agricultural Resources, for a discussion of Project impacts to prime agricultural land. The proposed Project would be consistent with Policy 2. |
| **Policy 4.** Monitor the amount of prime agricultural land taken out of production for urban uses or added within the plan area (I-3). | CONSISTENT. An evaluation of the potential effects on prime agricultural land is presented in Section 4.2, Agricultural Resources. Therefore, the proposed Project would be consistent with Policy 4. |
| **Policy 7.** Land use patterns, grading, and landscaping practices shall be designed to prevent soil erosion while retaining natural watercourses when possible (I-4). | CONSISTENT. As discussed in Section 4.6, Geology and Soils, the operator would implement a SWPPP which would include an Erosion Control Plan. Implementation of a SWPPP would reduce the potential for soil erosion while |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| | retaining natural watercourses. Therefore, the proposed Project would be consistent with Policy 7. |
| **Policy 12.** Prohibit premature removal of ground cover in advance of development and require measures to prevent soil erosion during and immediately after construction (I-4). | CONSISTENT. As discussed in Section 4.6, Geology and Soils, the operator would implement a SWPPP which would include an Erosion Control Plan. Measures included in the SWPPP would reduce the potential for soil erosion associated with project construction activities. Therefore, the proposed Project would be consistent with Policy 12. |
| **Implementation Measure 2.** Evaluate discretionary projects for their impact on agricultural resources. | CONSISTENT. An evaluation of the potential effects on prime agricultural land is presented in Section 4.2, Agricultural Resources. Therefore, the proposed Project would be consistent with Implementation Measure 2. |
| **Implementation Measure 3.** Document urban expansion and changes in the amount of agricultural land for purposes of determining cumulative impacts to prime agricultural land. | CONSISTENT. An evaluation of the potential cumulative effects on prime agricultural land is presented in Section 4.2, Agricultural Resources. Therefore, the proposed Project would be consistent with Implementation Measure 3. |
| **D. WATER RESOURCES** | |
| **Goal 1.** Conserve and augment the available water resources of the planning area. | CONSISTENT. As described in Section 4.17, Utilities and Service Systems, oil and gas operators currently recycle produced water for reuse in enhanced oil recovery and sell some water to municipal providers for local agricultural operations. These practices would continue in the future. Therefore, the proposed Project would be consistent with Goal 1. |
| **Goal 2.** Assure that adequate groundwater resources remain available to the planning area. | CONSISTENT. Impacts on groundwater are discussed in Section 4.9, Hydrology and Water Quality. With the implementation of mitigation measures, impacts on groundwater resources would be reduced. Therefore, the proposed Project would be consistent with Goal 2. |
| **Goal 3.** Assure that adequate surface water supplies remain available to the planning area. | CONSISTENT. Impacts on surface water are discussed in Section 4.9, Hydrology and Water Quality. With the implementation of mitigation measures, impacts on surface water resources would be reduced. Therefore, the proposed Project would be consistent with Goal 3. |
| **Goal 4**. Continue cooperative planning for and implementation of programs and projects which will resolve water resource deficiencies and water quality problems. | CONSISTENT. The County coordinates with numerous responsible and trustee agencies through the CEQA process. Federal, State and local agencies with jurisdiction in the Project Area received the NOP for the EIR, and a number of agencies have been given the opportunity to provide input throughout the CEQA |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| | process. Section 4.9, Hydrology and Water Quality, addresses project-related water quality issues that were identified by various agencies during the EIR scoping process. Therefore, the proposed Project would be consistent with Goal 4. |
| **Goal 5.** Achieve a continuing balance between competing demands for water resource usage. | CONSISTENT. The proposed Project analyzes project-related water supply impacts in Section 4.17, Utilities and Service Systems. With the implementation of mitigation measures, impacts related to water use would be reduced, which would help achieve a better balance between competing demands for water resource usage. Therefore, the proposed Project would be consistent with Goal 5. |
| **Goal 6.** Maintain effective cooperative planning programs for water resource conservation and utilization in the planning area by involving all responsible water agencies in the planning process. | CONSISTENT. With the publication of the NOP, the County notified water resource agencies including SWRCB, CCRWQCB, and CVRWQCB. In addition, some agencies were given the opportunity to provide input throughout the CEQA process. Therefore, the proposed Project would be consistent with Goal 6. |
| **Policy 6.** Protect planning area groundwater resources from further quality degradation (I-7). | CONSISTENT. Section 4.9, Hydrology and Water Quality, describes the potential for the proposed Project to affect groundwater resources and presents mitigation measures to minimize potential impacts and protect groundwater resources from further quality degradation. Therefore, the proposed Project would be consistent with Policy 6. |
| **Policy 8.** Consider each proposal for water resource usage within the context of total planning area needs and priorities-major incremental water transport, groundwater recharge, flood control, recreational needs, riparian habitat preservation and conservation (I-9). | CONSISTENT. The proposed Project analyzes project-related water supply impacts in Section 4.17, Utilities and Service Systems. With the implementation of mitigation measures, impacts related to water use would be reduced. Section 4.9, Hydrology and Water Quality, includes an analysis of impacts related to surface and groundwater and Section 4.4, Biological Resources, includes an analysis of impacts related to riparian habitat. Therefore, the proposed Project would be consistent with Goal 5. |
| **Policy 9.** Encourage and implement water conservation measures and programs (I-11). | CONSISTENT. As described in Section 4.17, Utilities and Service Systems, the proposed Project would support water conservation efforts currently practiced in the Project Area, such as the recycling of produced water for reuse in enhanced oil recovery and the sale of recycled water to municipal providers for local agricultural purposes. Therefore, the proposed Project would be consistent with Policy 9. |
| **Implementation Measure 6.** Support the provision of adequate wastewater collection systems and treatment reclamation and disposal facilities which will | CONSISTENT. As discussed in Section 4.17, Utilities and Services, prior to the issuance of a permit, the operator shall implement mitigation measures to ensure |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| prevent groundwater degradation by on-site wastewater systems. | that the method of sewage disposal for the Project shall be as required and approved by the Kern County Public Health Services Department. Additionally, Section 4.9, Hydrology and Water Quality, describes the potential for the proposed Project to affect groundwater resources and presents mitigation measures to protect groundwater resources from further quality degradation. Therefore, the proposed Project would be consistent with Implementation Measure 6. |
| **Implementation Measure 7.** Maintain industrial waste discharge regulation and monitoring programs which protect the planning area groundwater from contaminants. | CONSISTENT. As discussed in Section 4.6, Geology and Soils and Section 4.9, Hydrology and Water Quality, the operator would implement a SWPPP and would comply with all applicable federal, state, regional, and local agency water quality protection laws and regulations, and commonly utilized industry standards, including obtaining all applicable stormwater construction permits from the CVRWQCB. The operator would also comply with the Kern County Grading Ordinance. Additionally, all drilling operations would use either a closed loop system to avoid discharges of drilling muds and fluids or would obtain coverage under the SWRCB low threat discharge General Order (WDR General Order 2003-0003-DWQ). Implementation of these measures, laws, and regulations would protect the planning area groundwater from contaminants. Therefore, the proposed Project would be consistent with Implementation Measure 7. |
| **Implementation Measure 10.** Support additional water conservation measures and programs of benefit to the planning area. | CONSISTENT. As described in Section 4.17, Utilities and Service Systems, oil and gas operators currently recycle produced water for reuse in enhanced oil recovery and sell some water to municipal providers for agricultural operations. These water conservation practices would continue in the future. Therefore, the proposed Project would be consistent with Implementation Measure 10. |
| **E. AIR QUALITY** | |
| **Goal 1.** Promote air quality that is compatible with health, wellbeing, and enjoyment of life by controlling point sources and minimizing vehicular trips to reduce air pollutants | CONSISTENT. As described in Section 4.3, Air Quality, the applicant would be subject to the terms of an air quality permit, which, if required, would be approved by the San Joaquin Valley Unified Air Pollution Control District. In addition, the County has incorporated feasible mitigation to reduce the project's emissions impacts to the greatest extent feasible. Therefore, the proposed Project would be consistent with Goal 1. |
| **Goal 2.** Continue working toward attainment of Federal, State and Local standards as enforced by the San Joaquin Valley Unified Air Pollution Control District. | CONSISTENT. As described in Section 4.3, Air Quality, the applicant would be subject to the terms of the project's air quality permit, which would be approved by the San Joaquin Valley Unified Air Pollution Control District. Therefore, the |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| | proposed Project would be consistent with Goal 2. |
| **Goal 3.** Reduce the amount of vehicular emissions in the planning area. | CONSISTENT. Section 4.3, Air Quality, analyzes vehicular emissions and proposes mitigation measures to reduce impacts. Therefore, the proposed Project would be consistent with Goal 2. |
| **Policy 1.** Comply with and promote San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) control measures regarding Reactive Organic Gases (ROG). Such measures are focused on: (a) steam driven well vents, (b) Pseudo-cyclic wells, (c) natural gas processing plant fugitives, (d) heavy oil test stations, (e) light oil production fugitives, (f) refinery pumps and compressors, and (g) vehicle inspection and maintenance (I-1 ). | CONSISTENT. Section 4.3, Air Quality, describes the ROG control measures relevant to future oil and gas exploration and production activities that would be authorized under the proposed Project and conducted between 2015 and 2035. Section 4.3 also describes how the proposed Project will comply with the SJVUAPCD control measures regarding ROG. Therefore, the proposed Project would be consistent with Policy 1. |
| **Policy 2.** Encourage land uses and land use practices which do not contribute significantly to air quality degradation (I-1). | CONSISTENT. Section 4.3, Air Quality, analyzes vehicular emissions and proposes mitigation measures to reduce impacts. Therefore, the proposed Project would be consistent with Policy 2. |
| **Policy 3.** Require dust abatement measures during significant grading and construction operations (I-1 ). | CONSISTENT. Developers would be required to comply with dust suppression measures during construction as described in Section 4.3, Air Quality. Therefore, the proposed Project would be consistent with Policy 3. |
| **Policy 5.** Consider the location of sensitive receptors such as schools, hospitals, and housing developments when locating industrial uses to minimize the impact of industrial sources of air pollution (I-1 ). | CONSISTENT. Section 4.3, Air Quality, identifies the location of sensitive receptors and describes mitigation measures to minimize air pollution impacts on schools, hospitals, and residential areas. Therefore, the proposed Project would be consistent with Policy 5. |
| **CHAPTER 6. OPEN SPACE ELEMENT** | |
| **Goal 3.** Locate and site development to minimize the disruption of open space areas. | CONSISTENT. As described in Chapter 3.0, Project Description, the majority of new wells would be drilled in existing well fields in Tier 1 areas, where oil and gas activity are the primary land use. Additionally, oil or gas exploration or production is prohibited in the Open Space District (OS) zoning districts of Kern County. Therefore, the proposed Project would be consistent with Goal 3. |
| **Policy 1.** Promote the establishment, maintenance and protection of the planning area's open space resources, including the following:<br>a. Conservation of natural resources (refer to Chapter II-Land Use, Chapter V-Conservation, and Chapter XII Kern River Plan Element).<br>• Kern River corridor | CONSISTENT. The proposed Project would enact new oil and gas development standards which would streamline the permitting process and provide greater protection for the environment than exists under current County standards. Therefore, the proposed Project would encourage the maintenance and protection of the planning area's open space resources during future oil and gas development |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| • Management of hillsides<br>b. Managed production of resources<br>• Agriculture (refer to Chapter V-Conservation/Soils and Agriculture)<br>• Oil production (refer to Chapter V-Conservation/Mineral Resources)<br>c. Outdoor recreation<br>• Parks (refer to Chapter XI-Parks)<br>• Kern River corridor (refer to Chapter II-Land Use, Chapter V Conservation, and Chapter XII-Kern River Plan Element)<br>d. Public health and safety<br>• Hazard avoidance (refer to Chapter VIII-Safety) | in the Project Area, and the proposed Project would be consistent with Policy 1. |
| **Policy 5.** Development location and siting should be sensitive to its relationship to the Kern River (I-3). | CONSISTENT. Oil and gas development near the Kern River would be required to adhere to mitigation measures proposed throughout this EIR. In particular, refer to Sections 4.2, Biological Resources, and 4.9, Hydrology and Water Quality. Therefore, the proposed Project would be consistent with Policy 5. |
| **Policy 9.** Encourage depleted resource extraction sites to be restored as alternative open space or developed with uses compatible with those adjacent (I-5). | CONSISTENT. The majority of new wells would be drilled in existing well fields in Tier 1 areas, which have historically been used for oil and gas development. Former well fields would be abandoned in compliance with DOGGR standards and mitigation measures. Therefore, the proposed Project would be consistent with Policy 9. |
| **CHAPTER 7. NOISE ELEMENT** | |
| **Goal 1.** Ensure that residents of the Bakersfield Metropolitan Area are protected from excessive noise and existing moderate levels of noise are maintained. | CONSISTENT. Residents of the Bakersfield Metropolitan Area will be protected from excessive noise caused by oil and gas production through the implementation of mitigation measures as described in Section 4.12, Noise. Therefore, the proposed Project would be consistent with Goal 1. |
| **Goal 2.** Protect the citizens of the planning area from the harmful effects of exposure to excessive noise, and protect the economic base of the area by preventing the encroachment of incompatible land uses near known noise-producing roadways, industries, railroads, airports and other sources. | CONSISTENT. The majority of new wells would be drilled in existing well fields in Tier 1 areas, which are located outside of populated areas. Additionally, as described in Section 4.12, Noise, the applicant shall implement mitigation measures to ensure that residents of the Project Area will be protected from the harmful effects of exposure to excessive noise caused by oil and gas drilling and production activities. Therefore, the proposed Project would be consistent with Goal 2. |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| **Policy 1.** Identify noise-impact areas exposed to existing or projected noise levels exceeding 65 dB CNEL (exterior) or the performance standards described in Table VII-2. The noise exposure contour maps on file at the City of Bakersfield and County of Kern indicate areas where existing and projected noise exposures exceed 65 dB CNEL (exterior) for the major noise sources identified (I-1 ). | CONSISTENT. As described in Section 4.12, Noise, mitigation measures would reduce impacts related to noise. Therefore, the proposed Project would be consistent with Policy 1. |
| **Policy 2.** Prohibit new noise-sensitive land uses in noise-impacted areas unless effective mitigation measures are incorporated into project design to reduce noise to acceptable levels. (I-2, I-3, I-6, I-7). | CONSISTENT. The proposed Project is not a noise-sensitive land use. All future oil and gas development would be required to comply with development standards, which would reduce impacts of development on noise sensitive land uses. Therefore, the proposed Project would be consistent with Policy 2. |
| **Policy 3.** Review discretionary industrial, commercial or other noise-generating land use projects for compatibility with nearby noise-sensitive land uses. Additionally, the development of new noise-generating land uses which are not preempted from local noise regulation will be reviewed if resulting noise levels will exceed the performance standards contained within Table VII-2 in areas containing residential or other noise-sensitive land uses (I-3, I-6, I-7). | CONSISTENT. As described in Section 4.12, Noise, the applicant would implement mitigation measures to ensure project compatibility with nearby noise-sensitive land uses. Therefore, the proposed Project would be consistent with Policy 2. |
| **Policy 5.** Encourage vegetation and landscaping along roadways and adjacent to other noise sources in order to increase absorption of noise (I-7). | CONSISTENT. The proposed Project does not impact the County's ability to use vegetation and landscaping as sound buffers between noise sensitive land uses and roadways or other noise-generating sources. As described in Section 4.12, Noise, oil and gas developers would be required to comply with mitigation measures that reduce noise impacts. Therefore, the proposed Project would be consistent with Policy 5. |
| **Implementation Measure 2.** Review discretionary development plans, programs and proposals, including those initiated by both the public and private sectors, to ascertain and ensure their conformance to the policy framework outlined in this element. | CONSISTENT. As described in Section 4.12, Noise, the applicant would implement mitigation measures to ensure project compatibility with nearby noise-sensitive land uses. In addition, Kern County would review each Site Plan Application for oil and gas development on a site-specific basis per MM 4.10-1 to ensure its conformance to development standards. Therefore, the proposed Project would be consistent with Implementation Measure 2. |
| **Implementation Measure 4.** Require proposed commercial and industrial uses or operations to be designed or arranged so that they will not subject residential or other noise sensitive land uses to exterior noise levels in excess of 65 dB CNEL and interior noise levels in excess of 45 dB CNEL and so that impacts on noise sensitive uses shall not exceed the performance standards in Table VII-2. | CONSISTENT. As described in Section 4.12, Noise, very few new oil and gas exploration and production wells anticipated to be constructed annually within the Project Area are expected be located in Tier 4, which, with a predominance of urban uses, is where most sensitive receptors would be expected to occur. Implementation of mitigation measures would ensure that the proposed Project will not subject residential or other noise sensitive land uses to exterior noise levels |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| At time of any discretionary approval, such as a request for zone change or subdivision, the developer may be required to submit an acoustical report indicating the means by which the developer proposes to comply with the noise standards. The acoustical report shall:<br>a) Be the responsibility of the applicant.<br>b) Be prepared by a qualified acoustical consultant experienced in the fields of environmental noise assessment and architectural acoustics.<br>c) Include representative noise level measurements with sufficient sampling periods and locations to adequately describe local conditions.<br>d) Include estimated noise levels in terms of CNEL and the standards of Table VII-2 (if applicable) for existing and projected future (10-20 years hence) conditions, with a comparison made to the adopted policies of the Noise Element.<br>e) Include recommendations for appropriate mitigation to achieve compliance with the adopted policies and standards of the Noise Element.<br>f) Include estimates of noise exposure after the prescribed mitigation measures have been implemented. If compliance with the adopted standards and policies of the Noise Element will not be achieved, a rationale for acceptance of the project must be provided. | in excess of 65 dB CNEL. Therefore, the proposed Project would be consistent with Implementation Measure 4. |
| **Implementation Measure 10.** Standards for Project Noise Impacts for Mobile Sources. A significant increase of existing ambient noise levels affecting existing noise sensitive land uses (receptors), and requiring the adoption of practical and feasible mitigation measures, is deemed to occur where a project will cause:<br>• An increase of the existing ambient noise level by 5 dB or more, where the existing ambient level is less than 60 dB CNEL;<br>• An increase of the existing ambient noise level by 3 dB or more, where the existing ambient level is 60 to 65 dB CNEL;<br>• An increase of the existing ambient noise level by 1.5 dB or more, where the existing ambient level is greater than 65 dB CNEL.<br>Standards for Cumulative Noise Impacts for Mobile Sources. A project's contribution to noise increase would normally be considered cumulatively considerable and considered significant when ambient noise levels affect noise sensitive land uses (receptors) and when the following occurs.<br>• A project increases the ambient (cumulative without project) noise level by 1 dB or more; and<br>• The cumulative with project noise levels cause the following: | CONSISTENT. A complete discussion of the Project's noise impacts is included in Section 4.12, Noise. With implementation of mitigation measures, impacts to noise-sensitive land uses (receptors) would be reduced to less than significant. Therefore, the proposed Project would be consistent with Implementation Measure 10. |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| o An increase of the existing ambient noise level by 5 dB or more, where the existing ambient level is less than 60 dB CNEL;<br>o An increase of the existing ambient noise level by 3 dB or more, where the existing ambient level is 60 to 65 DB CNEL;<br>An increase on the existing ambient noise level by 1.5 dB or more, where the existing ambient level is greater than 65 dB CNEL. | |
| **CHAPTER 8. SAFETY ELEMENT** | |
| **A. SEISMIC SAFETY** | |
| **Goal 1.** Substantially reduce the level of death, injury, property damage, economic and social dislocation and disruption of vital services that would result from earthquake damage. | CONSISTENT. As described in the Future Development Scenario, the majority of new wells would be drilled in existing well fields in Tier 1 areas, which are located outside of populated areas and have historically been devoted to oil and gas development. The implementation of new development standards for the proposed Project would further reduce risks associated with loss of life, personal injury, property damage, and economic and social dislocation and disruption of vital services that would result from earthquake damage in and around oil and gas development areas. Therefore, the proposed Project would be consistent with Goal 1. |
| **Goal 2.** Ensure the availability and effective response of emergency services following an earthquake. | CONSISTENT. As described in Section 4.14, Public Services, the applicant shall pay mitigation fees to ensure the availability and effectiveness of firefighters, police and rescue responders in the event of an emergency in or around the oil and gas well fields. Therefore, the proposed Project would be consistent with Goal 2. |
| **Goal 4.** Prevent loss of life from the failure of critical facilities in an earthquake and ensure the continued functioning of essential facilities following a disaster. | CONSISTENT. Consistent with this goal, developers would be required to comply with adopted safety regulations, such as the Fire Code, and would comply with mitigation measures related to hazards and safety. Developers would also be required to adhere to applicable building code regulations. Therefore, the proposed Project would be consistent with Goal 4. |
| **Goal 5.** Protect essential lifelines and prevent casualties and major social and economic disruption due to liquefaction in an earthquake. | CONSISTENT. The implementation of new development standards for the proposed Project would minimize risks associated with loss of life and major social and economic disruption that could occur due to liquefaction in and around oil and gas development areas. Therefore, the proposed Project would be consistent with Goal 5. |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| **Goal 7.** Protect land uses from the risk of dam failure inundation including the assurances that: the functional capabilities of essential facilities are available in the event of a flood; hazardous materials* are not released; effective measures for mitigation of dam failure inundation are incorporated into the design of critical facilities; and the rapid and orderly evacuation of populations in the inundation area will occur. | CONSISTENT. As described in Section 4.9, Hydrology, project facilities in the potential dam inundation area would be required to comply with the Uniform Fire Code's siting or design requirements to prevent on-site hazards from affecting surrounding communities in the event of inundation from a catastrophic failure of the Lake Isabella dam. Compliance with applicable standards and mitigation measures would reduce the risk that components would damage essential facilities in the event of dam failure inundation. Therefore, the proposed Project would be consistent with Goal 7. |
| **CRITICAL FACILITIES POLICIES** | |
| **Policy 4.** Encourage critical facilities in dam inundation areas to develop and maintain plans for safe shut-down and efficient evacuation from their facilities, as appropriate to the degree of flood hazard for each facility (I-26, I-31 ). | CONSISTENT. The proposed Project components do not meet the definition of a critical facility. Further, the proposed Project would not impair the City's ability to develop or maintain plans for the safe shut-down and efficient evacuation from critical facilities in the Project Area. Therefore, the proposed Project would not conflict with and would be consistent with Policy 4. |
| **Policy 5.** Incorporate planning for incidents affecting critical facilities into contingency plans for disaster response and recovery (I-31). | CONSISTENT. The proposed Project would not impair the City's ability to incorporate planning for incidents affecting critical facilities into contingency plans for disaster response and recovery. Therefore, the proposed Project would not conflict with and would be consistent with Policy 5. |
| **FAULT RUPTURE POLICIES** | |
| **Policy 12.** Design significant lifeline installations such as highways, utilities and petrochemical pipelines which cross an active fault, to accommodate potential fault movement without prolonged disruption of an essential service or creating threat to health and safety (I-16). | CONSISTENT. The proposed Project does not include the design of significant lifeline installations, such as large petrochemical pipelines. However, gathering lines and other project components would be required to comply with proposed development standards, which would reduce impacts in case of an earthquake. Therefore, the proposed Project would be consistent with Policy 12. |
| **LIQUEFACTION POLICIES** | |
| **Policy 13.** Determine the liquefaction potential at sites in areas of high groundwater prior to development and determine specific mitigation to be incorporated into the foundation design, as necessary to prevent or reduce damage from liquefaction in an earthquake (I-17 through I-19). | CONSISTENT. Section 4.6, Geology and Soils, identifies areas of high groundwater, determines the liquefaction potential of those areas, and proposes mitigation as necessary to prevent or reduce damage from liquefaction in an earthquake. Compliance with mitigation measures would reduce the potential for the project to result in damage due to liquefaction in an earthquake. Therefore, the |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| | proposed Project would be consistent with Goal 2. |
| **Policy 14.** Route major lifeline installations around potential liquefaction areas or otherwise protect them against significant damage from liquefaction in an earthquake (I-20). | CONSISTENT. The proposed Project does not meet the definition of a major lifeline installation; however, implementation of mitigation measures would reduce the potential of the proposed Project to result in significant damage from liquefaction in an earthquake. Therefore, the proposed Project would be consistent with Policy 14. |
| **DAM FAILURE INUNDATION RISK POLICIES** | |
| **Policy 18.** Design discretionary critical facilities located within the potential inundation area for dam failure in order to: mitigate the effects of inundation on the facility; promote orderly shut-down and evacuation (as appropriate); and, prevent on-site hazards from affecting building occupants and the surrounding communities in the event of dam failure (I-26). | CONSISTENT. The proposed Project does not meet the definition of a major lifeline installation; however, implementation of mitigation measures would reduce the potential of the Project to impact critical facilities. Therefore, the proposed Project would be consistent with Policy 18. |
| **Policy 19.** Design discretionary facilities in the potential dam inundation area used for the manufacture, storage or use of hazardous materials to prevent on-site hazards from affecting surrounding communities in the event of inundation (I-27). | CONSISTENT. As described in Section 4.9, Hydrology, project facilities in the potential dam inundation area used for the manufacture, storage, and use of hazardous materials would be required to comply with the Uniform Fire Code's siting or design requirements to prevent on-site hazards from affecting surrounding communities in the event of inundation from a catastrophic failure of the Lake Isabella dam. Therefore, the proposed Project would be consistent with Policy 19. |
| **Policy 20.** Require emergency response plans for the planning area to include specific procedures for the sequential and orderly evacuation of the potential dam inundation area (I-28). | CONSISTENT. The proposed Project would not interfere with the City's ability to incorporate specific procedures for the sequential and orderly evacuation of the potential dam inundation area into emergency response plans. Therefore, the proposed Project would be consistent with Policy 20. |
| **Implementation Measure 2.** Require detailed site studies for ground shaking characteristics, liquefaction potential, dam failure inundation and flooding potential, and fault rupture potential, as background to the design process for critical facilities under city and county discretionary approval. | CONSISTENT. The proposed Project does not include the development of new critical facilities; therefore, there is no need to provide the detailed siting background that goes into the design of such facilities, as recommended in this implementation measure. However, oil and gas developers would be required to comply with development standards, which would reduce impacts on critical facilities. Therefore, the proposed Project is consistent with Implementation Measure 2. |
| **Implementation Measure 3.** Require structures that are within the plan area and are subject to Building Department review to adhere to the most current seismic standards adopted as part of the Uniform Building Code. | CONSISTENT. As described in Section 4.6, Geology and Soils, the Project Area is within Seismic Zone 4; accordingly, any structures erected would be required to comply with the Uniform Building Code's design standards applicable to Seismic |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| | Zone 4. Therefore, the proposed Project would be consistent with Implementation Measure 3. |
| **Implementation Measure 4.** Review existing critical facilities for any significant siting, design or construction problems that would make them vulnerable in an earthquake. The findings shall be incorporated into emergency operations plans as well as addressed in longer-term programs of facilities upgrading or relocation. | CONSISTENT. The proposed Project does not meet the definition of a critical facility; however, implementation of mitigation measures would reduce the potential of the Project to impact critical facilities in an earthquake. Therefore, the proposed Project would be consistent with Implementation Measure 4. |
| Implementation **Measure 10.** Develop appropriate criteria and procedures for third-party review of the seismic design of critical facilities. | CONSISTENT. The proposed Project does not meet the definition of a critical facility; however, implementation of mitigation measures would reduce the potential of the Project to impact critical facilities in an earthquake. Therefore, the proposed Project would be consistent with Implementation Measure 10. |
| **Implementation Measure 16.** Require plans and permits for installation of major lifeline components such as for highways, utilities and petroleum or chemical pipelines to incorporate design features to accommodate potential fault movement in areas of active faults without prolonged disruption of an essential service or threat to health and safety. | CONSISTENT. The proposed Project does not meet the definition of a major lifeline component; however, implementation of mitigation measures would reduce the potential of the Project to impact public health and safety during an earthquake. Therefore, the proposed Project would be consistent with Implementation Measure 16. |
| **Implementation Measure 17.** Require liquefaction investigations in all areas of high groundwater potential and appropriate foundation designs to mitigate potential damage to buildings on sites with liquefaction potential. | CONSISTENT. Section 4.6, Geology and Soils, describes the potential for liquefaction in the Project Area. The applicant would be required to design all buildings in accordance with applicable California Building Code standards and the Kern County Building Code. Prior to ground disturbing activities, the applicant would also be required to prepare a Site Plan Conformity Review application, in which they would confirm project compliance with applicable DOGGR regulations and the Alquist-Priolo Earthquake Fault Zoning Act. Therefore, the proposed Project would be consistent with Implementation Measure 17. |
| **Implementation Measure 20.** Route major lifeline components such as for highways, utilities and petroleum or chemical pipelines around areas of high groundwater wherever possible. Where they must cross an area of high groundwater, plans and permits shall require design features to accommodate extensive ground rupture without prolonged disruption of an essential service or threat to health and safety. | CONSISTENT. The proposed Project does not meet the definition of a major lifeline installation; however, implementation of mitigation measures would reduce the potential of the project to impact areas of high groundwater or cause threats to health and safety. Therefore, the proposed Project would be consistent with Implementation Measure 20. |
| **Implementation Measure 26.** Develop procedures for the discretionary review of critical facilities proposed in an area of potential dam inundation. Approvals shall include requirements that emergency shut-down and facility evacuation plans be | CONSISTENT. The proposed Project does not meet the definition of a critical facility; however, implementation of mitigation measures would reduce the potential of the project to impact critical facilities. Therefore, the proposed Project |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| developed, maintained and exercised for each facility, and the potential effects of inundation on essential facility functions and the safety of occupants and the community in general are addressed. | would be consistent with Implementation Measure 26. |
| **Implementation Measure 27.** Facilities used for the manufacture, storage or use of hazardous materials shall comply with the uniform fire code, with requirements for siting or design to prevent on-site hazards from affecting surrounding communities in the event of inundation. | CONSISTENT. As described in Section 4.14, Public Services, construction and operation of all future oil and gas exploration and production activities that would be authorized under the proposed Project would be subject to the provisions of the Uniform Fire Code and local amendments; Titles 19, 22, and 27 of the California Safety Code Regulations; the Kern County Ordinance Code; and the National Fire Protection Association Standards, among other regulations and development standards. Therefore, the proposed Project would be consistent with Implementation Measure 27. |
| **Implementation Measure 28.** Incorporate specific plans for the sequential and orderly evacuation of the potential dam inundation area into emergency response plans. | CONSISTENT. The proposed Project would not interfere with the City's ability to incorporate specific plans for the sequential and orderly evacuation of the potential dam inundation area into emergency response plans. Therefore, the proposed Project would be consistent with Implementation Measure 28. |
| **Implementation Measure 29.** Maintain effective disaster response and earthquake response plans and update on a regular basis. | CONSISTENT. The proposed Project would not interfere with the City's ability to maintain or update effective disaster response and earthquake response plans. Therefore, the proposed Project would be consistent with Implementation Measure 29. |
| **B. FLOODING** | |
| **Goal 1.** Minimize hazards to planning area residents resulting from flooding. | CONSISTENT. As discussed in Section 4.9, Hydrology and Water Quality, mitigation measures would be implemented to minimize flood hazards to planning area residents. With implementation of these measures, the Project would not expose people to a significant risk of injury or death involving flooding. Therefore, the proposed Project would be consistent with Goal 1. |
| **Goal 2.** Reduce the risk of flooding to land uses. | CONSISTENT. As discussed in Section 4.9, Hydrology and Water Quality, mitigation measures would be implemented to reduce the risk to land uses and structures within a flood hazard area. Therefore, the proposed Project would be consistent with Goal 2. |
| **Policy 1.** Develop specific standards which apply to development located in flood hazard areas, as defined by Federal Flood Insurance maps and most recent information as adopted by the responsible agency (I-1, I-2). | CONSISTENT. As discussed in Section 4.9, Hydrology and Water Quality, some existing oil and gas administrative fields within the Project Area are within a 100-year flood hazard area identified by FEMA on applicable Flood Insurance Rate |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| | Maps. The project would implement mitigation measures to minimize flood hazards related to development located in the flood hazard areas. Therefore, the proposed Project would be consistent with Policy 1. |
| **Implementation Measure 2.** Develop procedures for the review of proposed facilities which use, manufacture or store hazardous materials proposed in areas of identified flood hazard. | CONSISTENT. The proposed Project would not prevent the County and City from developing procedures for the review of proposed facilities which use, manufacture or store hazardous materials proposed in areas of identified flood hazard. In addition, the proposed Project would comply with development standards and regulations regarding hazardous materials. Therefore, the proposed Project would be consistent with Implementation Measure 2. |
| **C. PUBLIC SAFETY** | |
| **Goal 1.** Ensure that the Bakersfield metropolitan area maintains a high level of public safety for its citizenry. | CONSISTENT. The proposed Project includes a zoning amendment that would streamline the permitting process for oil and gas development activities within Kern County, while providing greater protection for the environment and residents than exists under current County standards. The proposed development standards would improve public safety for the Metropolitan Bakersfield Area. Therefore, the proposed Project would be consistent with Goal 1. |
| **Goal 4.** Assure that fire, hazardous substance regulation and emergency medical service problems are continuously identified and addressed in a proactive way, in order to optimize safety and efficiency | CONSISTENT. Section 4.14, Public Services, addresses impacts on police, fire and emergency medical services and facilities from the proposed Project. Section 4.8, Hazards and Hazardous Materials, addresses impacts related to hazardous wastes generated, handled, stored, treated, transported, and disposed of with respect to oil and gas development in the Project Area. Therefore, the proposed Project would be consistent with Goal 4. |
| **Policy 1.** Identify future site locations, projected facility expansions, projected site acquisition costs, construction costs and operational costs in a manner that would maximize the efficiency of new public safety services (I-1, I-2, I-3). | CONSISTENT. The proposed Project would be required to comply with new development standards, which would reduce impacts on the environment and public safety. Developers would also be required to pay impact mitigation fees related to fire, police, and traffic impacts. Therefore, the proposed Project would be consistent with Policy 1. |
| **Policy 2.** Require discretionary projects to assess impacts on police and fire services and facilities (I-3). | CONSISTENT. Impacts and mitigation measures related to police and fire services are outlined in Section 4.14, Public Services. The applicant would be required to address the project's demand for additional police and fire protection services through the payment of mitigation fees. Therefore, the proposed Project would be consistent with Policy 2. |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| **Policy 7.** Enforce ordinances regulating the use/manufacture/sale, transport/disposal of hazardous substances, and require compliance with state and federal laws regulating such substances. | CONSISTENT. As described in Section 4.8, Hazards and Hazardous Materials, oil and gas developers would comply with state and federal laws regulating the use/manufacture/sale, transport/disposal of hazardous substances. Specifically, all hazardous substances generated by the proposed Project would be handled and shipped in accordance with USDOT and waste regulatory requirements. Therefore, the proposed Project would be consistent with Policy 7. |
| **Policy 8.** The Kern County and Incorporated Cities Hazardous Waste Management Plan and Final Environmental Impact Report serves as the policy document guiding all facets of hazardous waste. | CONSISTENT. Operators would be required to comply with all applicable laws, regulations, ordinances and policy documents related to the use, transport, and disposal of hazardous waste, including the Kern County and Incorporated Cities Hazardous Waste Management Plan. Therefore, the proposed Project would be consistent with Policy 8. |
| **Policy 12.** Where recommended by appropriate local, state or federal agencies for discretionary projects, soils shall be tested for concentrations of agricultural chemicals prior to grading permit approval whenever feasible. Contaminated soils shall be excavated and disposed of at a certified hazardous waste disposal facility whenever necessary. | CONSISTENT. Section 4.8, Hazards and Hazardous Materials, describes the use, transport and disposal of hazardous substances with respect to oil and gas development in the Project Area. Consistent with this policy, contaminated soils shall be excavated and disposed of at a certified hazardous waste disposal facility whenever necessary. Therefore, the proposed Project would be consistent with Policy 12. |
| **Policy 16.** All new discretionary development projects shall be subject to environmental and design review on a site-specific, project-by-project basis, including but not limited to an assessment to determine whether hazardous materials present potential health effects to human health as required by the Department of Environmental Services. | CONSISTENT. Pursuant to CEQA, and consistent with this policy, this EIR analysis outlines the potential environmental impacts of the proposed Project, including an assessment of the potential human health effects, as described in Section 4.8, Hazards and Hazardous Materials. Therefore, the proposed Project would be consistent with Policy 16. |
| **Implementation Measure 2.** Funding for Police and Fire equipment and facilities will be facilitated through bond issues and/or development fees and/or land dedications and/or assessment districts. | CONSISTENT. As described in Section 4.14, Public Services, mitigation fees would be required to reduce impacts on police and fire protection in the Project Area. Therefore, the proposed Project would be consistent with Implementation Measure 2. |
| **CHAPTER 10. PUBLIC SERVICES AND FACILITIES ELEMENT** | |
| **A. GENERAL UTILITY SERVICES** | |
| **Goal 4.** Develop funding principles and programs which will assure that all new development will pay for the incremental costs of the public facilities and services--utilities bridges, parks, and public safety facilities--both on-site and offsite, to serve | CONSISTENT. As described in Section 4.14, Public Services, and Section 4.13, Population and Housing, nominal population growth in the Project Area would not stress certain existing public services, such as utilities bridges, parks, schools, and |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| such development. | libraries; however, the anticipated new oil and gas activity may tax for police and fire protection services in the vicinity of the new oil and gas wells. With implementation of mitigation measures impacts would be reduced. Therefore, the proposed Project would be consistent with Goal 4. |
| **Policy 5.** Require all new development to pay its pro rata share of the cost of necessary expansion in municipal utilities, facilities and infrastructure for which it generates demand and upon which it is dependent (I-3). | CONSISTENT. The proposed Project will not require modifications to existing public service facilities or infrastructure, such as parks, schools, and libraries. As described in Section 4.14, Public Services, the applicant would be required to address the Project's demand for additional police and fire protection services from new oil and gas exploration and production activities through the payment of mitigation fees. Therefore, the proposed Project would be consistent with Policy 5. |
| **Implementation Measure 4.** Create benefit assessment districts or establish service fees for the distribution of costs to users for capital improvement replacement costs and maintenance, utilizing such districts for the financing of improvements which are essential to planning area development. | CONSISTENT. The proposed Project would not impair the City's ability to create benefit assessment districts or establish service fees for the distribution of costs to users for capital improvement replacement costs and maintenance. Therefore, the proposed Project would be consistent with Implementation Measure 4. |
| **B. WATER DISTRIBUTION** | |
| **Goal 1.** Ensure the provision of adequate water service to all developed and developing portions of the planning area. | As described in Section 4.9, Hydrology and Water Quality, with the implementation of mitigation and the adherence to existing laws and regulations, the proposed Project would not impact surface and groundwater quality that is currently available for other uses. In addition, as described in Section 4.17, Utilities and Services, operators that currently provide produced water to municipal water districts for agricultural uses would continue to do so, which would help ensure that water continues to be available for such uses. Therefore, the proposed Project would be consistent with Goal 1. |
| **Policy 3.** Require that all new development proposals have an adequate water supply available (I-3, I-4). | CONSISTENT. The applicant would use reclaimed water to the extent possible per mitigation measures. Use of reclaimed water would reduce the Project's impact on the local water supply. Therefore, the proposed Project would be consistent with Policy 36. |
| **Implementation Measure 3.** Review, and modify as required, existing fee structures and ordinances to assure desired system financing and policy implementation. | CONSISTENT. Developers would be required to pay mitigation fees related to traffic, police, and fire protection in the Project Area. Therefore, the proposed Project would be consistent with Implementation Measure 3. |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| **C. SEWER SERVICE** | |
| **Goal 1.** Ensure the provision of adequate sewer service to serve the needs of existing and planned development in the planning area. | CONSISTENT. The Project would not connect to the public sewer system. As discussed in Section 4.17, Utilities and Services, the project's sanitary waste disposal needs would be met by new or expanded septic systems and the operator shall implement mitigation to ensure that the method of sewage disposal for the project shall be as required and approved by the Kern County Public Health Services Department. Therefore, the proposed Project would be consistent with Goal 1. |
| **Implementation Measure 6.** Exclusive of County Service Area No. 71, developers shall be required to install dry sewer lines in streets and connections thereto for parcels less than 1 acre (net) in size in areas where a centralized sewer system is planned and imminent and where on-site systems can be proven to be temporarily satisfactory.<br><br>Within County Service Area No. 71, an proposed development at a density greater than one dwelling unit per three gross acres, as well as all commercial and industrial developments, shall be required to be served by a regional sewage collection and treatment system subject to the following provisions:<br>1. All new development (commercial, industrial and residential at densities greater than one dwelling unit per three gross acres}, including both discretionary and ministerial projects, shall be required to connect to public sewer when said development is located 1,000 feet or closer to available public sewer.<br><br>If public sewer is more than 1 ,000 feet from development, a dry sewer system in conjunction with approved individual septic systems may be utilized for lots having an area of 10,000 square feet or larger. Dry sewer systems are not required for lots of three gross acres or larger. Single residential lots that require a ministerial permit shall connect to public sewer when located 200 feet or closer to available public sewer. Single residential lots less than three gross acres that are greater than 200 feet from available public sewer are required to install dry sewer in accordance with the requirements of the Engineering and survey.<br>2. All new development (commercial, industrial and residential at densities greater than one dwelling unit per three gross acres), including both discretionary and ministerial projects, shall pay a sewer development fee where the Board of | CONSISTENT. The project would not connect to the public sewer system and new sewer pipelines would not be required to serve the proposed Project. The project's sanitary waste disposal needs would be addressed by new or expanded septic systems, as approved by the Kern County Public Health Services Department. Therefore, the proposed Project would be consistent with Implementation Measure 6. |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| Supervisors has adopted a planned sewer area and install dry sewer within the project development when located in excess of 1,000 feet from public sewer or where sewer service is not available as determined by the Engineering and Survey Services Department. The fee amount shall be based on the property's pro rata share of all conveyance, facility and capacity costs. Single residential lots that are greater than 200 feet from available public sewer are required to install dry sewer in accordance with the requirements of the Engineering and Survey Services Department.<br>3. In those cases where sewer service will not be available as determined by the Sewer Master Plan, an exemption may be granted by the Engineering and Survey Services Department. All new development (commercial, industrial, and residential at densities greater than one dwelling unit per three gross acres) shall be required to annex to an existing County Service Area (CSA) or form a new CSA if none is already in place. In conjunction with formation of, or annexation to, a CSA, applicants shall be required to form a Zone of Benefit for the purpose of constructing and maintaining a sewer trunk line. | |
| **D. STORM DRAINAGE** | |
| **Goal 1.** Ensure the provision of adequate storm drainage facilities to protect planning area residents from flooding resulting from storm water excess. | CONSISTENT. As discussed in Section 4.9, Hydrology and Water Quality, developers would implement mitigation measures to ensure that the Project would not create or contribute runoff water that would exceed the capacity of local storm water drainage systems. Therefore, storm water runoff would not impact planning area residents and the proposed Project would be consistent with Goal 1. |
| **CHAPTER 12. KERN RIVER PLAN ELEMENT** | |
| **3.2 OPEN SPACE VERSUS DEVELOPMENT** | |
| **Policy 11.** New or relocated utility lines shall be placed underground, except in areas subject to intensive agricultural uses, areas designated as A.4 (Mineral and Petroleum) and electrical power lines to oil wells, water wells, and water control devises in areas designated as 8.5 (Resource Management) unless otherwise required by law, and at River crossings, or where it can be shown that the specific nature of the facility is such that it is entirely infeasible to do so. | CONSISTENT. As described in Chapter 3.0, Project Description, the Project's electrical distribution lines, which are intended to supply lower voltages of power to individual wells, would be sited above-ground. Such lines would be constructed according to the proposed development standards. Therefore, the proposed Project would be consistent with Policy 11. |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| **3.4 FLOODPLAIN MANAGEMENT** | |
| **Policy 9.** Oil and mineral exploration and production shall be allowed within the secondary floodway, provided that adverse effects on riparian vegetation and wildlife habitat are minimized. Appurtenant facilities, such as tank farms and steam generators, shall be located outside any floodway; except that they may be allowed within the 8.4/2.5 (Mineral and Petroleum/Secondary Floodway) upon showing by the operator that no other location is reasonably available for then, the proposed location and extent of construction is necessary for the operation of wells in the immediate vicinity, and the intent of this plan for the secondary floodway is followed. | CONSISTENT. An evaluation of the potential effects on riparian vegetation and wildlife habitat is addressed in Section 4.2, Biological Resources. The implementation of mitigation measures will minimize the impact of the proposed Project on sensitive biological resource areas. In addition, operators would be required to comply with all applicable laws, regulations, and ordinances with respect to oil and gas exploration and development in the Project Area. Therefore, the proposed Project would be consistent with Policy 9. |
| **Policy 10.** Resource extraction activities, such as sand and gravel removal, shall comply with the "California Surface Mining and Reclamation Act of 1975." | CONSISTENT. The operator shall comply with standards of the California Surface Mining and Reclamation Act of 1975 during resource extraction activities in an effort to protect other mineral resources in the Project Area from impacts related to oil and gas development. Therefore, the proposed Project would be consistent with Policy 10. |
| **3.5 PRIVATE PROPERTY AND PUBLIC USE** | |
| **Policy 2.** Open space qualities of the Kern River primary and secondary floodway shall be protected consistent with policies of this plan, regardless of whether the land is in public or private ownership. | CONSISTENT. Mitigation measures described in Section 4.4, Biological Resources, would be implemented to protect the open space qualities of the Kern River floodway areas. Therefore, the proposed Project would be consistent with Policy 2. |
| **3.6 MINERAL AND PETROLEUM** | |
| **Goal.** To provide for the continued production of petroleum resources and to ensure that future exploration activities can take place, while ensuring that other open space values in the River area are reasonably protected. Utilize sand and gravel resources of the River in such a way as to ensure that floodway, groundwater recharge, and wildlife habitat values are protected | CONSISTENT. As described in sections 4.4, Biological Resources and 4.9, Hydrology and Water Quality, mitigation measures would be implemented to ensure that the Kern River floodway, groundwater recharge, and wildlife habitat values are protected. Therefore, the proposed Project would be consistent with this goal. |
| **Policy 1.** Sand and gravel removal shall be done in such a manner as not to degrade, or otherwise adversely affect, the natural and scenic qualities of the Kern River, riparian vegetation, or wildlife habitat except as is necessary or appropriate to maintain the required channel capacity for flood control in the primary floodway. | CONSISTENT. As described in Sections 4.1, Aesthetics, 4.4, Biological Resources, and 4.9, Hydrology and Water Quality, mitigation measures would be implemented to protect the natural and scenic qualities of the Kern River, riparian vegetation and wildlife habitat. Therefore, the proposed Project would be consistent with Policy 1. |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| **Policy 2.** Petroleum or sand and gravel activities proposed within the primary floodway shall conform to the specific requirements of the State Reclamation Board and other State and local regulatory agencies. | CONSISTENT. The proposed Project is designed to encourage environmentally-conscience oil and gas development through the implementation of County-wide development standards and a new oil and gas permitting process. The proposed standards are intended to meet the requirements of agencies with jurisdiction over resource protection, such as the State Reclamation Board and other State and local regulatory agencies. Therefore, by developing this EIR and implementing the proposed development standards, the County has considered the decisions and actions of other agencies with respect to oil and gas development and any activities proposed within the primary floodway shall conform to the specific requirements of these regulatory agencies. The proposed Project would be consistent with Policy 2. |
| **Policy 3.** Petroleum extraction zone overlays and drilling island delineation shall be established in areas designated for resource uses for the purpose of protecting natural vegetation and wildlife. Brush clearing, moving of vegetation, and similar activities shall be permitted only to the extent required for those activities and a reclamation plan prepared. | CONSISTENT. 90% of the wells developed under the Future Development Scenario would be constructed in Tier 1 areas, where oil and gas drilling and production activities are the predominant land uses. Additionally, mitigation measures described in Section 4.4, Biological Resources, would be implemented to protect natural vegetation and wildlife in the Project Area during future oil and gas development activities. Therefore, proposed Project would be consistent with Policy 3. |
| **Policy 4.** Noise abatement measures shall be required of all resource management activities which would adversely affect adjacent land uses or wildlife habitat. | CONSISTENT. Refer to Section 4.12, Noise, for a complete discussion of potential noise impacts resulting from the proposed Project and proposed noise abatement measures to reduce impacts. With the implementation of proposed development standards, the proposed Project would be consistent with Policy 4. |
| **Policy 5.** Mineral and petroleum exploration and extraction activities are permitted in the primary and secondary floodways subject to regulations, to be adopted within a two-year period by the County and City to accomplish the goals and policies of this Element and to mitigate adverse impacts which may otherwise result from construction of facilities and access thereto. Such regulations shall include, but need not be limited to, requirements limiting the impact of access and facilities construction upon adjacent areas, prohibiting activities creating obstructions to floodflow, estab1ishing minimal standards for flood proofing all wells, pumps and associated equipment, specifying spill prevention control and counter-measure plans and emergency procedures, and specifying site and access restoration. | CONSISTENT. As discussed in Section 4.9, Hydrology and Water Quality, all applicants would be required to comply with applicable laws, regulations and standards, including well drilling management, construction, monitoring, blowout prevention, fluid and mud containment and emergency response measures. Additionally, DOGGR regulations would require the preparation of spill contingency plans (in addition to federal requirements, if applicable, to develop spill prevention, control and countermeasure (SPCC) plans), secondary containment for stored materials on site, and fluid and chemical storage and handling equipment inspections and maintenance during oil and gas operations. Therefore, the proposed Project would be consistent with Policy 5. |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| **CHAPTER 4. MAP PROVISIONS AND POLICIES** | |
| The intent of this plan with regard to the Primary and Secondary Floodways of the Kern River is that:<br>• No development or physical improvements for uses in the Primary Floodway which would restrict flows, interfere with groundwater recharge or increase the rise in water surface during high flows of the Kern River, or displace the primary floodway will be permitted.<br>• Limited development, with an emphasis on preserving open space within the area of the Secondary Floodway, with recognition of the potential flood hazard that exists therein, may be permitted. | CONSISTENT. The proposed Project would not restrict flows, interfere with groundwater recharge or increase the rise in water surface during high flows of the Kern River, or displace the primary floodway for the Kern River. Therefore, the proposed Project would be consistent with Chapter 4 of this plan. |
| **4.8 INDUSTRIAL** | |
| **Policy 5.** Industrial areas should be separate from residential areas to protect both homes and factories. | CONSISTENT. As described in the Future Development Scenario, 90% of future oil and gas activity would be located in Tier 1 areas, near existing oil and gas facilities and outside of residential areas. Although wells could be drilled outside of Tier 1 areas, such development would be dispersed and therefore would not meet the intended definition of an "industrial area" under this policy. Any future proposals to construct industrial-type ancillary facilities that are not described in the Future Development Scenario, such as cogeneration facilities, are not covered under the proposed Project and would require a separate approval process. Therefore, the proposed Project would be consistent with Policy 5. |
| **Policy 6.** Industrial areas adjacent to the Kern River primary or secondary floodway should be buffered by landscaping or vegetation to provide the least possible conflict with open space values of the River. | CONSISTENT. Mitigation measures described in Section 4.4, Biological Resources, would be implemented to protect the Kern River floodway areas. Therefore, the proposed Project would be consistent with Policy 6. |
| **CHAPTER 5. IMPLEMENTATION POLICIES** | |
| **B. OPEN SPACE AND DEVELOPMENT** | |
| **Implementation Policy 2.** Any new non-open space development, including projects by public agencies, shall not occur without prior City or County approval of a "Development Plan." The "Development Plan" shall be reviewed for completeness and consistency with the following guidelines:<br>a. Elevation drawings of all proposed structures and signs.<br>b. Landscaping plan which provides for screening of obnoxious uses and respects | CONSISTENT. Prior to the issuance of a drilling permit, Kern County would review the applicant's oil and gas drilling permit application for completeness and consistency with the Metropolitan Bakersfield General Plan, including the guidelines outlined in this implementation policy. The drilling permit form would identify the location of the proposed well(s) and appropriate mitigation measures required for the drilling area. Therefore, the proposed Project would not conflict |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| existing views of the Kern River channel.<br>c. Grading and revegetation plan.<br>d. Plot plan or recent aerial photograph depicting existing uses and natural vegetation cover.<br>e. A biota survey and analysis of effects which development would impose on any significant identified biota.<br>f. A certified delineation of the primary and secondary floodways, if applicable to the site, depicting both predevelopment conditions and future development conditions.<br>g. Other standard zoning and subdivision ordinance requirements in force at the time of application. | with and would be consistent with Implementation Policy 2. |
| **Implementation Policy 4.** All new development and accessory uses, excepting wells, shall maintain a minimum setback of 90 feet from the primary floodway line. If not feasible to do so because of lot size or configuration, new development, including accessory uses, shall maintain a setback from the primary floodway line of 60 percent or greater of the distance between the primary floodway line and the point of the lot farthest from the primary floodway. | CONSISTENT. As described in Section 4.9, Hydrology and Water Quality, the applicant would be required to comply with all applicable federal, state, regional and local agency laws and regulations, and commonly utilized industry standards, including the Kern County Floodplain Management Ordinance and General Plan and Zoning Code provisions related to floodplain risks. All development under the proposed Project would maintain the minimum setback standards in accordance with the Zoning Ordinance, as amended. Therefore, the proposed Project would be consistent with Implementation Policy 4. |
| **Implementation Policy 5.** In order to preserve views of the River, reasonable height limits will be imposed through the "Development Plan" review process on any new non-open space development within any floodway. Criteria for height limits shall be based on existing site factors, such as surrounding land use, vegetation, and distance to the Kern River course. | CONSISTENT. The proposed Project would enact new oil and gas development standards, which provide greater protection for visual resources in the Project Area than exists under current County standards. Section 4.1, Aesthetics, describes the impacts on visual resources that would result from future oil and gas development activities pursuant to the Project and mitigation measures that would reduce these impacts. Therefore, the proposed Project would be consistent with Implementation Policy 5. |
| **Implementation Policy 6.** Grading and filling for any new non-open space development shall not commence until approval under a "Development Plan." | CONSISTENT. Kern County would review and approve the applicant's drilling permit application prior to the issuance of a permit for drilling and associated construction activities. Therefore, the proposed Project would be consistent with Implementation Policy 6. |
| **Implementation Policy 7.** New or relocated utility lines shall be placed underground, except in areas subject to intensive agricultural uses, 8.4 areas (Mineral and Petroleum), and at River crossings or where it can be shown that the specific | CONSISTENT. As described in the Chapter 3.0, Project Description, the majority of new wells would be drilled in existing well fields in Tier 1 areas where oil and gas activity are the primary land use, and would include above-ground electrical |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| nature of the facility is such that it is entirely infeasible to do so. | distribution lines, which are intended to supply lower voltages of power to individual wells. Therefore, the proposed Project would be consistent with Implementation Policy 7. |
| **C. RIPARIAN VEGETATION** | |
| **Implementation Policy 1.** The City and County shall develop a master list of plant species for criteria to approve "Development Plans." This list shall be considered for incorporation into this plan by General Plan Amendment. Revegetation or landscaping with native or compatible shrubs and trees shall be required as part of all public and private projects. Areas of unique habitat value, such as the Mesquite-Saltbush Association in the vicinity of Enos lane, shall be preserved in accordance with the City's approved plan for use of the 2,800-acre recharge area and River channel maintenance. | CONSISTENT. As described in Chapter 3.0, Project Description, of this EIR re-vegetation of abandoned or disturbed oil and gas areas shall be in accordance with native vegetation in the immediate area. Therefore, the proposed Project would be consistent with Implementation Policy 1. |
| **Implementation Policy 2.** Prior to any development within the Kern River Plan boundaries, including residential, commercial, industrial, recreational, water recharge, channel improvement, and resource recovery projects, a landscaping plan shall be submitted to the respective City or County Planning Department for review and approval. | CONSISTENT. Visual screening would be required for oil and gas activities near sensitive receptors. In addition, future oil and gas activities on Tier 4 lands would require a CUP in accordance with Section 19.104 of the Kern County Zoning Ordinance, and as a condition of the CUP a landscaping plan shall be submitted to the County Planning Department for review and approval, consistent with this policy. Therefore, the proposed Project would be consistent with Implementation Policy 2. |
| **Implementation Policy 3.** For all new development in residentially, commercially, and industrially zoned properties within the plan boundaries, the River setback area shall be either landscaped or revegetated. Except as might be required by the City or County Fire Department, no clearing of shrubs or tree cutting will be allowed unless otherwise provided for by this plan. | CONSISTENT. Section 4.4, Biological Resources, of this EIR discusses potential impacts and mitigation measures related to the Kern River corridor. Therefore, the proposed Project would be consistent with Implementation Policy 3. |
| **F. MINERAL AND PETROLEUM EXTRACTION** | |
| **Implementation Policy 1.** The City and County shall revise, within two years from adoption of this plan, mineral and petroleum extraction regulations and provisions of their respective floodplain zoning ordinances consistent with all plan policies and incorporate the following features:<br>a. Strict limits on residential development.<br>b. Restrictions on the removal of riparian vegetation.<br>c. Noise limits when adjacent to highly sensitive and sensitive land uses. | CONSISTENT. The proposed Project includes an amendment to the Kern County Zoning Ordinance. New development standards that would be adopted under the proposed Project are intended to provide greater environmental protection with respect to oil and gas development in Kern County. As described in this EIR, the proposed Project would be consistent with all applicable policies in the Metropolitan Bakersfield General Plan, and mitigation measures would incorporate the features outlined in this implementation policy. See Section 4.1, Aesthetics, |

**Table 4-10-7: Project Consistency with Local Planning Documents**

| Goals and Policies | Proposed Project Consistency |
|---|---|
| d. Requirements for aesthetic treatment (painting, landscaping, screening) of production facilities (i.e., oil pump units, tanks, gravel crushers, etc.) located within the plan boundaries.<br>e. Allowance for sand and gravel operations necessary to the Kern River floodway or floodplain.<br>Allowances for petroleum extraction to occur with and without public hearing requirements and subject to a set of standard requirements, as in "a" through "d" above. | Section 4.4, Biological Resources, Section 4.9, Hydrology and Water Quality, and Section 4.12, Noise, for more information about specific measures. Therefore, the proposes Project would be consistent with Implementation Policy 1. |
| **Implementation Policy 2.** Mineral and petroleum extraction shall be encouraged on those lands designated "Mineral and Petroleum" on the Kern River Plan Map. Such use may also occur in other areas designated for recreation, resource, or industrial uses as long as the primary designated use is not significantly impaired and as long as such use would be consistent with other provisions of this plan and in compliance with existing local, State, and federal regulations. | CONSISTENT. The proposed Project includes an amendment to the Zoning Ordinance and includes development standards that would streamline the permitting process for oil and gas production, including development on lands designated "Mineral and Petroleum" and on other land designations where such development is allowed. Mitigation measures and compliance with existing local, state, and federal regulations would reduce adverse impacts to the environment Therefore, the proposed Project would be consistent with Implementation Policy 2. |

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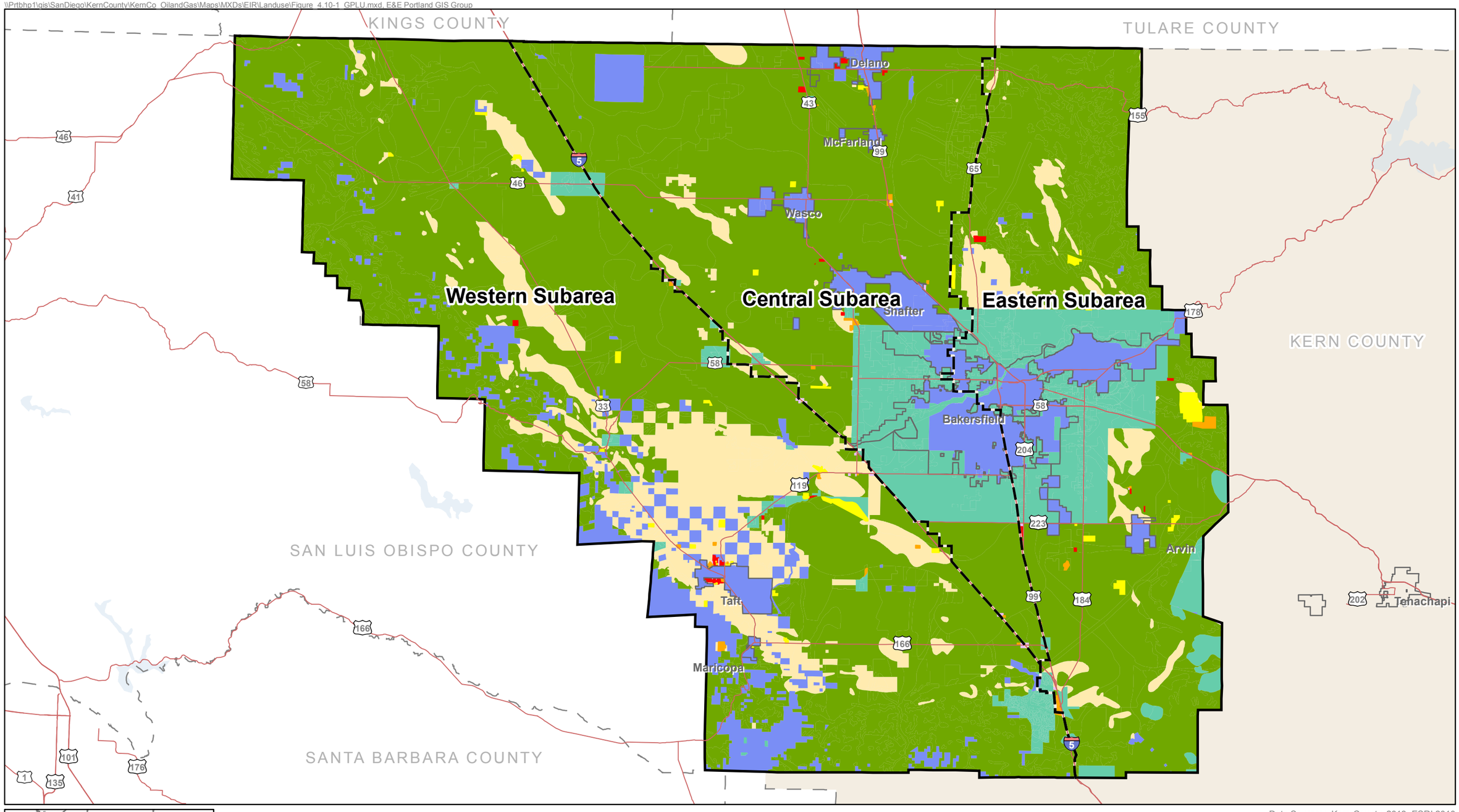


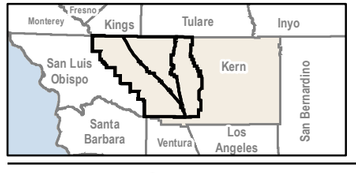


0 10
Miles

Project Area
Subarea
Kern County
City Limits
Highways
County Boundary

General Plan Categories

- Agricultural (8.1, 8.2, 8.3)
- Commercial (6.2, 6.3)
- Industrial (7.1, 7.2, 7.3)
- Non-Jurisdictional ( 1.1, 1.2)
- Public Facilities (3.1, 3.2, 3.3, 3.4.1, 3.4)
- Residential (5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7)
- Resource (8.4, 8.5)
- Specific Plan (4.1, 4.3, 9999)

Data Sources: Kern County, 2013, ESRI 2010

**Figure 4.10-1**
**General Plan Designations within the Project Area**

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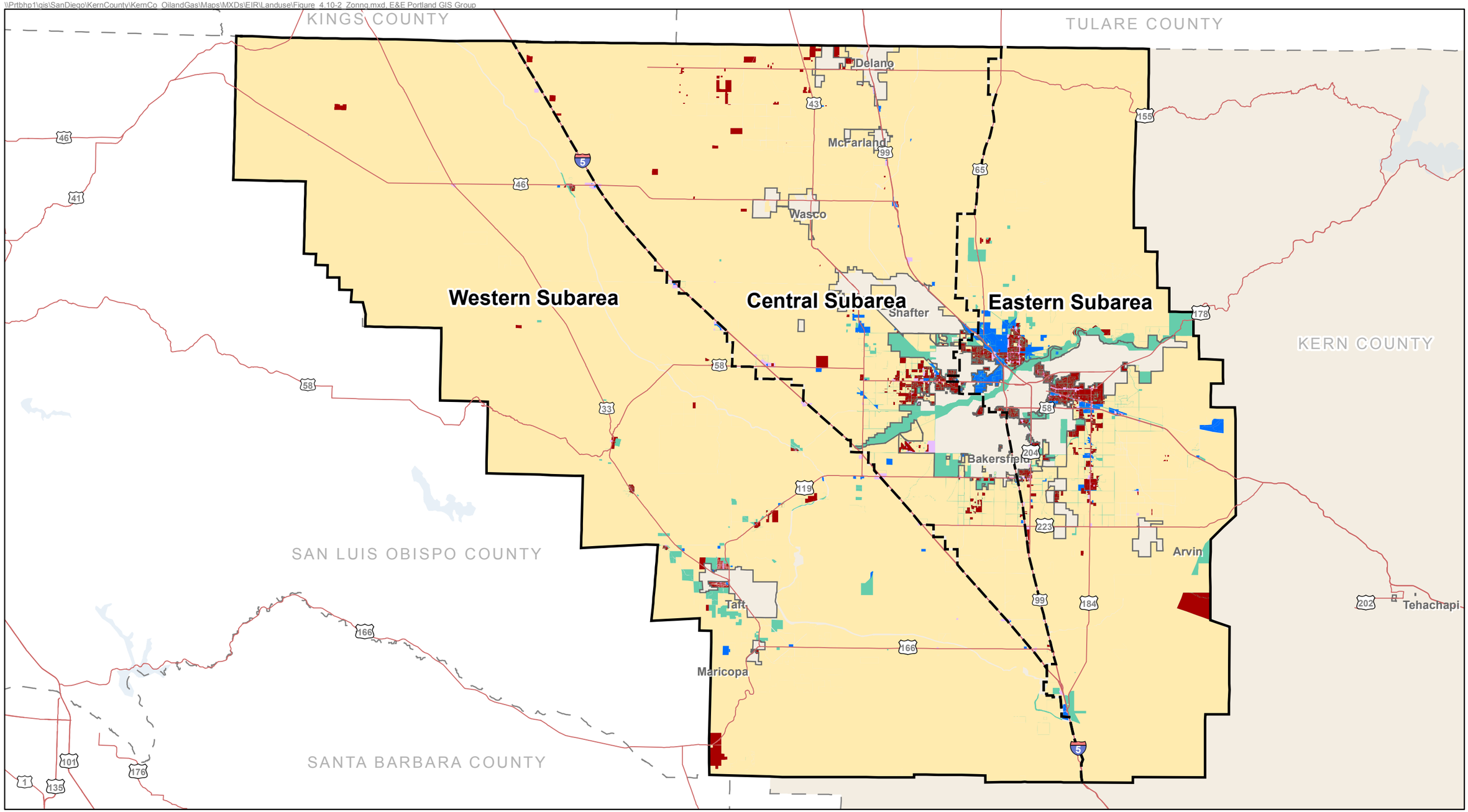
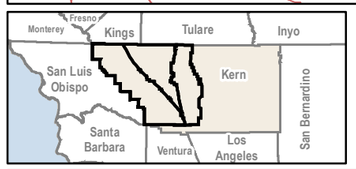


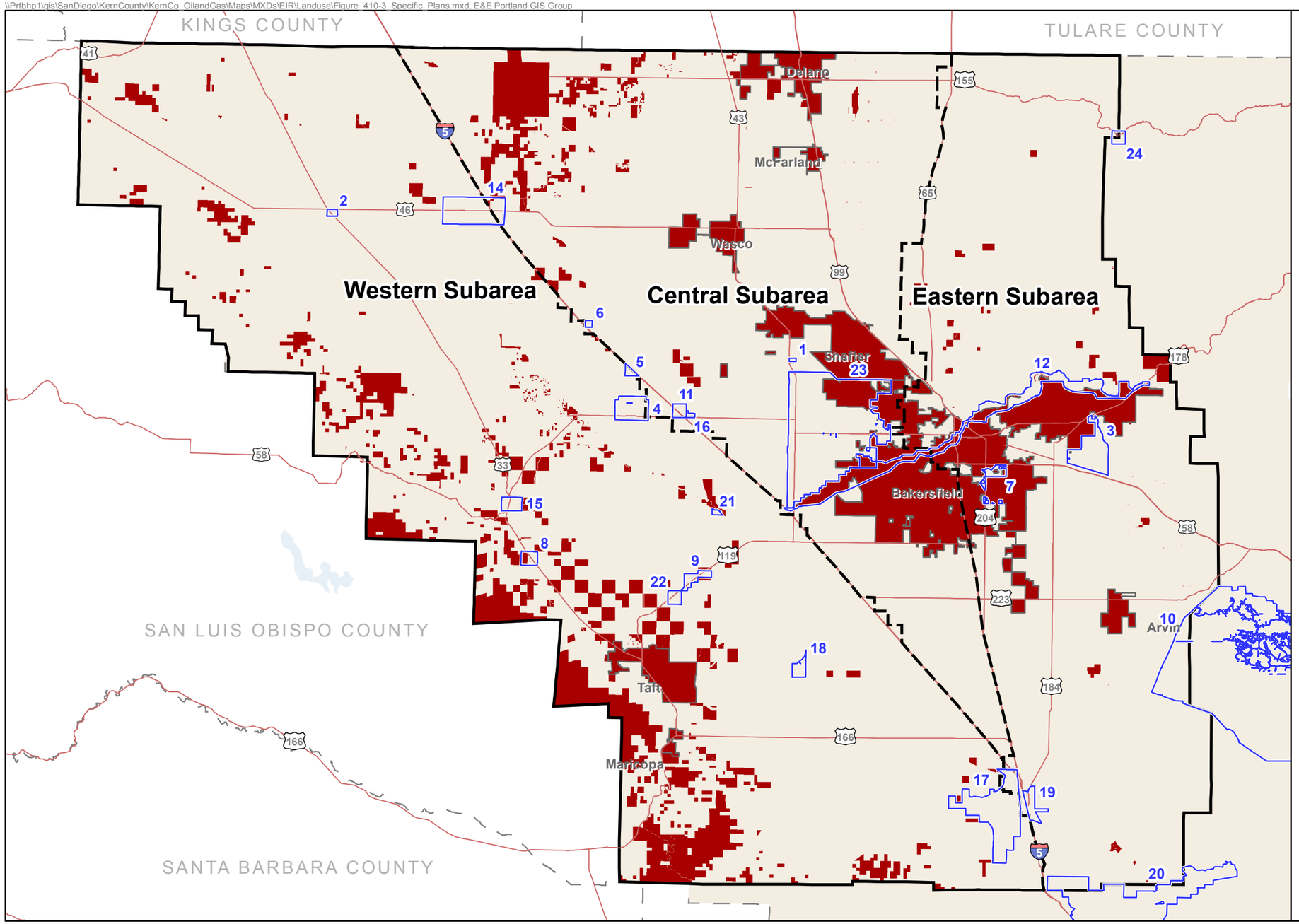

0 10
Miles

Project Area
Subarea
Kern County
Incorporated Cities
Highways
County Boundary

Zoning Categories
Agricultural Districts (A, A-1)
Commercial Districts (CO, C-1, C-2, CH )
Industrial Districts (M-1, M-2, M-3 )
Natural Resource and Special Planning District (NR, DI, FPP, RF,SP, OS)
Residential Districts (E, R-1, R-2, R-3, PL, MP)

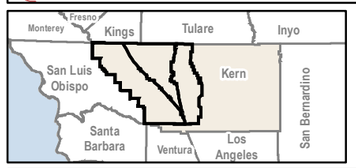
Data Sources: Kern County, 2013, ESRI 2010

**Figure 4.10-2**
**Zoning within the Project Area**




## Specific Plans

1: Beech Avenue Industrial Park
2: Blackwells Corner
3: Breckenridge Hills
4: Buttonwillow
5: Cal Centre
6: Cameron Point
7: Casa Loma
8: Derby Acres
9: Dustin Acres
10: Greater Tehachapi Area
11: I-5 and 58 Rural
12: Kern River (Westside) Freeway
13: Kern River Trails
14: Lost Hills
15: McKittrick
16: Oglesby
17: San Emidio
18: South Kern Industrial Center
19: Tejon Industrial Complex East
20: Tejon Mountain
21: Tupman
22: Valley Acres
23: Western Rosedale
24: Woody Rural




0 10 Miles

Project Area
Subarea
Specific Plan Areas
Kern County
City Limits
Highways
County Boundary

Tier Levels
Tier 1
Tier 2
Tier 3
Tier 4
Tier 5
Non-jurisdictional

Data Sources: Kern County, 2013, ESRI 2010

**Figure 4.10-3**
**Tiers and Specific Plans in the Project Area**

Section 4.11

# Mineral Resources

Section 4.11

# Mineral Resources

## 4.11.1 Introduction

This section describes the affected environment and regulatory setting for mineral resources. It also describes the impacts on mineral resources that would result from implementation of the Amendment to Chapter 19.98 (Oil and Gas Production) and related ordinance amendments to the Kern County Zoning Ordinance (Project), and mitigation measures that would reduce these impacts, if necessary.

State law defines "minerals" as "[a]ny naturally occurring chemical element or compound, or groups of elements and compounds, formed from inorganic processes and organic substances, including, but not limited to, coal, peat, and bituminous rock, but excluding geothermal resources, natural gas, and petroleum" (14 CCR § 3501). For purposes of this Environmental Impact Report (EIR), "minerals" are defined as also including oil and gas resources.

## 4.11.2 Environmental Setting

Kern County is California's third largest county, encompassing 8,202 square miles at the southern end of the Central Valley. The 3,700-square-mile Project Area is predominantly located in the western portion of the County in the San Joaquin Valley bounded by Kings and Tulare counties to the north; Santa Barbara and San Luis Obispo counties to the west; the Tehachapi Mountains and the Sierra Nevadas to east; and the northern boundary of the Los Padres National Forest to the south.

Kern County is located within District 4 of the State Division of Oil, Gas and Geothermal Resources (DOGGR) and is one of the richest oil-producing counties in the United States. The valley floor area of the County and the lower elevations of the surrounding mountain ranges contain numerous deposits of oil and gas resources, a major economic resource for the County. All oil and gas resources produced in District 4 as listed in State publications are from Kern County, except for about 1% that come from Tulare, Kings and San Luis Obispo counties.

Other mineral resources in Kern County include numerous mining operations that extract a variety of materials, including petroleum, natural gas, aggregate materials (sand and gravel), stone, gold, dimensional stone, limestone, clay, shale, gypsum, pumice, decorative rock, silica, and specialty sand.

## Oil and Gas Resources

Kern County leads the state in oil and natural gas production. Kern County produced 77% of California's in-state oil in 2012 and about 64% of the state's total natural gas. Kern County's Elk Hills oilfield is the state's top natural gas producer. Two other fields, South Belridge and

Lost Hills, rank in the state's top five for gas production. The state's top five oil producing fields—Midway-Sunset, South Belridge, Kern River, Cymric, and Elk Hills—are located within the Project Area in Kern County. Three of these fields—Midway-Sunset, South Belridge, and Kern River—are ranked in the top 10 producing oilfields in the nation. Specifically, Kern County produced 141.69 million barrels of oil and 143.16 million cubic feet of natural gas in 2012 (DOGGR 2013). The historic production of oil and natural gas in Kern County, from 2002 to 2012, is provided in Chapter 3, Project Description (Table 3-3). As of 2014, of the 100 administrative wellfields located within Kern County, 76 are active fields that continue to produce oil and natural gas.

Mineral and petroleum resources are a fundamental element of Kern County's employment base and overall economy. As new recovery technologies come into use, petroleum extraction should continue its economic importance. Even as California ramps up state laws to promote renewable energy resources and alternative transportation fuels, experts continue to recognize that oil and gas production will continue to be critical, and domestic oil and gas production remains a vital national interest.

# Aggregate Materials Resources (Sand and Gravel)

The State Geologist has classified 2,971 square miles of land in Kern County as Mineral Resource Zones (MRZs) of varying significance. The designated mineral resource zones in the Project Area are for aggregate resources, consisting of stone, sand, and gravel, generally suitable for use in building and road construction (CGS 2009), and are defined as follows:

- **MRZ-1**: Areas where available geologic information indicates that little likelihood exists for the presence of significant mineral resources.
- **MRZ-2**: Areas where adequate information indicates that significant mineral deposits are present, or where it is judged that a high likelihood for their presence exists. This zone shall be applied to known mineral deposits or where well-developed lines of reasoning, based upon economic-geologic principles and adequate data, demonstrate that the likelihood for occurrence of significant mineral deposits is high.
- **MRZ-3:** Areas containing known or inferred mineral occurrences of undetermined mineral resource significance (CGS 2009).

The locations of MRZ-1 and MRZ-2 zones are presented on Figure 4.11-1. The remainder of the Project Area either has not been studied for the presence of aggregate material resources or is designated as MRZ-3 where inferred occurrences of resources are of undetermined significance (CGS 2009).

Two areas within the Project Area are designated as MRZ-1, where there is little likelihood for the presence of aggregate material resources. One MRZ-1 zone is located within the Central Subarea just south of State Highway 46; the other zone crosses the Western, Central, and Eastern Subareas in the southern portion of the Project Area (Figure 4.11-1). Both MRZ-1 zones

are located in agricultural areas identified by the Project Description as "Tier 2" areas (Figure 4.11-2). The MRZ-1 zones partially overlap Core Areas (Figure 4.11-1).

Eleven aggregate material deposits are designated as MRZ-2 within the Project Area. As shown on Figure 4.11-1, two MRZ-2 zones are located wholly within the Western Subarea and six are wholly located within the Eastern Subarea. One of the MRZ-2 zones bisects the Western and Eastern Subareas in the southern portion of the Project Area, along Interstate 5. Two MRZ-2 zones bisect the Central and Eastern Subareas, along State Highways 99 and 65. Most of the MRZ-2 zones are located in agricultural areas identified by the Project Description as "Tier 2" areas. In addition, some MRZ-2 zones are located within areas identified as "Tier 3" and "Tier 4" (Figure 4.11-2). All of the MRZ-2 zones overlap Core Areas partially or wholly.

A number of smaller areas in the vicinity of known deposits are designated as MRZ-1 where the resource has been mined out. The remainder of the Project Area either has not been studied for the presence of aggregate material resources or is designated as MRZ-3, where inferred occurrences of resources are of undetermined significance (CGS 2009).

# Aggregate Mines

Based on a database search of active mines listed in the California Department of Conservation, Office of Mine Reclamation (OMR) database, there are 21 active or newly permitted (and presumed to be active in the near future) aggregate materials mines in the Project Area. Figure 4.11-3 shows mines and mineral resources in the Project Area and the Core Area boundaries as defined in the Project Description. Multiple data sources were used to develop this figure. For this reason mines and/or mineral deposits may appear as more than one map symbol. For example, active mines in deposits known before 1962 will appear on Figure 4.11-3 as an active mine symbol based on data from (OMR 2015) and a separate symbol to indicate the presence of a deposit, based on data from Mineral Resources of Kern County, County Report 1 (CDMG 1962). Deposits known before 1962 (from CDMG 1962) are described as potential deposits because they may have since been mined out or may still represent a recoverable resource.

As shown on Figure 4.11-3**,** a total of five of the active and newly permitted aggregate mines are located within the administrative boundaries of active oilfields. Three active and newly permitted aggregate mines are located in the Western Subarea, two of which are located within the administrative boundaries of active oilfields. Three active aggregate materials mines are located in Core Areas of the Western Subarea. No active or newly permitted aggregate materials mines are located in the Central Subarea. In the Central Subarea, no active aggregate materials mines are located in Core Areas. Eight active or and newly permitted aggregate materials mines are located in the Eastern Subarea, three of which are located within the administrative boundaries of active oilfields. Seven aggregate mines are located in the Eastern Subarea, four of which are located within the administrative boundaries of active oilfields. In the Eastern Subarea, a total of four active aggregate materials mines are located in Core Areas.

# Other Mineral Resources

Based on a search of the California Department of Conservation, Office of Mine Reclamation, database, there are seven active mines in the Project Area producing either shale, diatomite, clay, or gypsum. The OMR list does not specify the product being produced for two mines. There are 21 additional active mines producing aggregate materials (sand and gravel), as discussed above (OMR 2015).

As shown on Figure 4.11-3 deposits or historic mines for clay, copper, gems and minerals, lode gold, gypsum, specialty sand, sulfur, and uranium occur within the Project Area. There are five clay deposits in the Project Area, three of which are located within the administrative boundary of an active oilfield. There is one copper deposit in the Project Area, which is located outside the administrative boundaries of any oilfield. There are two gem and mineral localities in the Project Area, which are located outside the administrative boundaries of any oilfield. There are two lode gold and one placer gold deposits in the Project Area, which are located outside the administrative boundaries of any oilfield. There are 28 gypsum deposits in the Project Area, nine of which are located within the administrative boundaries of an active oilfield. There is one specialty sand deposit in the Project Area, which is located outside the administrative boundaries of any oilfield. There are three sulfur deposits in the Project Area, one of which is located within the administrative boundaries of an active oilfield. There are ten uranium deposits in the Project Area, five of which are located within the administrative boundaries of an active oilfield. (CDMG 1962)

In the Western Subarea, there are eight uranium, two clay, six potential aggregate materials, two sulfur, and 23 gypsum deposits mapped in Core Areas. In the Central Subarea, there is one aggregate materials deposit mapped in Core Areas. In the Eastern Subarea, there are one clay, potential aggregate materials, and two gypsum deposits mapped in Core Areas. Please note that the aggregate material deposits discussed here are not currently active mines in contrast to the active mines discussed above.

## 4.11.3 Regulatory Setting

# Federal

### Surface Mining and Reclamation Act of 1975

The Surface Mining and Reclamation Act of 1975 (SMARA) was mandated in order to identify and protect mineral resources of statewide or regional significance and ensure that those resources are available when needed. SMARA requires the State Geologist to classify land into MRZs according to its known or inferred mineral potential. The primary goal of mineral land classification is to ensure that the mineral potential of land is recognized by local government decision makers and considered before land use decisions are made that could preclude mining.

# State

## Division of Oil, Gas, and Geothermal Resources

DOGGR regulates the production of oil and gas, as well as geothermal resources, within the State of California. DOGGR regulations, which are contained in CCR, Title 14, Division 2, Chapter 4, include well design and construction standards, surface production equipment and pipeline requirements, and well abandonment procedures and guidelines. DOGGR regulates well abandonment procedures to ensure effectiveness in preventing migration of oil and gas from a producing zone to shallower zones, including potable groundwater zones. DOGGR oversees well operations.

DOGGR also has regulatory authority over Class II injection wells for enhanced recovery and disposal. In California, the operation of all Class II injection wells are regulated by DOGGR, under provisions of CCR Section 1724.6, and the federal Safe Drinking Water Act. When an operator ceases well operation or production, state law requires the well to be abandoned within a reasonable time period.

Effective January 1 2014, California adopted several new and amended provisions of the Public Resources Code and Water Code to regulate any oil or gas well stimulation activity designed to enhance oil or gas production or recovery by increasing the permeability of the geologic formation that contains hydrocarbon deposits. Well stimulation activities covered by the new legislation include hydraulic fracturing and acid well stimulation treatments. The legislation, commonly referred to as Senate Bill 4 (SB 4), amended Sections 3213, 3215, 3236.5, and 3401 of the Public Resources Code, added Article 3 to Chapter 1 of Division 3 of the Public Resources Code, and added Section 10783 to the Water Code. SB 4, as amended, requires that DOGGR: (1) promulgate emergency interim regulations by January 2014 and adopt permanent regulations regulating well stimulation treatments by July 2015; (2) complete a statewide Environmental Impact Report on well stimulation treatments by July 2015; (3) complete an independent scientific study of well stimulation by January, 2015; and (4) consult and reach formal agreements with other regulatory agencies to provide regulatory accountability for, and public transparency to, well stimulation treatments by January, 2015.

DOGGR adopted interim well stimulation regulations in January 2014, and readopted the interim regulations in July 2014. Proposed permanent regulations were circulated for public review and comment in October 2014, adopted on December 30, 2014, and are scheduled to go into effect by July 1, 2015.

## State Mining and Geology Board

Pursuant to SMARA, mineral lands are mapped with the California Mineral Land Classification System according to jurisdictional boundaries. All mineral commodities in the area, including aggregates, common clay, and dimensional stone, are mapped at one time. Priority is given to areas where future mineral resource extraction could be precluded by incompatible land uses or mineral resources are likely to be mined during the 50-year period following their classification.

Detailed mineral land classification and designation reports provided by the State Mining and Geology Board (SMGB) are on file with the City of Bakersfield and Kern County. SMGB also has adopted regulations (14 Cal. Code Regs. 3500 et seq.) establishing state policy for reclamation of mined lands and conduct of surface mining operations.

The SMGB established MRZs to designate lands that contain mineral deposits. Accordingly, the MRZ classification system is used to evaluate an area's mineral resources pursuant to SMARA. A "resource" is a concentration of naturally occurring solid, liquid, or gaseous material in such form and amount that economic extraction of the commodity from the concentration is currently potentially feasible. A "reserve" is that part of the resource base that could be economically extracted or produced within the foreseeable future. For any given mineral resource, an area may be classified as MRZ-1, MRZ-2, MRZ-3, or MRZ-4, as follows:

- **MRZ-1**: Areas where the available geologic information indicates that no significant mineral deposits are present or where it is judged that no significant likelihood exists for their presence;
- **MRZ-2a**: Areas where the available geologic information indicates that significant mineral deposits are present;
- **MRZ-2b**: Areas where the available geologic information indicates that there is likelihood for the presence of significant mineral deposits;
- **MRZ-3a**: Areas where the available geologic information indicates that mineral deposits exist, but the significance of the deposits cannot be determined from available data;
- **MRZ-3b**: Areas where the available geologic information indicates that mineral deposits are likely to exist, but the significance of the deposits cannot be determined from available data; and
- **MRZ-4**: Areas where the available geologic information is inadequate for assignment into any other MRZ or where there is not enough information available to determine the presence or absence of mineral deposits.

As described in Section 4.11.2, Environmental Setting, the Project Area contains mineral resource areas classified as MRZ-1, MRZ-2, and MRZ-3.

According to the SMGB, "Designation" is the process by which the SMGB determines that a particular classified mineral deposit is of regional, multi-community, or statewide economic significance. This process is facilitated through analyses by the State Geologist and the California Division of Mines and Geology (also known as the California Geological Survey, or CGS), and information gathered from local communities, the mining industry, and other governmental agencies, such as the Governor's Office of Planning and Research. The purpose of Designation is to identify those areas that are of prime importance in meeting future needs of the study region and that remain available from a land use perspective.

Designation is an effort to conserve mineral resources in regions of expected rapid urbanization or other land uses that might prevent surface mining activities, and therefore result in a loss of the mineral resource to the community. To avoid dictating to local communities where future aggregate mines should be located, mineral designated areas generally contain resources (un-permitted deposits) that are far in excess of the region's 50-year demand. This approach attempts to provide maximum flexibility to local governments in making land use decisions, while still conserving an adequate amount of construction aggregate for the future.

The objectives of these processes are to provide local agency decision makers with information on the location, need, and importance of mineral resources within their jurisdiction, and to require that this information be considered in local land use planning decisions. These objectives are met through the adoption of local Mineral Resource Management Policies that provide for the conservation and prudent development of these mineral deposits.

# Local

## Kern County General Plan

The Project Area is located within the Kern County General Plan (KCGP) area and, therefore, would be subject to applicable policies and measures of the KCGP. The Land Use, Conservation, and Open Space Element and the Energy Element of the KCGP include goals, policies, and implementation measures related to mineral resources that apply to the Project, as described below.

### Chapter 1. Land Use, Conservation, and Open Space Element

#### 1.9. Resource

#### Goals

**Goal 1.** To contain new development within an area large enough to meet generous protections of foreseeable need, but in locations that will not impair the economic strength derived from the petroleum, agriculture, rangeland, or mineral resources or diminish the other amenities that exist in the County.

**Goal 2.** Protect areas of important mineral, petroleum, and agricultural resource potential for future use.

**Goal 3.** Ensure the development of resource areas to minimize effects on neighboring resource lands.

**Goal 4.** Encourage safe and orderly energy development within the County, including research and demonstration projects, and to become actively involved in the decision and actions of other agencies as they affect energy development in Kern County.

### Policies

**Policy 1.** Appropriate resource uses of all types will be encouraged as desirable and consistent interim uses in undeveloped portions of the County regardless of General Plan designation.

**Policy 2.** In areas with a resource designation on the General Plan map, only industrial activities which directly and obviously relate to the exploration, production, and transportation of the particular resource will be considered to be consistent with this General Plan.

**Policy 14.** Emphasize conservation and development of identified mineral deposits.

**Policy 17.** Lands classified as MRZ-2, as designated by the State of California, should be protected from encroachment of incompatible land uses.

**Policy 25.** Discourage incompatible land use adjacent to Map Code 8.4 (Mineral and Petroleum) areas.

### Implementation Measures

**Implementation Measure H.** Use the California Geological Survey's latest maps to locate mineral deposits until the regional and Statewide importance mineral deposits map has been completed, as required by the Surface Mining and Reclamation Act.

**Implementation Measure I.** Periodically review the Zoning Ordinance to reflect new technology and energy sources, and encourage these types of uses for new development.

**Implementation Measure K.** Protect oilfields and mineral extraction areas through the use of appropriate implementing Zone Districts: A (Exclusive Agriculture), DI (Drilling Island), NR (Natural Resource), or PE (Petroleum Extraction).

## Chapter 5. Energy Element

### 5.2. Importance of Energy to Kern County

### General Goal

To assert Kern County's position as California's leading energy provider, to encourage safe and orderly energy development within the County, including research and demonstration projects, and to become actively involved in the decisions and actions of other agencies as they affect energy development in Kern County.

### Policies

**Policy 5**. The County shall work with other agencies to define regulatory responsibility concerning energy-related issues, and shall seek to eliminate, insofar as possible, duplicative regulations.

### 5.3. Petroleum Resources and Development

#### Policies

**Policy 4**. All oilfield development shall take place in accordance with regulations administered by DOGGR.

#### Implementation Measures

**Measure C**. The County shall monitor its regulations pertaining to petroleum exploration production and update such regulations as necessary.

## Metropolitan Bakersfield General Plan

The Metropolitan Bakersfield General Plan (MBGP), a joint effort between the Kern County Planning Department and the City of Bakersfield Planning Division, was last adopted on December 11, 2007. The MBGP includes both city and unincorporated County lands. The MBGP describes the community's physical development as well as its economic, social and environmental goals and is currently undergoing an update. The Project Area includes a total of 152,040 acres of unincorporated County lands that are covered under the MBGP (7.41%). Project-related development on unincorporated lands within the MBGP Planning Area would be subject to the following applicable policies and implementation measures of the MBGP, with respect to mineral resources.

## Chapter II. Land Use Element

#### Policies

**Policy 31.** Allow for a variety of industrial uses, including land-extensive mineral extraction and processing, heavy manufacturing, light manufacturing, warehousing and distribution, transportation-related, and research and development uses (I-1).

## Chapter V. Conservation Element

### B. Mineral Resources

#### Goals

**Goal 1.** Protect areas of significant resource potential for future use.

**Goal 2.** Document areas of current mineral and energy resource extraction, as a basis for land use and conservation policies and programs.

**Goal 3.** Avoid conflicts between the productive use of mineral and energy resource lands and urban growth.

**Goal 4.** Protect land, water, air quality and visual resources from environmental damage resulting from mineral and energy resource development.

### Policies

**Policy 4.** Land use decisions shall recognize the importance of identified mineral resources and need for conservation of resources identified by the State Mining and Geology Board (I-2).

**Policy 7.** Promote development of compatible uses adjacent to mineral extraction areas (I-2).

**Policy 10.** Implement, as appropriate, the California Environmental Quality Act to minimize land use conflicts and reduce environmental impacts of all proposed resource extraction operations (I-2).

**Policy 11.** Prohibit incompatible development in areas which have a significant potential for harm to public health, safety and welfare due to mineral and petroleum extraction and processing (I-2).

**Policy 12.** Design resource extraction operations subject to discretionary permits to maintain the integrity of areas of "high environmental quality" and unique scenic value (I-2).

**Policy 14.** Review all discretionary mineral or petroleum development including renewal of existing authorizations, under the policies and procedures of the California Environmental Quality Act (I-4).

**Policy 15.** Require petroleum production sites in urban areas which are subject to discretionary permits, to install peripheral landscaping to help reduce the noise, dust and visual impacts to adjacent sensitive receptors and public ways (I-4).

**Policy 16.** Require all mineral development to be predicated on appropriate reclamation plans that meet the standards of the State Surface Mining and Reclamation Act and the implementing guidelines of the State Mines and Geology Board, and (or) the standards of the State Division of Oil and Gas. Reclamation/restoration of the sites shall be done as each phase of development or extraction is completed (I-4, I-5).

### Implementation Measures

**Implementation Measure 3.** Periodically review and update local Zoning Ordinances that have been amended to accommodate mineral extraction uses outside of mineral resource zones.

## Kern County Specific Plans

Kern County has adopted 24 Specific Plans for properties within the Project Area. These Specific Plans are intended to be an amplification of the goals and policies of the KCGP and are, therefore, consistent therewith. As depicted in Figure 4.10-3, less than 8% of the Project Area is located wholly or partially within adopted Specific Plan areas. Future oil and gas exploration and production activities that would be authorized under the proposed Amendment to Chapter 19.98 (Oil & Gas Production) of the Kern County Zoning Ordinance that would be located within the boundary of an adopted Specific Plan would be regulated according to County zoning, with the exception of the Specific Plans identified as Tier 5.

# 4.11.4 Impacts and Mitigation Measures

## Methodology

The following documents were analyzed and compared to identify potential conflicts of the Project's presence and operations with mineral resource extraction:

- Mines and Mineral Resources of Kern County, California, County Report 1. California Division of Mines and Geology (CDMG 1962).
- Update of Mineral Land Classification: Aggregate Materials in the Bakersfield Production-Consumption Region, Kern County, California. California Geological Survey (CGS 2009).
- 2012 Preliminary Report of California Oil and Gas Production Statistics, Publication PR03. California Division of Oil, Gas, and Geothermal Resources (DOGGR 2013).
- Mines in Kern County, California, from the Mineral Resource Data System, from the United States Geological Survey (MRDS 2011).
- Mines within the Project Area, California Department of Conservation, Office of Mine Reclamation (OMR 2015).
- Surface Mining and Reclamation Ordinances – Current Status: January 29, 2014. California Department of Conservation, State Mining Geology Board (SMGB 2014).

A list of the specific cited references is provided at the end of this resource section.

## Thresholds of Significance

The Kern County California Environmental Quality Act (CEQA) Implementation Document and Kern County Environmental Checklist state that a project would have a significant impact on mineral resources if it would:

- Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state; or
- Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan.

## Project Impacts

The Project will protect and preserve the availability of known oil and gas resources, and the ongoing and future extraction of such resources, while imposing additional environmental mitigation measures, and substantive and procedural ordinance mandates, to avoid and minimize the significant impacts associated with such activities. Development of oil and gas resources through the Oil and Gas Conformity Review process under the Amended Zoning Ordinance is considered a beneficial mineral resource impact of the Project. Increasing oil and gas exploration

and production in Kern County and encouraging ongoing economic development by the oil and gas industry are among the Project Objectives.

The types of potential impacts related to mineral resources other than oil and gas are generally the same for both construction and operation of future oil and gas exploration and production activities, and therefore the analysis provided below applies to both temporary construction impacts and operational impacts.

## Impact 4.11-1: Result in the Loss of Availability of a Known Mineral Resource that would be of Value to the Region and the Residents of the State

Future oil and gas exploration and production activities could result in the temporary or permanent loss of availability of another type of mineral resource if development of oil and gas resources overlaps with areas that contain other mineral resources and those resources could not be extracted, or if oil and gas exploration and production activities prevented access to mineral resources.

There are two mapped clay deposits, 13 potential aggregate materials deposits, and nine gypsum, one sulfur, and five uranium deposits located within the current administrative boundaries of the oil and gas fields in the Project Area. There are three clay, 25 gypsum, eight uranium, and 20 potential aggregate materials deposits mapped within the Core Areas (Figure 4.11-3).

- In the Western Subarea, there are one clay, nine gypsum, one sulfur, five uranium, and six aggregate materials deposits within the administrative boundaries of oil and gas field. There are eight uranium, 23 gypsum, six aggregate materials, two sulfur, and two clay deposits mapped in Core Areas in the Western Subarea.

- In the Central Subarea, there is one potential aggregate materials deposit within the administrative boundary of an oil and gas field and in a Core Area.

- In the Eastern Subarea, there are six potential aggregate materials deposits and one clay deposit within the administrative boundaries of oil and gas fields. There are two gypsum, 13 aggregate materials, and one clay deposits mapped in Core Areas in the Eastern Subarea.

Mineral resource mines are active within the Project Area, including within the Core Areas of the oil and gas fields in the Project Area (Figure 4.11-3). Currently, eight mines are active within the administrative boundaries of oil and gas fields in the Project Area. These include five aggregate materials mines, one shale mine, one diatomite mine, and one gypsum mine.

- In the Western Subarea, there are one shale, one gypsum, one diatomite, and two aggregate materials mines currently active within the administrative boundaries of oil and gas fields. There are one gypsum, two diatomite, three aggregate materials, and two shale mines active in Core Areas of the Western Subarea.

- In the Central Subarea, there are no active mines within the administrative boundary of an oil and gas field or within a Core Area.

- In the Eastern Subarea, there are three aggregate materials mines currently active within the administrative boundaries of oil and gas fields. There are four aggregate materials mines active in Core Areas of the Eastern Subarea.

The presence of these mines within existing oil and gas fields demonstrates that concurrent development of both types of mineral resources is possible, and that the presence of oil and gas exploration and production facilities does not preclude the development of other mineral resources. With the use of directional drilling, oil and gas resources—which are typically located below other recoverable mineral deposits—can be developed from the perimeter of those deposits. Conversely, oil and gas development activities can be conducted concurrently with or after mining of another resource. For example, oil wells can be drilled on a reclaimed mine or in portions of active mines, such as mined out areas or areas that will not be mined for a number of years. Therefore, future development of oil and gas facilities from the implementation of the proposed Project would not result in the loss of availability of other known mineral resources and the Project would result in a less than significant impact.

### Mitigation Measures

No mitigation measures are required.

### Level of Significance

Impacts would be less than significant.

## Impact 4.11-2: Result in the Loss of Availability of a Locally Important Mineral Resource Recovery Site Delineated on a Local General Plan, Specific Plan, or Other Land Use Plan

The Kern County General Plan does not separately delineate any locally important mineral resource recovery site. However, General Plan Resource Policy 17 provides that "Lands classified as MRZ-2, as designated by the State of California, should be protected from encroachment of incompatible land uses." Future oil and gas exploration and production activities could result in the loss of availability of local important mineral resource if oil and gas activities prevented access to those resources. Based on a review of California Geological Survey publications, the locally important mineral resource recovery sites in the Project Area are aggregate materials resources. As shown on Figure 4.11-1, designated mineral resources zones for aggregate materials overlap the current administrative boundaries of oil and gas fields. Future development of petroleum resources could overlap areas that contain aggregate materials resources.

As described above, mineral resource mines are currently active within the administrative boundaries and Core Areas of oil and gas fields in the Project Area. For example, two aggregate materials mines are within the boundaries of MRZ-2, where significant aggregate materials

deposits are present. This demonstrates that oil and gas activities and mineral extraction can and do occur in close proximity to each other. With the use of directional drilling, oil and gas resources can be developed below mineral deposits. Mineral resources can also be developed after oil and gas operations end. Conversely, oil and gas development activities can be conducted concurrent with or after mining of aggregate materials resources. For example oil wells can be drilled on a reclaimed mine or in portions of active mines such as mined out areas or areas that will not be mined for a number of years. Therefore, future development of oil and gas facilities from the implementation of the proposed Project would not result in the loss of availability of other important mineral resources, and the Project would result in a less than significant impact.

### Mitigation Measures

No mitigation measures are required.

### Level of Significance

Impacts would be less than significant.

## 4.11.5 Cumulative Setting, Impacts, and Mitigation Measures

## Cumulative Setting

The geographic scope for cumulative impacts to mineral resources includes the area within 6 miles of the Project Area boundary, and areas (e.g., incorporated cities) within the Project Area that are not subject to County jurisdiction. While projects in a larger area may affect some of the same mineral resources as the Project, by focusing on projects within the Project Area and 6 miles outside of the Project Area, the analysis of cumulative impacts includes those projects that would most comparably affect the same resources as the Project.

### Impact 4.11-3: Contribute to Cumulative Mineral Resources Impacts

As described above, with techniques such as directional drilling and opportunities to develop oil and gas resources and other mineral resources concurrently or sequentially, the Project would not interfere with the recovery of other mineral resources within the Project Area or cause any potentially significant adverse impacts to mineral resource recovery outside the Project Area. As a result, the Project will not result in a cumulatively considerable contribution to cumulative impacts to mineral resources and the impact would be less than significant.

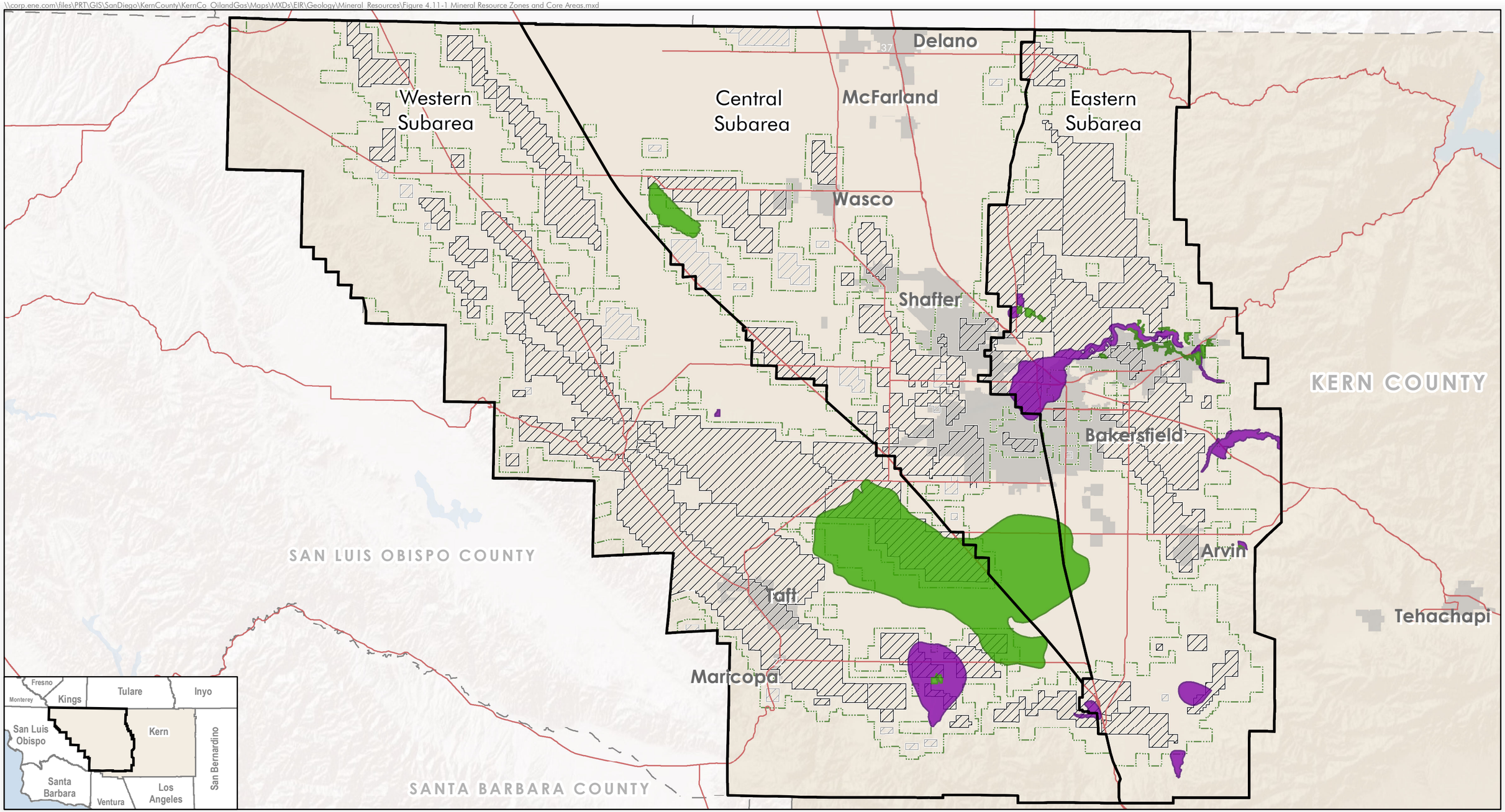
### Mitigation Measures

No mitigation measures are required.

### Level of Significance

Impacts would be less than significant.

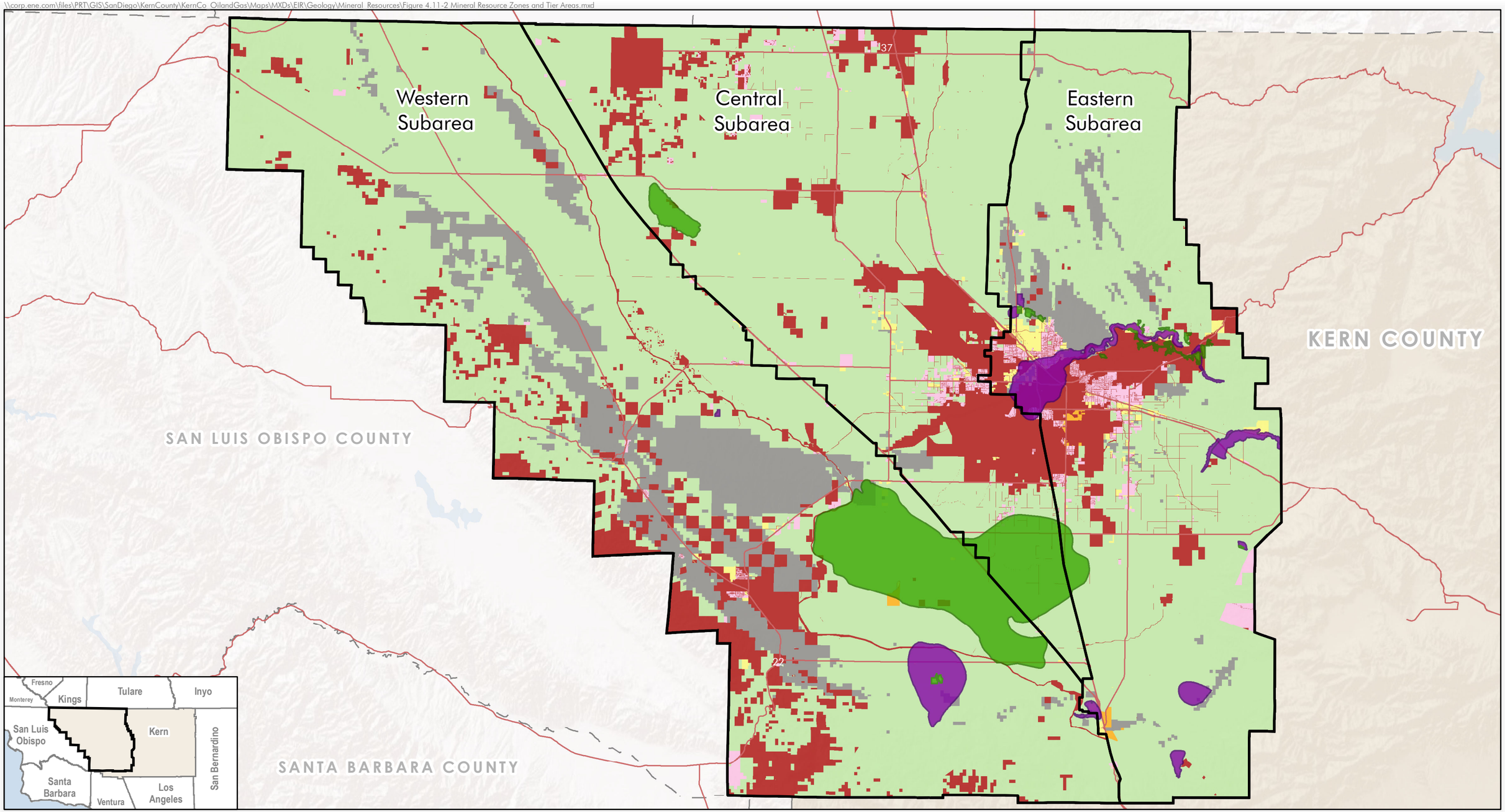
\\corp.ene.com\files\PRT\GIS\SanDiego\KernCounty\KernCo_OilandGas\Maps\MXDs\EIR\Geology\Mineral_Resources\Figure 4.11-1 Mineral Resource Zones and Core Areas.mxd




Data Sources: California Geological Survey 2009, DOGGR 2013, ESRI 2010, esps.kerndsa.com
Service Layer Credits: Copyright:© 2014 Esri

Figure 4.11-1
Mineral Resource Zones
and Core Areas

\\corp.ene.com\files\PRT\GIS\SanDiego\KernCounty\KernCo_OilandGas\Maps\MXDs\EIR\Geology\Mineral_Resources\Figure 4.11-2 Mineral Resource Zones and Tier Areas.mxd




Project Area
Kern County
City Limits
Highways
County Boundary

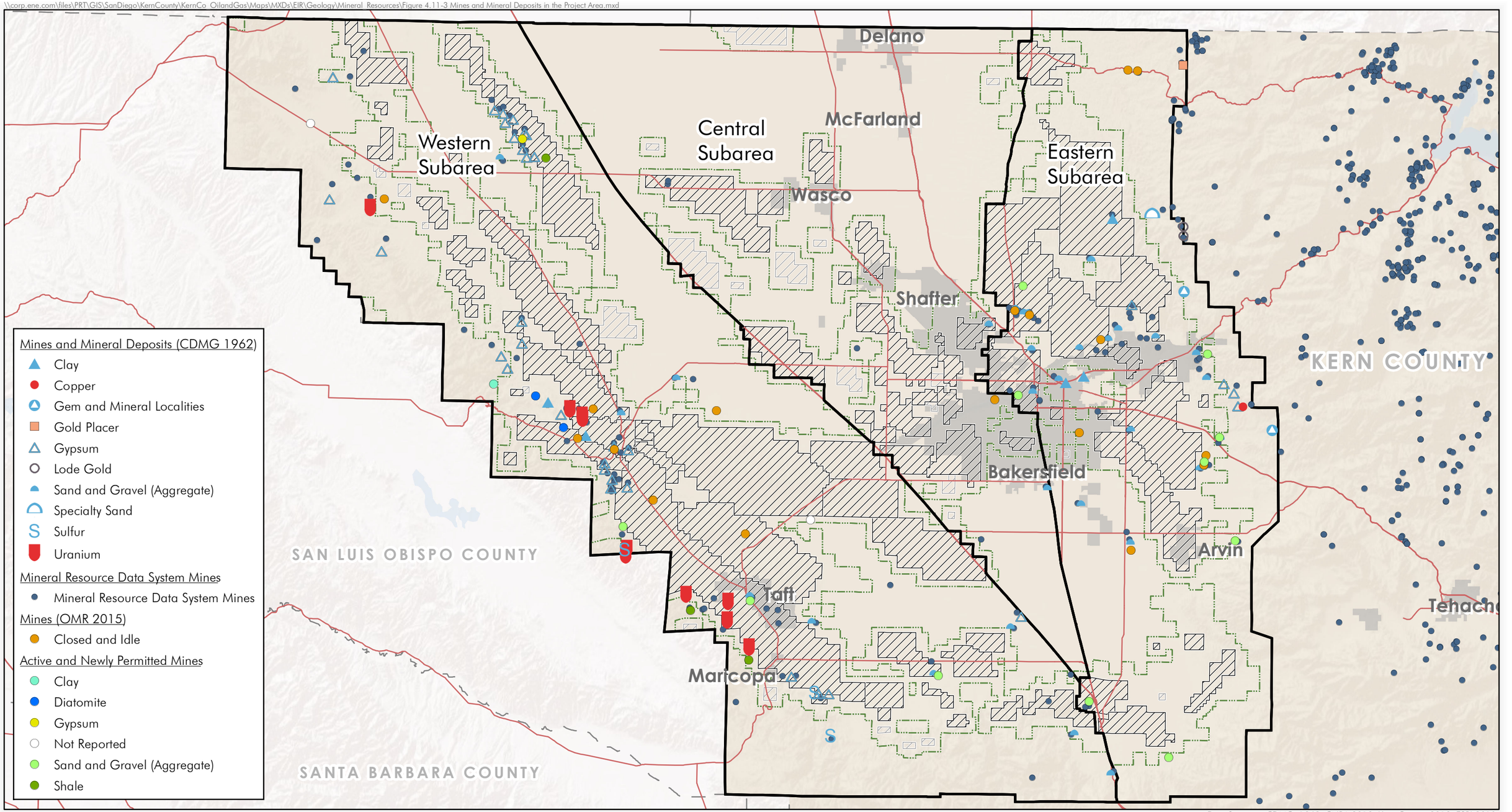
Designated Mineral Resource Zones
MRZ-1 (Little Likelihood for the Presence of Significant Mineral Resources)
MRZ-2 (Significant Mineral Deposits Present)

Tier
Tier 1
Tier 2
Tier 3
Tier 4
Tier 5
Non-jurisdictional

0 10
Miles

Data Sources: California Geological Survey 2009, DOGGR 2013, ESRI 2010, esps.kerndsa.com
Service Layer Credits: Copyright:© 2014 Esri

Figure 4.11-2
Mineral Resource Zones and Tier Areas




Data Sources: CDMG, 1962, CNRA 2013, Kern County, 2013, ESRI 2010, DOGGR, 2013, USGS 2015;
Service Layer Credits: Copyright:© 2014 Esri

Figure 4.11-3
Mines and Mineral Deposits in the Project Area

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Section 4.12

# Noise

Section 4.12

# Noise

## 4.12.1 Introduction

This section describes the affected environment and regulatory setting for noise quality. It also describes the impacts on noise receptors that would result from implementation of the Amendment to Chapter 19.98 (Oil and Gas Production) and related ordinance amendments to the Kern County Zoning Ordinance (Project), and mitigation measures that would reduce these impacts, if necessary.

This section is based on an independent evaluation of noise conditions in the Project Area, Project activities that cause noise, and the effectiveness of noise-related mitigation and avoidance measures. The section is also informed by the Environmental Noise Assessment Noise Study Technical Report prepared by Brown-Buntin Associates, Inc. (Brown-Buntin 2015), entitled "Environmental Noise Assessment, Oil and Gas Development EIR Kern County, California," which is presented in Appendix V.

## Terminology

### Noise

The assessment of noise impacts uses specific terminology and fundamental descriptors not commonly used in everyday conversation. Therefore, in order to assist in a thorough understanding of the subsequent analysis, these terms are discussed in this subsection.

**Acoustics** is the study of sound, and noise is defined as unwanted sound.

**Airborne sound** is a rapid fluctuation or oscillation of air pressure above and below atmospheric pressure creating a sound wave.

The **pitch** or loudness of sound determines whether a sound is of a pleasant or objectionable nature. Pitch, which is the height or depth of a tone or sound, is louder to humans when it is high-pitched versus low-pitched. The loudness of a sound is determined by a combination of the intensity of the sound waves with the reception characteristics of the ear.

Measurement scales are used to describe sounds. A **decibel (dB)** is a unit used to describe the amplitude of sound, and sound levels are calculated on a logarithmic, not linear, basis. The lowest sound level that an unimpaired human ear can hear is described as zero on the decibel scale. Due to the logarithmic nature of measuring sound levels on the decibel scale, a 10-dB increase represents a tenfold increase in acoustic energy, whereas a 20-dB increase represents a hundredfold increase in acoustic energy. Because a relationship exists between acoustic energy and intensity, each 10-dB increase in sound level can have an approximate doubling effect on loudness as perceived by the human ear.

The most common metric is the overall **A-weighted sound level measurement** (**dBA**) that has been adopted by regulatory bodies worldwide. The A-weighting network measures sound in a fashion similar to the way a person perceives or hears sound, thus achieving very good correlation in terms of evaluating acceptable and unacceptable sound levels.

The relative A-weighted noise levels of common sounds measured in the environment and industry for various qualitative sound levels are provided in Table 4.12-1.

**Table 4.12-1: Typical Sound Levels Measured in the Environment and Industry**

| Noise Source at a Given Distance | A-Weighted Sound Level (in decibels) | Qualitative Description |
|---|---|---|
| Carrier deck jet operation<br>Jet takeoff (200 feet) | 140<br>130<br>120 | Pain threshold |
| Auto horn (3 feet)<br>Jet takeoff (1,000 feet)<br>Shout (0.5 feet) | 110<br>100 | Maximum vocal effort |
| Heavy truck (50 feet) | 90 | Very annoying; hearing damage (8-hr, continuous exposure) |
| Pneumatic drill (50 feet)<br>Freight train (50 feet)<br>Freeway traffic (50 feet) | 80<br>70 to 80<br>70 | Annoying<br>Intrusive (telephone use difficult) |
| Air conditioning unit (20 feet)<br>Light auto traffic (50 feet)<br>Living room/Bedroom | 60<br>50<br>40 | Quiet |
| Library/Soft whisper (5 feet)<br>Broadcasting/Recording studio | 30<br>20<br>10 | Very quiet<br>Just audible |

Source: Adapted from Table E (NYSDEC 2001).

A-weighted sound levels can be measured or presented as **equivalent sound pressure level ($L_{eq}$)**. This is defined as the average noise level, on an equal-energy basis for a stated period of time, and is commonly used to measure steady-state sound or noise that is usually dominant. Statistical measurements are typically denoted by $L_n$, where 'n' represents the percentile of time the sound level is exceeded. The measurement of $L_{90}$ represents the noise level that is exceeded during 90% of the measurement period. Similarly, the $L_{10}$ represents the noise level exceeded for 10% of the measurement period. The maximum noise level ($L_{max}$) is the maximum instantaneous noise level during a specific period of time.

Of particular interest in this analysis are other descriptors of noise that are commonly used to help determine noise/land use compatibility and predict an average community reaction to adverse effects of environmental noise, including traffic-generated, construction, and industrial noise. One of the most universal descriptors is the average day-night level (DNL or $L_{dn}$). As a result of

recommendation by the California Health Department and state planning law, this descriptor is used by many planning agencies, including Kern County's Planning and Community Development Department. The $L_{dn}$ noise metric represents a 24-hour period and applies a time-weighted factor designed to penalize noise events that occur during nighttime hours when relaxation and sleep disturbance are of more concern for average residents. Noise occurring during the daytime hours—between 7:00 AM and 10:00 PM—is measured in decibels. Noise occurring between 10:00 PM and 7:00 AM, however, is effectively "penalized" by adding 10 dB to the measured level. In California, the use of the community noise equivalent level (CNEL) descriptor is also permitted. CNEL is identical to the day-night average sound level metric, except that CNEL adds a 5 dB penalty for noise occurring during evening hours between 7:00 PM and 10:00 PM (Harris 1991) as well as the 10 dB penalty added between 10:00 PM and 7:00 AM.

## Vibration

**Vibration** is defined as the mechanical motion of the ground, or buildings or other type of structures, that is induced by the operation of mechanical devices or equipment. Vibration generally results in an "oscillatory" motion, in terms of the displacement, velocity, or acceleration of the ground (or structure), that causes a person to be aware of the vibration by means such as, but not limited to, sensation by touch or visual observation of moving objects.

The effects of groundborne vibration include movements of building floors, rattling of windows, and shaking of items on shelves or hangings on the walls. In extreme cases, vibration can cause damage to buildings. The noise radiated from the motion of the room surfaces is called groundborne noise. Table 4.12-2 presents typical levels of groundborne vibration, vibration sources, and responses.

**Table 4.12-2: Typical Levels of Groundborne Vibration**

| Response | Velocity Level (1) | Typical Sources (At 50 feet) |
|---|---|---|
| Minor cosmetic damage of fragile buildings | 100 | Blasting from construction projects |
| Difficulty with tasks such as reading a video display terminal (VDT) screen | 90 | Bulldozers and other heavy tracked construction equipment |
| Residential annoyance, infrequent events | 80 | Rapid transit, upper range |
| Residential annoyance, frequent events | 70 | High speed rail, typical |
| Approximate threshold for human perception | 60 | Bus or truck, typical |
| None | 50 | Typical background vibration |

Source: Adapted from Figure 7-3 (FHWA 2006)

Note: (1) = Root mean square (RMS) Vibration Velocity Level in VdB relative to $10^{-6}$ inches/second.

Similar to noise, vibration varies based on the nature of the structure affected (i.e., the weight of the building), soil conditions, layering of the soils, the depth of groundwater table, etc.

## 4.12.2 Environmental Setting

## Noise-Sensitive Land Uses

Noise sensitive land uses, as defined by the Noise Elements of the Kern County General Plan (KCGP), the Metropolitan Bakersfield General Plan (MBGP), and adopted Specific Plans in the Project Area include residential areas, schools, convalescent and acute care hospitals, retirement homes, long-term medical or mental facilities, parks and recreation areas, and churches.

## Existing Environment

### Noise

Major noise sources in the Project Area include Interstate 5, state highways, railroads, airports and existing commercial/industrial operations (including existing oil and gas exploration/ production activities and related facilities). Existing ambient noise levels within the Project Area vary considerably depending upon distance from major noise sources and the noise generation characteristics of contributing noise sources at any given location. The noise environment in the Project Area has been characterized by conducting ambient noise level measurements at various locations within the Project Area and quantifying typical noise levels from the major sources that affect the Project Area.

Ambient noise monitoring was conducted between January 7, 2015 and January 21, 2015, at 18 locations within the Project Area. Noise monitoring sites were selected to represent typical acoustic settings within the Project Area where oil and gas exploration and production activities either already occur or could occur in the future, and included six locations in the Western Subarea, six locations in the Central Subarea, and six locations in the Eastern Subarea. Noise monitoring was conducted using unattended automated equipment that measured ambient noise levels continuously for a minimum period of 24 hours at each site. Figure 4.12-1 depicts the locations where ambient noise measurements were collected.

Noise monitoring equipment consisted of Larson-Davis Laboratories Model LDL 820 sound level analyzers equipped with Bruel & Kjaer (B&K) Type 4176 half inch diameter microphones. Microphones were located on tripods at approximately 5 feet aboveground and were equipped with random incidence correctors so that noise levels from sources in all directions could be accurately measured. The monitors were calibrated with a B&K Type 4230 acoustical calibrator to ensure the accuracy of the measurements. The equipment complies with applicable specifications of the American National Standards Institute (ANSI) for Type 1 sound measurement systems.

Table 4.12-3 summarizes ambient noise monitoring results. Noise measurement data are described in terms of the equivalent energy ($L_{eq}$), maximum ($L_{max}$) and $L_{90}$ noise level descriptors.

The $L_{eq}$ and $L_{max}$ describe energy average and maximum noise levels measured during each hour of the sample periods, respectively. The $L_{90}$ describes the noise level exceeded 90% of the time during each hour, which is generally considered to represent the residual (or background) noise level. Reported maximum noise levels in the absence of identifiable single noise events were typically caused by intermittent noise events such as a nearby passing vehicle, an occasional aircraft over-flight, and other localized noise sources close to the measuring device (e.g., car doors opening and closing, a barking dog, a conversation of people standing near the device, etc.). The measured DNL for each of the 18 ambient noise monitoring sites is also included in Table 4.12-3.

**Table 4.12-3: Ambient Noise Levels**

| Location | Range of Hourly Noise Levels | | | DNL/CNEL (dBA) |
|---|---|---|---|---|
| | $L_{eq}$ (dBA) | $L_{max}$ (dBA) | $L_{90}$ (dBA) | |
| **Western Subarea** | | | | |
| Site 1 | 42.9 – 58.4 | 54.8 – 76.5 | 34.2 – 39.4 | 58.5 |
| Site 2 | 45.5 – 63.6 | 66.7 – 83.1 | 32.6 – 56.1 | 63.9 |
| Site 3 | 52.9 – 66.5 | 71.4 – 89.9 | 44.4 – 59.6 | 67.8 |
| Site 4 | 38.0 – 55.7 | 55.8 – 76.0 | 31.3 – 49.1 | 56.7 |
| Site 5 | 40.6 – 68.4 | 57.8 – 94.2 | 32.0 – 48.3 | 59.0 |
| Site 6 | 41.4 – 56.5 | 57.6 – 76.5 | 37.6 – 48.6 | 55.9 |
| **Central Subarea** | | | | |
| Site 7 | 40.1 – 57.0 | 55.8 – 86.8 | 34.5 – 51.4 | 56.6 |
| Site 8 | 32.4 – 51.4 | 45.3 – 68.2 | 27.9 – 47.8 | 47.6 |
| Site 9 | 42.2 – 56.0 | 47.3 – 74.4 | 39.9 – 50.3 | 55.1 |
| Site 10 | 44.6 – 66.0 | 59.8 – 87.1 | 35.9 – 45.6 | 64.4 |
| Site 11 | 38.7 – 53.4 | 47.9 – 72.3 | 35.7 – 46.1 | 51.8 |
| Site 12 | 28.8 – 45.6 | 39.2 – 65.3 | 26.5 – 39.9 | 44.8 |
| **Eastern Subarea** | | | | |
| Site 13 | 29.7 – 55.6 | 43.6 – 72.6 | 25.1 – 51.0 | 50.7 |
| Site 14 | 36.0 – 49.4 | 50.6 – 64.7 | 29.6 – 44.8 | 50.4 |
| Site 15 | 43.0 – 56.9 | 54.8 – 80.1 | 33.1 – 47.7 | 55.4 |
| Site 16 | 38.3 – 46.8 | 42.8 – 65.2 | 35.9 – 43.0 | 48.3 |
| Site 17 | 34.0 – 50.8 | 48.5 – 72.4 | 30.8 – 44.6 | 50.7 |
| Site 18 | 34.8 – 45.9 | 43.2 – 66.8 | 31.2 – 41.5 | 46.9 |
| | | | **Average DNL/CNEL, dB** | **54.7** |

Source: Brown-Buntin Associates, Inc. 2015

Hourly $L_{eq}$ values represent average noise levels, and these average measurements can be significantly affected by occasional noise events in the vicinity of the monitoring site. Measured DNL values ranged from 44.8 to 67.8 decibels at the ambient noise monitoring sites, with an average of 54.7 dBA. Generally, the highest ambient noise levels occurred at sites that were located relatively close to major transportation sources or commercial/industrial activities unrelated to oil and gas exploration and production activities (Site 3, Site 10, and Site 15).

A detailed description of the noise monitoring sites, aerial photographs showing the site locations, noise sources affecting the site, and measured noise levels can be found in the Environmental Noise Assessment, presented in Appendix V.

### Vibration

The vibration environment would be affected by traffic from nearby roadways or train tracks. Heavy trucks can generate vibrations that vary depending on vehicle type, weight, and pavement conditions. For trains, factors such as speed, suspensions on the vehicle, rail and wheel conditions, and soil and subsurface conditions will affect the level of groundborne vibration. In the areas where oil and gas activities are likely to occur, existing vibration levels would be expected to be low.

## 4.12.3 Regulatory Setting

The Project Area does not include incorporated cities within Kern County. The Project includes land that is under the jurisdiction of Kern County. Noise standards for the County and federal noise guidelines are addressed here.

## Federal

Federal highway and aircraft guidelines and regulations have been established by Federal Highway Administration (FHWA) (23 Code of Federal Regulations [CFR] 772) and Federal Aviation Administration (FAA) regulations (18 CFR 150). Federal guidelines and regulations are summarized in Table 4.12-4. These federal regulations do not apply to Project activities, but are applicable to some existing activities in the Project Area (e.g., aircraft, roadway construction) and also represent useful benchmarks for noise standards used by other agencies.

**Table 4.12-4: Federal Guidelines and Regulations for Exterior Noise (dBA)**

| Agency | $L_{eq}$ | DNL |
|---|---|---|
| Federal Energy Regulatory Commission | [49] | 55 |
| U.S. Department of Transportation (construction noise level at residential land use during daytime)[a] | 90 | --- |
| Federal Highway Administration | 67 | [67] |
| Federal Aviation Administration | [59] | 65 |
| U.S. Department of Housing and Urban Development[b] | [59] | 65 |

Sources:
[a] FTA 2006
[b] 24 CFR 51B; HUD 1991
Note: Brackets around numbers (e.g., [59]) indicate a calculated equivalent standard. Because FHWA regulates peak noise level, the DNL is assumed equivalent to the peak noise hour.

### Occupational Safety and Health Act of 1970

Onsite noise levels are regulated by the Occupational Safety and Health Administration (OSHA). This regulation protects workers from the effects of occupational noise exposure. The noise exposure level of workers is regulated at 90 dBA over an 8-hour work shift to protect hearing (29 CFR 1910.95). Employee exposure to levels exceeding 85 dBA requires that employers develop a hearing conservation program. Such programs include adequate warning, the provision of hearing protection devices, and periodic employee testing for hearing loss.

## State

The Division of Occupational Safety and Health (CalOSHA) implements and enforces the noise exposure limits established by the federal OSHA, as described above, for the state of California.

No state regulations apply to noise specifically from oil and gas operations; however, there are general state guidelines provided by the California Department of Health Services that define acceptable noise levels based on a land use compatibility matrix designed to protect residents and other sensitive land uses from excessive noise levels. These guidelines help to define a threshold for acceptable noise levels for residential areas in the Project Area. The California Department of Health Services has identified DNL or CNEL values of 60 dBA or less as normally acceptable outdoor levels for residential areas.

Kern County does not have regulations that define acceptable levels of vibration. One of the most recent references suggesting vibration guidelines is the California Department of Transportation (Caltrans) Transportation and Construction Vibration Guidance Manual (Caltrans 2013). The Manual provides guidance for determining annoyance potential criteria and damage potential threshold criteria. These criteria are provided below in Table 4.12-5 and Table 4.12-6, and are presented in terms of peak particle velocity (PPV) in inches per second (in/sec).

**Table 4.12-5: Guideline Vibration Annoyance Potential Criteria**

| Human Response | Maximum PPV (in/sec) | |
|---|---|---|
| | Transient Sources | Continuous/Frequent Intermittent Sources |
| Barely Perceptible | 0.04 | 0.01 |
| Distinctly Perceptible | 0.25 | 0.04 |
| Strongly Perceptible | 0.9 | 0.1 |
| Severe | 2.0 | 0.4 |

Source: Caltrans 2013

**Table 4.12-6: Guideline Vibration Damage Potential Threshold Criteria**

| Structure and Condition | Maximum PPV (in/sec) | |
|---|---|---|
| | Transient Sources | Continuous/Frequent Intermittent Sources |
| Extremely fragile, historic buildings, ancient monuments | 0.12 | 0.08 |
| Fragile buildings | 0.2 | 0.1 |
| Historic and some old buildings | 0.5 | 0.25 |
| Older residential structures | 0.5 | 0.3 |
| New residential structures | 1.0 | 0.5 |
| Modern industrial/commercial buildings | 2.0 | 0.5 |

Source: Caltrans 2013

# Local

## Kern County General Plan

The Project Area is located within the Kern County General Plan area and, therefore, would be subject to applicable policies and measures of the KCGP. The Noise Element of the KCGP include goals, policies, and implementation measures related to noise that apply to the Project, as described below.

The KCGP Noise Element identifies residential areas, schools, convalescences and acute care hospitals, parks and recreation areas, and churches as noise sensitive land uses. In noise sensitive areas, exterior noise levels generated by new projects are to be mitigated to 65 dBA $L_{dn}$ or less in outdoor activity areas and to 45 dBA $L_{dn}$ or less within interior living spaces or other noise sensitive interior spaces.

# Chapter 3. Noise Element

## Goals

**Goal 1.** Ensure that residents of Kern County are protected from excessive noise and that moderate levels of noise are maintained.

**Goal 2.** Protect the economic base of Kern County by preventing the encroachment of incompatible land uses near known noise producing roadways, industries, railroads, airports, oil and gas extraction, and other sources.

## Policies

**Policy 2.** Require noise level criteria applied to all categories of land uses to be consistent with the recommendations of DOSH.

**Policy 3.** Encourage vegetation and landscaping along roadways and adjacent to other noise sources in order to increase absorption of noise.

**Policy 4.** Utilize good land use planning principles to reduce conflicts related to noise emissions.

**Policy 5**. Prohibit new noise-sensitive land uses in noise-impacted areas unless effective mitigation measures are incorporated into the project design. Such mitigation shall be designed to reduce noise to the following levels:

(a) 65 dBA $L_{dn}$ or less in outdoor activity areas; and

(b) 45 dBA $L_{dn}$ or less within interior living spaces or other noise sensitive interior spaces.

**Policy 6.** Ensure that new development in the vicinity of airports will be compatible with existing and projected airport noise levels as set forth in the Airport Land Use Compatibility Plan (ALUCP).

**Policy 7.** Employ the best available methods of noise control.

## Implementation Measures

**Implementation Measure A**. Utilize zoning regulations to assist in achieving noise-compatible land use patterns.

**Implementation Measure F**. Require proposed commercial and industrial uses or operations to be designed or arranged so that they will not subject residential or other noise sensitive land uses to exterior noise levels in excess of 65A dB $L_{dn}$ and interior noise levels in excess of 45 dBA $L_{dn}$.

**Implementation Measure H.** Encourage cooperation between the County and the incorporated cities within the County to control noise.

**Implementation Measure I.** Noise analyses shall include recommended mitigation measure, if required, and shall:

(a) Include representative noise level measurements with sufficient sampling periods and location to adequately describe local conditions.

(b) Include estimated noise levels, in terms of CNEL, for existing and projected future (10-20 years hence) conditions, with a comparison made to the adopted policies of the Noise Element.

(c) Include recommendations for appropriate mitigation to achieve compliance with the adopted polices and standards of the Noise Element.

(d) Include estimates of noise exposure after the prescribed mitigation measures have been implemented. If compliance with the adopted standards and policies of the Noise Element will not be achieved, a rationale for acceptance of this project must be provided.

**Implementation Measure J.** Develop implementation procedures to ensure that requirements imposed pursuant to the findings of an acoustical analysis are conducted as part of the project permitting process.

## Metropolitan Bakersfield General Plan

The MBGP, a joint effort between the Kern County Planning Department and the City of Bakersfield Planning Division, was last adopted on December 11, 2007. The MBGP includes both city and unincorporated County lands. The MBGP describes the community's physical development as well as its economic, social and environmental goals and is currently undergoing an update. The Project Area includes a total of 152,040 acres of unincorporated County lands that are covered under the MBGP (7.41%). Project-related development on unincorporated lands within the MBGP Planning Area would be subject to the following applicable policies and implementation measures of the MBGP, with respect to noise.

## Chapter III. Circulation Element

### A. Streets

#### Goals

**Goal 3.** Minimize the impact of truck traffic on circulation, and on noise sensitive land uses.

## Chapter V. Conservation Element

### B. Mineral Resources

### Policies

**Policy 15.** Require petroleum production sites in urban areas which are subject to discretionary permits, to install peripheral landscaping to help reduce the noise, dust and visual impacts to adjacent sensitive receptors and public ways (I-4).

## Chapter VII. Noise Element

### Goals

**Goal 1.** Ensure that residents of the Bakersfield metropolitan area are protected from excessive noise and existing moderate levels of noise are maintained.

**Goal 2.** Protect the citizens of the planning area from the harmful effects of exposure to excessive noise, and protect the economic base of the area by preventing the encroachment of incompatible land uses near known noise-producing roadways, industries, railroads, airports and other sources.

### Policies

**Policy 1.** Identify noise-impact areas exposed to existing or projected noise levels exceeding 65 dB CNEL (exterior) or the performance standards described in Table VII-2. The noise exposure contour maps on file at the City of Bakersfield and County of Kern indicate areas where existing and projected noise exposures exceed 65 dB CNEL (exterior) for the major noise sources identified (I-1 ).

**Policy 2.** Prohibit new noise-sensitive land uses in noise-impacted areas unless effective mitigation measures are incorporated into project design to reduce noise to acceptable levels. (I-2, I-3, I-6, I-7).

**Policy 3.** Review discretionary industrial, commercial or other noise-generating land use projects for compatibility with nearby noise-sensitive land uses. Additionally, the development of new noise-generating land uses which are not preempted from local noise regulation will be reviewed if resulting noise levels will exceed the performance standards contained within Table VII-2 in areas containing residential or other noise-sensitive land uses (I-3, I-6, I-7).

**Policy 5.** Encourage vegetation and landscaping along roadways and adjacent to other noise sources in order to increase absorption of noise (I-7).

### Implementation Measures

**Implementation Measure 2.** Review discretionary development plans, programs and proposals, including those initiated by both the public and private sectors, to ascertain and ensure their conformance to the policy framework outlined in this element.

**Implementation Measure 4.** Require proposed commercial and industrial uses or operations to be designed or arranged so that they will not subject residential or other noise sensitive land uses to exterior noise levels in excess of 65 dB CNEL and interior noise levels in excess of 45 dB CNEL and so that impacts on noise sensitive uses shall not exceed the performance standards in Table VII-2.

At time of any discretionary approval, such as a request for zone change or subdivision, the developer may be required to submit an acoustical report indicating the means by which the developer proposes to comply with the noise standards. The acoustical report shall:

(a) Be the responsibility of the applicant.

(b) Be prepared by a qualified acoustical consultant experienced in the fields of environmental noise assessment and architectural acoustics.

(c) Include representative noise level measurements with sufficient sampling periods and locations to adequately describe local conditions.

(d) Include estimated noise levels in terms of CNEL and the standards of Table VII-2 (if applicable) for existing and projected future (10-20 years hence) conditions, with a comparison made to the adopted policies of the Noise Element.

(e) Include recommendations for appropriate mitigation to achieve compliance with the adopted policies and standards of the Noise Element.

(f) Include estimates of noise exposure after the prescribed mitigation measures have been implemented. If compliance with the adopted standards and policies of the Noise Element will not be achieved, a rationale for acceptance of the project must be provided.

**Implementation Measure 5:** Develop implementation procedures to ensure that requirements imposed pursuant to the findings of an acoustical analysis are conducted as part of the project permitting process.

**Implementation Measure 6:** Enforce the Noise Insulation Standards (California Administrative Code, Title 24) and Chapter 35 of the Uniform Building Code concerning the construction of new multiple-occupancy dwellings such as hotels, apartments, and condominiums.

**Implementation Measure 10.** Standards for Project Noise Impacts for Mobile Sources. A significant increase of existing ambient noise levels affecting existing noise sensitive land uses (receptors), and requiring the adoption of practical and feasible mitigation measures, is deemed to occur where a project will cause:

- An increase of the existing ambient noise level by 5 dB or more, where the existing ambient level is less than 60 dB CNEL;

- An increase of the existing ambient noise level by 3 dB or more, where the existing ambient level is 60 to 65 dB CNEL;
- An increase of the existing ambient noise level by 1.5 dB or more, where the existing ambient level is greater than 65 dB CNEL.

### Standards for Project Noise Impacts from Mobile Sources

A significant increase in existing ambient noise levels affecting existing noise-sensitive land use (receptors) and requiring the adoption of practical and feasible mitigation measures is deemed to occur where a project would cause:

- An increase in the existing ambient noise level by 4 dB or more, where the existing ambient level is less than 60 dB CNEL;
- An increase in the existing noise level by 3 dB or more, where the existing ambient level is 60 to 65 dB CNEL; or
- An increase in the existing ambient noise level by 4.5 dB or more, where the existing ambient level is greater than 65 dB CNEL.

### Standards for Cumulative Noise Impacts for Mobile Sources

A project's contribution to noise increase would normally be considered cumulatively considerable and considered significant when ambient noise levels affect noise sensitive land uses (receptors) and when the following occurs:

- A project increases the ambient (cumulative without project) noise level by 1 dB or more; or
- The cumulative with project noise levels cause the following:
    - An increase of the existing ambient noise level by 5 dB or more, where the existing ambient level is less than 60 dB CNEL;
    - An increase of the existing ambient noise level by 3 dB or more, where the existing ambient level is 60 to 65 DB CNEL; or
    - An increase on the existing ambient noise level by 1.5 dB or more, where the existing ambient level is greater than 65 dB CNEL.

## 3.6. Mineral and Petroleum

### Policies

**Policy 4.** Noise abatement measures shall be required of all resource management activities which would adversely affect adjacent land uses or wildlife habitat.

## F. Mineral and Petroleum Extraction

### Implementation Measures

**Implementation Policy 1.** The city and County shall revise, within two years from adoption of this plan, mineral and petroleum extraction regulations and provisions of their respective floodplain Zoning Ordinances consistent with all plan policies and incorporate the following features:

a) Noise limits when adjacent to highly sensitive and sensitive land uses.

## Kern County Specific Plans

Kern County has adopted 24 Specific Plans for properties within the Project Area. These Specific Plans are intended to be an amplification of the goals and policies of the KCGP and are, therefore, consistent therewith. As depicted in Figure 4.10-3, less than 8% of the Project Area is located wholly or partially within adopted Specific Plan areas. Future oil and gas exploration and production activities that would be authorized under the proposed Amendment to Chapter 19.98 (Oil & Gas Production) of the Kern County Zoning Ordinance that would be located within the boundary of an adopted Specific Plan would be regulated according to County zoning, with the exception of the Specific Plans identified as Tier 5.

## Kern County Zoning Ordinance

Chapter 19.98 (Oil and Gas Production) of the Kern County Zoning Ordinance contains the procedures and standards that apply to all exploration drilling and production activities related to oil, gas, and other hydrocarbon substances carried out in unincorporated Kern County. At present, Chapter 19.98's general development standards and conditions relevant to noise require the following:

- **Specific well setback distances from various structures** (19.98050.A). No oil or gas well shall be drilled within 100 feet of any public highway or building not necessary to the operation of the well, or within 150 feet of any dwelling, or within 300 feet of any building used as a place of public assembly, institution, or school, or within 50 feet of any building utilized for commercial purposes constructed prior to the commencement of such drilling, without the written consent of the owner of such structure.

  Required setbacks from buildings and public highways for new oil and gas wells in various Zone Districts are presented on Table 3-1 of this EIR;

- **Material delivery restrictions** (19.98.050.J). Whenever a well is located within 500 feet from an existing dwelling unit, except in case of an emergency, no materials, equipment, tools, or pipe used for either drilling or production operations shall be delivered to or removed from the drilling site, except between the hours of 8:00 AM and 8:00 PM, unless otherwise required by the California Division of Oil and Gas.

- **Electric motors/Muffled engines** (19.98.050.K). Pumping wells shall be operated by electric motors or muffled internal combustion engines.

### Kern County Ordinance Code – Health and Safety – Title 8

Chapter 8.36, Noise Control (Section 8.36.020, Prohibited Sounds) of the Ordinance Code of Kern County prohibits the creation of construction noise between the hours of 9:00 PM and 6:00 AM on weekdays and between the hours of 9:00 PM and 8:00 AM on weekends, which is audible to a person with average hearing faculties or capacity at a distance of 150 feet from the construction site, if the construction site is within 1,000 feet of an occupied residential dwelling except for emergency work or when the Development Services Director or his designated representative provides an exemption for a limited time.

## 4.12.4 Impacts and Mitigation Measures

# Methodology

The California Environmental Quality Act (CEQA) requires determination of the significance of noise impacts associated with proposed projects. The process of assessing the significance of noise impacts associated with the Project involves establishing thresholds at which significant impacts on noise-sensitive uses may occur. Noise levels associated with construction and operational activities related to the Project were predicted and compared to these significance thresholds.

Methodology and assumptions from the Environmental Noise Assessment (Appendix V) are summarized in Table 4.12-7.

**Table 4.12-7: Methods and Assumptions for Noise**

| Methods/Assumptions | Analytical Framework for Measuring Noise |
|---|---|
| Equipment and methods to assess noise generation during construction and operation of future oil and gas wells and related facilities. | – Larson Davis Model 824 and Model LDL 820 sound level meters<br>– SoundPLAN acoustic modeling software used for modeling construction and operational noise<br>– Calculations based on FHWA Highway Construction Noise Handbook |
| Modeling assumptions | – Flat topography<br>– Ground absorption factor 0.5<br>– 40 degrees Fahrenheit<br>– 50% relative humidity<br>– 5-foot receiver height<br>– 10-foot noise source height |

Noise levels associated with oil and gas production activities were measured by Brown-Buntin Associates, Inc., at 18 locations throughout Kern County in December 2014 and January 2015 (Brown-Buntin 2015). For each activity, noise level measurements were taken in a minimum of

four different directions from the activity to document the loudest direction of noise. The activities measured included construction phase activities such as production well drilling (during both well advancement and pulling out of the borehole), exploratory well drilling, well stimulation and well workover activities, and operational-phase activities, such as active production wells (both electric and diesel powered), including use of ancillary facilities and equipment (e.g., pipelines, tanks, etc.). Well plugging, abandonment, and decommissioning activities were not specifically measured because these would be similar to, and therefore have been determined to produce noise levels, that are equivalent to or less than construction phase activities.

Noise measurements were conducted using a Larson Davis Model 824 Sound Level Meter to document the spectral (frequency) components of each source. The meter was calibrated prior to use with a Larson Davis CA250 calibrator to ensure the accuracy of the measurements. A windscreen was used over the microphone to avoid interference resulting from wind sources during outdoor measurements.

Project-related noise levels were calculated by Brown-Buntin Associates, Inc., using the SoundPLAN acoustic model. SoundPLAN utilizes measured spectral sound power levels to determine noise exposure from a noise source. Inputs to the model include noise source spectral sound power levels, topography, atmospheric conditions, ground absorption factors, shielding from existing walls or buildings, noise source height, and receiver height. The modeling included the conservative assumption that the topography was flat. Using the SoundPLAN noise model, which is based on ISO 9613, is overly conservative on sites with a flat topography or steady downward slope from turbine to receiver. It is also important to recognize that, in scenarios where the topography is relatively flat or there is a steady slope away from a sound source located on a hill, these methods can over-predict noise by up to 6 dBA, even where line-of-sight from the receiver location to the turbine hub is not broken. The model included the loudest observed noise measurement for each source as a basis for modeling potential Project-related noise exposure. The model included no shielding as a result of buildings or other structures that may be in the sound propagation path. These assumptions represent a worst-case assessment in regards to noise propagation from individual sources.

For the noise modeling effort, construction activities included well pad site preparation activities, such as geophysical surveys, land clearing and grading for well pads, access road construction or improvement, construction of temporary drilling sumps, installation, completion, and initial operation (testing) of new wells and ancillary equipment, installation of temporary equipment and facilities such as storage tanks or drilling sumps, and spill prevention activities. Construction activities result in temporary elevated noise levels.

Ground-level activities, such as land clearing, site preparation, and access road construction, require equipment including bulldozers, excavators, loaders, and dump trucks. The local increase in general vehicle traffic could be a source of noise impact, depending upon the number of trips to and from a specific area.

Although construction activities for a particular well, group of wells, or storage tank area may be temporary and somewhat brief (i.e., on the order of a several weeks to several months), staggered development of multiple wells or other oil and gas facilities within a particular area could occur over the course of several years.

Construction activities included well workovers and re-working. Well workover involves repair or maintenance of an existing production well for the purpose of restoring, prolonging or enhancing the production of the well, while re-working involves well changes including the removal and replacement or alteration of the well casing. Typically, the loudest source of noise associated with a drill rig is the power generation equipment, which is typically a diesel-powered internal combustion engine.

Well stimulation processes primarily consist of hydraulic fracturing treatments and acid well stimulation treatments (i.e., acid fracturing and acid matrix). Equipment used for these treatments is similar to that used for well construction. Stimulation may also involve more vehicles and equipment at a particular well site than during construction. Equipment used for well stimulation treatment may include mobile water tanks, truck-mounted blending units, sand storage trailers, truck-mounted pumps, generators, control vans, and other vehicles. Up to 20 truck-mounted pumps may be present at a well site for a large operation. Acid well stimulation treatments may require a similar amount of equipment and numbers of vehicles, although the types of equipment and vehicles may vary.

Well decommissioning and abandonment entails plugging and abandoning wells once they are no longer productive. Well decommissioning and abandonment involves removal, disassembly, and salvage or disposal of pumping units, well cellars, pipelines, and associated infrastructure, plugging the well with concrete and steel plates, and restoration of the well pad. Equipment used for decommissioning and abandonment varies somewhat from that used for construction, but would be expected to generate similar or lesser noise levels. Typical equipment used onsite for decommissioning and abandonment may include bulldozers, motor graders, front end loaders, cement and dump trucks, and well workover rigs.

Noise levels resulting from construction equipment are dependent on several factors, including the number and type of equipment operating, the level of operation, and the distance between sources and receptors. The loudest equipment during construction would contribute to a composite average or equivalent site noise level.

To evaluate the modelling data with respect to existing standards, some assumptions needed to be used. The Noise Element of the KCGP establishes a land use compatibility criterion of 65 dB DNL for exterior noise levels in outdoor activity areas of residential uses. The construction noise contour of 60 dBA is equivalent to CNEL of 63.2 dBA assuming the average of the high noise level measurements derived from Table 4.12-3. This level approaches the 65 dBA CNEL and for construction activity that extends beyond daytime hours, this level may exceed 65 dBA CNEL. Therefore, the noise contour at 60 dBA (see Tables 4.12-8 and 4.12-10) is assumed to be equivalent to 65 dBA CNEL.

# Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist state that a project would normally be considered to have a significant impact if it would result in:

- Exposure of persons to, or generate, noise levels in excess of standards established in the local general plan or noise ordinance or applicable standards of other agencies;
- Exposure of persons to, or generate, excessive groundborne vibration or groundborne noise levels;
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;
- For a project located within the Kern County Airport Land Use Compatibility Plan, expose people residing or working in the project area to excessive noise levels; or
- For a project within the vicinity of a private airstrip, expose people residing or working in the project area to excessive noise levels.

Based on these standards, the effects of the Project have been categorized as either a "less than significant impact" or a "potentially significant impact." Mitigation measures are recommended for potentially significant impacts. If a potentially significant impact cannot be reduced to a less than significant level through the application of mitigation, it is categorized as a "significant unavoidable impact."

# Project Impacts

## Impact 4.12-1: Exposure of Persons to, or Generate, Noise Levels in Excess of Standards Established in the Local General Plan or Noise Ordinance or Applicable Standards of Other Agencies

Potential noise impacts may vary for each location of future oil and gas construction and operational activities; however, the analysis provided below covers the potential Project activities that may occur at a given location.

### Construction Impacts

Short-term construction noise impacts could result from land clearing and grading for well pads and work areas, construction/maintenance of access roads, construction of accessory facilities (including pipelines, electrical transmission lines, drilling sumps or temporary storage tanks), transporting the drilling rig, associated equipment, workers and materials to the well pad site, well drilling, and construction equipment operations. Due to the complexity of drilling and the hazards associated with leaving a well unattended during the drilling process, drilling operations are typically conducted 24 hours a day. Depending upon the depth of the formation, some wells

may take less than 24 hours to drill, while some wells may take up to 60 days in deeper formations.

While new oil and gas exploration and production wells and related facilities could be located within any Zone Districts within the Project Area, historically 95% of such development has occurred within Core Areas. Of this total, 90% has occurred in Tier 1 areas, where the oil and gas activity is the primary land use and well and activity densities preclude almost all other uses. Of the 2,697 new oil and gas exploration and production wells anticipated to be constructed annually within the Project Area, 2,430 (90%) would be located within Tier 1 areas, while 25 new oil and gas exploration and production wells (less than 1%) would be located in Tier 4, which, with a predominance of urban uses, is where most sensitive receptors would be expected to occur. Construction noise is usually made up of intermittent peaks and continuous lower levels of noise from equipment cycling through use. During construction, noise from construction activities could impact noise-sensitive land uses if such uses are located in the immediate area. Using the noise levels associated with oil and gas well construction and development and the above-described methodology, distances from individual Project-related noise sources to the 50 dB, 55 dB and 60 dB contours were calculated using SoundPLAN. The results of the calculations are provided in Table 4.12-8.

**Table 4.12-8: Construction Noise Exposure Levels**

| | Distance (feet) to Contour | | |
|---|---|---|---|
| **Activity** | **50 dB** | **55 dB** | **60 dB** |
| Well Pad Preparation | 2,500 | 1400 | 800 |
| Drilling (Well Advancement) | 3,550 | 2,270 | 1,420 |
| Drilling (Pull Out Of Well/Borehole) | 2,130 | 1,300 | 750 |
| Large-Scale Exploratory Drilling[1] | 7,250 | 4,750 | 3,000 |
| Well Workover (Maintenance) | 2,150 | 1,350 | 850 |
| Well Stimulation | 2,700 | 1,650 | 1,000 |

Source: Brown-Buntin 2015
Note: (1) = Kenai Drill Rig #7

It should be noted that at increased distances from a modeled noise source (distances greater than 1,000 feet), the modeled results should be considered with tolerance limitations of +/- 5 dB. At such distances from the noise source, variables such as atmospheric conditions (including wind speeds and direction), topography and ground absorption could cause modeled results to vary, thereby warranting use of the tolerance limitation adjustment of +/- 5 dB.

The Kenai Rig included in Table 4.12-8 is one of the largest operating drill rigs in the United States, and is used for exploratory drilling at depths up to 25,000 feet below surface elevation. Noise levels produced by such drill rigs are substantially higher than those produced by more typical rigs commonly utilized in the Project Area. It is not expected that a rig of this size would be commonly used within the Project Area because average well depths in the Western Subarea

average 2,305 feet, 10,414 feet in the Central Subarea average, and 2,220 feet in the Eastern Subarea. Nonetheless, the noise levels and contour for the Kenai Rig was included as part of the conservative modeling and assessment methodology appropriate for a project-level EIR.

Noise from construction of other ancillary activities, such as pipelines, extensions of electric services to well sites, construction or maintenance of access roads, drilling of injection wells, etc., was determined to result in noise levels that were similar to or less than the measured construction noise scenarios listed in Table 4.12-8.

Although construction noise that occurs between 6:00 AM and 9:00 PM on weekdays, and between 8:00 AM and 9:00 PM on weekends is exempt from restrictions, after that time construction noise cannot be audible within 150 feet of the construction site and 1,000 feet of an occupied residential building. If construction were to be conducted 24 hours per day, all activities described in Table 4.2-8 would be audible at 150 feet. In accordance with the Kern County Zoning Ordinance, setbacks for oil and gas wells currently are 150 feet from residential dwellings and hospitals and 300 feet from places of assembly, including schools and churches. These land uses are considered sensitive noise receptors. If oil and gas activities were to occur within 150 feet of a residence or 300 feet of a place of assembly, construction noise levels could exceed audible levels if construction were to occur outside of the 6:00 AM to 9:00 PM framework. In addition, construction noise could exceed the County's 65 dBA CNEL threshold at residences and places of assembly, even if the current setbacks were observed. Therefore, even with the current setback requirements, construction noise impacts could be significant if construction were to occur between 9:00 PM and 6:00 AM.

## Operations Impacts

Using the noise levels associated with oil and gas production wells and related accessory activities included in the Project, the above-described methodology, distances from individual Project-related noise sources to the 50 dB, 55 dB, and 60 dB contours were calculated using SoundPLAN. The results of the calculations are provided in Table 4.12-9. As with construction noise, at increased distances from a modeled noise source (distances greater than 1,000 feet), the modeled results include tolerance limitations of +/- 5 dB to take into account noise source variables such as atmospheric conditions (including wind speeds and direction), topography, and ground absorption that could cause modeled results to vary from modeled results.

**Table 4.12-9: Operational Noise Exposure Kern County Oil and Gas Production**

| | Distance (feet) to Contour | | |
|---|---|---|---|
| **Activity** | **50 dB** | **55 dB** | **60 dB** |
| Well Production (Electric Power) | 180 | 110 | 70 |
| Well Production (Diesel Power) | 580 | 330 | 190 |

Source: Brown-Buntin 2015

Noise levels from the operation of industrial-scale ancillary activities, such as cogeneration plants and water treatment facilities, were not separately evaluated since these facilities currently exist in locations that are not proximate to any sensitive noise receptor (e.g., Tier 1 areas). As with well drilling, typically the loudest source of noise associated with well operation is the power generation equipment. Noise levels from tank batteries, subsurface pipelines, and related smaller-scale industrial activities would be expected to be at or below the noise levels measured for well production activities based on power generation equipment noise as noted in Table 4.12-9.

Larger ancillary facilities are outside the scope of this Project (i.e., no new cogeneration facilities or landfills are included within the scope of the Project), and mitigation measures for such excluded facilities are not proposed.

According to Implementation Measure 4 of the KCGP Noise Element, commercial and industrial uses or operations need to be designed or arranged so that they will not subject residential or other noise sensitive land uses to exterior noise levels in excess of 65 dBA CNEL. Table 4.12-9 demonstrates that noise from electric power generation attenuates to less than the 65 dB standard by a distance of 70 feet from the source. Accordingly, based on the current setback requirements for oil and gas activities in Kern County for residential dwellings and hospitals (150 feet), and places of assembly, including schools and churches (300 feet), well operations using electrical power would comply with the established noise level requirement. However, Table 4.12-9 shows that noise from diesel power generation attenuates to less than the 65 dB standard by a distance of 190 feet from the source, indicating that well operations using diesel power may not comply with the standard near residences and hospitals with a 150 foot setback. Therefore, impacts due to operational noise could be significant.

## Traffic Noise

A Traffic Impact Study and Roadway Assessment for the Project was prepared by Ruettgers & Schuler (March 2015) to analyze potential impacts of the Project and is included as Appendix W of this EIR. Potential Project impacts to existing traffic levels and roadways were determined for both construction and operation of the Project, using the most recently published roadway traffic volumes and Project-related vehicle trip calculations.

The Project would be expected to generate the equivalent of 19,300 trips per day by 2035, which includes worker trips, as well as equipment and material delivery truck trips (Appendix W). These trips would be disbursed to more than 500 roadways within the Project Area, based on historic wellfield production rates.

A doubling of traffic volumes on a roadway would be expected to result in a 3 dBA increase in noise generated by traffic, which is equivalent to the human threshold for perceiving a change in the ambient noise level. Based on the Project trip generation calculations and distribution as shown in Section 4.16, Transportation and Traffic, of this EIR, the Project would not double the traffic volumes on any affected roadways. Therefore, no significant increase in noise levels would occur along area roadways as a result of the Project.

## Mitigation Measures

**MM 4.12-1** The Site Plan Application shall include a Site Vicinity Figure showing the location of any sensitive receptor(s) within 3,000 feet of the construction site (potential impact area) for the proposed new well or other ancillary facility or equipment (excluding pipelines). This Figure need not be prepared for Tier 1 areas unless a sensitive receptor is located within 3,000 feet of a construction site inside the Tier 1 area.

a. If there are no sensitive noise receptors within this potential impact area, then no construction mitigation measures shall be required.

b. If there are sensitive human noise receptors within the potential impact area, then additional information must be provided showing the type of equipment being used and the noise contours with levels not exceeding 65 dBA at the nearest exterior wall of the sensitive receptor or more than 1 dBA higher than the ambient noise levels, if in excess of 65 dBA. If noise levels are shown to exceed 65 dBA or more than 1 dBA higher than the ambient noise levels in excess of 65 dBA, then one or more of the following mitigation measures shall be taken:

    1. Placement of a temporary sound attenuation wall(s) shall be placed at the optimal distance to the sensitive receptor, as determined by an acoustical expert.

    2. Construction of a temporary berm shall be placed at the optimal distance to the sensitive receptor, as determined by an acoustical expert.

    3. Modification of equipment to reduce noise impacts.

    4. Implementation of a quiet mode drilling plan or other sound reduction technology or practices as documented in a report submitted to the County.

    5. Arranging for the voluntary, temporary relocation of the occupants of the sensitive receptor during the construction period.

    6. Use the following setback distances for the activities specified:

**Construction Noise Setbacks**

| Activity | Setback Distance (feet) |
|---|---|
| Well Pad Preparation | 800 |
| Drilling (Well Advancement) | 1,420 |
| Drilling (Pull Out Of Well/Borehole) | 750 |
| Large-Scale Exploratory Drilling[1] | 3,000 |
| Well Workover | 850 |

Source: Brown-Buntin 2015
Note:
[1]Kenai Drill Rig #7

Information submitted with the Site Plan Application must detail the combination and methods used to determine the level of reduction and shall not exceed 65 dBA or any ambient levels in excess of 65 dBA or more than 1 dBA higher than the ambient noise levels, if in excess of 65 dBA.

**MM 4.12-2** New oil and gas wells shall be a minimum 190 feet from the closest sensitive receptor.

### Level of Significance After Mitigation

Impacts would be less than significant with mitigation.

## Impact 4.12-2: Exposure of Persons to, or Generate, Excessive Groundborne Vibration or Groundborne Noise Levels

Groundborne vibration from construction activities could be detected if there are activities, buildings, or businesses that are sensitive to vibration that are located near a construction site. Business such as recording studios and historic buildings are vulnerable to vibration.

Typical vibration levels at a distance of 100 feet from construction equipment used in oil and gas development activities are summarized by Table 4.12-10. As shown in Table 4.12-5, vibration is barely perceptible at level of 0.04 PPV from a transient source and at a level of 0.01 PPV from a continuous source. Vibration would be considered strongly perceptible at a level of 0.9 PPV from a transient source and at a level of 0.1 from a continuous source. Vibration levels that could cause damage to extremely fragile historic buildings are 0.12 PPV from a transient sources and 0.08 PPV from a continuous source (see Table 4.12-6).

In addition, vibration from transient sources is generated by geophysical surveys during oil and gas exploration. The vibroseis method generates vibrations utilizing truck-mounted units to vibrate the ground. The shothole method generates vibrations by detonation of underground charges. Vibroseis is used in for most survey work, but the shothole method is required where

vibroseis equipment cannot operate, e.g., areas of steep terrain, where vibroseis would disturb crops, plowed fields or orchards, or where shot hole drilling will be less disruptive to environmentally sensitive areas. Geophysical surveys are generally conducted in remote field areas well away from human habitation. They typically operate in a location for only a few minutes before moving on. Geophysical surveys are designed to create vibrational or impulsive energy for the purpose of obtaining reflections from deep rock layers to generate a 3D image of the subsurface. Accordingly, for both the vibroseis and the shothole methods, the sources are designed specifically to direct energy downward rather than up and out, and so result in relatively low PPV levels even at reasonably close surface proximity. Vibration associated with geophysical surveys is based on conservative scenarios of vibroseis equipment and varying charge sizes at a 50 foot depth.

For the shothole method, survey practices and existing regulatory guidance ensure that there would be no exceedence of the significance threshold when detonating charges. Operators generally follow the Blasting Guidance Manual of the U.S. Department of Interior Office of Surface Mining Reclamation and Enforcement in determining the charges to be used in proximity to different receptors and structures. According to the Blasting Guidance Manual, velocities as low as 0.50 PPV may damage brittle materials such as lath and plaster that may be found in older structures, while damage may occur to newer construction materials such as drywall starting at velocities of 0.75 PPV (Rosenthal and Morlock 1987). To avoid exceeding these values, operators generally set charges at least 300 feet from water wells and engineered structures unassociated with oil and gas development. For the shothole method, Table 4.12-10 shows the vibration levels for various charge sizes at the minimum 300 feet stand-off distance.

**Table 4.12-10: Typical Vibration Levels During Construction**

| Equipment | PPV (in/sec) | |
|---|---|---|
| | @ 100’ | @ 300’ |
| Bulldozer (Large) | 0.011 | -- |
| Bulldozer (Small) | 0.0004 | -- |
| Loaded Truck | 0.01 | -- |
| Caisson Drilling | 0.01 | -- |
| Vibroseis (4 units @ 70% drive) | 0.40 | -- |
| 5.5 lb shothole charge (dBX) @ 30 ft depth | >1.10 | ≤0.20 |
| 11 lb shothole charge (dBX) @ 50 ft depth | >1.95 | ≤0.30 |
| 13.2 lb shothole charge (dBX) @ 50 ft depth | >2.25 | >0.40 |

Sources: Caltrans 2013; Weingarten et al. 2015

As shown in Table 4.12-10, typical oil and gas development equipment operates at vibration levels that would be below both thresholds of annoyance or damage. Therefore, vibration impacts due to construction activities would be less than significant under this criterion.

Oil and gas well operations equipment that includes electric- or diesel-powered pumps. Other operational equipment includes tank batteries, subsurface pipelines, and related smaller-scale industrial activities. Use of this type of equipment typically would result in groundborne vibration in the immediate vicinity of the well at lower levels than the construction sources of vibration identified in Table 4.12-10. Because there are setback requirements for oil and gas activities, potentially vulnerable buildings or business would not be in the immediate vicinity of a well; therefore, impacts would be less than significant.

### Mitigation Measures

No mitigation measures are required.

### Level of Significance

Impacts would be less than significant.

## Impact 4.12-3: A Substantial Permanent Increase in Ambient Noise Levels in the Project Vicinity Above Levels Existing Without the Project

A substantial permanent increase in ambient noise levels would occur if noise levels increase in excess of 65 dBA CNEL. This analysis examined operational noise levels because they would be long-term in nature.

At a distance of 70 feet from a well, noise from electric-powered oil and gas wells would attenuate to a level of 60 dBA, which is less than 65 dBA CNEL. However, noise from diesel powered oil and gas wells would not attenuate to a level of 60 dBA CNEL until 190 feet from a well (see Table 4.12-9). A house or hospital could be located within 150 feet of a well; therefore, there is the potential for a substantial permanent increase in ambient noise levels in excess of the 65 dBA standard in the vicinity of sensitive noise receptors and therefore impacts could be significant.

### Mitigation Measures

Implement MM 4.12-2, as described above.

### Level of Significance After Mitigation

Impacts would be less than significant with mitigation.

## Impact 4.12-4: A Substantial Temporary or Periodic Increase in Ambient Noise Levels in the Project Vicinity Above Levels Existing Without the Project

Oil and gas well development would result in temporary increases in ambient noise levels in the vicinity. Noise levels would fluctuate depending on the phase of construction, equipment type and duration of use, and distance between the noise source and receptor. This analysis focuses on construction-related noise because it would be temporary or periodic.

### Well Pad Preparation

Prior to the installation of a well, a well pad site must be cleared and graded to make room for the placement of the necessary equipment and materials to be used during the drilling and developing of the well. Site preparation would generate noise from bulldozers, backhoes, and other types of construction equipment. The A-weighted sound pressure levels for the construction equipment that typically would be used during well pad preparation are presented in Table 4.12-11 along with the estimated sound pressure levels at various distances from the site.

**Table 4.12-11: Estimated Construction Noise Levels at Various Distances for Well Pad Preparation**

| Construction Equipment | Qty. | Usage Factor % | $L_{max}$ SPL @ 50 feet (dBA) | Distance in Feet/SPL (dBA) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 50 (adj.) | 250 | 500 | 1,000 | 1,500 | 2,000 |
| Excavator | 1 | 40 | 81 | 77 | 63 | 57 | 51 | 47 | 45 |
| Bulldozer | 1 | 40 | 82 | 78 | 64 | 58 | 52 | 48 | 46 |
| Water Truck | 1 | 40 | 76 | 72 | 58 | 52 | 46 | 42 | 40 |
| Dump Truck | 2 | 40 | 76 | 75 | 61 | 55 | 49 | 45 | 43 |
| Pick-Up Truck | 2 | 40 | 75 | 74 | 60 | 54 | 48 | 44 | 42 |
| Chain Saw | 2 | 20 | 84 | 80 | 66 | 60 | 54 | 50 | 48 |
| **Composite Noise Level** | | | | **84** | **70** | **64** | **58** | **55** | **52** |

Source: FHWA 2006
Key:
adj adjusted to quantity
dBA A-weighted decibels
$L_{max}$ maximum noise level
SPL sound pressure level

### Drilling

Drilling operations involve various sources of equipment noise. The types and quantities of this equipment are presented in Table 4.12-12, along with the estimated A-weighted individual and composite sound pressure levels that would be experienced at various distances from the operation.

**Table 4.12-12: Estimated Construction Noise Levels at Various Distances for Well Drilling**

| Construction Equipment | Qty | Sound Level | Distance | Distance in Feet/SPL[1] (dBA) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 50 (adj.) | 250 | 500 | 1,000 | 1,500 | 2,000 |
| Rig Drive Motor [2] | 1 | 105 | 0 | 71 | 57 | 51 | 45 | 41 | 38 |
| Generator [2] | 3 | 81 | 0 | 51 | 37 | 31 | 25 | 22 | 19 |
| Top Drive | 1 | 85 | 5 | 65 | 51 | 45 | 39 | 35 | 33 |
| Draw Works | 1 | 74 | 10 | 60 | 46 | 40 | 34 | 30 | 28 |
| Triple Shaker | 1 | 85 | 15 | 75 | 61 | 55 | 49 | 45 | 43 |
| **Composite Noise Level** | | | | **76** | **62** | **56** | **50** | **47** | **44** |

Notes:
[1] SPL = sound pressure level.
[2] sound power level.
Key:
Adj. = adjusted to quantity

## Hydraulic Fracturing

Table 4.12-13 presents the estimated noise levels that may be experienced at various distances from a hydraulic fracturing operation, based on 20 pumper trucks operating at a sound power level of 110 dBA and 20 pumper trucks operating at a sound power level of 115 dBA.

**Table 4.12-13: Estimated Construction Noise Levels at Various Distances for Hydraulic Fracturing**

| Construction Equipment | Qty. | SPL[2] (dBA) | Distance (feet) | Qty Adjusted Sound Level | Distance in Feet/SPL[1] (dBA) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 50 | 250 | 500 | 1,000 | 1,500 | 2,000 |
| Pumper Truck | 20 | 110 | 3 | 123 | 99 | 85 | 79 | 73 | 69 | 67 |
| Pumper Truck | 20 | 115 | 3 | 128 | 104 | 90 | 84 | 78 | 74 | 72 |

Source: Confidential Industry Source
Notes:
[1] SPL = sound pressure level.
[2] sound power level.

Although construction noise conducted between 6:00 AM and 9:00 PM on weekdays and 8:00 AM and 9:00 PM on weekends is exempt from restrictions, after that time it is prohibited from being audible within 150 feet of the construction site and 1,000 feet of an occupied residential building. Based on the data presented in the above tables, well pad preparation, drilling, and hydraulic fracturing would be audible within 150 feet of the equipment. Hydraulic fracturing would be audible at 1,000 feet from the pump trucks and well pad preparation and drilling could be audible at 1,000 feet. Based on the fact that sensitive noise receptors could hear construction noise and these noise levels would be in excess 65 dBA CNEL, particularly if drilling occurs all

night, construction noise is considered a significant adverse impact if located near one or more sensitive noise receptors (e.g., a home, hospital, school, church, or other public assembly facility).

Oil well operation for extraction purposes typically would not result in substantial temporary or permanent increases in ambient noise levels (see Table 4.2-9).

### Mitigation Measures

Implement MM 4.12-1, as described above.

### Level of Significance After Mitigation

Impacts would be less than significant with mitigation.

## Impact 4.12-5: For a Project Located within the Kern County Airport Land Use Compatibility Plan, Expose People Residing or Working in the Project Area to Excessive Noise Levels

Public use airports addressed by the Kern County ALUCP that are within the Project Area include Meadows Field, Bakersfield Municipal, Delano Municipal, Elk Hills-Buttonwillow, Poso Kern County, Taft Kern County, Shafter-Minter Field, Wasco Kern County, and Lost Hills airports. Currently, ten oilfields are located within 2 miles of a public use airport (see Figure 4.8-2). Future oil and gas-related development activities could occur in the vicinity of any of the public use airports identified in the Kern County ALUCP.

Aircraft operations at airports within the Project Area, with the exception of Meadows Field in Bakersfield, consist of relatively infrequent flights by small general aviation propeller aircraft. Occasional corporate jet aircraft operations occur at the Bakersfield Municipal, Delano Municipal, and Shafter-Minter Field airports. Meadows Field is an air carrier airport with scheduled turboprop and jet aircraft service and relatively frequent operations by general aviation propeller and jet aircraft.

The 65 dB CNEL contours for airports within the Project Area, as identified in the ALUCP, are confined to the airport property, with the exception of Bakersfield Municipal Airport and Meadows Field where the 65 dB CNEL contours extend slightly to the northwest of airport property.

As discussed previously, noise levels generated during construction or operations of oil and gas facilities at specified distances exceed 65 dB CNEL. Oil and gas activities could only occur at the appropriate setback distance, but could be as close as 50 feet from an industrial facility. If oil and gas facilities were built or operated within the 65 decibel CNEL contours of Meadows Field or the Bakersfield Municipal Airport, then the combined noise levels of aircraft take-offs and landings and oil and gas activities have the potential to exceed County acceptable noise levels for workers and/or residents that are in proximity to both the public airport and potential oil and gas activities, depending on the location of the well and the residence or facility. Therefore, there could be significant impacts.

### Mitigation Measures

Implement MM 4.12-1 and MM 4.12-2, as described above.

### Level of Significance After Mitigation

Impacts would be less than significant without mitigation.

## Impact 4.12-6: For a Project Located within the Vicinity of a Private Airstrip, Expose People Residing or Working in the Project Area to Excessive Noise Levels

Many private airports are located within the Project Area, such as Paradise Lakes Airport, Tejon Ag Airport, Creekside Airport, Di Giorgio Ranch Landing Strip, Majors Airport, Cashen Strip Airport, Belridge Strip Airport, and Paramount Farms Airport. In addition, two United States military airbases outside the Project Area utilize military operation airspace within a small portion of the Project Area for military aircraft operations. A complete list of the public and private airports is included in Section 4.8, Hazards and Hazardous Materials/Public Health Risks.

Oil and gas activities are currently occurring near private airstrips, including Belridge Strip and Di Giorgio Ranch Landing Strip. Future oil and gas development authorized under the Project could occur throughout the Project Area. Private airports in the area house mostly single-engine planes. The short duration of noise events generated by planes taking off and landing at private airstrips would temporarily increase noises levels in the immediate vicinity of the airport. Oil and gas development activities authorized under the Project could occur in proximity to a private airstrip. Given that oil and gas activities authorized under the Project would, at a minimum, have to comply with current setback requirements, an industrial facility could be within 50 feet or a residence could be with 150 feet. Noise levels at these distances under some circumstances could exceed acceptable noise levels. The combined noise levels of aircraft take-offs and landings and oil and gas activities have the potential to exceed acceptable noise levels for workers and/or residents that are in proximity to both a private airport and potential oil and gas activities, depending on the location of the well and the residence or facility and therefore impacts could be significant.

### Mitigation Measures

Implement MM 4.12-1 and MM 4.12-2, as described above.

### Level of Significance After Mitigation

Impacts would be less than significant with mitigation.

# 4.12.5 Cumulative Setting, Impacts, and Mitigation Measures

## Cumulative Setting

The geographic scope for cumulative impacts to noise receptors is the Project Area. Because noise can only be heard within a specific distance of a specific source, the cumulative impact analysis considers the combined noise impacts of the Project with nearby related projects.

The regional plans and projections evaluated in this cumulative analysis are described in Section 3.7 of Chapter 3, Project Description. Implementation of these plans and any projects associated with these plans would be required to comply with the goals, policies, and implementation measures of applicable federal and local laws and land use standards imposed by the respective jurisdictions within which each related project is located. This includes appropriate environmental review, in compliance with the requirements of CEQA and/or the National Environmental Policy Act. Should potential noise impacts be identified, appropriate mitigation would be prescribed.

### Impact 4.15-7: Cumulative Impact on Noise Receptors

Since oil and gas activities could occur anywhere in the Project Area, the combined noise levels from the Project and existing or reasonably foreseeable projects depend on the proximity of oil and gas activities to other noise sources at a specific location. Noise generated from construction of certain types of wells authorized under the Project, conservatively assuming use of the largest exploratory deep drilling rig (Kenai Rig), could be in excess of 65 dBA CNEL up to 3,000 feet from a construction site and up to 190 feet from a diesel-powered operating well. Therefore, significant noise impacts would occur if there are sensitive noise receptors within 3,000 feet of the construction of a well and 190 feet of an operating diesel-powered well. Other projects with construction or operations occurring concurrently with construction or operations of a well would also contribute to noise levels experienced by nearby sensitive noise receptors.

Projects associated with the aforementioned plans would have to comply with the Kern County Noise Ordinance and/or the Noise Element of the KCGP and, therefore, would have to ensure noise levels did not exceed standards. For example, the Kern Council of Governments (COG) 2014 Regional Transportation Plan for Kern County Final Program EIR provides numerous measures to address transportation-related noise.

Oil and gas activities subject to project authorization would have to implement MM 4.12-1 if there are sensitive human noise receptors within 3,000 feet of a well to ensure that the noise levels do not exceed 65 dBA at the nearest exterior wall of the nearest sensitive receptor or more than 1 dBA higher than the ambient noise levels, if in excess of 65 dBA. Cumulatively significant noise impacts could occur even if noise levels associated oil and gas activities are under 65 dBA, depending on the location of another nearby project, its noise levels, and the distance to a sensitive noise receptor.

## Mitigation Measures

Implement MM 4.12-1 and MM 4.12-2, as described above.

## Level of Significance After Mitigation

Impacts would be less than significant.

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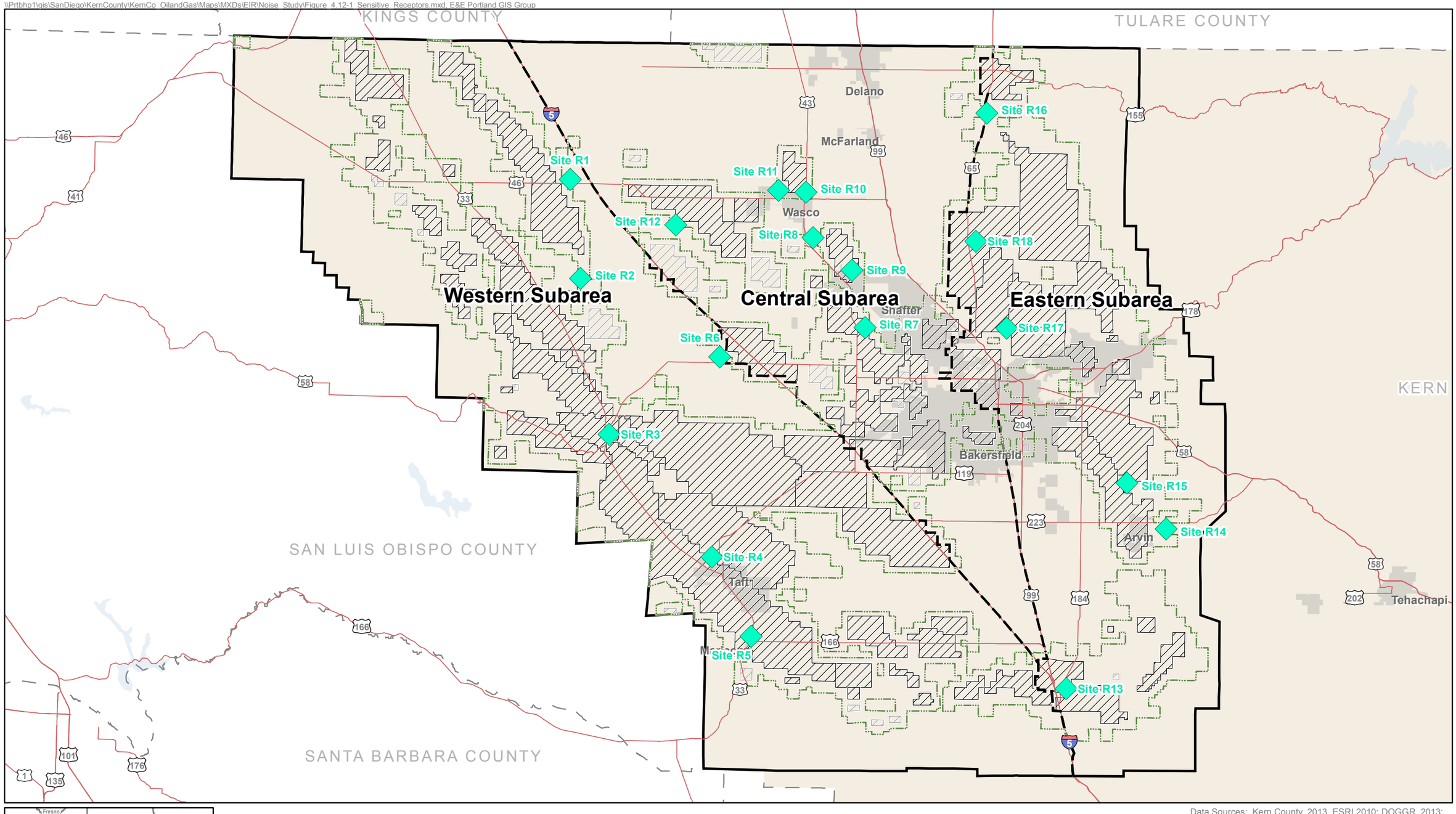


Data Sources: Kern County, 2013, ESRI 2010; DOGGR, 2013;

**Figure 4.12-1**
**Ambient Noise Measurement Locations**

Section 4.13

# Population and Housing

Section 4.13

# Population and Housing

## 4.13.1 Introduction

This section of the EIR describes the affected environmental and regulatory settings for population and housing. It also describes the impacts on population and housing that would result from implementation of the Amendment to Chapter 19.98 (Oil and Gas Production) of the Kern County Zoning Ordinance (Project) and, for those impacts that are deemed significant, mitigation measures that would reduce these impacts.

The information in this section is based on data from, but not limited to, the Kern Council of Government (COG) and Kern COG 2014 Regional Transportation Plan (RTP)/Sustainable Communities Strategy (SCS) and accompanying Environmental Impact Report (EIR), which is hereby incorporated by reference into this EIR, as well as the Kern County General Plan (KCGP) Housing Element (2008–2013), and demographic information from the California Department of Finance (DOF) and the U.S. Census Bureau.

## 4.13.2 Environmental Setting

### Population

Kern County is California's third largest county, encompassing 8,202 square miles at the southern end of the Central Valley. The 3,700-square-mile Project Area is predominantly located in the western portion of the County in the San Joaquin Valley bounded by Kings and Tulare counties to the north, Santa Barbara and San Luis Obispo counties to the west, the Tehachapi Mountains and the Sierra Nevada's to the east, and the northern boundary of the Los Padres National Forest to the south.

County population growth has been significant over the last several decades, particularly in the Bakersfield area. The DOF estimated that the total County population between 2010 and 2014 increased 4%, while population in the unincorporated areas increased by an estimated 1% (DOF 2014).

According to the U.S. Census Bureau, in 2010, the population of Kern County was 839,631, with 30.3% of Kern County residents under the age of 18, and 9.0% over the age of 65 (U.S. Census Bureau 2010). The DOF estimates that, while the total County population has increased, more growth is occurring in the incorporated cities than in the unincorporated County areas. Table 4.13-1 depicts the changes in population within Kern County from 2010 to 2014.

**Table 4.13-1: Kern County Population Trends (in thousands), 2010 to 2014**

| Kern County | 2010 | 2011 | 2012 | 2013 | 2014 | Change 2010-2014 | |
|---|---|---|---|---|---|---|---|
| | | | | | | Numeric | Percent |
| Incorporated Areas | 541.7 | 543.9 | 546.2 | 553.4 | 562.9 | 21.2 | 3% |
| Unincorporated Areas | 297.9 | 300.6 | 303.8 | 307.7 | 310.2 | 12.3 | 1% |
| **TOTAL** | **839.6** | **844.5** | **850.0** | **861.1** | **873.1** | **33.5** | **4%** |

Source: DOF 2014

Kern County has also experienced significant immigration growth in the last decade, and the natural increase in the existing, non-immigrant population has also remained fairly constant. On average, legal immigration in Kern County increases by approximately 2,176 per year (DOF 2013a).

The DOF projects Kern County's population will exceed one million by 2025 and reach 1,604,371 by July 1, 2050 (DOF 2013b). Additionally, the Kern COG Draft Regional Housing Data Report projects a net population increase of approximately 143,265 to the unincorporated areas of Kern County by 2023, an approximate 47% increase.

## Regional and Local Housing Trends

Unlike much of California, Kern County has experienced an increase in homeownership. In 2000, Kern County had a total of 231,564 housing units; in 2010, there were 284,367 units (DOF 2013c). Nearly 90% of the 284,367 units were occupied (owner occupied: 254,610; renter occupied: 101,782), and 29,757 (or 10.5%) of the units were vacant in 2010. As of May 10, 2013, Kern County had a total of 288,624 housing units, 10.4% of which were vacant. (DOF 2013d). Housing units and occupancy/vacancy rate trends for 2000 through 2013 are reflected in Table 4.13-2. Additionally, the Kern COG projects a net gain of approximately 83,176 housing units within the County by 2023, an increase of about 29% (Kern COG 2014).

**Table 4.13-2: Kern County Housing Trends**

| Area | Unit Count | | | Occupancy/Vacancy Rate | | |
|---|---|---|---|---|---|---|
| | 2000 | 2013 | Percent Change | Occupied 2000 | Occupied 2013 | Percent Change |
| Incorporated | 130,873 | 175,403 | 34 | 122,181/6.6% | 161,150/8.1% | 31.9/1.5 |
| Balance of the County | 100,694 | 113,221 | 12.4 | 86,474/14.1 | 97,513/13.9% | 12.8/0.2 |
| **TOTAL** | **231,567** | **288,624** | **24.6** | **208,655/9.9%** | **258,663/10.4%** | **24/0.5** |

Sources: DOF 2007, 2013d

Existing and projected housing in the Project Area and vicinity (including incorporated cities), as reported by the Kern COG in its RTP/SCS EIR, are presented in Table 4.13-3 (households) and Table 4.13-4 (housing units and households incorporated cities and surrounding County areas).

**Table 4.13-3: Estimated and Projected Housing Trends within Incorporated and Unincorporated Regional Statistical Areas**

| Area | 2010 | 2013 | 2023 | Percent Change 2013-2023 |
|---|---|---|---|---|
| Greater Arvin Area | 4,596 | 5,036 | 6,503 | 29.1 |
| Unincorporated Greater Arvin Area | 368 | 721 | 803 | 11.4 |
| Metro-Bakersfield | 168,373 | 178,842 | 217,548 | 21.6 |
| Unincorporated Metro-Bakersfield | 57,241 | 65,555 | 87,348 | 33.2 |
| Greater Delano/McFarland Area | 13,712 | 14,327 | 16,239 | 13.4 |
| Unincorporated Greater Delano/McFarland Area | 853 | 1,285 | 1,239 | -3.6 |
| Greater Shafter Area | 6,212 | 7,071 | 10,588 | 49.7 |
| Unincorporated Greater Shafter Area | 1,982 | 2,757 | 3,788 | 37.4 |
| Greater Taft/Maricopa Area | 6,189 | 6,578 | 7,863 | 19.5 |
| Unincorporated Greater Taft/Maricopa Area | 3,521 | 3,915 | 4,953 | 26.5 |
| Greater Tehachapi Area | 11,614 | 12,466 | 15,672 | 25.7 |
| Unincorporated Greater Tehachapi Area | 8,493 | 9,272 | 11,872 | 28.0 |
| Greater Wasco Area | 6,087 | 6,435 | 7,905 | 22.8 |
| Unincorporated Greater Wasco Area | 956 | 1,142 | 905 | -20.8 |
| **TOTAL** | **290,197** | **315,402** | **393,226** | **24.7** |

Source: Kern COG 2014

**Table 4.13-4: Estimated and Projected Housing Unit Trends within Incorporated Cities**

| | Housing Units | | | | Households | | | |
|---|---|---|---|---|---|---|---|---|
| Area | 2010 | 2013 | 2023 | %Change 2013-2023 | 2010 | 2013 | 2023 | % Change 2013-2023 |
| City of Arvin | 4,476 | 4,568 | 6,000 | 31.32% | 4,228 | 4,315 | 5,700 | 32.1 |
| City of Bakersfield | 120,725 | 123,066 | 140,500 | 14.17% | 111,132 | 113,287 | 130,200 | 14.9 |
| Delano | 10,713 | 10,831 | 12,500 | 15.41% | 10,260 | 10,373 | 12,000 | 15.7 |
| McFarland | 2,683 | 2,755 | 3,100 | 12.52% | 2,599 | 2,669 | 3,000 | 12.4 |

**Table 4.13-4: Estimated and Projected Housing Unit Trends within Incorporated Cities**

| Area | Housing Units | | | | Households | | | |
|---|---|---|---|---|---|---|---|---|
| | 2010 | 2013 | 2023 | %Change | 2010 | 2013 | 2023 | % Change |
| City of Shafter | 4,521 | 4,612 | 7,200 | 56.11% | 4,230 | 4,314 | 6,800 | 57.6 |
| City of Taft | 2,525 | 2,522 | 2,800 | 11.02% | 2,254 | 2,251 | 2,500 | 11.1 |
| City of Maricopa | 466 | 464 | 500 | 7.76% | 414 | 410 | 410 | 0.0 |
| City of Wasco | 5,477 | 5,649 | 7,400 | 31.00% | 5,131 | 5,293 | 7,000 | 32.3 |
| **TOTAL** | **151,586** | **154,468** | **180,000** | **16.53%** | **140,248** | **142,912** | **167,610** | **17.3** |

Source: Kern COG 2014

## Regional and Local Employment Trends

According to the California Employment Development Department (CEDD), Kern County consistently ranks among the top five most-productive agricultural counties in the United States and is the nation's third largest petroleum-producing counties. Additionally, because of its unique geographic location, Kern has also become the distribution center for some of the world's largest companies, with freight cargo going to and from the Ports of Los Angeles and Long Beach. The County is also host to major freeways, providing north-south access within and beyond California's borders, as well as access to California's central coast and eastward to adjacent states and beyond.

Between 2000 and 2010, Kern County's civilian labor force grew by 38%, and the compound growth rate of the labor force during this period was 3.2% per year. The employed labor force grew by 34% between 2000 and 2010, and the compound growth rate was 2.9% per year. Similarly, the number of jobs in healthcare grew by 31%. The energy and natural resources industry and transportation, logistics, and advanced manufacturing industry both increased by 16%. Value-added agriculture and construction industries increased by 6% and 4%, respectively. In the private sector, the total number of jobs grew by 12%, and the total number of establishments grew by 24% (Kern Economic Development Corporation 2012). Table 4.13-5 describes the workforce distribution for major industries in Kern County.

**Table 4.13-5: Private Sector Industries in Kern County**

| Industry | Percent of Workforce |
|---|---|
| Agriculture Production and Food Manufacturing | 24 |
| Energy, Natural Resources, and Utilities (including Oil and Gas) | 6.0 |
| Construction | 7.0 |
| Transportation, Logistics, and Manufacturing | 7.0 |
| Wholesale and Retail Trade | 16 |

**Table 4.13-5: Private Sector Industries in Kern County**

| Industry | Percent of Workforce |
|---|---|
| Professional, Scientific, and Technical Services | 5.0 |
| Finance, Business & Administrative Support Services | 11 |
| Health Care Services | 10 |
| Leisure, Hospitality, and Other Services | 14 |

Source: KEDC 2012

During 2011, the annual average number of individuals participating in the Kern County labor force was 382,000. Of these, 325,000 were employed during 2011, leaving 57,000 actively looking for work (KEDC 2012). Based on Kern Economic Development Corporation's (KEDC's) 2012 Labor Market Study, Kern County's labor force grew dramatically between 2005 and 2010, at nearly 19.6%. As a result, the unemployment rate in Kern County remains high. As of 2014 (annual data), the labor force stands at 394,400, with 353,200 employed and 41,200 unemployed, for an unemployment rate of 10.4% (CEDD 2015a). Unemployment is down from 13.2%, as reported in the KEDC 2012 Report. According to CEDD, employment from 2002 to 2012 in the oil and gas sector in Kern County almost doubled, starting at 6,900 and rising to 12,300. Since 2012, employment in the oil and gas sector has remained around 12,000 (CEDD 2015b).

Based on job growth patterns, national trends, and high occupational location quotients, the following are key industries for Kern County:

- Value-added agriculture;
- Energy and natural resources;
- Transportation, logistics, and advanced manufacturing;
- Aerospace and defense technology;
- Construction; and
- Healthcare services

According to the Kern COG Report, there were 1.10 jobs per housing unit for incorporated areas of Kern County in 2010, and that ratio increased to 1.18 in 2013 but is projected to decrease to 1.03 by 2023. Similarly, the ratio of jobs to housing units in unincorporated areas of Kern County is expected to decrease from 1.13 (2013) to 0.83 (2023) (Kern COG 2013).

# 4.13.3 Regulatory Setting

# State

## California Housing Element Law

California state law requires each city and county to adopt a general plan for future growth containing at least seven mandatory elements, including Housing Element. Unlike other general plan elements, the Housing Element is required to be updated every five to six years, and is subject to detailed statutory requirements and mandatory review by a state agency, the California Department of Housing and Community Development (HCD 2007). This plan must include a Housing Element that identifies housing needs for all economic segments and provides opportunities for housing development to meet their existing and projected housing needs including their share of the regional housing need. At the state level, the HCD estimates the relative share of California's projected population growth that could occur in each county in the state based on DOF population projections and historic growth trends. Where there is a regional COG, as in Kern County, the HCD provides the regional housing need to the COG. The council then assigns a share of the regional housing need to each of its cities and counties. The process of assigning shares provides cities and counties the opportunity to comment on the proposed allocations. The HCD oversees the process to ensure that the COGs distribute their share of the state's projected housing need.

Before adopting an update to its Housing Element, the city or county must submit a draft to the HCD for review. The HCD advises the local jurisdiction as to whether its Housing Element complies with the provisions of California housing element law.

The COGs are required to assign regional housing shares to the cities and counties within their regions on a similar five-year schedule. At the beginning of each cycle, the HCD provides population projections to the councils of governments, which then allocate shares to their cities and counties. The shares of the regional need are allocated before the end of the cycle so that the cities and counties can amend their housing elements by the deadline.

# Regional

## 2014 Regional Transportation Plan/Sustainable Communities Strategy

In June 2014, the Kern COG adopted a SCS for the Kern Region that implements Senate Bill 375, California's Sustainable Communities and Climate Protection Act. The SCS integrates transportation planning, greenhouse gas reductions from passenger vehicles and light-duty trucks, and regional housing needs with a forecasted development pattern that acknowledges Kern County's and the incorporated cities' General Plan programs.

The SCS acknowledges the importance of energy resources, including oil and gas production, as an important resource and industry to Kern County's economy and future growth.

# Local

## Kern County General Plan

The Project Area is located within the Kern County General Plan (KCGP) area and, therefore, would be subject to applicable policies and measures of the KCGP. The Land Use, Conservation, and Open Space Element and the Energy Element of the KCGP include goals, policies, and implementation measures related to population and housing that apply to the Project, as described below.

### Chapter 1. Land Use, Conservation, and Open Space Element

### 1.6. Residential

#### Goals

**Goal 2.** Ensure the provision of safe and amenable living environments and the promotion of efficient and economical use of land.

**Goal 6.** Promote the conservation of water quantity and quality in Kern County.

**Goal 7.** Minimize land use conflicts between residential and resource, commercial, or industrial land uses.

### 1.8. Industrial

#### Goals

**Goal 1.** Ensure that an adequate and geographically balanced supply of land is designated for a range of industrial purposes.

**Goal 2.** Promote the future economic strength and well-being of Kern County and its residents without detriment to its environmental quality.

**Goal 3.** Ensure compatibility with land use designations such as residential, commercial, or other land uses that may be affected by such activities.

**Policy 4.** Protect existing industrial designations from incompatible land use intrusion.

### 1.10. General Provisions

#### Goals

**Goal 1.** Ensure that the County can accommodate anticipated future growth and development while maintaining a safe and healthful environment and a prosperous economy by preserving valuable natural resources, guiding development away from hazardous areas, and assuring the provision of adequate public services.

### Policies

**Policy 6.** The County shall ensure the fair treatment of people of all races, cultures, incomes and age groups with respect to the development, adoption, implementation and enforcement of land use and environmental programs.

### 1.10.9. Economic Development

### Policies

**Policy 58**. Support and work toward the elimination of disincentives for business and industry to prosper in Kern County, and create special economic development programs to encourage commerce and industry to locate in Kern County.

**Policy 62**. Periodically review and update procedures for granting development approvals and permits and facilitate the processing of land use entitlements.

### Implementation Measures

**Implementation Measure DD.** Utilize the County's Economic Strategy and the Economic Incentive Program to promote economic growth and to maintain a strong local economy.

## Chapter 5. Energy Element

## 5.3.2. Kern County's Economic Dependence on the Oil Marketplace

### Goals

**Goal.** To reduce the County's susceptibility to fluctuations in the petroleum production levels, and to encourage diversification of the economy.

### Policies

**Policy 3.** The County shall encourage the conversion of existing petroleum-related facilities to other productive uses when they are no longer needed or productive.

**Policy 4.** The County should encourage the development of renewable energy industries to diversify the energy economy in Kern County.

## Metropolitan Bakersfield General Plan

The Metropolitan Bakersfield General Plan (MBGP), a joint effort between the Kern County Planning Department and the City of Bakersfield Planning Division, was last adopted on December 11, 2007. The MBGP includes both city and unincorporated County lands. The MBGP describes the community's physical development as well as its economic, social and environmental goals and is currently undergoing an update. The Project Area includes a total of 152,040 acres of unincorporated County lands that are covered under the MBGP (7.41%). There are no policies, goals, or implementation measures in the MBGP that are applicable to population and housing.

### Kern County Specific Plans

Kern County has adopted 24 Specific Plans for properties within the Project Area. These Specific Plans are intended to be an amplification of the goals and policies of the KCGP and are, therefore, consistent therewith. As depicted in Figure 4.10-3, less than 8% of the Project Area is located wholly or partially within adopted Specific Plan areas. Future oil and gas exploration and production activities that would be authorized under the proposed Amendment to Chapter 19.98 (Oil & Gas Production) of the Kern County Zoning Ordinance that would be located within the boundary of an adopted Specific Plan would be regulated according to County zoning, with the exception of the Specific Plans identified as Tier 5.

### Kern County General Plan, Housing Element 2008–2013, Adopted 2008

The Housing Element is a separate element of the KCGP. Each city and county is required by California housing law to develop a Housing Element, one of the seven general plan elements, in order to qualify for allocation of state regional housing funding. To receive regional housing funds, each city and county must update its general plan Housing Element on a regular basis (generally, every five years). The housing element must incorporate policies and identify potential sites that would accommodate the city or county's share of the regional housing needs. Kern County adopted the current Housing Element in December 2008. Because the Project would not include new housing, the goals and policies of the Housing Element largely do not apply to the Project.

## 4.13.4 Impact and Mitigation Measures

## Methodology

No population or employment growth is anticipated as part of the Project beyond the continued gradual population growth attributed to the region as a whole (and not attributable to any particular industry sector) by the Kern COG RTP/SCS EIR projections. While hydraulic fracturing and other well stimulation techniques have resulted in very substantial increases in oil and gas production activities in other states, the Monterey Shale geologic formation in Kern County is fundamentally different and estimates of both the quantity and rate of petroleum production from the Monterey Shale using existing technologies have been substantially reduced (See, e.g., http://www.postcarbon.org/publications/drilling-california/). In the absence of any dramatic technical advances, substantial increases in oil and gas production in the County—and substantial increases in the population and housing activity associated with oil and gas production—are not anticipated to increase appreciably above the baseline 2012 level. The dramatic drop in the global price of oil in 2014, for example, resulted in production curtailments and well construction activity levels in 2014 that were well under 2012 levels.

# Thresholds of Significance

The Kern County California Environmental Quality Act (CEQA) Implementation Document and Kern County Environmental Checklist state that a project would have a significant impact on population and housing if it would:

- Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure);
- Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere; or
- Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere.

Based on these standards, the effects of the Project have been categorized as either a "less than significant impact" or a "potentially significant impact." Mitigation measures are recommended for potentially significant impacts. If a potentially significant impact cannot be reduced to a less than significant level through the application of mitigation, it is categorized as a "significant unavoidable impact."

# Project Impacts

The types of potential impacts related to population and housing is generally the same for construction and operational activities, each of which requires a workforce of experienced employees. Accordingly, the impacts assessment applies to both Project construction and operation.

## Impact 4.13-1: Induce Substantial Population Growth in an Area, Either Directly (for example, by proposing new homes and businesses) or Indirectly (for example, through extension of roads or other infrastructure)

Based on information from the Bureau of Labor, it is estimated that 16,752 workers in Kern County were employed in the oil and gas extraction industry in 2012. Of this total, 14,067 were estimated to be "oilfield" employees. It should be noted that the Project's Traffic Impact Study and Roadway Assessment, (included as Appendix W of this EIR) conservatively assumed Kern County had 14,500 oilfield employees (Appendix W). The state's employment office estimated employment in the Kern County oil and gas sector differently, but shows a steady increase from 2002 to 2012 at which time the growth stabilized around 12,000 (CEDD 2015b).

Future oil and gas exploration and production activities that would be authorized under the proposed Amendment to Chapter 19.98 (Oil and Gas Production) of the Kern County Zoning Ordinance are anticipated to result in up to 2,697 new production wells being drilled annually, while 2,231 wells are anticipated to be plugged and abandoned. Additionally, it is anticipated that up to 1,200 wells would receive some type of well stimulation treatment annually (see Table

3-5, Annual Well Forecast – Project Subareas). These estimates are higher than historic averages, and much higher than occur during petroleum market contraction periods, such as 2014. Given the long history of oil and gas development within Kern County, including periods of relatively high and relatively low production, the oil and gas sector is expected to continue to sustain a substantial share of employment for Kern County residents. The pool of experienced oil and gas workers residing in Kern County is sufficient to provide the industry workforce over the lifetime of the Project, and any nominal increase in the oil and gas workforce in the future would likely continue to be comprised of local Kern County residents, consistent with the Kern COG's population and household growth projections for the County as a whole. In addition, unemployment in Kern County is approximately 10.4%; therefore, there would be an available labor pool to fill the anticipated nominal growth in employment. As such, the Project would not lead to substantial population growth and this impact is less than significant.

### Mitigation Measures

No mitigation measures are required.

### Level of Significance

Impacts would be less than significant.

## Impact 4.13-2: Displace Substantial Numbers of Existing Housing, Necessitating the Construction of Replacement Housing Elsewhere

Future oil and gas exploration and production activities that would be authorized under the proposed Amendment to Chapter 19.98 (Oil and Gas Production) of the Kern County Zoning Ordinance would not require the displacement of housing, nor necessitate the construction of replacement housing. No physical displacement of housing units are anticipated or authorized under the Project or this EIR.

Additionally, the vast majority of oil and gas production occurs in Tier 1, 2 and 3 areas that have no or few residences, and the Project's Noise and Air Quality Mitigation Measures require minimum setback distances from residences to avoid any incompatible land uses on an operational basis, and includes either mandatory setback distances during construction phase activities or the voluntary, temporary relocation of residents during such temporary construction work (typically lasting approximately 3 weeks). Additionally, the Conditional Use Permit and Specific Plan requirements applicable to oil and gas activities in Tiers 4 and 5 likewise provide for appropriate setback distances or other procedural and substantive requirements to assure land use compatibility between and oil and gas production activity and nearby residences. Accordingly, the Project would not indirectly result in displacement of housing and would therefore have no impact on housing.

### Mitigation Measures

No mitigation measures are required.

### Level of Significance

Impacts would be less than significant.

### Impact 4.13-3: Displace Substantial Numbers of People, Necessitating the Construction of Replacement Housing Elsewhere

As with Impact 4.13-2, above, the Project would not displace people or necessitate the construction of replacement housing in other locations. Therefore, there would be no impact.

### Mitigation Measures

No mitigation measures are required.

### Level of Significance

Impacts would be less than significant.

## 4.13.5 Cumulative Setting, Impacts, and Mitigation Measures

## Cumulative Setting

The geographic scope for cumulative impacts to recreation resources includes the area within 6 miles of the external Project Area. While projects in a larger area may affect some of the same recreation resources as the Project, by focusing on projects within the Project Area and 6 miles outside of the Project Area, the analysis of cumulative impacts includes those projects that would most comparably affect the same resources as the Project.

The regional plans and projections evaluated in this cumulative analysis are described in Section 3.7, of Chapter 3, Project Description.

### Impact 4.13-4: Cumulative Impact on Population and Housing

Kern County is expected to continue to grow, with or without the Project, consistent with the growth projections included in the 2014 Kern COG RTP/SCS and accompanying EIR.

As described above, the ongoing production of oil and gas in Kern County, with the additional mitigation measures and other substantive and procedural requirements included in the proposed revisions to the County's oil and gas ordinances included in the Project, would not be expected to result in any substantial increase in population or in housing demand, or require the displacement of substantial residences or people and construction of relocated housing, in Kern County. Further, growth in the Kern County area has been accounted for in various local and regional plans and projections. Accordingly, displacement of and demand for housing and changes in the local labor market and population would not be significant for Project-level or cumulative impact purposes for the Project. As a result, the Project will not result in a cumulatively considerable contribution to cumulative impacts for population and housing and the impact would be less than significant.

## Mitigation Measures

No mitigation measures are required.

## Level of Significance

Impacts would be less than significant.

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Section 4.14

# Public Services

Section 4.14

# Public Services

## 4.14.1 Introduction

This section describes the affected environment and regulatory setting for public services, which includes fire protection, law enforcement services, schools, emergency medical services, and other public facilities. This section also describes the impacts on public services that would result from implementation of the Amendment to Chapter 19.98 (Oil and Gas Production) of the Kern County Zoning Ordinance (Project) and related ordinance amendments, and mitigation measures that would reduce these impacts, if necessary. For impacts to parks and other recreational facilities, please refer to Section 4.15, Recreation.

## 4.14.2 Environmental Setting

Kern County is California's third largest county in California, encompassing 8,202 square miles at the southern end of the Central Valley. The 3,700-square-mile Project Area is predominantly located in the western portion of the County in the San Joaquin Valley bounded by Kings and Tulare counties to the north, Santa Barbara and San Luis Obispo counties to the west, the Tehachapi Mountains and the Sierra Nevadas to the east, and the northern boundary of the Los Padres National Forest to the south.

## Fire Protection

Wildland fire protection in Kern County is a cooperative effort. The Kern County Fire Department (KCFD) provides firefighting services to many cities throughout the County. In addition, operating agreements with the U.S. Forest Service (USFS), U.S. Department of the Interior, Bureau of Land Management (BLM), U.S. Fish and Wildlife Service (USFWS), and the California Department of Forestry and Fire Protection (CAL FIRE), also provide wildland fire protection.

According to the 2011 KCFD Unit Strategic Fire Plan, the Project Area falls within the Western Kern, Northern Kern Valley, Valley/Foothill, and Mt. Pinos Communities Fuel Management Areas. The following table lists the Fire Management Areas in the Project Area, the relevant battalion, and the authorities responsible for fire-fighting in these Fire Management Areas.

Most of the Project Area falls within either the fire protection authority of either the Kern County Fire Department or the City of Bakersfield Fire Department. These jurisdictions are discussed in further detail below. As shown in Table 4.14-1, the BLM, USFS and U.S. Department of Defense (DOD) also have responsibility for fire protection services in the Project Area.

**Table 4.14-1: Fire Protection Services**

| Fire Management Area | Battalion | Responsibility for Wildland Fires |
|---|---|---|
| Western Kern | 2 | State, Federal (BLM, DOD, USFWS), Local |
| Northern Kern Valley | 3 | State, Federal (USFS), Local |
| Mt. Pinos Communities | 5 | State, Federal (BLM, USFS), Local |
| Valley/Foothill | 4 and 6 | State, Federal (BLM, USFS), Local |

KCFD provides fire protection services for the 8,000 square miles of unincorporated areas of Kern County and the cities of Arvin, Delano, Maricopa, McFarland, Ridgecrest, Shafter, Taft, Tehachapi, and Wasco. KCFD has 45 full-time fire stations and one seasonal station. KCFD is broken into seven battalions for operational management; each battalion covers a large geographical area and includes seven to nine fire stations. In total, KCFD serves nine cities and 41 communities. As of 2010, over 546 uniformed firefighters were serving in the seven battalions, 46 fire stations, 55 engines, four ladder trucks, 41 patrols, 25 command vehicles, three hand crews, two helicopters, one fixed-wing aircraft, two hazardous materials response teams, one technical rescue team, one hotshot crew, and three light/air vans. KCFD has 14 Mutual Aid Agreements with neighboring fire suppression organizations to further strengthen the emergency services available to residents.

In 2012, KCFD responded to over 11,000 fires. In the oilfields in Western Kern County, over 1,100 fires have occurred from 2006 to January 2015.

The Bakersfield Fire Department (BFD), headquartered at 2101 H Street in Bakersfield, serves the City of Bakersfield. BFD has a response area of 130 square miles and currently serves a population of 333,719. The average response time for BFD is 4 minutes, with a dispatch time of 1 minute and 2 minutes for crew turnout (City of Bakersfield 2014a; Hartley 2014). BFD responded to an average of 1,742 fires, ruptures, and explosions, annually, over a five-year period (Hartley 2014).

BFD's inventory includes 14 engines, three ladder trucks, four Type III engines, two four wheel drive Type IV patrols, one "Light & Air" unit, one hazardous materials unit, one urban search and rescue unit, one heavy utility tender, one technical rescue trailer, one decontamination unit, four battalion command vehicles, three safety officer command vehicles, and other support units (City of Bakersfield 2014b). The equipment is distributed across BFD's 14 stations.

The City of Bakersfield has an annual oil well safety inspection program. These inspections focus on fire and safety issues as well as environmental and noise issues (City of Bakersfield 2014c).

The Emergency Communications Center (ECC) for KCFD and BFD is located in the Whiting Communications Center in Northeast Bakersfield (City of Bakersfield 2014d). The ECC is responsible for dispatching resources over an area of more than 8,000 square miles that includes 65 fire stations. ECC's approximate call volume was 85,000 calls in 2012.

Forty-one fire stations located within the Project Area are under the jurisdiction of KCFC or BFD, as listed in Table 4.14-2.

**Table 4.14-2: List of Fire Stations Serving the Project Area**

| **Kern County Fire Substations** [(a)] | | |
|---|---|---|
| Station 21 Taft<br>303 10th Street<br>Taft, CA 93268<br>Response area (sq. mi.): 172 | Station 22 Maricopa<br>801 Stanislaus Street<br>Maricopa, CA 93252<br>Response area (sq. mi.): 219 | Station 23 Fellows<br>100 Broadway<br>Fellows, CA 93224<br>Response area (sq. mi.): 66 |
| Station 24 McKittrick<br>23246 2nd Street<br>McKittrick, CA 93251<br>Response area (sq. mi.): 218 | Station 25 Buttonwillow<br>100 Mirasol Avenue<br>Buttonwillow, CA 93206<br>Response area (sq. mi.): 220 | Station 26 Lost Hills<br>14670 Lost Hills Road<br>P.O. Box 155<br>Lost Hills, CA 93429<br>Response area (sq. mi.): 761 |
| Station 31 Wasco<br>2424 7th Street<br>Wasco, CA 93280<br>Response area (sq. mi.): 155 | Station 32 Shafter<br>325 Sunset Avenue<br>Shafter, CA 93263<br>Response area (sq. mi.): 132 | Station 33 McFarland<br>700 West Perkins Avenue<br>McFarland, CA 93215<br>Response area (sq. mi.): 182 |
| Station 34 Delano<br>1001 12th Avenue<br>Delano, CA 93215<br>Response area (sq. mi.): 66 | Station 35 Woody<br>17977 Hwy 155<br>Woody, CA 93287<br>Response area (sq. mi.): 179 | Station 37 Delano West<br>132 West 11th Avenue<br>Delano, CA 93215<br>Response area (sq. mi.): 84 |
| Station 42 Niles<br>2011 Fairfax Road<br>Bakersfield, CA 93306<br>Response area (sq. mi.): 55 | Station 45 Edison<br>11809 Edison Highway<br>Bakersfield, CA 93307<br>Response area (sq. mi.): 163 | Station Tejon Ranch<br>5441 Dennis McCarthy Road<br>Metter, CA 93243<br>Response area (sq. mi.): 308 |
| Station 51 Lamont<br>8225 McKee Road<br>Lamont, CA 93241<br>Response area (sq. mi.): 60 | Station 52 Greenfield<br>312 Taft Highway<br>Bakersfield, CA 93307<br>Response area (sq. mi.): 65 | Station 53 Old River<br>9443 Taft Highway<br>Bakersfield, CA 93311<br>Response area (sq. mi.): 175 |
| Station 54 Arvin<br>301 Campus Drive<br>Arvin, CA 93203<br>Response area (sq. mi.): 126 | Station 57 Frazier Park<br>729 West End Drive<br>P.O. Box 402<br>Frazier Park, CA 93225<br>Response area (sq. mi.): 47 | Station 61 Norris<br>6400 Fruitvale Avenue<br>Bakersfield, CA 93308<br>Response area (sq. mi.): 34 |
| Station 62 Meadows Field<br>1652 Sunnyside Court<br>Bakersfield, CA 93308<br>Response area (sq. mi.): 1.75 | Station 63 Highland<br>101 Universe Avenue<br>Bakersfield, CA 93308<br>Response area (sq. mi.): 149 | Station 64 River View<br>101 East Roberts Lane<br>Bakersfield, CA 93308<br>Response area (sq. mi.): 5 |
| Station 65 Green Acres<br>10051 Meacham Road<br>Bakersfield, CA 93312<br>Response area (sq. mi.): 15 | Station 66 Landco<br>3000 Landco Drive<br>Bakersfield, CA 93308<br>Response area (sq. mi.): 5 | Station 67 Rosedale<br>14341 Brimhall Road<br>Bakersfield, CA 93312<br>Response area (sq. mi.): 64 |

**Table 4.14-2: List of Fire Stations Serving the Project Area**

| **Bakersfield Metropolitan Fire Stations** | | |
|---|---|---|
| Station No. 1<br>2101 H Street<br>Response area (sq. mi.): 3.81 | Station No. 2<br>716 E. 21st Street<br>Response area (sq. mi.): 2.15 | Station No 3<br>3400 Palm Street<br>Response area (sq. mi.): 2.4 |
| Station No. 4<br>130 Bernard Street<br>Response area (sq. mi.): 2.64 | Station No 5<br>106 E. White Lane<br>Response area (sq. mi.): 8.52 | Station No. 6<br>127 Brundage Lane<br>Response area (sq. mi.): 4.95 |
| Station No. 7<br>4030 Soranno Drive<br>Response area ($mi.^2$): 5.13 | Station No 8<br>2213 University Avenue<br>Response area (sq. mi.): 11.38 | Station No. 9<br>7912 Westwold Drive<br>Response area (sq. mi.): 4.66 |
| Station No. 10<br>12100 Alfred Harrell Highway<br>Response area (sq. mi.): 19.58 | Station No. 11<br>700 Stockdale Highway<br>Response area ( $mi^2$.): 4.3 | Station No. 13<br>4900 Poppyseed Street<br>Response area ($mi^2$.): 10.9 |
| Station No. 14<br>5812 Mountain Vista Drive<br>Response area (sq. mi.): 8.23 | Station No. 15<br>1315 Buena Vista Road<br>Response area (sq. mi.): 7.01 | |

Sources: City of Bakersfield 2014e; Hartley 2014

Available equipment and manpower for the Bakersfield Metropolitan Fire Stations are summarized by station in Table 4.14-3.

**Table 4.14-3: List of Bakersfield Metropolitan Fire Stations Serving the Project Area and Associated Equipment**

| | | |
|---|---|---|
| Station No. 1<br>8 firefighters,<br>4 Admin. Chief Officers,<br>2 Admin Captains per day<br>2 Fire Engines,<br>1 Truck,<br>Rescue Apparatus,<br>Rescue Trailer,<br>7 Command Vehicles,<br>1 Reserve Fire Engine | Station No. 2<br>8 firefighters,<br>4 Admin Chief Officers,<br>2 Admin Captains per day<br>2 Fire Engines,<br>1 Truck, Rescue Apparatus,<br>Rescue Trailer,<br>7 Command Vehicles,<br>1 Reserve Fire Engine | Station No 3<br>3 firefighters per day<br>1 Fire Engine |
| Station No. 4<br>3 firefighters per day<br>1 Fire Engine,<br>1 4X4 Patrol,<br>1 Reserve Fire Engine | Station No 5<br>3 firefighters per day<br>2 Fire Engines,<br>1 Reserve Fire Engine | Station No. 6<br>4 firefighters per day<br>1 Fire Engine,<br>1 Command Vehicle,<br>1 Reserve Fire Engine |
| Station No. 7<br>7 firefighters per day<br>1 Fire Engine,<br>1 Truck | Station No 8<br>3 firefighters per day<br>2 Fire Engines | Station No. 9<br>3 firefighters per day<br>1 Fire Engine) |

**Table 4.14-3: List of Bakersfield Metropolitan Fire Stations Serving the Project Area and Associated Equipment**

| | | |
|---|---|---|
| Station No. 10<br>3 firefighters per day<br>1 Fire Engine | Station No. 11<br>3 firefighters per day<br>1 Fire Engine,<br>Light & Air Apparatus | Station No. 13<br>3 firefighters per day<br>1 Fire Engine,<br>Rescue Trailer,<br>1 Reserve Fire Engine |
| Station No. 14<br>3 firefighters per day<br>2 Fire Engines,<br>1 Mobile Command Vehicle | Station No. 15<br>7 firefighters per day<br>1 Fire Engine,<br>1 Truck,<br>1 Haz. Mat Response Vehicle,<br>1 Reserve Truck | Training Facility –<br>3 firefighters<br>3 Command Vehicles |

Sources: City of Bakersfield 2014e; Hartley 2014

Within the Project Area, the majority of the fire stations are located in Non-Jurisdictional Areas; however, several are located within or near Tier 1 areas (see Figure 4.14-1).

# Police Protection

## California Highway Patrol

The California Highway Patrol (CHP) provides traffic regulation enforcement, oversees response to emergency incidents on California's highways or assists other public agencies responding to emergency incidents, and promotes the safe and efficient movement of people and goods on California highways to minimize loss of life, injuries, and property damage. CHP officers patrol State highways and implement the CHP's other law enforcement activities (e.g., drug interception, vehicle theft investigation and prevention, vehicle inspections, accident investigations, and public awareness campaigns), with the support of the non-uniformed personnel assigned to area and division offices.

The CHP has eight divisions that provide services throughout California. Kern County is located in both the Central and Inland Division service areas (CHP 2015). The CHP has three offices in the Project Area, including one in Bakersfield, one in Buttonwillow, and one in Lebec (see Table 4.14-4), which are part of the CHP's Central Division. The Central Division includes Kern, Fresno, Tulare, Merced, Madera, Kings, Stanislaus, and Tuolumne counties and has 15 area offices, six residential posts, two commercial inspection facilities, three communications/dispatch centers, 667 uniformed officers, and 226 non-uniformed personnel (CHP 2015).

**Table 4.14-4: California Highway Patrol Area Offices in the Project Area**

| | |
|---|---|
| (420) Bakersfield<br>4040 Buck Owens Boulevard | (426) Buttonwillow<br>29949 Stockdale Highway |
| (430) Fort Tejon<br>1033 Lebec Road | |

## Kern County Sheriff's Office

The Kern County Sherriff provides police protection services to the unincorporated portions of the County. The Kern County Sheriff is the County's chief law enforcement officer. The Sheriff's Office has 1,202 sworn and civilian employees. There are 567 authorized deputy sheriff positions deployed in patrol, substation, detective, courts services, and special investigations units. The Kern County Sheriff's Office provides protection for the unincorporated areas of Kern County and has a contract arrangement with some incorporated areas. The Kern County Sherriff's headquarters is located in Bakersfield and consists of 15 substations that provide patrol services to remote areas of Kern County, such as the desert and mountainous regions as well as other areas that need law enforcement services. Six of these substations are located within the Project Area: Buttonwillow, Delano, Lamont, Rosedale, Taft, and Wasco (see Table 4.14-5 and Figure 4.14-2). These substations are located in either non-jurisdictional areas or agricultural areas (Tier 2).

The average response times for the Kern County Sheriff's Office are 7 minutes 24 seconds for emergency in-progress calls (e.g., a crime that is under way and/or a life-or-death situation), 14 minutes 25 seconds for non-emergency in-progress calls (e.g., a crime that has already occurred and/or an incident that is not life-threatening), and 28 minutes 23 seconds for report calls (reporting a crime that is not in progress) (Pruitt 2014).

The Metro Patrol Division of the Kern County Sheriff's Office has eight sergeants, 67 deputies, seven senior deputies, and eight civilian support staff. The Kern County Sheriff's Office Metro Patrol Division covers four zones within the city of Bakersfield. The four zones cover 600 square miles, but this area does not include the outlying areas where the substations provide services.

The Rural Crimes Investigation Unit addresses property crimes in the agricultural, ranch, and oilfield portions of the County. Crime has increased in their jurisdiction in the period from 2009 to 2012; specifically, there has been a significant increase in metal thefts, which increased from 46 in 2009 to 455 in 2012 (Winn 2014).

**Table 4.14-5: List of Police and Sheriff Stations Serving the Project Area**

| Facility | Service Areas | Staff |
|---|---|---|
| **Kern County Sheriff Stations** | | |
| **Buttonwillow Station**<br>181 East First<br>Buttonwillow, CA | Communities of Buttonwillow, Lost Hills, Belridge, Blackwell's Corner, Keck's Corner, Spicer City, Devil's Den, and unincorporated areas near cities of Shafter, and Wasco. Response area (sq. mi.): 1,500 | 1 Sergeant,<br><br>2 Sr. Deputies,<br>10 Patrol Deputies,<br>2 FT Office Services Technicians |
| **Delano Substation**<br>455 Lexington Avenue<br>Delano, CA | Communities of Delano and McFarland,<br>Response area (sq. mi.): 450 | 1 Sergeant<br>8 Deputies<br>2 Clerks |
| **Lamont Substation**<br>12022 Main Street<br>Lamont, CA | Communities of Lamont and Arvin<br>Response area (sq. mi.): 840 | 1 Sergeant<br>3 Sr. Deputies<br>14 Deputies<br>2 Office Services Technicians |
| **Rosedale Substation**<br>10814 Rosedale Highway<br>Bakersfield, CA | Communities of Rosedale and Bakersfield<br>Response area (sq. mi.): not specified | 1 Sergeant<br>1 Investigator<br>Several Deputies<br>1 Clerk |
| **Taft Substation**<br>311 North Lincoln Street<br>Taft, CA | Communities of Taft and Maricopa<br>Response area (sq. mi.): 787 | 9 Deputies<br>2 Detectives<br><br>1 School Resource Deputy<br>1 Bailiff |
| **Wasco City Substation**<br>784 F Street<br>Wasco, CA | Communities of Wasco and Shafter<br>Response area (sq. mi.): 4 | 1 Commander1 Lieutenant<br><br>1 Sergeant<br>2 Sr. Deputies<br>13 Deputies<br>3 Office Services Technicians |
| **Bakersfield Police Department** [(a)] | | |
| **Bakersfield Police Dept.**<br>1601 Truxtun Avenue<br>Bakersfield, CA 93301 | City of Bakersfield<br><br>Response area (sq. mi.): 135 | 346 sworn officers |

Source: (a) City of Bakersfield 2014e

## Bakersfield Police Department

The Bakersfield Police Department (BPD) has jurisdiction over 150 square miles of City of Bakersfield. In 2014, the BPD had 346 sworn officers and has the authorized capacity of 389 (Table 4.14-5) (International Association of Chiefs of Police 2014; Grubbs 2014).

# Schools

Kern County public school system is operated by the Kern County Superintendent of Schools (KCSOS). The KCSOS serves 47 K-12 school districts in the County (Table 4.14-6).The Project Area is within the boundaries of 40 of these school districts. According to 2012-2013 data, the total K-12 enrollment for Kern County was 178,671 students (Table 4.14-6).

**Table 4.14-6: Kern County Student Enrollment, 2012 – 2013**

| **Kern County Student Enrollment, 2012-2013 School Year [(a)]** | | |
|---|---|---|
| **Schools** | **No. of School Districts** | **2012-2013 Enrollment** |
| Elementary | 35 | 124,820 |
| High School | 4 | 53,667 |
| Ungraded | 8 | 184 |
| **TOTAL** | **47** | **178,671** |

Sources: Educational Data Partnership 2015

In addition to Kern County's K-12 school districts, the County includes a number of private schools and home or independent study programs. Adult colleges in Kern County include Bakersfield College, California State University, Bakersfield, Taft College, and Cerro Coso Community College.

Table 4.14-7 provides the enrollment numbers for each district within the Project Area for the 2012-2013 school year.

**Table 4.14-7: School Districts Serving the Project Area and Student Enrollment, 2012 – 2013 School Year**

| **School District** | **Student Enrollment** |
|---|---|
| Arvin Union | 3,159 |
| Bakersfield City | 28,987 |
| Beardsley Elementary | 1,730 |
| Belridge Elementary | 32 |
| Blake Elementary | 6 |
| Buttonwillow Union Elementary | 342 |
| Caliente Union Elementary | 61 |
| Delano Joint Union High | 4,323 |
| Delano Union Elementary | 7,636 |
| Di Giorgio Elementary | 204 |
| Edison Elementary | 1,148 |
| Elk Hills Elementary | 201 |

**Table 4.14-7: School Districts Serving the Project Area and Student Enrollment, 2012 – 2013 School Year**

| School District | Student Enrollment |
|---|---|
| Fairfax Elementary | 2,363 |
| Fruitvale Elementary | 3,285 |
| General Shafter Elementary | 142 |
| Greenfield Union | 9,057 |
| Kern County Office Of Education | 4,552 |
| Kern High | 37,070 |
| Lakeside Union | 1,314 |
| Lamont Elementary | 2,862 |
| Linns Valley-Poso Flat Union | 30 |
| Lost Hills Union Elementary | 573 |
| Maple Elementary | 276 |
| Maricopa Unified | 2,366 |
| McFarland Unified | 3,306 |
| McKittrick Elementary | 72 |
| Midway Elementary | 101 |
| Norris Elementary | 3,884 |
| Panama-Buena Vista Union | 17,325 |
| Pond Union Elementary | 239 |
| Richland Union Elementary | 3,374 |
| Rio Bravo-Greeley Union Elementary | 1,041 |
| Rosedale Union Elementary | 5,408 |
| Semitropic Elementary | 571 |
| Standard Elementary | 2,979 |
| Taft City | 2,083 |
| Taft Union High | 1,032 |
| Vineland Elementary | 762 |
| Wasco Union Elementary | 3,466 |
| Wasco Union High | 1,760 |
| **TOTAL** | **159,122** |

Source: California Department of Education 2015

# Parks

Please see information regarding park and recreation facilities in Section 4.15, Recreation.

## Other Public Facilities

There are over 60 community health centers, health clinics, ambulatory surgical centers, and hospitals within the Project Area. The following are hospitals in the Project Area that have emergency rooms:

- Bakersfield Heart Hospital, Sillect Avenue, Bakersfield;
- Bakersfield Memorial Hospital, 34th Street, Bakersfield;
- Delano Regional Medical Center, Delano;
- Kern Medical Center, Bakersfield;
- Mercy Hospital, Bakersfield;
- Mercy Southwest Hospital, Bakersfield;
- Ridgecrest Regional Hospital, Ridgecrest; and
- San Joaquin Community Hospital, Bakersfield.

The Kern Medical Center also has a trauma center.

The Kern County Emergency Medical Services Department (EMS) is the lead agency for the EMS system in Kern County. EMS is responsible for coordinating all system participants, which include the public, emergency service providers, and hospitals throughout the County. The department provides training programs for EMS such as certification and recertification for local EMS personnel. It includes communications services, including EMS dispatch. Transportation services include ambulance service monitoring and system compliance, service areas and performance standards, and status of EMS transportation systems. The County has been divided into 10 geographic regions. Each region, or Exclusive Operating Area (EOA), has been assigned to one ambulance provider.

A Community Health Needs Assessment (CHNA) was prepared for Kern County in 2013 (Healthy Community Institute and Strategy Solutions 2013) through a collaborative effort of the Kern County Community Benefit Collaborative, and is comprised of Delano Regional Medical Center, Dignity Health (Mercy and Memorial Hospitals), Kaiser Permanente, and San Joaquin Community Hospital. The CHNA was conducted to identify primary health issues, status, and needs, and enable providers to establish priorities, development interventions, and to direct resources to improve the health of Kern County residents.

The CHNA identified that nearly 200 existing health care facilities and resources (out-patient care, home health, hospices, skilled nursing facilities, etc.) are available in the County. The results of the study did not reveal a lack of health care or hospital services availability to the community but, instead, identified the need to increase wellness and health education throughout the County.

Other public services include over 25 federal post offices and city and County libraries. Kern County Library Main Branch (Beale Memorial Library) is located at 701 Truxtun Avenue in Bakersfield. The County library system is divided into two districts: Greater Bakersfield Area and Outside Bakersfield Area. Greater Bakersfield Area has seven branch libraries, plus a bookmobile and the Olive Drive Fire Research Center; Outside Bakersfield Area has 13 branches, plus a bookmobile. Of these 20 library branches, 13 are located within the Project Area.

## 4.14.3 Regulatory Setting

# Federal

No federal regulations, plans, or public service standards applicable to the Project have been identified.

# State

### Fire Protection

#### CAL FIRE

Under Title 14 of the Natural Resources of the California Code of Regulations (CCR), CAL FIRE has the primary responsibility for implementing fire wildlife planning and protection for State Responsibility Area (SRA) lands. CAL FIRE develops fire safe regulations and issues fire safe clearances for land within a fire district of SRA. More than 31 million acres of California's privately-owned wildlands are under the jurisdiction of CAL FIRE through the CAL FIRE Resource Management Program. CAL FIRE provides emergency services in 36 of the state's 58 counties via contracts with local governments (CAL FIRE 2012).

In addition to wildland fires, CAL FIRE's planning efforts involve responding to other types of emergencies that may occur on a daily basis, including residential or commercial structure fires, automobile accidents, heart attacks, drowning victims, lost hikers, hazardous material spills on highways, train wrecks, floods, and earthquakes.

Under Title 24, Regulations Development, the Office of the State Fire Marshal (OSFM) is responsible for promulgating regulations that promote fire and life safety for inclusion into the State Building Codes, including the California Building Code, California Fire Code, California Electrical Code, California Mechanical Code, California Plumbing Code, and California Historical Building Code. These documents are also referred to as California Code of Regulations, Title 24. The process incorporates a great deal of public participation and is guided by the State Building Standards Law.

### California Occupational Safety and Health Administration

In accordance with CCR, Title 8, Sections 1270, Fire Prevention, and 6773, Fire Protection and Fire Equipment, the California Occupational Safety and Health Administration (Cal/OSHA) has established minimum standards for fire suppression and emergency medical services. The standards include, but are not limited to, guidelines on the handling of highly combustible materials, fire hosing sizing requirements, restrictions on the use of compressed air, access roads, and the testing, maintenance, and use of firefighting and emergency medical equipment.

## Schools

### California State Assembly Bill 2926 – School Facilities Act of 1986

In 1986, Assembly Bill (AB) 2926 was enacted by the State of California authorizing entities to levy statutory fees on commercial/industrial and residential development in order to pay for school facilities. AB 2926, entitled the School Facilities Act of 1986, was expanded and revised in 1987 through the passage of AB 1600, which added Section 66000 et seq. of the California Government Code.

### Proposition 1A/Senate Bill 50

Proposition 1A/Senate Bill (SB) 50 (Chapter 407, Statutes of 1998) created the School Facility Program where eligible school districts may obtain state bond funds. State funding requires matching local funds that generally come from developer fees. SB 50 authorizes school districts to assess fees directly to offset the costs associated with increasing school capacity as a result of new development. The old "Stirling" fees were incorporated into SB 50 and are referred to as Level 1 fees. These fees are currently capped at $0.47 per square foot for commercial and industrial (nonresidential) development and age-restricted senior housing. Districts meeting certain criteria may collect Level 2 fees as an alternative to Level 1 fees. Level 2 fees are calculated under a formula in SB 50. Level 3 fees are approximately double Level 2 fees and are implemented only when the State Allocation Board is not apportioning state bond funds. The passage of Proposition 1D on November 7, 2006, precludes the implementation of Level 3 fees for the foreseeable future. SB 50 states that payment of developer fees are "deemed to be complete and full mitigation" of the impacts of new development.

# Local

## Kern County General Plan

The Project Area is located within the Kern County General Plan (KCGP) area and, therefore, would be subject to applicable policies and measures of the KCGP. The Land Use, Conservation, and Open Space Element and the Safety Element of the KCGP include goals, policies, and implementation measures related to public safety that apply to the Project, as described below.

# Chapter 1. Land Use, Conservation, and Open Space Element

## 1.4. Public Facilities and Services

### Goals

**Goal 1.** Kern County residents and businesses should receive adequate and cost effective public services and facilities. The County will compare new urban development proposals and land use changes to the required public services and facilities needed for the proposed project.

### 1.4.1. Public Facilities and Services

### Policies

**Policy 1.** New discretionary development will be required to pay its proportional share of the local costs of infrastructure improvements required to service such development.

**Policy 6.** The County will ensure adequate fire protection to all Kern County residents.

**Policy 7.** The County will ensure adequate police protection to all Kern County residents.

### Implementation Measures

**Implementation Measure L.** Prior to the approval of development projects, the County shall determine the need for fire protection services. New development in the County shall not be approved unless adequate fire protection facilities and resources can be provided.

## 1.10. General Provisions

### Goals

**Goal 1**. Ensure that the County can accommodate anticipated future growth and development while maintaining a safe and healthful environment and a prosperous economy by preserving valuable natural resources, guiding development away from hazardous areas, and assuring the provision of adequate public services.

### 1.10.1. Public Services and Facilities

### Policies

**Policy 9**. New development should pay its pro rata share of the local cost of expansions in services, facilities, and infrastructure which it generates and upon which it is dependent.

**Policy 15**. Prior to approval of any discretionary permit, the County shall make the finding, based on information provided by the California Environmental Quality Act (CEQA) documents, staff analysis, and the applicant, that adequate public or private services and resources are available to serve the proposed development.

**Policy 16**. The developer shall assume full responsibility for costs incurred in service extensions or improvements that are required to serve the Project. Cost sharing or other forms of recovery shall be available when the service extensions or improvements have a specific quantifiable regional significance

## Chapter 4. Safety Element

### 4.6. Wildland and Urban Fire

#### Policies

**Policy 1**. Require discretionary projects to assess impacts on emergency services and facilities.

**Policy 3**. The County will encourage the promotion of fire prevention methods to reduce service protection costs and costs to taxpayers.

**Policy 4**. Ensure that new development of properties have sufficient access for emergency vehicles and for the evacuation of residents.

**Policy 5**. Require that all roads in wildland fire areas are well marked, and that homes have addresses prominently displayed.

**Policy 6**. All discretionary projects shall comply with the adopted Fire Code and the requirements of the Fire Department.

#### Implementation Measures

**Implementation Measure A**. Require that all development comply with the requirements of the Kern County Fire Department or other appropriate agency regarding access, fire flows, and fire protection facilities.

## Metropolitan Bakersfield General Plan

The Metropolitan Bakersfield General Plan (MBGP), a joint effort between the Kern County Planning Department and the City of Bakersfield Planning Division, was last adopted on December 11, 2007. The MBGP includes both city and unincorporated County lands. The MBGP describes the community's physical development as well as its economic, social and environmental goals and is currently undergoing an update. The Project Area includes a total of 152,040 acres of unincorporated County lands that are covered under the MBGP (7.41%). Project-related development on unincorporated lands within the MBGP Planning Area would be subject to the following applicable policies and implementation measures of the MBGP, with respect to public services.

## Chapter VIII. Safety Element

The MBGP Safety Element includes the following goals and policies:

### C. Public Safety

#### Goals

**Goal 1**. Ensure that the Bakersfield metropolitan area maintains a high level of public safety for its citizenry.

**Goal 2**. Ensure that adequate police and fire services and facilities are available to meet the needs of current and future metropolitan residents through the coordination of planning and development of metropolitan police and fire facilities and services.

**Goal 3**. Provide for the coordinated planning and development of service areas for police and fire protection to ensure an equitable burden of responsibility between County and City in metropolitan Bakersfield.

**Goal 4**. Ensure that fire, hazardous substance regulation, and emergency medical service problems are continuously identified and addressed in a proactive way, to optimize safety and efficiency.

#### Policies

**Policy 1**. Identify future site locations, projected facility expansions, projected site acquisition costs, construction costs and operational costs in a manner that would maximize the efficiency of new public safety services (I-1, I-2, I-3).

**Policy 2**. Require discretionary projects to assess impacts on police and fire services and facilities (I-3).

**Policy 11**. Expand emergency medical services by the City and County Fire Departments and encourage the integration of ground and air and public and private resources to achieve efficiency and effectiveness of emergency medical services.

#### Implementation Measures

**Implementation Measure 2**. Funding for Police and Fire equipment and facilities will be facilitated through bond issues and/or development fees and/or land dedications and/or assessment districts.

## Chapter X. Public Services and Facilities Element

### A. General Utility Services

#### Goals

**Goal 4**. Develop funding principles and programs which will assure that all new development will pay for the incremental costs of the public facilities and services—utilities bridges, parks, and public safety facilities—both onsite and offsite, to serve such development.

### Policies

**Policy 5**. Require all new development to pay its pro rata share of the cost of necessary expansion in municipal utilities, facilities and infrastructure for which it generates demand and upon which it is dependent (I-3).

### Implementation Measures

**Implementation Measure 4**. Create benefit assessment districts or establish service fees for the distribution of costs to users for capital improvement replacement costs and maintenance, utilizing such districts for the financing of improvements which are essential to planning area development.

## Chapter XI. Parks Element

None of the goals, policies, or implementation measures related to parks are applicable to the proposed Project.

## Kern County Specific Plans

Kern County has adopted 24 Specific Plans for properties within the Project Area. These Specific Plans are intended to be an amplification of the goals and policies of the KCGP and are, therefore, consistent therewith. As depicted in Figure 4.10-3, less than 8% of the Project Area is located wholly or partially within adopted Specific Plan areas. Future oil and gas exploration and production activities that would be authorized under the proposed Amendment to Chapter 19.98 (Oil & Gas Production) of the Kern County Zoning Ordinance that would be located within the boundary of an adopted Specific Plan would be regulated according to County zoning, with the exception of the Specific Plans identified as Tier 5.

## Kern County Unit Strategic Fire Plan

The Kern County Fire Department's 2012 Unit Strategic Fire Plan was developed collaboratively between federal, state, city, and County agencies to identify and prioritize fire management strategies. The plan is designed to be an assessment and planning tool. The plan documents the wildland fire situation throughout the State Responsibility Areas (SRA) within the County. The SRA is the area where the State of California is financially responsible for the prevention and suppression of wildfires. The goal of this plan is to reduce costs and losses from wildfire by protecting assets at risk through focused pre-fire management prescriptions and increasing initial attack success.

## Kern County Multi-Hazard Mitigation Plan

The purpose of the multi-hazard mitigation plan is to reduce or eliminate the long-term risk to people and property from natural hazards and their effects in the County. The plan was updated in 2012 to help Kern County become less vulnerable to losses from future disasters. The multi-jurisdictional plan includes the County and the incorporated municipalities of Arvin, Bakersfield, California City, Delano, Maricopa, McFarland, Ridgecrest, Shafter, Taft, Tehachapi, and Wasco. This plan also covers 53 special districts that include school, recreation and park, water,

community service, and other districts. Among the items assessed, the plan evaluated the risks associated with seismic events, dam failure, severe weather, and wildfire on oil and gas facilities.

## Kern County Wildland Fire Management Plan

The Kern County Wildland Fire Management Plan documents the assessment of wildland fire situations throughout the SRAs within the County. The Kern County Fire Department Wildland Fire Management Plan provides for systematically assessing the existing levels of wildland protection services and identifying high-risk and high-value areas that are potential locations for costly and damaging wildfires. The goal of the plan is to reduce costs and losses from wildfire by protecting assets at risk through focused pre-fire management prescriptions and increasing initial attack success. Based on this assessment, preventive measures are implemented, including the creation of wildfire protection zones.

## Capital Improvement Plan and Public Facilities Mitigation Program

The changing fiscal landscape in California during the past 30 years has steadily undercut the financial capacity of local governments to fund infrastructure. Faced with these trends, the County has adopted a policy of "growth pays its own way" through use of a public facilities mitigation program. The primary policy objective of this program is to ensure that new development pays the capital costs associated with growth.

In 2008, the County adopted a Capital Improvement Plan (CIP) that identifies the best current understanding of the public facilities that will be needed to accommodate new development anticipated through 2030. The CIP further identified appropriate existing facility demand standards to be used as a basis for estimating future facility needs and level of service. The adopted CIP includes a summary of proposed service levels for the included facilities and a conceptual list of planned projects, upon which the CIP was based. The scope of services includes: parks, libraries, sheriff (public protection and investigation), fire, animal control, public health, landfill/transfer stations, and general government. Roads and sewer costs and impacts are not part of the program.

Continued growth within the County and the associated impacts resulting from that growth have increased the demands to Countywide public services and have made it difficult to not only implement and fund many of those facilities identified within the CIP, but maintain existing public service demand standards as growth occurs. In short, despite the increase in property taxes generated as a result of the proposed Project and other similar projects within the County, public facility impacts are still underfunded and unable to maintain existing and adopted facility standards.

The purpose of the Public Facilities Mitigation Program is to identify impacts on public services and identify the monetary CEQA mitigation necessary to meet the facilities associated with that growth. The following categories have been identified to help determine which specific public needs are impacted by a typical development project.

- Countywide Public Protection Facilities;

- Sheriff Patrol and Investigation Facilities;
- Library Facilities;
- Animal Control Facilities;
- Park Facilities;
- Fire Facilities;
- Waste Management Facilities;
- Public Health Facilities; and
- General Government Facilities.

## 4.14.4 Impacts and Mitigation Measures

This section presents a discussion of the potential public services impacts associated with development of the proposed Project.

## Methodology

The potential impacts associated with the Project were evaluated on a quantitative and qualitative basis and reflect consultations with public service providers in the Project Area. Public service systems were evaluated by reviewing the most current data available from State and Kern County department websites, the KCGP, the Kern County Multi-Hazard Mitigation Plan, and the Kern Count Wildland Fire Management Plan.

## Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist state that a project would normally be considered to have a significant public services impact if it would:

- Result in substantial adverse physical impacts associated with the need for new or physically altered governmental facilities, the construction of which would cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or to other performance objectives for any of the following public services:
  - Fire protection,
  - Police protection,
  - Schools,
  - Parks, and
  - Other public facilities.

# Project Impacts

## Impact 4.14-1: Result in Substantial Adverse Physical Impacts Associated with the Need for New or Physically Altered Governmental Facilities, the Construction of which Would Cause Significant Environmental Impacts, in Order to Maintain Acceptable Service Ratios, Response Times, or Other Performance Objectives for Any of the Following Public Services: Fire Protection, Police Protection, Schools, Parks, and Other Public Facilities

The following analysis addresses potential impacts on fire, police, and other public services from construction of new or physically altered facilities and the impacts on these services that would be generated by implementation of the Project.

Population and industrial growth in a given area increases the use of public services, such as fire, police, and schools. Increased use of these services can strain their capacity, which affects their performance and/or their ability to provide their services adequately. Future oil and gas exploration and production activities that would be authorized under the Project are not anticipated to result in a substantial population increase (see Section 4.13, Population and Housing). In addition, future oil and gas exploration and production activities would not include provisions of new or physically altered government facilities.

Given the history of oil and gas development within Kern County, and as explained further in Section 4.13, Population and Housing, any nominal increase in the oil and gas workforce in the future would likely be comprised of local Kern County residents. As such, the nominal population growth would not stress certain existing public services, such as schools and libraries; however, the anticipated new oil and gas activity may strain services, such as police and fire services, in the vicinity of the new oil and gas wells.

### Fire Protection

Activities during any stage of oil and gas exploration and production activities could produce sparks or ignition sources that could ignite products being used or produced or nearby vegetation. A total of 598 fires have occurred in the western Kern County oilfields or oilfield extraction areas from 2000 to 2014. Figure 4.14-1 illustrates the locations of fire stations, the current oil and gas administrative wellfield areas, and CAL FIRE fire zones. Most active oil and gas fields are located in areas with moderate fire risks.

Construction and operation of all future oil and gas exploration and production activities that would be authorized under the proposed Project would be subject to the provisions of the Uniform Fire Code and local amendments (Titles 19, 22, and 27 of the California Safety Code Regulations; the Kern County Ordinance Code; and the National Fire Protection Association Standards). Oil and gas activities also would have to comply with all applicable wildland fire management plans and policies established by CAL FIRE and KCFD.

A community's requirements for fire protection facilities are based on the number of residents and workers in the primary service area. Service demand is primarily tied to the size of the population being served, not land use activity, because emergency medical calls typically make up the majority of responses provided by a fire department. As the population within a service area increases, so does the number of emergency medical calls. The need for fire protection and emergency response facilities also increases. However, future oil and gas exploration and production activities that would be authorized under the proposed Project are not anticipated to result in a substantial population increase. Given the long history of oil and gas development within Kern County, and as explained further in Section 4.13, Population and Housing, any nominal increase in the oil and gas workforce in the future would likely be comprised of local Kern County residents.

In general, oil and gas exploration and production facilities do not have their own onsite firefighting teams. While fire extinguishers are retained onsite to suppress small fires and precautions are taken to prevent fires, most facilities rely on the firefighting capabilities of the local jurisdiction to address most fires. Like other businesses that use hazardous materials, oil and gas exploration and production facilities are required to file hazardous materials business plans with the Kern County Environmental Health through the California Environmental Reporting System (CERS) program. This is, in part, so that the fire department would be prepared to respond to all types of emergencies that could occur at such facilities.

There are five classes of fires:

Class A: Class A fires are fires in ordinary combustibles, such as wood, paper, cloth, trash, and plastics.

Class B: Class B fires are fires in flammable liquids, such as gasoline, petroleum oil, and paint. Class B fires also include flammable gases, such as propane and butane. Class B fires do not include fires involving cooking oils and grease.

Class C: Class C fires are fires involving energized electrical equipment, such as motors, transformers, and appliances. Remove the power, and the Class C fire becomes one of the other classes of fire.

Class D: Class D fires are fires in combustible metals, such as potassium, sodium, aluminum, and magnesium.

Class K: Class K fires are fires in cooking oils and greases, such as animals fats and vegetable fats (Fire Equipment Manufacturers Association 2015)

Other than Class K, which are fires associated with commercial kitchens, any of these types of fires could occur at oil and gas facilities because of the hazardous materials that could be located on oil and gas facilities. Both Kern County and City of Bakersfield have hazardous materials teams. However, with the projected increase in the number of oil and gas facilities where many different types of chemicals and/or large quantities of oil or gas are present, significant impacts could occur if the hazardous material response teams do not have sufficient firefighting

materials or equipment to extinguish the type of fires that could be associated with the types of materials that could be at an oil and gas facility.

## Police Protection

The Kern County Sheriff's Office serves a population base of over 500,000 in metropolitan and rural areas. The staffing ratio for Metropolitan Bakersfield is currently one officer per 1,000 people, but their target goal is 1.3 per 1,000 people (City of Bakersfield 2014f). Implementation of the proposed Project would not lead to a substantial increase in the population within the County; therefore, the per capita staffing ratio would not be affected. However, there would be an increase in industrial development, potentially in rural areas of the County.

As shown on Figure 4.14-2 and Table 4.14-5, several Sheriff's stations have very large response areas, such as 1,500 square miles for the Buttonwillow substation and 850 square miles for the Lamont substation and 787 square miles for the Taft substation. The Buttonwillow and Taft substations cover most of the Western Subarea. The Delano, Wasco, and Rosedale Sheriff substations and the Bakersfield Police Department cover the Central Subarea, while the Delano and Lamont Sheriff substations and the Bakersfield Police Department cover the Eastern Subarea.

As described in Section 4.14.2, the Rural Crimes Investigation Unit, which addresses property crimes in the agricultural, ranch, and oil and gas field portions of Kern County, has experienced a 10-fold increase in incidences, specifically in metal theft, between 2009 and 2012 (Winn 2014). This rise in crime is not attributed to oil and gas activity. However, increased oil and gas development would mean that there would be equipment, vehicles, and other metal objects at existing and future construction and operations sites.

The Rural Crimes Investigation Unit (RCIU) is currently staffed with one sergeant (supervisor), two senior deputies (investigators), three deputies, one support technician (clerical). In addition, there is one unpaid reserve deputy. The total cost of the RCIU is $1,097,000, which includes salaries and benefits, overtime, surveillance equipment, supplies, training, fuel, and air support flight hours. The Sherriff's office receives approximately $366,000 in state funding from the Central Valley Rural Crimes Prevention Fund to help offset these costs; giving a net general fund cost of approximately $731,000.

The Rural Crimes Unit investigates all crimes that affect farming, ranching, and the oil industry in Kern County. Metal theft is the largest problem that affects farms, ranches, and the oil industry in Kern County. The addition of three deputies to the Rural Crimes Unit has allowed the Sheriff's Department to develop and implement effective strategies, which have reduced the dollar amount and number of rural crime incidences.

Although service demands would not increase from the implementation of the proposed Project , new oil and gas exploration and production activities could increase the level of demand for police protection services from the Sheriff's Office, specifically in rural areas, because new oil and gas activity could attract vandals or create security risks requiring police response. Since the

majority of new oil and gas activities would likely be in rural areas, there could be some increase in demands on the Rural Crimes Unit of the Kern County Sheriff's Department. This impact could be significant.

## Schools

Population growth is anticipated to be nominal as result of implementation of the proposed Project during the construction, operation, maintenance, and decommissioning phases of future oil and gas exploration and production activities (see Section 4.13, Population and Housing). As a result, the Project would not substantially affect enrollment in local schools, and school impacts are considered less than significant.

## Parks

Please see information regarding park and recreation facilities in Section 4.15, Recreation.

## Other Public Facilities

As discussed above, emergency medical calls typically make up the majority of responses provided by a fire department. As the number of residents and workers increases, the need for emergency response services increases. Since population growth is anticipated to be nominal as a result of the implementation of the proposed Project, the Project would not have a significant impact on emergency services or to other public facilities, such as or postal services or libraries. Therefore, impacts on other public facilities are considered to be less than significant.

## Mitigation Measures

The Facilities Mitigation Program is designed to augment, where appropriate, funding of services when projected tax revenues from projects are expected to result in a funding shortfall for project-related service demands. Applicants collectively contribute approximately 30% of the property tax revenues collected by the County, and accordingly pay their fair share for most local services with the exception of demand for fire-fighting and rural sheriff services, for which additional funding is included as mitigations (MM 4.14-1 and MM 4.14-2) in this Environmental Impact Report (EIR).

**MM 4.14-1** Applicant shall contribute to funding the acquisition of a Combination Walk-in/Non-Walk-in Industrial Firefighting vehicle capable of responding with a minimum of five firefighters with the tools and equipment necessary for industrial firefighting and rescue. Each Applicant shall pay $150 per well on each Oil and Gas Conformity Review permit until the total cost of the vehicle purchase is reached, not to exceed $850,000, to be paid through mitigation fees on Oil and Gas Conformity Review permits. Subsequent Applicants shall not be subject to this mitigation measure.

**MM 4.14-2** Applicant shall provide funding in the amount of $425 per Oil and Gas Conformity Review permit issued for the Sheriff's Rural Crime Unit. Funding shall be used for one Sergeant, two Senior Deputies (investigators), three

Deputies, One Support Technician (clerical), and helicopter usage, based on the amount of funding provided by this permit mitigation fee. The Sheriff's department shall annually report on the expenditure of funds for the Rural Crimes Unit, including incident reports and response times. If other sources of funding for the Rural Crimes Unit are secured, then the mitigation fee amount shall be adjusted to pay only the gap between actual costs and funding provided from other sources.

### Level of Significance After Mitigation

Impacts would be less than significant with mitigation.

## 4.14.5 Cumulative Setting, Impacts, and Mitigation Measures

## Cumulative Setting

Cumulative impacts to public services are usually associated with population in-migration and growth in an area, which increase the demand for particular services, leading to the need for expanded services or new facilities. Public services are provided by local jurisdictions or districts. Service providers serving the Project are located in Kern County. Therefore, the geographic scope for cumulative impacts to public services is limited to the County.

### Impact 4.14-2: Contribute to Cumulative Public Service Impacts

The plans evaluated in this cumulative analysis are described in Section 3.8, Cumulative Projects. Implementation of these plans and any projects associated with these plans would be required to comply with the goals, policies, and implementation measures of applicable federal and local laws and land use standards imposed by the respective jurisdictions within with each related project is located. This includes the possibility of being required to undergo environmental review, in compliance with the requirements of CEQA and/or the National Environmental Policy Act (NEPA). Should potential impacts to public services be identified, appropriate mitigation would be prescribed.

Significant impacts to fire and police protection services would occur as a result of the future oil and gas exploration and production activities that would be authorized under the proposed Project (Impact 4.14-1). However, mitigation measures MM 4.14-1 and MM 4.14-2 would be incorporated to ensure that impacts are less than significant.

Overall, the proposed Project would cumulatively contribute to an increased demand for fire, police, schools, and other public facilities and, therefore, could be significant impacts. While the proposed Project's contribution to growth in the region would be nominal, cumulative projects that would occur under the regional plans would add to the cumulative demand for such services through the introduction of new residents and users of the proposed facilities. However, this growth has been considered and accounted for in the KCGP, the MBGP, and the Kern Council of Government (COG) Regional Transportation Plan (RTP)/Sustainable Communities Strategy

(SCS). Additionally, in accordance with the KCGP, Public Services and Facilities, Policies 9 and 16 (see Section 4.14.3, Regulatory Setting), new developments would be required to pay a pro rata share of the local cost for the expansion of services under the Public Facilities Mitigation Program. Developers would be required to assume full responsibility for costs incurred in service extensions or improvements that are required to serve their project(s). Therefore, new projects would have to pay for the extension or improvement of fire, police, or other services to serve a specific development, if those services are not available and to ensure service objectives are met.

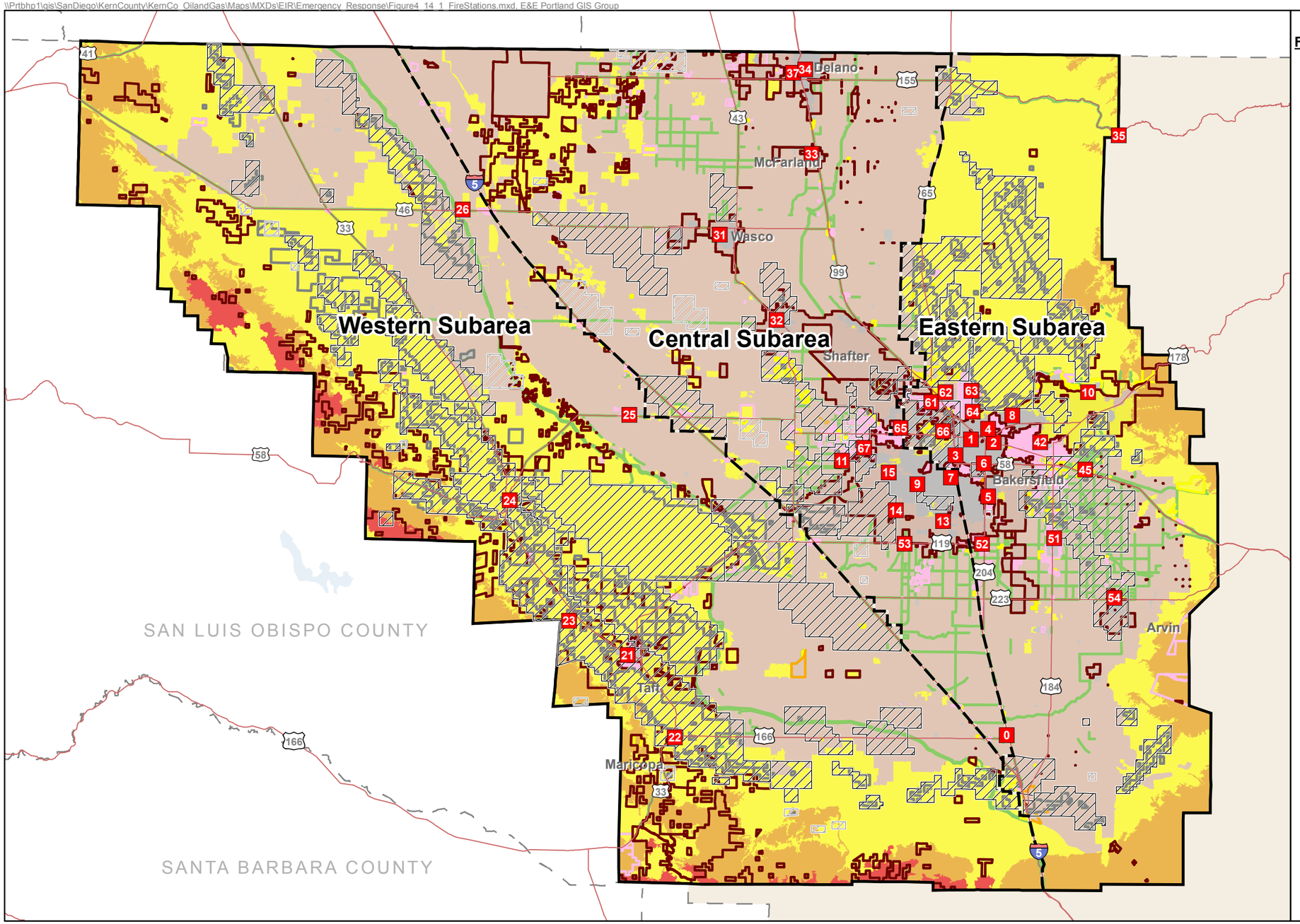
Additionally, the Project Area is located in an area that is served by all public service providers and the proposed Project's incremental impacts can be sufficiently mitigated (MM 4.14-1 and MM 4.14-2); therefore, the Project's incremental effect on public services is not cumulatively considerable and would be considered less than significant.

## Mitigation Measures

Implement MM 4.14-1 and MM 4.14-2, as described above.

## Level of Significance After Mitigation

Cumulative impacts would be less than significant with mitigation.




## Fire Stations

0. Station Tejon Ranch
5441 Dennis McCarthy Rd Metter, CA 93243
Response Area (sq. mi.): 308

1. Station No. 1 Bakersfield
2101 H St Bakersfield, CA
Response Area (sq. mi.): 3.81

2. Station No. 2 Bakersfield
716 E. 21st St Bakersfield, CA
Response Area (sq. mi.): 2.15

3. Station No. 3 Bakersfield
3400 Palm St Bakersfield, CA
Response Area (sq. mi.): 2.4

4. Station No. 4 Bakersfield
130 Bernard St Bakersfield, CA
Response Area (sq. mi.): 2.64

5. Station No. 5 Bakersfield
106 E White Ln Bakersfield, CA
Response Area (sq. mi.): 8.52

6. Station No. 6 Bakersfield
127 Brundage Ln Bakersfield, CA
Response Area (sq. mi.): 4.95

7. Station No. 7 Bakersfield
4030 Soranno Dr Bakersfield, CA
Response Area (sq. mi.): 5.13

8. Station No. 8 Bakersfield
2213 University Ave Bakersfield, CA
Response Area (sq. mi.): 11.38

9. Station No. 9 Bakersfield
7912 Westwold Dr Bakersfield, CA
Response Area (sq. mi.): 4.66

10. Station No. 10 Bakersfield
12100 Alfred Harrell Hwy Bakersfield, CA
Response Area (sq. mi.): 19.58

11. Station No. 11 Bakersfield
700 Stockdale Hwy Bakersfield, CA
Response Area (sq. mi.): 4.30

13. Station No. 13 Bakersfield
4900 Poppyseed St Bakersfield, CA
Response Area (sq. mi.): 10.90

14. Station No. 14 Bakersfield
5812 Mountain Vista Dr Bakersfield, CA
Response Area (sq. mi.): 8.23

15. Station No. 15 Bakersfield
1315 Buena Vista Rd Bakersfield, CA
Response Area (sq. mi.): 7.01

21. Station 21 Taft
303 10th St Taft, CA 93268
Response Area (sq. mi.): 172

22. Station 22 Maricopa
801 Stanislaus St Maricopa, CA 93252
Response Area (sq. mi.): 219

23. Station 23 Fellows
100 Broadway Fellows, CA 93224
Response Area (sq. mi.): 66

24. Station 24 McKittrick
23246 2nd St McKittrick, CA 93251
Response Area (sq. mi.): 218

25. Station 25 Buttonwillow
100 Mirasol Ave Buttonwillow, CA 93206
Response Area (sq. mi.): 220

26. Station 26 Lost Hills
14670 Lost Hills Rd Lost Hills, CA 93429
Response Area (sq. mi.): 761

31. Station 31 Wasco
2424 7th St Wasco, CA 93280
Response Area (sq. mi.): 155

32. Station 32 Shafter
325 Sunset Ave Shafter, CA 93263
Response Area (sq. mi.): 132

33. Station 33 McFarland
700 West Perkins Ave McFarland, CA 93215
Response Area (sq. mi.): 182

34. Station 34 Delano
1001 12th Ave Delano, CA 93215
Response Area (sq. mi.): 66

35. Station 35 Woody
17977 Hwy 155 Woody, CA 93287
Response Area (sq. mi.): 179

37. Station 37 Delano West
132 West 11th Ave Delano, CA 93215
Response Area (sq. mi.): 84

42. Station 42 Niles
2011 Fairfax Rd Bakersfield, CA 93306
Response Area (sq. mi.): 55

45. Station 45 Edison
11809 Edison Hwy Bakersfield, CA 93307
Response Area (sq. mi.): 163

51. Station 51 Lamont
8225 McKee Rd Lamont, CA 93241
Response Area (sq. mi.): 60

52. Station 52 Greenfield
312 Taft Hwy Bakersfield, CA 93307
Response Area (sq. mi.): 65

53. Station 53 Old River
9443 Taft Hwy Bakersfield, CA 93311
Response Area (sq. mi.): 175

54. Station 54 Arvin
301 Campus Dr Arvin, CA 93203
Response Area (sq. mi.): 126

57. Station 57 Frazier Park
729 West End Dr Frazier Park, CA 93225
Response Area (sq. mi.): 47

61. Station 61 Norris
6400 Fruitvale Ave Bakersfield, CA 93308
Response Area (sq. mi.): 34

62. Station 62 Meadows Field
1652 Sunnyside Ct Bakersfield, CA 93308
Response Area (sq. mi.): 1.75

63. Station 63 Highland
101 Universe Ave Bakersfield, CA 93308
Response Area (sq. mi.): 149

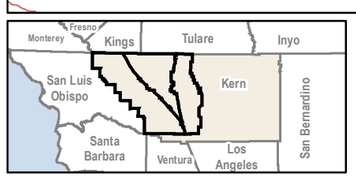
64. Station 64 New River
101 East Roberts Ln Bakersfield, CA 93308
Response Area (sq. mi.): 5

65. Station 65 Green Acres
10051 Meacham Rd Bakersfield, CA 93312
Response Area (sq. mi.): 15

66. Station 66 Landco
3000 Landco Dr Bakersfield, CA 93308
Response Area (sq. mi.): 5

67. Station 67 Rosedale
14341 Brimhall Rd Bakersfield, CA 93312
Response Area (sq. mi.): 64

Fire Hazard
- Very High
- High
- Moderate
- Non-Wildland/Non-Urban
- Urban Unzoned




0 10 Miles

- Project Area
- Subarea
- Highways
- County Boundary
- Kern County
- DOGGR Administrative Well Field Boundaries
- DOGGR Administrative Well Field Boundaries (Abd)

Tier Levels
- Tier 1
- Tier 2
- Tier 3
- Tier 4
- Tier 5
- Non-jurisdictional

Data Sources: City of Bakersfield, 2014; Kern County, 2013, ESRI 2010

**Figure 4.14-1**
**Fire Stations within the Project Area**

Western Subarea

Central Subarea

Eastern Subarea

Delano

McFarland

Wasco

Shafter

Bakersfield

Arvin

Taft

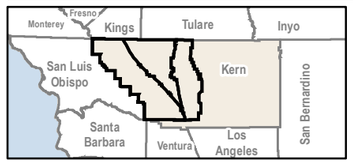
Maricopa

SAN LUIS OBISPO COUNTY

SANTA BARBARA COUNTY

## Police and Sheriff Stations

- Bakersfield Police Department
  1601 Truxtun Ave Bakersfield, CA 93301
  Reponse Area (sq. mi.): 135
  346 Sworn Officers
- Lamont Substation
  12022 Main St Lamont, CA
  Reponse Area (sq. mi.): 840
  1 Sergeant
  3 Sr. Deputies
  14 Deputies
  2 Office Services Technicians
- Delano Substation
  455 Lexington Ave Delano, CA
  Reponse Area (sq. mi.): 450
  1 Sergeant
  8 Deputies
  2 Clerks
- Rosedale Substation
  10814 Roseday Hwy Bakersfield, CA
  1 Sergeant
  1 Investigator
  Several Deputies
  1 Clerk
- Buttonwillow Station
  181 East First Buttonwillow, CA
  Reponse Area (sq. mi.): 1,500
  1 Sergeant
  2 Sr. Deputies
  10 Patrol Deputies
  2 FT Office Services Technicians
- Taft Substation
  311 North Lincoln St Taft, CA
  Reponse Area (sq. mi.): 787
  9 Deputies
  2 Detectives
  1 School Resource Deputy
  1 Bailiff
- California Highway Patrol
  Office #420 Bakersfield
  4040 Buck Owens Blvd. Bakersfield, CA 93308
- California Highway Patrol
  Office #426 Buttonwillow
  29449 Stockdale Hwy Bakersfield, CA 93314
- Wasco City Substation
  784 F St Wasco, CA
  Reponse Area (sq. mi.): 4
  1 Commander
  1 Lieutenant
  1 Sergeant
  2 Sr Deputies




0 10 Miles

Project Area
Subarea
DOGGR Administrative Well Field Boundaries
DOGGR Administrative Well Field Boundaries (Abd)
Kern County
City Limits
Highways
County Boundary

Tier Levels
Tier 1
Tier 2
Tier 3
Tier 4
Tier 5
Non-jurisdictional

Data Sources: City of Bakersfield, 2014; Kern County, 2013, Kern County Sheriff's Office, 2014; ESRI 2010

**Figure 4.14-2**
**Police Stations within the Project Area**

Section 4.15

# Recreation

Section 4.15

# Recreation

## 4.15.1 Introduction

This section describes the affected environment and regulatory setting for parks and recreation facilities. It also describes the impacts on parks and recreation facilities that would result from implementation of the Amendment to Chapter 19.98 (Oil and Gas Production) and related ordinance amendments to the Kern County Zoning Ordinance (Project), and mitigation measures that would reduce these impacts, if necessary.

## 4.15.2 Environmental Setting

Kern County is California's third largest county, encompassing 8,202 square miles at the southern end of the Central Valley. The 3,700-square-mile Project Area is predominantly located in the western portion of the County in the San Joaquin Valley bounded by Kings and Tulare counties to the north; Santa Barbara and San Luis Obispo counties to the west; the Tehachapi Mountains and the Sierra Nevadas to east; and the northern boundary of the Los Padres National Forest to the south.

The Project Area is located in the western half of Kern County, an area that includes, or is adjacent to, many recreational opportunities, including camping, hiking, horseback riding, boating and water skiing, bird watching, picnicking, scenic viewing, golf, baseball and softball, and soccer. The following sections provide a summary of federal, state, and local recreational facilities located in the region.

## Local

The Kern County Parks and Recreation Department operates and maintains 40 neighborhood parks throughout the County, as well as several public buildings that also are used for recreational purposes. There are several local parks located within and adjacent to the Project Area that are owned, operated, and maintained by local jurisdictions and private entities. The Lost Hills RV Park is a privately-owned recreational vehicle (RV) park and campground at State Route 46 and Interstate 5 in Lost Hills, California, that also has a swimming pool, playground, store, and other facilities (Lost Hills RV Park 2013). Lost Hills Paramount Park is also located in Lost Hills. Parks in the city of Arvin include the Smothermon and Kovacevich parks, Di Giorgio County Park and the Arvin Little League Field. Lamont Park and Buttonwillow Recreation Park are located in the towns of Lamont and Buttonwillow, respectively. Parks in the City of Shafter include Richland Park, Rodriguez Park, Kirchenmann Park, James Park, and Mannel Park. Westside Park, Barker Park, Wasco Recreation Ballpark, and Cormack Park are located in Wasco. Browning Road Park, Ritchey Park, Arturo J. Munoz Park, Villa Del Caribe Park, and McFarland Park are located in the City of McFarland. Eleven parks—Albany, Cecil Avenue, Cesar Chavez, Delano Skate Park, Jefferson, Kalibo, Morningside, Martin Luther King, Jr. (Valle

Vista), Veneto, Heritage, and Memorial—are located in the city of Delano. One stadium, Frederick Field Memorial Stadium, and the Delano Public Golf Course are also located in Delano. A Street Park, Taft City Park, Ford City Park, and Civic Center Park are located near the cities of Taft and Ford on the west side of the County. Capitola Park is located south of Maricopa along State Route 166.

# Regional Setting

Numerous park and recreational facilities are located in the vicinity of the Project Area, including national parks, national forests, state parks, and other recreational opportunities (Figure 4.15-1). In addition, the Pacific Crest Trail (PCT) is located east of the Project Area, with the closest segment 9.75 miles away.

The Kern County Parks and Recreation Department manages an extensive system of regional parks designed to serve the Countywide population and small neighborhood and community parks primarily intended to meet the recreational needs of nearby residents in unincorporated communities. These facilities include seven regional parks, 41 neighborhood parks, 25 public buildings, and three golf courses. The Department also provides landscaping services for 76 county buildings. Including incorporated areas, Kern County contains 4,726 acres of park land with 4,282 acres of regional parks and 389 acres of local neighborhood parks, both leased and owned by the County (Kern County Parks and Recreation Department 2010). The Kern River County Park, the largest regional recreation facility in the County, provides a variety of structured and non-structured recreational facilities, including Hart Memorial Park, Camp Okihi, the Kern County Soccer Park, Lake Ming, the Kern River Golf Course, and picnic areas. Non-structured recreational uses occur along the length of Kern River County Park and include rafting, hiking, bicycle trails, off-road vehicle uses. A list of regional parks and community parks within Kern County is provided as Table 4.15-1.

**Table 4.15-1: Existing Parks Inventory**

| Recreational Facility Name | Size (Acres) |
|---|---|
| **Regional Parks** | |
| Buena Vista Aquatic Rec. Area | 1,585 |
| Greenhorn Mountain | 110 |
| LeRoy Jackson | 100 |
| Kern River County Park Total | 1,445 |
| Lake Woollomes | 445 |
| Metropolitan Recreation Center/Stramler | 107 |
| Tehachapi Mountain | 490 |
| Camp Condor [(c)] | - |
| Lake Isabella Rec. Area [(*)] | - |

**Table 4.15-1: Existing Parks Inventory**

| Recreational Facility Name | Size (Acres) |
|---|---|
| **Community Parks** | |
| A.W. Noon | 12 |
| Belle Terrace | 19.30 |
| Boron | 10 |
| Casa Loma | 9 |
| Ed Oakley Park [(a)] | 1.70 |
| Frazier Mountain | 27 |
| Greenfield | 5 |
| Victoria Araujo Park | 3 |
| Heritage | 18 |
| Inyokern | 3 |
| Kern Delta Park [(b)] | 11.75 |
| Kernville Circle | 1 |
| Lake Isabella | 40 |
| Lost Hills | 7 |
| Mojave East | 8 |
| Mojave West | 10 |
| Mountain Mesa | 5.20 |
| North Edwards | 5 |
| Pioneer | 14 |
| Potomac | 5 |
| Randsburg | 0.20 |
| Rexland Acres | 4 |
| Riverside | 5 |
| Rosamond | 10 |
| Scodi [(e)] | 4 |
| Virginia Avenue | 9.50 |
| Wilkins | 2.60 |
| Wofford Heights | 7 |
| **Community Parks Within City or Special District** | |
| Blanco Little League [(d)] | 6 |
| Circle Park (Bakersfield) [(e)] | 0.10 |
| College | 17 |

**Table 4.15-1: Existing Parks Inventory**

| Recreational Facility Name | Size (Acres) |
|---|---|
| Cormack Park (Wasco) [f] | 6 |
| Delano Memorial | 32 |
| Derby Acres [g] | 3.80 |
| DiGiorgio | 16 |
| Fellows [h] | 8 |
| Ford City | 4.10 |
| Lamont | 8 |
| Panorama | 24 |
| Valley Acres | 2 |
| Westpark [i] | 5 |

Source: Kern County Parks and Recreation 2010
Notes:
(*) Not an official part of the Kern County park system. Kern County Parks and Recreation Dept. provides recreation services inside the park area.
(a) Ed Oakley Memorial Building located within a small park that includes recreational facilities.
(b) A new park.
(c) Owned by Kern County but operated as a Westside Recreation and Park District facility (not Kern County Parks) under a long-term lease.
(d) Leased, not owned, by the Parks Department.
(e) Currently listed as a Kern County park site.
(f) Park site has been transferred to the Wasco Park District.
(g) Leased, not owned, by the Parks Department.
(h) Leased, not owned, by the Parks Department.
(i) Ownership transferred to Rosamond Community Service District.

# Special Recreation and Park Districts

There are nine special recreation and park districts that provide recreational facilities within Kern County. Eight are independent park districts, and one is a community services district (Rosamond). Together these park districts provide over 40 parks or recreation facilities, along with local recreation programming. The extent and variety of parks and programs varies between districts depending on the level of local financial support and the primary mission of the organization. Recreational facilities provided by these districts are listed in Table 4.15-2.

**Table 4.15-2: Special Recreation and Park Districts**

| District | Recreational Facilities |
|---|---|
| Tehachapi Valley Recreation and Park District | – Brite Lake Aquatic Rec. Center<br>– Dye Natatorium Pool<br>– Philip Marx Central Park<br>– Meadowbrook Dog Park<br>– Meadowbrook Park<br>– West Park Activity Center<br>– Skate Park<br>– West Park |

**Table 4.15-2: Special Recreation and Park Districts**

| District | Recreational Facilities | |
|---|---|---|
| Buttonwillow Recreation and Park District | – Buttonwillow Park | – Buttonwillow Recreation Building |
| Shafter Recreation and Park District | – Mannel Park<br>– Kirschenmann Park<br>– Stringham Park | – Rodriguez Park<br>– Town Square<br>– Veterans Park |
| Bear Mountain Recreation and Park District | – Bear Mountain Park<br>– Weedpatch Park | – Arvin and Lamont Pools |
| Wasco Recreation and Park District | – Barker Park<br>– Westside Park | – Cormack Park |
| McFarland Recreation and Park District | – Browning Road Park | – McFarland Park |
| North of the River Recreation Department | – Almondale Park<br>– Beardsley Park, North<br>– Emerald Cove Park<br>– Fruitvale-Norris Park<br>– Greenacres Park<br>– Highland Park<br>– Liberty Park<br>– Madison Grove Park<br>– McCray Park<br>– Mondavi Park, North<br>– North Meadows Park<br>– North Rosedale Park | – Olive Park East and Olive Park West<br>– Polo Community Park<br>– The Rasmussen Center<br>– River Lakes Ranch Park<br>– Riverview Park<br>– San Lauren Park<br>– Sears Park<br>– Silver Oak Park<br>– Standard Park<br>– Westdale Park |
| West Side Recreation and Park District | – "A" Street Park<br>– Community Center Park (Skate Park)<br>– Fitness Center<br>– Franklin Field Complex<br>– Mil Potrero Park | – Taft Community Center<br>– Skate Escape<br>– Walter Glenn Natatorium Swimming Pool<br>– Westside Mountain Park |
| Rosamond Community Service District | – Jim Williford Community Park | – Rosamond Community Pool |

# National Forests, Parks, and Monuments

## Los Padres National Forest

The Los Padres National Forest is located immediately south of the Project Area. The forest extends 220 miles from Monterey County to the western edge of Los Angeles County and encompasses nearly 2 million acres. The forest is divided into five administrative districts, including the Monterey, Santa Lucia, Santa Barbara, Ojai, and Mount Pinos Ranger Districts. The Mount Pinos Ranger District includes the portion of the Los Padres National Forest that is closest to the Project Area. Recreational activities within the forest include fishing, hunting, off-roading, camping, hiking, horseback riding, and trail use (Oh Ranger.com. 2013).

### Sequoia National Forest

The Sequoia National Forest (SNF) is located within Kern County in the southern Sierra Nevada Mountains of California. The SNF is named for the giant sequoia trees that are located within 38 groves within the boundaries of the forest. The Giant Sequoia National Monument, 328,000 acres in size, is located within the forest, and was established by presidential proclamation on April 15, 2000. The SNF covers 1,865 square miles and ranges in elevation from 1,000 feet in the foothills of the Sierra Nevadas to over 12,000 feet. The SNF's Sequoia groves are part of its 196,000 acres of forests, which also consists of Jeffrey pine, red fir, coast Douglas-fir, ponderosa pine, white fir, and lodgepole pine. The SNF contains over 2,500 miles of roads and 850 miles of trails, and a number of camping and recreational facilities.

### Carrizo Plain National Monument

The Carrizo Plain National Monument (CPNM) is located in California's southern Coast Range, 90 miles west of the city of Bakersfield and 60 miles east of the city of San Luis Obispo. Most of the area is in the eastern portion of San Luis Obispo County; however, 5% of the CPMN (13,540 acres) is located within western Kern County within the Project Area. The CPNM is managed by the Bureau of Land Management (BLM), the Nature Conservancy, and the California Department of Fish and Wildlife. The 250,000-acre facility was established by presidential proclamation in 2001 to preserve unique San Joaquin Valley saline and fault zone habitats and related biological and geological resources.

Most CPNM recreational use is concentrated around the Goodwin Education Center, Soda Lake, Painted Rock, Selby, the Caliente Mountains, the Elkhorn Plain, and the KCL campground, a semi-private facility. The most current information available indicates that visitor use increased from 24,620 in fiscal year (FY) 2001 to 87,040 in FY 2007 (BLM 2010).

### Kern National Wildlife Refuge

The Kern National Wildlife Refuge (KNWR) is 11,250 acres in size and is located in the northern portion of the Project Area. It is primarily managed for hunting waterfowl, with a hunting season from October to late January. The KNWR has 17 hunting blinds spaced across 730 acres, with three of the blinds being wheelchair accessible or ADA compliant, and also provides up to 1,867 acres of free roam hunting area (USFWS 2013). The refuge also includes a 6-mile auto tour route and provides opportunities for hiking, bird watching, and photography.

## State Parks

The California Department of Parks and Recreation owns, maintains, and operates one state park (Red Rock Canyon) two state historic parks (Fort Tejon and Tomo-Kahni), one state reserve (Tule Elk), and one recreation area (Hungry Valley State Vehicular Recreation Area [SVRA]) available to the public for activities including off-road vehicle use and camping within Kern County.

## Red Rock Canyon State Park

Red Rock Canyon State Park is a 27,000-acre park within the Mojave Sector of the Tehachapi District of the California State Park System. The park is located along State Route 14 in Kern County, 25 miles northeast of Mojave, 80 miles east of Bakersfield, and 39 miles east of the Project Area. The park includes two natural preserves and opportunities for camping, sightseeing, equestrian activities, hiking, and off-highway vehicle use (California Department of Parks and Recreation 2013d).

## Fort Tejon State Historic Park

Fort Tejon State Historic Park is located near the apex of the Grapevine Canyon, which includes a portion of Interstate 5 and the main vehicular travel corridor between the Central Valley and Southern California. The park is operated and maintained by the California Department of Parks and Recreation and includes the site of a U.S. Army fort established in 1854 and abandoned in 1864. Restored adobes, several 400-year-old valley oak trees, and interactive exhibits, including period recreations with live actors, occur within the park. Facilities include a visitor's center and museum, picnic areas, and group campsites. The park generally is not a destination location and not heavily used except for one day each month from May through September when Civil War-period reenactments occur. The park's only campground, a group facility that can accommodate approximately 100 people, is rarely reserved. A portion of the Fort Tejon State Historical Park is located 1.3 miles south of the Project Area. This area of Fort Tejon State Historical Park contains historical markers for Rose Stage Station, Sebastian Indian Reservation, and the Fages-Zalvidea Trails (State Historic Landmarks 300, 133, and 291, respectively) which are points of interest for travelers along Interstate 5 (CDPR 2013a and The Historical Marker Database 2009a-c).

## Tomo-Kahni State Historic Park

Tomo-Kahni State Historic Park, located 21 miles east of the Project Area, was created as a unit of California State Parks in 1993 to protect and preserve the integrity of the site of Tomo-Kahni, or "Winter Village," a Kuwaitis (Nuwa) Native American community located atop a ridge in the Tehachapi Mountains, overlooking Sand Canyon to the east and the Tehachapi valley to the west. Tomo-Kahni is available to the public only by guided tours on weekends during the spring and fall months (California Department of Parks and Recreation 2013b). Recreational opportunities include hiking trails, historical/cultural sites, guided tours, vista points, and nature and wildlife viewing.

## Tule Elk State Natural Reserve

The 987-acre Tule Elk State Natural Reserve protects a small herd of tule elk, once in danger of extinction, and provides opportunities to observe native birds of the San Joaquin Valley (California Department of Parks and Recreation 2013c). Located southeast of Buttonwillow and within the Project Area, recreational facilities within the reserve include a picnic area and interpretive exhibits.

### Hungry Valley State Vehicular Recreation Area (SVRA)

SVRA is located south of the Tejon Pass, 6 miles south of the Project Area. The 19,000-acre SVRA is operated by the Off Highway Motor Vehicle Recreation Division of California State Parks and includes more than 130 miles of trails for motorcycle, dune buggy, all-terrain, and 4x4 vehicle use and fee campsites (California Department of Parks and Recreation 2013e).

## Private Parks

### Wind Wolves Preserve

The Wildlands Conservancy owns and manages the 93,000-acre Wind Wolves Preserve, a portion of which is within the Project Area. This private ecological preserve is south of State Route 166 and west of Interstate 5 in the foothills of the San Emigdio Mountain Range. Hiking, mountain biking, nature viewing, picnicking, and outdoor education activities are provided for public use.

# 4.15.3 Regulatory Setting

## Federal

### National Trails System Act of 1968

The National Trails System Act (Public Law 90-543) was passed by Congress in 1968 to create a series of trails "to promote the preservation of, public access to, travel within, and enjoyment and appreciation of the open-air, outdoor areas and historic resources of the Nation." The Act authorized a national system of trails and defined four categories of national trails, including National Scenic Trails, National Historic Trails, National Recreation Trails and Connecting or Side Trails. National Scenic Trails are established to provide access to spectacular natural beauty and to allow the pursuit of healthy outdoor recreation and "extended trails so located as to provide for maximum outdoor recreation potential and for the conservation and enjoyment of the nationally significant scenic, historic, natural, or cultural qualities of the areas through which such trails may pass" (16 U.S.C. 1242(a)(2)). In addition, the 1968 Act also authorized creation of the PCT as a National Scenic Trail. As Congressionally established long-distance trails, each trail in the National Trails System is administered by a federal agency, such as by the U.S. Department of Agriculture (USDA) Forest Service for the PCT.

### Pacific Crest Trail Planning Criteria

The Pacific Crest National Scenic Trail Comprehensive Plan (USDA Forest Service 1982) and previous Forest Service documents provide guidelines and criteria for design and location of the PCT. Specifically, these guidelines state that the most desirable location will avoid unattractive roads, mining areas, power and telephone lines, commercial and industrial development, fences, and other features incompatible with the natural condition of the trail and with its use for outdoor recreation. Where the trail encounters such development, it should be located so as not to adversely affect, or conflict with, the purpose of the development, natural vegetation, topography,

or natural plantings shall be used, where possible, to screen objectionable features from the view of trail users.

# State

There are no state recreation regulations applicable to this Project.

# Local

## Kern County General Plan

The Project Area is located within the Kern County General Plan (KCGP) area and, therefore, would be subject to applicable policies and measures of the KCGP. The Land Use, Conservation, and Open Space Element of the KCGP includes goals, policies, and implementation measures related to recreation that apply to the Project, as described below.

### Chapter 1. Land Use, Conservation, and Open Space Element

#### 1.4. Public Facilities and Services

##### Goals

**Goal 8.** Provide recreation opportunities for all citizens of Kern County while avoiding duplication between jurisdictions.

**Goal 12.** Provide a balanced system of parks and recreational facilities to meet Kern County's diverse needs and clearly define responsibility for the provision of these facilities.

**Goal 13.** Provide a variety of park and recreation programs that offer safe, equitable, and balanced recreational opportunities for all residents and visitors.

##### Policies

**Policy 4.** The provision of parks and recreational facilities of varying size, function, and location to serve County residents will be encouraged. Special attention will be directed to providing linear parks along creeks, rivers, and streambeds in urban areas.

**Policy 5.** Seek to provide recreational facilities where deficiencies have been identified.

##### Implementation Measures

**Implementation Measure E.** Continue to establish coordinated efforts between government entities and private enterprise to identify and preserve unique scenic qualities of existing natural resources and to enhance the image of the County as a whole.

**Implementation Measure F.** Continue to use the accepted California and National Design Standards for both passive and active park development to accommodate programmed and

spontaneous activities. Some usable area should be held as open turf for free play and community festivals.

**Implementation Measure G.** Continue to encourage coordination between appropriate jurisdictions in the acquisition (including cooperative agreements), developments, and use of parks to avoid duplication of facilities and provide economic use of public funds.

**Implementation Measure H.** Continue to pursue federal, state, and private grant funding for the rehabilitation and acquisition of parks and recreation facilities.

**Implementation Measure GG.** Implement a level of service standard of 2.5 acres of park area per 1,000 residents.

**Implementation Measure HH.** The County shall periodically investigate the level of service standards for parks and recreation services to ensure that adequate recreation facilities are provided for County residents.

**Implementation Measure II.** The Kern County Parks and Recreation Department will evaluate the possibility of alternative funding sources for the development, rehabilitation, and operation of park and recreational facilities. These funding sources shall include the possible implementation of development fees and/or special assessment districts such as used for lighting and landscaping, under a County Service Area (CSA).

## Metropolitan Bakersfield General Plan

The MBGP, a joint effort between the Kern County Planning Department and the City of Bakersfield Planning Division, was last adopted on December 11, 2007. The MBGP includes both city and unincorporated County lands. The MBGP describes the community's physical development as well as its economic, social and environmental goals and is currently undergoing an update. The Project Area includes a total of 152,040 acres of unincorporated County lands that are covered under the MBGP (7.41%). Project-related development on unincorporated lands within the MBGP Planning Area would be subject to the following applicable policies and implementation measures of the MBGP, with respect to recreation.

### Chapter VI. Open Space Element

#### Goals

**Goal 1.** Conserve and enhance the unique aspects of open space within the planning area.

**Goal 2.** Create an integrated system of open space amenities in the planning area.

**Goal 3.** Locate and site development to minimize the disruption of open space areas.

**Goal 6.** Create a greenbelt corridor along the Kern River with increased recreational opportunities.

### Policies

**Policy 1.** Promote the establishment, maintenance and protection of the planning area's open space resources, including the following:

c) Outdoor recreation

- Parks (refer to Chapter XI-Parks)
- Kern River corridor (refer to Chapter II-Land Use, Chapter V Conservation, and Chapter XII-Kern River Plan Element).

**Policy 5.** Development location and siting should be sensitive to its relationship to the Kern River (I-3).

## Kern County Specific Plans

Kern County has adopted 24 Specific Plans for properties within the Project Area. These Specific Plans are intended to be an amplification of the goals and policies of the KCGP and are, therefore, consistent therewith. As depicted in Figure 4.10-3, less than 8% of the Project Area is located wholly or partially within adopted Specific Plan areas. Future oil and gas exploration and production activities that would be authorized under the proposed Amendment to Chapter 19.98 (Oil & Gas Production) of the Kern County Zoning Ordinance that would be located within the boundary of an adopted Specific Plan would be regulated according to County zoning, with the exception of the Specific Plans identified as Tier 5.

## Kern River Plan Element (Chapter XII of the Kern County General Plan)

The Kern River Plan Element, which is included in both the KCGP and the MBGP, includes implementation measures related to recreational facilities and parks. Recreational facilities within the area covered by the Kern River Plan Element are described in Section 4.15.2, Regional Setting. The Kern River Plan Element implementation policies that apply to petroleum extraction within areas designated for recreational use are outlined below.

### Chapter V. Implementation Policies

#### 5.3. (F) Implementation Standards and Specific Policies: Mineral and Petroleum Extraction

**Implementation Policy 2.** Mineral and petroleum extraction shall be encouraged on those lands designated "Mineral and Petroleum" on the Kern River Plan Map. Such use may also occur in other areas designated for recreation, resource, or industrial uses as long as the primary designated use is not significantly impaired and as long as such use is consistent with other provisions of this plan and in compliance with existing local, state, and federal regulations.

## Kern County Parks and Recreation Master Plan

In 2010, the County of Kern County Parks and Recreation Master Plan (Master Plan), which evaluated the County's park and recreation resources, assessed the needs for the future, and

developed a roadmap to meeting those needs, was adopted. This Master Plan presents a long-term vision and goals for the Department and for the community to the year 2030; describes current and future needs, interests and community preferences for parks, recreation and facilities, and outlines the policies and goals that create a management framework for the parks and recreation system. It also describes the recommended actions for carrying out polices and achieving the goals.

## Chapter IV. Policies Goals and Actions

### Policy Recommendations

**Policy I**. Provide a quality park and open space system that supports opportunities for active and passive recreation to meet the wide ranging recreational and social needs of the diverse, varied communities of Kern County.

**Policy II.** Maximize resources and expand opportunities for the County-wide parks and recreation system by reforming the financial support structure for the park system, enhancing organizational capabilities, and pro-actively engaging other organizations and the community at large through partnerships and other cooperative arrangements.

**Goal 1.** Rehabilitate, renovate and modernize existing parks and recreational facilities in the Kern County park system.

**Goal 2.** Provide a minimum standard of 5 acres of park land per 1,000 residents. This standard would apply to regional parks serving the entire County, as well as local parks in unincorporated areas of the County not served by a local park district.

**Goal 3.** Provide access to various types of indoor and outdoor recreation facilities with the capacity to support increased recreation programming and provide year-round recreation opportunities for all County residents.

**Goal 4.** Expand trail connections and pathways throughout Kern County.

**Goal 5.** Ensure that all Kern County parks and recreation facilities maintain a high level of safety and security for visitors and employees.

**Goal 6.** Incorporate natural areas and unique ecological and archeological features into the park and open space system to protect threatened species, conserve significant natural and cultural resources and retain critical habitat areas that are unique to Kern County.

**Goal 7.** Achieve sustainable long-term financial viability for the Kern County park system to satisfy operational needs, capital requirements and desired recreation services.

**Goal 8.** Re-define the organizational structure of the Kern County park system to improve coordination with other park agencies, park and recreation districts and private providers to ensure that the parks and recreation needs of all Kern County residents are being met.

**Goal 9.** Continue to support the development and delivery of recreation programs and services provided by other park agencies, non-profit groups, and community organizations in Kern County.

**Goal 10.** Engage Kern County residents in the planning, stewardship, and programming of park and recreation resources, and provide effective community outreach and marketing to increase public awareness and support of recreation services.

**Goal 11.** Design and manage County parks and recreation facilities to support families, provide youth with healthy and safe recreational activities, and to encourage community-building.

**Goal 12.** Develop, train, and support a professional parks department staff who effectively serve the community in the realization of the goals and objectives of this Plan.

To ensure that an adequate amount of recreation facilities are available for all County residents in the future, the Master Plan recommended an overall level of service standard of 5.0 acres of parkland per 1,000 residents.

## 4.15.4 Impacts and Mitigation Measures

# Methodology

The evaluation of possible impacts to recreational resources included a review of the Kern County Parks Master Plan, KCGP Land Use, Open Space, and Conservation Element and the Kern River Plan Element, the MBGP, the Kern County Parks and Recreation Master Plan, and online U.S. Geological Survey (USGS) topographic maps using geographic information system (GIS) software to identify the location and/or description of parks and recreation areas in Kern County. To determine potential impacts, the impact significance thresholds described below were applied to all phases of future oil and gas exploration and production activities.

**Table 4.15-3: Methods and Assumptions for Recreation**

| Methods/Assumptions | Analytical Framework for Recreation |
|---|---|
| Population Increase | As explained in Section 4.13, Population and Housing, implementation of the Project would not result in a substantial increase in employment or employment-related population. |

# Thresholds of Significance

The Kern County California on Environmental Quality (CEQA) Implementation Document and Kern County Environmental Checklist state that a project would have a significant impact on recreation if it would:

- Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated; or

- Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment.

# Project Impacts

The types of potential impacts related to recreational facilities are generally the same for each phase of the future oil and gas exploration and production activities (well construction, operation and maintenance, well stimulation, well abandonment and decommissioning); therefore, the analysis provided below applies to all Project phases.

## Impact 4.15-1: Increase the Use of Existing Neighborhood and Regional Parks or Other Recreational Facilities such that Substantial Physical Deterioration of the Facility Would Occur or be Accelerated

Population growth in a given area increases the use of recreational facilities, which can cause accelerated deterioration of neighborhood and regional parks or other recreational facilities. Future oil and gas exploration and production activities that would be authorized under the proposed Project are not anticipated to result in a substantial population increase.

Given the long history of oil and gas development within Kern County, and as further explained in Section 4.13, Population and Housing, any nominal increase in the oil and gas workforce in the future would likely be comprised of local Kern County residents. As such, the Project would not lead to an increase in use of any recreational facilities that would cause or accelerate substantial deterioration of such facilities. Therefore, no impacts from increased use of recreational facilities would occur from implementation of the proposed Amendment to Chapter 19.98 (Oil and Gas Production) of the Kern County Zoning Ordinance during the construction, operation and maintenance, or abandonment and decommissioning phases of future oil and gas exploration and production activities. A less than significant impact is identified for this issue.

Potential impacts related to future oil and gas exploration and production activities located adjacent to or near parks and recreational activities are addressed in each topical section of this Environmental Impact Report (EIR) (e.g., aesthetics/visual resources, air quality, land use, noise, etc.), since parks are considered a sensitive land use.

### Mitigation Measures

No mitigation measures are required.

### Level of Significance

Impacts would be less than significant.

### Impact 4.15-2: Include Recreational Facilities or Require Construction or Expansion of Recreational Facilities that Might Have an Adverse Physical Effect on the Environment

Future oil and gas exploration and production activities that would be authorized under the proposed Amendment to Chapter 19.98 (Oil and Gas Production) of the Kern County Zoning Ordinance do not include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment. As explained above, future oil and gas exploration and production activities that would be authorized under the proposed Project are not anticipated to result in a substantial population increase or substantial increase in demand for recreational facilities. No adverse physical effects related to recreational facilities would occur to the environment as a result of the Project. Therefore, impacts are anticipated to be less than significant.

#### Mitigation Measures

No mitigation measures are required.

#### Level of Significance

Impacts would be less than significant.

## 4.15.5 Cumulative Setting, Impacts, and Mitigation Measures

## Cumulative Setting

The geographic scope for cumulative impacts to recreation resources includes the area within 6 miles of the external Project Area. While projects in a larger area may affect some of the same recreation resources as the Project, by focusing on projects within the Project Area and 6 miles outside of the Project Area, the analysis of cumulative impacts includes those projects that would most comparably affect the same resources as the Project.

The regional plans and projections evaluated in this cumulative analysis are described in Section 3.7, of Chapter 3, Project Description.

### Impact 4.15-3: Cumulative Impact on Recreational Facilities

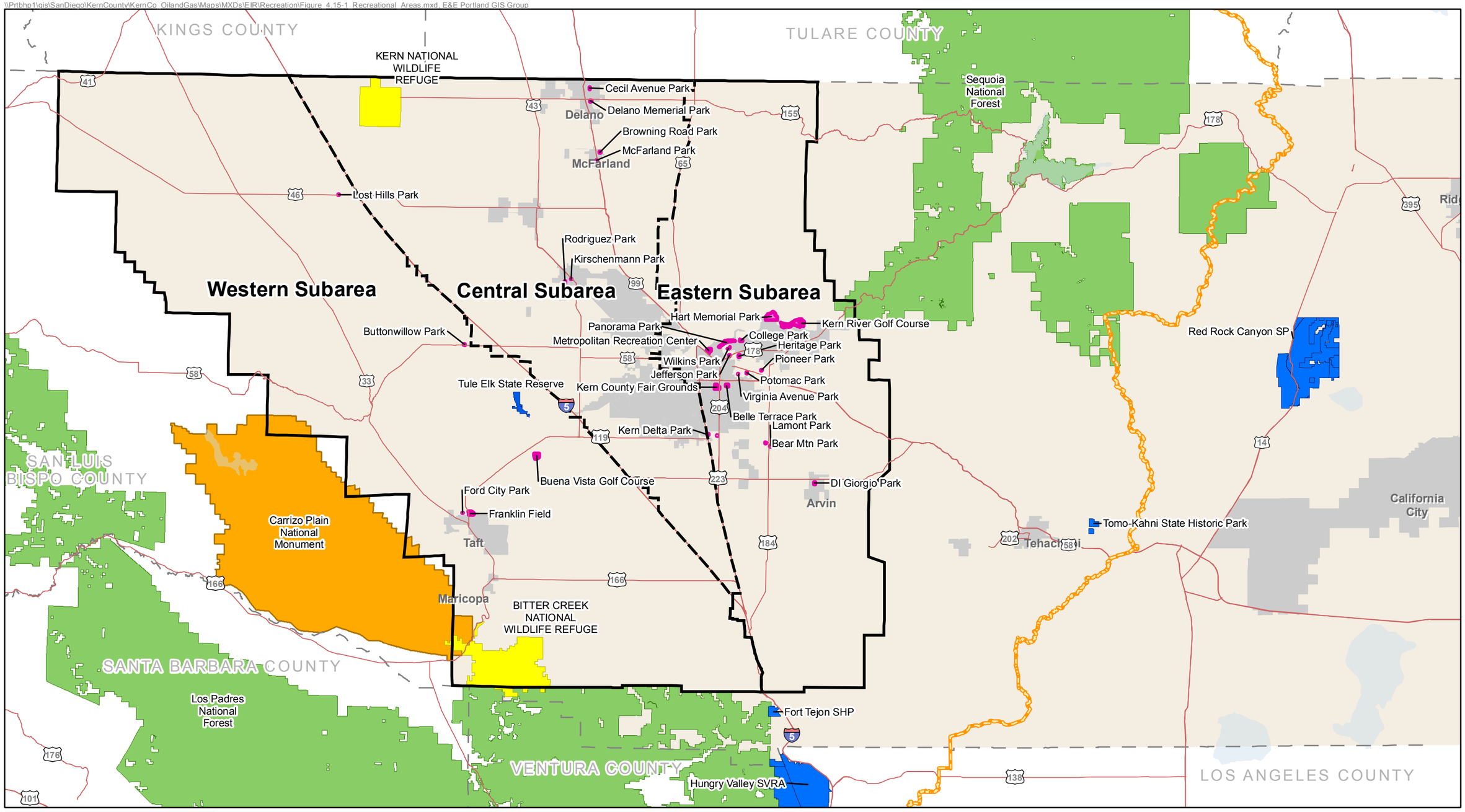
With regard to cumulative effects of the Project, together with other projects resulting in increased use of parks (Impact 4.15-1), the Project's impact would be minimal because any nominal increase in the oil and gas workforce in the future would likely be comprised of local Kern County residents. The Project's contribution to any cumulative recreation impact would not be cumulatively considerable. With regard to Impact 4.15-2, the Project's impacts was determined to also be minimal for similar reasons and, therefore, would not contribute to cumulative impacts together with other projects and therefore less than significant.

## Mitigation Measures

No mitigation measures are required.

## Level of Significance

Impacts would be less than significant.




Data Sources: Kern County, 2013, ESRI 2010

**Figure 4.15-1**
**Recreational Areas**

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Section 4.16

# Transportation and Traffic

Section 4.16

# Transportation and Traffic

## 4.16.1 Introduction

This section describes the affected environment and regulatory setting for transportation and traffic. It also describes the impacts on transportation and traffic that would result from implementation of the Amendment to Chapter 19.98 (Oil and Gas Production) of the Kern County Zoning Ordinance (Project), including impacts from future oil and gas development pursuant to the Amended Ordinance, and mitigation measures that would reduce these impacts, if necessary.

Information contained within this section was primarily provided by the Traffic Impact Study and Roadway Assessment Kern County Oil and Gas Well Activity (Traffic Study), dated March 2015, which was prepared by Ruettgers and Schuler and included as Appendix W of this Environmental Impact Report (EIR). This Traffic Study provides an analysis of existing and 2035 traffic conditions. Potential traffic impacts to intersections and roadways were determined for both development/construction and operation of the Project using the most recently published roadway traffic volumes and project-related vehicle trip calculations. Discussion and evaluation of transportation facilities, including pavement conditions, are based on site surveys with applicable thresholds and impacts identified. Additional impacts to the airport system are also discussed.

## 4.16.2 Environmental Setting

Kern County is California's third largest county, encompassing 8,202 square miles at the southern end of the Central Valley. The 3,700-square-mile Project Area is predominantly located in the western portion of the County in the San Joaquin Valley bounded by Kings and Tulare counties to the north, Santa Barbara and San Luis Obispo counties to the west, the Tehachapi Mountains and the Sierra Nevada Mountains to east, and the northern boundary of the Los Padres National Forest to the south.

Transportation in the Project Area is dominated by automobile traffic. This section discusses the existing conditions related to transportation and traffic in the Project Area. The circulation system in the Project Area is made up of a combination of state, county and city jurisdiction facilities. Major components of the system are discussed below.

### Regional and Local Roadway Facilities

Regional access to oilfields and ancillary facilities in the Project Area could be obtained via the numerous highways and two lane roads that traverse the Project Area. These facilities are described below and are presented on Figure 4.16-1.

## Regional Roads

**Interstate 5** is a major, four-lane, divided freeway that extends north from the Mexican border to the Canadian border and provides access for goods movement, shipping, and travel. This highway crosses the western portion of Kern County and is designated as an arterial/major highway by the Circulation Element of the Kern County General Plan (KCGP).

**State Route 33 (Westside Highway)** connects U.S. 101 at Ventura with Interstate 5 near Vernalis and Tracy. The highway begins in Ventura as a freeway, but changes to a rural character as it ascends the San Rafael Mountains near Ojai. State Route 33 descends into the great Central Valley, and it quickly becomes a parallel route to Interstate 5, serving the communities of Maricopa, Taft, Avenal, Coalinga, Mendota, Los Banos, and Patterson. State Route 33 ends its lengthy journey at its junction with Interstate 5 just south and east of Tracy.

**State Route 43 (Central Valley Highway)** extends north from State Route 119 in Kern County to State Route 99 in Kings County. State Route 43 operates as a four-lane highway between the cities of Shafter and Wasco and as a two-lane highway elsewhere within the Project Area.

**State Route 46 (Famoso Highway)** begins at State Route 99, goes west through Wasco, and continues west into San Luis Obispo County. This route ends at U.S. Highway 1 on the Pacific Coast. The road is a two-lane highway in Kern County.

**State Route 58 (Rosedale Highway/Mojave Freeway)** begins in San Luis Obispo County, enters Kern County near McKittrick, and runs east through Bakersfield and Mojave to the County boundary past Boron to end in San Bernardino County. This route is a divided highway that runs generally east-west across Kern County, connecting Bakersfield, Tehachapi, and Mojave to Lenwood and Barstow to the east. The right-of-way varies between two and four lanes.

**State Route 65** is a two-lane highway that starts at State Route 99 in unincorporated Oildale, north of Bakersfield, and continues into Tulare County.

**State Route 99 (Golden State Highway)** is a major north-south route through the central valley of California. State Route 99 begins south of Bakersfield branching off Interstate 5 and continuing north to Sacramento. State Route 99 provides a vital regional north-south link to the cities and communities in the San Joaquin Valley. Most of State Route 99 is a six-lane freeway in Kern County. Sections through Bakersfield have eight lanes. Sections north of McFarland and south of White Lane, in Bakersfield, have four lanes.

**State Route 166 (Maricopa Highway)** begins at Interstate 5 in Mettler Station. State Route 166 continues west through Maricopa into Santa Barbara County where it eventually reaches US 101.

**State Route 184 (Weedpatch Highway)** extends north from State Route 223 to Kern Canyon Road along the northerly extension of the Wheeler Ridge Road alignment. State Route 184 then turns onto the Kern Canyon Road alignment and continues northeasterly to State Route 178. State Route 184 operates as a two-lane roadway within the Project Area.

### Local Roads

County roads that are expected to provide access to the oilfields and ancillary facilities in the Project Area and also serve as links for regional traffic include Lerdo Highway, Seventh Standard Road, Stockdale Highway and Copus Road/David Road. These roadways all operate with two lanes within the Project Area, with the exception of Lerdo Highway from State Route 43 to State Route 99, and Seventh Standard Road from Santa Fe Way to State Route 99. Both of these segments operate as four-lane roadways.

Other county roads expected to provide east-west access to the oilfields include Garces Highway, Pond Road, Sherwood Avenue, Whisler Road, Kimberlina Road, Merced Avenue, and Stockdale Highway (Figure 4.16-1). These roads all operate as two-lane roadways in the vicinity of the oilfields.

## Performance Criteria

### Intersection and Roadway Levels of Service

For California Environmental Quality Act (CEQA) purposes, defined performance criteria are utilized to determine if a project causes a significant impact. To describe the quality of service of the study intersections and roadways, the Traffic Study (Appendix W) used Level of Service (LOS) ratings, which range from LOS A (free-flow conditions) to LOS F (severely congested conditions), as indicated in Tables 4.16-1, 4.16-2 and 4.16-3.

**Table 4.16-1: Level of Service Criteria for Unsignalized Intersections**

| Average Control Delay (seconds per vehicle) | Level of Service | Expected Delay to Minor Street Traffic |
|---|---|---|
| ≤ 10 | A | Little or no delay |
| > 10 and 15 | B | Short traffic delays |
| > 15 and 25 | C | Average traffic delays |
| > 25 and 35 | D | Long traffic delays |
| > 35and 50 | E | Very long traffic delays |
| > 50 | F | Extreme delay |

Source: Appendix W

**Table 4.16-2: Level of Service Criteria for Signalized Intersections**

| Volume/ Capacity | Control Delay (seconds per vehicle) | Level of Service |
|---|---|---|
| < 0.60 | ≤ 10 | A |
| 0.61 - 0.70 | > 10 and ≤ 20 | B |
| 0.71 - 0.80 | > 20 and ≤ 35 | C |

**Table 4.16-2: Level of Service Criteria for Signalized Intersections**

| Volume/ Capacity | Control Delay (seconds per vehicle) | Level of Service |
|---|---|---|
| 0.81 - 0.90 | > 35 and ≤ 55 | D |
| 0.91 - 1.00 | > 55 and ≤ 80 | E |
| > 1.0 | > 80 | F |

Source: Appendix W

**Table 4.16-3: Level of Service Characteristics for Roadways**

| LOS | Characteristics |
|---|---|
| A | Free-flow operation exists. |
| B | Reasonably free-flow operation exists; the ability to maneuver within the traffic stream is only slightly restricted. |
| C | Travel speeds are still at or near free-flow, but the ability to maneuver within the traffic stream is noticeably restricted. |
| D | Travel speeds begin to decline with increasing flows; the ability to maneuver is more noticeably limited; and minor incidents can be expected to create queuing. |
| E | Operation is at or near capacity and is therefore volatile because virtually no useable gaps in the traffic stream appear; maneuverability is extremely limited; and any disruption to the traffic stream, such as vehicles entering from ramps or changing lanes, can cause disruptions. |
| F | Breakdown in vehicular flow occurs, with queues forming behind major breakdown points, such as traffic incidents or recurring points of congestion. |

# Existing Traffic Conditions

The Traffic Study (Appendix W) provides information regarding the existing traffic operations for 65 unsignalized intersections, 36 signalized intersections, and 462 roadway segments in the Project Area. The existing traffic volumes are comprised of the combination of published annual average daily traffic volumes (AADT), and AM and PM peak hour turning movements that were counted in 2014. These traffic volumes represent a combination of traffic generated by non-oil and gas (NOG) activities (traffic completely unrelated to oil and gas operations), as well as traffic generated by existing oil and gas operations. The hours from 5:30 a.m. to 7:30 a.m. and 3:30 p.m. to 5:30 p.m. account for the morning and evening peak travel times. Traffic worksheets are provided in Appendix A of the Traffic Study (Appendix W).

The majority of the study intersections currently operate at an acceptable LOS (LOS D or better for intersections located within the non-metropolitan region of Kern County, and LOS C or better for intersections located within the Bakersfield and Kern County metropolitan areas and for

California Department of Transportation [Caltrans] facilities) during the AM and PM peak hours, as summarized in Tables 4.16-4 and 4.16-5. However, 19 intersections are calculated to operate at an unacceptable LOS during the AM Peak and/or PM Peak hours under existing conditions (Appendix W).

**Table 4.16-4: Unsignalized Intersection Operations 2015 (AM and PM Peak Hour)**

| Intersection | Movement | AM Peak Hour | PM Peak Hour |
|---|---|---|---|
| Rowlee Rd & Paso Robles Hwy (SR 46) | NB | B | B |
| West Side Hwy (SR 33) & Lerdo Hwy | WB | D | B |
| Lost Hills Rd & Lerdo Hwy | Overall Intersection | D | E |
| SR 5 SB Off Ramp & Lerdo Hwy | SB | B | A |
| SR 5 NB On Ramp & Lerdo Hwy | NB | A | A |
| Rowlee Rd & I-5 NB On Ramp | EB | A | A |
| Rowlee Rd & Frontage Rd | EB | A | A |
| West Side Hwy (SR 33) & Lost Hills Rd | WB | C | C |
| SR 5 SB Off Ramp & 7th Standard Rd | SB | A | A |
| SR 5 NB On Ramp & 7th Standard Rd | NB | A | A |
| Brown Material Rd & Paso Robles Hwy (SR 46) | NB | A | A |
| | SB | A | A |
| West Side Hwy (SR 33) & Brown Material Rd | Overall Intersection | A | A |
| West Side Hwy (SR 33) & West Side Hwy (SR 33) | WB | A | A |
| Central Valley Hwy (SR 43) & Garces Hwy (SR 155) | EB | B | B |
| | WB | B | B |
| Porterville Hwy (SR 65) & Garces Hwy (SR 155) | EB | B | B |
| | WB | B | B |
| Magnolia Ave & Paso Robles Hwy (SR 46) | NB | B | C |
| | SB | B | C |
| Central Valley Hwy (SR 43) & Paso Robles Hwy (SR 46) | NB | C | D |
| | SB | C | D |
| Golden State Hwy (SR 99) SB Ramps & Paso Robles Hwy (SR 46) | NB | B | B |
| Porterville Hwy (SR 65) & Paso Robles Hwy (SR 46) | EB | B | B |
| | WB | B | B |
| SR 65& Lerdo Hwy | EB | B | B |
| Golden State Hwy(SR 99) NB Ramps & Paso Robles Hwy (SR 46) | NB | B | B |
| Magnolia Ave & 7th Standard Rd | SB | B | C |
| Shafter Ave & 7thStandard Rd | SB | B | B |

**Table 4.16-4: Unsignalized Intersection Operations 2015 (AM and PM Peak Hour)**

| Intersection | Movement | AM Peak Hour | PM Peak Hour |
|---|---|---|---|
| Enos Ln (SR 43) & 7th Standard Rd | Overall Intersection | D | F |
| West Side Hwy (SR 33) & West Side Hwy (SR 33) | NB | A | A |
| West Side Hwy (SR 33) & Lokern Rd | EB | A | D |
| | WB | C | C |
| Lokern Rd & McKittrick Hwy(SR 58) | SB | C | F |
| Enos Ln (SR 43) & McKittrick Hwy (SR 58) | Overall Intersection | C | F |
| Enos Ln (SR 43) & Stockdale Hwy | Overall Intersection | F | F |
| West Side Hwy (SR 33) & McKittrick Hwy (SR 58) | EB | A | B |
| McKittrick Hwy (SR 58) & Santa Maria Valley Hwy(SR 58) | EB | F | B |
| Santa Maria Valley Hwy (SR 58) & Santa Maria Valley Hwy (SR 58) | Overall Intersection | A | A |
| McKittrick Hwy (SR 58) & Santa Maria Valley Hwy(SR 58) | EB | A | A |
| Enos Ln (SR 43) & Panama Ln | WB | F | F |
| Tupman Rd & Taft Hwy (SR 119) | NB | B | F |
| | SB | F | F |
| Elk Hills Rd & Taft Hwy (SR 119) | SB | C | C |
| McKittrick Hwy (SR 58) & Main St | Overall Intersection | A | A |
| Taft Hwy (SR 119) & SR 33 | EB | A | A |
| McKittrick Hwy (SR 58) & Reserve Rd | EB | C | E |
| | WB | C | B |
| Enos Ln (SR 43) & Rosedale Hwy (SR 58) | Overall Intersection | C | E |
| Tupman Rd & Taft Hwy (SR 119) | NB | E | A |
| | SB | F | F |
| Tracy Ave & Tracy Ave | NE | B | A |
| Tracy Ave & McKittrick Hwy (SR 58) | SE | C | D |
| SR 65 & James Rd | NW | C | B |
| James Rd & Granite Rd | Overall Intersection | B | B |
| Airport Dr. & 7th Standard Rd | Overall Intersection | E | D |
| China Grade Loop & Round Mountain Rd | NB | B | C |
| Enos Ln (SR 43) & SR 5 NB Off Ramp | WB | A | A |
| Enos Ln (SR 43) & SR 5 SB Off Ramp | EB | A | A |

**Table 4.16-4: Unsignalized Intersection Operations 2015 (AM and PM Peak Hour)**

| Intersection | Movement | AM Peak Hour | PM Peak Hour |
|---|---|---|---|
| | WB | A | A |
| SR 5 Off Ramp & Taft Hwy(SR 119) | NB | A | A |
| SR 5 NB On Ramp & Taft Hwy (SR 119) | NB | C | C |
| Buena Vista Rd & Taft Hwy (SR 119) | NB | B | C |
| | SB | C | D |
| Old River Rd & Taft Hwy (SR 119) | SB | C | F |
| Old River Rd & Bear Mountain Blvd (SR 223) | Overall Intersection | C | B |
| Gosford Rd & Bear Mountain Blvd (SR 223) | SB | B | B |
| Old River Rd & Copus Rd | EB | B | C |
| | WB | C | B |
| SR 33 & Maricopa Hwy SR 166 | Overall Intersection | A | A |
| Mettler Frontage Rd & SR 99 SB Off Ramp | Overall Intersection | A | A |
| Mettler Frontage Rd & Maricopa Hwy SR 166 | NB | A | A |
| | SB | B | B |
| SR 99 SB On Ramp & SR 99 SB On Ramp | SB | A | A |
| Old River Rd & Maricopa Hwy SR 166 | SB | B | B |
| I-5 SB Ramps & Maricopa Hwy SR 166 | SB | B | A |
| I-5 NB Ramps & Maricopa Hwy SR 166 | NB | B | B |
| Franco West Rd & Reward Rd | SB | A | B |
| SR 33 & Midway Rd | EB | C | D |
| | WB | E | B |

Source: Appendix W
Key:
EB = Eastbound
NB = Northbound
SB = Southbound
SR = State Route
WB = Westbound

**Table 4.16-5: Signalized Intersection Operations, 2015 (AM and PM Peak Hour)**

| Intersection | AM Peak Hour | PM Peak Hour |
|---|---|---|
| West Side Hwy (SR 33) & Paso Robles Hwy (SR 46) | B | C |
| Lost Hills Rd & Paso Robles Hwy (SR 46) | B | C |
| SR 5 SB Off Ramp & Paso Robles Hwy (SR 46) | A | C |
| SR 5 NB On Ramp & Paso Robles Hwy (SR 46) | A | C |
| NB I5 Off ramp & West Side Fwy (SR 5) | A | A |
| Central Valery Hwy (SR 43) & Paso Robles Hwy (SR 46) | C | C |
| Central Valley Hwy (SR 43) & Kimberlina Rd | C | D |
| Enos Ln (SR 43) & Taft Hwy(SR 119) | F | E |
| Taft Hwy (SR 119) & Gardner Field Rd | C | D |
| Taft Hwy (SR 119) & Midway Rd | B | D |
| SB I5 On/off ramp & McKittrick Hwy (SR 58) | C | A |
| Galpin St & Central Valley Hwy(SR 43) | D | D |
| Galpin St & 7th Standard Rd | A | A |
| Zerker Rd & 7th Standard Rd | C | D |
| Caloway Rd & 7thStandard Rd | F | E |
| Coffee Rd & 7thStandardRd | A | C |
| SR 99 SB Off Ramp & 7th Standard Rd | B | B |
| Quinn Rd & 7th Standard Rd | C | C |
| SR 65 & 7th Standard Rd | C | D |
| Chester Ave & China Grade Loop | D | D |
| Manor St & China Grade Loop | D | D |
| Caloway Dr. & Rosedale Hwy (SR 58) | C | F |
| Coffee Rd& Rosedale Hwy(SR 58) | D | F |
| Buena Vista Rd & Stockdale Hwy | E | D |
| Caloway Dr. & Stockdale Hwy | D | F |
| Real Rd.& Stockdale Hwy | C | E |
| Real Rd & SR 58 | C | E |
| Buena Vista Rd & Panama Ln | C | B |
| Old River Rd & Panama Ln | D | D |
| Gosford Rd & Panama Ln | C | C |
| Gosford Rd & Taft Hwy(SR 119) | C | C |
| SR 99 SB Off Ramp & Taft Hwy(SR 119) | A | A |
| Morning Dr & Bear Mountain Blvd (SR 223) | A | A |

**Table 4.16-5: Signalized Intersection Operations, 2015 (AM and PM Peak Hour)**

| Intersection | AM Peak Hour | PM Peak Hour |
|---|---|---|
| Coffee Rd & Stockdale Hwy | D | F |
| Mohawk Dr & Rosedale Hwy (SR 58) | E | F |
| Zachary Ave & 7th Standard Rd | A | B |

Source: Appendix W
Key:
SR = State Route

The existing AADT volumes and roadway capacities and the calculated volume to capacity (V/C) ratios are shown in Table 4.16-6. Of the 463 roadway segments evaluated, the majority operate at an acceptable LOS (LOS D or better for roadways located within the non-metropolitan region of Kern County and LOS C or better for roadways located within the Bakersfield and Kern County metropolitan areas and for Caltrans facilities). However, 30 segments are calculated to operate at an unacceptable LOS under existing conditions (Appendix W).

**Table 4.16-6: Roadway Segment Operations, 2015**

| Street Segment | Existing ADT | Existing Capacity | V/C Ratio |
|---|---|---|---|
| 25 Hill Rd: Buena Vis ta Pl - South St | 271[2] | 15,000 | 0.02 |
| 7th Standard Rd: Wagon W heel Rd - Los t Hills Rd | 1,769[2] | 15,000 | 0.12 |
| 7th Standard Rd: Los t Hills Rd - Main Drain Rd | 312[2] | 15,000 | 0.02 |
| 7th Standard Rd: Main Drain Rd - Buttonwillow Dr | 312[2] | 15,000 | 0.02 |
| 7th Standard Rd: Corn Camp Rd - Buttonwillow Dr | 1,270[2] | 15,000 | 0.08 |
| 7th Standard Rd: Buttonwillow Dr - Interstate 5 | 4,486[2] | 15,000 | 0.30 |
| 7th Standard Rd: Interstate 5 - Brandt Rd | 4,486[2] | 15,000 | 0.30 |
| 7th Standard Rd: Brandt Rd - Beech Ave | 5,819[2] | 15,000 | 0.39 |
| 7th Standard Rd: Beech Ave - SR 43 (Enos Ln) | 5,819[2] | 15,000 | 0.39 |
| 7th Standard Rd: SR 43 (Enos Ln) - Santa Fe Way | 5,828[2] | 15,000 | 0.39 |
| 7th Standard Rd: Santa Fe Way - Zerker Rd | 7,597[2] | 40,000 | 0.19 |
| 7th Standard Rd: Zerker Rd - Verdugo Ln | 12,813[2] | 40,000 | 0.32 |
| 7th Standard Rd: Verdugo Ln - Calloway Dr | 13,944[2] | 40,000 | 0.35 |
| 7th Standard Rd: Calloway Dr - Coffee Rd | 12,813[2] | 40,000 | 0.32 |
| 7th Standard Rd: Coffee Rd - Golden State Hwy | 24,435[2] | 40,000 | 0.61 |
| A St: Terrace Dr - S 10th St | 4,367[2] | 15,000 | 0.29 |
| Adohr Rd: Freeborn Rd - Tupman Rd | 250[2] | 15,000 | 0.02 |
| Alfred Harrell Hwy: China Grade Loop - Fairfax Rd | 4,594[2] | 40,000 | 0.11 |

**Table 4.16-6: Roadway Segment Operations, 2015**

| Street Segment | Existing ADT | Existing Capacity | V/C Ratio |
|---|---|---|---|
| Alfred Harrell Hwy: Fairfax Rd - Hart Park Ent | 4,947[2] | 40,000 | 0.12 |
| Alfred Harrell Hwy: Hart Park Ent - Morning Dr | 990[2] | 15,000 | 0.07 |
| Alfred Harrell Hwy: Morning Dr - Lake Ming Rd | 1,623[2] | 15,000 | 0.11 |
| Alfred Harrell Hwy: Lake Ming Rd - SR 178 | 2,011[2] | 15,000 | 0.13 |
| Bear Mtn Blvd: Coles Levee Rd - Interstate 5 | 1,529[2] | 15,000 | 0.10 |
| Bitterwater Valley Rd: SR 46 - S of SR 46 | 200[2] | 15,000 | 0.01 |
| Brite Rd: Buttonwillow Dr - W as co W y | 1,769[2] | 15,000 | 0.12 |
| Cadet Rd: SR 33 - Gardner Field Rd | 934[2] | 15,000 | 0.06 |
| Cerro Noroes te Rd: SR 166 - Klipstein Canyon Rd | 113[2] | 15,000 | 0.01 |
| China Grade Loop: Airport Dr - N Chester Ave | 8,772[2] | 30,000 | 0.29 |
| China Grade Loop: N Chester Ave - Manor St | 6,206[2] | 30,000 | 0.21 |
| China Grade Loop: Manor St - Oilfield Srv Rd | 5,788[2] | 15,000 | 0.39 |
| China Grade Loop: Oilfield Srv Rd - Round Mountain Rd | 5,013[2] | 15,000 | 0.33 |
| China Grade Loop: Round Mountain Rd - Alfred Harrel Hwy | 5,547[2] | 15,000 | 0.37 |
| Copus Rd: Basic School Rd - Old River Rd | 1,352[2] | 15,000 | 0.09 |
| Copus Rd: Old River Rd - SR 99 | 3,940[2] | 15,000 | 0.26 |
| David Rd: SR 99 - S W heeler Ridge Rd | 1,457[2] | 15,000 | 0.10 |
| Famoso Rd: SR 46 - Driver Rd | 2,238[2] | 15,000 | 0.15 |
| Famoso Rd: Driver Rd - SR 65 | 1,145[2] | 15,000 | 0.08 |
| Famoso Rd: SR 65 - Granite Rd | 593[2] | 15,000 | 0.04 |
| SR 155 (Garces Hwy): Corcoran Rd - SR 43 | 473[2] | 15,000 | 0.03 |
| SR 155 (Garces Hwy): SR 43 - SR 99 | 12,700[2] | 15,000 | 0.85 |
| Gardner Field Rd: SR 119 - S Lake Rd | 1,426[2] | 15,000 | 0.10 |
| Gardner Field Rd: S Lake Rd - Cadet Rd | 610[2] | 15,000 | 0.04 |
| Gardner Field Rd: Cadet Rd - Basic School Rd | 635[2] | 15,000 | 0.04 |
| Hazelton St: SR 166 - Wes tern Minerals Rd | 264[2] | 15,000 | 0.02 |
| Herring Rd: Old River Rd - SR 99 | 273[2] | 15,000 | 0.02 |
| James Rd: SR 65 (Porterville Hwy) - Oilfields Rd | 3,400[2] | 15,000 | 0.23 |
| James Rd: Oilfields Rd - Granite Rd | 3,682[2] | 15,000 | 0.25 |
| James Rd: Granite Rd - Petrol Rd | 3,500[2] | 15,000 | 0.23 |
| James Rd: Petrol Rd - N Chester Ave | 3,500[2] | 15,000 | 0.23 |
| Kecks Rd: SR 46 - Barker Rd | 73[2] | 15,000 | 0.00 |

**Table 4.16-6: Roadway Segment Operations, 2015**

| Street Segment | Existing ADT | Existing Capacity | V/C Ratio |
|---|---|---|---|
| Kimberlina Rd: Bell Rd - SR 43 | 4,810[2] | 15,000 | 0.32 |
| Kimberlina Rd: SR 43 - Shafter Ave | 5,241[2] | 15,000 | 0.35 |
| Kimberlina Rd: Shafter Ave - SR 99 | 5,241[2] | 15,000 | 0.35 |
| Lerdo Hwy: SR 33 - Lost Hills Rd | 2,081[2] | 7,500 | 0.28 |
| Lerdo Hwy: Los t Hills Rd - Interstate 5 | 3,226[2] | 7,500 | 0.43 |
| Lerdo Hwy: Interstate 5 - Rowlee Rd | 3,415[2] | 15,000 | 0.23 |
| Lerdo Hwy: Rowlee Rd - Magnolia Ave | 3,033[2] | 15,000 | 0.20 |
| Lerdo Hwy: Magnolia Ave - Scaroni Ave | 4,163[2] | 15,000 | 0.28 |
| Lerdo Hwy: Scaroni Ave - Poplar Ave | 4,304[2] | 15,000 | 0.29 |
| Lerdo Hwy: Poplar Ave - Schnaidt St | 5,688[2] | 20,000 | 0.28 |
| Lerdo Hwy: Schnaidt St - Shafter Ave | 6,881[2] | 15,000 | 0.46 |
| Lerdo Hwy: Shafter Ave - SR 43 (Central Valley Hwy) | 8,365[2] | 15,000 | 0.56 |
| Lerdo Hwy: SR 43 (Central Valley Hwy) - SR 99 | 8,365[2] | 15,000 | 0.56 |
| Lerdo Hwy: SR 99 - Zerker Rd | 5,751[2] | 15,000 | 0.38 |
| Lerdo Hwy: Zerker Rd - Kyte Ave | 5,751[2] | 15,000 | 0.38 |
| Lerdo Hwy: Kyte Ave - Indus trial Farm Rd | 5,751[2] | 15,000 | 0.38 |
| Lerdo Hwy: Indus trial Farm Rd - SR 65 (Porterville Hwy) | 5,751[2] | 15,000 | 0.38 |
| Lokern Rd: W of Los t Hills Rd - Lost Hills Rd | 448[2] | 15,000 | 0.03 |
| Lokern Rd: Lost Hills Rd - SR 33 | 504[2] | 15,000 | 0.03 |
| Lokern Rd: SR 33 - SR 58 | 2,812[2] | 15,000 | 0.19 |
| Manor St: 7th Standard - China Grade Loop | 7,091[2] | 40,000 | 0.18 |
| McCombs Rd: N Palm Ave - SR 43 | 1,444[2] | 15,000 | 0.10 |
| Merle Haggard Dr: Golden State Hwy - SR 99 | 26,577[2] | 40,000 | 0.66 |
| Merle Haggard Dr: SR 99 - SR 65 (Porterville Hwy) | 20,502[2] | 40,000 | 0.51 |
| Merle Haggard Dr: SR 65 (Porterville Hwy) - Beach Ave | 22,914[2] | 40,000 | 0.57 |
| Merle Haggard Dr: Beach Ave - Airport Dr | 11,828[2] | 15,000 | 0.79 |
| Merle Haggard Dr: Airport Dr - N Chester Ave | 8,095[2] | 30,000 | 0.27 |
| Midway Rd: SR 33 - SR 119 | 7,817[2] | 15,000 | 0.52 |
| Millux Rd: Interstate 5 - Old River Rd | 1,041[2] | 15,000 | 0.07 |
| Millux Rd: Hill Rd - Interstate 5 | 1,197[2] | 15,000 | 0.08 |
| Muller Rd: Malaga Rd - Comanche Dr | 1,050[2] | 15,000 | 0.07 |
| Panama Ln: SR 43 (Enos Ln) - Canfield Pkwy | 4,434[2] | 15,000 | 0.30 |

**Table 4.16-6: Roadway Segment Operations, 2015**

| Street Segment | Existing ADT | Existing Capacity | V/C Ratio |
|---|---|---|---|
| Panama Ln: Canfield Pkwy - Heath Rd | 4,400[2] | 15,000 | 0.29 |
| Panama Ln: Heath Rd - Renfro Rd | 3,000[2] | 15,000 | 0.20 |
| Panama Ln: Renfro Rd - Allen Rd | 3,000[2] | 15,000 | 0.20 |
| Panama Ln: Allen Rd - Buena Vis ta Rd | 3,290[2] | 15,000 | 0.22 |
| Panama Ln: Buena Vis ta Rd - Old River Rd | 7,804[2] | 15,000 | 0.52 |
| Panama Ln: Old River Rd - Gosford Rd | 6,000[2] | 15,000 | 0.40 |
| Panama Ln: Gosford Rd - As he Rd | 4,800[2] | 22,500 | 0.21 |
| Panama Ln: A she Rd - Stine Rd | 25,199[2] | 40,000 | 0.63 |
| Panama Ln: Stine Rd - Akers Rd | 29,974[2] | 60,000 | 0.50 |
| Panama Ln: Akers Rd - Wible Rd | 24,586[2] | 60,000 | 0.41 |
| Panama Ln: Wible Rd - SR 99 | 34,070[2] | 60,000 | 0.57 |
| Panama Ln: SR 99 - S H St | 19,701[2] | 50,000 | 0.39 |
| Panama Ln: S H St - S Union Ave | 7,913[2] | 40,000 | 0.20 |
| Panama Ln: S Union Ave - Cottonwood Rd | 7,322[2] | 15,000 | 0.49 |
| Panama Ln: Cottonwood Rd - Fairfax Rd | 6,888[2] | 15,000 | 0.46 |
| Panama Ln: Fairfax Rd - SR 184 (Weedpatch Hwy) | 4,277[2] | 15,000 | 0.29 |
| Panama Rd: S Union Ave - Cottonwood Rd | 9,400[2] | 15,000 | 0.63 |
| Panama Rd: Cottonwood Rd - Fairfax Rd | 8,500[2] | 15,000 | 0.57 |
| Panama Rd: Fairfax Rd - SR 184 (Weedpatch Hwy) | 7,178[2] | 15,000 | 0.48 |
| Panama Rd: Main St - Habecker Rd | 5,412[2] | 15,000 | 0.36 |
| Panama Rd: Habecker Rd - S Vineland Rd | 2,706[2] | 15,000 | 0.18 |
| Panama Rd: Vineland Rd - Edison Rd | 2,815[2] | 15,000 | 0.19 |
| Panama Rd: Edison Rd - Comanche Dr | 1,613[2] | 15,000 | 0.11 |
| Panama Rd: Comanche Dr - Tejon Hwy | 568[2] | 15,000 | 0.04 |
| Panama Rd: Tejon Hwy - Tower Line Rd | 568[2] | 15,000 | 0.04 |
| Pieri Rd: Coles Levee Rd - Hill Rd | 600[2] | 15,000 | 0.04 |
| Reserve Rd: SR 33 - Dirt Road | 320[2] | 15,000 | 0.02 |
| Reserve Rd: Dirt Road - Skyline Rd | 333[2] | 15,000 | 0.02 |
| Reward Loop: Reward Rd - Reward Rd | 300[2] | 15,000 | 0.02 |
| Reward Rd: SR 58 - Franco Western Rd | 532[2] | 15,000 | 0.04 |
| Reward Rd: Franco Western Rd - SR 33 | 926[2] | 15,000 | 0.06 |
| Skyline Rd: Reserve Rd - East of Reserve Rd | 260[2] | 15,000 | 0.02 |

**Table 4.16-6: Roadway Segment Operations, 2015**

| Street Segment | Existing ADT | Existing Capacity | V/C Ratio |
|---|---|---|---|
| Skyline Rd: Elk Hills Rd - Wes t of Elk Hills Rd | 260[2] | 15,000 | 0.02 |
| Skyline Rd: Elk Hills Rd - Unknown Rd | 250[2] | 15,000 | 0.02 |
| Skyline Rd: Unknown Rd - N Access Rd | 250[2] | 15,000 | 0.02 |
| Stockdale Hwy: Wasco Wy - Morris Rd | 1,353[2] | 15,000 | 0.09 |
| Stockdale Hwy: Morris Rd - Int 5 SB Ramps | 1,464[2] | 15,000 | 0.10 |
| Stockdale Hwy: Int 5 SB Ramps - Int 5 NB Ramps | 1,464[2] | 15,000 | 0.10 |
| Stockdale Hwy: Int 5 NB Ramps - Bussell Rd | 4,032[2] | 15,000 | 0.27 |
| Stockdale Hwy: Bus s ell Rd - SR 43 (Enos Ln) | 5,407[2] | 15,000 | 0.36 |
| Stockdale Hwy: SR 43 (Enos Ln) - Nord Ave | 6,471[2] | 15,000 | 0.43 |
| Stockdale Hwy: Nord Ave - Heath Rd | 13,482[2] | 15,000 | 0.90 |
| Stockdale Hwy: Heath Rd - Renfro Rd | 12,580[2] | 15,000 | 0.84 |
| Stockdale Hwy: Renfro Rd - Allen Rd | 25,308[2] | 40,000 | 0.63 |
| Stockdale Hwy: Allen Rd - Buena Vis ta Rd | 16,955[2] | 40,000 | 0.42 |
| Stockdale Hwy: Buena Vis ta Rd - Old River Rd | 34,232[2] | 60,000 | 0.57 |
| Stockdale Hwy: Old River Rd - Don Hart Dr E | 43,725[2] | 60,000 | 0.73 |
| Stockdale Hwy: Don Hart Dr E - Coffee Rd | 37,547[2] | 60,000 | 0.63 |
| Stockdale Hwy: Coffee Rd - El Rio Dr | 42,389[2] | 60,000 | 0.71 |
| Stockdale Hwy: El Rio Dr - Ashe Rd | 45,329[2] | 60,000 | 0.76 |
| Stockdale Hwy: Ashe Rd - New Stine Rd | 48,498[2] | 60,000 | 0.81 |
| Stockdale Hwy: New Stine Rd - Stine Rd | 27,123[2] | 60,000 | 0.45 |
| Stockdale Hwy: Stine Rd - Real Rd | 48,679[2] | 60,000 | 0.81 |
| Taft Hwy: S H St - Chevalier Rd | 13,293[2] | 15,000 | 0.89 |
| Taft Hwy: Chevalier Rd - S Union Ave | 9,783[2] | 15,000 | 0.65 |
| Twisselman Rd: Barker Rd - Holloway Rd | 885[2] | 15,000 | 0.06 |
| Twisselman Rd: Holloway Rd - Interstate 5 | 440[2] | 15,000 | 0.03 |
| Twisselman Rd: Interstate 5 - Los t Hill Rd | 110[2] | 15,000 | 0.01 |
| Union Rd: Enos Ln - Coles Levee Rd | 700[2] | 15,000 | 0.05 |
| Western Minerals Rd: Hazelton St - Klipstein Rd | 264[2] | 15,000 | 0.02 |
| Wood St: S 10th St - Olive Ave | 3,824[2] | 15,000 | 0.25 |
| Wood St: Olive Ave - SR 119 | 3,824[2] | 15,000 | 0.25 |
| Airport Dr: SR 99 - Olive Dr | 31,464[2] | 40,000 | 0.79 |
| Airport Dr: Olive Dr - China Grade Loop | 20,825[2] | 40,000 | 0.52 |

**Table 4.16-6: Roadway Segment Operations, 2015**

| Street Segment | Existing ADT | Existing Capacity | V/C Ratio |
|---|---|---|---|
| Airport Dr: China Grade Loop - Merle Haggard Dr | 14,668[2] | 15,000 | 0.98 |
| Airport Dr: Merle Haggard Dr - James Rd | 5,516[2] | 15,000 | 0.37 |
| Allen Rd: SR 58 (Rosedale Hwy) - Hageman Rd | 16,535[2] | 30,000 | 0.55 |
| Allen Rd: Hageman Rd - Reina Rd | 6,452[2] | 15,000 | 0.43 |
| Allen Rd: Reina Rd - Olive Dr | 6,900[2] | 20,000 | 0.35 |
| Allen Rd: Olive Dr - 7th Standard Rd | 3,882[2] | 15,000 | 0.26 |
| Basic School Rd: Copus Rd - Cadet Rd | 610[2] | 15,000 | 0.04 |
| Beech Ave: 7th Standard Rd - Petrol Rd | 1,487[2] | 15,000 | 0.10 |
| Brown Material Rd: SR 33 - SR 46 | 433[2] | 15,000 | 0.03 |
| Buena Vis ta Rd: Panama Ln - Pacheco Rd | 7,951[2] | 15,000 | 0.53 |
| Buena Vis ta Rd: Pacheco Rd - White Ln | 16,708[2] | 30,000 | 0.56 |
| Buena Vis ta Rd: White Ln - Ming Ave | 12,505[2] | 40,000 | 0.31 |
| Buena Vis ta Rd: Ming Ave - Stockdale Hwy | 12,215[2] | 40,000 | 0.31 |
| Buttonwillow Dr: Elk Hills Rd - Brite Rd | 1,800[2] | 15,000 | 0.12 |
| Buttonwillow Dr: SR 58 - 7th Standard Rd | 1,821[2] | 15,000 | 0.12 |
| Buttonwillow Dr: 7th Standard Rd - Lerdo Hwy | 1,353[2] | 15,000 | 0.09 |
| Calloway Dr: Stockdale Hwy - Brimhall Rd | 32,428[2] | 40,000 | 0.81 |
| Calloway Dr: Brimhall Rd - SR 58 (Rosedale Hwy) | 33,309[2] | 40,000 | 0.83 |
| Calloway Dr: SR 58 (Rosedale Hwy) - Meacham Rd | 29,590[2] | 40,000 | 0.74 |
| Calloway Dr: Meacham Rd - Hageman Rd | 26,576[2] | 40,000 | 0.66 |
| Calloway Dr: Hageman Rd - Olive Dr | 23,109[2] | 60,000 | 0.39 |
| Calloway Dr: Olive Dr – Norris | 7,922[2] | 50,000 | 0.16 |
| Calloway Dr: Norris Rd - Snow Rd | 7,922[2] | 30,000 | 0.26 |
| Calloway Dr: Snow Rd - 7th Standard Rd | 7,061[2] | 15,000 | 0.47 |
| Coffee Rd: Stockdale Hwy - Truxtun Ave | 69,257[2] | 60,000 | 1.15 |
| Coffee Rd: Truxtun Ave - Brimhall Rd | 55,228[2] | 60,000 | 0.92 |
| Coffee Rd: Brimhall Rd - SR 58 (Rosedale Hwy) | 36,728[2] | 60,000 | 0.61 |
| Coffee Rd: SR 58 (Rosedale Hwy) - Hageman Rd | 31,818[2] | 60,000 | 0.53 |
| Coffee Rd: Hageman Rd - Olive Dr | 25,767[2] | 60,000 | 0.43 |
| Coffee Rd: Olive Dr - Norris Rd | 12,462[2] | 30,000 | 0.42 |
| Coffee Rd: Norris Rd - Snow Rd | 7,599[2] | 15,000 | 0.51 |
| Coffee Rd: Snow Rd - 7th Standard Rd | 7,284[2] | 15,000 | 0.49 |

**Table 4.16-6: Roadway Segment Operations, 2015**

| Street Segment | Existing ADT | Existing Capacity | V/C Ratio |
|---|---|---|---|
| Coles Levee Rd: Pieri Rd - Bear Mountain Blvd | 624[2] | 15,000 | 0.04 |
| Coles Levee Rd: Bear Mountain Blvd - Union Rd | 300[2] | 15,000 | 0.02 |
| Comanche Dr: SR 223 (Bear Mtn Blvd) - DiGiorgio Rd | 7,749[2] | 15,000 | 0.52 |
| Comanche Dr: DiGiorgio Rd - Panama Rd | 7,255[2] | 15,000 | 0.48 |
| Comanche Dr: Panama Rd - Mountain View Rd | 6,700[2] | 15,000 | 0.45 |
| Comanche Dr: Mountain View Rd - Muller Rd | 6,700[2] | 15,000 | 0.45 |
| Comanche Dr: Muller Rd - SR 58 | 4,000[2] | 15,000 | 0.27 |
| Comanche Dr: SR 58 - Edis on Hwy | 4,331[2] | 15,000 | 0.29 |
| Comanche Dr: Edis on Hwy - Breckenridge Rd | 2,887[2] | 15,000 | 0.19 |
| Comanche Dr: Breckenridge Rd - SR 178 | 3,664[2] | 15,000 | 0.24 |
| Corn Camp Rd: SR 58 - 7th Standard Rd | 957[2] | 15,000 | 0.06 |
| Dairy Rd: Adohr Rd - Stockdale Hwy | 200[2] | 15,000 | 0.01 |
| Elk Hills Rd: SR 119 - Skyline Rd | 1,137[2] | 15,000 | 0.08 |
| Elk Hills Rd: Skyline Rd - Buttonwillow Dr | 1,249[2] | 15,000 | 0.08 |
| Enos Ln: Union Rd - SR 119 (Taft Hwy) | 728[2] | 15,000 | 0.05 |
| Fairfax Rd: SR 178 - Auburn St | 20,800[2] | 40,000 | 0.52 |
| Fairfax Rd: Auburn St - Panorama Dr | 11,997[2] | 40,000 | 0.30 |
| Fairfax Rd: Panorama Dr - Paladino Dr | 6,620[2] | 40,000 | 0.17 |
| Fairfax Rd: Paladino Dr - Alfred Harrell Hwy | 3,306[2] | 15,000 | 0.22 |
| Franco Western Rd: Reward Rd - West Side Hwy | 645[2] | 15,000 | 0.04 |
| Freeborn Rd: Adohr Rd - Stockdale Hwy | 600[2] | 15,000 | 0.04 |
| Gosford Rd: SR 223 (Bear Mtn Blvd) - SR 119 (Taft Hwy) | 1,827[2] | 15,000 | 0.12 |
| Gosford Rd: SR 119 (Taft Hwy) - McCutchen Rd | 5,800[2] | 15,000 | 0.39 |
| Gosford Rd: McCutchen Rd - Panama Ln | 4,809[2] | 15,000 | 0.32 |
| Gosford Rd: Panama Ln - Pacheco Rd | 14,629[2] | 40,000 | 0.37 |
| Gosford Rd: Pacheco Rd - White Ln | 20,111[2] | 60,000 | 0.34 |
| Gosford Rd: White Ln - S Laurelglen Blvd | 34,749[2] | 60,000 | 0.58 |
| Gosford Rd: S Laurelglen Blvd - N Laurelglen Blvd | 30,929[2] | 60,000 | 0.52 |
| Gosford Rd: N Laurelglen Blvd - Ming Ave | 29,635[2] | 60,000 | 0.49 |
| Gosford Rd: Ming Ave - Stockdale Hwy | 35,627[2] | 60,000 | 0.59 |
| Granite Rd: James Rd - N Chester Ave Ext | 3,052[2] | 15,000 | 0.20 |
| Granite Rd: N Chester Ave Ext - Round Mountain Rd | 2,950[2] | 15,000 | 0.20 |

**Table 4.16-6: Roadway Segment Operations, 2015**

| Street Segment | Existing ADT | Existing Capacity | V/C Ratio |
|---|---|---|---|
| Granite Rd: Round Mountain Rd - Garcia Rd | 361[2] | 15,000 | 0.02 |
| Granite Rd: Garcia Rd - Famoso Rd | 361[2] | 15,000 | 0.02 |
| Granite Rd: Famoso Rd - Pine Mountain Rd | 361[2] | 15,000 | 0.02 |
| Hill Rd: S Lake Rd` - Millux Rd | 843[2] | 15,000 | 0.06 |
| Hill Rd: Millux Rd - Pieri Rd | 810[2] | 15,000 | 0.05 |
| Klipstein Canyon Rd: Cerro Noroeste Rd - SR 166 | 52[2] | 15,000 | 0.00 |
| Lost Hills Rd: West Side Hwy - Lokern Rd | 562[2] | 15,000 | 0.04 |
| Lost Hills Rd: Lokern Rd - SR 33 | 1,030[2] | 15,000 | 0.07 |
| Lost Hills Rd: SR 33 - 7th Standard Rd | 1,000[2] | 15,000 | 0.07 |
| Lost Hills Rd: 7th Standard Rd - Lerdo Hwy | 1,030[2] | 15,000 | 0.07 |
| Lost Hills Rd: Lerdo Hwy - SR 46 | 4,451[2] | 15,000 | 0.30 |
| Lost Hills Rd: SR 46 - Twisselman Rd | 52[2] | 15,000 | 0.00 |
| Lost Hills Rd: Twisselman Rd - County Line Rd | 52[2] | 15,000 | 0.00 |
| Magnolia Ave: 7th Standard - Burbank St | 1,127[2] | 15,000 | 0.08 |
| Magnolia Ave: Burbank St - SR 46 | 561[2] | 15,000 | 0.04 |
| Main Drain Rd: 7th Standard Rd - Lerdo Hwy | 177[2] | 15,000 | 0.01 |
| Main Drain Rd: W Lerdo Hwy - Interstate 5 | 104[2] | 15,000 | 0.01 |
| Main Drain Rd: Interstate 5 - SR 46 | 561[2] | 15,000 | 0.04 |
| Malaga Rd: Panama Ln - Muller Rd | 640[2] | 15,000 | 0.04 |
| Mohawk St: Westside Parkway - SR 58 (Rosedale Hwy) | 10,000[2] | 60,000 | 0.17 |
| Morning Dr: Niles St - College Ave | 1,145[2] | 30,000 | 0.04 |
| Morning Dr: College Ave - Highland Knolls Dr | 1,100[2] | 15,000 | 0.07 |
| Morning Dr: Highland Knolls Dr - SR 178 | 500[2] | 15,000 | 0.03 |
| N Access Rd: Skyline Rd - Tupman Rd | 460[2] | 15,000 | 0.03 |
| N Chester Ave: China Grade Loop - Merle Haggard Dr | 11,448[2] | 40,000 | 0.29 |
| N Chester Ave Ext: Manor St - Granite Rd | 5,822[2] | 15,000 | 0.39 |
| Oilfield Rd: N of James Rd - James Rd | 604[2] | 15,000 | 0.04 |
| Old River Rd: SR 166 (Maricopa Hwy) - Copus Rd | 2,354[2] | 15,000 | 0.16 |
| Old River Rd: Copus Rd - Interstate 5 | 2,354[2] | 15,000 | 0.16 |
| Old River Rd: Interstate 5 - SR 223 (Bear Mtn Blvd) | 5,847[2] | 15,000 | 0.39 |
| Old River Rd: SR 223 (Bear Mtn Blvd) - SR 119 (Taft Hwy) | 3,666[2] | 15,000 | 0.24 |
| Old River Rd: SR 119 (Taft Hwy) - McCutchen Rd | 5,847[2] | 15,000 | 0.39 |

**Table 4.16-6: Roadway Segment Operations, 2015**

| Street Segment | Existing ADT | Existing Capacity | V/C Ratio |
|---|---|---|---|
| Old River Rd: McCutchen Rd - Panama Ln | 2,276[2] | 15,000 | 0.15 |
| Old River Rd: Panama Ln - Harris Rd | 8,044[2] | 15,000 | 0.54 |
| Old River Rd: Harris Rd - Campus Park Dr | 11,891[2] | 15,000 | 0.79 |
| Old River Rd: Campus Park Dr - White Ln | 10,369[2] | 40,000 | 0.26 |
| Old River Rd: White Ln - Ming Ave | 17,303[2] | 60,000 | 0.29 |
| Old River Rd: Ming Ave - Stockdale Hwy | 33,968[2] | 60,000 | 0.57 |
| Olive Ave: South St - Wood St | 271[2] | 15,000 | 0.02 |
| Palm Ave: SR 46 - McCombs Rd | 1,500[2] | 15,000 | 0.10 |
| Palm Ave: McCombs Ave - Phillips Rd | 1,340[2] | 15,000 | 0.09 |
| Real Rd: SR 58 - Stockdale Hwy | 16,105[2] | 50,000 | 0.32 |
| Round Mtn Rd: China Grade Loop - Pyramid Rd | 2,304[2] | 15,000 | 0.15 |
| Round Mtn Rd: Pyramid Rd - Granite Rd | 208[2] | 15,000 | 0.01 |
| Rowlee Rd: Lerdo Hwy - SR 46 | 2,381[2] | 15,000 | 0.16 |
| S 10th St: Wood St - A St | 8,657[2] | 15,000 | 0.58 |
| S Lake Rd: Gardner Field Rd - Hill Rd | 1,037[2] | 15,000 | 0.07 |
| SR 204 (Union Ave): SR 58 - Union Ave | 43,000[2] | 40,000 | 1.08 |
| Santa Fe W ay: Allen Rd - Hageman Rd | 9,600[2] | 40,000 | 0.24 |
| Santa Fe W ay: Hageman Rd - Renfro Rd | 9,600[2] | 15,000 | 0.64 |
| Santa Fe W ay: Renfro Rd - Kratzmeyer Rd | 9,600[2] | 15,000 | 0.64 |
| Santa Fe Way: Kratzmeyer Rd - 7th Standard Rd | 7,448[2] | 15,000 | 0.50 |
| Santa Fe Way: 7th Standard Rd - Los Angeles St | 11,245[2] | 15,000 | 0.75 |
| Shafter Ave: SR 43 - Merced Ave | 2,942[2] | 15,000 | 0.20 |
| Shafter Ave: Merced Ave - Kimberlina Rd | 1,509[2] | 15,000 | 0.10 |
| Shafter Rd: Lerdo Hwy - SR 43 | 2,942[2] | 15,000 | 0.20 |
| Tracy Ave: SR 58 - Int 5 NB Ramps | 1,000[2] | 10,000 | 0.10 |
| Tracy Ave: Int 5 NB Ramps - Willow Dr | 500[2] | 10,000 | 0.05 |
| Tracy Ave: Willow Dr - 7th Standard Rd | 500[2] | 15,000 | 0.03 |
| Tupman Rd: SR 119 - N Access Rd | 690[2] | 15,000 | 0.05 |
| Tupman Rd: N Access Rd - Adohr Rd | 239[2] | 15,000 | 0.02 |
| Wasco Wy: Brite Rd - SR 58 | 1,821[2] | 15,000 | 0.12 |
| Wasco Wy: Stockdale Hwy - Brite Rd | 1,821[2] | 15,000 | 0.12 |
| W heeler Ridge Rd: Interstate 5 - Del Sol Dr | 5,030[2] | 15,000 | 0.34 |

**Table 4.16-6: Roadway Segment Operations, 2015**

| Street Segment | Existing ADT | Existing Capacity | V/C Ratio |
|---|---|---|---|
| W heeler Ridge Rd: Del Sol Dr - David Rd | 5,030[2] | 15,000 | 0.34 |
| W heeler Ridge Rd: David Rd - SR 223 | 3,839[2] | 15,000 | 0.26 |
| Zerker Rd: 7th Standard Rd - Lerdo Hwy | 5,449[2] | 15,000 | 0.36 |
| SR 178: 24th St Frontage Rd - Union Ave | 54,000[2] | 75,000 | 0.72 |
| SR 178: Union Ave - Mt Vernon Ave | 63,000[2] | 112,500 | 0.56 |
| SR 178: Mt Vernon Ave - Oswell St | 40,500[2] | 112,500 | 0.36 |
| SR 178: Oswell St - Fairfax Rd | 30,000[2] | 75,000 | 0.40 |
| SR 58: Real Rd - SR 99 | 40,500[2] | 40,000 | 1.01 |
| SR 58: SR 99 - Union Ave | 81,000[2] | 75,000 | 1.08 |
| SR 58: Union Ave - Cottonwood Rd | 78,000[2] | 112,500 | 0.69 |
| SR 58: Cottonwood Rd - Mt Vernon Ave | 78,000[2] | 112,500 | 0.69 |
| SR 58: Mt Vernon Ave - Fairfax Rd | 76,000[2] | 112,500 | 0.68 |
| SR 58: Fairfax Rd - SR 184 (Weedpatch Hwy) | 40,500[2] | 112,500 | 0.36 |
| SR 58: SR 184 (Weedpatch Hwy) - Comanche Dr | 27,500[2] | 112,500 | 0.24 |
| SR 58: Comanche Dr - SR 223 (Bear Mtn Blvd) | 21,100[2] | 75,000 | 0.28 |
| Interstate 5: Grapevine Rd - S Wheeler Ridge Rd | 70,000[2] | 75,000 | 0.93 |
| Interstate 5: S W heeler Ridge Rd - SR 99 | 70,000[2] | 140,625 | 0.50 |
| Interstate 5: SR 99 - SR 166 (Maricopa Hwy) | 29,500[2] | 75,000 | 0.39 |
| Interstate 5: SR 166 (Maricopa Hwy) - Old River Rd | 29,500[2] | 75,000 | 0.39 |
| Interstate 5: Old River Rd - SR 223 (Bear Mtn Blvd) | 29,000[2] | 75,000 | 0.39 |
| Interstate 5: SR 223 (Bear Mtn Blvd) - SR 119 (Taft Hwy) | 31,000[2] | 75,000 | 0.41 |
| Interstate 5: SR 119 (Taft Hwy) - SR 43 | 31,000[2] | 75,000 | 0.41 |
| Interstate 5: SR 43 - Stockdale Hwy | 31,000[2] | 75,000 | 0.41 |
| Interstate 5: Stockdale Hwy - SR 58 | 36,000[2] | 75,000 | 0.48 |
| Interstate 5: SR 58 - 7th Standard Rd | 35,500[2] | 75,000 | 0.47 |
| Interstate 5: 7th Standard Rd - Lerdo Hwy | 35,500[2] | 75,000 | 0.47 |
| Interstate 5: Lerdo Hwy - SR 46 | 35,500[2] | 75,000 | 0.47 |
| Interstate 5: SR 46 - County Line Rd | 32,500[2] | 75,000 | 0.43 |
| SR 99: Interstate 5 - SR 166 | 43,000[2] | 112,500 | 0.38 |
| SR 99: SR 166 - Copus Rd | 40,500[2] | 112,500 | 0.36 |
| SR 99: Copus Rd - Herring Rd | 43,000[2] | 112,500 | 0.38 |
| SR 99: Herring Rd - SR 223 (Bear Mtn Blvd) | 42,000[2] | 112,500 | 0.37 |

**Table 4.16-6: Roadway Segment Operations, 2015**

| Street Segment | Existing ADT | Existing Capacity | V/C Ratio |
|---|---|---|---|
| SR 99: SR 223 (Bear Mtn Blvd) - SR 119 (Taft Hwy) | 50,000[2] | 112,500 | 0.44 |
| SR 99: SR 119 (Taft Hwy) - Panama Ln | 60,000[2] | 112,500 | 0.53 |
| SR 99: Panama Ln - SR 58 East | 140,000[2] | 112,500 | 1.24 |
| SR 99: SR 58 East - SR 178 | 139,000[2] | 112,500 | 1.24 |
| SR 99: SR 178 - Olive Dr | 109,000[2] | 187,500 | 0.58 |
| SR 99: Olive Dr - 7th Standard Rd | 78,000[2] | 112,500 | 0.69 |
| SR 99: 7th Standard Rd - Lerdo Hwy | 64,000[2] | 112,500 | 0.57 |
| SR 99: Lerdo Hwy - Kimberlina Rd | 57,000[2] | 112,500 | 0.51 |
| SR 99: Kimberlina Rd - SR 46 | 57,000[2] | 112,500 | 0.51 |
| SR 99: SR 46 - Garces Hwy | 51,000[2] | 112,500 | 0.45 |
| SR 99: Garces Hwy - County Line Rd | 47,500[2] | 112,500 | 0.42 |
| 23rd St: Bay St - 24th St Frontage Rd | 24,900[2] | 30,000 | 0.83 |
| SR 119 (Taft Hwy): SR 33 - Elk Hills Rd | 7,000[2] | 15,000 | 0.47 |
| SR 119 (Taft Hwy): Elk Hills Rd - Tupman Rd | 10,200[2] | 15,000 | 0.68 |
| SR 119 (Taft Hwy): Tupman Rd - SR 43 (Enos Ln) | 13,700[2] | 15,000 | 0.91 |
| SR 119 (Taft Hwy): SR 43 (Enos Ln) - Interstate 5 | 7,500[2] | 15,000 | 0.50 |
| SR 119 (Taft Hwy): Interstate 5 - Greeley Rd Ext | 7,800[2] | 15,000 | 0.52 |
| SR 119 (Taft Hwy): Greeley Rd Ext - Nord Rd Ext | 7,800[2] | 15,000 | 0.52 |
| SR 119 (Taft Hwy): Nord Rd Ext - Heath Rd Ext | 7,800[2] | 15,000 | 0.52 |
| SR 119 (Taft Hwy): Heath Rd Ext - Renfro Rd Ext | 7,800[2] | 15,000 | 0.52 |
| SR 119 (Taft Hwy): Renfro Rd Ext - Allen Rd Ext | 7,800[2] | 15,000 | 0.52 |
| SR 119 (Taft Hwy): Allen Rd Ext - Buena Vista Rd | 7,800[2] | 15,000 | 0.52 |
| SR 119 (Taft Hwy): Buena Vista Rd - Old River Rd | 8,000[2] | 15,000 | 0.53 |
| SR 119 (Taft Hwy): Old River Rd - Gosford Rd | 9,300[2] | 15,000 | 0.62 |
| SR 119 (Taft Hwy): Gosford Rd - A she Rd | 9,300[2] | 15,000 | 0.62 |
| SR 119 (Taft Hwy): Ashe Rd - Stine Rd | 9,300[2] | 15,000 | 0.62 |
| SR 119 (Taft Hwy): Stine Rd - Akers Rd | 9,300[2] | 15,000 | 0.62 |
| SR 119 (Taft Hwy): Akers Rd - Wible Rd | 9,300[2] | 15,000 | 0.62 |
| SR 119 (Taft Hwy): Wible Rd - SR 99 | 11,200[2] | 15,000 | 0.75 |
| SR 119 (Taft Hwy): SR 99 - S H St | 1,800[2] | 15,000 | 0.12 |
| SR 155 (Garces Hwy): SR 99 - Browning Rd | 15,500[2] | 15,000 | 1.03 |
| SR 155 (Garces Hwy): Browning Rd - Zachary Ave | 2,700[2] | 15,000 | 0.18 |

**Table 4.16-6: Roadway Segment Operations, 2015**

| Street Segment | Existing ADT | Existing Capacity | V/C Ratio |
|---|---|---|---|
| SR 155 (Garces Hwy): Zachary Ave - Famoso Porterville Hwy | 2,200[2] | 15,000 | 0.15 |
| SR 155 (Garces Hwy): Famoso Porterville Hwy - Quinn Rd | 630[2] | 15,000 | 0.04 |
| SR 155 (Garces Hwy): Quinn Rd - SR 65 | 400[2] | 15,000 | 0.03 |
| SR 166 (Maricopa Hwy): SR 33 – Cappello | 5,700[2] | 15,000 | 0.38 |
| SR 166 (Maricopa Hwy): Cappello - Old River Rd | 5,700[2] | 15,000 | 0.38 |
| SR 166 (Maricopa Hwy): Old River Rd - Wheeler Ridge Access Rd | 2,400[2] | 15,000 | 0.16 |
| SR 166 (Maricopa Hwy): Wheeler Ridge Access Rd - Interstate 5 | 2,500[2] | 15,000 | 0.17 |
| SR 166 (Maricopa Hwy): Interstate 5 - SR 99 | 1,800[2] | 15,000 | 0.12 |
| SR 178 (24th St): SR 99 - Bay St | 52,000[2] | 40,000 | 1.30 |
| SR 178 (24th St): Bay St - 24th St Frontage Rd | 24,900[2] | 30,000 | 0.83 |
| SR 178: Fairfax Rd - Morning Dr | 16,500[2] | 75,000 | 0.22 |
| SR 178: Morning Dr - Vineland Rd | 16,500[2] | 22,500 | 0.73 |
| SR 178: Vineland Rd - SR 184 (Kern Canyon Rd) | 16,500[2] | 30,000 | 0.55 |
| SR 178 (Kern Canyon Rd): SR184 (Kern Canyon Rd) - Comanche Dr | 12,500[2] | 15,000 | 0.83 |
| SR 178 (Kern Canyon Rd): Comanche Dr - Miramonte Dr | 4,000[2] | 22,500 | 0.18 |
| SR 178 (Kern Canyon Rd): Miramonte Dr - Rancheria Rd | 4,000[2] | 15,000 | 0.27 |
| SR 178 (Kern Canyon Rd): Rancheria Rd - Kern Canyon Ent | 4,000[2] | 15,000 | 0.27 |
| SR 184 (Kern Canyon Rd): Watergrass Rd - Niles St | 10,300[2] | 15,000 | 0.69 |
| SR 184 (Kern Canyon Rd): Vineland Rd - Watergrass Rd | 10,300[2] | 15,000 | 0.69 |
| SR 184 (Kern Canyon Rd): SR 178 - Vineland Rd | 4,500[2] | 30,000 | 0.15 |
| SR 223 (Bear Mtn Blvd): Interstate 5 - Gosford Rd | 1,400[2] | 15,000 | 0.09 |
| SR 223 (Bear Mtn Blvd): Gosford Rd - As he Rd | 3,750[2] | 15,000 | 0.25 |
| SR 223 (Bear Mtn Blvd): A she Rd - S H St | 3,850[2] | 15,000 | 0.26 |
| SR 223 (Bear Mtn Blvd): S H St - Costajo Rd | 3,850[2] | 15,000 | 0.26 |
| SR 223 (Bear Mtn Blvd): Costajo Rd - SR 99 NB Ramps | 3,850[2] | 15,000 | 0.26 |
| SR 223 (Bear Mtn Blvd): SR 99 NB Ramps - S Union Av | 5,950[2] | 15,000 | 0.40 |
| SR 223 (Bear Mtn Blvd): S Union Av - SR 184 (Weedpatch Hwy) | 6,100[2] | 15,000 | 0.41 |
| SR 223 (Bear Mtn Blvd): SR 184 (Weedpatch Hwy) - Comanche Dr | 7,050[2] | 15,000 | 0.47 |
| SR 223 (Bear Mtn Blvd): Comanche Dr - A St | 10,200[2] | 40,000 | 0.26 |

**Table 4.16-6: Roadway Segment Operations, 2015**

| Street Segment | Existing ADT | Existing Capacity | V/C Ratio |
|---|---|---|---|
| SR 223 (Bear Mtn Blvd): A St - Tejon Hwy | 9,900[2] | 40,000 | 0.25 |
| SR 223 (Bear Mtn Blvd): Tejon Hwy - Tower Line Rd | 3,800[2] | 15,000 | 0.25 |
| SR 223 (Bear Mtn Blvd): Tower Line Rd - General Beale Rd | 2,000[2] | 15,000 | 0.13 |
| SR 223 (Bear Mtn Blvd): General Beale Rd - SR 58 | 1,550[2] | 15,000 | 0.10 |
| SR 46: SR 41 - Kecks Rd | 6,000[2] | 20,000 | 0.30 |
| SR 46: Kecks Rd - Bitterwater Valley Rd | 6,800[2] | 20,000 | 0.34 |
| SR 46: Bitterwater Valley Rd - SR 33 | 6,800[2] | 20,000 | 0.34 |
| SR 46: SR 33 - Brown Material Rd | 7,150[2] | 20,000 | 0.36 |
| SR 46: Brown Material Rd - Los t Hills Rd | 7,900[2] | 15,000 | 0.53 |
| SR 46: Los t Hills Rd - Interstate 5 | 10,000[2] | 15,000 | 0.67 |
| SR 46: Interstate 5 - Corcoran Rd | 6,300[2] | 15,000 | 0.42 |
| SR 46: Corcoran Rd - Rowlee Rd | 9,000[2] | 15,000 | 0.60 |
| SR 46: Rowlee Rd - Magnolia Ave | 8,500[2] | 15,000 | 0.57 |
| SR 46: Magnolia Ave - Palm Ave | 15,500[2] | 15,000 | 1.03 |
| SR 46: Palm Ave - SR 43 South | 15,500[2] | 20,000 | 0.78 |
| SR 46: SR 43 South - Beech Ave | 9,700[2] | 15,000 | 0.65 |
| SR 46: Beech Ave - Famoso Rd | 9,300[2] | 15,000 | 0.62 |
| SR 58: 7 Mile Rd - SR 33 | 350[2] | 15,000 | 0.02 |
| SR 58: SR 33 - Lokern Rd | 2,550[2] | 15,000 | 0.17 |
| SR 58: Lokern Ave - Corn Camp Rd | 6,300[2] | 15,000 | 0.42 |
| SR 58: Corn Camp Rd - W as co W y | 6,300[2] | 15,000 | 0.42 |
| SR 58: Wasco Wy - Old Tracy Ave | 7,200[2] | 15,000 | 0.48 |
| SR 58: Old Tracy Ave - Tracy Ave | 15,000[2] | 15,000 | 1.00 |
| SR 58: Tracy Ave - SR 43 (Enos Ln) | 8,700[2] | 15,000 | 0.58 |
| SR 58 (Rosedale Hwy): SR 43 (Enos Ln) - Superior Rd | 7,700[2] | 15,000 | 0.51 |
| SR 58 (Rosedale Hwy): Superior Rd - Greeley Rd | 7,700[2] | 15,000 | 0.51 |
| SR 58 (Rosedale Hwy): Greeley Rd - Nord Rd | 7,700[2] | 15,000 | 0.51 |
| SR 58 (Rosedale Hwy): Nord Rd - Heath Rd | 8,300[2] | 15,000 | 0.55 |
| SR 58 (Rosedale Hwy): Heath Rd - Renfro Rd | 8,300[2] | 15,000 | 0.55 |
| SR 58 (Rosedale Hwy): Renfro Rd - Allen Rd | 25,800[2] | 15,000 | 1.72 |
| SR 58 (Rosedale Hwy): Allen Rd - Old Farm Rd | 25,800[2] | 40,000 | 0.65 |
| SR 58 (Rosedale Hwy): Old Farm Rd - Jewetta Ave N | 25,800[2] | 40,000 | 0.65 |

**Table 4.16-6: Roadway Segment Operations, 2015**

| Street Segment | Existing ADT | Existing Capacity | V/C Ratio |
|---|---|---|---|
| SR 58 (Rosedale Hwy): Jewetta Ave N - Calloway Dr | 30,345[2] | 40,000 | 0.76 |
| SR 58 (Rosedale Hwy): Calloway Dr - Coffee Rd | 33,900[2] | 40,000 | 0.85 |
| SR 58 (Rosedale Hwy): Coffee Rd - Patton W y | 36,100[2] | 40,000 | 0.90 |
| SR 58 (Rosedale Hwy): Patton Way - Mohawk St | 49,500[2] | 40,000 | 1.24 |
| SR 58 (Rosedale Hwy): Mohawk St - SR 99 | 49,500[2] | 40,000 | 1.24 |
| SR 184 (Weedpatch Hwy): SR 223 (Bear Mtn Blvd) - Sunset Blvd | 3,900[2] | 15,000 | 0.26 |
| SR 184 (Weedpatch Hwy): Sunset Blvd - Di Giorgio Rd | 10,500[2] | 15,000 | 0.70 |
| SR 184 (Weedpatch Hwy): Di Giorgio Rd - Panama Rd | 16,200[2] | 15,000 | 1.08 |
| SR 184 (Weedpatch Hwy): Panama Rd - Mountain View Rd | 10,500[2] | 15,000 | 0.70 |
| SR 184 (Weedpatch Hwy): Mountain View Rd - Panama Ln | 14,600[2] | 15,000 | 0.97 |
| SR 184 (Weedpatch Hwy): Panama Ln - Muller Rd | 9,500[2] | 30,000 | 0.32 |
| SR 184 (Weedpatch Hwy): Muller Rd - SR 58 | 10,500[2] | 40,000 | 0.26 |
| SR 184 (Weedpatch Hwy): SR 58 - Brundage Ln | 19,700[2] | 40,000 | 0.49 |
| SR 184 (Weedpatch Hwy): Brundage Ln - Edis on Hwy | 16,900[2] | 40,000 | 0.42 |
| SR 184 (Morning Dr): Edison Hwy - Breckenridge Rd | 16,900[2] | 15,000 | 1.13 |
| SR 184 (Morning Dr): Breckenridge Rd - Pioneer Dr | 16,900[2] | 15,000 | 1.13 |
| SR 184 (Morning Dr): Pioneer Dr - Niles St | 11,100[2] | 15,000 | 0.74 |
| SR 204 (Golden State Ave): Union Ave - SR 178 | 12,900[2] | 30,000 | 0.43 |
| SR 204 (Golden State Ave): SR 178 - SR 99 | 26,500[2] | 30,000 | 0.88 |
| SR 33 (SR 166): Stubblefield Rd - SR 166 | 4,100[2] | 15,000 | 0.27 |
| SR 33: SR 166 - Wood St | 5,100[2] | 15,000 | 0.34 |
| SR 33: Wood St - SR 119 (Taft Hwy) | 5,800[2] | 15,000 | 0.39 |
| SR 33: SR 119 (Taft Hwy) - 6th St | 9,300[2] | 15,000 | 0.62 |
| SR 33: 6th St - 10th St | 11,700[2] | 15,000 | 0.78 |
| SR 33: 10th St - Midway Rd | 7,400[2] | 15,000 | 0.49 |
| SR 33: Midway Rd - SR 58 | 4,400[2] | 15,000 | 0.29 |
| SR 33: SR 58 - SR 58 West | 4,000[2] | 15,000 | 0.27 |
| SR 33 (West Side Hwy): Reward Rd / Reserve Rd - SR 58 | 4,000[2] | 15,000 | 0.27 |
| SR 33: SR 58 East - Cymric Rd | 1,800[2] | 15,000 | 0.12 |
| SR 33: Cymric Rd - Lokern Rd | 1,900[2] | 15,000 | 0.13 |
| SR 33: Lokern Rd - Los t Hills Rd S | 4,800[2] | 15,000 | 0.32 |
| SR 33: Los t Hills Rd S - Los t Hills Rd N | 4,600[2] | 15,000 | 0.31 |

**Table 4.16-6: Roadway Segment Operations, 2015**

| Street Segment | Existing ADT | Existing Capacity | V/C Ratio |
|---|---|---|---|
| SR 33: Los t Hills Rd N - 7th Standard Rd | 3,600[2] | 15,000 | 0.24 |
| SR 33: 7th Standard Rd - Lerdo Hwy | 3,600[2] | 15,000 | 0.24 |
| SR 33: Lerdo Hwy - Brown Material Rd | 3,600[2] | 15,000 | 0.24 |
| SR 33: Brown Material Rd - SR 46 | 3,600[2] | 15,000 | 0.24 |
| SR 33: SR 46 - Twisselman Rd | 1,800[2] | 15,000 | 0.12 |
| SR 33: Twisselman Rd - SR 41 | 1,800[2] | 15,000 | 0.12 |
| SR 43 (Enos Ln): SR 119 (Taft Hwy) - Interstate 5 | 6,600[2] | 15,000 | 0.44 |
| SR 43 (Enos Ln): Interstate 5 - Panama Ln | 6,600[2] | 15,000 | 0.44 |
| SR 43 (Enos Ln): Panama Ln - Stockdale Hwy | 8,400[2] | 15,000 | 0.56 |
| SR 43 (Enos Ln): Stockdale Hwy - Brimhall Rd | 5,700[2] | 15,000 | 0.38 |
| SR 43 (Enos Ln): Brimhall Rd - SR 58 East (Rosedale Hwy) | 5,700[2] | 15,000 | 0.38 |
| SR 43 (Enos Ln): SR 58 East (Rosedale Hwy) - SR 58 Wes t | 5,500[2] | 15,000 | 0.37 |
| SR 43 (Enos Ln): SR 58 West - Kratzmeyer Rd | 5,400[2] | 15,000 | 0.36 |
| SR 43 (Enos Ln): Kratzmeyer Rd - 7th Standard Rd | 6,500[2] | 15,000 | 0.43 |
| SR 43 (Enos Ln): 7th Standard Rd - Imperial St | 4,000[2] | 15,000 | 0.27 |
| SR 43 (Beech Ave): Imperial St - Orange Ave | 4,000[2] | 15,000 | 0.27 |
| SR 43 (Beech Ave): Orange Ave - Los Angeles Ave | 4,000[2] | 15,000 | 0.27 |
| SR 43 (Central Valley Hwy): Los Angeles St - Lerdo Hwy | 9,600[2] | 15,000 | 0.64 |
| SR 43 (Central Valley Hwy): Lerdo Hwy - N Shafter Ave | 9,600[2] | 15,000 | 0.64 |
| SR 43 (Central Valley Hwy): N Shafter Ave - Dresser Ave | 14,000[2] | 15,000 | 0.93 |
| SR 43 (Central Valley Hwy): Dresser Ave - Kimberlina Rd | 14,000[2] | 15,000 | 0.93 |
| SR 43 (Central Valley Hwy): Kimberlina Rd - SR 46 | 10,400[2] | 40,000 | 0.26 |
| SR 43 (Central Valley Hwy): SR 46 - McCombs Rd | 6,800[2] | 15,000 | 0.45 |
| SR 43 (Central Valley Hwy): McCombs Rd - Garces Hwy | 6,800[2] | 15,000 | 0.45 |
| SR 43 (Central Valley Hwy): Garces Hwy - County Line Rd | 2,700[2] | 15,000 | 0.18 |
| SR 65 (Porterville Hwy): Merle Haggard Dr - James Rd | 15,000[2] | 15,000 | 1.00 |
| SR 65 (Porterville Hwy): James Rd - Lerdo Hwy | 14,300[2] | 15,000 | 0.95 |
| SR 65 (Porterville Hwy): Lerdo Hwy - Merced Ave | 11,100[2] | 15,000 | 0.74 |
| SR 65 (Porterville Hwy): Merced Ave - Famoso Rd | 6,800[2] | 15,000 | 0.45 |
| SR 65 (Porterville Hwy): Famoso Rd - SR 155 (Garces Hwy) | 9,400[2] | 15,000 | 0.63 |
| SR 65 (Porterville Hwy): SR 155 (Garces Hwy) - County Line Ave | 8,100[2] | 15,000 | 0.54 |

**Table 4.16-6: Roadway Segment Operations, 2015**

| Street Segment | Existing ADT | Existing Capacity | V/C Ratio |
|---|---|---|---|

Source: Appendix W
Notes:
(1) Published ADT data.
(2) Where existing data was not available, existing volumes are projected from latest previous year data
Key:
SR = State Route
V/C/ = Volume to Capacity

# Other Transportation Facilities

## Public Transit Service

The County of Kern operates Kern Regional Transit (KRT), which operates daily bus routes within the unincorporated communities of Buttonwillow, Lamont, Kern River Valley, Frazier Park, Rosamond, and Mojave. In western Kern County, bus routes connect Bakersfield to various cities including Delano, Wasco, Taft, Lebec, and Frazier Park (KRT 2014). KRT also provides intercity service between Delano/McFarland/Wasco/Shafter/ Bakersfield, Lamont/Bakersfield, Lake Isabella/Bakersfield, Frazier Park/Bakersfield, California City/Mojave/Rosamond/ Lancaster/Palmdale, Lost Hills/Bakersfield, and Taft/Bakersfield. GetBus operates daily bus routes within the city of Bakersfield and surrounding areas (GetBus 2014). Greyhound provides bus service from Bakersfield north to Fresno and from Bakersfield south to Los Angeles (Greyhound 2010).

## Railways

Amtrak provides passenger rail service from Bakersfield to the north through Fresno. Rail service from Bakersfield to Los Angeles is provided via San Francisco. A direct connection to the south through Los Angeles is not currently provided, but high-speed rail service between San Francisco and Los Angeles via Bakersfield may be available by 2029 (Amtrak 2014; California High-Speed Rail Authority 2014).

Freight service is provided by the San Joaquin Valley Railroad, which operates throughout the San Joaquin Valley and interchanges with the Union Pacific Railroad and the Burlington Northern Santa Fe Railroad in Bakersfield. Commodities transported by the San Joaquin Valley Railroad include petroleum and agricultural products.

# Aircraft and Military Aviation

## Public Airports

Commercial air travel in western Kern County is provided by Meadows Field Airport in northern Bakersfield. Direct flights are available to Los Angeles, San Francisco, Phoenix, Houston, and other U.S. cities. Bakersfield Municipal Airport is located in the south-central Bakersfield area.

Other public airports include Delano Municipal Airport, Wasco-Kern County Airport, and Shafter Airport-Minter Field in northern Kern County, and Taft-Kern County Airport in southwestern Kern County. Smaller public airports (averaging less than 100 aircraft operations per month) are also located in western Kern County, including Lost Hills-Kern County Airport, Elk Hills-Buttonwillow Airport, and Poso-Kern County Airport (AirNav 2014).

### Private Airports

A number of private airstrips are located throughout western Kern County, including Tejon Ag and Paradise Lakes airfields south of Bakersfield, Majors Airfield north of Bakersfield, Joe Gottlieb Field Airport west of Bakersfield, and Cashen Airport northwest of Wasco (AirNav 2014).

### Military Aviation

Kern County has three military aviation installations: the China Lake Naval Air Weapons Station and Edwards Air Force Base (AFB), both of which are located in the eastern part of the County, and the Lemoore Naval Air Station, located in the central San Joaquin Valley. Each installation has unique flying operations and their primary mission is to test military aircraft and weapon systems. Due to the military bases' required flying mission, aircraft fly beyond the boundaries of the installations at supersonic speeds and sometimes as low as 200 feet above the ground. In order to minimize flight hazards to non-military aircraft, the military aircraft from these installations fly within restricted airspace known as the Joint Service Restricted R-2508 Complex. This complex is considered an extension of the airspace for these military aviation installations and their flying missions. The facilities coordinated with local governments and airports in the Joint Land Use Study completed in 2008. Mojave Air and Space Port and Inyo Kern Airport both provide civilian flight-testing and drone testing capabilities. Mojave Air and Space Port is also the first FAA licensed civilian space flight testing facility in the United States.

## Bicycle and Pedestrian Facilities

Many cities within Kern County have adopted bicycle and pedestrian plans as a subsection of their General Plans' Circulation Element. In western Kern County, Bakersfield has a number of existing and planned bicycle lanes and paths, and the cities of Delano, Wasco, Shafter, and Taft have a number of planned bicycle lanes and paths, as well. A large bicycle and pedestrian path is planned between Bakersfield and Taft that would follow the California Aqueduct and primarily traverse through existing oilfields. This path would be an extension of the Kern River Bike Path that follows the Kern River through Bakersfield. The Kern River Bike Path is the most popular bicycle path in the County (Kern COG 2012).

## Existing Pavement Conditions

Analysis of the potential impacts of future oil and gas development on the pavement condition of roadways within the Project Area involved estimating remaining pavement service life and assessing the need and timing for maintenance and rehabilitation improvements. The analysis was

conducted for each of the study years (2015 through 2035) and included 400 centerline miles of county roads and 350 centerline miles of state routes.

Two primary data sources were used for the pavement condition analysis: truck load and pavement condition.

## Truck Load

Heavy truck traffic is the primary factor affecting pavement condition. Pavement is designed using a Traffic Index (TI), which is a measure of the cumulative number of heavy trucks expected to load a pavement over its service life. As per Caltrans methodology, TI's are estimated by converting mixed truck loads to 18,000-pound Equivalent Single-Axle Loads (ESALs). A TI for a 20-year design life (standard for new roadway construction) was assigned to each roadway. Caltrans truck count data for the year 2012 were used to develop TI estimates for state routes per Caltrans methodology. When available, design TIs obtained from record drawings were used for County roadways. For each of the remaining County roadways, TI's were estimated based on a review of Kern COG traffic count data and roadway classifications. The range of 20-year TIs used for this study, along with corresponding maximum ESAL values, are presented in Table 4.16-7.

**Table 4-16-7: Traffic Index and Maximum Equivalent Single-Axle Loads**

| Roadway Type | 20-Year Traffic Index (TI) | Maximum Equivalent Single-Axle Load (ESAL) (1) |
|---|---|---|
| Freeway State | 10.0 - 15.5 | 3,020,000 - 112,000,000 |
| Highway State | 8.0 - 12.0 | 487,000 - 13,500,000 |
| Arterial County | 9.0 - 10.0 | 1,270,000 - 3,020,000 |
| Collector County | 7.0 - 8.5 | 164,000 - 798,000 |

Source: Appendix W
Note:
(1) Caltrans 2006

## Pavement Condition Data

Caltrans assesses the condition of the California State Highway System (SHS) through its Pavement Condition Survey (PCS). The PCS data collection process involves conducting pavement surface condition inspections and measuring ride quality. PCS data are grouped into one of three pavement "condition states," as described in Table 4.16-8.

**Table 4.16-8: State Pavement Condition Survey Conditions**

| Pavement Condition | Condition State | Visible Distress |
|---|---|---|
| Good | 1 | Pavement in good/excellent condition No or few potholes or cracks |
| Fair | 2 | Pavement in fair condition Minor surface distress (cracking, raveling and potholes) |
| Poor | 3 | Pavement in poor condition with extensive/significant cracks or poor ride only |

Source: Appendix W

Kern County assesses pavement condition using the Pavement Surface and Evaluation Rating system (PASER). PASER ratings are assigned to County roadways based on visual surface condition inspections, and range from "1" (failed pavement in need of reconstruction) to "10" (new pavement or pavement with no visible signs of distress). For the purposes of this analysis, PASER ratings were grouped, as shown in Table 4.16-9, to generally correspond with Caltrans' pavement condition states.

**Table 4.16-9: County Pavement Surface and Evaluation Rating System Ratings**

| Pavement Condition | PASER Rating | Visible Distress |
|---|---|---|
| Good | 10 | None (new construction) |
| | 9 | None (recent overlay) |
| | 8 | Sealed or light linear cracks |
| Fair | 7 | Moderate linear cracks, no or light surface wear, no or few patches in excellent condition |
| | 6 | Severe linear cracks, early block cracking, light surface wear, patches in good condition |
| | 5 | Secondary linear cracks, block cracking, moderate surface wear, patches in good condition |
| Poor | 4 | Multiple linear cracks, block cracking, severe surface wear, patches in fair condition, ruts |
| | 3 | Multiple linear cracks, severe block cracking, some alligator cracking, patches, ruts, potholes |
| | 2 | Alligator cracking, severe ruts, extensive patches in poor condition, potholes |
| | 1 | Extensive amounts of severe distress |

Source: Appendix W

PCS and PASER data for the year 2013 were used for this study. Corresponding pavement conditions (Good, Fair, and Poor) for roadway segments within the Project Area are shown on Figure 4.16-2. The Kern County Roads Department has a general policy goal of maintaining at least 50% of its roadways at or above a PASER rating of 5 (Good or Fair condition). A review of the pavement condition data revealed that County roadways within the Project Area met this goal in 2013. Similarly, it was also found that at least 50% of study area state routes in the Project Area were in Good or Fair condition in 2013. These 2013 condition levels were used as the baseline conditions for the pavement condition analysis in Section 4.16.4.

## 4.16.3 Regulatory Setting

## Federal Aviation Administration

The Federal Aviation Administration (FAA) regulates aviation at regional, public, private, and military airports. The FAA regulates objects affecting navigable airspace and structures taller than 200 feet according to Federal Aviation Regulation 14 Code of Federal Regulations (CFR) Part 77. For structures of this size, both the U.S Department of Transportation (USDOT) and Caltrans require the proponent to submit FAA Form 7460-1, Notice of Proposed Construction or Alteration.

As described in 14 CFR 77.9 (Construction or Alteration Requiring Notice), each sponsor who proposes any of the following construction or alteration scenarios shall notify the FAA in the form and manner as follows:

If requested by the FAA, or if you propose any of the following types of construction or alteration, you must file notice with the FAA of:

(a) Any construction or alteration that is more than 200 feet above ground level (AGL) at its site.

(b) Any construction or alteration that exceeds an imaginary surface extending outward and upward at any of the following slopes:

  (1) 100 to 1 for a horizontal distance of 20,000 feet from the nearest point of the nearest runway of each airport described in paragraph (d) of this section with its longest runway more than 3,200 feet in actual length, excluding heliports.

  (2) 50 to 1 for a horizontal distance of 10,000 feet from the nearest point of the nearest runway of each airport described in paragraph (d) of this section with its longest runway no more than 3,200 feet in actual length, excluding heliports.

  (3) 25 to 1 for a horizontal distance of 5,000 feet from the nearest point of the nearest landing and takeoff area of each heliport described in paragraph (d) of this section.

(c) Any highway, railroad, or other traverse way for mobile objects, of a height which, if adjusted upward 17 feet for an Interstate Highway that is part of the National System of Military and Interstate Highways where overcrossings are designed for a minimum of 17

feet vertical distance, 15 feet for any other public roadway, 10 feet or the height of the highest mobile object that would normally traverse the road, whichever is greater, for a private road, 23 feet for a railroad, and for a waterway or any other traverse way not previously mentioned, an amount equal to the height of the highest mobile object that would normally traverse it, would exceed a standard of paragraph (a) or (b) of this section.

(d) Any construction or alteration on any of the following airports and heliports:

(1) A public use airport listed in the Airport/Facility Directory, Alaska Supplement, or Pacific Chart Supplement of the U.S. Government Flight Information Publications;

(2) A military airport under construction, or an airport under construction that will be available for public use;

(3) An airport operated by a Federal agency or the U.S. Department of Defense (DOD).

(4) An airport or heliport with at least one FAA-approved instrument approach procedure.

(e) You do not need to file a notice for construction or alteration is not needed for the following:

(1) Any object that will be shielded by existing structures of a permanent and substantial nature or by natural terrain or topographic features of equal or greater height, and will be located in the congested area of a city, town, or settlement where the shielded structure will not adversely affect safety in air navigation;

(2) Any air navigation facility, airport visual approach or landing aid, aircraft arresting device, or meteorological device meeting FAA-approved siting criteria or an appropriate military service siting criteria on military airports, the location and height of which are fixed by its functional purpose;

(3) Any construction or alteration for which notice is required by any other FAA regulation.

(4) Any antenna structure of 20 feet or less in height, except one that would increase the height of another antenna structure.

Per 14 CFR 77.7, notification requirements include sending one executed form set of FAA Form 7460-1, Notice of Proposed Construction or Alteration, to the Manager, Air Traffic Division, FAA Regional Office having jurisdiction over the area within which the construction or alteration will be located. The notice required must be submitted at least 45 days before the earlier of the following dates: (1) the date the proposed construction or alteration is to begin; or (2) the date an application for a construction permit is to be filed.

# State

## California Department of Transportation (Encroachment Permits and Transportation Permits (Oversized Permits)

Caltrans has jurisdiction over state highways within California and sets maximum load limits for trucks and safety requirements for oversized vehicles that operate on highways. The following Caltrans regulations apply to potential transportation and traffic impacts of the proposed Project:

**California Vehicle Code (CVC), Division 15, Chapters 1 through 5 (Size, Weight, and Load).** Includes regulation pertaining to licensing, size, width, and load of vehicles operated on highways.

Caltrans has the discretionary authority to issue special permits for the movement of vehicles/vehicle loads that exceed statutory limitations for size or weight on state roadways as specified in Division 15 of the CVC. Completion of a Transportation Permit application is required for Caltrans to issue a special permit (Caltrans 2014).

## Public Resources Code Section 3237, Emergency Access

The California Department of Conservation, Division of Oil, Gas, and Geothermal Resources (DOGGR), State Oil and Gas Supervisor District Deputy may order the plugging and abandonment of a well that has been deserted. For purposes of this regulation, credible evidence of desertion includes, but is not limited to, an operator's failure to maintain the access road to a well site passable to oilfield and emergency vehicles (DOGGR 2014).

## Public Resources Code Section 3600, Setback from Public Roadways

Public Resources Code (PRC) Section 3600 establishes that oil and gas wells located within 100 feet of a public street, road, or highway dedicated prior to the commencement of drilling of the well are a public nuisance.

## California Street and Highway Code Section 660, 670-695 and 1450 et seq.

This code requires permits from Caltrans for any roadway encroachment during truck transportation and delivery, includes regulations for the care and protection of state and County highways, provides for the issuance of written permits, and requires permits for any load that exceeds Caltrans weight, length, or width standards for public roads.

## Senate Bill 743

Senate Bill (SB) 743 (Stats. 2013, Ch. 386) authorizes the Governor's Office of Planning and Research to adopt CEQA Guidelines for establishing alternative metrics to analyze traffic impacts aside from LOS. Once the new CEQA Guidelines go into effect, vehicle LOS and similar measures related to delay shall not be used as the sole basis for determining the significance of transportation impacts.

# Local

## Kern Council of Governments 2014 Regional Transportation Plan/Sustainable Communities Strategy

The Kern Council of Governments (COG), as a regional transportation agency, prepares the Regional Transportation Plan (RTP) to examine long-range transportation issues, opportunities, and needs for Kern County. The 2014 RTP is a 26-year blueprint that establishes a set of regional transportation goals, policies, and actions intended to guide development of the planned multi-modal transportation systems in Kern County (Kern COG 2014). The 2014 RTP includes a policy element that is shaped by goals, policies, and performance indicators, a description of planning assumptions for regional growth and future needs for travel and goods movement, a Sustainable Communities Strategy (SCS) that identifies planning strategies and illustrative development patterns that would reduce greenhouse gas (GHG) emissions, and a plan of action for the region to pursue to meet identified transportation needs. The RTP was developed through a continuing, comprehensive, and cooperative planning process, and provides for effective coordination between local, regional, state, and federal agencies.

The RTP promotes a more efficient transportation system that calls for fully funding alternative transportation modes, while emphasizing transportation demand and transportation system management approaches for new highway capacity. The Constrained Program of Projects (included in the 2014 RTP, Chapter 5, Strategic Investments, Table 5-1), includes projects that move the region toward a financially constrained and balanced system. Constrained projects have undergone air quality conformity analyses to ensure that they contribute to the region's compliance with state and federal air quality rules.

Kern COG also prepares the Regional Transportation Improvement Program and the Federal Transportation Improvement Program, which are funding documents for the implementation of projects referenced and identified in the RTP. The Kern COG is the designated Congestion Management Agency for Kern County. The RTP/SCS includes a Congestion Management Program (CMP), which is designed to ensure that a balanced transportation system is developed, relating population and traffic growth, land use decisions, performance standards, and air quality improvements, as specified under SB 375.

The Kern COG CMP includes six elements: Land Use Impact Analysis, Multimodal Performance Standards, Regional Traffic Model, Transportation Demand Management, Capital Improvement Program (CIP), and Deficiency Plan. The Kern COG CMP network (also referred to as congestion management corridors), which includes a system of roadways that will be monitored in relation to established LOS standards and includes the several highways and principal arterials, is presented in Table 4.16-10.

**Table 4.16-10: Kern COG Congestion Management Corridors**

| **Highways** | |
|---|---|
| Interstate 5 | SR 155 |
| SR 14 | SR 166 |
| SR 33 | SR 178 |
| SR 43 | SR 184 |
| SR 46 | SR 202 |
| SR 58* | SR 204 |
| SR 65 | SR 223 |
| SR 99 | U.S. 395 |
| SR 119 | |
| **Principal Arterials** | |
| China Lake Boulevard – SR 178 to Route 395 | |
| Rosamond Boulevard – Tehachapi-Willow Springs Road to SR 14 | |
| Seventh Standard Road – SR 99 to Interstate 5 | |
| Tehachapi-Willow Springs Road – SR 58 to Rosamond Boulevard | |
| Wheeler Ridge Road – Interstate 5 to SR 223 | |

Source: Kern COG 2014
Note:
*The new Westside Parkway and Stockdale Highway will be added to the CMP system when the designation of SR 58 switches over to those routes, possibly by 2015.

LOS E has been established as the minimum system-wide LOS traffic standard in the CMP. Those roads currently experiencing even greater traffic congestion have been accepted at their existing traffic level of LOS F. By so doing, cities and the County will not be penalized through loss of gas tax funds for not meeting the new CMP LOS E standard. Existing LOS F locations, are listed below.

- Seventh Standard Road – SR 99 to Coffee Road;
- Portions of SR 119 at SR 99;
- Portions of SR 178/24th Street – Oak Street to N Street;
- Portions of SR 58 – SR 99 to Cottonwood Road; and
- Portions of SR 58/Rosedale Highway – SR 99 to Fruitvale Avenue.

According to the Final 2014 RTP/SCS, this list was updated based on the most recent travel demand model validation base year.

## Kern County General Plan

The Project Area is located within the KCGP area and, therefore, would be subject to applicable policies and measures of the KCGP. The Land Use, Conservation, and Open Space Element, the Circulation Element, and the Safety Element of the KCGP include goals, policies, and implementation measures related to transportation and traffic that apply to the Project, as described below.

### Chapter 1. Land Use, Conservation, and Open Space Element

#### 1.8. Industrial

##### Goals

**Policy 1.** Locations for new industrial activities shall be provided with adequate infrastructure (water, sewage disposal systems, roads, drainage, etc.) to minimize effects on County services.

**Policy 5.** Provide for the clustering of new industrial development adjacent to existing industrial uses and along major transportation corridors.

**Policy 13.** Where feasible, locate future industrial activities in close proximity to railroad facilities and inter- and intra-State transportation corridors to minimize extensive travel through urban areas and to promote alternative transportation of goods.

##### Implementation Measures

**Implementation Measure G.** Require a Specific Plan for industrial land projects (as defined in the Assumptions Section of the Special Treatment Areas) to identify site specific issues and implementation, such as infrastructure, circulation, compatibility, and public services and facilities.

#### 1.9. Resource

**Policy 2.** In areas with a resource designation on the General Plan map, only industrial activities which directly and obviously relate to the exploration, production, and transportation of the particular resource will be considered to be consistent with this General Plan.

### Chapter 2. Circulation Element

##### Objectives

**Objective 1.** To make certain that transportation facilities needed to support development are available. To ensure that these facilities occur in a timely manner so as to avoid traffic degradation.

**Objective 5**. Maintain a minimum Level of Service (LOS) D for all roads throughout the County.

### 2.3.3. Highway Plan

#### Goals

**Goal 5.** Maintain a minimum Level of Service (LOS) D.

#### Implementation Measures

**Implementation Measure B**. Continuity and integrity of the arterial and collector system at the mountain/valley region and the mountain/desert region boundary must be reviewed and approved in conjunction with project adoption on an individual basis.

**Implementation Measure C.** Conformance to alignment minimum design standards, where roadways that deviate from section and mid-section lines intersect those lines, must be reviewed and approved in conjunction with project adoption on an individual basis.

### 2.3.4. Future Growth

#### Goals

**Goal 1.** To provide ample flexibility in this plan to allow for growth beyond the 20 year planning horizon.

#### Policies

**Policy 2.** The County should monitor development applications as they relate to traffic estimates developed for this plan. Mitigation is required if development causes affected roadways to fall below Level of Service (LOS) D. Utilization of the CEQA process would help identify alternatives to or mitigation for such developments. Mitigation could involve amending the Land Use, Open Space and Conservation Element to establish jobs/housing balance if projected trips in any traffic zone exceed trips identified for this Circulation Element. Mitigation could involve exactions to build offsite transportation facilities. These enhancements would reduce traffic congestion to an acceptable level.

**Policy 4.** As a condition of private development approval, developers shall build roads needed to access the existing road network. Developers shall build these roads to County standards unless improvements along State routes are necessary then roads shall be built to Caltrans standards. Developers shall locate these roads (width to be determined by the Circulation Plan) along centerlines shown on the circulation diagram map unless otherwise authorized by an approved Specific Plan Line. Developers may build local roads along lines other than those on the circulation diagram map. Developers would negotiate necessary easements to allow this.

#### Implementation Measures

**Implementation Measure C.** Project development shall comply with the requirements of the Kern County Zoning Ordinance, Land Division Ordinance, and Development Standards.

### 2.3.7. Setback Deviation Studies

#### Implementation Measures

**Implementation Measure A.** A setback deviation request shall report proposed setback distance. The Kern County Zoning Ordinance gives setback distance for permanent structures located along surveyed section and mid-section lines. Setback deviations may be authorized where it is demonstrated that expressway, arterial or collector construction will not occur while the structure in question is usable, or valuable. An entity pursuing a setback deviation shall submit an application with necessary justification to support the request. The application shall include fees to defray costs to prepare staff reports and administering the application.

### 2.4. Priority Focus Area Topics - Highways

### 2.4.7. Taft Area

#### Goals

**Goal 1.** Upgrade road circulation in and around Taft.

**Goal 2.** Reduce the speeds and amount of commuters and truck traffic through the centers of rural communities based on engineering and speed surveys.

#### Policies

**Policy 3**. The County should monitor development applications as they relate to traffic generation developed for this plan. If traffic resulting from projects such as General Plan amendment(s) would exceed current volume to capacity projections, mitigation is required if development causes roadways to fall below LOS D and LOS C for Caltrans roadways. Utilization of the CEQA process would help identify alternatives to, or mitigation for such developments. Mitigation could involve amending the Land Use, Open Space and Conservation Element to establish jobs - housing balance. This is triggered if projected trips in any traffic zone exceed trips identified for this Circulation Element. Mitigation could involve exactions to build offsite transportation facilities. These enhancements would reduce traffic congestion impacts.

**Policy 4.** Kern County should not allow new roads that serve low-density parcels to have unpaved surfaces. Any road capable of or now serving fifty average daily traffic trips or more should be paved.

### 2.4.8. Delano – McFarland Area

#### Policies

**Policy 5**. The County should monitor development applications as they relate to traffic generation developed for this plan. If traffic resulting from projects such as General Plan amendment(s) would exceed current volume to capacity projections, mitigation is required if development causes roadways to fall below LOS D and LOS C for Caltrans roadways. Utilization of the CEQA process would help identify alternatives to, or mitigation for such developments. Mitigation could

involve amending the Land Use, Open Space and Conservation Element to establish jobs - housing balance. This is triggered if projected trips in any traffic zone exceed trips identified for this Circulation Element. Mitigation could involve exactions to build offsite transportation facilities. These enhancements would reduce traffic congestion impacts.

**Policy 6**. Kern County should not allow new roads that serve low-density parcels to have unpaved surfaces. Any road capable of or now serving fifty average daily traffic trips or more should be paved.

### 2.4.9. Lerdo Area

#### Goals

**Goal 3.** Improve traffic safety relative to farm vehicles and equipment.

**Goal 4.** Provide for improved traffic flow adjacent to existing communities.

#### Policies

**Policy 6**. The County should monitor development applications as they relate to traffic generation developed for this plan. If traffic resulting from projects such as General Plan amendment(s) would exceed current volume to capacity projections, mitigation is required if development causes roadways to fall below LOS D and LOS C for Caltrans roadways. Utilization of the CEQA process would help identify alternatives to, or mitigation for such developments. Mitigation could involve amending the Land Use, Open Space and Conservation Element to establish jobs - housing balance. This is triggered if projected trips in any traffic zone exceed trips identified for this Circulation Element. Mitigation could involve exactions to build offsite transportation facilities. These enhancements would reduce traffic congestion impacts.

**Policy 7.** Kern County should not allow new roads that serve low-density parcels to have unpaved surfaces. Any road capable of or now serving fifty average daily traffic trips or more should be paved.

## 2.5. Other Modes

### 2.5.1 Trucks and Highways

#### Goals

**Goal 1**. Provide for Kern County's heavy truck transportation in the safest way possible.

**Goal 2.** Reduce potential overweight trucks.

### 2.5.4. Transportation of Hazardous Materials

#### Goals

**Goal 1**. Reduce risk to public health from transportation of hazardous materials.

**Policy 1**. The commercial transportation of hazardous material, identification and designation of appropriate shipping routes will be in conformance with the adopted Kern County and Incorporated Cities Hazardous Waste Management Plan.

**Policy 2.** Kern County and affected cities should reduce use of County-maintained roads and city-maintained streets for transportation of hazardous materials.

## Chapter 5. Safety Element

### 5.3.3. Waste Disposal in Petroleum Development

#### Goals

**Goal.** To encourage the safe recycling, transportation, and disposal of wastes associated with petroleum production and processing, and to provide for the siting of disposal facilities in locations with proper access, while minimizing adverse impacts on the environment and on public health and safety.

#### Policies

**Policy 1.** The County shall continue to acknowledge the necessity to site nonhazardous oilfield waste disposal sites near petroleum development to minimize transportation hazards and expenses, consistent with the provisions of the Kern County and Incorporated Cities Integrated Waste Management Plan.

### 5.3.7. Processing and Transportation of Petroleum Products

#### Goals

**Goal.** To ensure the siting of refining facilities and pipelines in locations to provide maximum health, safety, and environmental protection; and to encourage the necessary processing and transportation facilities for Kern County's petroleum production.

## Metropolitan Bakersfield General Plan

The Metropolitan Bakersfield General Plan (MBGP), a joint effort between the Kern County Planning Department and the City of Bakersfield Planning Division, was last adopted on December 11, 2007. The MBGP includes both city and unincorporated County lands. The MBGP describes the community's physical development as well as its economic, social and environmental goals and is currently undergoing an update. The Project Area includes a total of 152,040 acres of unincorporated County lands that are covered under the MBGP (7.41%). Project-related development on unincorporated lands within the MBGP Planning Area would be subject to the following applicable policies and implementation measures of the MBGP, with respect to transportation and traffic.

## Chapter II. Land Use Element

### Policies

**Policy 34.** Provide for the clustering of new industrial development adjacent to existing industrial uses and along major transportation corridors (I-1).

**Policy 38.** Minimize impacts of industrial traffic on adjacent residential parcels through the use of site plan review and improvement standards (I-1, I-6).

## Chapter III. Circulation Element

### A. Streets

### Goals

**Goal 3.** Minimize the impact of truck traffic on circulation, and on noise sensitive land uses.

**Goal 5.** Provide a system of freeways which maintains adequate travel times in and around the metropolitan area.

**Goal 7.** Develop and maintain a circulation system that supports the land use plan shown in the general plan.

### Policies

**Policy 6.** Design and locate site access driveways to minimize traffic disruption where possible considering items such as topography, past parcelization and other factors (I-7).

**Policy 7.** Minimize direct and uncontrolled property access from arterials (I-8).

**Policy 14.** Maintain the integrity of the circulation system (I-12).

**Policy 14.** Provide continuous truck routes within incorporated areas that provide access to designated industrial areas (I-13).

**Policy 15.** Prohibit trucks from non-truck routes within incorporated areas except as necessary for direct property access for pick-up and delivery (I-13).

**Policy 16.** Require that truck access to commercial and industrial properties be designed to minimize impacts on adjacent residential parcels (I-14).

**Policy 36.** Prevent streets and intersections from degrading below Level of Service "C" where possible due to physical constraints (as defined in a Level of Service Standard) or when the existing Level of Service is below "C" prevent where possible further degradation due to new development or expansion of existing development with a three part mitigation program: adjacent right-of-way dedication, access improvements and/or an area-wide impact fee. The area-wide impact fee would be used where the physical changes for mitigation are not possible due to

existing development and/or the mitigation measure is part of a larger project, such as freeways, which will be built at a later date (I-28, I-29).

**Policy 37.** Require new development and expansion of existing development to pay for necessary access improvements, such as street extensions, widenings, turn lanes, signals, etc., as identified in the transportation impact report as may be required for a project (I-30, I-31, I-32).

**Policy 39.** Require new development and expansion of existing development to pay or participate in its pro rata share of the costs of expansions in area-wide transportation facilities and services which it necessitates (I-32, I-33).

### Implementation Measures

**Implementation Measure 7.** Review all site plans for compliance with adopted drive approach design standards.

**Implementation Measure 8.** Review site plans, rezonings, and subdivision requests, with respect to access from arterials. Consider conditions of approval to minimize uncontrolled property access.

**Implementation Measure 14.** Amend the city and county Zoning Ordinances as needed to regulate truck access on properties adjacent to residential areas.

**Implementation Measure 25.** Maintain records of existing traffic volume and cumulative projections of traffic from new development to schedule projects for the Capital Improvement Program.

**Implementation Measure 26.** Establish guidelines for project design review based on traffic engineering standards (e.g., driveway design, onsite circulation) and the Level of Service Ordinance.

**Implementation Measure 28.** Periodic review and if needed, revision of adopted ordinances that includes a Level of Service standard for the city and county to include a definition of Level of Service "C", procedures for how it is measured, and mitigation measures to keep from exceeding the standard.

**Implementation Measure 29.** Periodic review and, if needed, revision of adopted guidelines for preparation of transportation impact reports, definition of undesirable impacts, and identification of mitigation procedures.

**Implementation Measure 33.** Periodic review and, if needed, revision of adopted Transportation Impact Fee Ordinance for the city and county, which specifies the area wide impact fee schedule and how the fees will be used.

### B. Parking

#### Goals

**Goal 2.** Satisfy parking requirements in all new developments (residential, commercial, industrial, etc.) through off-street facilities.

#### Policies

**Policy 3.** Ensure that adequate onsite parking supply and parking lot circulation is provided on all site plans in accordance with the adopted parking standards (I-3).

**Policy 4.** Discourage the intrusion of non-neighborhood parking in residential areas (I-4).

#### Implementation Measures

**Implementation Measure 3**. Review all site plans for conformance with adopted parking standards.

## Chapter X. Public Services and Facilities Element

### A. General Utilities

#### Policies

**Policy 5.** Require all new development to pay its pro rata share of the cost of necessary expansion in municipal utilities, facilities and infrastructure for which it generates demand and upon which it is dependent (I-3).

## Kern County Specific Plans

Kern County has adopted 24 Specific Plans for properties within the Project Area. These Specific Plans are intended to be an amplification of the goals and policies of the KCGP and are, therefore, consistent therewith. As depicted in Figure 4.10-3, less than 8% of the Project Area is located wholly or partially within adopted Specific Plan areas. Future oil and gas exploration and production activities that would be authorized under the proposed Amendment to Chapter 19.98 (Oil & Gas Production) of the Kern County Zoning Ordinance that would be located within the boundary of an adopted Specific Plan would be regulated according to County zoning, with the exception of the Specific Plans identified as Tier 5.

## Kern County Airport Land Use Compatibility Plan

The Kern County Airport Land Use Compatibility Plan (ALUCP) establishes procedures and criteria by which Kern County can address compatibility issues when making planning decisions regarding airports and the land uses around them. Land Use Compatibility Maps for all airports in Kern County depict each airport's area of influence. Oil and gas exploration and production activities authorized under the proposed Project that would be located within an airport influence area would be subject to ALUCP policies.

# Chapter 3

## 3.2. Safety

### 3.2.1. Objective

The intent of land use safety compatibility criteria is to minimize the risks associated with an off-airport aircraft accident or emergency landing.

a. Risks both to people and property in the vicinity of an airport and to people on board the aircraft shall be considered.

b. More stringent land use controls shall be applied to the areas with greater potential risk.

### 3.2.4. Other Risks

Storage of fuel or other hazardous materials shall be prohibited in Compatibility Zone A and subject to restrictions in the B zones as identified in Table 3A of the ALUCP.

## 3.3. Airspace Protection

### 3.3.1. Height Limits

The criteria for limiting the height of structures, trees, and other objects in the vicinity of an airport shall be set in accordance with Part 77, Subpart C, of the Federal Aviation Regulations and with the United States Standard for Terminal Instrument Procedures.

### 3.3.4. FAA Notifications

Proponents of a project which may exceed a Part 77 surface must notify the Federal Aviation Administration as required by FAR Part 77, Subpart B, and by the California State Public Utilities Code Sections 21658 and 21659.

### 3.3.5. Other Flight Hazards

Land use characteristics which may produce hazards to aircraft in flight shall not be permitted within any airport's influence area. Specific characteristics to be avoided include:

a. Glare, distracting lights, or light patterns which could be mistaken for airport lights;

b. Sources of dust, steam, or smoke which may impair pilot visibility;

c. Sources of electrical interference with aircraft communications or navigation;

d. Any use, especially landfills and certain agricultural uses, which may attract large flocks of birds; and

e. Any light or series of lights which may cause visual discomfort or loss of orientation during critical phases of flight.

## Chapter 4

### 4.17. Military Aviation

#### 4.17.2.3. Military Aviation Encroachment

Towers – Obstructions such as cellular towers, radio towers, television towers and wind turbines that penetrate into airspace become a hazard to flight safety. Concentrated numbers of such structures can result in the loss of a route as useable for testing and training operations.

### Engineering, Surveying, and Permit Services Department

The Engineering, Surveying, and Permit Services Department enforce Kern County development standards for streets and other infrastructure. The standards are applicable to all developments within Kern County that are outside of incorporated cities. Division 9 of the County's development standards specifies requirements for traffic studies. Division 1, Section 105-4, of the standards requires that all construction to connect driveway approaches to County roads must first be authorized by an Encroachment Permit. The Engineering, Surveying, and Permit Services Department's Transportation and Encroachments Permits Division issues Transportation Permits for vehicles on County roadways that carry oversized loads, as specified in the California Vehicle Code.

## 4.16.4 Impacts and Mitigation Measures

## Methodology

The evaluation of the potential impacts of vehicular traffic associated with oil and gas exploration and production activity was broken into the following main areas:

- Intersection LOS;
- Roadway LOS;
- Pavement conditions; and
- Safety considerations.

The traffic operations analysis included LOS analysis of intersections during the AM and PM peak hour periods, and a V/C analysis of average daily traffic on roadway segments for both the existing and future (Year 2035) conditions. Roadway physical conditions were evaluated based on County and Caltrans roadway conditions reports and rating systems. Potential safety considerations were evaluated through review of County and Caltrans traffic data and interviews with County Roads Department staff regarding recent history of accidents, primarily within oilfield areas.

It is important to note that the Traffic Study (Appendix W) for this EIR differs from a typical traffic analysis for a residential development or industrial facility. A typical traffic study contains

a quantitative analysis of traffic generated by residents of housing or employees at operating facilities, but does not include quantitative analysis of short-term traffic generated during construction of the housing or facilities. By contrast, the quantitative analysis in the Traffic Study for this EIR includes traffic generated both by construction activities during the well development phase, and by operational activities during the production phase. The Traffic Study assumed that well development included all activities needed to bring an oil or gas well into production, including:

- Exploration and land preparation;
- Well drilling, completion, and stimulation; and
- Construction/installation of support infrastructure (e.g., collection and distribution pipelines, electric systems, etc.) and ancillary facilities (e.g., separators, storage tanks, etc.).

The Traffic Study assumed the development phase for a single oil or gas well would generally occur over a period of 30 to 90 days.

The Traffic Study assumed that well production would include routine daily operations and inspections, regular well maintenance and reworks, and plugging and abandonment when a well no longer fulfills its intended purpose.

## Trip Generation

Traffic engineers and planners typically use trip generation rates, equations, and data contained in the Institute of Transportation Engineers (ITE) Trip Generation Manual to estimate traffic volumes generated by conventional land uses (e.g., commercial, residential, industrial, recreational, etc.). However, the ITE Manual does not contain similar trip generation information for oil and gas development and production. Therefore, for the purposes of this study, a multi-tiered approach was used to estimate daily volumes of oil and gas traffic within the Project Area. This approach involved the use of three data sources: (1) oilfield vehicle counts; (2) oil and gas employment figures; and (3) AADT volumes, which are detailed in Appendix W.

The Traffic Study (Appendix W) found that each new well would generate 30 trips/day over a period of 30 to 90 days during the well development phase.

During the production phase, which (includes daily operation, well reworks/maintenance, and plug/abandonment) each well would generate 0.17 trips/day, based on oil/gas records, field observations, and other studies.

Future oil and gas traffic volumes were estimated by applying the development and production rates detailed above to the annual well count projections provided by the Applicant (Appendix W). The Project's annual future oil and gas trip generation for the years 2015 through 2035 are summarized in Table 4.16-11.

**Table 4.16-11: Projected Future Well Trip Generation**

| Year | Development Trips (30 trips/well/day; 60 days) | Production Trips (0.17 trips/well/day; 365 days) | Total Trips |
|---|---|---|---|
| 2015 | 26,072 | 9,438 | 35,510 |
| 2016 | 26,110 | 9,686 | 35,796 |
| 2017 | 26,149 | 9,934 | 36,083 |
| 2018 | 26,188 | 10,182 | 36,370 |
| 2019 | 26,227 | 10,431 | 36,658 |
| 2020 | 26,265 | 10,680 | 36,945 |
| 2021 | 26,304 | 10,930 | 37,234 |
| 2022 | 26,343 | 11,179 | 37,522 |
| 2023 | 26,382 | 11,430 | 37,812 |
| 2024 | 26,421 | 11,681 | 38,101 |
| 2025 | 26,459 | 11,932 | 38,391 |
| 2026 | 26,498 | 12,183 | 38,681 |
| 2027 | 26,537 | 12,435 | 38,972 |
| 2028 | 26,576 | 12,687 | 39,263 |
| 2029 | 26,614 | 12,940 | 39,555 |
| 2030 | 26,653 | 13,193 | 39,847 |
| 2031 | 26,692 | 13,447 | 40,139 |
| 2032 | 26,731 | 13,701 | 40,432 |
| 2033 | 26,769 | 13,955 | 40,725 |
| 2034 | 26,808 | 14,210 | 41,018 |
| 2035 | 26,847 | 14,465 | 41,312 |

### Trip Distribution

For the purposes of this analysis, trip distribution represents the movement of oil and gas traffic between the oilfields and the central metropolitan Bakersfield area. The Traffic Study (Appendix W) assumed that all oil and gas trips originate and terminate within the Project Area. Oil and gas trips were assigned to roadways based on oilfield production rates, published AADT volumes, and input from Kern County Roads Department staff regarding known oilfield access routes.

## Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist state that a project would normally be considered to have a significant impact if it would:

- Conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit;
- Conflict with an applicable congestion management program, including, but not limited to LOS standards and travel demand measures, or other standards established by the County congestion management agency for designated roads or highways as follows:
  - Metropolitan Bakersfield General Plan LOS C,
  - Kern County General Plan LOS D, and
  - Caltrans endeavors to maintain a target LOS at the transition between LOS C and LOS D;
- Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks;
- Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment);
- Result in inadequate emergency access; or
- Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities.

Based on these standards, the effects of the Project have been categorized as either a "less than significant impact" or a "potentially significant impact." Mitigation measures are recommended for potentially significant impacts. If a potentially significant impact cannot be reduced to a less than significant level through the application of mitigation, it is categorized as a "significant unavoidable impact."

# Project Impacts

## Impact 4.16-1: Conflict with an Applicable Plan, Ordinance, or Policy Establishing Measures of Effectiveness for the Performance of the Circulation System, Including, but not Limited to, Intersections, Streets, Highways and Freeways, Pedestrian and Bicycle Paths, and Mass Transit

The minimum LOS goal for roadways within the Bakersfield and Kern County metropolitan areas is LOS C. The minimum LOS goal for roadways within the non-metropolitan region of Kern County is LOS D, and for Caltrans facilities, the minimum LOS goal is between LOS C and LOS D. A significant impact is found where project traffic reduces the LOS to below the minimum LOS goal, or where the pre-existing condition of the roadway is below the minimum LOS, and the LOS degrades below the pre-existing LOS with the addition of the project.

## Year 2015 Intersection Operations

The addition of Project-related traffic to Year 2015 conditions would contribute to 19 of the 101 intersections evaluated as operating below acceptable LOS (at LOS E or worse for intersections located within the non-metropolitan region of Kern County and LOS D or worse for intersections located within the Bakersfield and Kern County metropolitan areas and for Caltrans facilities Appendix W). These impacts would be significant.

Table 4.16-12 summarizes the impacted intersections, as identified in the Traffic Study, and the improvements necessary to maintain or improve the operational LOS of the roadway system in the Project Area and, thereby, mitigate Project impacts. Also identified on Table 4.16-12 is the Project's percent share of the cost for implementation, as identified in the Traffic Study, of the intersection improvements, calculated by dividing the oil and gas (Project-related) traffic at the intersection by the total traffic. Implementation of MM 4.16-1 would require application to pay a roadway maintenance fee to address wear and tear of roads due to oil and gas industry traffic. Implementation of this mitigation measures, described below, would reduce impacts to below a level of significance.

**Table 4.16-12: Intersection Impacts and Mitigation 2015**

| No. | Intersections [1] | Level of Service Impacts | | Improvements Needed by 2015 | Project % Share |
|---|---|---|---|---|---|
| | | Ex 2015 NOG [2] | Ex. 2015 | | |
| 15 | West Side Hwy (SR 33) & Lerdo Hwy | - | X | Signal | 39.1% |
| 16 | Lost Hills Rd & Lerdo Hwy | - | X | Signal, 1 EBL, 1 WBL | 57.8% |
| 107 | Central Valley Hwy (SR 43) & Paso Robles Hwy (SR 46) | - | X | Signal | 11.3% |
| 112 | Central Valley Hwy (SR 43) & Kimberlina Rd | - | X | 1 EBL, 1 WBL | 0.0% |
| 212 | Enos Ln (SR 43) & 7th Standard Rd | - | X | Signal, 1 EBL, 1 EBT, 1 WBL, 1 NBL | 34.0% |
| 215 | West Side Hwy (SR 33) & Lokern Rd | - | X | Signal, 1 NBL, 1 SBL | 26.4% |
| 216 | Lokern Rd & McKittrick Hwy (SR 58) | - | X | Signal | 41.0% |
| 220 | Enos Ln (SR 43) & McKittrick Hwy (58) | - | X | Signal, 1 NBL | 35.2% |
| 225 | Enos Ln (SR 43) & Stockdale Hwy | - | X | 1 EBL, 1 WBL, 1 NBR, 1 SBL | 30.7% |
| 229 | McKittrick Hwy (SR 58) & West Side Hwy (SR 33) | - | X | Signal | 27.9% |
| 232 | Enos Ln (SR 43) & Panama Ln | - | X | Signal | 45.7% |
| 235 | Tupman Rd & Taft Hwy (SR 119) | - | X | Signal | 29.8% |
| 236 | Enos Ln (SR 43) & Taft Hwy (SR 119) | - | X | 2 SBR | 26.1% |

**Table 4.16-12: Intersection Impacts and Mitigation 2015**

| No. | Intersections (1) | Level of Service Impacts | | Improvements Needed by 2015 | Project % Share |
|---|---|---|---|---|---|
| | | Ex 2015 NOG (2) | Ex. 2015 | | |
| 243 | McKittrick Hwy (SR 58) & Reserve Rd | - | X | Signal | - |
| 244 | Enos Ln (SR 43) & Rosedale Hwy (SR 58) | - | X | Signal, 1 SBL, 1 NBL | 44.5% |
| 251 | Golf Course Rd & Taft Hwy (SR 119) | - | X | Signal, 1 WBT | 28.8% |
| 254 | Tracy Ave & McKittrick Hwy (SR 58) | - | X | Signal | 4.2% |
| 367 | Enos Ln (SR 43) & I-5 NB Off Ramp | - | X | 1 NBT, 1 NBL | 49.2% |
| 1002 | SR 33 & Midway Rd | - | X | Signal | 20.6% |

Source: Appendix W
Notes:
(1) Includes intersections operating below LOS C. X denotes scenario during which substandard operations would occur.
(2) NOG = Non-oil and gas-related traffic; Project – oil and gas-related traffic.
Key:
SR = State Route

## Year 2015 Roadway Operations

The addition of Project-related traffic to Year 2015 conditions would contribute to 30 of the 462 roadway segments evaluated as operating below acceptable LOS (at LOS E or worse for roadways located within the non-metropolitan region of Kern County, and LOS D or worse for roadways located within the Bakersfield and Kern County metropolitan areas and for Caltrans facilities (Appendix W). These impacts would be significant.

Table 4.16-13 summarizes the impacted roadway segments and the improvements necessary to maintain or improve the operational LOS of the roadway system in the Project Area and, thereby, mitigate Project impacts. Also identified on Table 4.16-13 is the Project's percent share of the cost for implementation of the roadway segment improvements, calculated by dividing the oil and gas (Project-related) traffic at the intersection by the total traffic. Implementation of a road maintenance fee, described in MM 4.16-1 and a Traffic Control Plan as described in MM 4.16-2 would reduce impacts to below a level of significance (Appendix W).

In addition, transportation of heavy equipment and materials associated with construction activities may result in temporary conflicts with other traffic on Caltrans routes, arterials or collectors. MM 4.16-1 provides for a Construction Traffic Control Plan incorporating standard elements, such as timing of deliveries and work hours, signage, lighting, and traffic control devices, and maintaining access. Implementation of mitigation measures MM 4.16-1, described below, would reduce such impacts to below a level of significance:

**Table 4.16-13: Roadway Impacts and Mitigation 2015**

| Roadway Segment [1] | No. of Lanes | Level of Service Impacts | | Roadway Improvement Needed by 2015 | Roadway Improvement Project % Share |
|---|---|---|---|---|---|
| | | Ex 2015 NOG[2] | Ex 2015 NOG + Project | | |
| Airport Dr: China Grade Loop - Merle Haggard Dr. | 2 | - | X | Add 2 lanes | 0.12% |
| SR 119 (Taft Hwy): Tupman Road – SR 43 (Enos Lane) | 2 | - | X | Add 2 lanes | 15.70% |
| SR 43 (Central Valley Hwy): N Shafter Ave – Dresser Ave | 4 | - | X | Add 2 lanes | 0.03% |
| SR 43 (Central Valley Hwy): Dresser Ave – Kimberlina Rd | 4 | - | X | Add 2 lanes | 0.03% |
| SR 46: Magnolia Ave - Palm Ave | 2 | - | X | Add 2 lanes | 5.25% |
| SR 58 (Rosedale Hwy): Calloway Dr. - Coffee Rd | 5 | - | X | Add 2 lanes | 7.24% |
| SR 58 (Rosedale Hwy): Mohawk St - SR 99 | 4 | - | X | Add 2 lanes | 0.08% |
| SR 58 (Rosedele Hwy): Renfro Rd – Allen Rd | 2 | - | -3 | - | - |
| SR 58 (Rosedele Hwy): Old Tracey Ave – Tracey Ave | 2 | - | -3 | - | - |
| SR 65 (Porterville Hwy): Merle Haggard Dr. - James Rd | 2 | - | X | Add 2 lanes | 4.30% |
| SR 65 (Porterville Hwy): James Rd - Lerdo Hwy | 2 | - | X | Add 2 lanes | 2.74% |
| Stockdale Hwy: Heath Rd - Renfro Rd | 2 | - | X | Add 2 lanes | 14.10% |
| Stockdale Hwy: Nord Ave - Heath Rd | 2 | - | X | Add 2 lanes | 13.25% |
| Taft Hwy: S H St - Chevalier Rd | 2 | - | X | Add 2 lanes | 0.12% |
| Calloway Dr: Stockdale Hwy - Brimhall Rd | 4 | - | X | - | - |
| Calloway Dr: Brimhall Rd - SR 58 (Rosedale Hwy) | 4 | - | X | - | - |
| SR 155 (Garces Hwy): SR 43 - SR 99 | 2 | - | X | - | - |
| SR 155 (Garces Hwy): SR 99 - Browning Rd | 2 | - | X | - | - |
| SR 178 (24th St): SR 99 - Bay St | 4 | - | X | - | - |
| SR 178 (Kern Canyon Rd): SR 184 (Kern Canyon Rd) - Comanche Dr. | 2 | - | X | - | - |
| SR 184 (Morning Dr): Edison Hwy - Breckenridge Rd | 2 | - | X | - | - |

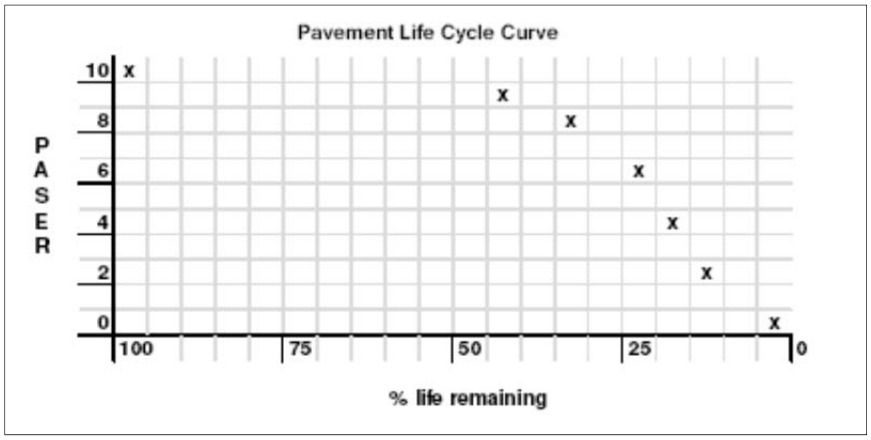
**Table 4.16-13: Roadway Impacts and Mitigation 2015**

| Roadway Segment [1] | No. of Lanes | Level of Service Impacts | | Roadway Improvement Needed by 2015 | Roadway Improvement Project % Share |
|---|---|---|---|---|---|
| | | Ex 2015 NOG[2] | Ex 2015 NOG + Project | | |
| SR 184 (Morning Dr): Breckenridge Rd - Pioneer Dr. | 2 | - | X | - | - |
| SR 184 (Weedpatch Hwy): Mountain View Rd - Panama Ln | 2 | - | X | - | - |
| SR 184 (Weedpatch Hwy): Di Giorgio Rd - Panama Rd | 4 | - | X | - | - |
| SR 204 (Union Ave): SR 58 - Union Ave | 4 | - | X | - | - |
| SR 58 (Rosedale Hwy): Coffee Rd - Patton Wy | 4 | - | X | - | - |
| SR 58 (Rosedale Hwy): Patton Way - Mohawk St | 4 | - | X | - | - |
| SR 58: Real Rd - SR 99 | 4 | - | X | - | - |
| SR 99: SR 58 East - SR 178 | 8 | - | - [3] | - | - |
| SR 99: Panama Ln - SR 58 East | 8 | - | - [3] | - | - |

Source: Appendix W
Notes:
(1) X denotes scenario during which substandard operations (below LOS C) would occur.
(2) NOG = Non-oil and gas-related traffic; Project – oil and gas-related traffic.
(3) Roadway cannot be expanded further.
Key:
SR = State Route

## Pavement Conditions

The pavement condition analysis consisted of assessing the need and timing for maintenance and rehabilitation improvements per roadway segment per study year based on estimates of remaining pavement service life. Both remaining life and improvement needs were estimated based on a pavement life cycle curve developed for this study. The pavement life cycle curve, illustrated below, closely approximates a "typical" pavement life cycle curve and correlates PASER ratings to pavement condition.




**Pavement Lifecycle Curve**

The pavement life cycle curve and 2013 pavement condition data were used to estimate a baseline remaining service life for each publicly maintained roadway in the Project Area. As shown below, the baseline percentage of remaining life per roadway segment was then applied to the maximum ESAL corresponding to the roadway's 20-year TI in order to establish the baseline ESAL total for the roadway segment.

*baseline ESAL total = (baseline % remaining service life) x (maximum ESAL)*

For each of the subsequent years, remaining service life per roadway segment was estimated by deducting the annual ESAL from the ESAL total for the preceding year. Annual ESAL's were calculated for each study roadway using Caltrans' methodology based on future traffic volume projections (discussed previously) and estimates of total truck and axle group percentages (developed based on Caltrans and Kern COG traffic count data).

For the purposes of this study, the need for a pavement condition improvement per study roadway per study year was identified when one of the remaining service life threshold conditions shown in Table 4.16-14a was met. The scheduling of needed improvements, as shown in Table 4.16-14b, was prioritized based on pavement condition and traffic volume, as shown in Table 4.16-15, in order to maintain the baseline pavement conditions for County roads and state routes. In general, roadways were scheduled for needed maintenance or rehabilitation in priority order (1 through 9) for each study year until these baseline conditions were met. All unscheduled improvements were deferred, except for overlays that, if not done in the present year, would lead to reconstruction in

the following year. The remaining life resets in Table 4.16-14a were applied in the year the corresponding pavement condition improvement was scheduled.

**Table 4.16-14a: Pavement Condition Improvement Thresholds and Resets**

| | Preventive Maintenance | | Corrective Maintenance | | Major Rehabilitation | | Roadway Reconstruction | |
|---|---|---|---|---|---|---|---|---|
| | Remaining Life | | Remaining Life | | Remaining Life | | Remaining Life | |
| Type | Threshold | Reset | Threshold | Reset | Threshold | Reset | Threshold | Reset |
| F | 28% | 40% | 22% | 40% | 19% | 100% | - - - | - - - |
| H | 28% | 40% | 22% | 40% | 16% | 100% | - - - | - - - |
| A | 28% | 40% | 22% | 40% | 16% | 50% | 13% | 100% |
| C | 28% | 40% | 22% | 40% | 16% | 50% | 6.5% | 100% |

Source: Appendix W
Key:
F = Freeway (rigid or composite pavement)
H = Highway (flexible pavement)
A = Arterial (flexible pavement)
C = Collector (flexible pavement)

**Table 4.16-14b: Pavement Condition Improvement, Maintenance and Rehabilitation Measures**

| Type | Preventive Maintenance | Corrective Maintenance | Major Rehabilitation | Roadway Reconstruction |
|---|---|---|---|---|
| F | crack seal | slab replacement | CSO or PCC overlay | N/A |
| H | seal coat | thin overlay (nonstructural) | mill/replace or IPR | N/A |
| A | seal coat | local repairs and seal coat | 0.20' overlay | full-depth reconstruction |
| C | seal coat | local repairs and seal coat | 0.20' overlay | full-depth reconstruction |

Source: Appendix W
Key:
CSO = crack, seat, and overlay
IRP = in-place recycling

**Table 4.16-15: Scheduling Prioritization**

| Traffic Volume | Pavement Condition | | |
|---|---|---|---|
| | **GOOD**<br>**C: PASER Rating 8 - 10**<br>**S: PCS State 1** | **FAIR**<br>**C: PASER Rating 5 - 7**<br>**S: PCS State 2** | **POOR**<br>**C: PASER Rating 1 - 4**<br>**S: PCS State 3** |
| HIGH<br>C: AADT > 5,000<br>S: AADT > 25,000 | 1 | 2 | 5 |
| MEDIUM<br>C: 2,000 < AADT < 5,000<br>S: 10,000 < AADT < 25,000 | 3 | 4 | 6 |
| LOW<br>C: AADT < 2,000<br>S: AADT < 10,000 | 7 | 8 | 9 |

Source: Appendix W
Key:
C = County
S = State

A breakdown of roadway improvements needed over the study period (2015 through 2035) is shown in Table 4.16-16. These improvements are based on estimates of existing and future pavement conditions and include impacts attributable to future oil and gas exploration and production activities within the Project Area.

**Table 4.16-16: Roadway Maintenance and Rehabilitation Summary, Years: 2015-2035**

| Project Area Roadways | Preventive Maintenance (lane miles) | Corrective Maintenance (lane miles) | Major Rehabilitation (lane miles) | Roadway Reconstruct (lane miles) |
|---|---|---|---|---|
| All Study Roadways | 2,355 | 992 | 877 | 288 |

Source: Appendix W

It is noted that preventive and corrective maintenance measures are designed to maintain pavement with little to moderate levels of distress in good condition and generally have an expected service life of less than ten years. It is for this reason that roadways in this analysis were scheduled for preventive and corrective maintenance multiple times over the 20-year study period. In contrast, rehabilitation measures are designed to provide structural enhancement to severely distressed pavements and have an expected service life ranging from ten years for a structural overlay to 20 or more years for complete reconstruction. Consequently, Project Area roadways would receive major rehabilitation once or twice over the 20-year study period.

Oil and gas exploration and production activities that would be authorized under the proposed Project would add additional vehicle and truck trips to the roadway system. Pavement conditions for 750 centerline miles of state routes and county roads were evaluated for potential pavement

condition impacts resulting from oil and gas truck traffic. Of this total, 400 centerline miles were considered to be primary and secondary routes for oil and gas traffic. Specific volumes of oil and gas traffic were assigned to these primary and secondary routes and a nominal volume of Project-related traffic was assigned to non-primary and non-secondary routes The Traffic Study found that this additional traffic could contribute to the degradation of pavement conditions and the service life for roadways in the Project Area, which could be a significant impact. Table 4.16-17 identifies the specific pavement condition improvements needed, by year, to maintain area roadways, along with the Project's fair-share contribution. Implementation of a road maintenance fee as described in MM 4.16-1 would reduce impacts to below a level of significance.

**Table 4.16-17: Pavement Impacts and Mitigation**

| Roadway Segment [1] | Pavement Condition Improvement Recommendation by Year Needed | | | | Project % Share |
|---|---|---|---|---|---|
| | Preventative, Maintenance | Corrective Maintenance | Major Rehabilitation | Roadway Reconstruction | |
| 25 Hill Rd: Buena Vista Pl - South St | 2018<br>2027 | - | - | - | 36.75% |
| 7th Standard Rd: Beech Ave - SR 43 (Enos Ln) | 2018<br>2030 | 2025 | - | - | 89.23% |
| 7th Standard Rd: Brandt Rd - Beech Ave | 2018<br>2030 | 2025 | - | - | 88.14% |
| 7th Standard Rd: Buttonwillow Dr. - Interstate 5 | 2034 | 2015 | - | 2019 | 9.66% |
| 7th Standard Rd: Calloway Dr. - Coffee Rd | 2018<br>2023 | 2029<br>2034 | - | - | 25.51% |
| 7th Standard Rd: Coffee Rd - Golden State Hwy | - | 2016 | - | 2019 | 13.38% |
| 7th Standard Rd: Corn Camp Rd - Buttonwillow Dr. | - | 2015 | 2018<br>2031 | - | 34.11% |
| 7th Standard Rd: Interstate 5 - Brandt Rd | 2019 | - | 2029 | - | 114.34 % |
| 7th Standard Rd: Santa Fe Way - Zerker Rd | 2022<br>2029 | - | - | - | 42.54% |
| 7th Standard Rd: SR 43 (Enos Ln) - Santa Fe Way | 2015 | 2023<br>2030 | - | - | 49.98% |
| 7th Standard Rd: Verdugo Ln - Calloway Dr. | - | 2027<br>2032 | - | - | 23.44% |
| 7th Standard Rd: Wagon Wheel Rd - Lost Hills Rd | - | - | 2035 | 2015 | 45.46% |
| 7th Standard Rd: Zerker Rd - Verdugo Ln | - | 2029<br>2034 | - | - | 25.51% |
| Airport Dr: Merle Haggard Dr. - James Rd | 2022 | - | 2015<br>2030 | - | 4.41% |

**Table 4.16-17: Pavement Impacts and Mitigation**

| Roadway Segment [1] | Pavement Condition Improvement Recommendation by Year Needed | | | | Project % Share |
|---|---|---|---|---|---|
| | Preventative, Maintenance | Corrective Maintenance | Major Rehabilitation | Roadway Reconstruction | |
| Airport Dr: China Grade Loop - Merle Haggard Dr. | 2018<br>2032 | - | 2025 | - | 1.00% |
| Allen Rd: Olive Dr. - 7th Standard Rd | 2015<br>2025 | - | 2018<br>2033 | - | 2.24% |
| Beech Ave: 7th Standard Rd - Petrol Rd | 2015<br>2029 | 2023 | - | - | 4.96% |
| Bitterwater Valley Rd: SR 46 - S of SR 46 | - | - | - | - | 12.60% |
| Brite Rd: Buttonwillow Dr. - Wasco Wy | - | - | 2035 | 2015 | 23.42% |
| Brown Material Rd: SR 33 - SR 46 | 2015 | - | - | 2027 | 17.58% |
| Buttonwillow Dr: Elk Hills Rd - Brite Rd | - | - | 2035 | 2015 | 23.02% |
| China Grade Loop: Airport Dr. - N Chester Ave | 2022 | 2034 | - | - | 13.95% |
| China Grade Loop: Manor St - Oilfield Srv Rd | - | 2015 | - | 2022 | 50.01% |
| China Grade Loop: N Chester Ave - Manor St | 2016<br>2029 | - | - | - | 18.67% |
| China Grade Loop: Oilfield Srv Rd - Round Mountain Rd | 2027 | 2015 | 2020<br>2034 | - | 57.74% |
| Comanche Dr: Panama Rd - Mountain View Rd | - | 2015 | - | 2019 | 1.00% |
| Comanche Dr: Mountain View Rd - Muller Rd | 2015 | - | - | 2019 | 1.00% |
| Comanche Dr: Muller Rd - SR 58 | 2034 | 2018<br>2023 | 2029 | - | 1.83% |
| Corn Camp Rd: SR 58 - 7th Standard Rd | 2025 | - | 2018<br>2033 | - | 45.26% |
| Elk Hills Rd: Skyline Rd - Buttonwillow Dr. | 2025<br>2030 | - | 2017 | - | 31.41% |
| Elk Hills Rd: SR 119 - Skyline Rd | - | - | 2017<br>2025 | - | 34.06% |
| Famoso Rd: SR 65 - Granite Rd | 2018 | - | - | - | 5.78% |
| Granite Rd: Garcia Rd - Famoso Rd | 2030 | 2019 | - | - | 2.37% |
| Granite Rd: Round Mountain Rd - Garcia Rd | - | - | - | - | 22.38% |

**Table 4.16-17: Pavement Impacts and Mitigation**

| Roadway Segment [1] | Pavement Condition Improvement Recommendation by Year Needed | | | | Project % Share |
|---|---|---|---|---|---|
| | Preventative, Maintenance | Corrective Maintenance | Major Rehabilitation | Roadway Reconstruction | |
| Granite Rd: James Rd - N Chester Ave Ext | 2030 | - | - | 2015 | 5.53% |
| Granite Rd: N Chester Ave Ext - Round Mountain Rd | - | - | 2015 | 2025 | 5.72% |
| Interstate 5: SR 58 - 7th Standard Rd | 2015<br>2020 | 2026 | 2032 | - | 1.00% |
| Interstate 5: 7th Standard Rd - Lerdo Hwy | - | - | 2019 | - | 2.09% |
| Interstate 5: SR 119 (Taft Hwy) - SR 43 | 2017<br>2022<br>2027 | 2032 | - | - | 1.00% |
| Interstate 5: Lerdo Hwy - SR 46 | 2035 | - | 2015 | - | 1.32% |
| Interstate 5: Stockdale Hwy - SR 58 | 2015<br>2020 | 2026<br>2031 | - | - | 1.02% |
| Interstate 5: S Wheeler Ridge Rd - SR 99 | - | 2035 | 2017 | - | 1.00% |
| Interstate 5: SR 43 - Stockdale Hwy | 2017<br>2022<br>2027 | 2032 | - | - | 1.01% |
| Interstate 5: SR 223 (Bear Mtn Blvd) - SR 119 (Taft Hwy) | 2017<br>2022<br>2027 | 2032 | - | - | 1.00% |
| James Rd: Oilfields Rd - Granite Rd | 2022 | 2027 | 2015<br>2034 | - | 1.92% |
| James Rd: SR 65 (Porterville Hwy) - Oilfields Rd | 2022 | - | 2015<br>2030 | - | 9.64% |
| Kimberlina Rd: Shafter Ave - SR 99 | 2022 | 2027<br>2032 | 2015 | - | 4.07% |
| Lerdo Hwy: Interstate 5 - Rowlee Rd | 2016<br>2027 | - | 2021<br>2033 | - | 16.02% |
| Lerdo Hwy: Industrial Farm Rd - SR 65 (Porterville Hwy) | 2034 | - | - | 2015 | 2.40% |
| Lerdo Hwy: Kyte Ave - Industrial Farm Rd | 2034 | - | - | 2015 | 2.40% |
| Lerdo Hwy: Lost Hills Rd - Interstate 5 | - | - | - | 2015 | 25.90% |
| Lerdo Hwy: Magnolia Ave - Scaroni Ave | 2016 | 2029 | 2020 | - | 13.14% |

**Table 4.16-17: Pavement Impacts and Mitigation**

| Roadway Segment [1] | Pavement Condition Improvement Recommendation by Year Needed | | | | Project % Share |
|---|---|---|---|---|---|
| | Preventative, Maintenance | Corrective Maintenance | Major Rehabilitation | Roadway Reconstruction | |
| Lerdo Hwy: Poplar Ave - Schnaidt St | 2015 | 2025 | 2018<br>2031 | - | 9.62% |
| Lerdo Hwy: Rowlee Rd - Magnolia Ave | 2016 | - | - | 2022 | 18.03% |
| Lerdo Hwy: Scaroni Ave - Poplar Ave | 2025 | - | 2017<br>2033 | - | 12.71% |
| Lerdo Hwy: Schnaidt St - Shafter Ave | 2015<br>2025 | - | 2017<br>2033 | - | 7.95% |
| Lerdo Hwy: Shafter Ave - SR 43 (Central Valley Hwy) | 2015<br>2023 | - | 2017<br>2029 | - | 3.27% |
| Lerdo Hwy: SR 33 - Lost Hills Rd | 2015<br>2025<br>2030 | - | 2017 | - | 42.40% |
| Lerdo Hwy: SR 43 (Central Valley Hwy) - SR 99 | 2025 | 2015 | 2019<br>2030 | - | 3.10% |
| Lerdo Hwy: SR 99 - Zerker Rd | - | 2023 | 2015<br>2030 | - | 5.30% |
| Lerdo Hwy: Zerker Rd - Kyte Ave | - | 2023 | 2015<br>2030 | - | 5.30% |
| Lokern Rd: Lost Hills Rd - SR 33 | - | - | 2017 | 2034 | 34.43% |
| Lokern Rd: SR 33 - SR 58 | - | 2015 | - | 2018 | 30.63% |
| Lokern Rd: W of Lost Hills Rd - Lost Hills Rd | - | - | 2017 | - | 45.47% |
| Lost Hills Rd: 7th Standard Rd - Lerdo Hwy | 2025 | 2015 | 2019<br>2032 | - | 45.54% |
| Lost Hills Rd: Lokern Rd - SR 33 | - | 2034 | - | 2015 | 18.22% |
| Lost Hills Rd: Lerdo Hwy - SR 46 | - | - | - | 2015 | 9.98% |
| Malaga Rd: Panama Ln - Muller Rd | 2018 | - | 2029 | - | 14.20% |
| Manor St: 7th Standard - China Grade Loop | - | - | - | 2015 | 146.94 % |
| McCombs Rd: N Palm Ave - SR 43 | - | - | 2016<br>2031 | - | 1.00% |
| Merle Haggard Dr: Airport Dr. - N Chester Ave | 2016 | - | - | 2022 | 30.50% |
| Merle Haggard Dr: Beach Ave - Airport Dr. | 2015 | 2025<br>2030 | 2017 | - | 22.60% |

**Table 4.16-17: Pavement Impacts and Mitigation**

| Roadway Segment [1] | Pavement Condition Improvement Recommendation by Year Needed | | | | Project % Share |
|---|---|---|---|---|---|
| | Preventative, Maintenance | Corrective Maintenance | Major Rehabilitation | Roadway Reconstruction | |
| Merle Haggard Dr: Golden State Hwy - SR 99 | - | 2016 | - | 2019 | 12.96% |
| Merle Haggard Dr: SR 65 (Porterville Hwy) - Beach Ave | - | 2015 | - | 2018 | 11.67% |
| Merle Haggard Dr: SR 99 - SR 65 (Porterville Hwy) | - | 2015 | - | 2018 | 12.37% |
| Midway Rd: SR 33 - SR 119 | 2015<br>2023 | - | 2017<br>2028 | - | 5.55% |
| Mohawk St: Westside Parkway - SR 58 (Rosedale Hwy) | 2022 | 2034 | - | - | 1.75% |
| Muller Rd: Malaga Rd - Comanche Dr. | - | 2018<br>2023 | 2029 | - | 8.66% |
| N Access Rd: Skyline Rd - Tupman Rd | - | - | 2017 | - | 44.40% |
| Oilfield Rd: N of James Rd - James Rd | 2015 | - | - | 2034 | 64.28% |
| Old River Rd: SR 166 (Maricopa Hwy) - Copus Rd | 2022 | 2027 | 2015, 2034 | - | 17.55% |
| Old River Rd: Copus Rd - Interstate 5 | 2022 | 2027 | 2015, 2034 | - | 17.55% |
| Old River Rd: SR 223 (Bear Mtn Blvd) - SR 119 (Taft Hwy) | 2025 | 2015, 2030 | 2019 | - | 39.78% |
| Old River Rd: Interstate 5 - SR 223 (Bear Mtn Blvd) | - | 2022, 2027, 2032 | 2015 | - | 24.94% |
| Olive Ave: South St - Wood St | 2018 | - | - | - | 245.68 % |
| Palm Ave: SR 46 - McCombs Rd | 2030 | 2018 | - | - | 12.36% |
| Palm Ave: McCombs Ave - Phillips Rd | - | 2018 | - | - | 15.82% |
| Panama Ln: Allen Rd - Buena Vista Rd | 2025 | 2015, 2030 | 2019 | - | 88.07% |
| Panama Ln: Buena Vista Rd - Old River Rd | 2015 | 2027 | - | - | 74.26% |
| Panama Ln: Canfield Pkwy - Heath Rd | - | 2015, 2027 | 2018, 2035 | - | 65.85% |
| Panama Ln: Heath Rd - Renfro Rd | - | 2015 | - | 2023 | 96.59% |
| Panama Ln: Old River Rd - Gosford Rd | 2016, 2027 | - | - | - | 96.59% |
| Panama Ln: Renfro Rd - Allen Rd | - | 2015 | - | 2023 | 96.59% |
| Panama Ln: SR 43 (Enos Ln) - Canfield Pkwy | - | 2015, 2027 | 2018, 2035 | - | 65.35% |
| Panama Rd: Cottonwood Rd - Fairfax Rd | - | 2016, 2022 | 2029 | - | 1.00% |

**Table 4.16-17: Pavement Impacts and Mitigation**

| Roadway Segment [1] | Pavement Condition Improvement Recommendation by Year Needed | | | | Project % Share |
|---|---|---|---|---|---|
| | Preventative, Maintenance | Corrective Maintenance | Major Rehabilitation | Roadway Reconstruction | |
| Panama Rd: Edison Rd - Comanche Dr | - | 2034 | - | 2015 | 1.11% |
| Panama Rd: Vineland Rd - Edison Rd | - | - | 2034 | 2015 | 1.00% |
| Panama Rd: Fairfax Rd - SR 184 (Weedpatch Hwy) | 2015 | 2023, 2030 | - | - | 1.00% |
| Panama Rd: Habecker Rd - S Vineland Rd | 2032 | - | - | 2015 | 1.00% |
| Panama Rd: Main St - Habecker Rd | - | - | - | 2015 | 1.00% |
| Panama Rd: S Union Ave - Cottonwood Rd | - | 2027, 2032 | - | - | 1.00% |
| Reserve Rd: Dirt Road - Skyline Rd | 2019, 2027, 2034 | - | - | - | 33.64% |
| Reserve Rd: SR 33 - Dirt Road | 2019, 2027 | - | - | - | 35.01% |
| Reward Rd: Franco Western Rd - SR 33 | - | - | 2015 | 2027 | 16.21% |
| Round Mtn Rd: Pyramid Rd - Granite Rd | - | - | - | - | 43.26% |
| Round Mtn Rd: China Grade Loop - Pyramid Rd | 2015, 2022, 2029 | - | - | - | 62.49% |
| Santa Fe Way: 7th Standard Rd - Los Angeles St | 2018 | - | 2027 | - | 5.98% |
| Shafter Ave: Merced Ave - Kimberlina Rd | 2025 | - | - | - | 29.84% |
| Shafter Ave: SR 43 - Merced Ave | 2018 | - | 2029 | - | 3.86% |
| Skyline Rd: Elk Hills Rd - Unkown Rd | - | - | - | 2025 | 40.10% |
| Skyline Rd: Elk Hills Rd - West of Elk Hills Rd | 2034 | - | 2019 | - | 39.17% |
| Skyline Rd: Reserve Rd - East of Reserve Rd | 2034 | - | 2019 | - | 45.15% |
| Skyline Rd: Unkown Rd - N Access Rd | - | - | - | 2025 | 40.96% |
| SR 119 (Taft Hwy): Akers Rd - Wible Rd | 2015, 2020, 2025 | 2030, 2035 | - | - | 8.75% |
| SR 119 (Taft Hwy): Allen Rd Ext - Buena Vista Rd | 2025, 2030, 2035 | 2019 | - | - | 10.72% |
| SR 119 (Taft Hwy): Ashe Rd - Stine Rd | 2015, 2020, 2025 | 2030, 2035 | - | - | 8.75% |
| SR 119 (Taft Hwy): Buena Vista Rd - Old River Rd | 2017, 2029 | 2024 | 2035 | - | 10.46% |

**Table 4.16-17: Pavement Impacts and Mitigation**

| Roadway Segment [1] | Pavement Condition Improvement Recommendation by Year Needed | | | | Project % Share |
|---|---|---|---|---|---|
| | Preventative, Maintenance | Corrective Maintenance | Major Rehabilitation | Roadway Reconstruction | |
| SR 119 (Taft Hwy): Elk Hills Rd - Tupman Rd | 2015 | - | 2023 | - | 16.67% |
| SR 119 (Taft Hwy): Gosford Rd - Ashe Rd | 2017, 2022, 2027 | 2032 | - | - | 8.75% |
| SR 119 (Taft Hwy): Greeley Rd Ext - Nord Rd Ext | 2017, 2029 | 2024, 2035 | - | - | 10.72% |
| SR 119 (Taft Hwy): Heath Rd Ext - Renfro Rd Ext | - | - | 2019 | - | 10.72% |
| SR 119 (Taft Hwy): Interstate 5 - Greeley Rd Ext | - | - | 2019 | - | 10.72% |
| SR 119 (Taft Hwy): Nord Rd Ext - Heath Rd Ext | 2030, 2035 | - | - | - | 10.72% |
| SR 119 (Taft Hwy): Old River Rd - Gosford Rd | 2017, 2022, 2027 | 2032 | - | - | 9.00% |
| SR 119 (Taft Hwy): Renfro Rd Ext - Allen Rd Ext | 2025, 2030, 2035 | 2019 | - | - | 10.72% |
| SR 119 (Taft Hwy): SR 33 - Elk Hills Rd | 2024 | 2019, 2029 | - | - | 11.04% |
| SR 119 (Taft Hwy): SR 43 (Enos Ln) - Interstate 5 | - | 2019, 2024 | 2032 | - | 5.35% |
| SR 119 (Taft Hwy): SR 99 - S H St | - | - | - | - | 1.00% |
| SR 119 (Taft Hwy): Stine Rd - Akers Rd | - | - | 2019 | - | 8.75% |
| SR 119 (Taft Hwy): Tupman Rd - SR 43 (Enos Ln) | - | 2017 | 2022 | - | 13.75% |
| SR 119 (Taft Hwy): Wible Rd - SR 99 | 2017 | 2022 | 2031 | - | 7.27% |
| SR 166 (Maricopa Hwy): Cappello - Old River Rd | 2019 | 2026 | - | - | 8.83% |
| SR 166 (Maricopa Hwy): Interstate 5 - SR 99 | 2026 | - | - | - | 7.02% |
| SR 166 (Maricopa Hwy): Old River Rd - Wheeler Ridge Access Rd | 2026 | - | - | - | 5.40% |
| SR 166 (Maricopa Hwy): SR 33 - Cappello | 2017 | 2024, 2030, 2035 | - | - | 8.48% |
| SR 166 (Maricopa Hwy): Wheeler Ridge Access Rd - Interstate 5 | 2026 | - | - | - | 5.05% |
| SR 33: 6th St - 10th St | 2017 | - | 2024 | - | 8.71% |

**Table 4.16-17: Pavement Impacts and Mitigation**

| Roadway Segment [1] | Pavement Condition Improvement Recommendation by Year Needed | | | | Project % Share |
|---|---|---|---|---|---|
| | Preventative, Maintenance | Corrective Maintenance | Major Rehabilitation | Roadway Reconstruction | |
| SR 33: SR 119 (Taft Hwy) - 6th St | 2017 | - | 2025 | - | 10.95% |
| SR 33: Lost Hills Rd N - 7th Standard Rd | 2019, 2026 | 2035 | - | - | 12.33% |
| SR 33: Lerdo Hwy - Brown Material Rd | - | - | 2035 | - | 27.92% |
| SR 33: SR 58 East - Cymric Rd | - | - | 2035 | - | 16.98% |
| SR 33: 7th Standard Rd - Lerdo Hwy | 2019, 2026 | 2035 | - | - | 21.52% |
| SR 33: Cymric Rd - Lokern Rd | 2035 | 2019 | - | - | 16.08% |
| SR 33: Lost Hills Rd S - Lost Hills Rd N | 2015 | - | 2031 | - | 9.65% |
| SR 33: Lokern Rd - Lost Hills Rd S | - | - | 2019 | - | 9.25% |
| SR 33: 10th St - Midway Rd | - | 2017 | 2026 | - | 13.76% |
| SR 33: Wood St - SR 119 (Taft Hwy) | - | 2017 | 2030 | - | 14.02% |
| SR 33: Brown Material Rd - SR 46 | 2019, 2026 | 2035 | - | - | 28.04% |
| SR 33: Midway Rd - SR 58 | 2015 | - | 2032 | - | 13.87% |
| SR 33 (West Side Hwy): Reward Rd / Reserve Rd - SR 58 | - | - | 2019 | - | 9.14% |
| SR 33: SR 58 - SR 58 West | 2015, 2024, 2032 | - | - | - | 15.25% |
| SR 33: SR 166 - Wood St | 2024, 2030, 2035 | 2017 | - | - | 2.00% |
| SR 43 (Central Valley Hwy): N Shafter Ave - Dresser Ave | 2017, 2022 | 2027 | 2035 | - | 1.00% |
| SR 43 (Central Valley Hwy): Dresser Ave - Kimberlina Rd | 2017, 2022 | - | 2031 | - | 1.00% |
| SR 43 (Central Valley Hwy): Los Angeles St - Lerdo Hwy | 2025, 2030 | 2035 | - | - | 1.58% |
| SR 43 (Central Valley Hwy): SR 46 - McCombs Rd | 2019, 2026, 2033 | - | - | - | 1.00% |
| SR 43 (Central Valley Hwy): Lerdo Hwy - N Shafter Ave | 2019<br>2025<br>2031 | - | - | - | 1.00% |
| SR 43 (Central Valley Hwy): Kimberlina Rd - SR 46 | 2017<br>2029 | 2024<br>2035 | - | - | 1.00% |
| SR 43 (Enos Ln): Kratzmeyer Rd - 7th Standard Rd | 2021 | 2030 | - | - | 31.22% |

**Table 4.16-17: Pavement Impacts and Mitigation**

| Roadway Segment [1] | Pavement Condition Improvement Recommendation by Year Needed | | | | Project % Share |
|---|---|---|---|---|---|
| | Preventative, Maintenance | Corrective Maintenance | Major Rehabilitation | Roadway Reconstruction | |
| SR 43 (Enos Ln): Stockdale Hwy - Brimhall Rd | - | - | 2035 | - | 23.23% |
| SR 43 (Enos Ln): SR 119 (Taft Hwy) - Interstate 5 | 2019<br>2024 | - | 2035 | - | 24.91% |
| SR 43 (Enos Ln): SR 58 West - Kratzmeyer Rd | 2015 | 2026<br>2035 | - | - | 37.58% |
| SR 43 (Enos Ln): Interstate 5 - Panama Ln | 2021 | - | - | - | 50.90% |
| SR 43 (Enos Ln): Brimhall Rd - SR 58 East (Rosedale Hwy) | - | - | 2035 | - | 23.23% |
| SR 43 (Enos Ln): SR 58 East (Rosedale Hwy) - SR 58 West | - | - | 2033 | - | 55.60% |
| SR 43 (Enos Ln): Panama Ln - Stockdale Hwy | 2019<br>2032 | 2026 | - | - | 23.63% |
| SR 46: Beech Ave - Famoso Rd | 2017<br>2026<br>2035 | - | - | - | 10.27% |
| SR 46: Bitterwater Valley Rd - SR 33 | 2026 | - | - | - | 1.00% |
| SR 46: Brown Material Rd - Lost Hills Rd | 2032 | 2024 | - | - | 23.41% |
| SR 46: Corcoran Rd - Rowlee Rd | 2019<br>2031 | - | - | - | 10.38% |
| SR 46: Interstate 5 - Corcoran Rd | 2019<br>2035 | - | - | - | 14.83% |
| SR 46: Lost Hills Rd - Interstate 5 | 2015<br>2021<br>2035 | 2029 | - | - | 18.49% |
| SR 46: Magnolia Ave - Palm Ave | 2026<br>2032 | - | - | - | 6.03% |
| SR 46: Palm Ave - SR 43 South | 2019<br>2026<br>2032 | - | - | - | 5.85% |
| SR 46: Rowlee Rd - Magnolia Ave | 2026<br>2035 | - | - | - | 10.99% |
| SR 46: SR 33 - Brown Material Rd | - | - | - | - | 14.63% |
| SR 46: SR 43 South - Beech Ave | 2017<br>2026<br>2035 | - | - | - | 9.85% |

**Table 4.16-17: Pavement Impacts and Mitigation**

| Roadway Segment [1] | Pavement Condition Improvement Recommendation by Year Needed | | | | Project % Share |
|---|---|---|---|---|---|
| | Preventative, Maintenance | Corrective Maintenance | Major Rehabilitation | Roadway Reconstruction | |
| SR 58 (Rosedale Hwy): Allen Rd - Old Farm Rd | - | - | 2017 | - | 11.10% |
| SR 58 (Rosedale Hwy): Calloway Dr. - Coffee Rd | - | - | 2019 | - | 8.45% |
| SR 58 (Rosedale Hwy): Greeley Rd - Nord Rd | 2019<br>2026<br>2032 | - | - | - | 37.18% |
| SR 58 (Rosedale Hwy): Heath Rd - Renfro Rd | 2019<br>2032 | 2026 | - | - | 34.49% |
| SR 58 (Rosedale Hwy): Jewetta Ave N - Calloway Dr. | 2015 | - | 2019 | - | 9.43% |
| SR 58 (Rosedale Hwy): Mohawk St - SR 99 | 2015 | - | 2018 | - | 1.00% |
| SR 58 (Rosedale Hwy): Nord Rd - Heath Rd | 2019<br>2032 | 2026 | - | - | 34.49% |
| SR 58 (Rosedale Hwy): Old Farm Rd - Jewetta Ave N | - | - | 2017 | - | 11.10% |
| SR 58 (Rosedale Hwy): Renfro Rd - Allen Rd | - | - | 2017 | - | 11.10% |
| SR 58 (Rosedale Hwy): SR 43 (Enos Ln) - Superior Rd | 2024<br>2030<br>2035 | 2017 | - | - | 37.18% |
| SR 58 (Rosedale Hwy): Superior Rd - Greeley Rd | 2024<br>2030<br>2035 | 2017 | - | - | 37.18% |
| SR 58: Corn Camp Rd - Wasco Wy | 2019<br>2024 | 2030<br>2035 | - | - | 14.69% |
| SR 58: Fairfax Rd - SR 184 (Weedpatch Hwy) | 2019<br>2026<br>2032 | - | - | - | 1.00% |
| SR 58: Lokern Ave - Corn Camp Rd | 2019<br>2024 | 2030<br>2035 | - | - | 21.22% |
| SR 58: Mt Vernon Ave - Fairfax Rd | 2017 | - | 2026 | - | 1.00% |
| SR 58: Old Tracy Ave - Tracy Ave | - | - | 2017 | - | 6.17% |
| SR 58: SR 184 (Weedpatch Hwy) - Comanche Dr. | 2019<br>2024<br>2029 | 2035 | - | - | 1.00% |
| SR 58: SR 33 - Lokern Rd | - | - | - | - | 14.76% |

**Table 4.16-17: Pavement Impacts and Mitigation**

| Roadway Segment [1] | Pavement Condition Improvement Recommendation by Year Needed | | | | Project % Share |
|---|---|---|---|---|---|
| | Preventative, Maintenance | Corrective Maintenance | Major Rehabilitation | Roadway Reconstruction | |
| SR 58: Tracy Ave - SR 43 (Enos Ln) | 2017<br>2029 | 2024 | 2035 | - | 11.82% |
| SR 58: Wasco Wy - Old Tracy Ave | 2020 | 2015 | 2030 | - | 12.85% |
| SR 65 (Porterville Hwy): Merced Ave - Famoso Rd | 2019<br>2026<br>2033 | - | - | - | 1.00% |
| SR 65 (Porterville Hwy): Merle Haggard Dr. - James Rd | 2017 | - | 2025 | - | 4.82% |
| SR 65 (Porterville Hwy): James Rd - Lerdo Hwy | 2017 | - | 2025 | - | 3.03% |
| SR 65 (Porterville Hwy): Lerdo Hwy - Merced Ave | 2024 | 2019<br>2029 | 2035 | - | 2.75% |
| SR 99: SR 166 - Copus Rd | 2019<br>2031 | - | - | - | 1.00% |
| SR 99: Copus Rd - Herring Rd | 2019<br>2030 | - | - | - | 1.00% |
| SR 99: Lerdo Hwy - Kimberlina Rd | 2015<br>2024<br>2032 | - | - | - | 1.00% |
| SR 99: 7th Standard Rd - Lerdo Hwy | 2017<br>2025<br>2032 | - | - | - | 1.00% |
| SR 99: SR 223 (Bear Mtn Blvd) - SR 119 (Taft Hwy) | 2017<br>2026<br>2035 | - | - | - | 1.00% |
| SR 99: Interstate 5 - SR 166 | 2020<br>2031 | - | - | - | 1.00% |
| SR 99: Herring Rd - SR 223 (Bear Mtn Blvd) | 2021<br>2032 | - | - | - | 1.00% |
| SR 99: Kimberlina Rd - SR 46 | 2017<br>2026<br>2032 | - | - | - | 1.00% |
| Stockdale Hwy: Allen Rd - Buena Vista Rd | 2016 | 2027 | 2020<br>2032 | - | 27.26% |
| Stockdale Hwy: Buena Vista Rd - Old River Rd | - | 2018 | - | 2023 | 27.00% |
| Stockdale Hwy: Bussell Rd - SR 43 (Enos Ln) | 2015 | - | 2018 | 2029 | 33.01% |

**Table 4.16-17: Pavement Impacts and Mitigation**

| Roadway Segment [1] | Pavement Condition Improvement Recommendation by Year Needed | | | | Project % Share |
|---|---|---|---|---|---|
| | Preventative, Maintenance | Corrective Maintenance | Major Rehabilitation | Roadway Reconstruction | |
| Stockdale Hwy: Don Hart Dr. E - Coffee Rd | 2016 | - | - | 2022 | 24.62% |
| Stockdale Hwy: Heath Rd - Renfro Rd | 2016 | - | - | 2022 | 36.74% |
| Stockdale Hwy: Int 5 NB Ramps - Bussell Rd | 2016 | - | - | 2022 | 44.27% |
| Stockdale Hwy: Int 5 SB Ramps - Int 5 NB Ramps | - | - | 2018 | - | 207.26 % |
| Stockdale Hwy: Morris Rd - Int 5 SB Ramps | - | 2023 | 2015<br>2030 | - | 25.41% |
| Stockdale Hwy: Nord Ave - Heath Rd | 2016 | 2027 | 2020<br>2032 | - | 34.28% |
| Stockdale Hwy: Old River Rd - Don Hart Dr. E | 2016<br>2025 | - | 2020<br>2030 | - | 21.14% |
| Stockdale Hwy: Renfro Rd - Allen Rd | - | 2016 | - | 2019 | 18.26% |
| Stockdale Hwy: SR 43 (Enos Ln) - Nord Ave | 2016 | 2023<br>2029 | - | - | 71.42% |
| Stockdale Hwy: Wasco Wy - Morris Rd | 2023 | - | 2015<br>2032 | - | 30.63% |
| Taft Hwy: Chevalier Rd - S Union Ave | 2016<br>2023<br>2030 | - | - | - | 1.00% |
| Taft Hwy: S H St - Chevalier Rd | - | 2016<br>2022 | - | 2029 | 1.00% |
| Tupman Rd: SR 119 - N Access Rd | - | 2025 | 2018<br>2032 | - | 29.60% |
| Wasco Wy: Stockdale Hwy - Brite Rd | 2025 | 2015<br>2030 | 2019 | - | 22.76% |
| Wheeler Ridge Rd: Interstate 5 - Del Sol Dr. | - | - | - | 2015 | 1.61% |
| Wood St: Olive Ave - SR 119 | - | 2025 | 2018<br>2030 | - | 90.44% |
| Allen Rd: Olive Dr. - 7th Standard Rd | 2015<br>2025 | - | 2018<br>2033 | - | 2.24% |
| A St: Terrace Dr. - S 10th St | - | 2023 | 2016<br>2029 | - | 1.00% |
| Adohr Rd: Freeborn Rd - Tupman Rd | - | - | 2023 | - | 1.00% |
| Airport Dr: Olive Dr. - China Grade Loop | - | 2018<br>2023 | 2029 | - | 1.00% |

**Table 4.16-17: Pavement Impacts and Mitigation**

| Roadway Segment [1] | Pavement Condition Improvement Recommendation by Year Needed | | | | Project % Share |
|---|---|---|---|---|---|
| | Preventative, Maintenance | Corrective Maintenance | Major Rehabilitation | Roadway Reconstruction | |
| Airport Dr: SR 99 - Olive Dr. | 2016 | 2027<br>2032 | 2020 | - | 1.00% |
| Alfred Harrell Hwy: China Grade Loop - Fairfax Rd | - | - | - | 2015 | 1.00% |
| Alfred Harrell Hwy: Fairfax Rd - Hart Park Ent | - | 2016 | - | 2025 | 1.00% |
| Alfred Harrell Hwy: Hart Park Ent - Morning Dr. | - | 2019 | - | - | 1.00% |
| Alfred Harrell Hwy: Lake Ming Rd - SR 178 | 2019<br>2027 | - | - | - | 1.00% |
| Alfred Harrell Hwy: Morning Dr. - Lake Ming Rd | 2023 | - | - | - | 1.00% |
| Allen Rd: SR 58 (Rosedale Hwy) - Hageman Rd | 2018<br>2023 | 2029<br>2034 | - | - | 1.00% |
| Allen Rd: Reina Rd - Olive Dr. | 2016 | 2027 | 2020<br>2032 | - | 1.00% |
| Allen Rd: Hageman Rd - Reina Rd | 2016<br>2027 | - | 2021<br>2033 | - | 1.00% |
| Basic School Rd: Copus Rd - Cadet Rd | - | - | 2018 | 2034 | 1.00% |
| Bear Mtn Blvd: Coles Levee Rd - Interstate 5 | - | 2025<br>2030 | 2017 | - | 1.00% |
| Buena Vista Rd: White Ln - Ming Ave | 2015<br>2022 | 2030 | - | - | 1.00% |
| Buena Vista Rd: Panama Ln - Pacheco Rd | - | 2016<br>2022<br>2027 | 2032 | - | 1.00% |
| Buena Vista Rd: Ming Ave - Stockdale Hwy | 2015<br>2022 | 2030 | - | - | 1.00% |
| Buena Vista Rd: Pacheco Rd - White Ln | - | 2015 | - | 2019 | 1.00% |
| Buttonwillow Dr: SR 58 - 7th Standard Rd | 2015<br>2034 | - | - | 2018 | 1.00% |
| Buttonwillow Dr: 7th Standard Rd - Lerdo Hwy | 2018<br>2025 | 2034 | - | - | 1.00% |
| Cadet Rd: SR 33 - Gardner Field Rd | - | 2015<br>2027 | 2019<br>2035 | - | 1.00% |
| Calloway Dr: Stockdale Hwy - Brimhall Rd | 2025 | 2015 | 2019<br>2030 | - | 1.00% |

**Table 4.16-17: Pavement Impacts and Mitigation**

| Roadway Segment [1] | Pavement Condition Improvement Recommendation by Year Needed | | | | Project % Share |
|---|---|---|---|---|---|
| | Preventative, Maintenance | Corrective Maintenance | Major Rehabilitation | Roadway Reconstruction | |
| Calloway Dr: Meacham Rd - Hageman Rd | 2027 | 2015<br>2032 | 2020 | - | 1.00% |
| Calloway Dr: SR 58 (Rosedale Hwy) - Meacham Rd | - | 2015 | - | 2022 | 1.00% |
| Calloway Dr: Olive Dr. - Norris | 2025 | 2015<br>2030 | 2019 | - | 1.00% |
| Calloway Dr: Hageman Rd - Olive Dr. | - | 2027<br>2032 | - | - | 1.00% |
| Calloway Dr: Norris Rd - Snow Rd | 2025 | 2015<br>2030 | 2019 | - | 1.00% |
| Calloway Dr: Brimhall Rd - SR 58 (Rosedale Hwy) | 2025 | 2015 | 2019<br>2030 | - | 1.00% |
| Calloway Dr: Snow Rd - 7th Standard Rd | 2023 | - | 2015<br>2031 | - | 1.00% |
| Cerro Noroeste Rd: SR 166 - Klipstein Canyon Rd | - | - | - | - | 1.00% |
| China Grade Loop: Round Mountain Rd - Alfred Harrel Hwy | - | 2015 | - | 2022 | 1.00% |
| Coffee Rd: Snow Rd - 7th Standard Rd | 2022 | 2027<br>2032 | 2015 | - | 1.00% |
| Coffee Rd: Truxtun Ave - Brimhall Rd | - | 2015 | 2018 | 2027 | 1.00% |
| Coffee Rd: SR 58 (Rosedale Hwy) - Hageman Rd | 2027 | 2015<br>2032 | 2020 | - | 1.00% |
| Coffee Rd: Olive Dr. - Norris Rd | 2015<br>2022 | 2030 | - | - | 1.00% |
| Coffee Rd: Hageman Rd - Olive Dr. | - | 2016<br>2029 | 2022<br>2034 | - | 1.00% |
| Coffee Rd: Norris Rd - Snow Rd | 2027 | 2015 | 2019<br>2035 | - | 1.00% |
| Coffee Rd: Brimhall Rd - SR 58 (Rosedale Hwy) | - | 2015 | - | 2022 | 1.00% |
| Coffee Rd: Stockdale Hwy - Truxtun Ave | 2023 | 2029<br>2034 | 2015 | - | 1.00% |
| Coles Levee Rd: Pieri Rd - Bear Mountain Blvd | - | - | 2018 | 2034 | 1.00% |

**Table 4.16-17: Pavement Impacts and Mitigation**

| Roadway Segment [1] | Pavement Condition Improvement Recommendation by Year Needed | | | | Project % Share |
|---|---|---|---|---|---|
| | Preventative, Maintenance | Corrective Maintenance | Major Rehabilitation | Roadway Reconstruction | |
| Coles Levee Rd: Bear Mountain Blvd - Union Rd | 2015 | - | - | - | 1.00% |
| Comanche Dr: Edison Hwy - Breckenridge Rd | 2018<br>2023 | 2030 | - | - | 1.00% |
| Comanche Dr: SR 223 (Bear Mtn Blvd) - DiGiorgio Rd | 2016 | - | - | 2022 | 1.00% |
| Comanche Dr: SR 58 - Edison Hwy | 2016 | - | - | - | 1.00% |
| Comanche Dr: DiGiorgio Rd - Panama Rd | 2016 | - | - | 2022 | 1.00% |
| Comanche Dr: Breckenridge Rd - SR 178 | 2018 | - | - | 2027 | 1.00% |
| Copus Rd: Basic School Rd - Old River Rd | - | - | 2015 | 2027 | 1.00% |
| Copus Rd: Old River Rd - SR 99 | - | 2032 | - | 2015 | 1.00% |
| Dairy Rd: Adohr Rd - Stockdale Hwy | - | - | - | - | 1.00% |
| David Rd: SR 99 - S Wheeler Ridge Rd | - | 2015 | - | 2023 | 1.00% |
| Enos Ln: Union Rd - SR 119 (Taft Hwy) | 2027 | 2015 | 2022<br>2032 | - | 1.00% |
| Fairfax Rd: Paladino Dr. - Alfred Harrell Hwy | - | 2025<br>2030 | 2017 | - | 1.00% |
| Fairfax Rd: SR 178 - Auburn St | - | 2016 | - | 2022 | 1.00% |
| Fairfax Rd: Panorama Dr. - Paladino Dr. | - | 2015 | - | 2022 | 1.00% |
| Fairfax Rd: Auburn St - Panorama Dr. | 2015 | - | 2025 | - | 1.00% |
| Famoso Rd: Driver Rd - SR 65 | - | 2018 | - | - | 1.00% |
| Famoso Rd: SR 46 - Driver Rd | 2015<br>2022<br>2029 | - | - | - | 1.00% |
| Franco Western Rd: Reward Rd - West Side Hwy | - | - | 2016 | 2027 | 39.64% |
| Freeborn Rd: Adohr Rd - Stockdale Hwy | 2023 | - | 2016 | - | 1.00% |
| SR 155 (Garces Hwy): Corcoran Rd - SR 43 | 2030 | - | - | - | 1.00% |
| SR 155 (Garces Hwy): SR 43 - SR 99 | - | 2015 | - | 2022 | 1.00% |

**Table 4.16-17: Pavement Impacts and Mitigation**

| Roadway Segment [1] | Pavement Condition Improvement Recommendation by Year Needed | | | | Project % Share |
|---|---|---|---|---|---|
| | Preventative, Maintenance | Corrective Maintenance | Major Rehabilitation | Roadway Reconstruction | |
| Gardner Field Rd: Cadet Rd - Basic School Rd | - | - | 2016 | 2027 | 1.00% |
| Gardner Field Rd: S Lake Rd - Cadet Rd | 2023 | - | 2016 | 2034 | 1.00% |
| Gardner Field Rd: SR 119 - S Lake Rd | - | - | 2017 | 2029 | 1.00% |
| Gosford Rd: SR 119 (Taft Hwy) - McCutchen Rd | - | - | - | 2015 | 1.00% |
| Gosford Rd: N Laurelglen Blvd - Ming Ave | - | - | - | 2015 | 1.00% |
| Gosford Rd: S Laurelglen Blvd - N Laurelglen Blvd | - | - | - | 2015 | 1.00% |
| Gosford Rd: Panama Ln - Pacheco Rd | - | 2034 | - | 2015 | 1.00% |
| Gosford Rd: McCutchen Rd - Panama Ln | 2022 | 2027<br>2032 | 2015 | - | 1.00% |
| Gosford Rd: White Ln - S Laurelglen Blvd | 2034 | - | - | 2015 | 1.00% |
| Gosford Rd: SR 223 (Bear Mtn Blvd) - SR 119 (Taft Hwy) | 2025<br>2030 | - | 2017 | - | 1.00% |
| Gosford Rd: Ming Ave - Stockdale Hwy | - | 2034 | - | 2015 | 1.00% |
| Gosford Rd: Pacheco Rd - White Ln | - | 2032 | - | 2015 | 1.00% |
| Granite Rd: Famoso Rd - Pine Mountain Rd | - | - | - | 2027 | 1.00% |
| Hazelton St: SR 166 - Western Minerals Rd | 2015<br>2025<br>2034 | - | - | - | 45.49% |
| Herring Rd: Old River Rd - SR 99 | 2018 | - | - | - | 1.00% |
| Hill Rd: S Lake Rd` - Millux Rd | - | 2015 | - | 2025 | 1.00% |
| Hill Rd: Millux Rd - Pieri Rd | 2023 | - | 2015<br>2032 | - | 1.00% |
| Interstate 5: SR 166 (Maricopa Hwy) - Old River Rd | 2025<br>2030 | 2035 | - | - | 1.00% |
| Interstate 5: Old River Rd - SR 223 (Bear Mtn Blvd) | 2017<br>2030 | 2025<br>2035 | - | - | 1.00% |
| Interstate 5: SR 46 - County Line Rd | 2017<br>2022<br>2027 | 2032 | - | - | 1.00% |

**Table 4.16-17: Pavement Impacts and Mitigation**

| Roadway Segment [1] | Pavement Condition Improvement Recommendation by Year Needed | | | | Project % Share |
|---|---|---|---|---|---|
| | Preventative, Maintenance | Corrective Maintenance | Major Rehabilitation | Roadway Reconstruction | |
| Interstate 5: Grapevine Rd - S Wheeler Ridge Rd | - | 2035 | 2017 | - | 1.00% |
| Interstate 5: SR 99 - SR 166 (Maricopa Hwy) | 2019<br>2025<br>2030 | 2035 | - | - | 1.00% |
| James Rd: Granite Rd - Petrol Rd | 2022 | - | 2015<br>2030 | - | 1.00% |
| James Rd: Petrol Rd - N Chester Ave | 2022 | - | 2015<br>2030 | - | 1.00% |
| Kecks Rd: SR 46 - Barker Rd | 2018 | - | - | - | 1.00% |
| Kimberlina Rd: Bell Rd - SR 43 | 2025 | 2015 | 2018<br>2033 | - | 1.00% |
| Kimberlina Rd: SR 43 - Shafter Ave | 2022 | 2027<br>2032 | 2015 | - | 1.00% |
| Klipstein Canyon Rd: Cerro Noroeste Rd - SR 166 | - | - | - | - | 1.00% |
| Lost Hills Rd: SR 33 - 7th Standard Rd | 2025 | 2015 | 2019<br>2032 | - | 46.91% |
| Lost Hills Rd: Twisselman Rd - County Line Rd | - | 2019 | - | - | 1.00% |
| Lost Hills Rd: West Side Hwy - Lokern Rd | - | - | - | 2018 | 45.50% |
| Lost Hills Rd: SR 46 - Twisselman Rd | - | - | - | - | 1.00% |
| Magnolia Ave: 7th Standard - Burbank St | 2015<br>2023<br>2030 | - | - | - | 1.00% |
| Magnolia Ave: Burbank St - SR 46 | - | - | - | - | 1.00% |
| Main Drain Rd: W Lerdo Hwy - Interstate 5 | - | - | - | - | 1.00% |
| Main Drain Rd: 7th Standard Rd - Lerdo Hwy | 2027 | - | - | - | 1.00% |
| Main Drain Rd: Interstate 5 - SR 46 | - | - | - | - | 1.00% |
| Millux Rd: Hill Rd - Interstate 5 | - | - | 2017<br>2025 | - | 1.00% |
| Millux Rd: Interstate 5 - Old River Rd | - | 2025 | - | - | 1.00% |
| Morning Dr: Niles St - College Ave | 2027 | - | - | - | 1.00% |

**Table 4.16-17: Pavement Impacts and Mitigation**

| Roadway Segment [1] | Pavement Condition Improvement Recommendation by Year Needed | | | | Project % Share |
|---|---|---|---|---|---|
| | Preventative, Maintenance | Corrective Maintenance | Major Rehabilitation | Roadway Reconstruction | |
| Morning Dr: College Ave - Highland Knolls Dr. | - | 2018 | - | - | 1.00% |
| Morning Dr: Highland Knolls Dr. - SR 178 | - | - | - | - | 1.00% |
| N Chester Ave Ext: Manor St - Granite Rd | 2034 | - | - | 2015 | 1.00% |
| N Chester Ave: China Grade Loop - Merle Haggard Dr. | 2032 | - | - | 2015 | 1.00% |
| Old River Rd: Harris Rd - Campus Park Dr. | - | 2015 | - | 2022 | 1.00% |
| Old River Rd: Panama Ln - Harris Rd | - | 2027<br>2032 | - | - | 1.00% |
| Old River Rd: SR 119 (Taft Hwy) - McCutchen Rd | - | 2022<br>2027 | 2015<br>2032 | - | 1.00% |
| Old River Rd: White Ln - Ming Ave | 2015 | 2023<br>2030 | - | - | 1.00% |
| Old River Rd: McCutchen Rd - Panama Ln | - | 2025 | 2018<br>2030 | - | 1.00% |
| Old River Rd: Ming Ave - Stockdale Hwy | 2027 | 2015<br>2032 | 2020 | - | 1.00% |
| Old River Rd: Campus Park Dr. - White Ln | - | 2027<br>2032 | - | - | 1.00% |
| Panama Ln: Akers Rd - Wible Rd | - | 2027<br>2032 | - | - | 1.00% |
| Panama Ln: Ashe Rd - Stine Rd | - | 2015 | - | 2022 | 1.00% |
| Panama Ln: Cottonwood Rd - Fairfax Rd | - | 2015 | 2019<br>2027 | - | 1.00% |
| Panama Ln: Fairfax Rd - SR 184 (Weedpatch Hwy) | 2023 | - | 2018<br>2029 | - | 1.00% |
| Panama Ln: Gosford Rd - Ashe Rd | 2016<br>2030 | - | - | - | 1.00% |
| Panama Ln: S H St - S Union Ave | 2015<br>2025<br>2034 | - | - | - | 1.00% |
| Panama Ln: S Union Ave - Cottonwood Rd | 2027<br>2032 | 2015 | 2019 | - | 1.00% |
| Panama Ln: SR 99 - S H St | - | 2016<br>2029 | 2022<br>2034 | - | 1.00% |

**Table 4.16-17: Pavement Impacts and Mitigation**

| Roadway Segment [1] | Pavement Condition Improvement Recommendation by Year Needed | | | | Project % Share |
|---|---|---|---|---|---|
| | Preventative, Maintenance | Corrective Maintenance | Major Rehabilitation | Roadway Reconstruction | |
| Panama Ln: Stine Rd - Akers Rd | - | 2016 | - | 2022 | 1.00% |
| Panama Ln: Wible Rd - SR 99 | 2027 | 2015<br>2032 | 2020 | - | 1.00% |
| Panama Rd: Comanche Dr. - Tejon Hwy | 2025 | 2015 | 2019<br>2032 | - | 1.00% |
| Panama Rd: Tejon Hwy - Tower Line Rd | - | - | 2016 | 2027 | 1.00% |
| Pieri Rd: Coles Levee Rd - Hill Rd | 2025 | - | 2018<br>2033 | - | 1.00% |
| Real Rd: SR 58 - Stockdale Hwy | 2015<br>2027 | 2022 | 2034 | - | 1.00% |
| Reward Loop: Reward Rd - Reward Rd | - | - | - | 2018 | 1.00% |
| Reward Rd: SR 58 - Franco Western Rd | - | 2025 | 2016<br>2034 | - | 1.00% |
| Rowlee Rd: Lerdo Hwy - SR 46 | - | 2018<br>2023 | 2030 | - | 1.00% |
| S 10th St: Wood St - A St | 2019 | 2029 | - | - | 1.00% |
| S Lake Rd: Gardner Field Rd - Hill Rd | 2025 | 2015 | 2019<br>2032 | - | 1.00% |
| Santa Fe Way: Kratzmeyer Rd - 7th Standard Rd | 2022<br>2030 | - | - | - | 1.00% |
| Santa Fe Way: Allen Rd - Hageman Rd | 2016<br>2025 | - | - | - | 1.00% |
| Santa Fe Way: Renfro Rd - Kratzmeyer Rd | 2019 | - | 2029 | - | 1.00% |
| Santa Fe Way: Hageman Rd - Renfro Rd | 2016<br>2023<br>2029 | - | - | - | 1.00% |
| Shafter Rd: Lerdo Hwy - SR 43 | 2018 | - | 2029 | - | 1.00% |
| SR 155 (Garces Hwy): Browning Rd - Zachary Ave | 2026 | - | - | - | 1.00% |
| SR 155 (Garces Hwy): Famoso Porterville Hwy - Quinn Rd | - | - | - | - | 1.00% |
| SR 155 (Garces Hwy): Quinn Rd - SR 65 | - | - | - | - | 1.00% |
| SR 155 (Garces Hwy): SR 99 - Browning Rd | 2015 | - | 2021 | - | 1.00% |

**Table 4.16-17: Pavement Impacts and Mitigation**

| Roadway Segment [1] | Pavement Condition Improvement Recommendation by Year Needed | | | | Project % Share |
|---|---|---|---|---|---|
| | Preventative, Maintenance | Corrective Maintenance | Major Rehabilitation | Roadway Reconstruction | |
| SR 155 (Garces Hwy): Zachary Ave - Famoso Porterville Hwy | 2026 | - | - | - | 1.00% |
| SR 178 (24th St): Bay St - 24th St Frontage Rd | 2017<br>2022<br>2027 | 2032 | - | - | 1.00% |
| SR 178 (24th St): SR 99 - Bay St | - | 2015 | 2020 | - | 1.00% |
| SR 178 (Kern Canyon Rd): Comanche Dr. - Miramonte Dr. | 2019 | - | - | - | 1.00% |
| SR 178 (Kern Canyon Rd): Miramonte Dr. - Rancheria Rd | - | - | - | - | 1.00% |
| SR 178 (Kern Canyon Rd): Rancheria Rd - Kern Canyon Ent | - | - | - | - | 1.00% |
| SR 178 (Kern Canyon Rd): SR 184 (Kern Canyon Rd) - Comanche Dr. | 2021<br>2032 | - | - | - | 1.00% |
| SR 178: 24th St Frontage Rd - Union Ave | - | 2015<br>2020<br>2025 | 2032 | - | 1.00% |
| SR 178: Fairfax Rd - Morning Dr. | 2017<br>2026<br>2032 | - | - | - | 1.00% |
| SR 178: Morning Dr. - Vineland Rd | 2017<br>2026<br>2032 | - | - | - | 1.00% |
| SR 178: Mt Vernon Ave - Oswell St | 2017<br>2022 | - | 2032 | - | 1.00% |
| SR 178: Oswell St - Fairfax Rd | 2019<br>2024<br>2029 | - | 2035 | - | 1.00% |
| SR 178: Union Ave - Mt Vernon Ave | 2017 | - | 2024 | - | 1.00% |
| SR 178: Vineland Rd - SR 184 (Kern Canyon Rd) | 2021<br>2030 | - | - | - | 1.00% |
| SR 184 (Kern Canyon Rd): SR 178 - Vineland Rd | - | - | 2019 | - | 1.00% |
| SR 184 (Kern Canyon Rd): Vineland Rd - Watergrass Rd | - | - | 2017 | - | 1.00% |
| SR 184 (Kern Canyon Rd): Watergrass Rd - Niles St | - | - | 2017 | - | 1.00% |
| SR 184 (Morning Dr): Edison Hwy - Breckenridge Rd | - | - | 2017 | - | 1.00% |

**Table 4.16-17: Pavement Impacts and Mitigation**

| Roadway Segment [1] | Pavement Condition Improvement Recommendation by Year Needed | | | | Project % Share |
|---|---|---|---|---|---|
| | Preventative, Maintenance | Corrective Maintenance | Major Rehabilitation | Roadway Reconstruction | |
| SR 184 (Morning Dr): Pioneer Dr. - Niles St | - | - | 2019 | - | 1.00% |
| SR 184 (Morning Dr): Breckenridge Rd - Pioneer Dr. | - | - | 2019 | - | 1.00% |
| SR 184 (Weedpatch Hwy): SR 58 - Brundage Ln | - | - | 2019 | - | 1.00% |
| SR 184 (Weedpatch Hwy): Sunset Blvd - Di Giorgio Rd | - | - | 2019 | - | 1.00% |
| SR 184 (Weedpatch Hwy): Brundage Ln - Edison Hwy | - | - | 2019 | - | 1.00% |
| SR 184 (Weedpatch Hwy): Panama Rd - Mountain View Rd | - | - | 2019 | - | 1.00% |
| SR 184 (Weedpatch Hwy): Panama Ln - Muller Rd | - | - | 2019 | - | 1.00% |
| SR 184 (Weedpatch Hwy): Mountain View Rd - Panama Ln | - | - | 2017 | - | 1.00% |
| SR 184 (Weedpatch Hwy): Di Giorgio Rd - Panama Rd | - | - | 2019 | - | 1.00% |
| SR 184 (Weedpatch Hwy): Muller Rd - SR 58 | - | - | 2019 | - | 1.00% |
| SR 184 (Weedpatch Hwy): SR 223 (Bear Mtn Blvd) - Sunset Blvd | 2026 | - | - | - | 1.00% |
| SR 204 (Golden State Ave): Union Ave - SR 178 | 2017<br>2024<br>2031 | - | - | - | 1.00% |
| SR 204 (Golden State Ave): SR 178 - SR 99 | - | 2015 | 2020 | - | 1.00% |
| SR 204 (Union Ave): SR 58 - Union Ave | - | - | - | 2015 | 1.00% |
| SR 223 (Bear Mtn Blvd): A St - Tejon Hwy | 2019<br>2025<br>2031 | - | - | - | 1.00% |
| SR 223 (Bear Mtn Blvd): Ashe Rd - S H St | 2017 | 2033 | - | - | 1.00% |
| SR 223 (Bear Mtn Blvd): Comanche Dr. - A St | 2017 | - | 2026 | - | 1.00% |
| SR 223 (Bear Mtn Blvd): Costajo Rd - SR 99 NB Ramps | - | - | 2019 | - | 1.00% |

**Table 4.16-17: Pavement Impacts and Mitigation**

| Roadway Segment [1] | Pavement Condition Improvement Recommendation by Year Needed | | | | Project % Share |
|---|---|---|---|---|---|
| | Preventative, Maintenance | Corrective Maintenance | Major Rehabilitation | Roadway Reconstruction | |
| SR 223 (Bear Mtn Blvd): General Beale Rd - SR 58 | 2019 | - | - | - | 1.00% |
| SR 223 (Bear Mtn Blvd): Gosford Rd - Ashe Rd | - | - | 2019 | - | 1.00% |
| SR 223 (Bear Mtn Blvd): Interstate 5 - Gosford Rd | 2019 | - | - | - | 1.00% |
| SR 223 (Bear Mtn Blvd): S H St - Costajo Rd | - | - | - | - | 1.00% |
| SR 223 (Bear Mtn Blvd): S Union Av - SR 184 (Weedpatch Hwy) | 2017<br>2026 | 2035 | - | - | 1.00% |
| SR 223 (Bear Mtn Blvd): SR 184 (Weedpatch Hwy) - Comanche Dr. | 2026<br>2033 | 2019 | - | - | 1.00% |
| SR 223 (Bear Mtn Blvd): SR 99 NB Ramps - S Union Av | 2015<br>2024<br>2032 | - | - | - | 1.00% |
| SR 223 (Bear Mtn Blvd): Tejon Hwy - Tower Line Rd | 2026 | - | - | - | 1.00% |
| SR 223 (Bear Mtn Blvd): Tower Line Rd - General Beale Rd | 2019 | - | - | - | 1.00% |
| SR 33 (SR 166): Stubblefield Rd - SR 166 | 2026<br>2033 | 2019 | - | - | 1.00% |
| SR 33: Twisselman Rd - SR 41 | 2026 | - | - | - | 1.00% |
| SR 33: SR 46 - Twisselman Rd | 2026 | - | - | - | 1.00% |
| SR 43 (Beech Ave): Orange Ave - Los Angeles Ave | - | 2019<br>2033 | - | - | 1.00% |
| SR 43 (Beech Ave): Imperial St - Orange Ave | 2026 | - | - | - | 1.00% |
| SR 43 (Central Valley Hwy): Garces Hwy - County Line Rd | 2017 | - | - | - | 1.00% |
| SR 43 (Central Valley Hwy): McCombs Rd - Garces Hwy | 2019<br>2026<br>2033 | - | - | - | 1.00% |
| SR 43 (Enos Ln): 7th Standard Rd - Imperial St | - | 2019<br>2033 | - | - | 1.00% |
| SR 46: Kecks Rd - Bitterwater Valley Rd | 2026 | - | - | - | 1.00% |
| SR 46: SR 41 - Kecks Rd | 2026 | - | - | - | 1.00% |

**Table 4.16-17: Pavement Impacts and Mitigation**

| Roadway Segment [1] | Pavement Condition Improvement Recommendation by Year Needed | | | | Project % Share |
|---|---|---|---|---|---|
| | Preventative, Maintenance | Corrective Maintenance | Major Rehabilitation | Roadway Reconstruction | |
| SR 58 (Rosedale Hwy): Coffee Rd - Patton Wy | - | - | 2019 | - | 1.00% |
| SR 58 (Rosedale Hwy): Patton Way - Mohawk St | 2015 | - | 2018 | - | 1.00% |
| SR 58: 7 Mile Rd - SR 33 | - | - | 2024 | - | 1.00% |
| SR 58: Comanche Dr. - SR 223 (Bear Mtn Blvd) | 2019<br>2026<br>2032 | - | - | - | 1.00% |
| SR 58: Cottonwood Rd - Mt Vernon Ave | 2017 | - | 2026 | - | 1.00% |
| SR 58: Real Rd - SR 99 | - | - | 2015 | - | 1.00% |
| SR 58: SR 99 - Union Ave | 2015 | - | 2020 | - | 1.00% |
| SR 58: Union Ave - Cottonwood Rd | 2015 | 2030<br>2035 | - | - | 1.00% |
| SR 65 (Porterville Hwy): SR 155 (Garces Hwy) - County Line Ave | 2019<br>2032 | 2026 | - | - | 1.00% |
| SR 65 (Porterville Hwy): Famoso Rd - SR 155 (Garces Hwy) | 2019<br>2024<br>2029 | - | - | - | 1.00% |
| SR 99: Olive Dr. - 7th Standard Rd | 2026<br>2032 | - | - | - | 1.00% |
| SR 99: Garces Hwy - County Line Rd | 2017<br>2026<br>2035 | - | - | - | 1.00% |
| SR 99: SR 46 - Garces Hwy | 2017<br>2026<br>2035 | - | - | - | 1.00% |
| SR 99: SR 178 - Olive Dr. | 2017 | - | 2026 | - | 1.00% |
| SR 99: SR 119 (Taft Hwy) - Panama Ln | 2017<br>2025<br>2032 | - | - | - | 1.00% |
| SR 99: SR 58 East - SR 178 | - | 2017<br>2022 | 2029 | - | 1.00% |
| SR 99: Panama Ln - SR 58 East | - | 2017<br>2022 | 2029 | - | 1.00% |
| Stockdale Hwy: Ashe Rd - New Stine Rd | 2016 | - | - | 2022 | 1.00% |

**Table 4.16-17: Pavement Impacts and Mitigation**

| Roadway Segment [1] | Pavement Condition Improvement Recommendation by Year Needed | | | | Project % Share |
|---|---|---|---|---|---|
| | Preventative, Maintenance | Corrective Maintenance | Major Rehabilitation | Roadway Reconstruction | |
| Stockdale Hwy: Coffee Rd - El Rio Dr. | 2016 | 2027 | 2020<br>2032 | - | 1.00% |
| Stockdale Hwy: El Rio Dr. - Ashe Rd | 2016 | - | - | 2022 | 1.00% |
| Stockdale Hwy: New Stine Rd - Stine Rd | - | 2018<br>2023 | - | 2029 | 1.00% |
| Stockdale Hwy: Stine Rd - Real Rd | 2016 | - | - | 2022 | 1.00% |
| Tracy Ave: Willow Dr. - 7th Standard Rd | 2030 | - | - | - | 1.00% |
| Tracy Ave: SR 58 – I 5 NB Ramps | 2034 | 2025 | - | - | 1.00% |
| Tracy Ave: I 5 NB Ramps - Willow Dr. | 2030 | - | - | - | 1.00% |
| Tupman Rd: N Access Rd - Adohr Rd | 2015 | - | 2035 | - | 1.00% |
| Twisselman Rd: Barker Rd - Holloway Rd | - | 2015 | - | 2023 | 1.00% |
| 23rd St: Bay St - 24th St Frontage Rd | 2015 | - | 2019 | - | 1.00% |
| 7th Standard Rd: Lost Hills Rd - Main Drain Rd | 2019<br>2027 | - | - | - | 1.00% |
| 7th Standard Rd: Main Drain Rd - Buttonwillow Dr. | 2019<br>2027 | - | - | - | 1.00% |
| Twisselman Rd: Holloway Rd - Interstate 5 | 2018 | - | 2029 | - | 1.00% |
| Twisselman Rd: Interstate 5 - Lost Hill Rd | 2018 | - | - | - | 1.00% |
| Union Rd: Enos Ln - Coles Levee Rd | - | 2025 | 2018<br>2031 | - | 1.00% |
| Wasco Wy: Brite Rd - SR 58 | - | 2025<br>2030 | 2018 | - | 23.55% |
| Western Minerals Rd: Hazelton St - Klipstein Rd | 2015<br>2025<br>2034 | - | - | - | 45.49% |
| Wheeler Ridge Rd: Del Sol Dr. - David Rd | - | - | - | 2015 | 1.00% |
| Wheeler Ridge Rd: David Rd - SR 223 | - | 2023 | 2015<br>2029 | - | 1.00% |
| Wood St: S 10th St - Olive Ave | - | 2025<br>2030 | 2018 | - | 1.00% |
| Zerker Rd: 7th Standard Rd - Lerdo Hwy | 2029<br>2034 | 2015 | 2021 | - | 1.00% |

**Table 4.16-17: Pavement Impacts and Mitigation**

| Roadway Segment [1] | Pavement Condition Improvement Recommendation by Year Needed | | | | Project % Share |
|---|---|---|---|---|---|
| | Preventative, Maintenance | Corrective Maintenance | Major Rehabilitation | Roadway Reconstruction | |

Source: Appendix W
Key:
SR = State Route

As described, Project-related impacts could conflict with applicable plans and ordinance relations to the performance of the circulation system. As a result, there could be significant impacts. Implementation of MM 4.16-1 would require application to pay a roadway maintenance fee to address wear and tear of roads due to oil and gas industry traffic. Implementation of this mitigation measures, described below, would reduce impacts to below a level of significance. Implementation of a Traffic Control Plan as described in MM 4.16-2 would ensure that the level of congestion would be reduced so that the impact would be below a level of significance

## Mitigation Measures

**MM 4.16-1** The Applicant shall pay a road maintenance mitigation fee of $1,500 per permit for new wells to pay for roadway maintenance and related improvements to address wear and tear on roads caused by oil and gas industry traffic. The Roads department shall annually report on the expenditure of funds from the Oil and Gas Roadway Maintenance Fee. Expenditures from the fund shall be as determined by the Roads Commissioner, using as a reference the list of roadways identified in the Environmental Impact Report as being used for traffic by the oil and gas industry. If Kern County secures funding from a sales tax dedicated to transportation funding, then the amount of the traffic mitigation fee shall be re-evaluated at the time the County becomes a self-help county.

**MM 4.16-2** Applicants who are using an arterial or collector, or Caltrans route, for access to a construction site, shall consult with the Kern County Public Works Department – Roads Division to determine if a Construction Traffic Control Plan is required based on the timing and volume of larger vehicle rigs and the volume of traffic to address public safety and congestion management. If a Plan is required, the Applicant shall prepare and submit a Construction Traffic Control Plan to the Kern County Roads Department and to the California Department of Transportation (District 9 office) for approval. The Construction Traffic Control Plan must be prepared in accordance with both the California Department of Transportation Manual on Uniform Traffic Control Devices and Work Area Traffic Control Handbook and shall include, but not be limited to, the following issues:

a. Timing of deliveries of heavy equipment and building materials.

b. Placing temporary signing, lighting, and traffic control devices as necessary to indicate the presence of heavy vehicles and construction traffic.

c. Determining the need for construction work hours and arrival/departure times outside peak traffic periods.

d. Ensuring access for emergency vehicles to the Project site.

e. Any temporary closure of travel lanes or disruptions to street segments and intersections during well development.

f. Maintaining access to adjacent property.

### Level of Significance After Mitigation

Impacts would be less than significant with mitigation.

## Impact 4.16-2: Conflict with an Applicable Congestion Management Program, Including, but not limited to LOS Standards and Travel Demand Measures, or Other Standards Established by the County Congestion Management Agency for Designated Roads or Highways, as Follows: Metropolitan Bakersfield General Plan LOS C; Kern County General Plan LOS D; and Caltrans Endeavors to Maintain a Target LOS at the Transition between LOS C and LOS D.

The Circulation Element of the KCGP states that the design LOS for Kern County is LOS C. The minimum LOS for conformance with the KCGP is LOS D. The Kern COG CMP has established LOS E as the minimum system-wide LOS traffic standard for CMP corridors (Table 4.16-10). With the addition of Project-related construction traffic, under the future condition (Year 2035 NOG + Project), a number of CMP corridors would operate at LOS E or below. However, these roadways would also operate below acceptable LOS even without Project-related traffic (Year 2035 NOG). Therefore, operation of these corridors below acceptable LOS is not considered an impact of the Project; however because the LOS of these corridors is impaired, implementation of MM 4.16-2 would reduce Project impacts to existing levels that would represent a less than significant impact.

### Mitigation Measures

Implement MM 4.16-2, as described above.

### Level of Significance After Mitigation

Impacts would be less than significant with mitigation.

## Impact 4.16-3: Result in a Change in Air Traffic Patterns, Including Either an Increase in Traffic Levels or a Change in Location that Results in Substantial Safety Risks

Because the Project is not expected to include structures exceeding 500 feet in height, it would comply with Kern County Zoning Ordinance 19.08.160 and Section 3.3.1 of the Kern County ALUCP. If an applicant would require a vertical structure more than 200 feet in height (e.g., transmission line poles, vertical pump jack), the applicant would be required to comply with FAA Advisory Circular 70/7460-1, Obstruction Lighting/Marking requirements. The applicant would file Form 7460-1, Notification of Proposed Construction or Alteration, with the FAA for each structure. Airport-related mitigation measures, described in Section 4.8, Hazards and Hazardous Materials, require an applicant to submit FAA Form 7460-1 requesting that the FAA issue a Determination of No Hazard to Air Navigation, when required. If the FAA determines that the structure would result in a potential obstruction unless reduced to a specified height, the applicant would be required to work with the FAA to resolve any adverse effects on aeronautical operations.

Numerous public, military, and private airports are located within the Project Area. Section 4.8, Hazards and Hazardous Materials includes mitigation measures, which require applicants to comply with the applicable airport land use compatibility plan if their operations would be located within an airport area of influence.

Implementation of these mitigation measures would ensure that the Project is consistent with Section 3.3.4 of the Kern County ALUCP. The mitigation measures would also ensure that the Project would not impact operations of aircraft using Kern County airspace, and that all required Project components shall have lighting and markings required by the FAA so as not to create a hazard to air navigation

### Mitigation Measures

Implement airport-related mitigation measures as described in Section 4.8, Hazards and Hazardous Materials.

### Level of Significance After Mitigation

Impacts would be less than significant with mitigation.

## Impact 4.16-4: Substantially Increase Hazards due to a Design Feature (e.g., Sharp Curves or Dangerous Intersections) or Incompatible Uses (e.g., Farm Equipment)

Well development (which includes well stimulation activities), would continue to require the delivery of heavy construction equipment using area roadways. The use of oversized vehicles during construction can create a hazard to the public by limiting motorist views on roadways and by the obstruction of space and, therefore, could have a significant impact. A description of the need for California Highway Patrol escorts, as well as the number needed, and the timing of

transport, is required to be detailed in respective oversized load permits. The Traffic Study (Appendix W) prepared for this project assumed that 10% of all oil and gas-related traffic would be heavy trucks. Of this total, 35% would be two-axle trucks, 10% would be three-axle trucks, 25% would be four-axle trucks, and, 30% would be five-or-more-axle trucks.

The Traffic Study reviewed roadway accident history data obtained from the County and state. Potential areas of concern regarding accidents were also discussed with Kern County Roads Department staff. In general, there were no specific findings indicating increased accident rates on Project Area roadways related to oil and gas activity. Historically, the County has addressed various safety and operational issues that have arisen periodically over the years due to changes in roadway activity along oil and gas routes.

The introduction of construction-related traffic would have the potential to increase accident rates and could result in significant impacts; however, with the implementation of MM 4.16-1, , as listed above, would also require this information be provided in the Construction Traffic Control Plan for Kern County approval and would reduce potential impacts to less than significant

### Mitigation Measures

Implement MM 4.16-2, as described above.

### Level of Significance After Mitigation

Impacts would be less than significant with mitigation.

## Impact 4.16-5: Result in Inadequate Emergency Access

As described above, increased Project-related traffic could cause a significant increase in congestion or affect the existing and future LOS on roads, which could indirectly affect emergency access. While the Project is not expected to require closures of public roads, which could inhibit access by emergency vehicles, during well development, heavy construction-related traffic could interfere with emergency response or emergency evacuation procedures in the event of an emergency, such as a wildfire or a chemical spill. Heavy construction-related traffic could also interfere with emergency response to other NOG-related uses in the vicinity and, therefore, could represent a significant impact

To ensure emergency access during construction, MM 4.16-2 requires the preparation of a Construction Traffic Control Plan and includes assurance of access for emergency vehicles.

### Mitigation Measures

Implement MM 4.16-2, as described above.

### Level of Significance After Mitigation

Impacts would be less than significant with mitigation.

### Impact 4.16-6: Conflict with Adopted Policies, Plans, or Programs Regarding Public Transit, Bicycle, or Pedestrian Facilities, or Otherwise Decrease the Performance or Safety of Such Facilities

Kern County operates KRT, which operates daily bus routes within the unincorporated communities of Buttonwillow, Lamont, Kern River Valley, Frazier Park, Rosamond, and Mojave. In western Kern County, bus routes connect Bakersfield to various cities including Delano, Wasco, Taft, Lebec, and Frazier Park (KRT 2014). KRT also provides inter-city service between Delano/McFarland/Wasco/Shafter/ Bakersfield, Lamont/Bakersfield, Lake Isabella/Bakersfield, Frazier Park/Bakersfield, California City/Mojave/Rosamond/Lancaster/Palmdale, Lost Hills/Bakersfield, and Taft/Bakersfield.

To ensure Project-related traffic would not impact roadways utilized by the KRT, MM 4.16-2 requires that a Construction Traffic Control Plan be prepared, These mitigation measures would ensure that Project-related traffic does not impact KRT operations.

#### Mitigation Measures

Implement MM 4.16-2, as described above.

#### Level of Significance After Mitigation

Impacts would be less than significant with mitigation.

## 4.16.5 Cumulative Setting, Impacts, and Mitigation Measures

## Cumulative Setting

The geographic scope for transportation and traffic cumulative impacts is Kern County as a whole. This geographic scope of analysis is appropriate for transportation and traffic due to the regional nature of transportation and traffic impacts that could occur within the entire Kern County transportation network.

This cumulative impact analysis utilizes the projection method due to the mostly rural nature of the Project Area, the large regional nature of the Project Area, and the uncertain timing of future projects. Based on information from the Traffic Study, Year 2035 volumes were developed utilizing growth rates obtained from the Kern COG traffic model. The Kern COG traffic model is a comprehensive analytic model used by the County to forecast traffic impacts as development occurs. The Kern COG model is based upon the General Plans of the County and cities within the County. When approval is given to projects that involve amendments to the General Plans, those General Plan amendments and projects are added to the Kern COG traffic model in order to ensure that the model accurately reflects land use changes. In this manner, the KCOG model is constantly updated to ensure that the baseline data contained accurately reflect the traffic volumes associated with growth trends in the region.

To assess traffic impacts in the Future Year 2035, two scenarios were evaluated that include the 2035 Growth Only (2035 NOG) and the 2035 NOG + O&G Projection.

### 2035 Growth Only (2035 NOG)

This scenario utilized existing traffic counts projected out to the Year 2035 at a growth rate included in the Kern COG traffic model. This scenario utilized a methodology that is typically used in traffic impact studies and, thus, provided typical future traffic volumes. However, because oil and gas activities may not necessarily grow at the same rate as NOG activities; the 2035 NOG + O&G Projection was also analyzed for comparison purposes (Appendix W).

### 2035 NOG + O&G Projection

This scenario utilized existing NOG traffic volumes projected out to the Year 2035, plus the addition of projected oil and gas traffic. The growth rates for projected oil and gas traffic were based on input provided by the Applicant and Kern County staff. Under this scenario, oil and gas and NOG traffic volumes were projected to grow at different rates, which provided an additional data set from which potential traffic impacts associated with the increase in oil and gas exploration and production activity were identified (Appendix W).

If an intersection or segment was forecasted to operate below the established LOS in Year 2035, a significant cumulative impact was identified.

# Project Impacts

## Impact 4.16.7: Cumulative Impacts on Transportation and Traffic

### Year 2035 Intersection Operations

The addition of Project-related traffic contributes to 34 of the 101 intersections that operate below acceptable LOS (LOS E or below for intersections located within the non-metropolitan region of Kern County and LOS D or below for intersections located within the Bakersfield and Kern County metropolitan areas and for Caltrans facilities, as stated in the Traffic Study) under Year 2035 conditions (Table 4.16-18). This impact would be significant. It should be noted, however, that, based on information provided in the Traffic Study, 31 of these intersections would also operate below acceptable LOS in the Year 2035 condition without the addition of Project-related traffic (Appendix W). Based on the conclusions of the Traffic Study, implementation of mitigation measure MM 4.16-2 would reduce the impact to below a level of significance.

**Table 4.16-18: Cumulative Intersection Impacts and Mitigation**

| No. | Intersections [1] | Level of Service Impacts | | Improvements Needed by 2035 | Project % Share |
|---|---|---|---|---|---|
| | | 2035 NOG[2] | 2035 NOG + Project | | |
| 7 | West Side Hwy (SR 33) & Paso Robles Hwy (SR 46) | X | X | 1 WBL | 21.8% |
| 8 | Lost Hills Rd & Paso Robles Hwy (SR 46) | - | X | 1 EBR, 1 WBL, 1 SBR, 1 NBR | 35.0% |
| 10 | SR 5 SB Off Ramp & Paso Robles Hwy (SR 46) | X | X | 1 WBT | 30.5% |
| 15 | West Side Hwy (SR 33) & Lerdo Hwy | X | X | Signal, 1 SBL | 39.1% |
| 16 | Lost Hills Rd & Lerdo Hwy | X | X | Signal, 1 EBL, 1 EBT, 1 WBL | 57.8% |
| 25 | West Side Hwy (SR 33) & Lost Hills Rd | X | X | 1 WBR | 37.3% |
| 28 | SR 5 SB Off Ramp & 7th Standard Rd | - | X | Signal | 20.2% |
| 105 | Magnolia Ave & Paso Robles Hwy (SR 46) | X | X | Signal, 1 EBL, 1 WBL, 1 NBL, 1 SBL | 14.2% |
| 107 | Central Valley Hwy (SR 43) & Paso Robles Hwy (SR 46) | X | X | Signal, 1 EBL 1 NBL, 1 SBL | 11.3% |
| 112 | Central Valley Hwy (SR 43) & Kimberlina Rd | X | X | 1 EBL, 1 WBL | 0.0% |
| 210 | Magnolia Ave & 7th Standard Rd | - | X | Signal, 1 EBT | 42.0% |
| 212 | Enos Ln (SR 43) & 7th Standard Rd | X | X | Signal, 1 EBL, 1 EBT, 1 WBL, 1 WBT, 1 NBL, 1 NBT, 1 SBT | 34.0% |
| 215 | West Side Hwy (SR 33) & Lokern Rd | X | X | Signal, 1 EBL, 1 WBL, 1 NBL, 1 SBL | 26.4% |
| 216 | Lokern Rd & McKittrick Hwy (SR 58) | X | X | Signal, 1 WBR | 41.0% |
| 220 | Enos Ln (SR 43) & McKittrick Hwy (58) | X | X | Signal, 1 NBL, 1 SBR, Stripe EB for Dedicated R-L | 35.2% |
| 225 | Enos Ln (SR 43) & Stockdale Hwy | X | X | Signal, 1 EBL, 1 WBL, 1 NBR, 1 SBL | 30.7% |
| 229 | McKittrick Hwy (SR 58) & West Side Hwy (SR 33) | X | X | Signal, 1 NBL, 1 NBT, 1 SBR, 1 SBT, Stripe EB for Dedicated R-L | 27.9% |
| 232 | Enos Ln (SR 43) & Panama Ln | X | X | Signal | 45.7% |
| 235 | Tupman Rd & Taft Hwy (SR 119) | X | X | Signal, 1 EBT, 1 EBR, 2 WBT, 1 WBR | 29.8% |
| 236 | Enos Ln (SR 43) & Taft Hwy (SR 119) | X | X | 1 EBL, 1 EBT, 1 EBR, 1 WBL, 1 WBT, 1 WBR, 1 NBR, 2 SBR | 26.1% |
| 237 | Elk Hills Rd & Taft Hwy (SR 119) | X | X | Signal, 1 EBT, 1 WBT | 26.9% |

**Table 4.16-18: Cumulative Intersection Impacts and Mitigation**

| No. | Intersections [1] | Level of Service Impacts | | Improvements Needed by 2035 | Project % Share |
|---|---|---|---|---|---|
| | | 2035 NOG[2] | 2035 NOG + Project | | |
| 243 | McKittrick Hwy (SR 58) & Reserve Rd | X | X | Signal | 18.5% |
| 244 | Enos Ln (SR 43) & Rosedale Hwy (SR 58) | X | X | Signal, 1 SBL, 1 SBR, 1 NBL, 1 NBR | 44.5% |
| 250 | Taft Hwy (SR 119) & Midway Rd | X | X | 1 NBT, 1 SBT | 19.4% |
| 251 | Golf Course Rd & Taft Hwy (SR 119) | X | X | Signal, 1 EBT, 2 WBT | 28.8% |
| 254 | Tracy Ave & McKittrick Hwy (SR 58) | X | X | Signal, 1 EBT | 4.2% |
| 307 | SR 65 & James Rd | X | X | 1 WBR | 6.1% |
| 318 | SR 99 SB Off Ramp & 7th Standard Rd | X | X | 1 SBL | 8.9% |
| 367 | Enos Ln (SR 43) & I-5 NB Off Ramp | X | X | 1 NBT, 1 NBL | 49.2% |
| 387 | I-5 NB On Ramp & Taft Hwy (SR 119) | X | X | Signal, 1 EBT | 15.1% |
| 393 | SR 99 SB Off Ramp & Taft Hwy (SR 119) | X | X | 1 EBR | 4.5% |
| 407 | Old River Rd & Bear Mountain Blvd (SR 223) | X | X | 1 WBL | 14.6% |
| 513 | Old River Rd & Copus Rd | X | X | 1 WBL | 27.2% |
| 1002 | SR 33 & Midway Rd | X | X | Signal | 20.6% |

Source: Appendix W
Notes:
(1) Includes intersections operating below LOS C. X denotes scenario during which substandard operations would occur.
(2) NOG = Non-oil and gas-related traffic; Project – oil and gas-related traffic.
Key:

EBL = Eastbound Left-Turn
EBR = Eastbound Right-Turn
EBT = Eastbound Through
NBL = Northbound Left-Turn
NBR = Northbound Right-Turn
NBT = Northbound Through
SBL = Southbound Left-Turn
SBR = Southbound Right-Turn
SBT = Southbound Through
SR = State Route
WBL = Westbound Left-Turn
WBR = Westbound Right-Turn
WBT = Westbound Through

## Year 2035 Roadway Operations

The addition of Project-related traffic contributes to 99 of the 462 roadway segments that operate below acceptable LOS (LOS E or below for roadways located within the non-metropolitan region of Kern County and LOS D or below for roadways located within the Bakersfield and Kern County metropolitan areas and for Caltrans facilities) under Year 2035 conditions (see Table 4.16-19) (Appendix W). This impact would be significant. However, based on information provided in the Traffic Study, all 99 of these roadway segments would also operate below acceptable LOS in the Year 2035 condition without the addition of Project-related traffic. This

significant impact would be reduced to below a level of significance with implementation of MM.4.16-1 and MM 4.16-2.

**Table 4.16-19: Cumulative Roadway Impacts and Mitigation**

| Roadway Segment [1] | No. of Lanes | Level of Service Impacts | | Roadway Improvement Required by 2035 [3] | Roadway Improvement Project % Share |
|---|---|---|---|---|---|
| | | 2035 NOG | 2035 NOG + Project [4] | | |
| 7th Standard Rd: Coffee Rd - Golden State Hwy | 4 | X | X | Add 2 lanes | 5.29% |
| Airport Dr: China Grade Loop - Merle Haggard Dr. | 2 | X | X | Add 2 lanes | 0.12% |
| Lerdo Hwy: SR 43 (Central Valley Hwy) - SR 99 | 2 | X | X | Add 2 lanes | 1.26% |
| Merle Haggard Dr: Beach Ave - Airport Dr. | 2 | X | X | Add 2 lanes | 18.43% |
| Merle Haggard Dr: Golden State Hwy - SR 99 | 4 | X | X | Add 2 lanes | 5.35% |
| Merle Haggard Dr: SR 65 (Porterville Hwy) - Beach Ave | 4 | X | X | Add 2 lanes | 10.22% |
| Merle Haggard Dr: SR 99 - SR 65 (Porterville Hwy) | 4 | X | X | Add 2 lanes | 10.45% |
| Midway Rd: SR 33 - SR 119 | 2 | X | X | Add 2 lanes | 7.35% |
| Santa Fe Way: 7th Standard Rd - Los Angeles St | 2 | X | X | Add 2 lanes | 1.28% |
| SR 119 (Taft Hwy): Akers Rd - Wible Rd | 2 | X | X | Add 2 lanes | 6.95% |
| SR 119 (Taft Hwy): Allen Rd Ext - Buena Vista Rd | 2 | X | X | Add 2 lanes | 8.45% |
| SR 119 (Taft Hwy): Ashe Rd - Stine Rd | 2 | X | X | Add 2 lanes | 6.95% |
| SR 119 (Taft Hwy): Buena Vista Rd - Old River Rd | 2 | X | X | Add 2 lanes | 8.25% |
| SR 119 (Taft Hwy): Elk Hills Rd - Tupman Rd | 2 | X | X | Add 2 lanes | 18.74% |
| SR 119 (Taft Hwy): Gosford Rd - Ashe Rd | 2 | X | X | Add 2 lanes | 6.95% |
| SR 119 (Taft Hwy): Greeley Rd Ext - Nord Rd Ext | 2 | X | X | Add 2 lanes | 8.45% |
| SR 119 (Taft Hwy): Heath Rd Ext - Renfro Rd Ext | 2 | X | X | Add 2 lanes | 8.45% |
| SR 119 (Taft Hwy): Interstate 5 - Greeley Rd Ext | 2 | X | X | Add 2 lanes | 8.45% |
| SR 119 (Taft Hwy): Nord Rd Ext - Heath Rd Ext | 2 | X | X | Add 2 lanes | 8.45% |
| SR 119 (Taft Hwy): Old River Rd - Gosford Rd | 2 | X | X | Add 2 lanes | 7.13% |
| SR 119 (Taft Hwy): Renfro Rd Ext - Allen Rd Ext | 2 | X | X | Add 2 lanes | 8.45% |
| SR 119 (Taft Hwy): SR 33 - Elk Hills Rd | 2 | X | X | Add 2 lanes | 12.78% |
| SR 119 (Taft Hwy): SR 43 (Enos Ln) - Interstate 5 | 2 | X | X | Add 2 lanes | 6.39% |
| SR 119 (Taft Hwy): Stine Rd - Akers Rd | 2 | X | X | Add 2 lanes | 6.95% |
| SR 119 (Taft Hwy): Tupman Rd - SR 43 (Enos Ln) | 2 | X | X | Add 3 lanes | 15.70% |
| SR 119 (Taft Hwy): Wible Rd - SR 99 | 2 | X | X | Add 2 lanes | 5.80% |
| SR 33: 6th St - 10th St | 2 | X | X | Add 2 lanes | 10.54% |

**Table 4.16-19: Cumulative Roadway Impacts and Mitigation**

| Roadway Segment [1] | No. of Lanes | Level of Service Impacts | | Roadway Improvement Required by 2035 [3] | Roadway Improvement Project % Share |
|---|---|---|---|---|---|
| | | 2035 NOG | 2035 NOG + Project [4] | | |
| SR 33: SR 119 (Taft Hwy) - 6th St | 2 | X | X | Add 2 lanes | 13.03% |
| SR 33: 10th St - Midway Rd | 2 | X | X | Add 2 lanes | 16.04% |
| SR 43 (Central Valley Hwy): N Shafter Ave - Dresser Ave | 4 | X | X | Add 2 lanes | 0.03% |
| SR 43 (Central Valley Hwy): Dresser Ave - Kimberlina Rd | 4 | X | X | Add 2 lanes | 0.03% |
| SR 43 (Central Valley Hwy): Los Angeles St - Lerdo Hwy | 2 | X | X | Add 2 lanes | 1.35% |
| SR 43 (Central Valley Hwy): Lerdo Hwy - N Shafter Ave | 4 | X | X | Add 2 lanes | 0.25% |
| SR 43 (Enos Ln): Interstate 5 - Panama Ln | 2 | X | X | Add 2 lanes | 34.05% |
| SR 43 (Enos Ln): Panama Ln - Stockdale Hwy | 2 | X | X | Add 2 lanes | 18.41% |
| SR 46: Beech Ave - Famoso Rd | 2 | X | X | Add 2 lanes | 8.70% |
| SR 46: Brown Material Rd - Lost Hills Rd | 2 | X | X | Add 2 lanes | 25.60% |
| SR 46: Corcoran Rd - Rowlee Rd | 2 | X | X | Add 2 lanes | 8.79% |
| SR 46: Lost Hills Rd - Interstate 5 | 2 | X | X | Add 2 lanes | 21.10% |
| SR 46: Magnolia Ave - Palm Ave | 2 | X | X | Add 2 lanes | 5.25% |
| SR 46: Palm Ave - SR 43 South | 2 | X | X | Add 2 lanes | 4.89% |
| SR 46: Rowlee Rd - Magnolia Ave | 2 | X | X | Add 2 lanes | 9.27% |
| SR 46: SR 43 South - Beech Ave | 2 | X | X | Add 2 lanes | 8.37% |
| SR 58 (Rosedale Hwy): Allen Rd - Old Farm Rd | 4 | X | X | Add 2 lanes | 9.35% |
| SR 58 (Rosedale Hwy): Calloway Dr. - Coffee Rd | 5 | X | X | Add 2 lanes | 7.24% |
| SR 58 (Rosedale Hwy): Greeley Rd - Nord Rd | 2 | X | X | Add 2 lanes | 26.77% |
| SR 58 (Rosedale Hwy): Heath Rd - Renfro Rd | 2 | X | X | Add 2 lanes | 25.21% |
| SR 58 (Rosedale Hwy): Jewetta Ave N - Calloway Dr. | 4 | X | X | Add 2 lanes | 8.04% |
| SR 58 (Rosedale Hwy): Mohawk St - SR 99 | 4 | X | X | Add 2 lanes | 0.08% |
| SR 58 (Rosedale Hwy): Nord Rd - Heath Rd | 2 | X | X | Add 2 lanes | 25.21% |
| SR 58 (Rosedale Hwy): Old Farm Rd - Jewetta Ave N | 4 | X | X | Add 2 lanes | 9.35% |
| SR 58 (Rosedale Hwy): Renfro Rd - Allen Rd | 2 | - [2] | - [2] | - | - |
| SR 58 (Rosedale Hwy): SR 43 (Enos Ln) - Superior Rd | 2 | X | X | Add 2 lanes | 26.77% |

**Table 4.16-19: Cumulative Roadway Impacts and Mitigation**

| Roadway Segment [1] | No. of Lanes | Level of Service Impacts | | Roadway Improvement Required by 2035 [3] | Roadway Improvement Project % Share |
|---|---|---|---|---|---|
| | | 2035 NOG | 2035 NOG + Project [4] | | |
| SR 58 (Rosedale Hwy): Superior Rd - Greeley Rd | 2 | X | X | Add 2 lanes | 26.77% |
| SR 58: Old Tracy Ave - Tracy Ave | 2 | - [2] | - [2] | - | - |
| SR 58: Tracy Ave - SR 43 (Enos Ln) | 2 | X | X | Add 2 lanes | 9.59% |
| SR 65 (Porterville Hwy): Merle Haggard Dr. - James Rd | 2 | X | X | Add 2 lanes | 4.30% |
| SR 65 (Porterville Hwy): James Rd - Lerdo Hwy | 2 | X | X | Add 2 lanes | 2.74% |
| SR 65 (Porterville Hwy): Lerdo Hwy - Merced Ave | 2 | X | X | Add 2 lanes | 2.49% |
| Stockdale Hwy: Heath Rd - Renfro Rd | 2 | X | X | Add 2 lanes | 14.10% |
| Stockdale Hwy: Nord Ave - Heath Rd | 2 | X | X | Add 2 lanes | 13.25% |
| Stockdale Hwy: Renfro Rd - Allen Rd | 4 | X | X | Add 2 lanes | 7.41% |
| Taft Hwy: S H St - Chevalier Rd | 2 | X | X | Add 2 lanes | 0.12% |
| Airport Dr: SR 99 - Olive Dr. | 4 | X | X | - | - |
| Allen Rd: SR 58 (Rosedale Hwy) - Hageman Rd | 4 | X | X | - | - |
| Buena Vista Rd: Pacheco Rd - White Ln | 3 | X | X | - | - |
| Calloway Dr: Stockdale Hwy - Brimhall Rd | 4 | - [2] | - [2] | - | - |
| Calloway Dr: Meacham Rd - Hageman Rd | 4 | X | X | - | - |
| Calloway Dr: SR 58 (Rosedale Hwy) - Meacham Rd | 4 | X | X | - | - |
| Calloway Dr: Brimhall Rd - SR 58 (Rosedale Hwy) | 4 | - [2] | - [2] | - | - |
| SR 155 (Garces Hwy): SR 43 - SR 99 | 2 | X | X | - | - |
| Old River Rd: Harris Rd - Campus Park Dr. | 2 | X | X | - | - |
| Panama Ln: Ashe Rd - Stine Rd | 4 | X | X | - | - |
| Santa Fe Way: Renfro Rd - Kratzmeyer Rd | 2 | X | X | - | - |
| Santa Fe Way: Hageman Rd - Renfro Rd | 2 | X | X | - | - |
| SR 155 (Garces Hwy): SR 99 - Browning Rd | 2 | X | X | - | - |
| SR 178 (24th St): Bay St - 24th St Frontage Rd | 3 | - [2] | - [2] | - | - |
| SR 178 (24th St): SR 99 - Bay St | 4 | X | X | - | - |
| SR 178 (Kern Canyon Rd): SR 184 (Kern Canyon Rd) - Comanche Dr. | 2 | X | X | - | - |
| SR 178: Morning Dr. - Vineland Rd | 4 | X | X | - | - |
| SR 178: Vineland Rd - SR 184 (Kern Canyon Rd) | 4 | X | X | - | - |

**Table 4.16-19: Cumulative Roadway Impacts and Mitigation**

| Roadway Segment [1] | No. of Lanes | Level of Service Impacts | | Roadway Improvement Required by 2035 [3] | Roadway Improvement Project % Share |
|---|---|---|---|---|---|
| | | 2035 NOG | 2035 NOG + Project [4] | | |
| SR 184 (Kern Canyon Rd): Vineland Rd - Watergrass Rd | 2 | X | X | - | - |
| SR 184 (Kern Canyon Rd): Watergrass Rd - Niles St | 2 | X | X | - | - |
| SR 184 (Morning Dr): Edison Hwy - Breckenridge Rd | 2 | X | X | - | - |
| SR 184 (Morning Dr): Pioneer Dr. - Niles St | 2 | X | X | - | - |
| SR 184 (Morning Dr): Breckenridge Rd - Pioneer Dr. | 2 | X | X | - | - |
| SR 184 (Weedpatch Hwy): Sunset Blvd - Di Giorgio Rd | 2 | X | X | - | - |
| SR 184 (Weedpatch Hwy): Panama Rd - Mountain View Rd | 2 | X | X | - | - |
| SR 184 (Weedpatch Hwy): Mountain View Rd - Panama Ln | 2 | X | X | - | - |
| SR 184 (Weedpatch Hwy): Di Giorgio Rd - Panama Rd | 4 | X | X | - | - |
| SR 204 (Union Ave): SR 58 - Union Ave | 4 | X | X | - | - |
| SR 58 (Rosedale Hwy): Coffee Rd - Patton Wy | 4 | X | X | - | - |
| SR 58 (Rosedale Hwy): Patton Way - Mohawk St | 4 | X | X | - | - |
| SR 58: Real Rd - SR 99 | 4 | X | X | - | - |
| SR 65 (Porterville Hwy): Famoso Rd - SR 155 (Garces Hwy) | 2 | X | X | - | - |
| SR 99: Olive Dr. - 7th Standard Rd | 6 | - [2] | - [2] | - | - |
| SR 99: SR 58 East - SR 178 | 8 | - [2] | - [2] | - | - |
| SR 99: Panama Ln - SR 58 East | 8 | - [2] | - [2] | - | - |
| 23rd St: Bay St - 24th St Frontage Rd | 3 | - [2] | - [2] | - | - |

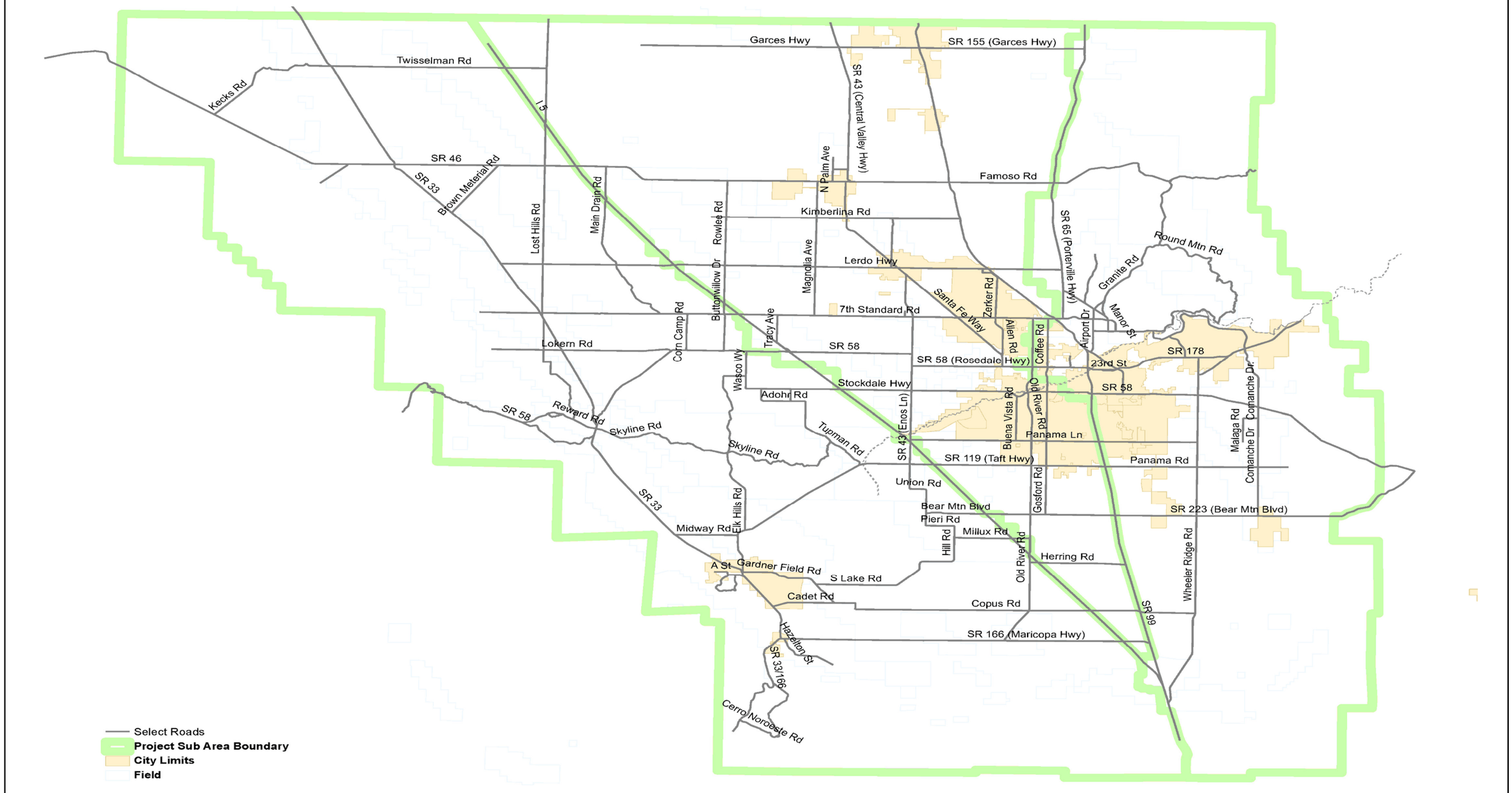
Source: Appendix W
Notes:
(1) Includes intersections operating below LOS C. X denotes scenario during which substandard operations would occur.
(2) Roadway cannot be expanded further.
(3) Assumes no mitigation implemented in 2015.
(4) NOG = Non-oil and gas-related traffic; Project – oil and gas-related traffic
Key:
SR = State Route

## Mitigation Measures

Implement MM 4.16-1 and MM 4.16-2, as described above.

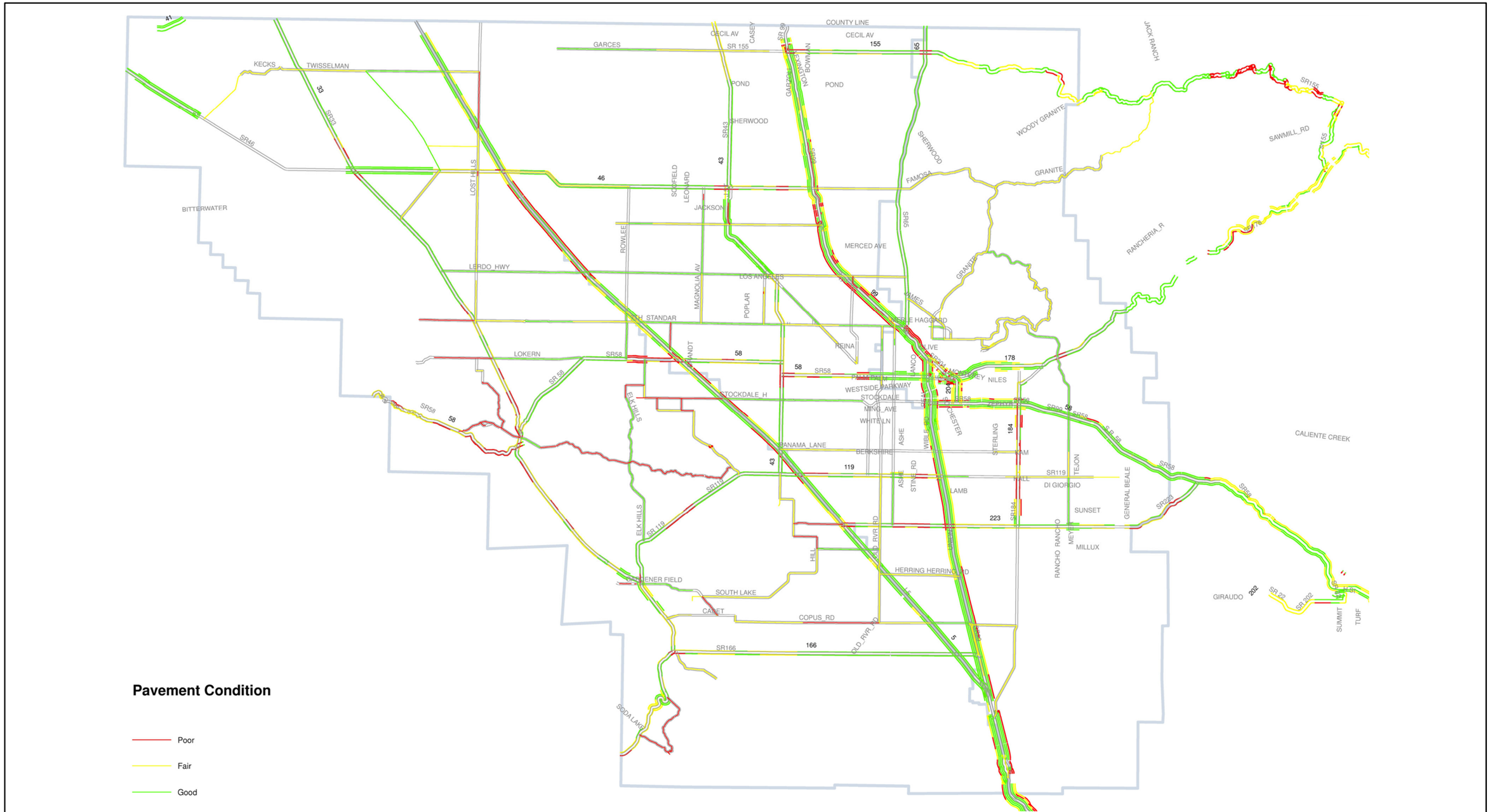
## Level of Significance After Mitigation

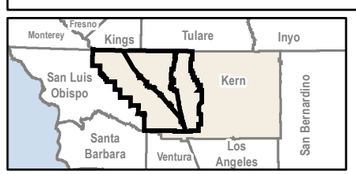
Based on information provided in the Traffic Study (Appendix W), impacts would be less than significant with mitigation.




Data Source: Ruettgers and Schuler, 2015. Traffic Impact Study and Roadway Assessment for Kern County Oil and Gas Well Activity.

Figure 4.16-1
Project Area Boundaries




Data Source: Ruettgers and Schuler, 2015. Traffic Impact Study and Roadway Assessment for Kern County Oil and Gas Well Activity.

Figure 4.16-2
Pavement Conditions

Section 4.17

# Utilities and Service Systems

Section 4.17

# Utilities and Service Systems

## 4.17.1 Introduction

This section describes the affected environment and regulatory setting for public utilities and service systems: water, solid waste, and wastewater and stormwater drainage. It also describes the impacts on utility infrastructure systems that would result from implementation of the Amendment to Chapter 19.98 (Oil and Gas Production) and related ordinance amendments to the Kern County Zoning Ordinance (Project), including impacts from future oil and gas development pursuant to the Amended Ordinance, and mitigation measures that would reduce these impacts, if necessary.

## 4.17.2 Environmental Setting

Kern County is California's third largest county, encompassing 8,202 square miles at the southern end of the Central Valley. The 3,700-square-mile Project Area is predominantly located in the western portion of the County in the San Joaquin Valley bounded by Kings and Tulare counties to the north, Santa Barbara and San Luis Obispo counties to the west, the Tehachapi Mountains and the Sierra Nevada Mountains to the east, and the northern boundary of the Los Padres National Forest to the south.

Kern County is located within District 4 of the State Division of Oil, Gas and Geothermal Resources (DOGGR) and is a large producer of natural gas. The valley floor area of the County and the lower elevations of the surrounding mountain ranges contain numerous deposits of oil and gas resources, a major economic resource for the County. Five of the state's most productive natural gas fields are located in Kern County.

## Water Supply and Demand

An analysis of the Project Area's water supply and demand, including for oil and gas exploration and production activities, was prepared by the Applicant's consultant, Kennedy/Jenks Consultants and independently reviewed by the County. The analysis is attached as Appendix T to this Environmental Impact Report (EIR) and utilizes the Water Supply Assessment (WSA) criteria in California Water Code Sections 10910 et seq., including an analysis of Project Area water supply and demand under current and projected future conditions in normal or average single dry and multiple dry years and information in the Tulare Lake Basin Portion of Kern County Integrated Regional Water Management Plan (IRWMP), Final Update, prepared by Kennedy/Jenks Consultants and approved by the Kern County Water Agency in 2011. The IRWMP provides a cooperative regional framework, implementation plan, and context for managing water resources, and was developed with the participation of a wide range of water agencies, town councils, regulatory, environmental, agricultural, tribal, and land use planning entities in the Kern County region, including the Project Area (KCWA 2011).

## Project Area Water Supplies

Water supplies in the Project Area are obtained from: (1) imported surface water from the State Water Project (SWP) and federal Central Valley Project (CVP); (2) local surface water, primarily in the Kern River and regulated flows from the Lake Isabella dam and reservoir; (3) secondary and tertiary-treated recycled water from 14 wastewater treatment plants (WWTPs) in the San Joaquin Valley portion of Kern County; (4) produced water that is reused, primarily for oil and gas exploration and production activities and agriculture (excluding produced water disposed to the surface or by injection); and (5) groundwater.

Based on historical records for the San Joaquin Valley portion of the Kern County, on average groundwater accounts for about 37% of the total Project Area water supply. However, during dry years, groundwater can account for more than 60% of total supply. During dry years in 2007 and 2008, groundwater pumping made up approximately 69% of total supply compared with less than 10% during 2011, a recent wet year (Appendix T). During the current drought, which began in 2012, portions of the Project Area have not received any imported water and are totally dependent on groundwater. This reliance on groundwater has negatively impacted groundwater levels in the Project Area.

The following sections summarize each of the primary water supplies in the Project Area.

### Imported Surface Water

Imported surface water is used for agricultural and municipal and industrial (M&I) purposes and is the most important source of groundwater recharge in the Project Area. Imported water avoids the use of groundwater when available, and is percolated into groundwater in several water banking facilities in wetter years for storage and use in drier periods. Figure 4.9-6 shows the locations of the primary water banking districts located in the Project Area. During the current drought, surface water supplies have been significantly curtailed for several successive years, significant banking and recharge using imported water has not been possible to achieve, and groundwater levels throughout the state, including the Project Area, have been depleted.

#### State Water Project

The Project Area receives imported surface water from the SWP and CVP. The SWP is the largest state-built, multi-purpose water project in the United States and includes 33 storage facilities, 21 reservoirs and lakes, 24 pumping and generating plants, four hydroelectric power plants, and 660 miles of aqueducts. SWP facilities and deliveries are maintained and operated by the California Department of Water Resources (DWR). The SWP system conveys water to the Project Area that is primarily released from Oroville Dam on the Feather River and flows south to pumping facilities located on the southern edge of the Sacramento Delta.

SWP water supplies are allocated to 29 system contractors under the terms of water supply contracts with the DWR. The maximum amount of water per year that an SWP contactor may request is listed in Table A of each contract with the DWR and is referred to as the contractor's "Table A amount." As discussed below, actual deliveries vary with hydrologic conditions and

may be significantly lower than the listed Table A amount in drier years and higher in wetter years. The Kern County Water Agency (KCWA) is the SWP contractor for the Project Area. Under current conditions, the maximum amount available for all 29 SWP contractors is 4.17 million acre-feet per year (AFY). KCWA has a Table A amount of 982,730 AFY. KCWA allocates SWP water under contracts with 13 Project Area water districts (WDs), or "member units," and to an improvement district that is operated by KCWA for agricultural and municipal and industrial (M&I) uses. Table 4.17-1 lists the KCWA member units and the maximum annual amount of SWP agricultural and M&I water each district could receive under its contract with the KCWA.

**Table 4.17-1: Kern County Water Agency Member Unit SWP Contract Amounts**

| District/Agency | Agricultural Contract Amount (AF) | M&I Contract Amount (AF) | Total (AF) |
|---|---|---|---|
| Belridge WSD | 121,508 | | 121,508 |
| Berrenda Mesa WD | 92,600 | | 92,600 |
| Buena Vista WSD | 21,300 | | 21,300 |
| Cawelo WD | 38,200 | | 38,200 |
| Henry Miller WD | 35,500 | | 35,500 |
| KCWA ID4 | 5,946 | 77,000 | 82,946 |
| KCWA | 8,000 | | 8,000 |
| Kern Delta WD | 25,500 | | 25,500 |
| Lost Hills WD | 119,110 | | 119,110 |
| Rosedale-Rio Bravo WSD | 29,900 | | 29,900 |
| Semitropic WSD | 155,000 | | 155,000 |
| Tehachapi-Cummings County WD | 4,300 | 15,000 | 19,300 |
| Tejon-Castac WD | 3,278 | 2,000 | 5,278 |
| West Kern WD | 6,500 | 25,000 | 31,500 |
| Wheeler Ridge-Maricopa WSD | 197,088 | | 197,088 |
| **TOTAL** | **863,730** | **119,000** | **982,730** |

Source: Appendix T, Table 5

Due to annual rainfall and snowpack variability, system storage levels, Sacramento Delta water quality and flow requirements for state and federally protected species, contractor demands, and other factors, the amount of water delivered to SWP contractors varies each year. According to KCWA, the agency received about 35% of the listed Table A amount in 2013, about 5% in 2014, a critically dry year, and, in March 2015, the DWR announced that SWP deliveries would be 20% of contractor requests in 2015 (KCWA 2014, 2015).

Table 4.17-2 shows the deliveries of SWP water supplied by KCWA to member units from 2003-2012.

**Table 4.17-2: SWP Deliveries to KCWA, 2003-2012**

| Year | SWP Deliveries (AF) |
|---|---|
| 2003 | 919,424 |
| 2004 | 771,898 |
| 2005 | 1,377,899 |
| 2006 | 1,242,631 |
| 2007 | 716,612 |
| 2008 | 279,334 |
| 2009 | 380,337 |
| 2010 | 469,319 |
| 2011 | 1,083,667 |
| 2012 | 584,589 |

Source: Appendix T, Table 6

The DWR biannually analyzes the wet, normal, dry and multiple dry year reliability of SWP system deliveries in draft and final SWP delivery reliability reports (DRRs). The most recent DRR is the Final Delivery Reliability Report 2013, issued in December 2014 (DWR 2014). The report considers regulatory and judicial decisions affecting pumping levels from the Delta, the potential effects of climate change, the hydrologic record in 1922-2003, and other factors to identify current and future delivery reliability, expressed as percentage of Table A contract amounts for SWP contractors, including KCWA. Table 4.17-3 summarizes the projected deliveries of SWP water to KCWA based on the current DRR and future reliability estimated by the DWR for 2020 to 2035. Table 4.17-3 shows the SWP could deliver 58 to 62% of the Table A amounts for each contractor on a long-term average basis. The DWR further estimates that SWP deliveries during multiple-dry year periods would average about 31% of the Table A amounts and 11% during single dry years. The most recent version of the SWP delivery reliability report does not take account of SWP deliveries during the most recent years of the current drought.

**Table 4.17-3: KCWA SWP Supply Reliability (AF) 2015-2035**

| Wholesaler (Supply Source) | 2015 | 2020 | 2025 | 2030 | 2035[(b)] |
|---|---|---|---|---|---|
| **Average Water Year** | | | | | |
| DWR (SWP) | | | | | |
| KCWA Table A Supply | 594, 700 | 556, 300 | 556,300 | 556,300 | 556, 300 |
| % of Table A Amount[(a)] | 62% | 58% | 58% | 58% | 58% |
| **Single Dry Year** | | | | | |
| DWR (SWP) | | | | | |
| KCWA Table A Supply | 115,000 | 105,500 | 105,500 | 105,500 | 105,500 |
| % of Table A Amount[(a)] | 12% | 11% | 11% | 11% | 11% |
| **Multiple Dry Year** | | | | | |
| DWR (SWP) | | | | | |
| KCWA Table A Supply | 293,700 | 293,700 | 293,700 | 293,700 | 293,700 |
| % of Table A Amount[(a)] | 31% | 31% | 31% | 31% | 31% |

Source: Appendix T, Table 7

Table 4.17-4 shows anticipated SWP delivery reliability by Subarea in average, single dry, and multiple dry years.

**Table 4.17-4: SWP Delivery Reliability in Average, Dry, and Multiple Dry Years by Subarea (AF) 2015-2035**

| Year Types/Subareas | 2015 | 2020 | 2025 | 2030 | 2035[(a)] |
|---|---|---|---|---|---|
| **Average Water Year** | | | | | |
| Central | 183,100 | 171,300 | 171,300 | 171,300 | 171,300 |
| Eastern | 93,100 | 87,100 | 87,100 | 87,100 | 87,100 |
| Western | 318,500 | 297,900 | 297,900 | 297,900 | 297,900 |
| **TOTAL** | **594,700** | **556,300** | **556,300** | **556,300** | **556,300** |
| % of Table A Amount | 62% | 58% | 58% | 58% | 58% |
| **Single Dry Year** | | | | | |
| Central | 35,400 | 32,500 | 32,500 | 32,500 | 32,500 |
| Eastern | 18,000 | 16,500 | 16,500 | 16,500 | 16,500 |
| Western | 61,600 | 56,500 | 56,500 | 56,500 | 56,500 |
| **TOTAL** | **115,000** | **105,500** | **105,500** | **105,500** | **105,500** |
| % of Table A Amount | 12% | 11% | 11% | 11% | 11% |

**Table 4.17-4: SWP Delivery Reliability in Average, Dry, and Multiple Dry Years by Subarea (AF) 2015-2035**

| Year Types/Subareas | 2015 | 2020 | 2025 | 2030 | 2035[(a)] |
|---|---|---|---|---|---|
| **Multiple Dry Year** | | | | | |
| Central | 90,400 | 90,400 | 90,400 | 90,400 | 90,400 |
| Eastern | 46,000 | 46,000 | 46,000 | 46,000 | 46,000 |
| Western | 157,300 | 157,300 | 157,300 | 157,300 | 157,300 |
| **TOTAL** | **293,700** | **293,700** | **293,700** | **293,700** | **293,700** |
| % of Table A Amount | 31% | 31% | 31% | 31% | 31% |

Source: Appendix T, Table 8
Note:
(a) A large portion of the Tejon Castac WD is located outside of the Project Area; thus, its contract amount of 5,278 AF was excluded from future projections. A small portion of Tehachapi-Cummings County WD (about 5%) is within the Project Area and 5% of the WD's contract amount (equivalent to 1,035 AFY) was included for future projections.

SWP contractors are periodically able to access other water supplies, including "Article 21" water (water that is excess to the current needs of SWP contractors and that is available under Article 21 of the DWR contracts), turnback pool water (unused Table A water that is "turned back" to the DWR and available to other contractors), and DWR dry year purchases. These potential water sources are discussed in more detail below. The availability of these potential deliveries is uncertain and dependent on hydrological conditions and regulatory constraints. To provide a conservative assessment, none of these potential water sources is included in the Project Area supply analysis.

Article 21 water may be supplied when Delta outflow requirements for environmental purposes have been met, SWP storage south of the Delta is full, and there is available aqueduct conveyance capacity. However, recent regulatory and judicial decisions affecting Delta flow requirements to protect certain fish species are anticipated to reduce the availability of Article 21 water under future conditions.

The turnback pool program allows contractors to sell ("turn back") excess Table A supplies to other contractors. In general, as urban contractor demands have increased, the amount of water turned back and available for purchase under this program has diminished over time.

The DWR has the authority to implement dry year water purchase programs in critically dry years. Water is purchased by DWR, where available, and resold to contractors that may desire additional supplies. The amount, availability, and cost of water delivered under a dry year water purchase program is subject to multiple uncertainties and cannot be reliably predicted in any given year.

## Central Valley Project

The CVP is a set of federal facilities that extend from north of Redding to areas near Bakersfield and to the South Bay Area. The CVP encompasses two of California's largest river systems: the Sacramento River, which flows south toward the Delta, and the San Joaquin River, which flows north to the Delta. The Friant Dam stores San Joaquin River flows in Millerton Lake northeast of Fresno. These supplies are routed south to the Project Area through the 151.8-mile-long Friant-Kern Canal, which terminates near the Kern River in southwest Bakersfield. The Friant-Kern Canal has a maximum capacity of 5,000 cubic feet per second (cfs), which decreases to 2,000 cfs at its terminus in the Project Area.

The CVP is operated by the U.S. Bureau of Reclamation (USBR). CVP supplies are generally allocated to long-term contractors on the basis of Class 1 ("firm") and Class 2 ("non-firm, hydrology dependent") amounts. Surplus supplies may be provided to other contractors on an irregular basis under Section 215 of the Reclamation Reform Act of 1982 ("Section 215" water). According to the KCWA, during 1950 to 2007, an average of 318,877 AFY of CVP water was delivered through the Friant-Kern Canal to the Project Area for agricultural and M&I uses (IRWMP 2011).

The CVP long-term contractors in the Project Area include Arvin-Edison Water Storage District (WSD), Delano-Earlimart Irrigation District (ID), Kern-Tulare WD, Shafter-Wasco ID, and Southern San Joaquin WSD. Water districts that are not contractors with the USBR in the Project Area occasionally exchange other supplies for CVP water, including KCWA, Kern Delta WD, North Kern WSD, Rosedale-Rio Bravo WSD, and Semitropic WSD. Since 2003, deliveries of CVP water to the contractors and exchange districts within the Project Area have ranged from 260,000 AF (2007) to 800,000 AF (2005). Table 4.17-5 provides a summary of the CVP deliveries to the Project Area during 2003 to 2012, including to long-term contractors and by exchanges to non-contractors.

**Table 4.17-5: CVP deliveries to Project Area, 2003-2012 (AF)**

| Year | Arvin-Edison WSD [a] | Delano-Earlimart ID [a] | Kern-Tulare WD [a], [b] | Shafter Wasco ID [a] | Southern San Joaquin MUD [a] | KCWA [c] | Kern-Delta WD [c] | North Kern WSD [c] | Rosedale Rio Bravo WSD [c] | Semitropic WSD [c] | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2003 | 116,102 | 121,342 | 25,284 | 62,151 | 111,417 | 0 | 0 | 0 | 25,257 | 0 | 461,553 |
| 2004 | 33,795 | 128,219 | 53,574 | 53,761 | 101,178 | 0 | 0 | 0 | 0 | 0 | 370,527 |
| 2005 | 213,757 | 116,280 | 45,486 | 65,505 | 115,604 | 96,623 | 1,890 | 56,337 | 88,786 | 0 | 800,268 |
| 2006 | 178,484 | 121,275 | 24,846 | 69,703 | 118,151 | 42,736 | 1,829 | 59,023 | 0 | 883 | 616,047 |
| 2007 | 19,787 | 73,916 | 49,846 | 34,311 | 70,112 | 0 | 0 | 12,252 | 0 | 19,819 | 260,224 |
| 2008 | 54,173 | 112,531 | 46,047 | 49,366 | 92,458 | 9,412 | 0 | 5,019 | 0 | 0 | 369,006 |
| 2009 | 110,898 | 121,435 | 44,925 | 50,723 | 121,259 | 0 | 0 | 4,563 | 0 | 0 | 453,803 |

**Table 4.17-5: CVP deliveries to Project Area, 2003-2012 (AF)**

| Year | Arvin-Edison WSD [a] | Delano-Earlimart ID [a] | Kern-Tulare WD [a], [b] | Shafter Wasco ID [a] | Southern San Joaquin MUD [a] | KCWA [c] | Kern-Delta WD [c] | North Kern WSD [c] | Rosedale Rio Bravo WSD [c] | Semitropic WSD [c] | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2010 | 207,275 | 178,123 | 78,164 | 64,670 | 117,714 | 0 | 0 | 0 | 0 | 0 | 645,949 |
| 2011 | 193,835 | 152,217 | 45,299 | 75,526 | 125,889 | 63,158 | 0 | 1,949 | 6,448 | 0 | 664,321 |
| 2012 | 23,572 | 106,598 | 57,637 | 34,140 | 75,961 | 0 | 0 | 0 | 0 | 0 | 297,908 |

Source: Appendix T, Table 9
Notes:
(a) CVP contractors.
(b) Combined deliveries from Friant-Kern Canal and Cross Valley Canal.
(c) Non-CVP contractors receiving CVP water by exchange with contractors.

The reliability of future CVP deliveries to the Project Area is affected by hydrological variability and a 2006 settlement of an 18-year lawsuit involving the U.S. Department of the Interior and Commerce Department, the Natural Resources Defense Council, and the Friant Water Users Authority (now Friant Water Authority) regarding fish habitat in the San Joaquin River below Friant Dam. The settlement and related federal legislation in 2009 require that significant amounts of water previously available to CVP Friant contractors, including Kern County, must, instead, be discharged to the river channel in an effort to create salmon and other fish habitats. A series of interim flows to the river were initiated in 2009, and more permanent "restoration" flows began in 2014. Restoration flow releases will range from approximately 71,000 AF in a critical dry year to approximately 556,000 AF in wetter years and will have a priority over existing contracts. In certain emergency drought conditions, restoration flows may be reduced for other purposes.

The level of CVP delivery reductions to the Project Area related to the 2006 settlement also depends on hydrological and other factors. Current estimates indicate that average annual deliveries from Friant Dam will be reduced by 13% to 15% from prior levels. The potential availability of Section 215 water supplied in the Project Area will also likely fall by as much as 30,000 to 40,000 AFY (see Appendix T).

To provide a conservative assessment, future CVP delivery levels in the Project Area assume that only Class 1 (firm) contract supplies would be delivered under future conditions. This approach is conservative because Class 2, Section 215, or other exchange water may be available under certain conditions, but uncertain future hydrological and regulatory conditions are expected to reduce the probability that the CVP system will have surplus supplies. Hydrologic modeling of CVP operations for 1922 to 1994 was conducted during the 2006 settlement to estimate the water supply expected to be available under various hydrologic conditions (Appendix T). The post-settlement operational model results were used to project the amount of CVP-Friant supplies of Class 1 water that would be delivered to the Project Area.

As shown in Table 4.17-6, the projections indicate that the Project Area would, on average, receive 305,600 AFY from the CVP system under future conditions, or 91% of the Class 1 water contract amounts. CVP deliveries would fall to 23% of Class 1 amounts during a single dry year (analogous to 1977 conditions), and to 68% during multiple dry year periods (based on the historically most severe four-year drought in 1931 to 1934).

**Table 4.17-6: CVP Project Area Delivery Reliability in Average, Dry and Multiple Dry Years (AF)**

| CVP Water Supply Reliability | Delano – Earlimart ID | Shafter-Wasco ID | Southern San Joaquin MUD | Arvin-Edison WSD | Kern-Tulare WD | Total |
|---|---|---|---|---|---|---|
| **Long-Term Average** | | | | | | |
| Class 1 Amount | 99,000 | 45,500 | 88,300 | 36,400 | 36,400 | 305,600 |
| % of Class 1 Amount | 91% | 91% | 91% | 91% | 91% | |
| **Single Dry Year** | | | | | | |
| Class 1 Amount | 25,000 | 11,500 | 22,300 | 9,200 | 9,200 | 77,200 |
| % of Class 1 Amount | 23% | 23% | 23% | 23% | 23% | |
| **Multiple Dry Year** | | | | | | |
| Class 1 Amount | 74,000 | 34,000 | 66,000 | 27,200 | 27,200 | 228,400 |
| % of Class 1 Amount | 68% | 68% | 68% | 68% | 68% | |

Source: Appendix T, Table 11

As shown in Table 4.17-7 most of the CVP water would be delivered to the Central Subarea, which would also experience the largest delivery reductions. The Central Subarea would receive 262,500 AFY (86%) of the CVP deliveries, and the Eastern Subarea would receive 13.5% in an average year. About 0.3% would be delivered to the Western Subarea. Dry and multiple dry year CVP deliveries would be reduced by 23% and 68%, respectively, in each Subarea.

**Table 4.17-7: CVP Project Area Delivery Reliability in Average, Dry and Multiple Dry Years by Subarea (AF)**

| CVP Water Supply Reliability | Western [(a)] | Central [(b)] | Eastern [(c)] | Total |
|---|---|---|---|---|
| **Long-Term Average** | | | | |
| Class 1 Amount | 900 | 262,500 | 42,200 | 305,600 |
| % of Class 1 Amount | 91% | 91% | 91% | 91% |
| **Single Dry Year** | | | | |
| Class 1 Amount | 200 | 66,300 | 10,700 | 77,200 |
| % of Class 1 Amount | 23% | 23% | 23% | 23% |

**Table 4.17-7: CVP Project Area Delivery Reliability in Average, Dry and Multiple Dry Years by Subarea (AF)**

| CVP Water Supply Reliability | Western [(a)] | Central [(b)] | Eastern [(c)] | Total |
|---|---|---|---|---|
| **Multi-Dry Year** | | | | |
| Class 1 Amount | 700 | 196,200 | 31,500 | 228,400 |
| % of Class 1 Amount | 68% | 68% | 68% | 68% |

Source: Appendix T, Table 12
Notes:
Includes Class 1 allocations from a portion of Arvin-Edison WSD (2%).
Includes Class 1 allocations from the following agencies: Delano-Earlimart ID, Shafter-Wasco ID, Southern San Joaquin MUD, a portion of Arvin-Edison WSD (4%), and a portion of Kern-Tulare WD (77%).
Includes Class 1 allocations from the following agencies: a portion of Arvin-Edison WSD (93%) and a portion of Kern-Tulare WD (23%).

## Local Surface Water

Local surface water in the Project Area is primarily obtained from Kern River flows, which are regulated by the Lake Isabella dam operated by the U.S. Army Corps of Engineers (USACE) and the Kern River Watermaster. Smaller streams, most of which are ephemeral, flow during periods of rain or for brief periods in the spring if they are fed by snowmelt and generally percolate into valley floor aquifers or, in limited instances, are used for agricultural irrigation. The Lake Isabella reservoir was designed to store approximately 570,000 AF of water. The facility's water storage has been limited to approximately 361,250 AF for safety purposes until the USACE upgrades the dam in accordance with an approved safety modernization program scheduled for completion in 2022 (USACE 2015).

The Kern River Watermaster coordinates reservoir releases with the USACE to provide water for downstream users, primarily for irrigation and groundwater recharge. Table 4.17-8 summarizes the annual unregulated and regulated flow volumes in the Kern River from 1980 to 2011. In 1989 the State Water Resources Control Board (SWRCB) declared that Kern River was fully appropriated and that no new diversions would be considered for approval. The status of the river flows remains subject to an ongoing administrative appeal and related legal process that may alter the existing patterns of Kern River water use.

**Table 4.17-8: Historic Kern River Flows (AF)**

| Year | Natural (AF) | Regulated (AF) | Year | Natural (AF) | Regulated (AF) |
|---|---|---|---|---|---|
| 1980 | 1,639,957 | 1,560,652 | 1996 | 1,038,261 | 968,036 |
| 1981 | 449,263 | 460,469 | 1997 | 1,181,969 | 1,133,463 |
| 1982 | 1,271,139 | 1,121,088 | 1998 | 1,717,967 | 1,662,556 |
| 1983 | 2,489,128 | 2,381,575 | 1999 | 433,971 | 461,621 |
| 1984 | 821,797 | 834,036 | 2000 | 476,819 | 472,536 |
| 1985 | 1,444,939 | 668,971 | 2001 | 391,451 | 375,769 |
| 1986 | 375,935 | 1,331,561 | 2002 | 424,696 | 357,160 |
| 1987 | 294,685 | 432,309 | 2003 | 519,724 | 460,406 |
| 1988 | 397,038 | 335,473 | 2004 | 407,305 | 407,272 |
| 1989 | 203,571 | 348,773 | 2005 | 1,156,109 | 935,439 |
| 1990 | 406,289 | 219,501 | 2006 | 1,071,841 | 1,027,688 |
| 1991 | 296,829 | 333,494 | 2007 | 252,692 | 318,050 |
| 1992 | 853,760 | 272,822 | 2008 | 517,997 | 455,874 |
| 1993 | 1,385,160 | 642,339 | 2009 | 470,166 | 442,268 |
| 1994 | 336,456 | 422,361 | 2010 | 910,878 | 752,302 |
| 1995 | 1,385,160 | 1,197,100 | 2011 | 1,374,894 | 1,404,645 |

Sources: Appendix T, Table 13

Flows from minor streams also occur in the Project Area, particularly in the Central and Eastern Subareas. The mean flow of Project Area streams, other than Kern River, is 98,900 AF (KCWA 2011). To provide a conservative assessment, local surface water supplies in the Project Area were assumed to be solely derived from the Kern River. Average year Kern River supplies were 764,400 AFY (Appendix T) during 1970 to 2011. In 1977, the driest year for which data is available, Kern River diversions were 197,000 AF, and during the 1987-1991 drought, average diversions were 335,500 AF (Appendix T). Table 4.17-9 summarizes the availability of Kern River water supplies in the Project Area during average, single dry and multiple-dry years based on 1970-2011 diversion records. The river water is assumed to be diverted and used in the Eastern Subarea, although some flows may reach the Central or Western Subareas in very wet years.

**Table 4.17-9: Project Area Kern River Supplies in Average, Single Dry and Multiple Dry Years by Subarea**

| Water Year Type | Project Area (AF) | Western Subarea (AF) | Central Subarea (AF) | Eastern Subarea (AF) |
|---|---|---|---|---|
| Average Water Year (based on average diversions 1970 to 2011) | 764,400 | -- | -- | 764,400 |
| Single-Dry Water Year (based on diversions 1977) | 197,000 | -- | -- | 197,000 |
| Multiple Dry Year (based on average diversions 1987 to 1991) | 335,500 | -- | -- | 335,500 |

Source: Appendix T, Table 15

## Recycled Water

In 2011, 54,000 AF of secondary and tertiary-treated recycled water was produced for use in the Project Area by 14 WWTPs in the San Joaquin Valley portion of Kern County. About 49,000 AF of the recycled water supply was used for agricultural irrigation (Appendix T). Many farming operations have also installed facilities that intercept water that would normally run off fields during irrigation ("tailwater") for reuse in the same or adjacent fields (from the foot of one field to the head of another). Based on regional planning estimates prepared by the KCWA and other water districts, the amount of secondary and tertiary-treated recycled water from Project Area WTTPs and recycled tailwater from farming operations in the Project Area is about 77,000 AFY (Appendix T). This level of recycled water supply is conservative because several Project Area water suppliers and users are considering measures to increase recycled water production and use.

## Produced Water from Oil and Gas Activities

As discussed in Section 4.9, Hydrology and Water Quality, oil and gas exploration and production activities in the Project Area also generate "produced water" (i.e., residual water from the separation of oil and gas after extraction). About 234,959 AF of produced water was generated during 2012 in the Project Area. The oil and gas industry reused 38% (88,812 AF) of this amount for enhanced oil recovery (EOR) injection or other oilfield activities, and 14% (32,771 AF) was supplied to the Cawelo WD for agricultural irrigation. About 84,571 AF (36%) of the produced water was disposed into injection wells, and 30,223 AF (13%) was disposed in surface ponds.

For analysis purposes, the supply of produced water in the Project Area available for treatment and reuse in the future is assumed to be sufficient to meet the anticipated demand for reuse, including oilfield operations and agricultural irrigation. This is a reasonable assumption, given that approximately half of produced water is currently disposed of rather than reused. As shown in Table 19 and Table 39 of Appendix T, the Project Applicant has estimated that, in 2015, about 93,106 AF of produced water will be reused for EOR and other oil and gas purposes. By 2035, oil and gas activities will utilize about 121,412 AF of produced water. The projections further assume that produced water use for agriculture will be 32,771 AFY under existing and future

conditions. As a result, the total Project Area produced water supply, excluding produced water disposal by injection or to surface ponds, is projected to increase from about 125,877 AFY in 2015 to 154,183 AFY in 2035.

## Groundwater

As discussed in Section 4.9, Hydrology and Water Quality, the Project Area primarily overlies the Tulare Lake Basin/Kern County Subbasin of the San Joaquin Valley Groundwater Basin (DWR Groundwater Basin 5-22.14). Historically, California law has not required that water well operators in the state, including the Project Area, report the amount of groundwater extracted for agricultural, M&I, or other uses, except when aquifers are subject to a court-imposed adjudication. Project Area groundwater is not managed under an adjudication. The IRWMP developed estimates of groundwater extraction in the Project Area based on land uses and other water supplies. Table 4.17-10 summarizes the estimated amount of groundwater extracted in the Project Area from 1980 to 2011.

**Table 4.17-10: Estimated Annual Project Area Groundwater Extraction, 1980-2011**

| Year | Extractions (AF) | Year | Extractions (AF) |
|---|---|---|---|
| 1980 | 977,000 | 1996 | 1,609,600 |
| 1981 | 1,161,000 | 1997 | 1,091,400 |
| 1982 | 802,200 | 1998 | 1,290,200 |
| 1983 | 762,700 | 1999 | 1,471,500 |
| 1984 | 1,252,200 | 2000 | 1,360,100 |
| 1985 | 1,293,800 | 2001 | 1,953,900 |
| 1986 | 947,600 | 2002 | 1,575,000 |
| 1987 | 1,208,700 | 2003 | 1,203,900 |
| 1988 | 1,540,000 | 2004 | 1,842,300 |
| 1989 | 1,588,500 | 2005 | 579,900 |
| 1990 | 1,796,000 | 2006 | 716,500 |
| 1991 | 2,002,400 | 2007 | 2,212,300 |
| 1992 | 1,673,600 | 2008 | 2,306,500 |
| 1993 | 987,700 | 2009 | 1,212,400 |
| 1994 | 1,897,700 | 2010 | 230,400 |
| 1995 | 1,242,800 | 2011 | 419,000 |
| | | **Mean [(a)]** | **1,319,000** |

Sources: Appendix T, Table 16
Note:
(a) Mean of the historical records is rounded off to the nearest hundred.

Project Area groundwater use tends to increase during drier periods when surface supplies decrease. As discussed in Section 4.9, Hydrology and Water Quality, groundwater withdrawals have been particularly significant in response to the current drought and have reduced aquifer storage and groundwater elevations to historically low levels in many locations. Prior to the drought, the IRWMP identified groundwater overdraft as "one of the longest-standing issues in the Kern Region," and also indicated that the region including the Project Area may experience a net loss to storage due to groundwater pumping of approximately 325,000 AFY (KCWA 2011). In November 2014, the DWR published a public update on drought conditions in California indicating that groundwater in the Tulare Lake Basin, which includes the Project Area, experienced notable declines since 2011, including reductions in the range of 25 to 50 feet to historically low levels (DWR 2014).

For analysis purposes in this EIR, the mean volume of estimated groundwater extractions during 1980 to 2011, 1.319 million AF, is assumed to represent average year demand for groundwater in the Project Area. The amount of groundwater extracted in a single dry year groundwater extraction was assumed to be the average groundwater use during dry and critically dry years, as defined by the DWR during 1980 to 2011. The amount of groundwater extracted during multiple dry years is assumed to be the average level of extraction estimated to have occurred during the 1987-1992 drought. Project Area and Subarea groundwater use in average, dry, and multiple dry years is summarized in Table 4.17-11.

**Table 4.17-11: Project Area Average, Dry and Multiple Dry Year Groundwater Supplies by Subarea**

| | Project Area (AF) | Western Subarea (AF) | Central Subarea (AF) | Eastern Subarea (AF) |
|---|---|---|---|---|
| Average Water Year (based on average extractions 1980-2011) | 1,319,000 | 659,500 | 237,400 | 422,100 |
| Single-Dry Water Year (based on average of dry and critical years of extractions 1980-2011) | 1,673,000 | 836,500 | 301,100 | 535,400 |
| Multiple Dry Year (based on average extractions 1987-1992) | 1,635,000 | 817,450 | 294,300 | 523,200 |

Source: Appendix T, Table 17

Groundwater extractions by Subarea were estimated based on the assumption that groundwater extractions would be proportional to the estimated agricultural demand within each Subarea. Groundwater supplies may not be available for all uses in each Subarea.

As discussed in Section 4.9.3, Regulatory Setting, in 2014, California enacted the Groundwater Sustainability Management Act. The Act requires, for the first time, the implementation of Groundwater Sustainability Plans (GSPs) for high- and medium-priority aquifers, based on groundwater data compiled by the California Statewide Groundwater Elevation Monitoring (CASGEM) program. Project Area groundwater basins are subject to a "high" priority ranking, and one or more GSPs must be adopted for the regional aquifers by 2020. A GSP must ensure

that, over a period of 20 years, "sustainable groundwater management" is achieved, including the avoidance of "chronic lowering of groundwater levels" and "significant and unreasonable" reductions in groundwater storage, land subsidence, and "adverse impacts on beneficial uses." The DWR is required to adopt regulations for the preparation of a GSP by January 2016. To date, draft regulations have not been circulated for public review and comment. It is possible that groundwater use in the Project Area may be modified or reduced from the assumed levels in Table 4.17-11 if necessary to achieve the sustainable groundwater management requirements mandated by the new state legislation.

## Project Area Supply Summary

Table 4.17-12 summarizes the Project Area water supplies that are currently available for the Project Area, including SWP and CVP imported water, Kern River water, recycled water, oilfield-produced water, and groundwater, and that are estimated to be available in 2035.

**Table 4.17-12: Summary of Project Area Average, Single Dry, and Multiple Dry Year Water Supplies, 2015 and 2035 (AF)**

| | Average (AF) | Single-Dry Year (AF) | Multiple Dry Year (AF) |
|---|---|---|---|
| **2015** | | | |
| SWP Imported Water | 565,900 | 105,500 | 293,700 |
| CVP Imported Water | 305,600 | 77,200 | 228,400 |
| Groundwater | 1,319,000 | 1,673,000 | 1,635,000 |
| Kern River | 764,400 | 197,000 | 335,500 |
| Recycled Water | 77,000 | 77,000 | 77,000 |
| Oilfield-Produced Water [(a)] | 125,981 | 125,981 | 125,981 |
| **TOTAL** | **3,157,881** | **2,255,681** | **2,695,581** |
| **2035** | | | |
| SWP Imported Water | 565,900 | 105,500 | 293,700 |
| CVP Imported Water | 305,600 | 77,200 | 228,400 |
| Groundwater | 1,319,000 | 1,673,000 | 1,635,000 |
| Kern River | 764,400 | 197,000 | 335,500 |
| Recycled Water | 77,000 | 77,000 | 77,000 |
| Oilfield-Produced Water | 155,004 | 155,004 | 155,004 |
| **TOTAL** | **3,186,904** | **2,284,704** | **2,724,604** |

Source: Appendix T, Table 20
Note:
(a) Oilfield produced water supply includes 32,771 AFY provided for agricultural reuse in the Eastern Subarea to the Cawelo Water District and produced water supply amounts are slightly higher (104 AF higher for 2015 and 810 AF higher for 2035) than projected produced water demand in Tables 19 and 39 of the WSA due to the use of a different supply estimation methodology.

## Project Area Water Demand

The primary sources of water demand in the Project Area are agriculture, urban use, including residential commercial, industrial, public service (e.g., schools, parks, recreation) and other urban M&I demand, and oil and gas exploration and production. The following sections summarize the water demands for each of these uses in the Project Area.

### Agricultural Water Demand

Agricultural water demand was estimated by using the per-acre water application rate for the major crops grown multiplied by the acreage of each crop in the Project Area. As shown in Table 4.17-13, based on 2006 land use data prepared by the DWR, about 886,000 acres are used for irrigated agriculture in the Project Area. The average consumption per irrigated acre ranges from less than 2 AFY per acre to more than 4 AFY per acre, depending on the type of crop under cultivation.

**Table 4.17-13: Project Area Agricultural Acreage, Crop Application Rates and Water Demand (AFY)**

| Crop Type | Irrigated Acreage | Consumptive Water Use (AF/acre) | Agricultural Water Demand (AFY) |
|---|---|---|---|
| Alfalfa and alfalfa mixtures | 90,129 | 4.10 | 369,529 |
| Almonds | 171,273 | 3.28 | 561,776 |
| Apples, Pears, Plums | 3,958 | 3.45 | 13,655 |
| Apricots, Nectarines, Peaches | 4,890 | 3.35 | 16,383 |
| Beans (dry and green) | 3,811 | 2.11 | 8,041 |
| Carrots | 24,684 | 2.55 | 62,944 |
| Citrus(grapes, lemons, oranges) | 60,566 | 3.37 | 204,108 |
| Corn, Grain Sorghum | 26,659 | 2.95 | 78,644 |
| Cotton | 103,302 | 2.71 | 279,949 |
| Grapes(Vineyards) | 103,371 | 2.81 | 290,471 |
| Grain and Grain Hay | 110,184 | 2.07 | 228,080 |
| Melons, Squash, Cucumbers | 4,375 | 1.46 | 6,388 |
| Misc. Deciduous Trees | 15,996 | 3.34 | 53,427 |
| Misc. Field Crops | 47,972 | 2.09 | 100,261 |
| Misc. Subtropical Trees | 669 | 3.38 | 2,263 |
| Misc. Vegetables | 6,785 | 1.62 | 10,991 |
| Nursery | 5,145 | 3.28 | 16,875 |
| Onions, Garlic | 10,875 | 1.70 | 18,487 |
| Pasture, Turf, Misc. Grasses | 9,530 | 4.13 | 39,360 |
| Pistachios | 63,351 | 4.11 | 260,372 |

**Table 4.17-13: Project Area Agricultural Acreage, Crop Application Rates and Water Demand (AFY)**

| Crop Type | Irrigated Acreage | Consumptive Water Use (AF/acre) | Agricultural Water Demand (AFY) |
|---|---|---|---|
| Potatoes | 4,379 | 1.98 | 8,671 |
| Safflower | 1,304 | 2.23 | 2,909 |
| Sugar Beets | 574 | 3.29 | 1,888 |
| Tomatoes | 9,854 | 2.51 | 24,734 |
| Walnuts | 2,153 | 3.89 | 8,375 |

Source: Appendix T, Table 37

Table 4.17-14 summarizes the irrigated acreage and agricultural water demand by Subarea. The Central Subarea accounts for about 50%, the Western Subarea accounts for about 32%, and the Eastern Subarea accounts for 18% of total Project Area agricultural demand. Agriculture utilizes about 2.669 million AFY in the Project Area.

**Table 4.17-14: Irrigated Agricultural Acreage and Water Demand by Subarea**

| Subarea | Irrigated Acreage | Agricultural Water Demand (AFY) |
|---|---|---|
| Western | 289,404 | 867,309 |
| Central | 428,561 | 1,327,759 |
| Eastern | 167,863 | 473,619 |
| **TOTAL** | **885,828** | **2,668,687** |

Source: Appendix T, Table 38

As discussed in Appendix T, for analysis purposes in this EIR, existing agricultural water demand is conservatively assumed to remain constant, although urban development and other factors are likely to reduce irrigated acreage and water use in the Project Area over time.

## Urban Water Demand

Urban demand projections were evaluated in normal, single dry, and multiple dry years in five-year increments from 2010 to 2035, based on publicly available data, including urban water management plans (UWMPs) adopted by water agencies in the Project Area, the IRWMP, and the Poso Creek Integrated Regional Water Management Plan (see Appendix T). Urban water demands include residential, commercial, industrial, institutional, landscape, and other public services, such as fire department, recreational, and school uses. Table 4.17-15 summarizes the existing and projected future average year urban water demand in the Project Area from 2010 to

2035. Urban water use in the Project Area is expected to increase from 237,028 AFY in 2015 to 301,736 AFY in 2035.

**Table 4.17.15: Project Area Average (Average) Hydrologic Year Urban Water Demand 2010-2035 (AFY)**

| Subarea | Purveyor | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|---|---|
| Eastern and Central | California Water Service | 77,177 | 84,029 | 80,644 | 86,788 | 93,400 | 100,513 |
| Eastern and Central | City of Bakersfield | 43,210 | 45,906 | 44,419 | 48,577 | 52,735 | 57,655 |
| Eastern | East Niles CSD | 8,942 | 9,238 | 9,569 | 10,042 | 10,583 | 11,572 |
| Eastern and Central | North of the River MWD | 8,400 | 8,800 | 9,200 | 10,000 | 11,000 | 11,000 |
| Eastern and Central | Oildale MWC | 8,173 | 7,930 | 7,768 | 8,524 | 9,324 | 10,194 |
| Eastern | Greenfield CWD | 2,843 | 3,108 | 3,398 | 3,715 | 4,061 | 4,440 |
| Central | Stockdale MWC and Annex | 219 | 239 | 261 | 286 | 312 | 341 |
| Central | Victory MWC | 224 | 245 | 268 | 293 | 320 | 350 |
| Western | Buttonwillow CWD | 142 | 155 | 170 | 186 | 203 | 222 |
| Eastern and Central | Vaughn WC | 11,104 | 14,962 | 15,383 | 17,479 | 19,576 | 21,402 |
| Western | West Kern WD | 27,170 | 26,983 | 27,080 | 27,177 | 27,275 | 27,373 |
| Central | City of Delano | 9,271 | 11,785 | 11,785 | 13,021 | 14,387 | 15,900 |
| Central | City of Shafter | 4,739 | 5,037 | 5,322 | 5,171 | 5,708 | 6,302 |
| Central | City of Wasco | 4,681 | 6,661 | 8,925 | 11,469 | 14,293 | 17,397 |
| Central | McFarland MWC | 1,765 | 1,929 | 2,109 | 2,306 | 2,521 | 2,756 |
| Eastern | Arvin CSD | 3,472 | 3,796 | 4,150 | 4,538 | 4,961 | 5,424 |
| Eastern | Lamont PUD | 4,865 | 5,319 | 5,815 | 6,358 | 6,951 | 7,600 |
| Central and Western | Lost Hills UD | 462 | 506 | 553 | 604 | 661 | 723 |
| Eastern | Tehachapi-Cummings CWD | 367 | 401 | 439 | 480 | 524 | 573 |
| | **TOTAL** | **217,226** | **237,028** | **237,257** | **257,014** | **278,795** | **301,736** |

Source: Appendix T, Table 31
Note: The urban estimates exclude a small amount of urban demand in Casa Loma WC and Mettler CWD in the Central Subarea due to lack of available data. City of MacFarland demand is included in the MacFarland MWC totals.

Based on the data sources summarized above and in Appendix T, Project Area urban water demands in single dry and multiple dry years were also estimated under existing and future conditions. As shown in Table 4.17-16, urban water demands are estimated to be slightly lower in a single dry year and slightly higher during multiple dry years compared with normal or average year projections.

**Table 4.17-16: Project Area Average, Single Dry and Multiple Dry Year Urban Water Demand 2015-2035 (AFY)**

| | 2015 | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|
| Average (Average) Year | 237,028 | 237,257 | 257,014 | 278,795 | 301,736 |
| Single Dry Year | 234,938 | 236,461 | 255,928 | 277,418 | 299,970 |
| Multiple Dry Year | 239,853 | 241,170 | 261,009 | 282,901 | 305,885 |

Source: Appendix T, Tables 34-36

Table 4.17-17 shows existing and projected future Project Area urban water demand by Subarea for 2015-2035. Most of the urban water use in the Project Area occurs in the Eastern Subarea (49%) and Central Subarea (41%). The Western Subarea has a lower resident population and accounts for about 9% of Project Area urban water demand in an average year.

**Table 4.17-17: Subarea Average, Single Dry and Multiple Dry Year Urban Water Demand 2015-2035 (AFY)**

| Subarea | 2015 | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|
| **Average Year** | | | | | |
| Western | 27,471 | 27,613 | 27,760 | 27,912 | 28,070 |
| Central | 89,458 | 91,015 | 101,205 | 112,575 | 124,883 |
| Eastern | 120,100 | 118,628 | 128,049 | 138,308 | 148,783 |
| **TOTAL** | **237,028** | **237,257** | **257,014** | **278,795** | **301,736** |
| **Single Dry Year** | | | | | |
| Western | 30,169 | 30,321 | 30,478 | 30,640 | 30,808 |
| Central | 86,212 | 88,957 | 98,957 | 110,137 | 122,221 |
| Eastern | 118,557 | 117,182 | 126,493 | 136,640 | 146,942 |
| **TOTAL** | **234,938** | **236,461** | **255,928** | **277,418** | **299,970** |
| **Multiple Dry Years** | | | | | |
| Western | 29,973 | 30,124 | 30,280 | 30,441 | 30,609 |
| Central | 86,771 | 89,494 | 99,535 | 110,759 | 122,890 |
| Eastern | 123,110 | 121,551 | 131,194 | 141,700 | 152,387 |
| **TOTAL** | **239,853** | **241,170** | **261,009** | **282,901** | **305,885** |

Source: Appendix T, Tables 34-36

## Oil and Gas Exploration and Production Demand

As discussed in Appendix T and in Section 4.9, Hydrology and Water Quality, oil and gas exploration and production activities require the use of produced water, mainly for EOR steam and water injection purposes, and M&I supplies for well drilling and maintenance, well stimulation treatment, supplemental steam generation, and other operations that require higher quality water.

### Produced Water Demand

Produced water is generated during the oil and gas extraction process from water that is located in oil-bearing formations. Oil and gas production wells bring a mixture of hydrocarbons and water to the surface. The extracted hydrocarbon and water mixture is routed to tanks and other facilities to separate the lighter oil and gas contents from heavier produced water. As shown in Figure 4.9-7 (see Section 4.9, Hydrology and Water Quality), the ratio of produced water to oil recovered in the Project Area has increased from under 6 units (e.g., gallons, barrels, or AF) of produced water for each unit of oil recovered in 2002 to nearly 13 units of produced water for each unit of oil recovered in 2012 and 2013. About 231,260 AF of produced water was generated along with the extraction of about 18,300 AF (141.6 million barrels) of oil in the Project Area in 2013.

As summarized in Section 4.9, Water Quality and Hydrology, Project Area produced water generally has relatively high levels of total dissolved solids (TDS), contains naturally-occurring residual oil, grease and other hydrocarbon-related constituents, and may contain elevated levels of boron, chloride or other constituents that tend to occur in hydrocarbon-bearing formations. About 38% of the total volume of produced water in 2012, or 88,812 AF, was reused for EOR water and steam injections, pressure maintenance, well pulling, coil tubing activities, dust control, and surface facility construction. As shown in Table 4.17-18, produced water demand for oil and gas reuse is expected to be about 93,106 AF in 2015 and to increase to 121,412 AF by 2035.

**Table 4.17-18: Oil and Gas Exploration and Production Demand for Produced Water 2012-2035 (AFY)**

| 2012 | 2015 | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|
| 88,812 | 93,106 | 100,182 | 107,258 | 114,334 | 121,412 |

Source: Appendix T, Table 19 and Table 39

As discussed in Section 4.9, Hydrology and Water Quality, about 32,771 AFY of relatively high quality produced water from oilfields located along the base of Sierra Nevadas in the Eastern Subarea is provided to CWD for agricultural reuse. Produced water reuse for irrigation requires additional filtration and treatment to meet applicable water quality standards, including waste discharge requirements (WDRs) issued by the Central Valley Regional Water Quality Board (CVRWQCB). The Applicant has projected that 32,771 AF of produced water will continue to be supplied to CWD in the Eastern Subarea through 2035. As discussed below, additional produced water reuse has been proposed or considered, but none has been approved or implemented in other Project Area locations.

### M&I Water Demand

As discussed in Appendix T, oil and gas exploration and production demand for M&I water is projected in this EIR based on the ratio of water use for applicable activities per production well in the Project Area during 2012. M&I water is used for oil and gas operations that require higher water quality than can typically be obtained from produced water to protect equipment, avoid potential chemical reactions, and to avoid potential water quality impacts during well drilling when muds and drilling fluids could come into contact with water-bearing formations before well casings and cement seals have been installed. M&I water is used by oil and gas operators for: (a) drilling muds; (b) well stimulation treatments; (c) mud service, cementing, acidizing, and coil tubing maintenance; (d) well pulling; (e) domestic water use in oilfields and related structures; (f) well abandonment; and (g) steam production. As shown in Table 4.17-19, oil and gas M&I water demand in the Project Area was about 8,778 AF in 2012.

**Table 4.17-19: Oil and Gas Exploration and Production Demand for M&I Water 2012 (AF)**

| | |
|---|---|
| New Well Construction (Drill Mud + Well Stimulation) | 589 |
| Maintenance (Mud Services + Cementing) | 61 |
| Maintenance (Acidizing + Coil Tubing) | 52 |
| Maintenance (Well Pulling + Domestic Water) | 594 |
| Well Abandonment | 202 |
| Steam Production | 7,279 |
| **TOTAL** | 8,778 |

Source: Appendix T, Table 28

As discussed in Chapter 3, Project Description, the Project Applicant has estimated that up to 2,697 new production wells could be subject to Oil and Gas Conformity Review under the proposed Zoning Ordinance amendment each year, 64% of which would be located in the Western Subarea, 5% in the Central Subarea, and 31% in the Eastern Subarea. As shown in Table 4.17-20, oil and gas M&I demand could increase to 11,760 AFY (or to 12,936 AFY, including a 10% contingency factor) by 2035 under these assumptions.

**Table 4.17-20: Oil and Gas Exploration and Production Demand for M&I Water 2015-2035 (AFY)**

| | 2015 | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|
| Projected M&I Use | 9,660 | 10,185 | 10,710 | 11,235 | 11,760 |
| Projected M&I demand with 10% contingency | 10,626 | 11,204 | 11,781 | 12,359 | 12,936 |

Source: Appendix T, Table 30

Oil and gas operators obtain M&I water from a variety of sources, including groundwater wells, deliveries from Project Area water purveyors, spot market purchases, or in truck-mounted tanks that are filled at industrial locations served by M&I suppliers. As discussed in Appendix T, 52 water purveyors were surveyed to determine if each had adopted an UWMP or an agricultural water management plan (AWMP) that identified oil and gas supply as a component of total service demand. The analysis identified 21 purveyors with adopted UWMPs or AWMPs that did not discuss oil and gas demand, 25 purveyors for which UWMPs or AWMPs were not available, and six purveyors with UWMPs or AWMPs that addressed oil and gas demand. The six purveyors include the Vaughn Water Company, West Kern Water District, Oildale Mutual Water Company, Rag Gulch Water District 2008 AWMP (currently incorporated into the Kern-Tulare Water District AWMP, which does not address oil and gas demand), Belridge Water Storage District , and the Lost Hills Water District.

As shown in Table 4.17-21, the Belridge Water Storage District (1,600 AFY) and the Lost Hills Water District (708 AFY) were the only purveyors that quantified the amount of water expected to be provided to oil and gas operators over time. These two districts estimate that about 2,308 AFY of water will be supplied to oil and gas operators. A review of approved online well stimulation treatment notices posted by DOGGR between December 3, 2013, and March 6, 2014, identified the Belridge Water Storage District, the West Kern Water District, other "canal" and "Tulare" water, and groundwater as M&I water supply sources for oil and gas well stimulation activities (Appendix S).

**Table 4.17-21: Oil and Gas Exploration and Production Demand Identified in Project Area UWMPs and AWMPs (AFY)**

| | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|---|
| Belridge 2012 AWMP | 1,600 | 1,600 | 1,600 | 1,600 | 1,600 | 1,600 |
| Lost Hills Water District 2012 AWMP | 708 | 708 | 708 | 708 | 708 | 708 |
| **TOTAL** | **2,308** | **2,308** | **2,308** | **2,308** | **2,308** | **2,308** |

Source: Appendix T, Table 3

As discussed in Appendix T, and in Impact 4.17-4, the analysis of supply and demand indicates that surplus water is not available in the Project Area. Any new use reduces the availability of water to another Project Area user, or increases the existing and severe regional groundwater overdraft if supply shortfalls are addressed by increased groundwater extraction. Due to the variability of oil and gas M&I supply sources from year to year, the current drought that has severely restricted the availability of imported and local surface supplies, and for conservative analysis purposes, this EIR assumes that all oil and gas demand for M&I-quality water are met by using M&I-quality groundwater.

## Project Area Demand Summary

Table 4.17-22 summarizes the Project Area agricultural, urban, and oil and gas water demands in average, single dry, and multiple dry years for 2015 and 2035.

**Table 4.17-22: Summary of Project Area Average, Single Dry and Multiple Dry Year Water Demand, 2015 and 2035 (AF)**

| | Average Year | Single Dry Year | Multiple Dry Year |
|---|---|---|---|
| **2015** | | | |
| Urban Demand (M&I) | 237,029 | 234,938 | 239,854 |
| Agricultural Demand (Excluding Produced Water) | 2,635,916 | 2,635,916 | 2,635,916 |
| Agricultural Demand (Produced Water Reuse) | 32,771 | 32,771 | 32,771 |
| Oil and Gas M&I Demand | 9,660 | 9,660 | 9,660 |
| Oil and Gas Produced Water Demand | 93,106 | 93,106 | 93,106 |
| **TOTAL** | **3,008,482** | **3,006,391** | **3,011,307** |
| **2035** | | | |
| Urban Demand (M&I) | 301,736 | 299,971 | 305,886 |
| Agricultural Demand (Excluding Produced Water) | 2,635,916 | 2,635,916 | 2,635,916 |
| Agricultural Demand (Produced Water Reuse) | 32,771 | 32,771 | 32,771 |
| Oil and Gas M&I Demand | 11,761 | 11,761 | 11,761 |
| Oil and Gas Produced Water Demand | 121,412 | 121,412 | 121,412 |
| **TOTAL** | **3,103,596** | **3,101,831** | **3,107,746** |

Source: Appendix T, Table 39

California is currently experiencing a major period of drought, including below normal rainfall and mountain snowpack levels that have persisted since 2012. On January 17, 2014, Governor Brown proclaimed a drought state of emergency and directed state officials to take all necessary actions to prepare for these drought conditions (State of California 2014). California obtains about one-third of its water supply from the snowmelt in the Sierra Nevadas. Snowmelt is the primary source for water, which is delivered to the Project Area through state and federal canal projects. As of March 12, 2015, the Sierra Nevadas snowpack was only 17% of the historical average for the time of year.

On April 1, 2015, Governor Brown issued an executive order directing the SWRCB to impose a 25% reduction on the state's 400 local water supply agencies. The agencies will be responsible for implementing restrictions to cut back on water use and for monitoring compliance. The order would impose varying degrees of cutbacks on water use affecting homeowners, farms, and other businesses, as well as the maintenance of cemeteries and golf courses. The order included additional water conservation and planning measures, and the potential installation of salinity barriers in the Sacramento Delta in response to historically low snowpack levels in the state (State of California 2015). The executive order also requires that groundwater elevation monitoring be implemented throughout the state, including the Project Area, by the end of 2015. On May 22,

2015, the SWRCB approved a program under which riparian water right holders in the Sacramento-San Joaquin River Delta would voluntarily cut back water use by 25% from 2013 levels in exchange for assurances that the rights holders will not face further riparian curtailment during the June-September growing season (SWRCB 2015). In April 2015, the state Department of Water Resources determined that the drought is continuing into a fourth year (DWR 2014, 2015).

# Electricity and Natural Gas

Pacific Gas and Electric Company (PG&E), Southern California Edison (SCE), and Southern California Gas Company (SoCalGas) provide electricity and natural gas to Kern County customers, with PG&E generally servicing the westerly portion of the County. SoCalGas also provides gas to customers in the western County. PG&E's service territory, referred to as its "Kern Division," covers a large area of the County and includes Arvin, Bakersfield, Maricopa, McFarland, Ridgecrest, Shafter, Taft, Wasco, and unincorporated portions of the County. Within this area, PG&E serves gas and/or electricity to 154,000+ residential customers and about 23,000 commercial and industrial customers. SCE serves electricity only to most of the remaining parts of the County, including the mountain, foothill, and southern desert communities of the County. This includes Delano, Lake Isabella, and Tehachapi, Mojave, Rosamond, and other unincorporated areas. SoCalGas provides gas-only service to various regions of Kern County.

Table 4.17-23 provides an estimate of the electricity and natural gas use in 1997, 2008, and 2012 for oil and gas production. The data indicate that there is an increased use of electricity over the time period, but a decreased used natural gas.

**Table 4.17-23: Estimated Project Area (DOGGR District 4) Electricity and Natural Gas Use 1997, 2008 and 2012 for Oil and Gas Production**

| **Electricity** | | | |
|---|---|---|---|
| **Year** | **Crude Oil production (kbbl)** | **Electrical use factor, Kkwh/kbbl** | **Annual use (Gwh)** |
| 1997 | 213,053 | 12.98 | 2,765 |
| 2008 | 162,286 | 20.70 | 3,359 |
| 2012 | 141,694 | 25.18 | 3,568 |
| **Natural Gas** | | | |
| **Year** | **Crude Oil production (kbbl)** | **Natural gas use factor, MBTU/kbbl** | **Annual use (TBtu)** |
| 1997 | 213,053 | 1,147 | 244 |
| 2008 | 162,286 | 1,335 | 217 |
| 2012 | 141,694 | 1,444 | 205 |

1997 and 2008 calculated from statewide energy intensity factors (CEC 2013; see Table 2) and reported District 4 production (DOGGR 1998, 2009); 2012 estimated from 1997-2008 statewide energy intensity factors (CEC 2013; see Table 2) pro-rated by reported statewide crude oil production decline during 1997-2008 reported in the 2013 CALEB update (CEC 2013) and reported District 4 production (DOGGR 2013).

Oil and gas extraction energy use in the Project Area is a function of the location and amount of crude oil production, neither of which can be predicted with reasonable certainty under future conditions. If recent trends persist, oil production in the Project Area would require additional energy per barrel produced, but total energy use would continue to decline. Therefore, no new power generation plants or new major gas infrastructure would be needed to support the anticipated energy needs for the Project.

# Wastewater Disposal

## Kern County Waste Management Department

The Kern County Waste Management Department (WMD) operates two County Sanitation Districts: Kern Sanitation Authority (KSA) and Ford City-Taft Heights Sanitation District, two wastewater plants (the KSA Treatment Plant and Taft Treatment Plant owned by the County of Kern (and two County Service Area [CSA]) wastewater collection systems. The Board of Supervisors serves as the members of the Board of Directors for the two districts.

Wastewater treatment services within Kern County are provided by a number of local agencies, and the current flow and capacity of these facilities are presented in Table 4.17-24.

**Table 4.17-24: Wastewater Flows and Capacity of Treatment Facilities in the Kern**

| Agency | Wastewater Facility | Current Flow (mgd) | Capacity Flow (mgd) |
|---|---|---|---|
| Kern Sanitation Authority (KSA) | Buena Vista Aquatic Recreation Area Wastewater System[(a)] | 0.016 | 0.2[(m)] |
| California City | California City Wastewater Treatment Plant[(b)] | 0.8 | 1.5 |
| City of Taft | Taft Federal Correctional Institution's Wastewater Treatment Plant[(a)] | 0.35 | 0.5 |
| City of Arvin | City of Arvin Wastewater Treatment Plant[(c)] | 1.4 | 1.7 |
| City of Bakersfield | City of Bakersfield Treatment Plant 2[(d)] | 16.5 | 25 |
| City of Bakersfield | City of Bakersfield Treatment Plant 3[(a)] | 16.4[(e)] | 32 |
| City of Delano | City of Delano Wastewater Treatment Facility[(a)] | 4.9 | 8.8 |
| City of McFarland | City of McFarland Wastewater Treatment Facility[(f)] | 1.1 | 1.55 |
| City of Ridgecrest | City of Ridgecrest Wastewater Treatment Plant[(g)] | 2.6 | 3.6 |
| North of the River Sanitary District | City of Shafter/North of River Sanitary District Number-1 Wastewater Plant[(h)] | 5.6 | 7.5 |
| City of Tehachapi | City of Tehachapi Wastewater Treatment Plant[(i)] | 0.830 | 1.25 |
| City of Wasco | City of Wasco Wastewater Treatment Facility Plant[(a)] | 1.7 | 3.0 |
| Golden Hills Sanitation Company | Golden Hills Sanitation Company Wastewater Treatment Plant[(g)] | 0.025 | 0.200 |
| Kern Sanitation Authority | Kern Sanitation Authority Wastewater Treatment Plant[(i)] | 3.8 | 4.0 |

**Table 4.17-24: Wastewater Flows and Capacity of Treatment Facilities in the Kern**

| Agency | Wastewater Facility | Current Flow (mgd) | Capacity Flow (mgd) |
|---|---|---|---|
| Lamont Public Utilities District | Lamont Public Utilities District Plant[(k)] | 1.4 | 2.0 |
| KSA Service Area 39.8 | Reeder Tract County Service Area 39.8 Wastewater System[(a)] | 0.25 | 0.04[(m)] |
| Minter Field | Shafter Field Airport District Wastewater Plant[(a)] | 0.15 | 0.2 |
| KSA | Sheriff's Lerdo Facility Wastewater System[(a)] | 0.30 | 0.54 |
| Stallion Springs Community Services District | Stallion Springs Community Services District Wastewater Treatment Facility[(i)] | 0.038 | 0.25 |
| City of Taft | Taft Municipal Wastewater Treatment Facility[(a)] | 1.3 | 1.5 |

Sources:
(a) Kennedy/Jenks Consultants 2011
(b) California City Planning Department 2014
(c) Veloia Water 2014
(d) City of Bakersfield Public Works Wastewater Division 2015a
(e) City of Bakersfield Public Works Wastewater Division 2015b
(f) City of McFarland 2015
(g) Kreiger and Stewart, Inc. 2011
(h) City of Shafter 2014
(i) Integrated Resource Management, LLC 2008
(k) Lamont Public Utility District, n.d.
(m) Kern County Waste Management Department 2015

# Produced Water/Wastewater Disposal

Groundwater that exists naturally in oil and gas reservoirs is brought to the surface when oil and gas are extracted from these reservoirs. This water is known as "produced water." Produced water that is not reused for oilfield operations, or that is not treated and supplied to other users for agricultural irrigation, is disposed by oilfield operators in surface impoundments (ponds) in accordance with WDRs issued by the CVRWQCB or is injected into Class II injection wells (discussed in more detail in Section 4.9, Hydrology and Water Quality) permitted by DOGGR. During 2012, oilfield operators disposed of about 30,000 AF of produced water into surface ponds, and 84,500 AF of produced water was disposed by injection into Class II wells in the Project Area. The generation, reuse, and disposal of produced water, potential impacts associated with produced water activities, and mitigation measures required to reduce potentially significant impacts to less than significant levels are discussed in Section 4.9, Hydrology and Water Quality.

# Stormwater Drainage

The Kern County Engineering and Survey Services Department manages storm drain systems in Kern County. Development sites are required to provide for their own onsite retention or show that existing facilities have sufficient capacity to carry the additional runoff. These onsite retention basins are usually maintained by a County service area if they are for a residential project or privately maintained by the developer through a special district or other entity if they are for a commercial development. The County declines to assume liability for commercial or

industrial drainage sumps, due to the issues of increased nonpoint-source contamination, particularly from industrial uses.

As discussed in Section 4.9, Hydrology and Water Quality, Impact 4.9-5, about 97.4% of the Project Area consists of Tier 1 and Tier 2 lands. Tier 1 lands, in which oil and gas activities are the predominant land use, represent 10.1% of the Project Area, while Tier 2 lands, where agriculture is the predominant use, represent 87.3% of the Project Area. In addition, 97% of the projected annual disturbance of up to 4,856 acres would occur in Tier 1 (4,400 acres) or Tier 2 (298 acres) areas. Urban-scale constructed stormwater drainage systems occur, to a limited extent, in Tier 1 and Tier 2 areas. Most drainage is managed on a site-specific basis in Project Area oilfields and agricultural locations. Potential project-related development would affect, at most, 0.3% of the acreage in Tiers 3, 4, and 5 that could generate runoff to existing or planned regional or constructed stormwater drainage systems.

# Solid Waste

## Kern County Waste Management Department

The Kern County WMD provides environmentally safe management of solid waste and is responsible for operating seven landfills, five transfer stations, and three bin sites throughout the County. WMD landfills are located in Bakersfield (Bena Landfill), Boron, Mojave-Rosamond, Ridgecrest, Shafter-Wasco, Taft, and Tehachapi.

WMD also operates two special waste facilities and provides information to the residents of Kern County regarding recycling and ways to reduce waste. In addition, the WMD oversees the operation of several wastewater treatment facilities.

Solid waste is a mixture of items discarded as useless or unwanted arising from residential, commercial, industrial, institutional, agricultural, and mining activities. These wastes include construction and demolition (C&D) -generated waste as well as inert wastes. In most cases, solid waste is hauled directly to Class III landfills, with the remainder being taken to transfer stations, resource recovery centers, or refuse-to-energy facilities. Class III landfills typically handle the disposal of non-hazardous waste. The general waste classifications utilized by the Kern County WMD are:

- Non-hazardous solid waste, which consists mostly of household garbage, commercial wastes, agricultural waste, and litter.

- Special waste, which is any waste that requires special handling, including infectious waste, pesticide containers, sewage sludge, oilfield waste, household hazardous waste, and asbestos waste.

- Designated waste, which is a waste that consists of or contains pollutants that could be released at concentrations in excess of applicable water quality objectives and standards

or hazardous waste that has been granted a variance from hazardous waste management requirements.

- Hazardous waste, which is a waste that, because of its quantity, concentration, physical, chemical, or infectious characteristics, may either: (a) cause or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness; or (b) pose a substantial present or potential hazard to human health or the environment when improperly managed.

- Industrial wastes, which are hazardous and non-hazardous by-products produced by oil and gas extraction, pesticide, paper, petrochemical, rubber, plastics, electronics, and other industries.

Not all of the above-defined wastes may be disposed of at a landfill. State law regulates the disposal of wastes at landfills.

Kern County is responsible for compliance with the California Integrated Wastewater Management Act of 1989, Assembly Bill (AB) 939. AB 939 requires that cities and counties reduce the amount of solid waste being sent to landfills by 50% by January 1, 2000, and requires cities and counties to prepare AB 939 solid waste planning documents. These documents include the Source Reduction and Recycling Element (SRRE), the Household Hazardous Waste Element (HHWE), and the Non-Disposal Facility Element (NDFE). All three of these documents have been approved for Kern County, as well as an Integrated Waste Management Plan approved February 1998 by the California Integrated Waste Management Board (California Integrated Waste Management). The Kern County Integrated Waste Management Plan is the long-range planning document for landfill facilities.

C&D waste is heavy, inert material. This material creates significant problems when disposed of in landfills. Since C&D waste is heavier than paper and plastic, it is more difficult for counties and cities to reduce the tonnage of disposed waste. For this reason, C&D waste has been specifically targeted by the State of California for diversion from the waste stream. Projects that will generate C&D waste should emphasize deconstruction and diversion planning, rather than demolition. Deconstruction is the planned and organized dismantling of a prior construction project, which allows maximum use of the deconstructed materials for recycling in other construction projects and sends a minimum of the deconstruction material to landfills.

The Kern County Waste Management Department administers or sponsors the following recycling programs that contribute to meeting the State-mandated solid waste diversion goals:

- Recycling programs at landfills to recycle or divert a wide variety of products, such as wood waste, cathode ray tubes, tires, inert materials, appliances, etc.

- Kern County and the City of Bakersfield operate drop-off recycling centers for household recyclables located within the unincorporated metropolitan area and within the city. County and City drop-off recycling centers may be used by both County and City residents.

- Financial assistance for the operation of the City of Bakersfield Green Waste Facility.
- Kern County Special Waste Facility provides disposal of household hazardous waste services to all County residents.
- Cosponsors semi-annual Bulky Waste Collection Events, which are held in the Bakersfield area and are available to both County and city residents.
- Participates jointly with the City of Bakersfield on a Christmas tree recycling campaign.
- Cosponsors jointly with the Community Clean Sweep, a telephone book recycling program.
- Sponsors the Community Clean Sweep to conduct summer workshops called "Trash to Treasure," which educates children on recycling and other Kern County Waste Management Department programs.
- Operates, in collaboration with the Community Clean Sweep, an innovative elementary school education program called "Clean Kids Hit the Road Puppet Show."
- Provides recycling trailers to churches, schools, and non-profit organization.

## Landfills

Table 4.17-25 identifies the landfill class, maximum cubic yards, maximum tons per day, cubic yards per year, closure date, and remaining capacity date of the landfills in Kern County.

**Table 4.17-25: Landfills in Kern County**

| Landfill Name and Location | Landfill Class | Permitted Capacity | | Remaining Cubic Yards | Closure Date Under Current Permits | Remaining Capacity Date |
|---|---|---|---|---|---|---|
| | | Max Cubic Yards Per Year | Max Tons Per Day | | | |
| **Public Landfills** | | | | | | |
| Bakersfield Metropolitan (Bena) Sanitary Landfill<br>2951 Neumarkel Road,<br>Caliente, CA 93220 | Class III | 53,000,000 | 4,500 | 32,808,260 | April 1, 2046 | July 01, 2013 |
| Boron Sanitary Landfill<br>11400 Boron Avenue,<br>Boron, CA 93516 | Class III | 1,057,000 | 200 | 94,851 | January 1, 2037 | January 19, 2011 |
| Clean Harbors<br>Buttonwillow LLC<br>2500 West Lokern Road<br>Buttonwillow, CA 93206 | Class I | 14,293,760 | 4,000 | 183,960,000 | January 1, 2040 | May 29, 2014 |
| McKittrick Waste Treatment Site<br>56533 Highway 58,<br>McKittrick, CA 93251 | Class II | 2,091,800 | 1,180 | 662,221 | December 31. 2029 | May 1, 2014 |
| Mojave-Rosamond Sanitary Landfill<br>400 Silver Queen Road,<br>Mojave, CA 93501 | Class III | 2,262,243 | 470 | 606,848 | December 31. 2019 | March 11, 2010 |
| Ridgecrest Recycling & Sanitary Landfill<br>3301 Bowman Road<br>Ridgecrest, CA 93555 | Class III | 10,500,000 | 701 | 5,037,428 | December 31, 2045 | September 16, 2010 |
| Shafter-Wasco Recycling & Sanitary Landfill<br>17621 Scofield Ave.,<br>Shafter, CA 93263 | Class III | 21,895,179 | 1,500 | 14,534,860 | December 31, 2027 | May 23, 2014 |
| Taft Recycling & Sanitary Landfill<br>13351 Elk Hills Road,<br>Taft, CA 93268 | Class III | 11,000,000 | 800 | 7,380,708 | December 31, 2078 | February 01, 2011 |

**Table 4.17-25: Landfills in Kern County**

| Landfill Name and Location | Landfill Class | Permitted Capacity | | Remaining Cubic Yards | Closure Date Under Current Permits | Remaining Capacity Date |
|---|---|---|---|---|---|---|
| | | Max Cubic Yards Per Year | Max Tons Per Day | | | |
| Tehachapi Sanitary Landfill<br>12001 Tehachapi Blvd.,<br>Tehachapi, CA 93561 | Class III | 3,388,723 | 1,000 | 329,171 | January 1, 2016 | May 23, 2014 |
| **Private Use Landfills** | | | | | | |
| Edwards Air Force Base (AFB)<br>Main Base Sanitary Landfill, (1) (a)<br>220 Landfill Road,<br>Edwards Air Force Base, CA 93524 | Class III | 2,250,000 | 120 | 1,078,875 | December 31, 2028 | Not Available |
| H.M. Holloway Landfill<br>13850 Holloway Road,<br>Lost Hills, CA 93249 | Class II,<br>Class III | 12,600,000 | 2,000 | 7,522,934 | January 31, 2019 | December 31, 2013 |
| U.S. Borax Inc.-Gangue/ (2) (b)<br>Refuse Waste Pile<br>14486 Borax Road,<br>Boron, CA 93516 | Class III | 8,500,000 | 443 | 908,496 | January 1, 2023 | May 29, 2014 |

Sources:
CalRecycle 2013a
(a) CalRecycle 2009
(b) CalRecycle 2013b
Notes:
(1) Not a public landfill; only accepts waste generated at Edwards AFB.
(2) Not a public landfill; only accepts waste derived solely from US Borax Boron Operations.
Operators are only required to update information every five years.

# 4.17.3 Regulatory Setting

# Federal

## Clean Water Act (33 U.S.C. §1251 et seq.)

The 1972 Federal Water Pollution Control Act and its 1977 amendments, collectively known as the Clean Water Act (CWA), established national water quality goals and the basic structure for regulating discharges of pollutants into the waters of the United States. Section 402 of the CWA establishes the National Pollutant Discharge Elimination System (NPDES) to regulate the discharge of pollutants into waters of the United States. Section 404 of the CWA regulates the discharge of fill or dredged materials to waters of the U.S. (see Section 4.4, Biological Resources). Permits issued under the CWA limit the composition and, in some cases, the volume of a discharge and the concentrations of individual pollutants. Discharge requirements are based on available technology (technology-based effluent limits) and on the quality of the receiving waters (water quality-based effluent limits).

The CWA allows for the delegation of implementation authority to the states. Under the federal or delegated program, all the information required for permit application and monitoring for permit compliance are considered public, with the exception of certain confidential business information that may be considered "trade secret." In addition, the program requires delegated states to establish water quality standards for specific water bodies and to designate the types of pollutants to be regulated, including total suspended solids and oil and grease. In California, NPDES permitting authority is delegated to the SWRCB and nine Regional Water Quality Control Boards (RWQCBs). The Project Area is within the jurisdiction of the CVRWQCB.

Under the NPDES program, all point sources that discharge directly into waters of the United States are required to obtain a permit regulating their discharge. Each NPDES permit specifies effluent limitations for particular pollutants as well as monitoring and reporting requirements for the proposed discharge. Construction activities in the Project Area that could result in a discharge to waters of the United States are subject to the California NPDES General Permit for Stormwater Associated with Construction Activities (Construction Activity NPDES Storm Water General Permit, 2009-0009-DWQ and 2010-0014-DWQ). Other stormwater discharges could be subject to the Industrial General Permit issued under the NPDES program, to a municipal separate storm sewer system NPDES permit issued for municipal locations, or to individual NPDES permits issued to specific landowners or land use operators.

Discharges of treated wastewater to surface waters of the United States require a NPDES permit. In California, the RWQCBs administer the issuance of these federal permits. Obtaining a NPDES permit requires preparation of detailed information, including characterization of wastewater sources, treatment processes, and effluent quality. The conditions of a permit are subject to many factors, such as basin plan water quality objectives, impaired water body status of the receiving water, historical flow rates of the receiving water, effluent quality and flow, the California Toxics Rule (CTR), the SWRCB's State Implementation Plan (SIP) implementing the

CTR, and established Total Maximum Daily Loads (TMDLs) for various pollutants. More information about NPDES permits that apply to oil and gas operations is provided in the discussion of state permitting below.

Section 401 of the CWA requires that an applicant requesting a federal permit for an activity that may result in a discharge into waters of the United States obtain state certification that the proposed activity will not violate state and federal water quality standards. State water quality standards are discussed below. The CVRWQCB implements Section 401 of the CWA in the Project Area.

### Total Maximum Daily Loads

Under Section 303(d) of the CWA, states, territories, and authorized tribes are required to develop lists of impaired waters. These are waters that exceed applicable water quality standards. The law requires that these jurisdictions establish priority rankings for waters on the lists and develop TMDLs for these waters. A TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards.

There are no impaired waters listed within the Project Area, and no TMDLs have been established for surface waters in the Project Area.

### Safe Drinking Water Act

The Safe Drinking Water Act of 1974 (SDWA) gave the U.S. Environmental Protection Agency (EPA) the authority to set standards for contaminants in drinking water supplies. The EPA was required to establish primary regulations for the control of contaminants that affected public health and secondary regulations for compounds that affect the taste, odor, and aesthetics of drinking water. Under the provisions of SDWA, the California Department of Health Services (DHS) has primary enforcement responsibility. Title 22 of the California Administrative Code establishes DHS authority and stipulates state drinking water quality and monitoring standards.

### Federal Energy Regulatory Commission

The Federal Energy Regulatory Commission (FERC) regulates and oversees the energy industries in the interest of the American public. The Energy Policy Act of 2005 gave FERC additional responsibilities, including interstate commerce, licenses and inspections, energy markets, and penalizing energy organizers and individuals who violate FERC rules in the energy markets.

## State

### California Energy Commission

The California Energy Commission (CEC) regulates the provision of natural gas and electricity within the state. The CEC is the state's primary energy policy and planning agency. Created in 1974, the CEC has five major responsibilities: forecasting future energy needs and keeping

historical energy data, licensing thermal power plants 50 megawatts (MW) or larger, promoting energy efficiency through appliance and building standards, developing energy technologies and supporting renewable energy, and planning for and directing the State of California's response to energy emergencies.

## Water Code Sections 10910 et seq.

Water Code Section 10910 et seq. were amended by Senate Bill (SB) 610 in 2001 to require that a WSA be prepared by a public water system for certain projects subject to the California Environmental Quality Act (CEQA), including: a proposed residential development of more than 500 dwelling units; a proposed shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet of floor space; a proposed commercial office building employing more than 1,000 persons or having more than 250,000 square feet of floor space; a proposed hotel or motel, or both, having more than 500 rooms; a proposed industrial, manufacturing, or processing plant, or industrial park planned to house more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area; a mixed-use project that includes one or more of the projects specified in this subdivision; or a project that would demand an amount of water equivalent to, or greater than, the amount of water required by a 500–dwelling-unit project. Water Code Section 10910(b) further provides that the CEQA lead agency may prepare the WSA if a public water system that may supply water for the project cannot be identified. As discussed above, no public water system would provide more than a small portion of the water required for oil and gas activities in the Project Area.

The Applicant's consultant, Kennedy/Jenks Consultants, completed a draft water supply and demand analysis that includes the required elements of a WSA. The draft WSA was independently reviewed by the County and helped inform the water supply and demand analysis in this EIR. A copy of the draft WSA is included in Appendix T of this EIR.

## Senate Bill 1281, Disclosure of Oil and Gas Water Use and Disposal

SB 1281, effective January 2015, amended Sections 3226.3 and 3227 of the Public Resources Code (PRC) to require that: (1) DOGGR provide the SWRCB with an annual "inventory of all unlined oil and gas field sumps;" and (2) well operators provide DOGGR with quarterly information regarding the source and disposition of water produced by or used in oil and gas production in addition to existing obligations to report gas and oil production and produced water information on a monthly basis. The new quarterly reporting requirements include information regarding: (a) the source and volume of any water, including produced water (also subject to monthly reporting), including the water used to generate or make up the composition of any injected fluid or gas, identified by water source if more than one water source is used; (b) the volume of untreated water suitable for domestic or irrigation purposes used in oil and gas operations; (c) the treatment of water and the use of treated or recycled water in oil and gas field activities including, but not limited to, exploration, development, and production; and (d) the specific disposition of all water used in or generated by oil and gas field activities, including

water produced from each well as reported in an operator's monthly reports, and separated by volume of disposition if more than one disposition method is used.

The amendments retain certain previous monthly reporting requirements in Section 3227, including: (1) the amount and gravity of oil, gas and water, and the number of days fluid was produced from each well; (2) the number of drilling, producing, injecting, or idle wells owned or operated by a person subject to reporting requirements; (3) the disposition of gas produced from each field; (4) the disposition of produced water each field and the amount of fluid or gas injected into each well used for enhanced recovery, underground storage of hydrocarbons, or wastewater disposal.

DOGGR has collected and reported the monthly data described in Section 3227 for several years. The first quarterly reports pursuant to SB 1281 amendments were due to be filed by well operators by June 1, 2015 (DOGGR 2015).

DOGGR has indicated that the new information required by SB 1281 would be published after the close of each quarterly reporting period.

## Sustainable Groundwater Management Act

In 2014, California enacted the Sustainable Groundwater Management Act (Water Code Section 10720 et seq.). The Act, and related amendments to California law, require that all groundwater basins designated as high- or medium-priority in the DWR CASGEM program and that are subject to critical overdraft conditions must be managed under a new GSP, or a coordinated set of GSPs, by January 31, 2020. High- and medium-priority basins that are not subject to critical overdraft conditions must be managed under a GSP by January 31, 2022. Where GSPs are required, one or more local groundwater sustainability agencies (GSAs) must be formed to cover the basin and prepare and implement applicable GSPs. The Act does not apply to basins that are managed under a court-approved adjudication, or to low-or very–low-priority basins.

A GSA has the authority to require registration of groundwater wells, measure and manage extractions, require reports and assess fees, and to request revisions of basin boundaries, including establishing new subbasins. The preparation of a GSP by a GSA is exempt from CEQA. Each GSP must include a physical description of the covered basin, such as groundwater levels, groundwater quality, subsidence, information on groundwater-surface water interaction, data on historical and projected water demands and supplies, monitoring and management provisions, and a description of how the plan will affect other plans, including city and county general plans.

The Act defines groundwater as "water beneath the surface of the earth within the zone below the water table in which the soil is completely saturated with water, but does not include water that flows in known and definite channels." A groundwater extraction facility is defined as "a device or method for extracting groundwater from within a basin" Water Code Section 10721(g-h). GSPs are reviewed by the DWR to ensure that, over a period of 20 years, "sustainable groundwater management" is achieved. As defined by the Act, sustainable groundwater

management means that groundwater use within basins managed by a GSP will not cause any of the following "undesirable results":

- Chronic lowering of groundwater levels (not including overdraft during a drought, if a basin is otherwise managed);
- Significant and unreasonable reductions in groundwater storage;
- Significant and unreasonable seawater intrusion;
- Significant and unreasonable degradation of water quality;
- Significant and unreasonable land subsidence; and
- Surface water depletions that have significant and unreasonable adverse impacts on beneficial uses (Water Code Section 10721(w)).

The DWR must adopt regulations for the preparation of a GSP by January 2016, and GSAs must be formed for high- and medium-priority basins by June 2017. The current CASGEM maps identify virtually all of the valley floor groundwater basins in the Project Area as "high-priority" basins (DWR, n.d.). Unless subsequently revised, GSPs must be implemented for these basins by January 2020 where critical overdraft conditions have been identified, or by 2022. At present, no GSA has been formed and no GSP has been adopted for any portion of the Project Area. In April 2015, Governor Brown issued an executive order requiring that the CASGEM groundwater level monitoring requirements identified in Water Code Section 10933 be implemented by local agencies by the end of 2015 (State of California 2015).

## Senate Bill 4 (Well Stimulation Water Use Disclosure)

Effective January 1, 2014, California adopted several new and amended provisions of the PRC and Water Code to regulate any oil or gas well stimulation activity designed to enhance oil or gas production or recovery by increasing the permeability of the geologic formation that contains hydrocarbon deposits. Well stimulation activities covered by the new legislation include hydraulic fracturing and acid well stimulation treatments. The legislation, commonly referred to as "SB 4," amended Sections 3213, 3215, 3236.5, and 3401 of, and added Article 3 to, Chapter 1 of Division 3 of the PRC, and added Section 10783 to the Water Code. SB 4 requires that DOGGR: (1) promulgate emergency interim and adopt permanent regulations regulating well stimulation treatments by January 2015 to take effect no later than July 1, 2015; (2) complete a statewide EIR on well stimulation treatments by July 2015; (3) complete an independent scientific study of well stimulation by January 2015; and (4) consult and reach formal agreements with other regulatory agencies to provide regulatory accountability for, and public transparency to, well stimulation treatments by January 2015. SB 4 also requires that the SWRCB develop model criteria for oil and gas-related groundwater monitoring by July 2015. The regulations, studies, and interagency agreements required by SB 4 are intended to regulate water quality and potential geological hazards that could be associated with well stimulation, such as earthquakes or ground instability resulting from bedrock fracturing or acidization.

The well stimulation regulations require that each well operator disclose, within 60 days after a well stimulation treatment is completed, information regarding the source, volume, composition, and disposition of well stimulation fluids, including, but not limited to, water sources, hydraulic fracturing fluids, acid well stimulation fluids, and flowback fluids (CCR §1788). The disclosures are provided to DOGGR and must be available online in a format that allows for searching and aggregating the information. A well stimulation treatment report must also be filed with DOGGR, including any information concerning stimulation treatments that differ from what was anticipated in the well stimulation treatment design submitted to DOGGR under Section 1784(b) and whether the actual location of the well stimulation treatment differs from what was indicated in the well stimulation permit application.

## Porter-Cologne Water Quality Control Act

The Porter–Cologne Water Quality Control Act (Porter-Cologne Act) authorizes regulation of California water rights and water quality by the SWRCB. The Porter–Cologne Act also established nine RWQCBs to ensure that water quality on local/regional levels is maintained. The Project Area is under the jurisdiction of the CVRWQCB.

## Wastewater

### General Waste Discharge Requirements for Sanitary Sewer Systems

The General WDRs for Sanitary Sewer Systems were adopted by the SWRCB in May 2006. These WDRs require local jurisdictions to develop a sewer system management plan (SSMP) that addresses the necessary operation and emergency response plans to reduce sanitary sewer overflows. The WDRs require that the local jurisdiction approve the SSMP.

## Solid Waste

### California Department of Resources Recycling and Recovery (formerly California Integrated Waste Management Board)

California Department of Resources Recycling and Recovery (CalRecycle) is the State agency designated to oversee, manage, and track California's 76 million tons of waste generated each year. It is one of the six agencies under the umbrella of the California Environmental Protection Agency (Cal/EPA). CalRecycle develops regulations to control and manage waste, for which enforcement authority is typically delegated to the local government. CalRecycle works jointly with local governments to implement regulations and fund programs.

### California Integrated Waste Management Act (AB 939)

California adopted its first statewide, general recycling program in 1989.[1] The Integrated Waste Management Act of 1989 (PRC 40050 et seq. or AB 939, codified in PRC 40000), administered by CalRecycle, requires all local and county governments to adopt a Source Reduction and Recycling Element to identify means of reducing the amount of solid waste sent to landfills. This law set reduction targets at 25% by the year 1995 and 50% by the year 2000.

### Assembly Bill 341

AB 341 (Chesbro, Chapter 476, Statutes of 2011), approved by Governor Brown on October 5, 2011, established a new statewide goal of 75% recycling composting and source reduction by 2020. In contrast to earlier diversion mandates, disposal-related activities, including alternative daily cover, alternative intermediate cover, transformation, waste tire-derived fuel, and beneficial reuse at solid waste landfills, do not count toward the statewide recycling goal.

In order to achieve the 75% recycling goal, CalRecycle has identified six primary focus areas: (1) moving organics out of the landfill; (2) continuing reform of the Beverage Container Recycling Program; (3) expanding the recycling/manufacturing infrastructure; (4) exploring new models for state and local funding of materials management programs; (5) promoting state procurement of post-consumer recycled content products; and (6) promoting extended producer responsibility.

## Oil and Gas-Related Wastewater Disposal

Federal, state, and local laws, regulations, and policies pertaining to the disposal of oil and gas-related produced water and other wastewater in the Project Area are discussed in detail in Section 4.9.3, Regulatory Setting.

## Energy

### California Energy Commission

The CEC is the state's primary energy policy and planning agency. Created by the legislature in 1974, the CEC has five major responsibilities: (1) forecasting future energy needs and keeping historical energy data; (2) licensing thermal power plants 50 MW or larger; (3) promoting energy efficiency through appliance and building standards; (4) developing energy technologies and supporting renewable energy; and (5) planning for and directing state response to energy emergencies. With the signing of the Electric Industry Deregulation Law in 1998 (AB 1890), the CEC's role includes overseeing funding programs that support public interest energy research, advancing energy science and technology through research, development, and demonstration, and providing market support to existing, new, and emerging renewable technologies.

### California Public Utilities Commission

The California Public Utilities Commission (CPUC) regulates privately owned electric, telecommunications, natural gas, water, and transportation companies, in addition to household goods movers and rail safety. The CPUC is responsible for ensuring that customers have safe and reliable utility service at reasonable rates, protecting against fraud and promoting the health of California's economy.

### California's Energy Efficiency Standards for Residential and Nonresidential Buildings (Title 24 Building Standards)

The CEC administers Title 24 Building Standards, which were established in 1978 in response to a legislative mandate to reduce California's energy consumption. Standards are periodically updated to allow consideration and possible incorporation of new energy efficiency technologies and methods. California's building efficiency standards are updated on an approximately three-year cycle. The 2013 Building Standards will continue to improve upon the current 2008 Standards for new construction of, and additions and alterations to, residential and non-residential buildings. The 2013 Building Standards will go into effect on January 1, 2014, following approval of the California Building Standards Commission.

# Local

## Kern County General Plan

The Project Area is located within the Kern County General Plan (KCGP) area and, therefore, would be subject to applicable policies and measures of the KCGP. The Land Use, Conservation, and Open Space Element and the Energy Element of the KCGP includes goals, policies, and implementation measures related to utilities and service systems that apply to the Project, as described below.

## Chapter 1. Land Use, Conservation, and Open Space Element

### 1.4. Public Facilities and Services

#### Goals

**Goal 1.** Kern County residents and businesses should receive adequate and cost effective public services and facilities. The County will compare new urban development proposals and land use changes to the required public services and facilities needed for the proposed project.

**Goal 5.** Ensure that adequate supplies of quality (appropriate for intended use) water are available to residential, industrial, and agricultural users within Kern County.

**Goal 9.** Serve the needs of industries and Kern County residents in a manner that does not degrade the water supply and the environment and protect the public health and safety by avoiding surface and subsurface nuisances resulting from the disposal of hazardous wastes, irrespective of the geographic origin of the waste.

**Policy 1.** New discretionary development will be required to pay its proportional share of the local costs of infrastructure improvements required to service such development.

**Policy 3.** Individual projects will provide availability of public utility service as per approved guidelines of the serving utility.

### Implementation Measures

**Implementation Measure C.** Project developers shall coordinate with the local utility service providers to supply adequate public utility services.

**Implementation Measure L.** Prior to the approval of development projects, the County shall determine the need for fire protection services. New development in the County shall not be approved unless adequate fire protection facilities and resources can be provided.

**Implementation Measure N.** Secure complete and accurate information on all hazardous wastes generated, handled, stored, treated, transported, and disposed of within or through Kern County.

**Implementation Measure O.** Reduce to the greatest degree possible the amount of waste to be disposed of by encouraging private industry to construct and manage a high quality system of transfer stations, recycling facilities, treatment plants, and incinerators located near the generators of hazardous waste.

**Implementation Measure R.** Roads and highways utilized for commercial shipping of hazardous waste destined for disposal will be designated as such pursuant to Vehicle Code Sections 31303 et seq. Permit applications shall identify commercial shipping routes they propose to utilize for particular waste streams.

### 1.8 Industrial

### Policies

**Policy 1.** Locations for new industrial activities shall be provided with adequate infrastructure (water, sewage disposal systems, roads, drainage, etc.) to minimize effects on County services.

## 5. Energy Element

### 5.3.3. Waste Disposal in Petroleum Development

### Goals

**Goal**, To encourage the safe recycling, transportation, and disposal of wastes associated with petroleum production and processing and to provide for the siting of disposal facilities in locations with proper access, while minimizing adverse impacts on the environment and on public health and safety.

### Policies

**Policy 1,** The County shall continue to acknowledge the necessity to site nonhazardous oilfield waste disposal sites near petroleum development to minimize transportation hazards and expenses, consistent with the provisions of the Kern County and Incorporated Cities Integrated Waste Management Plan.

**Policy 2,** The County shall encourage recycling and new treatment methods for hazardous and nonhazardous oilfield wastes.

**Policy 3,** The County shall work cooperatively with appropriate State and regional agencies to provide for the proper siting of oilfield waste disposal facilities.

**Policy 4,** The County shall address hazardous oilfield waste disposal issues in the Kern County and Incorporated Cities Hazardous Waste Management Plan policies and implementation measures.

### Implementation Measures

**Implementation Measure B,** The County shall address oilfield hazardous waste issues through the Kern County and Incorporated Cities Hazardous Waste Management Plan.

**Implementation Measure C,** The County shall continue to maintain provisions in the Zoning Ordinance to provide for oilfield waste disposal facilities.

**Implementation Measure D,** The County shall continue to maintain provisions in the Zoning Ordinance for the development of oilfield waste recycling and treatment facilities.

## Metropolitan Bakersfield General Plan

The Metropolitan Bakersfield General Plan (MBGP), a joint effort between the Kern County Planning Department and the City of Bakersfield Planning Division, was last adopted on December 11, 2007. The MBGP includes both city and unincorporated County lands. The MBGP describes the community's physical development as well as its economic, social and environmental goals and is currently undergoing an update. The Project Area includes a total of 152,040 acres of unincorporated County lands that are covered under the MBGP (7.41%). Project-related development on unincorporated lands within the MBGP Planning Area would be subject to the following applicable policies and implementation measures of the MBGP, with respect to utilities and service systems.

## Chapter II. Land Use Element

### Policies

**Policy 54,** The developer shall be responsible for all onsite costs incurred as a result of the proposed project, in addition to a proportional share of offsite costs incurred in service extension or improvements. The availability of public or private services or resources shall be evaluated during discretionary project consideration. Availability may affect project approval or result in a reduction in size, density, or intensity otherwise indicated in the general plan’s map provisions.

# Chapter X. Public Services and Facilities Element

## A. General Utilities

### Goals

**Goal 4.** Develop funding principles and programs which will assure that all new development will pay for the incremental costs of the public facilities and services--utilities bridges, parks, and public safety facilities--both onsite and offsite, to serve such development.

### Policies

**Policy 5.** Require all new development to pay its pro rata share of the cost of necessary expansion in municipal utilities, facilities and infrastructure for which it generates demand and upon which it is dependent (I-3).

### Implementation Measures

**Implementation Measure 4.** Create benefit assessment districts or establish service fees for the distribution of costs to users for capital improvement replacement costs and maintenance, utilizing such districts for the financing of improvements which are essential to planning area development.

## B. Water Distribution

### Goals

**Goal 1.** Ensure the provision of adequate water service to all developed and developing portions of the planning area.

### Policies

**Policy 3.** Require that all new development proposals have an adequate water supply available (I-3, I-4).

### Implementation Measures

**Implementation Measure 3.** Review, and modify as required, existing fee structures and ordinances to assure desired system financing and policy implementation.

## C. Sewer Service

### Goals

**Goal 1.** Ensure the provision of adequate sewer service to serve the needs of existing and planned development in the planning area.

### Implementation Measures

**Implementation Measure 6.** Exclusive of County Service Area No. 71, developers shall be required to install dry sewer lines in streets and connections thereto for parcels less than 1 acre (net) in size in areas where a centralized sewer system is planned and imminent and where onsite systems can be proven to be temporarily satisfactory.

Within County Service Area No. 71, a proposed development at a density greater than one dwelling unit per three gross acres, as well as all commercial and industrial developments, shall be required to be served by a regional sewage collection and treatment system subject to the following provisions:

1. All new development (commercial, industrial and residential at densities greater than one dwelling unit per three gross acres}, including both discretionary and ministerial projects, shall be required to connect to public sewer when said development is located 1,000 feet or closer to available public sewer.

   If public sewer is more than 1,000 feet from development, a dry sewer system in conjunction with approved individual septic systems may be utilized for lots having an area of 10,000 square feet or larger. Dry sewer systems are not required for lots of three gross acres or larger. Single residential lots that require a ministerial permit shall connect to public sewer when located 200 feet or closer to available public sewer. Single residential lots less than three gross acres that are greater than 200 feet from available public sewer are required to install dry sewer in accordance with the requirements of the Engineering and survey.

2. All new development (commercial, industrial and residential at densities greater than one dwelling unit per three gross acres), including both discretionary and ministerial projects, shall pay a sewer development fee where the Board of Supervisors has adopted a planned sewer area and install dry sewer within the project development when located in excess of 1 ,000 feet from public sewer or where sewer service is not available as determined by the Engineering and Survey Services Department. The fee amount shall be based on the property's pro rata share of all conveyance, facility and capacity costs. Single residential lots that are greater than 200 feet from available public sewer are required to install dry sewer in accordance with the requirements of the Engineering and Survey Services Department.

3. In those cases where sewer service will not be available as determined by the Sewer Master Plan, an exemption may be granted by the Engineering and Survey Services Department.

4. All new development (commercial, industrial, and residential at densities greater than one dwelling unit per three gross acres) shall be required to annex to an existing County Service Area (CSA) or form a new CSA if none is already in place. In conjunction with formation of, or annexation to, a CSA, applicants shall be required to form a Zone of Benefit for the purpose of constructing and maintaining a sewer trunk line.

### D. Storm Drainage

#### Goals

**Goal 1.** Ensure the provision of adequate storm drainage facilities to protect planning area residents from flooding resulting from storm water excess.

## Kern County Specific Plans

Kern County has adopted 24 Specific Plans for properties within the Project Area. These Specific Plans are intended to be an amplification of the goals and policies of the KCGP and are, therefore, consistent therewith. As depicted in Figure 4.10-3, less than 8% of the Project Area is located wholly or partially within adopted Specific Plan areas. Future oil and gas exploration and production activities that would be authorized under the proposed Amendment to Chapter 19.98 (Oil & Gas Production) of the Kern County Zoning Ordinance that would be regulated according to County zoning, with the exception of the Specific Plans identified as Tier 5.

## Kern River Plan

### 3.2. Open Space Versus Development

#### Policies

**Policy 11.** New or relocated utility lines shall be placed underground, except in areas subject to intensive agricultural uses, areas designated as A.4 (Mineral and Petroleum) and electrical power lines to oil wells, water wells, and water control devises in areas designated as 8.5 (Resource Management) unless otherwise required by law, and at River crossings, or where it can be shown that the specific nature of the facility is such that it is entirely infeasible to do so.

### 5.3. Implementation Standards and Specific Policies

### B. Open Space and Development

#### Implementation Policies

**Implementation Policy 7.** New or relocated utility lines shall be placed underground, except in areas subject to intensive agricultural uses, 8.4 areas (Mineral and Petroleum), and at River crossings or where it can be shown that the specific nature of the facility is such that it is entirely infeasible to do so.

## Kern County and Incorporated Cities Hazardous Waste Management Plan

In 1991, Kern County and the incorporated cities adopted the Kern County and Incorporated Cities Hazardous Waste Management Plan, which was developed to comply with State Law (California Health and Safety Code Section 25135 et seq.). The Hazardous Waste Management Plan includes goals, policies, and implementation measures directed at the safe and responsible management of hazardous waste including waste stream management, source reduction, siting of

new facilities, and other provisions. The safe management of hazardous waste is to be accomplished in accordance with federal, state and local laws.

## 4.17.4 Impacts and Mitigation Measures

## Methodology

The potential impacts associated with the Project were evaluated on a quantitative and qualitative basis and reflect consultations with public service providers in the Project Area. Public service systems were evaluated by reviewing the most current data available from State and Kern County department websites, the KCGP, the Kern County Multi-Hazard Mitigation Plan, water management plans adopted by Project Area water providers, an analysis of Project Area water supplies completed by Kennedy/Jenks Consultants (Appendix T) and the Kern County Fire Department Wildfire Management Plan. The potential impacts associated with the proposed Project are evaluated on a quantitative and qualitative basis through coordination with the service agencies described above. The discussion below lists specific impacts and measures that would be incorporated to mitigate and reduce potential impacts, to the extent feasible.

## Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist state that the proposed project would have significant impacts on utilities and service systems depending on whether the project would:

- Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board;
- Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects;
- Require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects;
- Not have sufficient water supplies available to serve the project from existing entitlements and resources, or new or expanded entitlements would be needed;
- Result in a determination by the wastewater treatment provider that serves or may serve the project that it has inadequate capacity to serve the project's projected demand in addition to the provider's existing commitments;
- Be served by a landfill with insufficient permitted capacity to accommodate the project's solid waste disposal needs; or
- Fail to comply with federal, state, and local statutes and regulations related to solid waste.

# Project Impacts

## Impact 4.17-1: Exceed Wastewater Treatment Requirements of the Applicable Regional Water Quality Control Board

As discussed above and in Section 4.9, Hydrology and Water Quality, about 97.4% of the Project Area consists of Tier 1 lands, in which oil and gas activities are the predominant land use, or Tier 2 lands, where agriculture is the predominant use. Of the 97.4% of the Project Area in Tier 1 and Tier 2 lands, 10.1% of the Project Area is located in Tier 1, and 87.3% is located in Tier 2. The remaining 2.6% is found in Tier 3, 4, and 5 lands. In addition, 97% of the projected annual disturbance of up to 4,856 acres would occur in Tier 1 (4,400 acres) or Tier 2 (298 acres) areas. Urban-scale constructed wastewater treatment facilities that are subject to CVRWQCB wastewater treatment requirements would not be significantly affected by Project activity because the majority of activity would not occur where these types of facilities are present.

The majority of wastewater produced by oil and gas activities associated with the implementation of the Project is produced water and well stimulation flowback water, which would likely be either disposed of via Class II Underground Injection Control (UIC) injection wells, percolation and evaporation ponds (aka wastewater disposal ponds), and sumps. Wastewater would not be delivered directly to a municipal wastewater treatment facility. Therefore, these disposal methods would not impact municipal wastewater treatment facilities.

Potential impacts could occur associated with wastewater treatment requirements that may be adopted by the CVRWQCB for other oil and gas-related activities are discussed in Section 4.9, Hydrology and Water Quality, including Impact 4.9-1 (Violate any water quality standards or waste discharge requirements) Potential impacts related to CVRWQCB wastewater treatment requirements analyzed in Section 4.9 include: stormwater and runoff impacts; surface or subsurface discharges during well construction and operation; produced water reuse and disposal (including enhanced oil recovery activities, agricultural irrigation, disposal in evaporation and percolation ponds, and disposal in injection wells); and well stimulation activities. These could result in significant impacts, but would be mitigated through the implementation of the stormwater mitigation measures in Section 4.9, Hydrology and Water Quality, which require compliance with all applicable water quality protection laws and regulations, including stormwater management laws and regulations.

In addition, as discussed in the Section 4.13, Population and Housing, no population or employment growth is anticipated as part of the of the Project beyond the continued gradual growth attributed to the region as a whole (and not attributable to any particular industry sector) by the Kern County of Governments (COG) Regional Transportation Plan (RTP)/Sustainable Communities Strategy (SCS) EIR projections. Therefore, Project-related employment would not lead to sanitary wastewater generation that would exceed wastewater treatment requirements, and impacts would be less than significant

### Mitigation Measures

Implement stormwater mitigation measures, as described in Section 4.9, Hydrology and Water Quality.

### Level of Significance After Mitigation

Impacts would be less than significant after mitigation.

## Impact 4.17-2: Require or Result in the Construction of New Water or Wastewater Treatment Facilities or Expansion of Existing Facilities, the Construction of which could cause Significant Environmental Effects

As discussed above and in Section 4.9, Hydrology and Water Quality, about 97.4% of the Project Area consists of Tier 1 and Tier 2 lands. Tier 1 lands, in which oil and gas activities are the predominant land use, represent 10.1% of the Project Area, while Tier 2 lands, where agriculture is the predominant land use, represent 87.3% of the Project Area. In addition, 97% of the projected annual disturbance of up to 4,856 acres would occur in Tier 1 (4,400 acres) or Tier 2 (298 acres) areas. Almost all oil and gas activities in the Project Area would occur in locations that are not served by, or planned to be served by, constructed, municipal, or regional water or wastewater treatment facilities. Potential impacts related to the construction or expansion of existing or new regional water or wastewater treatment facilities would be less than significant. Potential impacts related to the use of municipal and industrial water supplies are discussed in Impact 4.17-4 below.

Future oil and gas exploration and production activities and related Project facilities could, depending on their location relative to existing oil and gas infrastructure, require construction/expansion of a septic system and leach line. While sanitary wastewater generation is not anticipated to be significant, new and/or expanded non-municipal wastewater treatment facilities could be required.

While all applicable local, state, and federal requirements and Best Management Practices (BMPs) would be incorporated into construction of all Project-related facilities, a new or expanded septic system and leach line could result in significant impacts to the environment (with respect to surface water, groundwater, and vegetation).

### Mitigation Measures

**MM 4.17-1** Prior to the issuance of building permits for an operations and maintenance building, the method of sewage disposal shall be as required and approved by the Kern County Public Health Services Department. Compliance with this requirement will necessitate that the Project proponent obtain the necessary approvals for the design of the septic system from the Kern County Engineering, Surveying and Permit Services Department. The septic system disposal field shall be located a minimum of 100 feet from a classified stream or 25 feet from a

non-classified stream and shall not be located where it would impact State wetlands or special-status plant species.

### Level of Significance After Mitigation

Impacts would be less than significant after mitigation.

## Impact 4.17-3: Require or Result in the Construction of New Stormwater Drainage Facilities or Expansion of Existing Facilities, the Construction of which Could Cause Significant Environmental Effects

As discussed for Impacts 4.9-4 and 4.9-5 in Section 4.9, Hydrology and Water Quality, about 97.4% of the Project Area consists of Tier 1 and Tier 2 lands. Tier 1 lands, in which oil and gas activities are the predominant land use, represent 10.1% of the Project Area, while Tier 2 lands, where agriculture is the predominant use, represent 87.3% of the Project Area. In addition, 97% of the projected annual disturbance of up to 4,856 acres would occur in Tier 1 (4,400 acres) or Tier 2 (298 acres) areas. Urban-scale constructed stormwater drainage systems occur, to a limited extent, in Tier 1 and Tier 2 areas. Potential project-related development in Tiers 3, 4, and 5 could produce runoff to existing or planned regional or constructed stormwater drainage systems, The extent of the potential new development would affect, at most, 0.3% of the acreage in Tiers 3, 4, and 5, per year, and would not generate new sources of runoff that could significantly impact existing or planned wastewater treatment systems in these locations (see Impact 4.9-5, as described in Section 4.9, Hydrology and Water Quality).

As discussed in Section 4.9, Hydrology and Water Quality, stormwater drainage would be managed by site-specific stormwater and runoff management measures. Oil and gas operations that are located in close proximity with or on sites that are hydrologically connected to waters of the United States are generally subject to the requirements of the Construction General Permit and Industrial General Permit adopted by the SWRCB unless otherwise subject to exemption or waiver. These permits require strict compliance with water quality standards through the implementation of BMPs and other measures. The American Petroleum Institute (API) and other sources of applicable industry engineering standards publish and regularly update oil and gas industry standards and criteria for stormwater and runoff management. Stormwater mitigation measures in Section 4.9, Hydrology and Water Quality, require compliance with all applicable federal, state, regional, and local agency water quality protection laws and regulations, and commonly utilized industry standards, including (where applicable) obtaining coverage under the stormwater construction general permit and industrial general permit issued by the SWRCB and complying with industry stormwater management standards for construction and operational activities. In addition, they require that any oil and gas applicant not subject to state or federal stormwater management laws, regulations or general permits, must implement a drainage plan as specified in the Kern County Grading. These measures ensure that all sites subject to the Chapter 19.98 conformity review process will implement stormwater drainage control measures that meet applicable water quality and other legal requirements. As discussed in Appendix F the conservative disturbance factors used in this EIR account for all activities, including stormwater management measure implementation, related to oil and gas activities subject to the proposed oil

and gas Chapter 19.98 conformity review process. Therefore, with the implementation of the stormwater mitigation measures in Section 4.9, Hydrology and Water Quality, would further ensure that impact would be less than significant.

Potential environmental effects that may be associated with site-specific stormwater drainage facilities in the Project Area are evaluated in the other substantive sections of this EIR, including Section 4.4, Biological Resources, and Section 4.9, Hydrology and Water Quality.

### Mitigation Measures

Implement stormwater mitigation measures, as described in Section 4.9, Hydrology and Water Quality.

### Level of Significance After Mitigation

Impacts would be less than significant after mitigation.

## Impact 4.17-4: Not Have Sufficient Water Supplies Available to Serve the Project from Existing Entitlements and Resources, or New or Expanded Entitlements would be Needed

As discussed above and in Appendix T, based on the potential development of up to 2,697 new production wells per year, oil and gas exploration and production demand for produced water and M&I water would increase from existing levels. As shown in Table 4.17-26, oil and gas demand for produced water is projected to increase by 32,600 AFY, and M&I demand is projected to increase by about 2,982 AFY from 2012 levels by 2035. Produced water demand for agricultural reuse is projected to be 32,771 AFY.

**Table 4.17-26: Produced Water and Oil and Gas M&I Water Demand 2012, 2015 and 2035 (AF)**

| | 2012 | 2015 | 2035 | Net Increase 2012-2035 | Percent Increase |
|---|---|---|---|---|---|
| Produced Water (oil and gas uses) | 88,812 | 93,106 | 121,412 | 32,600 | 37% |
| Produced Water (agricultural reuse) | 32,771 | 32,771 | 32,771 | -- | 0% |
| Subtotal: Produced Water Demand | 121,583 | 125,877 | 154,183 | 32,600 | 27% |
| Projected M&I Water Demand | 8,778 | 9,660 | 11,760 | 2,982 | 34% |

Source: Appendix T, Table 19, Table 30, and Table 39

As discussed in Section 4.9, Hydrology and Water Quality, oil and gas exploration and production activities currently generate sufficient produced water to meet existing and future demands. About 234,959 AF of produced water was generated in 2012, and about 321,894 AF would be generated in 2035 if produced water volume increases at the same rate as projected oil and gas industry demand (37% increase during 2012-2035). About 49% of produced water was

disposed by injection or to surface ponds in 2012. As shown in Section 4.9, the percentage of surplus produced water subject to disposal in 2035 could range from 48% to 52%, depending on the potential reuse of these supplies for other purposes.

The amount of produced water generated in the Project Area in 2012 would exceed anticipated demand in 2035 for oil and gas and agricultural reuse by more than 80,000 AF. As shown in Section 4.9, the volume of produced water, and the ratio of produced water to recovered hydrocarbons, has increased in the Project Area over time. As Project Area oilfields mature, it is likely that the volume of produced water, and the ratio of produced water to recovered hydrocarbons, would be comparable to or greater than in 2012. Consequently, Project Area produced water supplies can be expected to continue to exceed demand by a significant margin under future conditions, and produced water resources are sufficient to meet current and projected future produced water demand in the Project Area.

Oil and gas demand for M&I water is also projected to increase by about 2,982 AFY from 2012 levels by 2035 (see Table 4.17-26). This EIR assumes that all oil and gas M&I demands are met by using M&I-quality groundwater. This is a conservative assumption because oil and gas M&I supply sources vary from year to year and may include surface supplies in wetter periods. Current drought conditions have severely restricted the availability of imported and local surface supplies throughout California, including the Project Area, and groundwater is being used more heavily to meet Project Area demand, including for oil and gas activities. As discussed above and in Appendix T, the draft WSA prepared by the Project Applicant concludes that surplus M&I-quality water is not available in the Project Area. Any new use reduces the availability of M&I-quality water to another Project Area user, or increases the regional groundwater overdraft if supply shortfalls are addressed by increased groundwater extraction. Consequently, existing entitlements and resources are insufficient to meet current and projected future M&I water demand in the Project Area. Increasing M&I water demand under overdraft conditions is considered to be a significant impact.

Tables 4.17-27 to 4.17-29 summarize Project Area urban, agricultural, and oil and gas supply and demand in the Project Area and for each Subarea, over 2015-2035 under average, single dry year, and multiple dry year conditions. The estimated supply and demand in each projection incorporate the assumptions discussed in Section 4.17.2, Environmental Setting.

Table 4.17-27 shows that, under average year conditions, water supply in the Project Area is approximately the same as total demand. Due to significant agricultural activity and related irrigation demand, the Central Subarea has a supply deficit in average years ranging from -681,596 AF in 2015 to -717,682 AF in 2035. Surpluses in the Eastern Subarea, generally associated with the availability of diverted water from the Kern River, and smaller average year surpluses in the Western Subarea slightly exceed the supply deficits in the Central Subarea.

**Table 4.17-27: Project Area and Subarea Average Year Water Demand and Supply 2015-2035**

| | 2015 | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|
| **Project Area** | | | | | |
| Supply | 3,157,881 | 3,165,137 | 3,172,393 | 3,179,649 | 3,186,904 |
| Demand | 3,008,482 | 3,016,310 | 3,043,669 | 3,073,050 | 3,103,596 |
| Difference (supply - demand) | 148,399 | 148,827 | 128,724 | 106,599 | 83,308 |
| **Western Subarea** | | | | | |
| Supply | 1,041,993 | 1,047,065 | 1,052,136 | 1,057,208 | 1,062,279 |
| Demand | 981,984 | 987,370 | 992,761 | 998,157 | 1,003,561 |
| Difference (supply - demand) | 60,009 | 59,695 | 59,375 | 59,051 | 58,718 |
| **Central Subarea** | | | | | |
| Supply | 736,991 | 737,103 | 737,216 | 737,328 | 737,441 |
| Demand | 1,418,587 | 1,420,422 | 1,430,889 | 1,442,536 | 1,455,123 |
| Difference (supply - demand) | -681,596 | -683,319 | -693,673 | -705,208 | -717,682 |
| **Eastern Subarea** | | | | | |
| Supply | 1,378,897 | 1,380,969 | 1,383,041 | 1,385,113 | 1,387,184 |
| Demand | 607,911 | 608,518 | 620,019 | 632,357 | 644,912 |
| Difference (supply - demand) | 770,986 | 772,451 | 763,022 | 752,756 | 742,272 |

Source: Appendix T

Table 4.17-28 shows that, under single dry year conditions, when surface supplies from the SWP, CVP and Kern River systems would be substantially reduced, significant supply deficits would occur in the Project Area, the Central Subarea, and the Western Subarea. Project Area supply deficits in single dry years would range from -750,710 AF in 2015 to -817,127 AF in 2035. Supply deficits in the Central Subarea would exceed -950,000 AFY, and range from -12,989 to -14,320 AFY in the Western Subarea. Surpluses in the Eastern Subarea would be unable to offset the deficits projected in the Central and Western Subareas.

**Table 4.17-28: Project Area and Subarea Single Dry Year Water Demand and Supply 2015-2035**

| | 2015 | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|
| **Project Area** | | | | | |
| Supply | 2,255,681 | 2,262,937 | 2,270,193 | 2,277,449 | 2,284,704 |
| Demand | 3,006,391 | 3,015,514 | 3,042,583 | 3,071,672 | 3,101,831 |
| Difference | -750,710 | -752,577 | -772,390 | -794,223 | -817,127 |

**Table 4.17-28: Project Area and Subarea Single Dry Year Water Demand and Supply 2015-2035**

| | 2015 | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|
| (supply - demand) | | | | | |
| **Western Subarea** | | | | | |
| Supply | 971,693 | 976,765 | 981,836 | 986,908 | 991,979 |
| Demand | 984,682 | 990,078 | 995,479 | 1,000,885 | 1,006,299 |
| Difference (supply - demand) | -12,989 | -13,313 | -13,643 | -13,977 | -14,320 |
| **Central Subarea** | | | | | |
| Supply | 462,791 | 462,903 | 463,016 | 463,128 | 463,241 |
| Demand | 1,415,341 | 1,418,364 | 1,428,641 | 1,440,098 | 1,452,461 |
| Difference (supply - demand) | -952,550 | -955,461 | -965,625 | -976,970 | -989,220 |
| **Eastern Subarea** | | | | | |
| Supply | 821,197 | 823,269 | 825,341 | 827,413 | 829,484 |
| Demand | 606,368 | 607,072 | 618,463 | 630,689 | 643,071 |
| Difference (supply - demand) | 214,829 | 216,197 | 206,878 | 196,724 | 186,413 |

Source: Appendix T

Table 4.17-29 shows that, under multiple dry year conditions, when surface supplies would be reduced below average year levels, significant supply deficits would occur in the Project Area and the Central Subarea. Project Area supply deficits in multiple dry years would range from -315,626 AF in 2015 to -383,042 AF in 2035. Central Subarea supply deficits would range from -772,009 AF in 2015 to -808,789 AF in 2035. Surpluses in the Eastern Subarea and Western Subarea would be unable to offset the deficits projected in the Central Subarea.

**Table 4.17-29: Project Area and Subarea Multiple Dry Year Water Demand and Supply 2015-2035**

| | 2015 | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|
| **Project Area** | | | | | |
| Supply | 2,695,681 | 2,702,937 | 2,710,193 | 2,717,449 | 2,724,704 |
| Demand | 3,011,307 | 3,020,223 | 3,047,664 | 3,077,155 | 3,107,746 |
| Difference (supply - demand) | -315,626 | -317,286 | -337,471 | -359,706 | -383,042 |
| **Western Subarea** | | | | | |
| Supply | 1,053,993 | 1,059,065 | 1,064,136 | 1,069,208 | 1,074,279 |
| Demand | 984,486 | 989,881 | 995,281 | 1,000,686 | 1,006,100 |
| Difference | 69,507 | 69,184 | 68,855 | 68,522 | 68,179 |

**Table 4.17-29: Project Area and Subarea Multiple Dry Year Water Demand and Supply 2015-2035**

| | 2015 | 2020 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|
| (supply - demand) | | | | | |
| **Central Subarea** | | | | | |
| Supply | 643,891 | 644,003 | 644,116 | 644,228 | 644,341 |
| Demand | 1,415,900 | 1,418.901 | 1,429,219 | 1,440,720 | 1,453,130 |
| Difference (supply - demand) | -772,009 | -774,898 | -785,103 | -796,492 | -808,789 |
| **Eastern Subarea** | | | | | |
| Supply | 997,797 | 999,869 | 1,001,941 | 1,004,013 | 1,006,084 |
| Demand | 610,921 | 611,441 | 623,164 | 635,749 | 648,516 |
| Difference (supply - demand) | 386,876 | 388,428 | 378,777 | 368,264 | 357,568 |

Source: Appendix T

Under current conditions, water supply deficits in the Project Area are largely addressed by increased groundwater extractions. The November 2014 drought impact update published by the DWR indicates that subsidence is occurring in many groundwater basins in the state, especially in the Tulare Lake hydrologic region that includes the Project Area, and that the southern San Joaquin Valley has a higher potential for future subsidence due to groundwater withdrawals. The DWR also concluded that, since spring 2008 groundwater levels have fallen to at all-time lows in the southern San Joaquin Valley hydrologic region and are more than 50 feet below previous historically low levels experienced prior to 2000 (DWR 2014). Satellite data since 2003 indicates that excessive groundwater pumping rates in the San Joaquin Valley, including the Project Area, have caused aquifer losses approximately equal to the storage capacity of Lake Mead, America's largest reservoir (NASA 2009).

Oil and gas exploration and production water use in the Project Area accounts for a relatively small portion of overall demand and higher-quality M&I water consumption in the Project Area. Oil and gas total water use, including produced water demand, is expected to be about 3.4% of total Project Area water demand in 2015. Oil and gas water demand would account for 4.3% of total Project Area water use in 2035 (see Table 4.17-30).

**Table 4.17-30: Total Project Area and Oil and Gas in Average, Single Dry, and Multiple Dry Years, 2015 and 2035 (AF)**

| | Average Year | Single Dry Year | Multiple Dry Year |
|---|---|---|---|
| **2015** | | | |
| Project Area Demand | 3,008,482 | 3,006,391 | 3,011,307 |
| Oil and Gas M&I Demand | 9,660 | 9,660 | 9,660 |

**Table 4.17-30: Total Project Area and Oil and Gas in Average, Single Dry, and Multiple Dry Years, 2015 and 2035 (AF)**

| | Average Year | Single Dry Year | Multiple Dry Year |
|---|---|---|---|
| Oil and Gas Produced Water Demand | 93,106 | 93,106 | 93,106 |
| Subtotal: Oil and Gas Water Demand | 102,766 | 102,766 | 102,766 |
| Oil and gas share of total Project Area demand | 3.4% | 3.4% | 3.4% |
| **2035** | | | |
| Project Area Demand | 3,103,596 | 3,101,831 | 3,107,746 |
| Oil and Gas M&I Demand | 11,761 | 11,761 | 11,761 |
| Oil and Gas Produced Water Demand | 121,412 | 121,412 | 121,412 |
| Subtotal: Oil and Gas Water Demand | 133,173 | 133,173 | 133,173 |
| Oil and gas share of total Project Area demand | 4.3% | 4.3% | 4.3% |

Sources: See Tables 4.17-20 and 4.17-27 to 4.17-29

Most of the oil gas demand in the Project Area is met by using produced water. As shown in Table 4.17-31, excluding produced water supply and demand, oil and gas water use accounts for about 0.34% of total Project Area M&I and agricultural water demand in 2015. In 2035, oil and gas M&I demand would account for 0.40% of total Project Area M&I and agricultural water demand. As shown in Table 4.17-20, the projected oil and gas M&I demand with a 10% contingency would be 10,626 AFY in 2015 and 12,936 AFY in 2035. Based on oil and gas M&I demand estimates with a 10% contingency, oil and gas M&I demand could be 0.37% of total Project Area M&I and agricultural water demand in 2015 and 0.44% of total Project Area M&I and agricultural water demand in 2035.

**Table 4.17-31: Total Project Area and Oil and Gas M&I and Agricultural Water Demand (Excluding Produced Water Supplies and Demand) Average, Single Dry, and Multiple Dry Years, 2015 and 2035 (AF)**

| | Average Year | Single Dry Year | Multiple Dry Year |
|---|---|---|---|
| **2015** | | | |
| Project Area Demand | 2,872,945 | 2,870,854 | 2,875,770 |
| Oil and Gas M&I Demand | 9,660 | 9,660 | 9,660 |
| Oil and gas share of total urban and agricultural demand | 0.34% | 0.34% | 0.34% |
| **2035** | | | |
| Project Area Demand | 2,937,652 | 2,935,887 | 2,941,802 |
| Oil and Gas M&I Demand | 11,761 | 11,761 | 11,761 |

**Table 4.17-31: Total Project Area and Oil and Gas M&I and Agricultural Water Demand (Excluding Produced Water Supplies and Demand) Average, Single Dry, and Multiple Dry Years, 2015 and 2035 (AF)**

| | Average Year | Single Dry Year | Multiple Dry Year |
|---|---|---|---|
| Oil and gas share of total urban and agricultural demand | 0.40% | 0.40% | 0.40% |

Sources: See Tables 4.17-20 and 4.17-27 to 4.17-29

Excluding the use of produced water, current and projected oil and gas M&I water demand is about 4% of total urban M&I water use in the Project Area. As shown in Table 4.17-32, oil and gas M&I water use accounts for about 4.03% to 4.11% of total Project Area urban demand in 2015. In 2035, oil and gas M&I demand would account for 3.84% to 3.92% of total Project Area urban water demand depending on hydrologic conditions. As shown in Table 4.17-20, the projected oil and gas M&I demand with a 10% contingency would be 10,626 AFY in 2015 and 12,936 AFY in 2035. Based on oil and gas M&I demand estimates with a 10% contingency, oil and gas M&I demand could range from 4.23% to 4.31% of total Project Area urban M&I demand in 2035, depending on hydrologic conditions.

**Table 4.17-32: Total Project Area and Oil and Gas M&I and Urban Water Demand in Average, Single Dry, and Multiple Dry Years, 2015 and 2035 (AF)**

| | Average Year | Single Dry Year | Multiple Dry Year |
|---|---|---|---|
| **2015** | | | |
| Project Area Urban Demand | 237,029 | 234,938 | 239,854 |
| Oil and Gas M&I Demand | 9,660 | 9,660 | 9,660 |
| Oil and Gas % of Total Urban Demand | 4.08% | 4.11% | 4.03% |
| **2035** | | | |
| Project Area Urban Demand | 301,736 | 299,971 | 305,886 |
| Oil and Gas M&I Demand | 11,761 | 11,761 | 11,761 |
| Oil and Gas % of Total Urban Demand | 3.90% | 3.92% | 3.84% |

Sources: See Tables 4.17-20 and 4.17-27 to 4.17-29

Oil and gas M&I demand is expected to increase by 2,100 AF per year from 2015 to 2035, while urban demand is projected to increase from 64,707 to 66,032 AF from 2015 levels, depending on hydrologic conditions. As shown in Table 4.17-33, oil and gas M&I demand would amount to 3.18% to 3.25% of the net increase in urban M&I demand in the Project Area during 2015 to 2035. Projected oil and gas M&I demand would increase by about 2,310 AFY during 2015 to 2035, including a 10% contingency (see Table 4.17-20), and would amount to 3.5% to 3.57% of the net increase in urban M&I demand in the Project Area during 2015 to 2035.

**Table 4.17-33: Project Area Urban and Oil and Gas M&I Water Net Demand Increase, 2015 to 2035 Average, Single Dry, and Multiple Dry Years**

| | Average Year | Single Dry Year | Multiple Dry Year |
|---|---|---|---|
| Project Area Urban Demand Increase | 64,707 | 65,033 | 66,032 |
| Oil and Gas M&I Demand Increase | 2,100 | 2,100 | 2,100 |
| Oil and Gas/Urban Demand Increase | 3.25% | 3.23% | 3.18% |

Sources: See Tables 4.17-20 and 4.17-27 to 4.17-29

As discussed above, for conservative analysis purposes, all oil and gas M&I water demand is assumed to be supplied from Project Area M&I-quality groundwater aquifers. As discussed in Appendix T, prior levels of Project Area groundwater extraction by all users are assumed to be maintained in future years, although the implementation of a GSP for the Project Area could change the volume of groundwater that can be used to meet new state sustainability requirements. As shown in Table 4.17-34, under these assumptions, oil and gas M&I water demand in 2015 would account for about 0.58% to 0.73% of total Project Area groundwater extraction, depending on hydrologic conditions. In 2035, oil and gas M&I water demand would account for about 0.70% to 0.89% of total Project Area groundwater use. As shown in Table 4.17-20, the projected oil and gas M&I demand with a 10% contingency would be 10,626 AFY in 2015 and 12,936 AFY in 2035. Based on oil and gas M&I demand estimates with a 10% contingency, and assuming that all such demand was met by using groundwater, oil and gas M&I demand would amount to 0.61% to 0.81% of Project Area groundwater use in 2015, and 0.77% to 0.98% of Project Area groundwater use in 2035, depending on hydrologic conditions.

**Table 4.17-34: Project Area Total Groundwater Extraction and Oil and Gas M&I Water Demand in Average, Single Dry, and Multiple Dry Years, 2015 and 2035**

| | Average Year | Single Dry Year | Multiple Dry Year |
|---|---|---|---|
| **2015** | | | |
| Project Area Groundwater Extraction | 1,319,000 | 1,673,000 | 1,635,000 |
| Oil and Gas M&I Demand | 9,660 | 9,660 | 9,660 |
| Oil and Gas Share of Groundwater Use | 0.73% | 0.58% | 0.59% |
| **2035** | | | |
| Project Area Groundwater Extraction | 1,319,000 | 1,673,000 | 1,635,000 |
| Oil and Gas M&I Demand | 11,761 | 11,761 | 11,761 |
| Oil and Gas Share of Groundwater Use | 0.89% | 0.70% | 0.72% |

Source: Appendix T

Oil and gas M&I water demand represents a relatively small share of total Project Area agricultural and urban water use, excluding produced water supply and demand (see Table 4.17-30) and total Project Area groundwater extractions (see Table 4.17-34). However, oil and gas annual M&I water demand during 2015 to 2035 would account for about 4% of total urban demand and more than 3% of the net increase in urban demand anticipated over the same period (see Tables 4.17-33 and Table 4.17-34). The projected growth in oil and gas M&I water demand would require the development of new or expanded M&I-quality entitlements in a region for which existing and projected future supplies are projected to be inadequate to meet demand under dry and multiple dry year conditions, even assuming the maintenance of historical groundwater extraction levels. As discussed above, groundwater use prior to the current drought was estimated to result in a net withdrawal of over 300,000 AFY from southern San Joaquin valley aquifers (KCWA 2011), and more recently has caused unprecedented reductions in groundwater levels, subsidence, and storage in the Project Area (DWR 2014). Under these conditions, oil and gas M&I water use would compete with other M&I demands for supplies that are not expected to be readily available in the Project Area. A commensurate increase in groundwater extraction would be required to meet M&I demand if other supply sources are constrained. The impacts to M&I water supplies in the Project Area would be significant at a Project level, and oil and gas water demand would also contribute to significant cumulative impacts to groundwater and regional water resources in the Project Area.

Impacts related to oil and gas exploration and production demand for M&I water could be reduced or avoided by the increased reuse of produced water otherwise subject to disposal. As discussed in Section 4.9, Hydrology and Water Quality, the additional reuse of about 7% of the total produced water that is projected to be disposed by injection or into surface ponds (e.g., 11,761 AF of a projected disposal volume of about 163,711 AF in 2035; see Section 4.9) would completely offset oil and gas M&I water demand by 2035. As discussed in Appendix T, there is no surplus water available in the Project Area to meet demand, particularly for higher-quality M&I water, and any such use reduces potential supplies for other purposes.

Produced water is generated from hydrocarbon-bearing formations that are not currently used and are unlikely to be used for M&I purposes due to typically high levels of TDS, hydrocarbon-related constituents, boron, chloride, and other potential constituents of concern. As discussed above, produced water has been treated, blended with other water supplies, and successfully reused for agricultural irrigation in the Eastern Subarea. Agricultural irrigation generally uses surface and groundwater supplies that have substantially higher water quality than produced water and that can be more easily and cost-effectively treated for M&I use. Additional produced water treatment and reuse for agriculture, or additional produced water use in lieu of M&I supplies by oil and gas operators, would effectively increase the supply of higher quality surface and groundwater in the supply-limited Project Area.

The extent to which additional produced water could be reused to offset oil and gas M&I water use in the Project Area depends on several factors, including produced water quality, treatment costs and requirements, the availability of conveyance capacity to route produced water to and from treatment facilities, and the availability of institutional mechanisms for managing produced

water treatment and distribution. As discussed in Section 4.9, Hydrology and Water Quality, the CVRWQCB has determined that, in certain instances, even relatively high-quality produced water available from certain oilfields in the Eastern Subarea has, on occasion, not met applicable arsenic or oil and grease water quality standards. Additional management measures, including percolation into water banking facilities, have been required to address these water quality concerns (see CVRWQCB Order R5-2011-0900 and CVRWQCB Order R5-2012-0058). The reuse of additional produced water, particularly supplies with lower quality than available in the Eastern Subarea, could require more intensive, technically demanding, and more costly forms of treatment. It is possible that treatment requirements could have other environmental effects related to increased energy use and air quality and greenhouse gas (GHG) emissions, or post-treatment waste stream disposal.

Additional produced water reuse in the Project Area could occur from agreements between individual oilfield operators and potential water users. The Kern-Tulare Water District has proposed to use 8,000 AFY of treated produced water in the Western Subarea. A CEQA notice of preparation for an EIR that will address potential environmental impacts related to the proposed produced water use was published in 2015 (SCH Number: 2015021024). The EIR will be prepared by the district. Additional use of treated produced water has been considered, but has not yet been formally proposed, in other Project Area locations. The extent to which additional produced water reuse may occur from agreements between individual oilfield operators and potential water users in the Project Area is uncertain. To date, no such agreements, other than with the CWD, have been approved and implemented in the Project Area.

Oil and gas operators may be able to substitute additional produced water for M&I supplies to conduct certain oilfield activities, including EOR and steam production. EOR activities currently account for the largest share of oil and gas M&I water use. Certain EOR operations, such as steam generation, may require higher-quality water supplies than can be typically obtained from treated produced water to avoid equipment corrosion or damage and potential chemical interactions. The use of produced water for other oilfield activities, such as discharge for dust suppression, would require additional permitting and approvals to avoid impacts to biological, water, and other resources. The extent to which oilfield operators can feasibly increase produced water reuse and decrease M&I demand is uncertain.

It is also possible that the development of significant additional produced water reuse could occur under the sponsorship of a regional program that would apportion treatment and infrastructure costs, identify and utilize the highest quality produced water to minimize treatment and waste requirements, and distribute available supplies. There is no existing administrative mechanism for accomplishing these objectives. As discussed in Section 4.17.3, Regulatory Setting, recently enacted state law requires that a new groundwater management agency (GMA) or set of agencies be established to develop and implement one or more GSPs for Project Area aquifers. The GSPs must ensure that Project Area groundwater use avoid certain “undesirable results” as defined under state law.

The potential reuse of additional amounts of produced water could be consistent with GSP groundwater sustainability requirements. In addition, the regional scope of the GSP process could

facilitate the implementation of conveyance, treatment, and cost allocation measures that would most efficiently increase produced water reuse throughout the Project Area. One or more GMAs for the Project Area must be created by 2017, and one or more GSPs for Project Area aquifers must be adopted by 2020 to achieve applicable legislative sustainability objectives by 2040. The GSP process has never before been implemented in California, and regulations have yet to be promulgated by the DWR for the development of groundwater sustainability plans. Consequently, the extent to which the GSP process could be used to enhance produced water reuse in the Project Area is uncertain.

Based on existing water constraints in the Project Area, the Project would continue to create existing, as well as projected future, increases in water demand, and there are no feasible mitigation measures available to reduce such impacts to a less than significant level. Implementation of MM 4.17-2 to MM 4.17-4 could reduce water supply impacts, but the allocation of water supplies and water demands, the complex laws affecting water rights, the many water districts that have legal jurisdiction over one or more sources of water in the Project Area, the varied technical feasibility of treating produced water, and the produced water reuse opportunities all present complex variables that fall outside the scope of the County's jurisdiction or control under CEQA. The County concludes that other agencies can and should cooperate in water management planning and implementation actions under the Sustainable Groundwater Management Act and other applicable laws to improve the quantity and reliability of water supplies in the Project Area. Project impacts to water supplies would be significant and unavoidable.

## Mitigation Measures

**MM 4.17-2** Applicant shall increase the re-use of produced water, and reduce its use of municipal and industrial-quality ground or surface water use to the extent feasible. By the end of 2016, the Applicants shall review water use data submitted to Division of Oil Gas and Geothermal Resources under Senate Bill 1281 and identify the five biggest oil industry users of municipal and industrial water by volume. The five biggest oil industry users of municipal and industrial water shall work together to develop and implement a plan identifying new measures to reduce municipal and industrial water use by 2020. The plan shall address the following activities, as appropriate: steam generation; drilling and completions (including hydraulic fracturing); dust control; compaction activities related to construction; and landscaping. Through the KernFLOWS initiative or other efforts (e.g., Groundwater Sustainability Agency), the five biggest oil industry users of municipal-and-industrial water shall also work with local agricultural producers and water districts to identify new opportunities to increase the use of produced water for agricultural irrigation and other activities, as appropriate. Any produced water treated and used for agricultural irrigation or other activities shall be tested and monitored to assure compliance with applicable standards for such agricultural irrigation or other uses.

**MM 4.17-3** In the County's required participation for the formulation of a Groundwater Sustainability Agency, the Applicant shall work with the County to integrate into the Groundwater Sustainability Plan for the Tulare Lake-Kern Basin, best practices from the oil and gas industry to encourage the re-use of produced water from oil and gas activities, and (with appropriate treatment) to produce new water supplies for other uses such as agricultural irrigation and groundwater recharge. The produced water re-use goal is 30,000 acre-feet per year, which would offset more than the current use of imported water and groundwater from non-oil bearing zones by the oil and gas industry.

**MM 4.17-4** The Applicant shall work with the County on the Groundwater Sustainability Plan to increase Applicant use of reclaimed water and reduce the Applicant's use of municipal-and-industrial quality imported surface water or groundwater.

### Level of Significance After Mitigation

Significant and unavoidable.

## Impact 4.17-5: Result in a Determination by the Wastewater Treatment Provider that Serves or may Serve the Project that it has Inadequate Capacity to Serve the Project's Projected Demand in Addition to the Provider's Existing Commitments

As discussed in Impact 4.17-2, almost all oil and gas activities in the Project Area would occur in locations that are not served by, or planned to be served by, constructed, municipal, or regional wastewater treatment facilities. Potential impacts related to the capacity of a wastewater treatment provider to meet Project-related demands would be less than significant. Potential impacts related to produced water and other wastewater treatment and disposal are discussed in Section 4.9, Hydrology and Water Quality, and Impact 4.17-1 and Impact 4.17-2, and will be less than significant with mitigation. Potential impacts related to onsite domestic wastewater treatment will be mitigated by MM 4.17-1 to less than significant levels by requiring the installation of septic systems where applicable in compliance with Kern County standards.

As discussed in the Section 4.13, Population and Housing, no population or employment growth is anticipated as part of the of the Project beyond the continued gradual growth attributed to the region as a whole (and not attributable to any particular industry sector) in the Kern COG 2014 RTP/ SCS and accompanying Environmental Impact Report. Therefore, Project-related sanitary wastewater generation would not exceed the capacity of wastewater treatment providers, and impacts would be less than significant.

### Mitigation Measures

Implement MM 4.17-1, as described above.

### Level of Significance After Mitigation

Impacts would be less than significant with mitigation.

## Impact 4.17-6: Be Served by a Landfill with Insufficient Permitted Capacity to Accommodate the Project's Solid Waste Disposal Needs

The Project would generate solid waste during construction and operations. Drilling and production wastes are non-hazardous. Most drilling and production wastes would be managed using one of the following methods (all of which require compliance with applicable laws and regulations):

- Underground injection, such as in disposal wells;
- Onsite burial, such as in pits, and landfills of non-hazardous drilling muds;
- Land treatment, such as by land spreading, land farming, and road spreading of non-hazardous oily dirt;
- Evaporation; and
- Discharge to evaporation and percolation ponds.

Other types of waste generated in oilfield operations include wood, metal equipment parts, damaged tools, construction debris, excess soil and vegetation generated from cutting and grading, concrete residue, pallets, cardboard boxes, papers, plastics, banding materials, scrap steel, scrap aluminum, scrap wire, and general trash. These wastes are collected at specially permitted in-field solid waste transfer stations or disposed of in onsite permitted facilities, or transported to offsite landfills or recycling facilities, as appropriate, on a regular basis. Transfer stations consist of containers where waste is collected for transfer to Kern County landfills or other approved sites. It is estimated that 11 cubic feet of road mix would be generated per well. Excess soil and vegetation (mulched) found to be nonhazardous could be used as ground cover.

The California Solid Waste Reuse and Recycling Access Act of 1991, as amended, requires expanded or new development projects to incorporate storage areas for recycling bins into the project design. Reuse and recycling of construction debris would reduce operating expenses and save valuable landfill space.

Several landfills within the County have the availability capacity to accommodate the solid waste anticipated to be generated by the Project through and beyond 2035, and as discussed above much of the solid waste that would be generated by oil and gas activities would be managed onsite. Therefore, the Project would not be expected to significantly impact Kern County landfills. Nevertheless, MM 4.17-5 is required to ensure compliance with policies to reduce waste sent to landfills.

### Mitigation Measures

Implement MM 4.17-2 and MM 4.17-3, as described above, and the following:

**MM 4.17-5** During construction activities for Project facilities, the Applicant shall not store construction waste onsite for longer than the duration of the construction activity, or transport any waste to any unpermitted facilities. The Applicant shall also reduce construction waste transported to landfills by recycling solid waste construction materials, such as taking materials to recycling and reuse locations listed in the brochure on recycling construction and demolition materials available on the Kern County Waste Management Department website.

### Level of Significance After Mitigation

Impacts would be less than significant with mitigation.

## Impact 4.17-7: Fail to comply with Federal, State, and Local Solid Waste Statutes and Regulations

As discussed above, the Project would generate solid waste during construction and operations. The 1989 California Integrated Waste Management Act (AB 939) requires Kern County to attain specific waste diversion goals. In addition, the California Solid Waste Reuse and Recycling Access Act of 1991, as amended, requires expanded or new development projects to incorporate storage areas for recycling bins into the project design. AB 341 requires additional solid waste recycling by 2020. Implementation of MM 4.17-5 will ensure compliance with policies to reduce waste sent to landfills.

### Mitigation Measures

Implement MM 4.17-5, as described above.

### Level of Significance After Mitigation

Impacts would be less than significant with mitigation.

# 4.17.5 Cumulative Setting, Impacts, and Mitigation Measures

The geographic scope for cumulative impacts to utilities and service systems includes the area within 6 miles of the external Project Area. While projects in a larger area may affect some of the same resources as the Project, by focusing on projects within the Project Area and 6 miles outside of the Project Area, the analysis of cumulative impacts includes those projects that would most comparably affect the same resources as the Project.

The regional plans and projections evaluated in this cumulative analysis are described in Section 3.7, of Chapter 3, Project Description.

## Impact 4.17-8: Cumulative Impacts on Utilities and Service Systems

Kern County has grown, and is expected to continue to grow, with or without the Project, consistent with the growth projections included in the 2013 Kern COG RTP/SCS and accompanying EIR.

As described above, the ongoing production of oil and gas in Kern County, with the additional mitigation measures and other substantive and procedural requirements included in the proposed revisions to the County's oil and gas ordinances included in the Project, would not be expected to result in any substantial increase in population.

Significant cumulative impacts to public services would occur if the cumulative projects would overburden the public service agencies and if utility providers were unable to provide adequate services. The cumulative projects would substantially increase the demand for public service providers and utility servers. As discussed above, the Project would not increase the demand for municipal wastewater treatment, stormwater management, or landfills. Incorporation of the mitigation measures 4.17-1 and 4.17-5 described above would further reduce impacts from the proposed Project, in conjunction with other projects in the area, to a less than significant cumulative level for public utilities use except water supply

As shown in Table 4.17-27 to 4.17-29, future growth will increase water demand in the Project Area by 2035 in average, dry, and multiple dry year conditions, even assuming groundwater extractions remain at historic levels and are not limited to comply with the state's new GSP requirements. Table 4.17-27 shows that the Central Subarea has a supply deficit in average years ranging from -681,596 AF in 2015 to -717,682 in 2035. Surpluses in the Eastern Subarea, generally associated with the availability of diverted water from the Kern River, and smaller average year surpluses in the Western Subarea slightly exceed the supply deficits in the Central Subarea. Table 4.17-28 shows that, under single dry year conditions, Project Area supply deficits in single dry years would range from -750,710 AF in 2015 to -817,127 AF in 2035. Table 4.17-29 shows that, under multiple dry year conditions, Project Area supply deficits in multiple dry years would range from -315,626 AF in 2015 to -383,042 AF in 2035.

Oil and gas demand for M&I water is also projected to increase by about 2,982 AFY from 2012 levels by 2035. As discussed above and in Appendix T, surplus M&I-quality water is not available in the Project Area. Any new use reduces the availability of M&I-quality water to another Project Area user, or increases the regional groundwater overdraft if supply shortfalls are addressed by increased groundwater extraction. Consequently, existing entitlements and resources are insufficient to meet the current and projected future M&I water demand in the Project Area, and increasing M&I water demand under overdraft conditions would contribute to a significant cumulative water supply impact in the Project Area.

Implementation of MM 4.17-2 to 4.17-4 could reduce cumulative water supply impacts, but the allocation of water supplies and water demands, the complex laws affecting water rights, the many water districts that have legal jurisdiction over one or more sources of water in the Project Area, the varied technical feasibility of treating produced water, and the produced water reuse

opportunities, all present complex variables that fall outside the scope of the County's jurisdiction or control under CEQA. The County concludes that other agencies can and should cooperate in water management planning and implementation actions under the Sustainable Groundwater Management Act and other applicable laws to improve the quantity and reliability of water supplies in the Project Area. Because of significant ongoing regional uncertainties regarding water supplies, and the need for agencies other than Kern County to take action to improve management of regional water supplies to meet existing and reasonable foreseeable demand, cumulative impacts to water supplies would remain significant and unavoidable.

## Mitigation Measures

Implement MM 4.17-1 through MM 4.17-5, as described above.

## Level of Significance After Mitigation

Significant and unavoidable with respect water supply. Less than significant with respect to other public utilities, including municipal wastewater treatment, stormwater management, or landfills with mitigation.

Chapter 5

# Consequences of Project Implementation

Chapter 5

# Consequences of Project Implementation

## 5.1 Environmental Effects Found To Be Less Than Significant

According to Section 15128 of the California Environmental Quality Act (CEQA) Guidelines, an Environmental Impact Report (EIR) must "contain a statement briefly indicating the reasons that various possible significant effects of a project were determined not to be significant and were therefore not discussed in detail in the EIR."

Kern County has engaged the public in the scoping of the EIR. The contents of this EIR were established based on an Initial Study/Notice of Preparation (NOP) prepared in accordance with the CEQA Guidelines and on public and agency comments received during the public scoping period. Issues that were identified to have no impact or less-than-significant impacts during preparation of the Initial Study/NOP do not need to be addressed further in this EIR. However, based on the findings of the NOP and the results of scoping, Kern County has determined that the EIR must include a detailed analysis of all environmental issues identified in Appendix G of the CEQA Guidelines.

After further study and environmental review in this EIR, direct and indirect impacts of the oil and gas development and operational activities associated with the implementation of the Amendment to Chapter 19.98 (Oil and Gas Production) and related ordinance amendments to the Kern County Zoning Ordinance Project (not including cumulative impacts) would be less than significant or could be reduced to less-than-significant levels with mitigation measures for the following issue areas:

- Geology and Soils;
- Hazards and Hazardous Materials;
- Land Use and Planning;
- Mineral Resources;
- Noise;
- Population and Housing;
- Recreation;
- Utilities and Services; and
- Transportation and Traffic.

# 5.2 Significant Environmental Effects That Cannot Be Avoided

Section 15126.2(b) of the CEQA Guidelines requires that the EIR describe any significant impacts, including those that can be mitigated but not reduced to less-than-significant levels. Potential environmental effects of the proposed Project and proposed mitigation measures are discussed in detail in Chapter 4 of this EIR. The following environmental impacts were determined to be significant and unavoidable (Table 5-1).

**Table 5-1: Summary of Unavoidable Significant Adverse Impacts of the Project**

| Resources | Project Impacts | Cumulative Impacts |
|---|---|---|
| Aesthetics and Visual Resources | Although implementation of mitigation measures would reduce the adverse visual changes experienced at individual key observation point locations, there are no mitigation measures that would preserve the existing character and quality of the Project Area and its surroundings. Project-related oil and gas activities would continue to produce visible changes to the existing environment and the resultant visual impact is considered **significant and unavoidable**. The Project has the potential to create a new source of substantial light or glare that would adversely affect day or nighttime views in the area. After implementation of MM 4.1-6, this impact would remain **significant and unavoidable.** | The oil and gas industry has a visible presence on the landscape of the San Joaquin Valley Floor and, the Project in combination with the implementation of other reasonably foreseeable oil and gas projects will continue to result in adverse visible changes within Kern County. Therefore, the Project's cumulative contribution after implementation of the recommended mitigation measures would remain cumulatively **significant and unavoidable** as a result of these changes in visual character and quality. |
| Air Quality | The Project would continue to generate odors. With implementation of MM 4.3-7, impacts would still be **significant and unavoidable**. | The construction and operational activities of oil and gas activities that would be authorized under the Project would result in an increase of criteria pollutants (oxides of nitrogen [NOx], volatile organic compounds [VOC], carbon monoxide [CO], particulate matter less than 10 microns and less than 2.5 microns in diameter [$PM_{10}$ and $PM_{2.5}$, respectively]) in excess of the recommended criteria pollutant significance threshold adopted by the SJVAPCD Board. Emission sources in Kern County contribute between 11% and 21% of criteria pollutant emissions in the San |

**Table 5-1: Summary of Unavoidable Significant Adverse Impacts of the Project**

| Resources | Project Impacts | Cumulative Impacts |
|---|---|---|
| | | Joaquin Valley Air Basin. The Project would contribute between 2% and 14% of these pollutants in the San Joaquin Valley Air Basin or between 19% and 97% of Kern County's contribution. This analysis indicates that most sulfur dioxide ($SO_2$) emissions in Kern County would originate from oil and gas activities and the majority of $NO_X$ emissions. Therefore, the proposed Project would have a **cumulatively considerable** contribution of criteria pollutant ($NO_X$, $PM_{10}$, $PM_{2.5}$, CO and $SO_2$) emissions to the Kern County portion of the SJVAB. |
| Agricultural Resources | None. | The geographic scope for cumulative impacts to agricultural and forest resources encompasses the whole of Kern County. The oil and gas exploration and production activities that would be authorized through implementation of the proposed Project along with projected population growth could result in **significant and unavoidable** cumulative impacts on farmland conversion. |
| Biological Resources | None. | Future oil and gas exploration and production activities related to the proposed Zoning Ordinance amendment could contribute to a significant cumulative impact on Project Area biological resources because future use and development of federal, state, and incorporated urban lands are not within the County's jurisdiction or control. Future land uses and development could affect biological resources in each of these jurisdictions and would be undertaken as independent actions with associated impacts, avoidance and minimization requirements, and mitigation, if required, under applicable federal, state, regional and local agency law. Impacts would remain **significant and unavoidable** with mitigation. |

**Table 5-1: Summary of Unavoidable Significant Adverse Impacts of the Project**

| Resources | Project Impacts | Cumulative Impacts |
|---|---|---|
| Cultural Resources | None. | The geographic scope for cumulative impacts to cultural and paleontological resources includes the area within a one-mile radius from the Project Area. Cumulative impacts could result when paleontological, historical, and archaeological resources or human remains cannot be avoided by future projects. For paleontological and archaeological resources, it is important to recover a scientifically significant sample so the information can be preserved. For historic buildings and structures, detailed recordings, including measured drawings and photographs, can preserve the information. For human remains, reburial in a location not slated for future development can protect those remains from future disturbance. There could be **significant cumulative impacts** to paleontological, historical, and archaeological resources or human remains as a result of the oil and gas exploration and production activities that would be authorized under the Project.<br><br>Implementation of best professional practices would reduce many impacts to a less than significant level. However, buried archaeological and paleontological resources could be damaged or destroyed. Direct mitigation using the measures above would reduce most of these impacts to a **less than significant level**. |
| Greenhouse Gases | The Project has the potential to conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases. With the implementation of MM 4.7-5, the impact would remain **significant and unavoidable.** | The geographic scope for cumulative impacts for GHGs includes the area within 6 miles of the external Project Area boundary, and areas (e.g., incorporated cities) within the Project Area. Climate change impacts are inherently global and cumulative, and not Project specific. While implementation of MM 4.7-1 through MM 4.7-3 and the 2014 |

**Table 5-1: Summary of Unavoidable Significant Adverse Impacts of the Project**

| Resources | Project Impacts | Cumulative Impacts |
|---|---|---|
| | | Regional Transportation Plan mitigation measures would encourage reduction in GHG emissions at a regional level, they do not provide a mechanism that guarantees GHG emission reductions on a cumulative basis. The Project's cumulative contribution after implementation of the recommended mitigation measures would remain **cumulatively significant and unavoidable** as a result of the GHG emissions associated with the Project. |
| Hydrology and Water Quality | As discussed in Section 4.17, Utilities and Service Systems, while MM 4.17-2 through MM 4.17-4 would encourage the additional reuse of produced water, the extent to which oilfield operators can increase produced water reuse and decrease M&I demand is uncertain. As a result, potential impacts to groundwater levels and aquifer volumes would be **significant and unavoidable with mitigation**. | Project impacts could result in cumulatively considerable impacts that would be considered significant. Implementation of MM 4.9-1 through MM 4.9-6 would reduce potential cumulative impacts to water quality, erosion risks, flooding and other hydrologic resources to less than significant with mitigation. As discussed in Section 4.17, Utilities and Service Systems, although MM 4.17-2 through MM 4.17-4 encourage the additional reuse of produced water, the extent to which oilfield operators can increase produced water reuse and decrease municipal and industrial (M&I) demand is uncertain. As a result, cumulative impacts to groundwater would be significant and unavoidable.<br>The County lacks jurisdiction and control over land conversions, and actions or approvals by other agencies that may cause cumulatively significant impacts to hydrology or water quality in the region; accordingly, this impact remains **significant and unavoidable**. |
| Utilities and Services | Implementation of MM 4.17-2 to MM 4.17-4 could reduce water supply impacts, but the allocation of water supplies and water demands, the complex laws affecting water | The geographic scope for cumulative impacts to utilities and service systems includes the area within 6 miles of the external Project Area. |

**Table 5-1: Summary of Unavoidable Significant Adverse Impacts of the Project**

| Resources | Project Impacts | Cumulative Impacts |
|---|---|---|
| | rights, the many water districts that have legal jurisdiction over one or more sources of water in the Project Area, the varied technical feasibility of treating produced water, and the produced water reuse opportunities all present complex variables that fall outside the scope of the County's jurisdiction or control under CEQA. Although mitigation measures would reduce water use impacts, water quality impacts would be **significant and unavoidable**. | Cumulative impacts would be **significant and unavoidable with respect to water supply**. For other public utilities, including municipal wastewater treatment, stormwater management, or landfills with mitigation, impacts would be **less than significant** with mitigation measures. |

# 5.3 Irreversible Impacts

Section 15126.2(c) of the CEQA Guidelines defines an irreversible impact as an impact that uses nonrenewable resources during the initial and continued phases of the Project. Irreversible impacts can also result from damage caused by environmental accidents associated with the Project. Irretrievable commitments of resources should be evaluated to ensure that such consumption is justified. Oil and gas development and operational activities associated with the implementation of the Amendment to Chapter 19.98 (Oil and Gas Production) and related ordinance amendments to the Kern County Zoning Ordinance would commit nonrenewable resources during construction and operation activities. During these activities, oil, gas, and other nonrenewable resources would be consumed. Therefore, an irreversible commitment of nonrenewable resources would occur as a result of the Zoning Ordinance. However, assuming that those commitments occur in accordance with the adopted goals, policies, and implementation measures of the Kern County General Plan (KCGP), as a matter of public policy, those commitments have been determined to be acceptable. The KCGP ensures that any irreversible environmental changes associated with those commitments will be minimized.

# 5.4 Significant Cumulative Impacts

According to Section 15355 of the CEQA Guidelines, the term cumulative impacts "refers to two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." Individual effects that may contribute to a cumulative impact may be from a single project or a number of separate projects. Individually, the impacts of a project may be relatively minor, but when considered along with impacts of other closely

related or nearby projects, including newly proposed projects, the effects could be cumulatively considerable.

This EIR has considered the potential cumulative effects of the proposed Project. Impacts for the following issue areas have been found to be cumulatively considerable:

- Aesthetics;
- Agriculture and Forest Resources;
- Air Quality;
- Biological Resources;
- Cultural Resources;
- Greenhouse Gases (GHGs);
- Hydrology and Water Quality; and
- Utilities and Services (Water Supply).

Each of these significant cumulative impacts is discussed in the applicable section of Chapter 4, Environmental Setting, Impacts, and Mitigation Measures, of this EIR.

## 5.5 Growth Inducement

The KCGP recognizes that certain forms of growth are beneficial, both economically and socially. Section 15126.2(d) of the CEQA Guidelines provides the following guidance on growth-inducing impacts: a project is identified as growth inducing if it "could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment."

Growth inducement can be a result of new development that requires an increase in employment, removes barriers to development, or provides resources that lead to secondary growth. With respect to employment, 16,752 workers in Kern County were employed in the oil and gas extraction industry in 2012. Of this total, 14,067 were estimated to be "oilfield" employees. Future oil and gas exploration and production activities that would be authorized under the proposed Amendment to Chapter 19.98 (Oil & Gas Production) of the Kern County Zoning Ordinance would result in 2,697 new production wells being drilled annually, while 2,231 wells would be plugged and abandoned. Additionally, it is anticipated that 1,200 wells would receive some type of well stimulation treatment during this same timeframe. Given the long history of oil and gas development within Kern County, implementation of the Project would not result in a large increase in employment that would significantly induce growth.

With respect to removing barriers to development, such as through providing access to previously undeveloped areas, the oil and gas development activities would involve constructing temporary and permanent access roads. Some roads may be removed and restored after initial construction;

some may be reduced in size; and others may be maintained at their construction size for the life of the associated oil and gas operation. In general, these roads would provide for access to oil and gas construction and operation areas and would not provide access into other areas thereby promoting growth-inducing development. No other development would be anticipated as a result of these roads, and oil and gas development would tend to preclude other development from occurring.

While the Project would contribute to energy supply, which supports growth, the development of additional oil and gas resources is a response to increased market demand and is not a factor that induces new growth. Kern County planning documents already permit and anticipate a certain level of growth in the area of the Project and in the state as a whole, along with attendant growth in energy demand. It is this anticipated growth that drives energy-production projects and development, not vice versa. The Project would supply oil and gas to accommodate and support existing demand and projected growth, but it would not foster any new growth. Therefore, any link between the Project and growth in Kern County would be speculative.

In Kerncrest Audubon Society v. Los Angeles Department of Water and Power, the analysis of growth-inducing effects contained in the EIR for the Pine Tree Wind Development Project was challenged. Plaintiffs argued that the discussion was too cursory to provide adequate information about how additional electricity generated by the Project would sustain further growth in the Los Angeles area. The court held that the additional electricity that the Project would produce was intended to meet the current forecast of growth in the Los Angeles area. As such, the wind development project would not cause growth, and so it was not reasonable to require a detailed analysis of growth-inducing impacts. In addition, EIRs for similar energy projects have contained similarly detailed analyses of growth-inducing impacts. Their conclusions that increasing the energy supply would not create growth has been upheld, because: (1) the additional energy would be used to ease the burdens of meeting existing energy demands within and beyond the area of the Project; (2) the energy would be used to support already-projected growth; or (3) the factors affecting growth are so multifarious that any potential connection between additional energy production and growth would necessarily be too speculative and tenuous to merit extensive analysis. Thus, as has been upheld in the courts, this level of analysis is sufficient to inform the public and decision makers of the growth-inducing impacts of the Project.

## 5.6 Energy Conservation

In order to assure that energy implications are considered in Project decisions, CEQA requires that EIRs include a discussion of the potential energy impacts of proposed projects, with particular emphasis on avoiding or reducing inefficient, wasteful and unnecessary consumption of energy (see Public Resources Code section 21100(b)(3)). According to Appendix F of the CEQA Guidelines, the goal of conserving energy implies the wise and efficient use of energy including: (1) decreasing overall per capita energy consumption; (2) decreasing reliance on natural gas and oil; and (3) increasing reliance on renewable energy sources.

There are no reported data specifically identifying oil and gas production and exploration energy use in the Project Area. The California Energy Commission (CEC) and the Lawrence Berkeley National Laboratory (LBNL) have been developing California energy balance (CALEB) estimates for the state that include data for the "oil and gas extraction" industry. The most recent CALEB update was published by the CEC in 2013 and includes energy supply and demand estimates, including oil and gas extraction energy use, for the period 1997-2008 (CEC 2013).

The LBNL has published a 2012 flowchart for California energy use that summarizes total state energy use and energy sources for that year (LBNL 2015).

This section primarily uses the data provided in the 2013 CALEB update (CEC 2013), the 2012 LBNL state energy flow chart (LBNL 2015) annual crude oil production statistics for California, and the Project Area (DOGGR District 4) published by DOGGR for 1997, 2008, and 2012 (DOGGR 1998, 2009, and 2013), and energy data compiled in the state of California and available online in the state energy consumption data management system (ECDMS 2015).

Energy use is measured in different ways depending on the source (e.g., natural gas, petroleum products, or electricity) and end use (e.g., industry, residential or transportation). The CALEB data and LBNL flow charts generally convert energy use and supply from all sources to British thermal units (Btus), which is a measure of the heat content in a specific volume of gas or petroleum fuel or in a specific amount of electrical power. Natural gas use is also measured by volume, including a standard cubic foot (SCF) or cubic foot (CF). According to the U.S. Energy Information Administration (EIA), in 2014 the average heat content of a CF of natural gas in the United States was about 1,028 Btus (EIA 2015). Electrical energy use is usually measured in watt-hours, which represents the amount of electricity used over time to power a specific use. For example, the operation of piece of equipment that requires 1,000 watts to operate (i.e., equipment with a power requirement of one kilowatt or "kw") for two days would consume 48 kilowatt hours (Kwh) of energy. Larger amounts of electrical energy use, such as statewide totals, are often measured in millions of Kwh, or gigawatt hours (Gwh).

According to the LBNL, in 2012 California used about 2,500 trillion Btus (TBtu) of natural gas (LBNL 2015). The California Energy Almanac indicates that the state used about 282,140 Gwh of electrical energy in 2012 (ECDMS 2015). The LBNL estimates that total state energy use, converted to Btus from all sources, was about 7,100 TBtu in 2012 (LBNL 2012). The CALEB database indicates that the state used 8,016 TBtu of total energy in 2008 (CEC 2013). These estimates indicate that, despite continued population increases, California reduced total energy consumption by about 11% from 2008 to 2012.

Based on data from EIA, California is the U.S. state that imports the greatest amount of energy from other states and countries. Consumption of overall energy in California outweighs in-state production by about three-to-one (DOGGR 2015). The most recent CALEB data published by the CEC indicates that California imported 6,046 TBtu (75%) of the 8,016 TBtu of energy used in that year (CEC 2013). As shown in Table 5-2, in 2013 California relied on imports to meet 32% of in-state electrical demand, 90% of instate natural gas demand (including natural gas used to produce in-state electricity), and about 63% of the crude oil delivered to in-state refineries,

including about 12% from Alaska, and 51% from foreign producers in locations such as Saudi Arabia, Ecuador, Iraq, and Colombia (ECDMS 2015; DOGGR 2015).

**Table 5-2: California Energy Demand and In-State and Imported Supplies (2013)**

| | Total Demand | Instate Supply | Imported Supply | Percent Imported |
|---|---|---|---|---|
| Electricity (gigawatt hours per year) | 296,628 | 199,783 | 96,845 | 33% |
| Natural gas (million standard cubic feet per day) | 6,061 | 618 | 5,443 | 90% |
| Crude oil delivered to instate refineries (million barrels per year-42 gallon per barrel) | 624 | 230 | 393 | 63% |

Source: ECDMS 2015

According to the LBNL, in 2012 petroleum accounted for 3,300 TBtu (46.5%) and natural gas 2,500 TBtu (35.2%) of California's total energy use of 7,100 TBtu (LBNL 2015). As shown in Table 5-2, the state is heavily reliant on imports from other locations for natural gas energy supplies. California is also increasingly reliant on imports to meet petroleum-related energy needs. In-state crude oil deliveries to California refineries, which produce petroleum products used mainly for in-state purposes, fell from 49.6% of total refinery deliveries in 2000 to 37% in 2013 (ECDMS 2015). As discussed below, the declining share of in-state crude oil supplies for in-state refiners requires that California import crude oil delivered primarily by ship from overseas locations, including South America and the Middle East, and by pipeline, rail or truck from Alaska or, to a lesser extent, other U.S. sources. The production and conveyance of imported crude oil to meet in-state petroleum energy demand requires additional energy, increases the risk of transportation-related hazards, such as ocean crude oil discharges or rail accidents, and utilizes crude oil produced in locations that are generally much less regulated than in California and have not implemented policies similar in scope to the state's landmark energy efficiency and GHG reduction requirements (see Section 4.7, Greenhouse Gas Emissions and Global Climate Change).

The most recent CALEB data published by the CEC indicates that oil and gas extraction used about 342 TBtu in 2008. About 94% of this energy use was generated from natural gas used to operate remote pumping facilities, steam generation, and other heating and treatment purposes (CEC 2013). Based on these estimates, the CALEB data indicates that oil and gas extraction accounted for about 4% of the state's total 8,016 Btu of energy use in 2008 (CEC 2013).

The most recent CALEB data published by the CEC also includes estimates of electrical and natural gas use per volume of extracted oil in California for the period 1997-2008 (Table 5-3). These estimates indicate that oil and gas electricity use ranged from 12.3 Kwh per 1,000 barrels (kbbl) to 20.7 Kwh/kbbl of crude oil produced in the state during 1998-2007. Natural gas use was estimated to range from 1,085 million Btu (MBtu)/kbbl to 1,375 MBtu/kbbl of crude oil produced over the same period (CEC 2013). One barrel of oil equals 42 gallons.

**Table 5-3: California CALEB Estimates of Crude Oil Extraction Energy Use, 1997 and 2008**

| | Unit | 1997 | 2008 |
|---|---|---|---|
| Electricity use | Gwh/year | 4,418 | 5,170 |
| Fuel use | TBtu/year | 390 | 334 |
| Production of crude oil in California | Kbbl | 340,362 | 249,993* |
| Electricity use per kbbl of crude oil | Kkwh/kbbl | 12.98 | 20.68 |
| Natural gas use per kbbl of crude oil | MBTU/kbbl | 1,147 | 1,335 |

Source: CEC 2013
*Crude oil production includes onshore and state and federal offshore totals.
DOGGR reported data for 2008 indicates total production from onshore and state and federal offshore sources was about 238,600 kbbl

As noted in the most recent CALEB data published by the CEC, the energy intensity required to produce a barrel of crude oil in California increased over 1997–2008 while total production decreased. The reason for the increasing energy intensity of crude oil production in the state appears to be related to the declining productivity of many oilfields, which requires the use of steam, water, and other enhanced oil recovery (EOR) techniques to recover increasingly viscous and more difficult to extract crude oil in existing oilfields (CEC 2013). As discussed in Section 3, Project Description and Section 4.9, Hydrology and Water Quality, EOR requires energy, mainly in the form of natural gas, to treat, heat, and inject steam or water to mobilize oil in underground formations for pumping to the surface. Although the amount of natural gas required to extract a barrel of crude oil increased from 1997–2008, the overall decline in California production by 90,369,443 barrels during this period resulted in a decrease in natural gas use from 390 TBtu to 334 TBtu (Table 5-4).

The most recent CALEB data published by the CEC energy intensity estimates can be used to approximate Project Area electricity use in 1997 and 2008 based on Project Area crude oil production. Project Area oil and gas extraction energy use in 2012 can also be estimated by calculating the increase in energy use per production decline during 1997-2008 from the CALEB data. Based on the data in Table 5-4, as California production declined by 90,369,443 barrels, electricity use increased by 0.000085 Kkwh/kbbl and natural gas increased by 0.0021 MBtu/kbbl during 1997–2008. These increases are consistent with the conclusions in the most recent CALEB data published by the CEC that additional energy per barrel is required as oilfield deposits become more difficult to extract. According to DOGGR, California crude oil production from all sources was 197,510,422 barrels in 2012, a decline of 52,482,578 barrels from the production levels reported in the most recent CALEB data published by the CEC (Table 5-3). If energy use increased at the same rate in relation to production declines over 2008-2012 as during 1997-2008, crude oil extraction would have used about 25.2 Kkwh/kbbl and 1,444 MBtu/kbbl in 2012. Table 5-4 summarizes oil and gas production energy use in the Project Area in 1997, 2008, and 2012 based on the statewide electricity and natural gas factors produced in the 2013 CALEB update, 2012 factors calculated from the most recent CALEB data published by the CEC, and Project Area (DOGGR District 4) crude oil production for 1997, 2008, and 2012.

**Table 5-4: Estimated Project Area (DOGGR District 4) Electricity and Natural Gas Use 1997, 2008, and 2012**

| Electricity | | | |
|---|---|---|---|
| **Year** | **Crude Oil production (kbbl)** | **Electrical use factor, Kkwh/kbbl** | **Annual use (Gwh)** |
| 1997 | 213,053 | 12.98 | 2,765 |
| 2008 | 162,286 | 20.70 | 3,359 |
| 2012 | 141,694 | 25.18 | 3,568 |
| **Natural Gas** | | | |
| **Year** | **Crude Oil production (kbbl)** | **Natural gas use factor, MBTU/kbbl** | **Annual use (TBtu)** |
| 1997 | 213,053 | 1,147 | 244 |
| 2008 | 162,286 | 1,335 | 217 |
| 2012 | 141,694 | 1,444 | 205 |

Notes: 1997 and 2008 calculated from statewide energy intensity factors (CEC 2103; see Table 5-3) and reported District 4 production (DOGGR 1997, 2008); 2012 estimated from 1997-2008 statewide energy intensity factors (CEC 2103; see Table 5-3) pro-rated by reported statewide crude oil production decline during 1997-2008 reported in the 2013 CALEB update (CEC 2013) and reported District 4 production (DOGGR 2012).

Based on the statewide energy intensity factors developed in the most recent CALEB data published by the CEC (CEC 2013), Project Area oil and gas production energy use is consistent with reported statewide trends for 1997-2008. As oil deposits became more difficult to extract, more electricity and natural gas were used per barrel of crude oil produced in the Project Area over this period (Table 5-4). Total electrical energy use rose from 2,765 Gwh to 3,359 Gwh and total natural gas use declined from 244 TBtu to 217 TBtu as crude oil production declined by 50,766,000 barrels from 1997 to 2008. Table 5-4 indicates that similar trends would have occurred during 2008-2012 if the energy intensity increase per unit of production decline over 1997-2008 was the same during 2008 to 2012. Under these assumptions, total Project Area electrical energy use would have increased from 3,359 Gwh to 3,568 Gwh and total natural gas use would have declined from 217 TBtu to 205 TBtu as crude oil production declined by 20,592,000 barrels from 2008 to 2012 (see Table 5-4).

The energy use estimates in Table 5-4 and Table 5-5 indicate that since 1997, as crude oil production declined, total Project Area energy use also declined. Although oil extraction sector statewide and Project Area electrical energy use increased from 1997, as discussed above, well over 90% of all such energy use is produced from natural gas when measure in terms of heat content (Btu) (CEC 2013). Total natural gas use tends to fall as total crude oil production volumes decline. The most recent CALEB data published by the CEC estimated that total energy use for oil and gas extraction in California measured in total Btus fell by 13% from 1997-2008 even though energy use per barrel extracted rose over this period (CEC 2013).

Similar trends appear to characterize energy use in the Project Area. Table 5-5 summarizes Project Area energy use for 1997, 2008, and 2012 based on Table 5-4 and by converting electrical energy use to equivalent heat content levels (in Btu).

**Table 5-5: Project Area Oil and Gas Extraction Energy Use - 1997, 2008, and 2012**

| | 1997 | 2008 | 2012 |
|---|---|---|---|
| Electricity (TBtu) | 9.44 | 11.46 | 12.18 |
| Natural gas (TBtu) | 244.37 | 216.65 | 204.63 |
| Total (TBtu) | 253.81 | 228.11 | 216.81 |

Note: Calculated from Table 5-4 converting electrical use to Btus at rate of 3,412 Btu per Kwh

Table 5-5 shows that, consistent with the conclusions in the most recent CALEB data published by the CEC, natural gas provides substantially more than 90% of oil and gas extraction energy use in the Project Area (CEC 2013). Between 1997 and 2008, Project Area energy use for oil and gas extraction declined because overall production declined. If 1997-2008 energy intensity trends continued after 2008, Project Area total energy use also would have declined due to reduced crude oil production during 2008 through 2012.

Oil and gas extraction energy use in the Project Area is a function of the location and amount of crude oil production, neither of which can be predicted with reasonable certainty under future conditions. If recent trends persist, oil production in the Project Area would require additional energy per barrel produced, but total energy use would continue to decline. The state supply of electricity and natural gas, including electrical power and gas that is produced and used by oil and gas operators in cogeneration and similar facilities, has been sufficient to meet Project Area demand. Supplies would likely remain sufficient to meet demand assuming oil and gas production electricity and natural gas demand in the Project Area remains consistent with historical levels. The extent to which new sources of crude oil may exist in recoverable quantities in the Project Area remains uncertain. In 2014, for example, the EIA's estimates of the recoverable oil in the 1,750-square-mile Monterey Shale formation in California, portions of which underlie the Project Area, were reportedly reduced from 13.6 billion to 600 million barrels (Los Angeles Times 2014). Due to the wide variation in these estimates, it is not possible to estimate potential energy use in the Project Area that could be associated with Monterey Shale or other nonconventional oil recoveries.

Oil and gas production is inherently energy intensive and results in the production of hydrocarbon materials that are refined into fossil fuels. As discussed above, due to California's continued dependence on petroleum products to meet state energy needs, and declining in-state crude oil production, all in-state production is supplied to California refineries. In-state production reduces the amount of crude oil that the state must import from Alaska, South America, and the Middle East, and reduces the transportation energy use, health and safety hazards, and potential environmental consequences associated with crude oil production in less regulated locations outside of the state.

Project Area oil and gas extraction energy efficiency is also affected by public regulatory and market factors. As discussed in Section 4.7, Greenhouse Gas Emissions and Global Climate Change, California has enacted landmark legislation to reduce the use of fossil fuels, reduce GHG emissions, and increase the efficiency of fossil fuel use for home and industrial heating and transportation. Oil and gas production in California is regulated under the state's GHG cap and trade program. These measures impose building construction and operational standards that increase incentives to reduce energy use in all state sectors, including oil and gas production.

Market factors include competition from other global crude oil suppliers to California refineries, many of which are subject to significantly less regulation and oversight than Project Area producers. Major oil producers, such as Saudi Arabia, have also indicated a willingness to reduce crude oil prices to maintain market share and reduce competition from higher-cost crude oil sources (Forbes 2015). As discussed above, crude oil production in California has been characterized by increasing energy intensity per barrel produced; a factor that increases production costs and reduces the competitiveness of in-state oil supplies. Project Area production has been decreasing in part due to the energy costs associated with extracting remaining supplies relative to competing crude oil prices. California's regulatory policies discouraging fossil fuel use, including natural gas combustion that supplies over 90% of Project Area oil and gas extraction energy requirements, also increase energy costs for instate producers. Under these conditions, Project Area oil and gas production operators have significant incentives to use energy as efficiently and wisely as possible to compete with global producers.

Chapter 6

# Alternatives

Chapter 6
# Alternatives

## 6.1 Introduction

The California Environmental Quality Act (CEQA) requires that an Environmental Impact Report (EIR) describe a range of reasonable alternatives to the project or to the location of the project site that could feasibly avoid or lessen any significant environmental impacts of the project while attaining most of the project's basic objectives. An EIR also must compare and evaluate the environmental effects and comparative merits of the alternatives. This chapter describes alternatives considered but eliminated from further consideration, including the reasons for elimination, and compares the environmental impacts of several alternatives retained with those of the Project.

The following are key provisions of the CEQA Guidelines (Section 15126.6):

- The discussion of alternatives shall focus on alternatives to the Project or its location that are capable of avoiding or substantially lessening any significant effects of the Project, even if these alternatives would impede to some degree the attainment of the Project objectives, or would be more costly.

- The No Project Alternative shall be evaluated, along with its impacts. The no Project analysis shall discuss the existing conditions at the time the notice of preparation was published, as well as what would be reasonably expected to occur in the foreseeable future if the Project were not approved, based on current plans and consistent with available infrastructure and community services.

- The range of alternatives required in an EIR is governed by a "rule of reason;" therefore, the EIR must evaluate only those alternatives necessary to permit a reasoned choice. The alternatives shall be limited to ones that would avoid or substantially lessen any of the significant effects of the Project.

- For alternative locations, only locations that would avoid or substantially lessen any of the significant effects of the Project need be considered for inclusion in the EIR.

- An EIR need not consider an alternative whose effects cannot be reasonably ascertained and whose implementation is remote and speculative.

The range of feasible alternatives is selected and discussed in a manner to foster meaningful public participation and informed decision making. Among the factors that may be taken into account when addressing the feasibility of alternatives, as described in Section 15126.6(f)(1) of the CEQA Guidelines, are environmental impacts, site suitability, economic viability, availability

of infrastructure, general plan consistency, regulatory limitations, jurisdictional boundaries, and whether the Project proponent could reasonably acquire, control, or otherwise have access to an alternative site. An EIR need not consider an alternative whose effects could not be reasonably identified, whose implementation is remote or speculative, and that would not achieve the basic Project objectives.

Per the CEQA Guidelines, this section discusses alternatives that are capable of avoiding or substantially lessening the Project's potentially significant environmental effects. Section 6.2, Summary of Project Impacts Relevant to Evaluation of Alternatives, summarizes the potentially significant Project impacts relevant to this EIR's evaluation of Project alternatives. Following this summary, Section 6.3, Project Objectives, restates the Project proponent's Project objectives. Section 6.4, Process Used to Develop/Screen Alternatives, describes the process used to develop and screen the alternatives evaluated in this EIR. Section 6.5, Alternatives Eliminated from Further Consideration, presents alternatives to the Project that were considered but eliminated for further analysis. Section 6.6, Alternatives to the Project, presents alternatives fully analyzed in this EIR, and provides a comparison of each alternative's environmental effects to those of the Project. Section 6.7, Comparative Impacts of Project to All Alternatives, sets forth a table that summarizes the relative impacts of all of the alternatives as compared to the Project. Section 6.8, Environmentally Superior Alternative, makes a determination about the environmentally superior alternative analyzed in this EIR.

# 6.2 Summary of Project Impacts Relevant to Evaluation of Alternatives

Potential significant adverse environmental impacts that would result from the Project have been evaluated in Chapter 4, Environmental Setting, Impacts, and Mitigation Measures, of this EIR. The mitigation measures and impact conclusions are summarized in Chapter 1, Executive Summary, which includes a summary chart of impact conclusions for all topic areas. This EIR concludes that the Project has the potential to cause significant and unavoidable environmental impacts in the following categories: Aesthetics and Visual Resources; Agricultural and Forest Resources; Air Quality; Biological Resources; Cultural and Paleontological Resources; Greenhouse Gas Emissions and Global Climate Change; Hydrology and Water Quality; Utilities and Service Systems. Each impact category evaluated in this EIR is summarized below.

## 6.2.1 Aesthetics and Visual Resources

As explained in Section 4.1, Aesthetics and Visual Resources, the Project would have less than significant impacts, without mitigation, with respect to its effects on scenic vistas and scenic resources. However, the Project would substantially degrade the existing visual character or quality of the Project site and its surroundings, even with mitigation, and thus this impact would be significant and unavoidable. Even with mitigation, the Project would create some new sources of light or glare that could adversely affect day or nighttime views in some portions of the Project

Area and such impacts would be significant and unavoidable. Finally, the Project's incremental aesthetic effects, combined with the aesthetic effects of other projects, would be cumulatively considerable, a significant impact for which there is no mitigation. Thus, the Project cumulative aesthetic impact would also be significant and unavoidable.

## 6.2.2 Agricultural and Forest Resources

As explained in Section 4.2, Agricultural and Forest Resources, with mitigation, the Project would have a less than significant impact with respect to its potential to convert prime farmland, unique farm, or farmland of statewide importance to non-agricultural use. Even without mitigation, however, the Project would have a less than significant impact with respect to its potential to conflict with existing agricultural zoning, forestry zoning, timberland zoning, and Williamson Act contracts. Likewise, since there is no forest land in the Project Area, the Project would have no impact on forest land resources. Moreover, the Project would not result in the cancellation of an open space contract or farmland security zone contract for any parcel of 100 or more acres. The Project would have a potential significant impact with respect to its potential to involve other changes in the environment which, because of their location or nature, could result in the conversion of farmland to non-agricultural use (or the conversion of forest land to non-forest use), but such impacts would be mitigated to less than significant levels. Finally, the Project's incremental effects on agricultural resources would be cumulatively considerable and, even with mitigation, this potentially significant cumulative impact would not be mitigated to a less than significant level.

## 6.2.3 Air Quality

As explained in Section 4.3, Air Quality, with mitigation, the Project would not conflict with or obstruct implementation of the applicable air quality plan, or violate any applicable air quality standard. However, even with mitigation, scientific uncertainty regarding the use of $NO_X$ and $PM_{10}$ offsets for ROG emissions other factors makes Project-related emission of these criteria pollutants significant and unavoidable. With mitigation, the Project would not expose sensitive receptors to substantial pollutant concentrations, and would not create objectionable odors affecting a substantial number of people; however, ambient conditions remain which could cause Project odor-related impacts to remain significant and unavoidable. Finally, cumulative air emissions would be significant and unavoidable, even with mitigation.

## 6.2.4 Biological Resources

As explained in Section 4.4, Biological Resources, with mitigation, the Project's potential to have a direct or indirect adverse effect on any species identified as candidate, sensitive, or special status species in local or regional plans, policies, or regulations or by wildlife agencies would be less than significant. Also, with mitigation, the Project's potential to have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by wildlife agencies would be less than significant. The Project's

potential to have a substantial adverse effect on federally protected wetlands through direct removal, filing, or hydrological interruption, or other means would be less than significant with mitigation. Likewise, with mitigation, the Project would not interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of wildlife nursery sites. With mitigation, the Project would not conflict with any local policies or ordinances protecting biological resources, such as tree preservation policies or ordinances. Moreover, any adverse impacts related to the Project's potential to conflict with the provisions of a habitat conservation plan, natural community conservation plan, or other approved local, regional, or state habitat conservation plan would be mitigated to a less than significant level. However, the Project would make a cumulatively considerable contribution to cumulative biological resource impacts, even with mitigation.

### 6.2.5 Cultural and Paleontological Resources

As explained in Section 4.5, Cultural and Paleontological Resources, with mitigation, the Project would have a less than significant impact with respect to its potential to cause a substantial adverse change in the significance of an historic resource. Similarly, with implementation of mitigation measures described in Section 4.5, the Project would have a less than significant impact with respect to its potential to cause a substantial adverse chance in the significance of an archaeological resource. Moreover, with mitigation, the Project would have a less than significant impact with respect to its potential to directly or indirectly destroy a unique paleontological resource, site, or feature. With mitigation, the Project would also have a less than significant impact with respect to its potential to disturb any human remains. However, even with mitigation, the Project would make a cumulatively considerable contribution to impacts regarding historic, archaeological, or paleontological resources or human remains and such impact is significant and unavoidable.

### 6.2.6 Geology and Soils

As explained in Section 4.6, Geology and Soils, with mitigation, the Project would not cause a significant impact with respect to its potential to expose people or structures to risk of loss, injury or death involving the rupture of a known earthquake fault. The Project, as mitigated, would not expose people or structures to substantial adverse effects including the risk of loss, injury or death involving strong seismic ground shaking. Moreover, with mitigation, the Project would not expose people or structures to substantial adverse effects including risk of loss, injury or death involving seismic-related ground failure, including liquefaction. Likewise, with mitigation, the Project would not expose people or structures to substantial adverse effects including risk of loss, injury or death involving landslides. The Project, as mitigated, would not result in substantial soil erosion or the loss of topsoil. The Project's potential impacts related to onsite or offsite landslide, lateral spreading, subsidence, liquefaction, or collapse would also be mitigated to a less than significant level. The Project's potential significant impacts related to expansive soils, or soils incapable of adequately supporting the use of septic tanks or alternate wastewater disposal

systems where sewers are not available would be less than significant with mitigation. Finally, with mitigation, the Project would not make a cumulatively considerable contribution related to geologic and soil resource impacts.

### 6.2.7 Greenhouse Gas Emissions and Global Climate Change

As explained in Section 4.7, Greenhouse Gas Emissions and Global Climate Change, the Project's potential adverse effects related to direct and indirect greenhouse gas emissions would be mitigated to less than significant levels. However, the Project would conflict with any applicable plan, policy, or regulation adopted for the purpose of reducing emissions of greenhouse gases, thus causing a significant and unavoidable impact, even with mitigation. Finally, the Project would make a cumulatively considerable contribution to a cumulative greenhouse gas emission impact, even with mitigation, and this impact is therefore significant and unavoidable.

### 6.2.8 Hazards and Hazardous Materials/Public Health Risks

As explained in Section 4.8, Hazards and Hazardous Materials/Public Health Risks, with mitigation, the Project would have a less than significant environmental impact with respect to its potential to create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials. Likewise, with mitigation, the Project would have a less than significant environmental impact with respect to its potential to create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment. The Project's potential to handle hazardous or acutely hazardous materials, substance, or wastes within one-quarter mile of an existing or proposed school would also be mitigated to a less than significant level, as would the Project's potential to create a hazard to the public or the environment as a result of being a site that is included on a list of hazardous materials sites complied pursuant to Government Code Section 65962.5. With mitigation, the Project would have a less than significant impact with respect to its potential to result in a safety hazard for people residing or working within an area covered by an adopted Airport Land Use Compatibility Plan. Even without mitigation, the Project would have a less than significant impact with respect to its potential to result in a safety hazard for people residing or working within the vicinity of an airstrip, and with respect to the Project's potential to impair implementation of, or physically interfere with, an adopted emergency response plan or emergency evacuation plan. The Project's potential to expose people or structures to a significant risk of loss, injury, or death involving wildland fires would be mitigated to a less than significant level, as would the Project's potential to generate vectors or have a component that includes agricultural waste exceeding adopted qualitative thresholds. Moreover, with mitigation, the Project would not make a cumulatively considerable contribution to cumulative hazards and hazardous materials impacts.

## 6.2.9 Hydrology and Water Quality

As explained in Section 4.9, Hydrology and Water Quality, the Project's construction period impacts, including stormwater and runoff impacts, and impacts related to surface or subsurface discharges during well construction, well reworking, and plugging and abandonment, would not violate water quality standards or waste discharge requirements and would be less than significant with mitigation. Likewise, the Project's operational period impacts, including stormwater and runoff impacts, and impacts related to oil, produced water, maintenance and production (including "enhanced oil recovery" (EOR) and well stimulation), municipal and industrial (M&I) water, and constituent leaks and surface spills or equipment leaks at the surface from ruptured or leaking tanks, pipes, values, hoses, and other process equipment, would not violate water quality standards or waste discharge requirements and would be less than significant with mitigation. Moreover, the Projects operational period impacts related to surface or subsurface discharges during well construction, well reworking, and plugging and abandonment, and surface or subsurface discharges related to produced water or well stimulation, will be less than significant with mitigation and would not violate any water quality standards or waste discharge requirements.

As further explained in Section 4.9, Hydrology and Water Quality, the Project's potential impacts to groundwater supply and recharge from produced water generation, injection, and well stimulation will be less than significant with mitigation. However, as discussed in both Section 4.9 and Section 4.17, Utilities and Service Systems, although mitigation measures encourage the additional reuse of produced water, the extent to which oilfield operators can increase produced water reuse and decrease M&I demand is uncertain. As a result, potential Project impacts to groundwater levels and aquifer volumes will be significant and unavoidable with mitigation. However, with mitigation, the Project will have a less than significant impact with respect to its potential to substantially alter the existing drainage pattern of the Project Area in a manner that would result in substantially erosion or siltation onsite or offsite. Moreover, with mitigation, the Project would not substantially alter the existing drainage pattern of the Project Area, or substantially increase the rate of surface runoff, in a manner that would result in onsite or offsite flooding.

With mitigation, the Project would not create or contribute to runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff. Likewise, the proposed Project would not place housing within a mapped 100-year flood hazard area, even without mitigation. Moreover, with mitigation, the Project would not place structures that would impede or redirect flood flows within a 100-year flood hazard. Similarly, Project impacts related to its potential to expose people or structures to a significant risk of loss, injury, or death involving flooding would be mitigated to less than significant levels. Even without mitigation, the Project would not contribute to inundation by seiche, tsunami, or mudflow.

The Project's potential impacts related to conflicts with the Water Quality Control Plan for the Tulare Lake Basin (Basin Plan) would be less than significant with mitigation if groundwater not

shown as exempted in the Basin Plan is not considered suitable or potentially suitable for municipal (MUN) uses by the Regional Water Quality Control Board. However, this impact would be significant and unavoidable if Project Area groundwater not shown as exempted in the Basin Plan is considered suitable or potentially suitable for MUN uses.

Even with mitigation, the Project would cause a significant and unavoidable impact with respect to its potential to make a cumulatively considerable contribution to cumulative impacts to groundwater elevations and aquifer volumes, unless M&I water use for oil and gas exploration and production is offset by additional reuse of produced water under future conditions, in which case such impact would be mitigated to a less than significant level. However, potential cumulative impacts to water quality, erosion risks, flooding and other hydrologic resources would be mitigated to a less than significant level.

## 6.2.10 Land Use and Planning

As explained in Section 4.10, Land Use and Planning, with mitigation, the Project would have a less than significant impact with respect to its potential to physically divide an established community. Likewise, with mitigation, the Project would not conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the Project. Even without mitigation, the Project would not conflict with any applicable habitat conservation plan or natural community conservation plan. Finally, the Project would not make a cumulatively considerable contribution to any cumulative land use or planning impacts, even without mitigation.

## 6.2.11 Mineral Resources

As explained in Section 4.11, Mineral Resources, the Project would have a less than significant impact with respect to its potential to result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state, even without mitigation. Moreover, the Project would have a less than significant impact, without mitigation, with respect to is potential to result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, Specific Plan, or other land use plan. Finally, the Project would not make a cumulatively considerable contribution to mineral resource impacts, even without mitigation.

## 6.2.12 Noise

As explained in Section 4.12, Noise, the Project would have the potential to expose persons to, or generate, noise levels in excess of standards established in the local general plan or noise ordinance or applicable standards of other agencies, but such potentially significant impacts would be mitigated to a less than significant levels. The Project's potential to expose persons to, or to generate, excessive groundborne vibration or groundborne noise levels would be less than significant and does not require mitigation. Although the Project has the potential to result in a substantial permanent increase in ambient noise levels in the Project vicinity above levels existing

without the Project, this potentially significant impact would be mitigated to a less than significant level. Likewise, the Project's potential to result in a substantial temporary or periodic increase in ambient noise levels in the Project vicinity above levels existing without the Project would be mitigated to a less than significant level. Moreover, mitigation would reduce the Project's potential to expose people residing or working in the Project to excessive noise levels caused by those Project activities occurring within the Kern County Airport Land Use Compatibility Plan to less than significant levels. Those Project activities located within the vicinity of a private airstrip have the potential to expose people residing or working in the Project Area to excessive noise levels, but such impacts would be reduced to less than significant through mitigation. Finally, the Project's potential to make a cumulatively considerable contribution to noise impacts on noise receptors would be mitigated to less than significant levels.

## 6.2.13 Population and Housing

As explained in Section 4.13, Population and Housing, the Project would not induce substantial population growth in the area, either directly or indirectly, even without mitigation. Moreover, the Project would not displace substantial numbers of people or existing housing, necessitating the construction of replacement housing elsewhere, even without mitigation. Nor would the Project make a cumulatively considerable contribution to population and housing impacts, even without mitigation.

## 6.2.14 Public Services

As explained in Section 4.14, Public Services, with mitigation, the Project would not result in substantial adverse physical impacts associated with the provision of, or need for, new or physically altered governmental facilities, the construction of which could cause significant environmental effects, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services, including fire protection, police protection, schools, parks and other public facilities. Moreover, with mitigation, the Project would not cause a cumulatively considerable contribution to any cumulative public service impacts.

## 6.2.15 Recreation

As explained in Section 4.15, Recreation, the Project would have a less than significant impact, without mitigation, with respect to its potential to result in the increased use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration would occur or be accelerated. Nor would the Project include recreational facilities or require construction or expansion of recreational facilities that might have an adverse physical effect on the environment, even without mitigation. Finally, the Project would not make a cumulatively considerable contribution to impacts on recreation facilities, even without mitigation.

### 6.2.16 Transportation and Traffic

As explained in Section 4.16, Transportation and Traffic, with mitigation, the Project would not conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system, and would not conflict with an applicable congestion management program. With mitigation, the Project would not result in a change in air traffic patterns that results in substantial safety risks, nor would it substantially increase transportation-related hazards due to a design feature or incompatible use. The Project as mitigated would have a less than significant impact with respect to its potential to result in inadequate emergency access, and would not conflict with adopted policies, plans, or programs regarding public transit, bicycle or pedestrian facilities, or otherwise decrease the performance or safety of such facilities. Finally, with mitigation, the Project would not make a cumulatively considerable contribution to cumulative transportation or cumulative traffic impacts.

### 6.2.17 Utilities and Service Systems

As explained in Section 4.17, Utilities and Service Systems, with mitigation, the Project would not exceed applicable wastewater treatment requirements. Further, with mitigation, the Project would not require or result in the construction or expansion of new or existing water or wastewater treatment facilities or stormwater drainage facilities in a manner that would cause significant environmental effects. With mitigation, the Project would have a less than significant impact with respect to adequate wastewater treatment and landfill capacities. Moreover, with mitigation, the Project's potential to violate federal, state, and local solid waste statutes would be less than significant. However, the Project would result in a significant and unavoidable Project-level and cumulative impact with respect to having sufficient water supplies available to serve the Project from existing entitlements and resources, even with mitigation. The Project would not, however, cause a cumulatively considerable contribution to any other cumulative impacts related to utilities and service systems.

## 6.3 Project Objectives

### 6.3.1 County Objectives

The County has defined the following objectives for the Project:

- Update the County's Zoning Ordinance to include additional procedures and compliance standards that address changes in laws and regulations by other agencies, and technological advancements within the oil and gas industry, for the purpose of reducing or eliminating potential significant adverse environmental impacts, to the extent feasible, of future oil and gas activities, and thereby ensure that current County ordinances reflect the County's interest in protecting the health, safety and general welfare of residents and visitors.

- Encourage ongoing economic development by the oil and gas industry that creates quality, high paying jobs and promotes capital investment in Kern County which enables the County to invest in capital improvement projects and social programs, which benefit County residents, retail businesses, and capital industries which ensures the County's fiscal stability.

- Continue Kern County's ongoing commitment to consult and cooperate with federal, state, regional and local agencies by periodically reviewing adopted regulations to ensure the long-term viability of Kern County's resources.

- Continue to improve and streamline current energy regulations and increase County monitoring and involvement in state and federal energy legislation.

- Protect areas of important mineral, petroleum, and agricultural resource potential for future use by promoting sustainability and encouraging best management practices, which are mutually beneficial, through strategic short and long range planning.

- Ensure the protection of environmental resources by emphasizing the conservation of productive agricultural lands, the encouragement of planned urban growth, the promotion of clean air strategies to address existing air quality issues, and the promotion of long-term water conservation strategies which will ensure the quality and adequacy of surface and groundwater supplies for future growth of all of Kern County's industries.

- Contain new development within an area large enough to meet generous projections of foreseeable need but in locations that will not impair the economic strength derived from residential developments, agriculture, rangeland, mineral resources, or diminish the other amenities that exist in Kern County.

## 6.3.2 Applicant Objectives

The Project proponents have defined the following objectives for the Project:

- Create an effective regulatory and permitting process for oil and gas exploration and production that can be relied on by the County of Kern, as well as the California Division of Oil, Gas and Geothermal Resources and other responsible agencies.

- Achieve an efficient and streamlined environmental review and permitting process for all oil and gas operations covered by the proposed Project.

- Provide for economically feasible and environmentally responsible growth of the Kern County oil and gas industry.

- Develop industry-wide best practices, performance standards and mitigation measures that ensure adequate protection of public health and safety and the environment.

- Increase oil and gas exploration and production in Kern County as a means of reducing California's dependence upon foreign sources of energy.

- Increase oil and gas exploration and production in Kern County as a means of increasing employment opportunities and economic prosperity to Kern County's residents, businesses, and local government.

# 6.4 Process Used to Develop/Screen Alternatives

The alternatives to the Project analyzed in this EIR were selected through a two-step process. First, the County identified potential alternatives based on the comments it received during the EIR scoping process and though internal deliberations that took into consideration the overall Project objectives, and then the County screened out those alternatives that it determined would not meet most of the Project objectives, were infeasible, would not substantially reduce any of the Project's significant environmental effects, or were not reasonable or realistic. Second, the County identified those alternatives that passed the screening criteria and which represent a range of available options to carry forward for analysis in this chapter.

# 6.5 Alternatives Eliminated from Further Consideration

Kern County considered several alternatives to reduce the Project's significant and unavoidable impacts. Per CEQA, the lead agency may make an initial determination as to which alternatives are feasible and warrant further consideration and which are infeasible. The following alternatives were initially considered but were eliminated from further consideration in this EIR because they do not meet Project objectives and/or were infeasible.

## 6.5.1 Drilling Ban on Agriculturally Productive Land Alternative

The Drilling Ban on Agriculturally Productive Land Alternative is identical to the Project, except that it would amend Chapter 19.98 of the Kern County Zoning Ordinance to prohibit all new oil and gas exploration, development and production activities on lands zoned either Exclusive Agricultural (A) or Limited Agricultural (A-1) if such land is being used for agricultural production at the time of drilling permit application. If this alternative were implemented, the Project's agricultural mitigation program, as set forth in Mitigation Measure 4.2-1 would not apply. As a result, under this alternative, there would be less agricultural land conserved in perpetuity in the County, and there would be less restoration of agricultural land to productive use through the removal of legacy oil and gas production equipment, than would occur under the Project. Moreover, under this alternative, it is more likely that otherwise prohibited oil and gas

activities on agricultural lands would be displaced to non-agricultural lands with greater habitat and wildlife resource values than are typically found on previously disturbed and actively farmed irrigated agricultural land, potentially causing greater overall environmental harm. Moreover, this alternative could result in more horizontal and directional subsurface drilling activities needed to recover subsurface oil and gas resources located outside of agricultural zoning districts. This additional horizontal and directional subsurface drilling activity would generate greater air quality, greenhouse gas, and toxic air contaminant emissions than would the proposed Project. Horizontal and directional drilling activities generally require more time to complete than does the vertical drilling activity typically associated with Kern County oil and gas well development and longer drilling periods require the additional combustion of fossil fuels that cause polluting emissions. In addition, since the vast majority of the Project Area would be off-limits to oil and gas activities under this alternative, Alternative 3 is legally infeasible due to legal restrictions on the County's authority to prohibit access to subsurface mineral interests without liability. For these reasons, the Drilling Ban on Agriculturally Productive Land Alternative is rejected for analysis in this EIR.

## 6.5.2 Drilling Ban on All Lands Alternative

The Drilling Ban On All Lands Alternative would amend Chapter 19.98 the Kern County Zoning Ordinance to prohibit all new oil and gas exploration, development and production activities within the Project Area. Under this alternative, existing oil and gas wells that are in production on or before the Zoning Ordinance amendment would be authorized to continue, but all existing oil and gas exploration and well development activities would be required to cease and all affected land would be required to be restored to its pre-exploration condition. This alternative assumes that Chapter 19.98 of the Kern County Zoning Ordinance would not be amended to establish updated development standards and conditions to address environmental impacts of pre-drilling exploration, well drilling and the operation of wells and other oil and gas production-related equipment and facilities, including exploration, production, completion, stimulation, reworking, injection, monitoring and plugging and abandonment. Moreover, this alternative assumes that Chapter 19.98 of the Kern County Zoning Ordinance would not be amended to establish a new "Oil and Gas Conformity Review" ministerial permit procedure for County approval of future well drilling and operations to ensure compliance with the updated development standards and conditions and provide for ongoing tracking and compliance monitoring. Finally, this alternative would not be updated to incorporate the Project's relevant proposed development standards into the County's Dark Skies Ordinance or the Zoning Ordinance provisions governing the Floodplain Primary District, the Petroleum Extraction (PE) Combining District, and Hillside Development.

The Drilling Ban On All Lands Alternative was screened from consideration because it would not achieve most Project objectives. Specifically, this alternative would not achieve any of the Applicant's Project objectives, and it would not achieve four of the seven of the County's Project objectives. In addition to failing to meet most of the Project objectives, an alternative that completely bans all new oil and gas exploration, development and production activities is infeasible due to existing legal restrictions on the County's authority to prohibit access to subsurface mineral interests without liability. Since the Drilling Ban On All Lands Alternative is

legally infeasible and would not achieve most of the Project's basic objectives it is rejected for analysis in this EIR.

## 6.5.3 Larger Project Area Alternative

The Larger Project Area Alternative is identical to the Project, except it would enlarge the Project Area described in Chapter 3, Project Description, to include additional acreage in the Project Area's Eastern Subarea. This alternative is feasible, and it would achieve most of the County's and Applicant's Project objectives. This alternative would not, however, reduce of any of the Project's potentially significant adverse environmental effects. By expanding the Project Area to include more acreage available for oil and gas exploration, development and production activities, the Larger Project Area Alternative would likely have more adverse environmental effects to air quality, biology, cultural resources, and agricultural resources than would the Project. Since this alternative would not reduce any of the Project's significant adverse effects, it is rejected for analysis in this EIR.

## 6.5.4 More Wells within Project Footprint Alternative

The More Wells Within the Project Footprint Alternative is identical to the Project, except it would also amend Zoning Ordinance Chapter 19.98 to cap the number of oil and gas drilling permits issued by the County at 3,500 per calendar year. As discussed in Chapter 3, Project Description, this EIR assumes that, under Project conditions, 2,697 new producing wells would be drilled in the Project Area on an annual basis over the next 20 years. Under the Permit Cap Alternative, the County would authorize more growth than is assumed by this EIR, but would cap the maximum number of new well permits available to applicants within the Project Area at 3,500 per calendar year. This alternative is screened from consideration in this EIR because a larger number of wells than is contemplated by the Project would not reduce, but may exacerbate, the Project's significant environmental effects.

## 6.5.5 Fewer Wells within the Project Footprint Alternative

The Fewer Wells Within the Project Footprint Alternative is identical to the Project, except it would also amend Zoning Ordinance Chapter 19.98 to cap the number of oil and gas drilling permits issued by the County at 1,500 per calendar year, an amount significantly less than the Project's 2,697 new producing wells assumed by this EIR to be drilled on an annual basis over the next 20 years. This alternative is screened from consideration in this EIR because it would not achieve the basic Project objectives of the Applicant (i.e., to provide for growth of the Kern County oil and gas industry through creation of streamlined environmental review and permitting process for all Kern County oil and gas operations), and because a permit cap is legally infeasible due to legal restrictions on the County's authority to prohibit access to subsurface mineral interests without liability.

## 6.5.6 Offsite Alternative

The Offsite Alternative would carry out the Project in a different area of the County outside of the Project Area described Chapter 3, Project Description. The Project Area, however, was selected because of its proximity to the location of oil and gas resources within the County. As explained in Chapter 3, Project Description, the Project Area was selected because it encompasses the portion of the County in which oil and gas development has historically occurred and is reasonably foreseeable to occur in the coming decades. DOGGR requires oil and gas production wells to be reported, and each is included in an "Administrative Boundary" area for DOGGR's regulatory oversight purposes. If a new well is drilled outside the Administrative Boundary, the boundary is adjusted by DOGGR once the new well reaches a sustained production output for a year. Historically, more than 95% of oil and gas production occurs within DOGGR's Administrative Area boundaries. Since the Project Area boundary was drawn to encompass the DOGGR Administrative Area boundaries, and land outside of such Administrative Areas where it is probable that oil and gas development will expand, the proposed Project Area best represents the location of probable future oil and gas development in Kern County. Since the fundamental purpose of the Project is to update the County's zoning regulations applicable to future oil and gas development in the County, and since the proposed Project Area represents the area wherein 95% of future oil and gas development is likely to occur, no other sites would be suitable for the Project as proposed. Moreover, it would be technologically infeasible to construct and operate oil and gas drilling facilities that are located outside of the Project Area but also have access to the County's oil and gas resources, which are primarily located inside the proposed Project Area. For these reasons, the Offsite Alternative was dismissed from analysis in this EIR.

It should also be noted that, while CEQA requires an EIR to identify project alternatives, it does not require the EIR to identify alternative project locations. Per the CEQA Guidelines, an EIR must include a reasonable range of "alternatives to the project, *or* to the location of the project." (14 Cal. Code of Regs. Section 15126.6(a)(emphasis added)). Applicable case law recognizes that CEQA grants lead agencies flexibility to elect to analyze either onsite or offsite alternatives, or both. (Mira Mar Mobile Community v. City of Oceanside (2004) 119 Cal.App.4$^{th}$ 447, 491). There is no requirement under CEQA that an EIR always explore an offsite alternative. (California Native Plant Society v. City of Santa Cruz (2009) 177 Cal.App.4$^{th}$ 957, 933). Thus, CEQA does not require this EIR to analyze the Offsite Alternative.

## 6.5.7 Renewable Energy Alternatives

This chapter considers multiple alternatives designed to offset some of the Project-related air emissions associated with energy consumption, including greenhouse gas emissions, by considering a version of the proposed Project that would amend Chapter 19.98 of the Kern County Zoning Ordinance to require all new oil and gas well drilling operations to be powered by renewable electric generation sources, such as wind and solar technologies, rather than being powered by fossil fuel-powered electric generation sources. In all other respects, the alternatives discussed in this section would be identical to the Project.

## Wind Energy Alternative

The Wind Energy Alternative assumes that each new well site permitted in the Project Area would be developed in the same manner as would occur under Project conditions, but also that each new well site would be developed with wind turbines and related facilities in an amount sufficient to provide the electric capacity needed to power well operations at such site.

Wind energy, or electricity generated from wind-power turbines, is a proven and available technology. Like solar energy, however, wind energy is high variable. Both wind and solar energy are "non-firm" forms of renewable energy and thus are interruptible and not available on a continuous schedule. Moreover, according to the California Energy Commission, wind resource potential for the Project Area is low, with average wind speeds generally below 10.1 miles per hour, making wind energy less desirable than solar energy for oil and gas well drilling and production needs.

According to the American Wind Energy Association, as a general rule of thumb, it requires 60 acres to produce 1 megawatt (MW) of power capacity for land-based wind farms. To match the electricity capacity required to power oil and gas development and production activities associated with a new oil well, wind turbines would need to be constructed at each well site to supply electricity to that well, thus expanding each well site footprint, as compared to the Project. The wind turbine development assumed by this alternative would result in additional ground disturbance and construction at each well site, thus exacerbating the environmental effects associated with well site development under Project conditions (e.g., for each well site, this alternative would entail greater impacts to aesthetic, agricultural, cultural, and biological resources that would the Project). In addition, wind turbine operation at each well site could cause noise impacts associated with subsonic noise generation, as well as avian mortality impacts associated with wind turbine operations that would otherwise be avoided by the Project. Since the wind energy development required by this alternative would cause greater environmental impacts at each well site than would the Project, further analysis of the Wind Energy Alternative is rejected for analysis by this EIR on the basis that it would not offer significant environmental advantages over the Project, even if it would reduce overall Project emissions by reducing each well site's reliance on polluting fossil fuel combustion to power well operations. Moreover, the energy storage technology necessary to make this alternative technically feasible is not presently commercially available.

## Solar Energy Alternative

The Solar Energy Alternative assumes that each new well site permitted in the Project Area would be developed in the same manner as would occur under Project conditions, but also that each new well site would be developed with solar photovoltaic (PV) panels and related facilities in an amount sufficient to provide the electric capacity needed to power well operations at such site.

Solar PV electric generation is commercially available in the Project Area. Like wind power generation, however, solar PV power generation is variable with the potential for sudden changes

during daily and seasonal cycles. Moreover, solar PV technology only generates power during daylight hours, whereas the drilling and operation of the new oil and gas wells contemplated by this alternative would be conducted on 24-hour basis, as discussed in Chapter 3, Project Description. Because of variations in insolation (i.e., incoming solar radiation), a solar PV system designed to meet each well site's energy demand would need to store energy during peak insolation hours for use during non-peak times. Solar PV systems typically would provide power at design capacity for 5-6 hours per day. Thus, to store sufficient power to provide continuous, uninterrupted power for 24-hours per day consistent with this alternative's electricity demand, the solar PV facility would have to have a capacity four to five times larger than this alternative's electricity demand.

Solar PV technology typically requires approximately 8 acres of solar PV cells to generate 1 MW of capacity, though some recent design improvements have reduced this to 6 acres per MW. Using the 6-acre-per-MW scale, this alternative would require far more acres of land to produce the amount of electric power needed to supply sufficient electricity to each well site, thus expanding each well site footprint, as compared to the Project. The Solar PV development assumed by alternative would result in additional ground disturbance and construction at each well site, thus exacerbating the environmental effects associated with well site development under Project conditions (e.g., for each well site, this alternative would entail greater impacts to aesthetic, agricultural, cultural, and biological resources that would the Project). Thus, further analysis of the Solar Energy Alternative in this EIR is rejected on the basis that it would not offer significant environmental advantages over the Project, even if it might reduce the Project emissions overall by reducing reliance on polluting fossil fuel combustion to power well site operations. Moreover, the energy storage technology necessary to make this alternative technically feasible is not presently commercially available. For these reasons, the Solar Energy Alternative is not further considered in this EIR.

## Zero Net Gain Alternative

The Zero Net Gain Alternative is identical to the Project, except that it would amend Chapter 19.98 of the Kern County Zoning Ordinance to also provide that no new oil or gas well drilling permits will be issued by the County, except to the extent that an equal number of existing oil or gas wells have first stopped production and have been abandoned in accordance with state law. Thus, under this alternative, there would be zero net gain in the total number of oil and gas wells operating in the County as compared to baseline conditions. The Zero Net Gain alternative is rejected for consideration in this EIR because it would not achieve most of the Applicant's Project objectives, including its objectives to (i) achieve an efficient and streamlined environmental review and permitting process for all oil and gas operations covered by the Project, (ii) provide for economically feasible and environmentally responsible growth of the Kern County oil and gas industry; (iii) increase oil and gas exploration and production in Kern County as a means of reducing California's dependence upon foreign sources of energy, or (iv) increase oil and gas exploration and production in Kern County as a means of increasing employment opportunities and economic prosperity to Kern County's residents, businesses, and local government. Moreover, this alternative would also not achieve the County's objective of

encouraging ongoing economic development by the oil and gas industry that creates quality, high paying jobs and promotes capital investment in Kern County that enables the County to invest in capital improvement projects and social programs.

# 6.6 Alternatives to the Project

Alternatives that would avoid or substantially lessen any of the significant effects of the Project and that would feasibly attain most of the basic Project objectives are evaluated in Sections 6.6.1 through 6.6.6, below. Each alternative is discussed with respect to its relationship to the Project's objectives. Kern County has considered the following alternatives, which are also identified in Table 6-1, Comparison of Alternatives, and discussed individually below:

- Alternative 1 – "No Project" Alternative
- Alternative 2 – CUP Alternative
- Alternative 3 – Reduced Ground Disturbance Alternative
- Alternative 4 – No Hydraulic Fracturing Alternative
- Alternative 5 – Low-Emission EOR Technology Alternative
- Alternative 6 – Recycled Water Alternative

## 6.6.1 Alternative 1 – "No Project" Alternative

As required by CEQA Guideline §15126.6, this chapter describes and analyzes a "no project" alternative for the purpose of comparing the impacts of approving the Project with the impacts of not approving the Project. Alternative 1, the "No Project" Alternative, thus assumes that the Project's proposed amendment to Title 19 of the Kern County Zoning Ordinance will not be approved. Accordingly, Alternative 1 assumes that Chapter 19.98 of the Kern County Zoning Ordinance will not be amended to establish updated development standards and conditions to address environmental impacts of pre-drilling exploration, well drilling and the operation of wells and other oil and gas production-related equipment and facilities, including exploration, production, completion, stimulation, reworking, injection, monitoring and plugging and abandonment. Moreover, Alternative 1 assumes that Chapter 19.98 of the Kern County Zoning Ordinance will not be amended to establish a new "Oil and Gas Conformity Review" ministerial permit procedure for County approval of future well drilling and operations to ensure compliance with the updated development standards and conditions and provide for ongoing tracking and compliance monitoring. Moreover, under Alternative 1, the Zoning Ordinance would not be updated to incorporate the Project's relevant proposed development standards into the County's Dark Skies Ordinance or the Zoning Ordinance provisions governing the Floodplain Primary District, the Petroleum Extraction (PE) Combining District, and Hillside Development.

Alternative 1 assumes that oil and gas development and production activities will continue in the Project Area in accordance with the existing Kern County Zoning Ordinance. As discussed in Chapter 3, Project Description, Section 19.98.020 of the existing Zoning Ordinance currently authorizes "unrestricted drilling," with no County permit required, in County lands zoned for Exclusive Agriculture (A), Limited Agriculture (A-1), Medium Industrial (M-2), Heavy Industrial (M-3) and Natural Resource (NR), subject to compliance with specified conditions and standards which augment those of DOGGR, the SJVAPCD, and applicable fire and safety ordinances and regulations of the County of Kern. Thus, in these zoning districts, no review or permit would be required under the "No Project" Alternative for the drilling of any well intended for the exploration for, or development or production of, oil, gas, and other hydrocarbon substances, or for any related accessory equipment, structure, or facility used as part of the oil and gas production process. However, per the existing Zoning Ordinance, under Alternative 1, drilling would continue to be prohibited within, at minimum, one hundred (100) feet of any existing residence without the written consent of the owner thereof.

Under Alternative 1, oil or gas exploration or production would continue to be allowed within the Floodplain Primary District (FPP), subject to the Special Review Procedures and Development Standards set forth in Zoning Ordinance Section 19.50.130. Moreover, oil or gas exploration or production would continue to be permitted within a Special Planning District (SP), provided it is consistent with the County General Plan land use designation applicable to the subject property and does not create a conflict with the public health, safety, and welfare.

In addition, under Alternative 1, drilling by "ministerial permit" will continue in several zoning districts pursuant to Zoning Ordinance Section 19.98.030. A "ministerial" permit requires an application and review process, but the County does not impose site-specific conditions in such permits and the Applicant is entitled to receive the permit once it demonstrates that relevant standards are met. Under Alternative 1, ministerial permits will continue to be required in the Light Industrial (M-1) and Recreation-Forestry (RF) Districts, subject to specified development standards, which will also continue to apply in Drilling Island (DI) Zone Districts and Petroleum Extraction (PE) Combining District.

Under Alternative 1, a Conditional Use Permit (CUP) will continue to be required for oil or gas exploration or production in all residential districts, including the Estate District (E), as well as in the Low, Medium, and High-Density Residential Districts (R-1, R-2, and R-3, respectively). A CUP will also continue to be required in commercial districts, including the Commercial Office District (CO), Neighborhood Commercial District (C-1), General Commercial District (C-2) and the Highway Commercial District (CH) as well as in the Platted Lands District (PL). Finally, under Alternative 1, oil and gas exploration or production will continue to be prohibited in Mobile Home Park District (MP) (Section 19.26.040) and in the Open Space District (OS) zoning districts (Section 19.44.040).

## Comparative Impacts of Alternative 1

Alternative 1 is environmentally inferior to the proposed Project. As explained in Chapter 3, Project Description, the proposed Project would substantially amend sections of the Kern County

Zoning Ordinance related to oil and gas exploration and production, including Chapter 19.98, Oil and Gas Production. In doing so, the Project would update and extend to all oil and gas exploration and production facilities development standards and conditions designed to avoid or minimize environmental impacts associated with pre-drilling exploration, well drilling, and the operation of well and other oil and gas production-related equipment and facilities. As discussed in Chapter 3, Project Description, the updated development standards and conditions include several new requirements that would avoid or minimize the impacts of oil and gas exploration and production related to land use, agricultural resources, biological resources, soils and geological resources, water resources, flooding, fire safety, odor management, noise, air quality, cultural resources, lighting, spill prevention and remediation measures, among other categories. The Project would also establish a new "Oil and Gas Conformity Review" procedure for County approval of future well drilling and operations to ensure compliance with the updated development standards and conditions, and to provide for ongoing tracking and compliance monitoring. If Alternative 1 were adopted, none of the Project's proposed development standards or conditions would be implemented in the County on a consistent basis for all new oil and gas wells in the future and, therefore, Alternative 1 would not achieve the same environmental benefits of the Project. Without implementation of the Project's proposed development standards and conditions, Alternative 1 would have greater environmental impacts than the Project in most impact categories, particularly with respect to impacts related to biological resources, hydrological resources, cultural resources, and noise.

## Alternative 1's Relationship to the Project Objectives

If implemented, Alternative 1 would not achieve most of the Project objectives. Alternative 1 would not update the County's Zoning Ordinance to include additional procedures and compliance standards. Alternative 1 would not streamline the County's current energy regulations, nor would it promote sustainability and best management practices to the same extent as the Project. Compared to the Project, Alternative 1 would not ensure the protection of environmental resources by emphasizing the conservation of productive agricultural lands, the encouragement of planned urban growth, the promotion of clean air strategies, and the promotion of long-term water conservation strategies. Compared to the Project, Alternative 1 would not create an effective regulatory and permitting process for oil and gas exploration and production that can be relied on by the County, DOGGR, and other responsible agencies. Since Alternative 1 would not implement the Project's proposed development standards and conditions, it would not ensure future oil and gas development in a manner that avoids impairing the economic strength derived from residential developments, agricultural, rangeland, mineral resources, other amenities that exist in Kern County. Finally, Alternative 1 would not encourage ongoing economic development by the oil and gas industry that creates quality, high paying jobs and proposed capital investment in Kern County.

### 6.6.2 Alternative 2 – CUP Alternative

Under Alternative 2, the CUP Alternative, all new oil and gas exploration, development, and production activities would be permitted in the Project Area only upon County's issuance of a

conditional use permit that authorizes such activities. Under Alternative 2, Chapter 19.98 of the Kern County Zoning Ordinance would be amended to eliminate its Sections 19.98.020 (Unrestricted Drilling) and 19.98.030 (Drilling By Ministerial Permit), and amend Section 19.98.040 to require a conditional use permit for new oil and gas development and production activities in the following zoning districts: Exclusive Agriculture (A); Limited Agriculture (A-1); Medium Industrial (M-2); Heavy Industrial (M-3); Natural Resource (NR); Light Industrial (M-1); Recreation-Forestry (RF); Estate District (E); Low, Medium, and High-Density Residential (R-1, R-2, R-3); Commercial Office (CO); Neighborhood Commercial (C-1); General Commercial (C-2); Highway Commercial (CH); Platted Lands (PL); Floodplain Primary (FPP); and Special Planning (SP). Conforming amendments would also be made to the Zoning Ordinance chapters applicable to each of the above zoning districts to clarify that oil and gas exploration, development and production activities are conditionally permitted uses within such districts. In effect, Alternative 2 would amend the Zoning Ordinance to eliminate all unrestricted, and ministerial approval of, oil and gas exploration, development, and production activities. Under Alternative 2, such activities would only be permitted upon issuance of a conditional use permit in all zoning districts, except the Mobile Home Park District (MP) and the Open Space District (OS), were new oil and gas development and production activities would continue to be prohibited.

Like the Project, Alternative 2 would amend Zoning Ordinance Chapter 19.98 to establish updated development standards and conditions to address environmental impacts of pre-drilling exploration, well drilling and the operation of wells and other oil and gas production-related equipment and facilities, including exploration, production, completion, stimulation, reworking, injection, monitoring and plugging and abandonment. Unlike the Project, however, Alternative 2 would not amend the Zoning Ordinance to establish a new "Oil and Gas Conformity Review" procedure to ensure compliance with all of the updated development standards and conditions and provide for ongoing tracking and compliance monitoring. Instead, under Alternative 2, implementation of the updated development standards and conditions would occur on a case-by-case basis, as deemed necessary, through the standard conditional use permit approval and compliance monitoring processes.

## Comparative Impacts of Alternative 2

Although, under Alternative 2, future oil and gas drilling projects in the County would require a discretionary conditional use permit approval from the County that would incorporate site-specific and project-specific conditions of approval to minimize or avoid each project's potential environmental effects, Alternative 2 is ultimately environmentally inferior to the proposed Project. Whereas the Project would implement a comprehensive avoidance and mitigation program specifically designed to reduce the environmental effects of the County's entire oil and gas industry as a well-planned cohesive whole, Alternative 2 would consider the potential environmental effects each oil or gas well permitted in the County on a case-by-case basis without benefit of a comprehensive industry-wide mitigation strategy specifically designed to address regional conservation priorities. In practice, the Project's ministerial approval procedure would be more protective of the environment overall than would Alternative 2. Under the Project,

each development standard and condition will apply to every well project irrespective of whether the proposed well development and operations would actually cause the environmental impacts such development standards and conditions are designed to reduce or avoid. Under the Project, future permit applicants will not have the opportunity to avoid compliance with many of the Project's new development standards or conditions by demonstrating that the Applicant's Project would not cause the impact any such development standard or conditions is intended to reduce or avoid, as might occur for some impact categories under Alternative 2. For example, under the Project's proposed regulatory structure, all Project Area ground disturbance is subject to a 1:1 or 1:0.5 compensatory mitigation requirement, irrespective of whether such disturbance will impact sensitive habitat or special status species. Such mitigation would not be implemented under Alternative 2 without evidence of a foreseeable impact. Thus, the Project is likely to over-mitigate with respect to some oil and gas wells that would be permitted under future Project conditions. Since the Project's comprehensive mitigation program would implement new impact avoidance and minimization measures at a scale that exceeds the impact avoidance and minimization potential of Alternative 2, Alternative 2 is generally environmentally inferior to the Project. However, by implementing a CUP program for all new wells in the Project Area, Alternative 2 does offer some opportunities for reducing overall aesthetic impacts by, for example, clustering multiple well sites in an aesthetically advantageous manner pursuant to a development plan approved under a single CUP, though such impact would remain significant and unavoidable, as compared to the Project. Otherwise, the environmental effects of Alternative 2 are comparable to the proposed Project.

## Alternative 2's Relationship to the Project Objectives

Alternative 2 would achieve most, but not all, of the Project objectives. Although Alternative 2 would update the County's Zoning Ordinance to include additional procedures and compliance standards for future permitting of oil and gas exploration and development, it would not streamline the County's current oil and gas permitting procedures because it would impose a lengthy and cumbersome discretionary permitting process on all new oil and gas development within the County. Such a process would also discourage, rather than encourage, ongoing economic development by the oil and gas industry and thus would arguably frustrate this Project Objective.

Alternative 2 would help protect areas of important mineral, petroleum, and agricultural resource potential for future use by promoting long-term water conservation strategies, but not to the same extent as the Project. However, Alternative 2 would provide sufficient new development within an area large enough to meet generous projections of foreseeable need but in locations that will not impair the economic strength derived from residential developments, agriculture, rangeland, mineral resources, or diminish the other amenities that exist in Kern County. Finally, Alternative 2 would create an effective regulatory and permitting process for oil and gas exploration and production that can be relied on by the County and other responsible agencies, but it would not develop comprehensive mitigation strategy that implements industry-wide best practices, performance standards and mitigation measures that ensure adequate protection of public health and safety and the environment.

### 6.6.3 Alternative 3 – Reduced Ground Disturbance Alternative

Alternative 3, the Reduced Ground Disturbance Alternative, is identical to the Project, except that it would prohibit all new well drilling activities outside existing DOGGR-designated "Administrative Boundary" areas and would require subsurface oil and gas to be extracted from surface equipment located within such Administrative Boundary areas. This alternative would also limit the disturbance footprint on existing agricultural lands to requiring clustering of new wells in locations immediately adjacent to existing oil and gas equipment. As discussed in Chapter 3, Project Description, the vast majority of future oil and gas production in Kern County will occur in and adjacent to Administrative Boundary areas. Accordingly, this alternative assumes that subsurface oil and gas resources located outside of existing Administrative Boundary areas could still be accessed from inside existing Administrative Boundary areas through use of directional and horizontal drilling techniques. Thus, Alternative 3's restrictions on oil and gas exploration and development are assumed to be legally feasible.

Like the Project, Alternative 3 would amend sections of the Kern County Zoning Ordinance relating to oil and gas drilling, including Chapter 19.98 (Oil and Gas Production) to establish updated development standards and conditions to address environmental impacts of pre-drilling exploration, well drilling and the operation of wells and other oil and gas production-related equipment and facilities, including exploration, production, completion, stimulation, reworking, injection, monitoring and plugging and abandonment. Like the Project, Alternative 3 would amend Zoning Ordinance Chapter 19.98 to establish a new "Oil and Gas Conformity Review" ministerial permit procedure for County approval of future well drilling and operations within the Project Area to ensure compliance with the updated development standards and conditions and provide for ongoing tracking and compliance monitoring. Unlike the Project, however, no new ground disturbance from well drilling activities would be allowed outside existing Administrative Boundary areas.

## Comparative Impacts of Alternative 3

Since Alternative 3 would restrict new oil and gas well surface development to locations within existing Administrative Boundary areas, it will result in less overall ground disturbance than would the Project, which allows for new well development both inside and outside of existing Administrative Boundary areas. Thus, Alternative 3 would have somewhat reduced impacts to agricultural resources, biological resources, aesthetic resources, and hydrologic resources as compared to the Project. Further, Alternative 3 would reduce the Project's significant and unavoidable cumulative aesthetic impacts, though not to a less than significant level.

In addition to its environmental benefits, Alternative 3 would create certain environmental impacts greater than those caused by the Project. Since Alternative 3 would prohibit new wells outside of existing Administrative Boundary areas, compared to the Project, this alternative would result in more horizontal and directional subsurface drilling activities needed to recover subsurface oil and gas resources located outside Administrative Boundary areas. This additional

horizontal and directional subsurface drilling activity would generate greater air quality, greenhouse gas, and toxic air contaminant emissions than would the proposed Project because such activities generally require more time to complete than does the vertical drilling activity typically associated with Kern County oil and gas well development. Longer drilling periods require the additional combustion of fossil fuels that cause polluting emissions. The extended drilling times associated with Alternative 3 would also generate more noise impacts within Administrative Boundary areas than would the Project, and would result in a comparative increase in traffic within and around such Administrative Boundary areas due to the additional trips need to ferry drilling equipment to and from new well sites developed under Alternative 3. Otherwise, the environmental effects of Alternative 3 are comparable to the Project.

## Alternative 3's Relationship to the Project Objectives

Alternative 3 would achieve most of the Project objectives. Alternative 3 would update the County's Zoning Code in a manner similar to the Project, though it would reduce the overall Project surface footprint. Alternative 3 would also encourage ongoing and increased economic development by the oil and gas industry in a manner consistent with the Project objectives, though perhaps not to the same extent as the Project. Like the Project, Alternative 3 would streamline the County's oil and gas regulations and environmental review processes. Alternative 3 would also help reduce California's dependence upon foreign sources of energy and would accommodate foreseeable need in appropriate locations, provided more oil and gas can be produced through increased horizontal and directional drilling techniques than would occur under the "No Project" scenario. Alternative 3 would also ensure the protection of environmental resources by emphasizing the conservation of productive agricultural lands and through the development and implementation of industry-wide best practices, performance standards, and mitigation measures, though it would have greater overall environmental effects in some impact categories than would the Project, as discussed above.

### 6.6.4 Alternative 4 – No Hydraulic Fracturing Alternative

Pursuant to its police power, the County has broad discretion to regulate oil and gas exploration and production activities within its jurisdiction. However, a local government's legal authority to regulate every step in the hydraulic fracturing process is the subject of legal disputes currently pending in certain California courts. Assuming the County has sufficient legal authority to regulate subsurface oil and gas exploration and development activities as contemplated by this alternative, Alternative 4, the No Hydraulic Fracturing Alternative, would implement the Project as proposed, except that it would amend Zoning Ordinance Chapter 19.98 to ban all hydraulic fracturing activities, a form of well stimulation, within the Project Area. In all other respects, the Alternative 4 is the same as the Project.

Alternative 4 would only prohibit hydraulic fracturing in the Project Area, but it would not prohibit acid fracturing or acid matrix well stimulation techniques. Were Alternative 4 approved, however, it is unlikely that its hydraulic fracturing ban would cause in increase in acid fracturing or acid matrix well stimulation in the Project Area. Hydraulic fracturing is a viable well

stimulation treatment in diatomite subsurface formations, as explained in Section 4.9, Hydrology and Water Quality. In contrast, acid fracturing and acid matrix stimulation techniques are only viable in carbonate reservoir rocks and siliciclastic reservoir formations, respectively. Thus, acid fracturing and acid matrix techniques do not serve as viable substitutes for hydraulic fracturing. Moreover, as explained in Section 4.9, there are no carbonate reservoir rocks in Kern County oil and gas fields that would be subject to acid fracturing techniques, in any case. A ban on hydraulic fracturing may, however, cause an increased use of Enhanced Oil Recovery techniques in the Project Area.

## Comparative Impacts of Alternative 4

For most impacts, Alternative 4 is environmentally comparable to the Project. Indeed, as explained in Section 4.9, Hydrology and Water Quality, most wells that are hydraulically fractured in the Project Area are shallow vertical wells installed in diatomite subsurface formations located in the Western Subarea. Accordingly, in the Central and Eastern Subareas, where little to no hydraulic fracturing is expected to occur, Alternative 4 is essentially the same as Project and would cause generally identical impacts as the Project. Even in the Western Subarea, Alternative 4's environmental effects related to aesthetic, agricultural, and forest resources, biological resources, cultural resources, geology and soils, land use and planning, mineral resources, noise, population and housing, public services, recreation, and utilities and service systems would be generally the same as the Project.

As discussed in Section 4.8, Hazards and Hazardous Materials/Public Health Risks, hydraulic fracturing uses a variety of hazardous materials and non-hazardous materials, though the significant majority of such materials have been determined to have a low hazard potential in terms of oral toxicity and there is no confirmed degradation of groundwater in the Project Area attributable to hydraulic fracturing or to other well stimulation techniques. However, certain hazardous hydraulic fracturing fluid components, such as biocides, corrosion inhibitors and mineral acids used in very small amounts in the hydraulic fracturing process may present concerns for acute toxicity, as discussed in Section 4.8 and Section 4.9. If adopted, Alternative 4 would have reduced environmental impacts associated with hazardous materials transportation and handling, and fewer chemical constituents in produced water, as compared to the Project. As discussed above, however, Alternative 4 could cause an increased use of Enhanced Oil Recovery techniques in the Project Area, which would cause a corresponding increase in the emission of greenhouse gases and criteria air pollutants, as compared to the Project.

## Alternative 4's Relationship to the Project Objectives

Alternative 4 would achieve most of the Project objectives to some degree. Alternative 4 would update the County's Zoning Code in a manner similar to the Project, though it would also ban hydraulic fracturing in the Project Area. Alternative 4 would also encourage ongoing and increased economic development by the oil and gas industry in a manner consistent with the Project objectives, though not to the same extent as the Project (unless increases in EOR activities spurred by Alternative 4 are able to offset any decrease in oil and gas production caused by a

hydraulic fracturing ban). This alternative would also protect areas of important mineral, petroleum, and agricultural resource potential for future use by promoting sustainability and encouraging best management practices. Like the Project, Alternative 4 would streamline the County's oil and gas regulations and environmental review processes. Alternative 4 would also help reduce California's dependence upon foreign sources of energy and would accommodate foreseeable need in appropriate locations, but perhaps not to the same degree as the Project. Finally, Alternative 4 would ensure the protection of environmental resources through the development and implementation of industry-wide best practices, performance standards, and mitigation measures, though it may have greater overall environmental effects in some impact categories than would the Project, as discussed above.

### 6.6.5 Alternative 5 – Low-Emission Enhanced Oil Recovery (EOR) Technology Alternative

Alternative 5, the Low-Emission Enhanced Oil Recovery (EOR) Alternative, is identical to the proposed Project, except that the updated development standards and conditions required by the Project's proposed Zoning Ordinance amendment would be expanded to require oil and gas well permit applicants to implement low-emission EOR technology as a condition of permit approval for new and replacement steam generators, and to replace existing steam generators constructed prior to 1990 within five years of enactment of the amended Ordinance. As explained in Chapter 3, Project Description, EOR is a production technique used to increase the mobility of oil, most commonly through steam injection techniques that reduce the viscosity of the hydrocarbons and allow produced fluids to flow. There are four major types of EOR operations: waterflood; thermal (i.e., steamflood, cyclic steam and in-situ combustion); $CO_2$ or other gas (miscible and immiscible); and chemical/polymer flooding (i.e., alkaline flooding or micellar-polymer flooding). With thermal EOR, steam is injected into a well, which necessitates the installation of steam generators at the well. Steam generators are large heaters that generate steam, usually from produced groundwater. Under Alternative 5, all new and replacement steam generators for thermal EOR activities would be required to implement low-emission steam generation technology, such as the ClearSign Duplex Tile combustion technology or the equivalent. In all other respects, Alternative 5 would be identical to the Project.

## Comparative Impacts of Alternative 5

Alternative 5's environmental effects would be generally the same as the Project, except Alternative 5 would have reduced air quality and greenhouse gas impacts, as compared to the Project. With respect to new Project-level emissions, Alternative 5 and the Project, as mitigated, would have similar air quality and greenhouse gas impacts. However, Alternative 5's additional requirement that certain existing pre-1990 steam generators be replaced within five years of enactment of the amended Zoning Ordinance would further reduce emissions that are included in the baseline emissions inventory, a reduction that would not occur under Project conditions. In addition, it is expected that Alternative 5's required low-emission steam generation technology would be more fuel efficient than Project technology, thus reducing overall fuel transportation

and handling impacts, as compared to the Project. Alternative 5 is not expected to cause any environmental impacts that would be greater than those caused by the Project.

## Alternative 5's Relationship to the Project Objectives

Alternative 5 would meet most of the Project objectives. This alternative would update the County's Zoning Ordinance to include additional procedures and compliance standards that address changes in laws and regulations by other agencies, and it would continue to improve and streamline current energy regulations and increase County monitoring and involvement in state and federal energy legislation. Alternative 5 would also protect areas of important mineral, petroleum, and agricultural resource potential for future use by promoting clean air strategies to address existing air quality issues. Alternative 5 would provide sufficient new development within an area large enough to meet generous projections of foreseeable need but in locations that will not impair the economic strength derived from residential developments, agriculture, rangeland, mineral resources, or diminish the other amenities that exist in Kern County. Alternative 5 would also create an effective regulatory and permitting process for oil and gas exploration and production that can be relied on by the County and other responsible agencies, and it would develop industry-wide best practices, performance standards and mitigation measures that ensure adequate protection of public health and safety and the environment. Finally, this alternative also has the potential to increase oil and gas exploration and production in Kern County as a means of (i) reducing California's dependence upon foreign sources of energy, and (ii) increasing employment opportunities and economic prosperity to Kern County's residents, businesses, and local government.

# 6.6.6 Alternative 6 – Recycled Water Alternative

Under Alternative 6, the Recycled Water Alternative, the Applicants would be required to treat an amount produced water that is currently being disposed of via underground injection wells which is equivalent to the amount of M&I water used in Applicant's operations. The produced water reuse goal is 30,000 acre-feet per year, which would offset more than the current use of imported water and groundwater from non-oil bearing zones by the oil and gas industry. Such produced water would be required to be treated, recycled and put to an alternate use such as agricultural irrigation to the extent feasible. As explained in Section 4.9, Hydrology and Water Quality, oil-bearing formations in the Project Area include a mixture of usually saline or other poor-quality groundwater and hydrocarbons. Production wells extract a mixture of water and hydrocarbons that is separated in surface facilities, typically a series of tanks or "tank batteries," where lighter oil and gas compounds are isolated and skimmed from the heavier water. Residual water generated by the hydrocarbon separation process is generally referred to as "produced water" in the context of oil and gas exploration and production. Under current practices, much of this produced water is used in future oil and gas recovery operations (e.g., steam and water flooding) and for oil and gas maintenance activities, and the remainder is disposed of primarily through underground injection wells. In some portions of the Project Area, produced water is also treated and reused for agricultural irrigation purposes, as explained in Section 4.9.

Produced water is often treated to remove salts and other constituents for reuse in the oil and gas exploration and production process. As explained in Section 4.9, over 234,000 acre-feet of produced water was extracted in 2010, and by 2035 the annual amount of produced water could increase to more than 324,000 acre-feet. As explained in Section 4.17, Utilities and Service Systems, about 38% of the total volume of produced water in 2012, or 88,812 acre-feet, was reused for water and steam injections, pressure maintenance, well pulling, coil tubing activities, dust control, and surface facility construction. Produced water demand for oil and gas reuse is expected to rise to 122,234 acre-feet by 2035. In addition, about 32,771 acre-feet per year of relatively high-quality produced water from oilfields located along the base of the Sierra Nevada in the Eastern Subarea is provided to Cawelo Water District for agricultural reuse. Produced water reuse for irrigation requires additional filtration and treatment to meet applicable water quality standards.

Under Alternative 6, Applicants would be required to fund treatment and conveyance facilities for produced water for local re-use (such as agricultural irrigation). For purposes of analysis in this EIR, this Alternative assumes that water treatment facilities would be located in Tier 1 areas more than 1000 feet away from the nearest sensitive receptor, that treatment facilities would be subject to New Source Review permit requirements (where applicable) including use of best available control technology to minimize air emissions, that remaining criteria and GHG emissions would be fully offset, and that waste products (including residuals from treated produced water) would be disposed of in accordance with applicable law. In all other respects, Alternative 6, the Recycled Water Alternative, is identical to the proposed Project.

## Comparative Impacts of Alternative 6

As explained in Section 4.17, Utilities and Service Systems, the extent to which additional produced water can be reused in the Project Area depends on several facts, including produced water quality. Produced water is generated from hydrocarbon-bearing formations that are not suitable for M&I purposes due to typically high levels of total dissolved solids (TDS), hydrocarbon and related constituents, boron, chloride and other potential constituents of concern. As discussed in Section 4.9, Hydrology and Water Quality, the Central Valley Regional Water Quality Control Board has determined that, in certain instances, even relatively high-quality produced water present in certain oilfields in the Eastern Subarea has, on occasion, not met applicable arsenic or oil and grease water quality standards. Given the range of constituents present in some produced water, it is unlikely that all produced water can be feasibly treated for reuse under this alternative. Nevertheless, the water treatment facilities to be funded under Alternative 6 could feasibly treat some additional produced water for agricultural and other uses, thus reducing Project hydrology and water quality impacts associated with the extraction of produced water in Project Area wells, and potentially offsetting some oil and gas M&I water demand. This alternative would also create a potential regional benefit by adding to the net supply of irrigation water available for use in the County. However, construction and operation of the Alternative 6 treatment plants would result in adverse environmental effects otherwise avoided by the Project, including adverse impacts to aesthetic, agricultural, biological, and cultural resources,

noise and traffic. In all other respects, the environmental effects of Alternative 6 are comparable to the Project.

## Alternative 6's Relationship to the Project Objectives

Alternative 6 would meet most of the Project objectives. This alternative would update the County's Zoning Ordinance to include additional procedures and compliance standards that address changes in laws and regulations by other agencies, and it would continue to improve and streamline current energy regulations and increase County monitoring and involvement in state and federal energy legislation. Alternative 6 would also protect areas of important mineral, petroleum, and agricultural resource potential for future use by promoting long-term water conservation strategies which will ensure the quality and adequacy of surface and groundwater supplies for future growth of all of Kern County's industries. Alternative 6 would provide sufficient new development within an area large enough to meet generous projections of foreseeable need but in locations that will not impair the economic strength derived from residential developments, agriculture, rangeland, mineral resources, or diminish the other amenities that exist in Kern County. The increased cost of oil and gas development and production attributable to this alternative's funding obligations could, however, discourage, rather than encourage, ongoing economic development by the oil and gas industry that creates quality, high paying jobs and promotes capital investment in Kern County. Offsetting the industry's M&I water use would require major capital investment, including construction of advanced water treatment systems to allow produced water for agricultural irrigation (e.g., reverse osmosis to remove dissolved solids, chemical treatment to remove trace metals such as arsenic and boron) and construction of new infrastructure (e.g., pipelines and storage facilities) to convey water from fields in which it is produced to agricultural users. This alternative could also require concentrating exploration and production in reservoirs where produced water is fresh enough to warrant use for agricultural irrigation. However, Alternative 6 would create an effective regulatory and permitting process for oil and gas exploration and production that can be relied on by the County and other responsible agencies, and it would develop industry-wide best practices, performance standards and mitigation measures that ensure adequate protection of public health and safety and the environment.

# 6.7 Comparative Impacts of Project to All Alternatives

A summary of the comparative impacts of the Project to all of the alternatives analyzed in this EIR is set forth in Table 6-1.

**Table 6-1: Summary of Comparison of Alternative Impacts**

| | **Project** Summary of Impacts | **Alternative 1** No Project | **Alternative 2** CUP Alternative | **Alternative 3** Reduced Ground Disturbance Alternative | **Alternative 4** No Hydraulic Fracturing Alternative | **Alternative 5** Low-Emission EOR Technology Alternative | **Alternative 6** Recycled Water Alternative |
|---|---|---|---|---|---|---|---|
| **Aesthetics and Visual Resource** | Significant and Unavoidable | Greater than Project | Less than Project | Less than Project | Same as Project | Same as Project | Greater than Project |
| **Agricultural and Forest Resources** | Significant and Unavoidable | Greater than Project | Greater than Project | Less than Project | Same as Project | Same as Project | Same as Project |
| **Air Quality** | Significant and Unavoidable | Greater than Project | Greater than Project | Greater than Project | Greater as Project | Less than Project | Greater than Project |
| **Biological Resources** | Significant and Unavoidable | Greater than Project | Greater than Project | Less than Project | Same as Project | Same as Project | Greater than Project |
| **Cultural and Paleontological Resources** | Significant and Unavoidable | Greater than Project | Same as Project | Less than Project | Same as Project | Same as Project | Greater than Project |
| **Geology and Soils** | Less than Significant | Greater than Project | Same as Project | Same as Project | Same as Project | Same as Project | Same as Project |
| **Greenhouse Gas Emissions and Global Climate Change** | Significant and Unavoidable | Greater than Project | Greater than Project | Greater than Project | Greater than Project | Less than Project | Greater than Project |
| **Hazards and Hazardous Materials/Public Health Risks** | Less than Significant | Greater than Project | Greater than Project | Same as Project | Less than Project | Same as Project | Same as Project |
| **Hydrology and Water Quality** | Significant and Unavoidable | Greater than Project | Greater than Project | Same as Project | Less than Project | Same as Project | Less than Project |
| **Land Use and Planning** | Less than Significant | Same as Project | Same as Project | Same as Project | Same as Project | Same as Project | Same as Project |
| **Mineral Resources** | Less than Significant | Same as Project | Same as Project | Same as Project | Same as Project | Same as Project | Same as Project |
| **Noise** | Less than Significant | Greater than Project | Greater than Project | Greater than Project | Same as Project | Same as Project | Greater than Project |

**Table 6-1: Summary of Comparison of Alternative Impacts**

| | **Project** Summary of Impacts | **Alternative 1** No Project | **Alternative 2** CUP Alternative | **Alternative 3** Reduced Ground Disturbance Alternative | **Alternative 4** No Hydraulic Fracturing Alternative | **Alternative 5** Low-Emission EOR Technology Alternative | **Alternative 6** Recycled Water Alternative |
|---|---|---|---|---|---|---|---|
| **Population and Housing** | Less than Significant | Same as Project | Same as Project | Same as Project | Same as Project | Same as Project | Same as Project |
| **Public Services** | Less than Significant | Same as Project | Same as Project | Same as Project | Same as Project | Same as Project | Same as Project |
| **Recreation** | Less than Significant | Same as Project | Same as Project | Same as Project | Same as Project | Same as Project | Same as Project |
| **Transportation and Traffic** | Less than Significant | Greater than Project | Greater than Project | Greater than Project | Same as Project | Less than Project | Same as Project |
| **Utilities and Service Systems** | Significant and Unavoidable | Greater than Project | Same as Project | Same as Project | Same as Project | Same as Project | Less than Project |

# 6.8 Environmentally Superior Alternative

Identification of an environmentally superior alternative is required under CEQA (Cal. Code Regs. Section 15126.6(e)(2)).

As compared to the Project, Alternative 1, the No Project Alternative, would have greater impacts than the Project in most categories. Alternative 2, the CUP Alternative, would slightly reduce the Project's aesthetic impacts, but would also generate greater in environmental effects than the Project is multiple impact categories. As compared to the Project, Alternative 3, the Reduced Ground Disturbance Alternative, would have less impacts to aesthetic resources, agricultural resources, cultural resources, and biological resources, but these environmental benefits would be offset by greater environmental impacts related to air quality, greenhouse gas emissions, noise, and traffic. Alternative 4, the No Hydraulic Fracturing Alternative, would have less water quality and hazards impacts than the Project, but would have greater impacts related to air quality and greenhouse gas emission than would the Project. As compared to the Project, Alternative 6, the Recycled Water Alternative, would have less hydrology and water quality impacts, and less utilities and service system impacts, than the Project, but would have greater impacts related to aesthetics, air quality, biological resources, cultural resources, greenhouse gas emissions, and noise.

The environmentally superior alternative is Alternative 5, the Low-Emission EOR Technology Alternative. Compared to the Project, Alternative 5 would have less environmental effects related to air quality, greenhouse gases, and transportation and traffic. Moreover, Alternative 5 would not result in any environmental impacts that are greater than those of the Project.

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Chapter 7

# Response to Comments

# Chapter 7
# Response to Comments

This chapter is being reserved for, and will be included with, the Final EIR.

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Chapter 8

# Organizations and Persons Consulted

Chapter 8

# Organizations and Persons Consulted

## 8.1 Federal

Edwards Air Force Base

U.S. Air Force

U.S. Army

U.S. Bureau of Land Management

U.S. Department of Agriculture, Natural Resource Conservation Service

U.S. Environmental Protection Agency Region IX

U.S. Fish and Wildlife Service

U.S. Marine Corps

## 8.2 State of California

California Air Resources Control Board

California Department of Conservation

California Department of Conservation, Department of Oil, Gas, and Geothermal Resources

California Department of Fish and Wildlife

California Department of Public Health

California Energy Commission

California Highway Patrol

California Natural Resources Agency

California Regional Water Quality Control Board, Lahontan Region

California State Clearinghouse

California State University Bakersfield

San Joaquin Valley Air Pollution Control District

## 8.3 Regional and Local

Adams, Broadwell, Joseph & Cardozo

Antelope Valley-East Kern Water Agency

California City Planning Department

CBI

Chumash Council of Bakersfield

City of Arvin

City of Bakersfield Planning Department

City of Bakersfield Public Works Department

City of Delano Planning Department

City of Maricopa

City of McFarland

City of Ridgecrest

City of Shafter

City of Taft

City of Tehachapi

City of Wasco

Cogstone Resource Management, Inc.

Communities for a Better Environment

East Kern Air Pollution Control District

Enova Solutions, Inc.

Grubbs, Sgt. Joe; Bakersfield Police Department

Bakersfield Police Department

Habel, Marilu; California Department of Conservation, Department of Oil, Gas, and Geothermal Resources

Holland and Knight

Iberdrola Renewables

ICF International (Troy Rahmig)

Integrated Waste Management

Inyo County Planning Department

Kern Council of Governments

Kern County Administrative Officer

Kern County Agriculture Department

Kern County Engineering, Surveying, and Permit Services

Kern County Environmental Health Services Department

Kern County Fire Department

Kern County Library, Beale Branch

Kern County Library, Rosamond Branch

Kern County Parks and Recreation

Kern County Planning Department

Kern County Roads Department

Kern County Sheriff's Department

Kern County Waste Management Department

Kern County Water Agency

Kern Valley Indian Council

Kimley-Horn and Associates, Inc.

Kings County Planning Agency

Los Angeles Audubon

Los Angeles County Regional Planning Agency

Lozeau Drury LLP

McCormick Biological Consulting, Inc.

Mojave Foundation

Mojave Town Council

Native American Heritage Council of Kern County

OB-1 Air Analysis, Inc.

Pacific Gas & Electric Company

Pruitt, Ray; Kern County Sherriff

Quad Knopf

Recurrent Energy

San Francisco Public Utilities Commission

San Luis Obispo County Planning Department

Santa Barbara County Resource Management Department

Southern California Edison

South San Joaquin Valley Archaeological Information Center

State Office of Historical Preservation

Structure Cast

Terra-Gen Power, LLC

Tulare County Planning and Development Department

Vector Environmental

Winn, Robert; Kern County Sherriff

Chapter 9

# List of Preparers

Chapter 9

# List of Preparers

## 9.1 Lead Agency

### Kern County Planning and Community Development Department

Ms. Lorelei Oviatt, AICP, Planning Director

Mr. Christopher Mynk, AICP Supervising Planning, Advanced Planning Division

Mr. Shawn Beyler, Planner III Advanced Planning Division

## 9.2 Technical Assistance

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Ms. Christina J. Willis, Project Manager, Introduction, Population and Housing, Recreation, Public Utilities, Transportation and Traffic

Ms. Rachel James, AICP, Deputy Project Manager, Project Description, Aesthetics/Visual Simulations, Agricultural Resources, Land Use and Planning

Dr. George Lukert, Geology and Soils

Mr. Gene Florentino, PG, Geology and Soils

Ms. Louise Flynn, Hazards and Hazardous Materials, Public Services

Ms. Robin Clemens, Hazards and Hazardous Materials

Mr. Paul Jones, Hazards and Hazardous Materials, Hydrology and Water Quality

Mr. Howard Edwards, Hazards and Hazardous Materials, Hydrology and Water Quality

Mr. Joe Donaldson, RLA, Aesthetics/Visual Simulations

Ms. Kristin Siekmann, Aesthetics/Visual Simulations

Ms. Susan Nordstrom, Agricultural Resources

Mr. Chris Jessen, Agricultural Resources

Mr. Bruce Wattle, QEP, CCM, Air Quality, Greenhouse Gas Emissions

Dr. Pasquale Franzese, Air Quality

Ms. Noreen Roster, Biological Resources

Mr. Grant Young, Biological Resources, GIS

Mr. Joel Moore, Biological Resources

Ms. Silvia Yanez, Greenhouse Gas Emissions

Mr. Joe O'Bannon, Air Quality Specialist

Ms. Erin Lynch, PG, Hydrology and Water Quality

Mr. Tom Siener, CIH, Noise

Mr. Travis Whitney, Population and Housing, Recreation

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Ms. April Showers, Graphics

Ms. Amber Lauzon, GIS Specialist

Mr. Jeffrey Comstock, GIS Specialist

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## Cogstone Resource Management, Inc.

Ms. Sherri Gust, Paleontological and Archaeological Resources Specialist

Ms. Molly Valasik, Paleontological and Archaeological Resources Specialist

Ms. Kim Scott, Paleontological and Archaeological Resources Specialist

## Linscott, Law and Greenspan

Walter Musial, P.E, Traffic and Transportation

Amelia Giacalone, Traffic and Transportation

## McCormick Biological Consulting, Inc.

Ms. Randi McCormick, Principal Biologist

JayAnna Miller, Senior Biologist

Jennifer Castro, Staff Biologist

Chapter 10

# Bibliography

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## 2.0 Introduction

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Chapter 11

# Acronyms, Abbreviations, and Glossary

Chapter 11

# Acronyms, Abbreviations, and Glossary

## 11.1 Acronyms and Abbreviations

| | |
|---|---|
| °F | Degrees Fahrenheit |
| µS/cm | MicroSiemens per Centimeter |
| AADT | Annual Average Daily Traffic |
| AB | Assembly Bill |
| ACBM | Asbestos Containing Building Material |
| ACEC | Areas of Critical Environmental Concern |
| ADSA | Axial Dimensional Stimulation Area |
| AF | Acre-Feet |
| AFB | Air Force Base |
| AFY | Acre-Feet per Year |
| AGL | Above Ground Level |
| AIR | Association of Irritated Residents |
| ALUCP | Airport Land Use Compatibility Plan |
| AMSL | Above Mean Sea Level |
| ANSI | American National Standards Institute |
| ANSS | Advanced National Seismic System |
| AOF | Administrative Oil Field |
| AOR | Area of Review |
| APCD | Air Pollution Control District |
| APCO | Air Pollution Control Officer |
| API | American Petroleum Institute |
| APSA | Aboveground Petroleum Storage Act |
| AQMD | Air Quality Management District |
| ASME | American Society of Mechanical Engineers |
| ASTM | American Society for Testing and Materials |
| ATC | Authority to Construct |
| ATCM | Airborne Toxic Control Measure |
| AUC | Area Under the Curve |

| | |
|---|---|
| AWMP | Agricultural Water Management Plan |
| AWWA | American Water Works Association |
| B&B | Brown and Bryant Arvin facility |
| B&K | Bruel & Kjaer |
| B.P. | Before Present |
| BACT | Best Available Control Technology |
| BAU | Business-As-Usual |
| Bbls | Barrels |
| BFD | Bakersfield Fire Department |
| BFW | Base Freshwater Interface |
| BGEPA | Bald and Golden Eagle Protection Act |
| BGS | Below Ground Surface |
| bhp | Brake Horsepower |
| BLM | UNITED STATES Department of the Interior, Bureau of Land Management |
| BLS | Bureau of Labor Statistics |
| BMP | Best Management Practice |
| BNLL | Blunt-Nosed Leopard Lizard |
| BOPE | Blowout Prevention Equipment |
| BPD | Bakersfield Police Department |
| BPS | Best Performance Standards |
| $Bq/m^3$ | Becquerels per Cubic Meter |
| BRM | Bedrock Mortar |
| BSK | BSK Associates |
| C&D | Construction and Demolition |
| C2ES | Center for Climate and Energy Solutions |
| CAA | Clean Air Act |
| CAAQS | California Ambient Air Quality Standards |
| CADTSC | California Department of Toxic Substances Control |
| CAL FIRE | California Department of Forestry and Fire Protection |
| Cal/OSHA | California Occupational Safety and Health Administration |
| CalARP | California Accidental Release Prevention Program |
| CALEEMOD | California Emission Estimator Model |
| CalEPA | California Environmental Protection Agency |
| CALFIRE | California Department of Forestry and Fire Protection |

| | |
|---|---|
| CalOES | California Office of Emergency Services |
| CalRecycle | California Department of Resources Recycling and Recovery |
| Caltrans | California Department of Transportation |
| CALVEG | Classification and Assessment with Landsat of Visible Ecological Groupings |
| CAPCOA | California Air Pollution Control Officers Association |
| CARB | California Air Resources Board |
| CASGEM | California Statewide Groundwater Elevation Monitoring |
| CBC | California Building Code |
| CBE | Communities for a Better Environment |
| CCAA | California Clean Air Act |
| CCAP | Climate Change Action Plan |
| CCR | California Code of Regulations |
| CCST | California Council on Science and Technology |
| CDFG | California Department of Fish and Game |
| CDFW | California Department of Fish and Wildlife |
| CDFW-OSPR | California Department of Fish and Wildlife-Office of Spill Prevention and Response |
| CDPH | California Department of Public Health |
| CEC | California Energy Commission |
| CEDD | California Employment Development Department |
| CEHP | California Essential Habitat Connectivity Project |
| CEPAM | California Emissions Projection Analysis Model |
| CEQA | California Environmental Quality Act |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act/Superfund Amendments And Reauthorization Act |
| CERS | California Environmental Reporting System |
| CESA | California Endangered Species Act |
| CFC | Chlorofluorocarbon |
| CFGC | California Fish and Game Code |
| CFR | Code of Federal Regulations |
| cfs | Cubic Feet per Second |
| CGS | California Geological Survey |
| $CH_4$ | Methane |
| CHL | California Historical Landmark |

| | |
|---|---|
| CHNA | Community Health Needs Assessment |
| CHP | California Highway Patrol |
| CHRIS | California Historical Resources Information System |
| CIP | Capital Improvement Program |
| CIPA | California Independent Petroleum Association |
| CMP | Congestion Management Program |
| CNDDB | California Department of Fish and Wildlife Natural Diversity Database |
| CNEL | Community Noise Equivalent Level |
| CNPS | California Native Plant Society |
| CNRA | California Natural Resources Agency |
| CO | Carbon Monoxide |
| $CO_2$ | Carbon Dioxide |
| CO2e (MtCO2e) | Carbon Dioxide Equivalent |
| COG | Council of Governments |
| COHb | Carboxyhemoglobin |
| County | Kern County |
| CPNM | Carrizo Plain National Monument |
| CPUC | California Public Utilities Commission |
| CRC | California Resources Corporation |
| CREED | Citizens for Responsible Equitable Environmental Development |
| CRHR | California Register of Historic Resources |
| CRPR | California Rare Plant Rank |
| CRWQCB | California Regional Water Quality Board |
| CSA | County Service Area |
| CSC | California Department of Fish and Wildlife Species of Special Concern |
| CSLC | California State Lands Commission |
| CT | California State Threatened |
| CTR | California Toxics Rule |
| CUP | Conditional Use Permit |
| CUPA | Certified Unified Program Agencies |
| CVC | California Vehicle Code |
| CVFPB | Central Valley Flood Protection Board |
| CVP | Central Valley Project |

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| CVRWQCB | Central Valley Regional Water Quality Control Board |
| CWA | Clean Water Act |
| CWC | California Water Code |
| CWD | Cawelo Water District |
| CWHR | California Wildlife Habitat Relationships |
| DAUs | Detailed Analysis Units |
| dB | Decibel |
| dBA | A-weighted Sound Level Measurement |
| DBCP | 1,2-dibromo-3-chloropropane |
| DBH | Diameter at Breast Height |
| DEIR | Draft Environmental Impact Report |
| DHS | Department of Homeland Security |
| DI | Drilling Island |
| DMC | Development Mitigation Contracts |
| DNL | Day-Night Level |
| DOC | Department of Conservation |
| DOD | U.S. Department of Defense |
| DOF | Department of Finance |
| DOGGR | (California) Department of Conservation Division of Oil, Gas, and Geothermal Resources |
| DPM | Diesel Particulate Matter |
| DPR | Department of Pesticide Regulation |
| DRR | Delivery Reliability Reports |
| DTSC | Department of Toxic Substances Control |
| DWR | Department of Water Resources |
| E & E | Ecology and Environment, Inc. |
| E&P | Exploration and Production |
| ECC | Emergency Communications Center |
| ECDMS | Energy Consumption Data Management System |
| ECP | Eagle Conservation Plan; *also*<br>Emissions Control Plan |
| EDC | Endocrine Disruptor Chemicals |
| EHHCP | Elk Hills Habitat Conservation Plan |
| EHOF | Elk Hills Oil Field |
| EIR | Environmental Impact Report |

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| EIS | Environmental Impact Statement |
| EMS | Kern County Emergency Medical Services Division |
| EO | Executive Order |
| EOA | Exclusive Operating Area |
| EOR | Enhanced Oil Recovery |
| EPA | U.S. Environmental Protection Agency |
| ERC | Environmental Review Committee |
| ESA | Endangered Species Act |
| ESAL | Equivalent Single-Axle Load |
| eTRIP | Employer-based Trips Reduction |
| FAA | Federal Aviation Administration |
| FAR | Federal Aviation Regulations |
| FC | Federal Candidate |
| FE | Federal Listed as Endangered |
| FEIR | Final Environmental Impact Report |
| FEMA | Federal Emergency Management Agency |
| FERC | Federal Energy Regulatory Commission |
| FHWA | Federal Highway Administration |
| FIFRA | Federal Insecticide, Fungicide, and Rodenticide Act |
| FIRM | Federal Insurance Rate Map |
| FLPMA | Federal Land Policy and Management Act |
| FMCSA | Federal Motor Carrier Safety Administration |
| FMMP | Farmland Mapping and Monitoring Program |
| FP | State Fully Protected |
| FPP | Floodplain Primary |
| FPPA | Farmland Protection Policy Act |
| FPS | Floodplain Secondary |
| FRA | Federal Railroad Administration |
| FRP | Facility Response Plan |
| FSZ | Farmland Security Zone |
| FT | Federal Listed as Threatened |
| FY | Fiscal Year |
| GAMA | Groundwater Ambient Monitoring and Assessment |
| GAMAQI | Guide for Assessing the Mitigation Air Quality Impacts |

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|---|---|
| GHG | Greenhouse Gas |
| GHS | United Nations Globally Harmonized System of Classification and Labeling of Chemicals |
| GIS | Geographic Information Systems |
| GMA | Groundwater Management Agency |
| GPS | Global Positioning System |
| GSA | Groundwater Sustainability Agency |
| GSP | Groundwater Sustainability Plan |
| GWP | Global Warming Potential |
| $H_2S$ | Hydrogen Sulfide |
| HABS | Historic American Buildings Survey |
| HAER | Historic American Engineering Record |
| HAP | Hazardous Air Pollutant |
| HARP2 | Hotspots Analysis and Reporting Program, Version 2 |
| HazMat | Hazardous Materials |
| HCA | High Consequence Areas |
| HCD | California Department of Housing and Community Development |
| HCP | Habitat Conservation Plan |
| HFC | Hydrofluorocarbon |
| HHWE | Household Hazardous Waste Element |
| HI | Hazard Index |
| HMBP | Hazardous Materials Business Plan |
| HMIS | Hazardous Materials Inventory Statement |
| HMMP/HMIS | California Uniform Fire Code Hazardous Materials Management Plans and Hazardous Materials Inventory Statement |
| HMRRP | Hazardous Materials Release Response Plan and Inventory Program |
| HMSP | Hazardous Materials Safety Permit |
| HMTA | Hazardous Material Transportation Act |
| HOV | High-Occupancy Vehicle |
| HRA | Health Risk Assessment |
| HRRS | Health-Risk Reduction Strategy |
| HSM | Habitat Suitability Model |
| HSWA | Associated Hazardous and Solid Waste Amendments |
| I-5 | Interstate 5 |

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| IBC | International Building Code |
| ICC | International Code Council |
| ICF | ICF International, Inc. |
| ICS | Incident Management System |
| ID | Irrigation District |
| ILRP | Irrigated Lands Regulatory Program |
| IOPA | Independent Oil Producers Association |
| IRWMP | Integrated Regional Water Management Plan |
| IS | Initial Study |
| ITE | Institute of Transportation Engineers |
| ITP | Incidental Take Permit |
| ITS | Intelligent Transportation Systems |
| IWMB | Integrated Waste Management Board |
| KCEH | Kern County Environmental Health Division |
| KCFD | Kern County Fire Department |
| KCGP | Kern County General Plan |
| KCPCDD | Kern County Planning and Community Development Department |
| KCSOS | Kern County Superintendent of Schools |
| KCWA | Kern County Water Agency |
| KCWMD | Kern County Waste Management Department |
| KEDC | Kern Economic Development Corporation |
| KNWR | Kern National Wildlife Refuge |
| KOP | Key Observation Point |
| KRT | Kern Regional Transit |
| KSA | Kern Sanitation Authority |
| kV | Kilovolt |
| KWB | Kern Water Bank |
| KWBA | Kern Water Bank Authority |
| KWBHCP | Kern Water Bank Habitat Conservation Plan |
| Kwh | Kilowatt Hours |
| LBNL | Lawrence Berkeley National Laboratory |
| LCFS | Low Carbon Fuel Standard |
| LDA | Light Duty Autos |
| LDAR | Leak Detection and Repair |

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|---|---|
| Ldn | Average Day-Night Level |
| Leq | Equivalent Sound Pressure Level |
| LEV | Low Emission Vehicle |
| LHCP | Lokern Habitat Conservation Plan |
| Lmax | Maximum Noise Level |
| LOS | Level of Service |
| LS | Length Slope |
| M&I | Municipal and Industrial |
| MAOP | Maximum Allowable Operating Pressure |
| MASP | Maximum Allowable Surface Injection Pressure |
| MBGP | Metropolitan Bakersfield General Plan |
| MBHCP | Metropolitan Bakersfield Habitat Conservation Plan |
| MBTA | Migratory Bird Treaty Act |
| MCF | Million Cubic Feet |
| MCL | Maximum Contaminant Level |
| MDAB | Mojave Desert Air Basin |
| MEI | Maximally Exposed Individual |
| mg/L | Milligrams per Liter |
| MMBtu | One Million Metric British Thermal Units |
| MMRP | Mitigation, Monitoring, and Reporting Program |
| MMS | Mineral Management Service |
| MOA | Memorandum of Agreement |
| MOU | Memorandum of Understanding |
| MPO | Metropolitan Planning Organization |
| MRR | Mandatory Reporting Regulation |
| MRZ | Mineral Resource Zone |
| MS4 NPDES permit | Municipal Separate Storm Sewer System (MS4) NPDES Permit |
| MSDS | Material Safety Data Sheet |
| MSHCP | Multiple Species Habitat Conservation Plan |
| MSL | Mean Sea Level |
| $MtCO_2e$ | Million Metric Tons of Carbon Dioxide Equivalent |
| MUN | Municipal |
| MW | Megawatt(s) |
| $N_2O$ | Nitrous Oxide |

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| NAAQS | National Ambient Air Quality Standards |
| NAHC | California Native American Heritage Commission |
| NAS | National Academy of Sciences |
| NCCP | Natural Community Conservation Plan |
| NCP | National Oil and Hazardous Substance Pollution Contingency Plan |
| NDFE | Non-Disposal Facility Element |
| NEC | No Exposure Certification |
| NEES | Network For Earthquake Engineering Simulation |
| NEHRP | National Earthquake Hazards Reduction Program |
| NEPA | National Environmental Policy Act |
| NESHAP | National Emissions Standards for Hazardous Air Pollutants |
| $NH^3$ | Ammonia |
| NHD | National Hydrology Dataset |
| NHPA | National Historic Preservation Act |
| NHTSA | National Highway Traffic and Safety Administration |
| NIMS | National Incident Management System |
| NIST | National Institute of Standards and Technology |
| NMFS | National Marine Fisheries Service |
| $NO_2$ | Nitrogen Dioxide |
| $NO_3$ | Nitrates |
| NOA | Naturally Occurring Asbestos |
| NOAA | National Oceanic and Atmospheric Administration |
| NOC | Notice of Completion |
| NOD | Notice of Determination |
| NOG | Non-Oil and Gas |
| NOI | Notice of Intent to Prepare an Environmental Impact Statement (CEQA); *also*<br>Notice of Intent to Obtain Coverage under a General Permit (SWRCB); *also*<br>Notice of Intention to Drill New Well (DOGGR) |
| NONA | Notice of Non-Applicability |
| NOP | Notice of Preparation |
| NORM | Naturally Occurring Radioactive Material |
| $NO_X$ | Oxides of Nitrogen |
| NPDES | National Pollutant Discharge Elimination System |

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|---|---|
| NPL | National Priorities List |
| NPR | Naval Petroleum Reserves |
| NPS | National Park Service |
| NR | Natural Resource |
| NRC | National Response Center |
| NRCS | Natural Resources Conservation Service |
| NRDC | Natural Resources Defense Council |
| NRF | National Response Framework |
| NRHP | National Register of Historic Places |
| NRP | National Response Plan |
| NSF | National Science Foundation |
| NSPS | New Source Performance Standards |
| NTSA | National Trails System Act |
| NTU | Nephelometric Turbidity Units |
| NWI | National Wetlands Inventory |
| NWIS | National Water Information System |
| $O_3$ | Ozone |
| OADP | Ozone Attainment Demonstration Plan |
| OEHHA | Office of Environmental Health Hazard Assessment |
| OG-ERA | Oil and Gas Emission Reduction Agreement |
| OHV | Off-Highway Vehicle |
| OMR | Office of Mine Reclamation |
| OPA | Oil Pollution Act |
| OPR | Governor's Office of Planning and Research |
| OPS | Office of Pipeline Safety |
| OSFM | Office of the State Fire Marshal |
| OSHA | Occupational Safety and Health Administration |
| P.L. | Public Law |
| PAH | Polycyclic Aromatic Hydrocarbon |
| PASER | Pavement Surface and Evaluation Rating System |
| Pb | Lead |
| PBSD | Performance-Based Seismic Design |
| PCDD | Planning and Community Development Department |
| pCi/L | Picocuries per Liter |

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|---|---|
| PCR | Petro Capital Resources |
| PCS | Pavement Condition Survey |
| PCT | Pacific Crest Trail |
| PE | Petroleum Extraction |
| PERC | Perchloroethylene |
| PERP | Portable Equipment Registration Program |
| PFC | Perfluorocarbon |
| PFYC | Potential Fossil Yield Classification |
| PG&E | Pacific Gas and Electric |
| PHMSA | Pipeline and Hazardous Materials Safety Administration |
| PI | Pacific Institute |
| $PM_{10}$ | Particulate Matter less than 10 Microns |
| $PM_{2.5}$ | Particulate Matter less than 2.5 Microns |
| ppb | Parts per Billion |
| ppm | Parts per Million |
| ppmv | Parts per Million Volume |
| PPV | Peak Particle Velocity |
| PRC | Public Resources Code |
| Project or proposed Project | Amendment to Chapter 19.98 (Oil and Gas Production) of the Kern County Zoning Ordinance |
| PSD | Prevention of Signification Deterioration |
| PSIA | Pipeline Safety Improvement Act |
| PSM | Process Safety Management |
| PTO | Permits to Operate |
| PV | Photovoltaic |
| PVC | Polyvinyl Chloride |
| PXP | Plains Exploration and Production Company |
| QK | Quad Knopf |
| RACM | Reasonably Available Control Measures |
| RACT | Reasonably Available Control Technology |
| RCRA | Resource Conservation and Recovery Act |
| RECs | Reduced Emission Completions |
| REL | Recommended Exposure Limit |
| RFS-2 | Reformulated Fuels Standard |
| RHNA | Regional Housing Needs Allocation |

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| RMP | Resource Management Plan |
| ROD | Record of Decision |
| ROG | Reactive Organic Gases |
| ROP | Rate of Progress |
| ROW | Right of Way |
| RPF | Registered Professional Forester |
| RPS | Renewable Portfolio Standard |
| RSPA | Research and Special Provisions Administration |
| RTP | Regional Transportation Plan |
| RTPA | Regional Transportation Planning Agency |
| RUSLE | Revised Universal Soil Loss Equation |
| RV | Recreational Vehicle |
| RWQCB | Regional Water Quality Control Board |
| SANDAG | San Diego Association of Governments |
| SAPT | Standard Annular Pressure Test |
| SARA | Superfund Amendments and Reauthorization Act |
| SB | Senate Bill |
| SBM | Statistical-based Model |
| SCAQMD | South Coast Air Quality Management District |
| SCE | Southern California Edison |
| SCEDC | Southern California Earthquake Data Center |
| SCS | Sustainable Communities Strategy |
| SDS | Safety Data Sheet |
| SDWA | Safe Drinking Water Act |
| $SF_6$ | Sulfur Hexafluoride |
| SHPO | State Historic Preservation Office(r) |
| SHS | State Highway System |
| SIC | Standard Industry Classification |
| SIP | State Implementation Plan |
| SJAPCD | San Joaquin Air Pollution Control District |
| SJV | San Joaquin Valley |
| SJV Recovery Plan | Recovery Plan for the Upland Species of the San Joaquin Valley |
| SJVAB | San Joaquin Valley Air Basin |
| SJVAPCD | San Joaquin Valley Air Pollution Control District |

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| SMARA | Surface Mining and Reclamation Act |
| SMBRP | Site Mitigation and Brownfields and Reuse Program |
| SMGB | State Mining and Geology Board |
| SNF | Sequoia National Forest |
| $SO_2$ | Sulfur Dioxide |
| SoCalGas | Southern California Gas Company |
| $SO_X$ | Sulfur Oxides |
| SP | Special Planning |
| SPCC | Spill Prevention, Control, and Countermeasures |
| SR | State Route |
| SRA | State Responsibility Area |
| SRRE | Source Reduction and Recycling Element |
| SSC | Species of Special Concern |
| SSMP | Sewer System Management Plan |
| SSURGO | Soil Survey Geographic |
| ST | State Listed as Threatened |
| STORET | Storage and Retrieval |
| STRONGER | State Review of Oil and Natural Gas Environmental Regulations |
| SVOC | Semi-Volatile Organic Compound |
| SVRA | State Vehicular Recreation Area |
| SWAMP | Surface Water Ambient Monitoring Program |
| SWANCC | Solid Waste Agency of Northern Cook County |
| SWP | State Water Project |
| SWPPP | Stormwater Pollution Prevention Plan |
| SWRCB | State Water Resources Control Board |
| TAC | Toxic Air Contaminants |
| TCLP | Toxicity Characteristic Leaching Procedure |
| TDS | Total Dissolved Solid |
| TEOR Well | Thermally Enhanced Oil Recovery Well |
| THLPSSC | Technical Hazardous Liquids Pipeline Safety Standards Committee |
| TI | Traffic Index |
| TMDL | Total Maximum Daily Load |
| TRC | TRC Operating Company, Inc. |
| TUMSHCP | Tehachapi Uplands Multiple Species Habitat Conservation Plan |

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| U.S.C. | United States Code |
| UBC | Uniform Building Code |
| UFC | Uniform Fire Code |
| UIC | Underground Injection Control |
| UNFCCC | United Nations Framework Convention on Climate Change |
| USACE | United States Army Corps of Engineers |
| USBR | U.S. Bureau of Reclamation |
| USDA | United States Department of Agriculture |
| USDOE | U.S. Department of Energy |
| USDOT | U.S. Department of Transportation |
| USDW | Underground Source of Drinking Water |
| USFS | United States Forest Service |
| USFWS | United States Fish and Wildlife Service |
| USGS | United States Geological Survey |
| USLE | Universal Soil Loss Equation |
| UST | Underground Storage Tank |
| UWMP | Urban Water Management Plan |
| V/C | Volume to Capacity |
| Vector | Vector Environmental, Inc. |
| VERA | Voluntary Emission Reduction Agreement |
| VFHCP | Valley Floor Habitat Conservation Plan |
| VMT | Vehicle Miles Traveled |
| VOC | Volatile Organic Compound |
| VOCDD | Volatile Organic Compound Destruction Devices |
| WD | Water District |
| WDRs | Waste Discharge Requirements |
| WL | Watch List |
| WMD | Kern County Waste Management Department |
| WOUS | Waters of the United States |
| WQA | Water Quality Act |
| WRI | World Resources Institute |
| WSA | Waterway Supply Assessment |
| WSD | Water Storage District |
| WSPA | Western States Petroleum Association |

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| WST | Well Stimulation Treatment |
| WWTP | Wastewater Treatment Plant |
| ZEV | Zero-Emission Vehicle |

# 11.2 Glossary

## -A-

**Abandoned Well** When a well is no longer needed, either because the oil or gas reservoir becomes depleted, or because no oil or gas was found (called a dry-hole), the well is plugged and abandoned. A well is plugged by placing cement in the well-bore or casing at certain intervals as specified in California laws or regulations. The purpose of the cement is to seal the wellbore or casing and prevent fluid from migrating between underground rock layers. Cement plugs are required to be placed across the oil or gas reservoir (zone plug), across the base-of-fresh-water (BFW plug), and at the surface (surface plug). Other cement plugs may be required at the bottom of a string of open casing (shoe plug), on top of tools that may become stuck down hole (junk plug), on top of cut casing (stub plug), or anywhere else where a cement plug may be needed. Also, the hole is filled with drilling mud to help prevent the migration of fluids. (DOGGR 2013a)

**Abandonment (also see "abandon", "plug and abandon")** To temporarily or permanently cease production from a well or to cease further drilling operations. (OSHA 2014)

**Acidize (also see acid well stimulation treatment)** To pump acid into the wellbore to remove near-well formation damage and other damaging substances. This procedure commonly enhances production by increasing the effective well radius. When performed at pressures above the pressure required to fracture the formation, the procedure is often referred to as acid fracturing. (Schlumberger Limited 2014)

**Acid Volume Threshold** "Acid Volume Threshold" means a volume, in US gallons, per treated foot of well stimulation treatment, calculated as follows:
(((Size of the drill bit diameter in inches that was used in the treated zone/2 + 36 inches)$^2$ - (bit diameter in inches/2)$^2$) x 3.14159 x 12 inches x treated formation porosity)/231 (inches$^3$/gallon).

The lowest calculated or measured porosity in the zone of treated formation shall be the treated formation porosity used for calculating the Acid Volume Threshold. (SB-4)

**Acid Well Stimulation Treatment** A well stimulation treatment that uses, in whole or in part, the application of one or more acids to the well or underground geologic formation. The acid well stimulation treatment may be at any applied pressure and may be used in combination with hydraulic fracturing treatments or other well stimulation treatments. Acid well stimulation treatments include acid matrix stimulation treatments and acid fracturing treatments. (SB-4)

**Active Observation Well** A well being used for the sole purpose of gathering reservoir data, such as pressure or temperature in a reservoir being currently produced or injected by the operator, and the data is gathered at least once every three years. (DOGGR 2013a)

**Alluvium** A fine-grained fertile soil consisting of mud, silt, and sand deposited by flowing water on flood plains, in river beds, and in estuaries.

**Alquist-Priolo Earthquake Fault Zone** In 1972, the State of California delineated Special Studies Zones around active and potentially active faults in the State. The zones extend about six hundred and sixty (660) feet on either side of the identified fault traces. No structure for human occupancy may be built across an identified fault trace. An area of fifty (50) feet on either side of an active fault trace is assumed to be underlain by the fault unless proven otherwise.

**American Petroleum Institute (API)** A trade association and standards organization that represents the interests of the oil and gas industry. It offers publications regarding standards, recommended practices, and other industry related information. (OSHA 2014)

**Ancillary Equipment and Facilities (BLM)** Equipment, facilities, or structure(s) that often are required in oil and gas fields usually used to house or contain operating, maintenance, or support equipment and functions, other than wells and pipelines, such as compressor stations. Ancillary equipment and facilities required for enhanced recovery methods include producing steam, and pressurizing steam or water, typically through larger cogeneration plants serving the well fields where these techniques are utilized.

**Annular Pressure** Pressure in an annular space (between the tubing and casing in a well [well bore]). (OSHA 2014)

**Annular Valve (annular blowout preventer)** A large valve used to control wellbore fluids. In this type of valve, the sealing element resembles a large rubber doughnut that is mechanically squeezed inward to seal on either pipe (drill collar, drillpipe, casing, or tubing) or the openhole. The ability to seal on a variety of pipe sizes is one advantage the annular blowout preventer has over the ram blowout preventer. Most blowout preventer (BOP) stacks contain at least one annular BOP at the top of the BOP stack, and one or more ram-type preventers below. While not considered as reliable in sealing over the openhole as around tubulars, the elastomeric sealing doughnut is required by API specifications to seal adequately over the openhole as part of its certification process. (Schlumberger Limited 2014)

**Annulus** The space around a pipe in a well bore, sometimes termed the annular space. (OSHA 2014)

**API Number** American Petroleum Institute Well Number (also called **API**) is a unique, permanent, numeric identifier assigned to each oil and gas well in the US. An API Well number can have up to 14 digits divided into State Code (2 digits), County Code (3 digits), Unique Well Identifier (5 digits), Directional Sidetrack Code (2 digits), Event Sequence Code (2 digits). As of 2014, API Numbers in the DOGGR Well Finder database consist of 8 digits - County Code (first 3 digits) and Unique Well Identifier

**Aquifer (BLM)** A water-bearing bed or layer or permeable rock, sand, of gravel capable of yielding water.

**Archaeological Site** A site is defined by the National Register of Historic Places (NRHP) as the place or places where the remnants of a past culture survive in a physical context that allows for the interpretation of these remains. Archaeological remains usually take the form of artifacts (e.g., fragments of tools, vestiges of utilitarian, or non-utilitarian objects), features (e.g., remnants of walls, cooking hearths, or midden deposits), and ecological evidence (e.g., pollen remaining from plants that were in the area when the activities occurred). **Prehistoric archaeological sites** generally represent the material remains of Native American groups and their activities dating to the period before European contact. In some cases, prehistoric sites may contain evidence of trade contact with Europeans. **Ethnohistoric archaeological sites** are defined as Native American settlements occupied after the arrival of European settlers in California. **Historic archaeological sites** reflect the activities of nonnative populations during the Historic period.

**Artifact** An object that has been made, modified, or used by a human being.

**Assembly Bill 32** "Assembly Bill 32" (AB 32) is the Global Warming Solutions Act was passed in California on August 31, 2006 requiring the State's global warming emissions to be reduced to 1990 levels by 2020. The reduction will be accomplished through an enforced statewide cap on GHG emissions that will be phased.

# -B-

**Berm (BLM)** "Berm" means a raised area with vertical or sloping sides, often used to prevent, minimize, stabilize, mitigate or eliminate the release or threat of hazardous waste or hazardous substance. (Association of Environmental Professionals 2014)

**Best Available Control Technology** Section 169(3) of the federal Clean Air Act defines "Best Available Control Technology" (BACT) as an emission limitation based on the maximum degree of reduction of each pollutant subject to regulation under this Act emitted from or which results from any major emitting facility, which the permitting authority, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such facility through application of production processes and available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of each such pollutant. In no event shall application of "best available control technology" result in emissions of any pollutant which will exceed the emissions allowed by any applicable standard established pursuant to section 111 or 112 of this Act. Emissions from any source utilizing clean fuels, or any other means, to comply with this paragraph shall not be allowed to increase above levels that would have been required under this paragraph as it existed prior to enactment of the federal Clean Air Act Amendments of 1990. (CAPCOA BACT Clearinghouse 2000)

**Best Management Practice** "Best Management Practice" (BMP) means mandatory mitigation measures and/or development standards in the revised zoning ordinances, and as appropriate includes revisions to these BMPs to address the project-level circumstances in Core and non-Core areas, and Tiers.

**Biological Resources (Baldwin Hills EIR)** "Biological Resources" means class of resources found on a project site, according to the California Environmental Quality Act, that includes plant or animal species or habitat that can be classified as either a significant ecological resource or sensitive environmental resource.

**Blooie Line** A discharge line used in conjunction with a rotating head. (BLM 1988)

**Blowout** An uncontrolled flow of reservoir fluids into the wellbore, and sometimes catastrophically to the surface. A blowout may consist of salt water, oil, gas or a mixture of these. Blowouts occur in all types of exploration and production operations, not just during drilling operations. If reservoir fluids flow into another formation and do not flow to the surface, the result is called an underground blowout. If the well experiencing a blowout has significant openhole intervals, it is possible that the well will bridge over (or seal itself with rock fragments from collapsing formations) downhole and intervention efforts will be averted. (Schlumberger Limited 2014)

# -C-

**Carrier Fluid** A fluid that is used to transport materials into or out of the wellbore. Carrier fluids typically are designed according to three main criteria: the ability to efficiently transport the necessary material (such as pack sand during a gravel pack), the ability to separate or release the materials at the correct time or place, and compatibility with other wellbore fluids while being nondamaging to exposed formations. (Schlumberger Limited 2014)

**Casing–** (Drilling) Large-diameter pipe lowered into an openhole and cemented in place. The well designer must design casing to withstand a variety of forces, such as collapse, burst, and tensile failure, as well as chemically aggressive brines. Most casing joints are fabricated with male threads on each end, and short-length casing couplings with female threads are used to join the individual joints of casing together, or joints of casing may be fabricated with male threads on one end and female threads on the other. Casing is run to protect fresh water formations, isolate a zone of lost returns or isolate formations with significantly different pressure gradients. The operation during which the casing is put into the wellbore is commonly called "running pipe." Casing is usually manufactured from plain carbon steel that is heat-treated to varying strengths, but may be specially fabricated of stainless steel, aluminum, titanium, fiberglass and other materials. (Schlumberger Limited 2014)

(Well Completions) Steel pipe cemented in place during the construction process to stabilize the wellbore. The casing forms a major structural component of the wellbore and serves several important functions: preventing the formation wall from caving into the wellbore, isolating the different formations to prevent the flow or crossflow of formation fluid, and providing a means of maintaining control of formation fluids and pressure as the well is drilled. The casing string provides a means of securing surface pressure control equipment and downhole production equipment, such as the drilling blowout preventer (BOP) or production packer. Casing is available in a range of sizes and material grades. (Schlumberger Limited 2014)

Casing Shoe– 1. The bottom of the casing string, including the cement around it, or the equipment run at the bottom of the casing string. 2. A short assembly, typically manufactured from a heavy steel collar and profiled cement interior, that is screwed to the bottom of a casing string. The rounded profile helps guide the casing string past any ledges or obstructions that would prevent the string from being correctly located in the wellbore. (Schlumberger Limited 2014)

Casing String– An assembled length of steel pipe configured to suit a specific wellbore. The sections of pipe are connected and lowered into a wellbore, then cemented in place. The pipe joints are typically approximately 40 ft [12 m] in length, male threaded on each end and connected with short lengths of double-female threaded pipe called couplings. Long casing strings may require higher strength materials on the upper portion of the string to withstand the string load. Lower portions of the string may be assembled with casing of a greater wall

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| | thickness to withstand the extreme pressures likely at depth. Casing is run to protect or isolate formations adjacent to the wellbore. The following are the most common reasons for running casing in a well: 1) protect fresh-water aquifers (surface casing) 2) provide strength for installation of wellhead equipment, including BOPs 3) provide pressure integrity so that wellhead equipment, including BOPs, may be closed 4) seal off leaky or fractured formations into which drilling fluids are lost 5) seal off low-strength formations so that higher strength (and generally higher pressure) formations may be penetrated safely 6) seal off high-pressure zones so that lower pressure formations may be drilled with lower drilling fluid densities 7) seal off troublesome formations, such as flowing salt 8) comply with regulatory requirements (usually related to one of the factors listed above). (Schlumberger Limited 2014)<br><br>(Well Completions) An assembly of valves, spools, pressure gauges and chokes fitted to the wellhead of a completed well to control production. Christmas trees are available in a wide range of sizes and configurations, such as low- or high-pressure capacity and single- or multiple-completion capacity. (Schlumberger Limited 2014) It is used when reservoir pressure is sufficient to cause reservoir fluids to rise to the surface. (OSHA 2014) |
| **Cathodic Devices (also see sacrificial anode)** | A protective device to prevent electrolytic corrosion. Anodes (often made of Mg or Al metal) are sacrificed intentionally to protect a steel system, such as a buried pipeline or offshore platform. (Schlumberger Limited 2014) |
| **Christmas Tree (Drilling)** | The set of valves, spools and fittings connected to the top of a well to direct and control the flow of formation fluids from the well. (Schlumberger Limited 2014) |
| **Cogeneration** | The process of generating two or more forms of energy from a single energy source. For example, in a heavy oil field, turbines are often used to generate electricity while their waste heat is removed to generate steam. Other alternatives exist, with turbines being run by burning gas or crude oil. Alternatively, the primary heat source can be used to generate steam directly at extremely high pressure and temperature, with the steam being run through a turbine to generate electricity before the steam is distributed to injection wells. (Schlumberger Limited 2014) |
| **Color** | The hue (e.g., red, brown) and value (e.g., light, dark) of the light reflected by objects in the visual landscape. |
| **Completion Operations** | A generic term used to describe the assembly of downhole tubulars and equipment required to enable safe and efficient production from an oil or gas well. The point at which the completion process begins may depend on the type and design of well. However, there are many options applied or actions performed during the construction phase of a well that have significant impact on the productivity of the well. (Schlumberger Limited 2014) |

**Contrast** The opposition or unlikeness of different forms, lines, colors, or textures in a landscape.

**Critical Well** A well within 300 feet of the following: Any building intended for human occupancy that is not necessary to the operation of the well or Any airport runway; or 100 feet of the following: Any dedicated public street, highway, or nearest rail of an operating railway that is in general use or any navigable body of water or watercourse perennially covered by water or any public recreational facility such as a golf course, amusement park, picnic ground, campground, or any other area of periodic high-density population, or any officially recognized wildlife preserve. (State of California 2011)

**Cuttings (Drilling)** Small pieces of rock that break away due to the action of the bit teeth. Cuttings are screened out of the liquid mud system at the shale shakers and are monitored for composition, size, shape, color, texture, hydrocarbon content and other properties by the mud engineer, the mud logger and other on-site personnel. The mud logger usually captures samples of cuttings for subsequent analysis and archiving. (Schlumberger Limited 2014)

**Cyclic Steaming (Cyclic Steam Injection)** A method of thermal recovery in which a well is injected with steam and then subsequently put back on production. A cyclic steam-injection process includes three stages. The first stage is injection, during which a slug of steam is introduced into the reservoir. The second stage, or soak phase, requires that the well be shut in for several days to allow uniform heat distribution to thin the oil. Finally, during the third stage, the thinned oil is produced through the same well. The cycle is repeated as long as oil production is profitable. Cyclic steam injection is used extensively in heavy-oil reservoirs, tar sands, and in some cases to improve injectivity prior to steamflood or in situ combustion operations. Cyclic steam injection is also called steam soak or the huff `n puff (slang) method. (Schlumberger Limited 2014)

## -D-

**Derrick** The structure used to support the crown blocks and the drillstring of a drilling rig. Derricks are usually pyramidal in shape, and offer a good strength-to-weight ratio. If the derrick design does not allow it to be moved easily in one piece, special ironworkers must assemble them piece by piece, and in some cases disassemble them if they are to be moved. (Schlumberger Limited 2014)

**Direct or Primary Impact** Impact that is caused by the proposed project and occur at the same time and place of project implementation.

**Disposal Well** A well, often a depleted oil or gas well, into which waste fluids can be injected for safe disposal. Disposal wells typically are subject to regulatory requirements to avoid the contamination of freshwater aquifers. (Schlumberger Limited 2014)

**Directional Drilling**

The intentional deviation of a wellbore from the path it would naturally take. This is accomplished through the use of whipstocks, bottomhole assembly (BHA) configurations, instruments to measure the path of the wellbore in three-dimensional space, data links to communicate measurements taken downhole to the surface, mud motors and special BHA components and drill bits, including rotary steerable systems, and drill bits. The directional driller also exploits drilling parameters such as weight on bit and rotary speed to deflect the bit away from the axis of the existing wellbore. In some cases, such as drilling steeply dipping formations or unpredictable deviation in conventional drilling operations, directional-drilling techniques may be employed to ensure that the hole is drilled vertically. While many techniques can accomplish this, the general concept is simple: point the bit in the direction that one wants to drill. The most common way is through the use of a bend near the bit in a downhole steerable mud motor. The bend points the bit in a direction different from the axis of the wellbore when the entire drillstring is not rotating. By pumping mud through the mud motor, the bit turns while the drillstring does not rotate, allowing the bit to drill in the direction it points. When a particular wellbore direction is achieved, that direction may be maintained by rotating the entire drillstring (including the bent section) so that the bit does not drill in a single direction off the wellbore axis, but instead sweeps around and its net direction coincides with the existing wellbore. Rotary steerable tools allow steering while rotating, usually with higher rates of penetration and ultimately smoother boreholes. Directional drilling is common in shale reservoirs because it allows drillers to place the borehole in contact with the most productive reservoir rock. (Schlumberger Limited 2014)

**Distribution Lines (medium-voltage, NOT high-voltage transmission lines)**

"Distribution Lines" means an electrical line which delivers power through conductors, usually medium voltage (not more than 50kV), to the end user. Typical construction of distribution lines consist mainly of poles, insulator, connectors, and wires. Distribution systems are typically set up in an overhead configuration but highly urbanized areas may utilize an underground system by using power cables and cabinet substations.

**Drilling**

To prepare a well to be closed permanently, usually after either logs determine there is insufficient hydrocarbon potential to complete the well, or after production operations have drained the reservoir. Different regulatory bodies have their own requirements for plugging operations. Most require that cement plugs be placed and tested across any open hydrocarbon-bearing formations, across all casing shoes, across freshwater aquifers, and perhaps several other areas near the surface, including the top 20 to 50 ft [6 to 15 m] of the wellbore. The well designer may choose to set bridge plugs in conjunction with cement slurries to ensure that higher density cement does not fall in the wellbore. In that case, the bridge plug would be set and cement pumped on top of the plug through drillpipe, and then the drillpipe withdrawn before the slurry thickened. (Schlumberger Limited 2014)

**Drill/Drilling – (NOR)**

Drilling is the process of drilling a hole or "wellbore" in the ground for the purpose of extracting crude oil or natural gas resources or for the injection of a fluid from surface to a subsurface reservoir. Drilling may be in field, exploratory or development. In field drilling is intended to maximize recovery of oil and natural gas within the defined and known subsurface reserves. (Kern County 2013)

**"Prospect well"** or **"exploratory well"** means any well drilled to extend a field or explore a new, potentially productive reservoir. **"Development well"** is a well drilled into a known producing formation in a previously discovered field, to be distinguished from a wildcat, exploratory, or offset well. (California Department of Conservation, Division of Oil, Gas, and Geothermal Resources 2014)

Exploratory drilling is intended to determine whether the resource exists in a specific area and whether extraction is economically viable. Exploration can also be characterized as defining the lateral limits of hydrocarbons outside of a known producing area (i.e., step-out zone). Development drilling consists of drilling wells to extract known hydrocarbon resources to efficiently maximize the development of the reservoir or field. Most current drilling projects are classified as development within existing administrative field boundaries or "in field." (Kern County 2013)

**Drilling Island (DI) District**

A Zoning District in the Kern County Zoning Ordinance (Chapter 1948) applied to single lots and relatively small areas within the boundaries of final map subdivisions and mobilehome parks that contain productive or potentially productive petroleum resources. Uses in the DI District are limited to petroleum and gas exploration, production and transportation, and to compatible open space and recreational uses. (Kern County 2012)

**Drilling Fluids**

(Rock pieces dislodged by the drill bit as it cuts rock in the hole. Cuttings are distinct from cavings, rock debris that spalls as a result of wellbore instability. Visual inspection of rock at the shale shaker usually distinguishes cuttings from cavings. (Schlumberger Limited 2014)

**Drilling Muds**

Any of a number of liquid and gaseous fluids and mixtures of fluids and solids (as solid suspensions, mixtures and emulsions of liquids, gases and solids) used in operations to drill boreholes into the earth. Synonymous with "drilling fluid" in general usage, although some prefer to reserve the term "drilling fluid" for more sophisticated and well-defined "muds." Classification of drilling fluids has been attempted in many ways, often producing more confusion than insight. One classification scheme, given here, is based only on the mud composition by singling out the component that clearly defines the function and performance of the fluid: (1) water-base, (2) non-water-base and (3) gaseous (pneumatic). Each category has a variety of subcategories that overlap each other considerably. (Schlumberger Limited 2014)

**Drilling Pad** A temporary drilling site, usually constructed of local materials such as gravel, shell or even wood. For some long-drilling-duration, deep wells, such as the ultradeep wells of western Oklahoma, or some regulatory jurisdictions such as The Netherlands, pads may be paved with asphalt or concrete. After the drilling operation is over, most of the pad is usually removed or plowed back into the ground. (Schlumberger Limited 2014)

**Drilling Rig** The machine used to drill a wellbore. In onshore operations, the rig includes virtually everything except living quarters. Major components of the rig include the mud tanks, the mud pumps, the derrick or mast, the drawworks, the rotary table or topdrive, the drillstring, the power generation equipment and auxiliary equipment. Offshore, the rig includes the same components as onshore, but not those of the vessel or drilling platform itself. The rig is sometimes referred to as the drilling package, particularly offshore. (Schlumberger Limited 2014)

**Drilling Sumps** "Drilling Sump" means a sump used in conjunction with well drilling operations. (California Code of Regulations. Title 14, Division 2, Chapter 4. Development, Regulation, and Conservation of Oil and Gas Resources, Subchapter 2, Article 3, Section 1770(c))

Drilling sumps are large earthen pits historically used to contain oil, production water, and drilling mud during drilling operations. Sumps vary in size from an average residential lot, to the size of a football field. (Shell Oil Products US 2014)

DOGGR requires all free fluids to be removed from drilling sumps within 30 days after the date the drill rig is disconnected from the well. (California Code of Regulations. Title 14, Division 2, Chapter 4. Development, Regulation, and Conservation of Oil and Gas Resources, Subchapter 2, Article 3, Section 1770(c)).

**Dwelling Unit** "Dwelling Unit" means (1) or more habitable rooms which are designed to be occupied by one (1) family with facilities for living, sleeping, cooking, eating, and sanitation

## -E-

**Emergency Work (Delano)** "Emergency Work" means any work performed for the purpose of preventing or alleviating the physical trauma or property damage threatened or caused by an emergency.

**Emerging Production Field**

A production field with an "emerging" resource type, such as shale oil and gas or coal bed natural gas. In some instances, these areas may not have seen large scale exploration and production activities until the last 10 to 15 years and as a result, they might be held to a higher environmental protection standard. These fields typically are emerging due to a combination of rising energy costs and new extraction technologies, which can introduce unique issues associated with the exploration and production. specifically the lack of existing infrastructure (roads, pipelines, power, etc.) necessary to effectively deliver the resource to market, and therefore, the amount of new disturbances can be greater than infill drilling in a vintage field (even for the same number of wells). (IOGCC 2008)

**Enhanced Oil Recovery (EOR)**

An oil recovery enhancement method using sophisticated techniques that alter the original properties of oil. Once ranked as a third stage of oil recovery that was carried out after secondary recovery, the techniques employed during enhanced oil recovery can actually be initiated at any time during the productive life of an oil reservoir. Its purpose is not only to restore formation pressure, but also to improve oil displacement or fluid flow in the reservoir. The three major types of enhanced oil recovery operations are chemical flooding (alkaline flooding or micellar-polymer flooding), miscible displacement (carbon dioxide [$CO_2$] injection or hydrocarbon injection), and thermal recovery (steamflood or in-situ combustion). The optimal application of each type depends on reservoir temperature, pressure, depth, net pay, permeability, residual oil and water saturations, porosity and fluid properties such as oil API gravity and viscosity. Enhanced oil recovery is also known as improved oil recovery or tertiary recovery and it is abbreviated as EOR. (Schlumberger Limited 2014)

**Environment**

The physical conditions that exist within the area that will be affected by the proposed project, including, but not limited to land, air, water, minerals, flora, fauna, ambient noise, and objects of historical or aesthetic significance. The area involved is the locale in which significant direct or indirect impacts would occur as a result of the project. The environment includes both natural and man-made conditions.

**Ethnographic**

Relating to the study of human cultures. "Ethnographic resources" represent the heritage resource of a particular ethnic or cultural group, such as Native Americans or African, European, Latino, or Asian immigrants. They may include traditional resource-collecting areas, ceremonial sites, value-imbued landscape features, cemeteries, shrines, or ethnic neighborhoods and structures.

**Exploration or Exploratory Drilling**

Exploration is the initial phase in petroleum operations that includes generation of a prospect or play or both, and drilling of an exploration well. Appraisal, development and production phases follow successful exploration. "Exploratory Drilling" means the drilling intended to determine whether the resource exists in a specific area and whether extraction is economically viable. (Schlumberger Limited 2014)

## -F-

**Flare** An arrangement consisting of a vertical tower and burners used to burn combustible vapors. A flare is usually situated near a producing well or at a gas plant or refinery. A flare is also called a flare stack. (Schlumberger Limited 2014)

**Flowback** The process of allowing fluids to flow from the well following a treatment, either in preparation for a subsequent phase of treatment or in preparation for cleanup and returning the well to production. (Schlumberger Limited 2014)

**Flowback Fluid** The fluid recovered from the treated well before the commencement of oil and gas production from that well following a well stimulation treatment. The flowback fluid may include materials of any phase. (SB-4)

**Forest Land** Land that can support 10 percent native tree cover of any species, including hardwoods, under natural conditions, and that allows for management of one or more forest resources, including timber, aesthetics, fish and wildlife, biodiversity, water quality, recreation, and other public benefits. (Public Resources Code Section 12220 (g))

**Fracking** Hydraulic fracturing (also known as hydrofracturing, "fracking," or "fracing") is the injection of a mixture of water, chemicals, and substances (primarily silica sand) called "proppants" into a well at pressures greater than the fracturing pressure of the oil-bearing formation.

**Fugitive Dust** "Fugitive Dust" is particulate matter (or solid particles which come primarily from the soil) suspended in the air by wind action and hum activities. It has not come out of a vent or a stack, and is usually not a by-product of burning. Fugituve dust particles are composed mainly of soil minerals (e.g., oxides of silicon, aluminum, calcium, and iron), but can also contain sea salt, pollen, spores, tire particles, etc. (CARB 2007)

## -G-

**Gas** Any natural hydrocarbon gas coming from the earth. (DOGGR 2013a)

**Gathering Line** A pipeline (independent of size) that transports liquid hydrocarbons between any of the following: multiple wells, a testing facility, a treating and production facility, a storage facility, or a custody transfer facility (ACTF). (DOGGR, n.d.)

**Geophysical Surveys** The tests conducted to determine the extent of the presence of natural gas and oil reserves and whether the resources require additional development for production. The surveys generate low-frequency sound waves and the date is recorded by small geophones strategically placed in the survey area. The low-frequency sound waves are produced by using specialized trucks to vibrate the ground (vibroseis) or through detonating charges underground (shothole). (Kern County 2013)

## -H-

**Historic Period** The period that begins with the arrival of the first nonnative population and thus varies by area. In 1772, Commander Don Pedro Fages was the first European to enter Kern County, initiating the historic period in the project study area.

**Historical Resource** This term is used for the purposes of CEQA and is defined in the CEQA Guidelines (§15064.5) as: (1) a resource listed in, or determined to be eligible for listing in the California Register of Historical Resources (CRHR); (2) a resource included in a local register of historical resources, as defined in Public Resources Code (PRC) §5020.1(k) or identified as significant in a historical resource survey meeting the requirements of PRC §5024.1(g); and (3) any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California by the lead agency, provided the lead agency's determination is supported by substantial evidence in light of the whole record.

**Holocene** Of, denoting, or formed in the second and most recent epoch of the Quaternary period, which began 10,000 years ago at the end of the Pleistocene.

**Horizontal Drilling** A subset of the more general term "directional drilling," used where the departure of the wellbore from vertical exceeds about 80 degrees. Note that some horizontal wells are designed such that after reaching true 90-degree horizontal, the wellbore may actually start drilling upward. In such cases, the angle past 90 degrees is continued, as in 95 degrees, rather than reporting it as deviation from vertical, which would then be 85 degrees. Because a horizontal well typically penetrates a greater length of the reservoir, it can offer significant production improvement over a vertical well. (Schlumberger Limited 2014)

**Hydraulic Fracturing** A well stimulation treatment that, in whole or in part, includes the pressurized injection of hydraulic fracturing fluid or fluids into an underground geologic formation in order to fracture or with the intent to fracture the formation, thereby causing or enhancing, the production of oil or gas from a well. (SB-4)

**Hydrostatic Testing** One of the primary ways in which California pipeline safety standards exceed the minimum federal standards is in pipeline integrity testing. Federal regulations mandate that a pipeline system be hydrostatically tested before initial operation begins. California laws mandates that each pipeline system be tested at least every five years by an independent third-party approved by the Office of the State Fire Marshal (SFM). In these hydrostatic tests the hazardous liquid is removed from the pipe and replaced with water. The pipe is then pressurized to 125% of the maximum pipeline operating pressure and held for eight hours. Testing results are submitted to SFM for review and concurrence. Tests are randomly witnessed by SFM engineers. In certain cases, SFM has approved the use of internal inspection tools "smart pigs" in lieu of hydrostatic testing. In these cases, the test results are also submitted to the SFM for review and concurrence. (Office of the State Fire Marshall 2013)

## -I-

**Idle Well** **"Idle well"** means a well, other than a suspended well, that has not been officially plugged and abandoned, on which the operator has ceased all activity, including but not limited to drilling, production or injection. California Code of Regulations. Title 14, Division 2, Chapter 4. Development, Regulation, and Conservation of Oil and Gas Resources, Subchapter 2, Article 3, Section 1770(c)). Testing of idle wells is required for any well that has not produced oil or natural gas or has not been used for injection for six (6) consecutive months of continuous operation during the last five (5) or more years. It does not include an active observation well. (DOGGR 2013b)

**Indirect or Secondary Impacts** Impacts that are caused by the proposed project at a later time or farther removed in distance but are still reasonably foreseeable. Indirect or secondary impacts may include growth-inducing impacts and other effects related to induced changes in the pattern of land use, population density or growth rate, or related effects on air, water, and other natural systems, including ecosystems.

**Infrastructure** Necessary Infrastructure" is any on-site and off-site facilities which are necessary to the development and maintenance of the well pad such as: access roads, electrical transmission lines, and pipelines; but are not directly related to the exploration and drilling process.

**Injection Well** A well into which fluids are injected rather than produced, the primary objective typically being to maintain reservoir pressure. Two main types of injection are common: gas and water. Separated gas from production wells or possibly imported gas may be reinjected into the upper gas section of the reservoir. Water-injection wells are common offshore, where filtered and treated seawater is injected into a lower water-bearing section of the reservoir. (Schlumberger Limited 2014)

**Intactness** The visual integrity of the natural and human-built landscape and its freedom from encroaching elements; this factor can be present in well-kept urban and rural landscapes, as well as in natural settings. (FHWA 1981)

**Isolate** An isolated artifact or small group of artifacts that appear to reflect a single event, loci, or activity. It may lack identifiable context but has the potential to add important information about a region, culture, or person. Isolates are not considered under CEQA to be significant and, thus, do not require avoidance mitigation (CEQA Statute §21083.2 and CEQA Guidelines §15064.5). All isolates located during the field effort, however, are recorded and the data are transmitted to the appropriate California Historical Resources Information System (CHRIS) Information Center.

## -K-

**Key Observation Point (KOP)** One or a series of points on a travel route or at a use area or potential use area where the view of a management activity (project) would be the most revealing (USFS 1995).

## -L-

**Landslides and Rock falls** Landslides and Rock falls are large movements of land downhill. They can be induced by seismic events (earthquakes) or wet saturated soil conditions and can cause significant damage to life and property.

**Line (in reference to aesthetics and visual resources)** The well-defined edges of shapes or masses created in the visual landscape by horizons, silhouettes, or human-made features. This element of visual character is usually the second strongest (USFS 1995).

**Liquefaction** A process by which water-saturated sediment temporarily loses strength and acts as a fluid, like when you wiggle your toes in the wet sand near the water at the beach. This effect can be caused by earthquake shaking. (USGS Earthquake Hazards Program 2012)

**Lithic** Of or pertaining to stone. Specifically, in archaeology lithic artifacts are chipped or flaked stone tools, and the stone debris resulting from their manufacture.

**Long-Term Idle Well** Any well that has not produced oil or natural gas or has not been used for injection for six (6) consecutive months of continuous operation during the last ten (10) or more years. A long-term idle well does not include an active observation well. (DOGGR 2013b)

# -M-

**Maintenance**

The division (DOGGR) shall, by regulation, prescribe minimum facility maintenance standards for all production facilities in the state. The regulations shall include, but are not limited to, standards for all of the following:

(1) Leak detection.
(2) Corrosion prevention and testing.
(3) Tank inspection and cleaning.
(4) Valve and gauge maintenance, and secondary containment maintenance.
(5) Other facility or equipment maintenance that the supervisor deems important for the proper operation of production facilities and that the supervisor determines are necessary to prevent damage to life, health, property, and natural resources; damage to underground oil and gas deposits from infiltrating water and other causes; loss of oil, gas, or reservoir energy; and damage to underground and surface waters suitable for irrigation or domestic purposes by the infiltration of, or the addition of, detrimental substances.

(b) An operator who constructs, acquires, maintains, or alters an oil well or a production facility shall comply with the standards prescribed pursuant to subdivision (a).

(c) In a form and at a time prescribed by the division in regulation, an operator shall notify the supervisor of the construction, alteration, or decommissioning of a production facility.

(d) An operator shall maintain at the production facility's local office records of maintenance and repair operations, tests, and inspections, and shall provide the supervisor with access to these records at all times during normal business hours and with copies of the records immediately, upon request. (DOGGR 2013a).

**Master Development Plan**

"Master Development Plan" provides information common to multiple planned wells, including drilling plans, Surface Use Plans of Operations, and plans for future production; they are typically prepared for a planned cluster of wells and associated facilities in close proximity, or for multiple in-fill wells scattered throughout an oil and gas Unit or field, and include information on associated facilities (roads, pipelines, utility corridors, compressor stations, etc.). (BLM 2015).

**Midstream Operation (Loyalsock, PA)**

"Midstream Operations" means the compressors, compressor stations, meters and processing plants that support more than one well pad. (All operations and facilities constructed or installed between the well heads and the main product transportation line.)

**Ministerial Decision** "Ministerial decision" means a decision requiring the application of the statutes, ordinance, or regulations to the facts as prescribed and involving little or no personal judgment by the public official or decision-making body as to the wisdom or manner of carrying out a project.

**Mitigation Measures** "Mitigation Measures" are actions taken to reduce or minimize potential impacts to the environment.

**Mitigation Monitoring or Reporting Program** In 1989, the Legislature added to CEQA a requirement that a public agency, in approving feasible mitigation measures contained in EIRs and negative declarations, must also adopt a mitigation monitoring and reporting program. Such a program is to be designed to ensure compliance with the changes to a project which were required by the public agency in order to reduce or avoid significant environmental effects. (City of Winters 2015)

## -N-

**Native American Sacred Site** An area that has been, and often continues to be, of religious significance to Native American peoples, such as an area where religious ceremonies are practiced or an area that is central to their origins as a people. They also include areas where Native Americans gather plants for food, medicinal or economic purposes.

**Native Species (BLM)** "Native Species" are plants or animals that originated in the area in which they are found (i.e. they naturally occur in that area); with respect to a particular ecosystem, a species that, other than as a result of an introduction, historically occurred or currently occurs in that ecosystem.

**Natural Gas** (Geology) A naturally occurring mixture of hydrocarbon gases that is highly compressible and expansible. Methane [$CH_4$] is the chief constituent of most natural gas (constituting as much as 85% of some natural gases), with lesser amounts of ethane [$C_2H_6$], propane [$C_3H_8$], butane [$C_4H_{10}$] and pentane [$C_5H_{12}$]. Impurities can also be present in large proportions, including carbon dioxide, helium, nitrogen and hydrogen sulfide. (Shale Gas) Natural gas produced from shale reservoirs is known as shale gas. The composition of the gas stream is a function of the thermal maturity of the rock. Thermally immature rocks will contain heavier hydrocarbon components, possibly even liquid components. Overmature reservoirs typically contain appreciable quantities of carbon dioxide [$CO_2$]. (Schlumberger Limited 2014)

**New Well (Baldwin Hills EIR)** "New well" means a well bore established at the ground surface and not including the redrilling or reworking of an existing well. An abandoned well that is reentered will be considered a new well for purposes of drilling, redrilling, and reworking.

**Non-Associated Gas** Natural gas which is in reservoirs that do not contain significant quantities of crude oil (Schlumberger Limited 2014)

**Nonnative Invasive Species (BLM)** "Nonnative Invasive Species" are plant species that are introduced into an area in which they did not evolve, and in which they usually have few or no natural enemies to limit their reproduction and spread. These species can cause environmental harm by significantly changing ecosystem composition, structure, or processes, and can cause economic harm or harm to human health.

**Notice of Preparation (Baldwin Hills EIR)** "Notice of Preparation" is a document preceding an Environmental Impact Report, that provides notice to interested agencies (responsible, trustee, and federal) and stakeholders, that the Lead Agency plans to prepare and Environmental Impact Report for a project. The Notice of Preparation includes a project description and a scope of content to be covered by the Environmental Impact Report.

## -O-

**Oil and Gas Conformity Review** A new "Oil and Gas Conformity Review" would be established as a ministerial permit procedure for County approval of future well drilling and operations to ensure compliance with the updated development standards and conditions and provide for ongoing tracking and compliance monitoring. This review will allow for comprehensive review of all drilling activities and will require consistent, comprehensive mitigation based on defined tiers of surrounding land uses as specified in the Amended Zoning Ordinance. An application package must be submitted that includes a site plan and written documentation assuring compliance with all applicable Development Standards and Conditions.

**Oil and Gas Lease** Any contact, profit-share agreement, joint venture, or other agreement issued or approved by the United States under a mineral leasing law that authorizes exploration for, extraction of, or removal of oil or gas (see 43 CFR 3160.0-5). (BLM 1988)

A contract between mineral owner, otherwise known as the lessor and a company or working interest owner, otherwise known as the lessee in which the lessor grants the lessee the right to explore, drill and produce oil, gas and other minerals for a specified primary term and as long thereafter as oil, gas or other minerals are being produced in paying quantities. This lease gives the lessee a working interest. The oil and gas lease is granted in exchange for royalty payments to the lessor. (Schlumberger Limited 2014)

**Oil Operation (Baldwin Hills EIR)**

"Oil Operation" means the use or maintenance of any installation, facility, or structure used, either directly or indirectly, to carry out or facilitate one or more of the following functions: drilling, redrilling, reworking and repair, production, processing, extraction, Enhanced Recovery, stimulation, abandonment, storage or shipping of oil or gas from the subsurface of the earth. It does not include administrative operations (e.g., work carried on in the administrative office buildings).

**Oil or Gas Exploration by Scientific Means**

Includes, but is not limited to, the following: seismic surveys, magnetotelluric, magnetometer or gravity meter surveys; surface mapping and holes less than five hundred (500) feet deep drilled for the purpose of taking core samples, velocity readings, temperature measurements, or water samples. (USFS 1995)

Oil Field – means an accumulation, pool or group of pools of oil in the subsurface. An oil field consists of a reservoir in a shape that will trap hydrocarbons and that is covered by an impermeable or sealing rock. Typically, industry professionals use the term with an implied assumption of economic size. (Schlumberger Limited 2014)

**Oil Well**

A producing well with oil as its primary commercial product. Oil wells almost always produce some gas and frequently produce water. Most oil wells eventually produce mostly gas or water. (Schlumberger Limited 2014)

**Operations**

Any one or all of the activities of an operator covered by Division 3 of the Public Resources Code. (State of California 2011)

**Operation Sumps**

"Operations sump" means a sump used in conjunction with an abandonment or rework operation. For operational sumps, DOGGR requires that all free fluids shall be removed from operations sumps within 14 days after the rig removal or from completion of operations, whichever occurs first. (California Code of Regulations. Title 14, Division 2, Chapter 4. Development, Regulation, and Conservation of Oil and Gas Resources, Subchapter 2, Article 3, Section 1770(c)).

**Orphan Well**

A well that has been deserted and has no viable operator or owner. The Division maintains a list of orphan wells that are available for adoption under the "adopt a well" program. The well list may be downloaded in Acrobat PDF or Excel formats. This program allows prospective operators to enter into a three-way agreement (PDF) to test an orphan well for up to 90 days without incurring any liability for plugging the well. If the test is successful, the prospective operator can adopt the well by posting a bond and becoming its permanent operator. If the test is unsuccessful, the prospective operator can walk away from the agreement with no liability incurred. (Kern County 2012)

# -P-

**Paleontological Resources (Fossils)**

The physical remains of plants and animals preserved in soils and sedimentary rock formations. Paleontological resources contribute to the understanding of past environments, environmental change, and the evolution of life.

**Percolation Ponds**

Similar to a sump, a percolation pond acts as a holding facility while gravity allows the water to percolate or seep through the soils. A percolation pond is used to dispose of water associated with hydrocarbon production. A natural or artificial evaporation pond is a pond with a large surface area that is designed to efficiently evaporate water by exposure to sunlight. In contrast to sumps, evaporation and percolation ponds are not designed to separate oil and other contaminates from water, but rather are intended for water disposal. Percolation and evaporation ponds vary in size, but are typically between two and five acres and can be as shallow as five feet deep. Some facilities contain multiple ponds totaling as much as 80 acres. The State Water Resources Control Board adopts site-specific WDRs for percolation and evaporation ponds.

**Perforate**

To create holes in the casing or liner to achieve efficient communication between the reservoir and the wellbore. The characteristics and placement of the communication paths (perforations) can have significant influence on the productivity of the well. Therefore, a robust design and execution process should be followed to ensure efficient creation of the appropriate number, size and orientation of perforations. A perforating gun assembly with the appropriate configuration of shaped explosive charges and the means to verify or correlate the correct perforating depth can be deployed on wireline, tubing or coiled tubing. (Shale Gas) The creation of holes in the casing or liner to achieve efficient communication between the reservoir and the wellbore. This process is integral to the optimal creation of hydraulic fractures. Geomechanical analysis is commonly conducted before perforating shale reservoirs to account for the relationship between formation stresses and productivity. (Schlumberger Limited 2014)

**Perforated Interval (DOC)**

The section of wellbore that has been prepared for production by creating channels between the reservoir formation and the wellbore. In many cases, long reservoir sections will be perforated in several intervals, with short sections of unperforated casing between each interval to enable isolation devices, like packers, to be set for subsequent treatments or remedial operations. (Schlumberger Limited 2014)

**Permanently Illuminated Oil, Gas, Or Other Hydrocarbon Well Activities**

Does not include drilling operations, reworks.

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| **Pigging** | The act of forcing a device called a pig through a pipeline for the purposes of displacing or separating fluids, and cleaning or inspecting the line. (Schlumberger Limited 2014) |
| **Pipeline** | A tube or system of tubes used for transporting crude oil and natural gas from the field or gathering system to the refinery. (Schlumberger Limited 2014) |
| **Planning Director** | "Planning Director" means the Director of the Planning and Community Development Department of the County of Kern or his/her designee. |
| **Pleistocene (Ice Age)** | An epoch in the Quaternary period of geologic history lasting from 1.8 million to 10,000 years ago. The Pleistocene was an epoch of multiple glaciation, during which continental glaciers covered nearly one fifth of the earth's land. |
| **Pool** | An underground reservoir containing, or appearing at the time of determination to contain, a common accumulation of crude petroleum oil or natural gas or both. Each zone of a general structure which is separated from any other zone in the structure is a separate pool. (State of California 2011) |
| **Prehistoric Period** | The era prior to 1772. The later part of the prehistoric period (post-1542) is also referred to as the protohistoric period in some areas, which marks a transitional period during which native populations began to be influenced by European presence resulting in gradual changes to their lifeways. |
| **Production Facility** | Any equipment attendant to oil and gas production or injection operations including, but not limited to, tanks, flow lines, headers, gathering lines, wellheads, heater treaters, pumps, valves, compressors, injection equipment, and pipelines that are not under the jurisdiction of the State Fire Marshal pursuant to Section 51010 of the Government Code. (DOGGR 2013a) |
| **Production Well** | Production wells are current producing wells, whereas, I have no doubt WZI has intermingled these two terms and created a mess. We need to use them correctly. |
| **Producible Well** | All wells that "can" produce. |
| **Project Area** | The area within which the proposed amendment to Title 19 – Kern County Zoning Ordinance would apply. |
| **Proppant (also Propping Agent)** | Materials inserted or injected into the underground geologic formation that are intended to prevent fractures from closing. (DOGGR 2013a)<br><br>A granular substance (sand grains, crushed walnut shells, aluminum pellet, or other material) that is carried in suspension by the fracturing fluid. Proppant keeps fractures open in a formation when fracturing fluid is withdrawing after a fracture treatment. (OSHA 2014) |

**Prospect Well/Exploratory well (DOGGR)** Any well drilled to extend a field or explore a new, potentially productive reservoir. (DOGGR 2013a)

**Protected Water** "Protected water" means water outside of a hydrocarbon zone that contains no more than 10,000 mg/l total dissolved solids unless the water has been determined to be an exempt aquifer pursuant to the Code of Federal Regulations, title 40, part 146.4.

## -Q-

**Quaternary Age** The most recent of the three periods of the Cenozoic Era in the geologic time scale of the International Commission on Stratigraphy (ICS). It follows the Tertiary Period, spanning 2.588 ± 0.005 million years ago to the present. The Quaternary includes two geologic epochs: the Pleistocene and the Holocene Epochs.

## -R-

**Redrilling (Culver City)** Redrilling" means any drilling operation, including deviation from original well bore, to recomplete the well in the same or different geologic zone, excluding sidetracking (Bakersfield Municipal Code n.d.).

**Remediation** Cleanup or other methods used to remove or contain a toxic spill or hazardous materials from a Superfund site. (EPA 2011)

**Repressuring Operations** Gas injection operations, water injection operations, water flooding operations, or any combination thereof, or any other operations intended primarily to arrest or ameliorate subsidence, or to restore or increase the pressure in a pool, or to avoid or minimize a reduction of pressure within a pool. (DOGGR 2013a)

**Reservoir** A subsurface body of rock having sufficient porosity and permeability to store and transmit fluids. Sedimentary rocks are the most common reservoir rocks because they have more porosity than most igneous and metamorphic rocks and form under temperature conditions at which hydrocarbons can be preserved. A reservoir is a critical component of a complete petroleum system. (Schlumberger Limited 2014)

**Retention Basin (Baldwin Hills EIR)** "Retention Basic" is a type of best management practice that is used to manage stormwater runoff to prevent flooding and downstream erosion and improve water quality in an adjacent river, stream, lake, or bay. It is essentially an artificial lake with vegetation around the perimeter, and includes a permanent pool of water in its design.

**Rework** To restore production from an existing formation when it has fallen off substantially or ceased altogether. (OSHA 2014)

Any operation subsequent to drilling that involves deepening, redrilling, plugging, or permanently altering in any manner the casing of a well or its function. (State of California 2011)

**Right-of-Way (BLM)** "Right-of-Way" is the legal right for use, occupancy, or access across land or water areas for a specified purpose or purposes.

**Rural Agriculture and/or Ranching (IOGCC)** "Rural Agriculture and/or Ranching" means a rural area where agriculture and livestock dominate the surface land use and will have surface disturbance issues specific to the area, including concerns about: Crops, Grazing/pasturelands, Water supply for livestock and irrigation, and Impacts to soil quality and vegetation stability.

## -S-

**Sacrificial Anode (also Galvanic Anode)** A protective device to prevent electrolytic corrosion. Anodes (often made of Mg or Al metal) are sacrificed intentionally to protect a steel system, such as a buried pipeline or offshore platform. (Schlumberger Limited 2014)

**Scoping** Early consultation, also called scoping, provides the opportunity to identify the range of actions, alternatives, mitigation measures, and significant effects to be analyzed in depth in the environmental impact report. Guidelines Section 15083 provides that the lead agency may also consult with other persons or organizations which may be concerned with the environmental effects of the project. PRC Sections 21104 and 21153 require the lead agency to consult with responsible and trustee agencies and with adjoining cities and counties. (OPR 2001)

**Seismic Hazards** Seismicity is the geographic and historical distribution of earthquakes, including their frequency, intensity, and distribution. Seismic hazards include surface rupture, ground shaking, liquefaction, landslides, subsidence, expansive soils, and soil erosion.

**Sensitive Habitat** Areas which provide habitat for rare or endangered species which meet the definition of Section 15380 of the California Environmental Quality Act guidelines.

**Set Back (also Lay Down Pipe)** To place stands of drill pipe and drill collars in a vertical position to one side of the rotary table in the derrick or mast of a drilling or workover rig. (OSHA 2014)

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| **Shale Gas** | A generic term used to describe the events and equipment necessary to bring a wellbore into production once drilling operations have been concluded, including but not limited to the assembly of downhole tubulars and equipment required to enable safe and efficient production from an oil or gas well. Completion quality can significantly affect production from shale reservoirs. (Schlumberger Limited 2014) |
| **Shallow Cyclic Thermal Production** | "Shallow Cyclic Thermal Production" is the low permeability shallow cyclic thermal production operation in shallow, low permeability reservoirs that are produced primarily or exclusively through intermittent steam injection to create permeability channels or dilate a reservoir. It is a form of Enhanced Oil Recovery, steam injection. |
| **Significant and Unavoidable Impact** | An impact that exceeds the defined thresholds of significance and cannot be eliminated or reduced to a less-than-significant level through the implementation of mitigation measures. |
| **Significant Impact** | An impact that exceeds the defined thresholds of significance and would or could cause a substantial adverse change in the environment. Mitigation measures are recommended to eliminate the impact or reduce it to a less-than-significant level. |
| **Slant Drilling** | See Directional drilling. |
| **Slurry (DOC)** | 1. (Drilling) a plastic mixture of cement and water that is pumped into a well to harden. There it supports the casing and provides a seal in the wellbore to prevent migration of underground fluids. 2. a mixture in which solids are suspended in a liquid. (OSHA 2014) |
| **Spill Prevention, Response, and Remediation (secondary containment structures)** | DOGGR regulates the minimum facility maintenance standards for production facilities. The regulations (14 CCR Sections 1722 – 1777.3) require operators to develop and implement spill contingency plans where condensate storage volume exceeds 50 barrels or at facilities that produce at least one barrel per day. The implementing regulations provide specific requirements for the spill contingency plan that include emergency contacts, available safety equipment, checklist for spill response, maps of the facility, a list of chemicals at the facility, containment features, corrosion prevention techniques, and the sensor and alarm systems. These plans may be fulfilled by SPCC plans if the SPCC plan is deemed adequate by DOGGR. Production facilities storing and/or processing fluids, with specific exceptions, shall have secondary containment that is capable of containing the volume of liquids from the container with the largest gross capacity within the secondary containment and should be able to confine the liquid for 72 hours. (AB 1960 Public Resources, Facilities and Oil Spills.) |

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| **Spud or Spudding** | Spud or Spudding means to begin drilling a well; to start the hole. |
| **Standard Annular Pressure Test** | "Standard Annular Pressure Test" is a pressure test conducted using a fluid to fill the annular space between the casing, tubing and packer. Pressure is maintained for a specified time as a specified pressure. If the closed system retains the pressure after the pressure source is removed, the well is determined to have mechanical integrity. |
| **Steam Injection (also Steamflood, Continuous Steam Injection)** | A method of thermal recovery in which steam generated at surface is injected into the reservoir through specially distributed injection wells. When steam enters the reservoir, it heats up the crude oil and reduces its viscosity. The heat also distills light components of the crude oil, which condense in the oil bank ahead of the steam front, further reducing the oil viscosity. The hot water that condenses from the steam and the steam itself generate an artificial drive that sweeps oil toward producing wells. Another contributing factor that enhances oil production during steam injection is related to near-wellbore cleanup. In this case, steam reduces the interfacial tension that ties paraffins and asphaltenes to the rock surfaces while steam distillation of crude oil light ends creates a small solvent bank that can miscibly remove trapped oil. (Schlumberger Limited 2014) |
| **Step-Out Zone** | Step-out Zone" means an area of exploration drilling outside a known hydrocarbon producing area. |
| **Stimulation (well stimulation treatment)** | Any treatment of a well designed to enhance oil and gas production or recovery by increasing the permeability of the formation. Well stimulation treatments include, but are not limited to, hydraulic fracturing treatments and acid well stimulation treatments. (State of California 2013) |
| **Storage Facilities** | Includes Tanks, conveyance facilities, supportive piping. Various sizes of tanks typically are utilized to store oil prior to off-site transport. Such storage facilities can range in size from small to large tank arrangements with supportive piping and conveyance facilities. Storage facilities may also be located offsite. Crude oil produced in Kern County is shipped to offsite storage facilities or refineries to be processed into gasoline and other products via distribution pipelines, and/or tanker trucks. |
| **Stratigraphy** | The natural and cultural layers of soil that make up an archaeological deposit, and the order in which they were deposited relative to other layers. |

**Subsidence** Land subsidence is the gradual, local settling or shrinking of the earth's surface with little or no horizontal motion. Subsidence is normally the result of gas, oil, or water extraction, hydro compaction, peat oxidation and not the result of landslide or ground failure. There are four types of subsidence occurring in the County: tectonic subsidence; subsidence from extraction of oil and gas; subsidence from groundwater withdrawal; and subsidence caused by hydrocompaction of moisture-deficient alluvial deposits.

**Sump** "Sump" means a lined or unlined, covered, or uncovered excavation pit which holds petroleum or other liquids incidental thereto, or solids associated with drilling or production operations. (Bakersfield Municipal Code n.d.)

**Surface Disturbing Activities (BLM)** "Surface Disturbing Activities" mean any authorized action that disturbs vegetation and surface soil, increasing erosion potential above normal site conditions. This definition typically applies to mechanized or mechanical disturbance. However, intense or extensive use of hand or motorized hand tools may fall into this category. Examples include construction of well pads and roads, pits and reservoirs, pipelines and power lines, mining, and vegetation treatments.

**Surface Rupture** Surface rupture occurs when movement on a fault deep within the earth breaks through to the surface. Fault ruptures almost always follow pre-existing faults that are zones of weakness. Rupture may occur suddenly during an earthquake or slowly in the form of fault creep. Sudden displacements are more damaging to structures because they are accompanied by shaking. Fault creep is the slow rupture of the earth's crust.

**Swabbing** (Drilling) To reduce pressure in a wellbore by moving pipe, wireline tools or rubber-cupped seals up the wellbore. If the pressure is reduced sufficiently, reservoir fluids may flow into the wellbore and towards the surface. Swabbing is generally considered harmful in drilling operations, because it can lead to kicks and wellbore stability problems. In production operations, however, the term is used to describe how the flow of reservoir hydrocarbons is initiated in some completed wells. (Well Completion) To unload liquids from the production tubing to initiate flow from the reservoir. A swabbing tool string incorporates a weighted bar and swab cup assembly that are run in the wellbore on heavy wireline. When the assembly is retrieved, the specially shaped swab cups expand to seal against the tubing wall and carry the liquids from the wellbore. (Schlumberger Limited 2014)

## -T-

**Tank** A metal or plastic vessel used to store or measure a liquid. The three types of tanks in an oil field are drilling, production and storage tanks. (Schlumberger Limited 2014)

**Tank Battery** For crude oil production facilities, a tank battery is an aggregation of two or more tanks where the tanks are located so that no one tank is more than 150 feet from another tank as measured from the closest tank edges, and the tanks are located in the same crude oil production field. (SJVAPCD Rule 4623)

**Temporary Facilities** Any structure or other man-made improvement that can be readily and completely dismantled and/or removed from the site when the authorized use terminates.

**Texture** The apparent surface coarseness of the visual landscape caused by the aggregation or density of surface features and vegetation (e.g., fine, medium, coarse). This element of visual character is usually the least dominant (USFS 1995)

**Texture (BLM)** The visual manifestations of the interplay of light and shadow created by the variations in the surface of an object or landscape.

**Threatened Species (BLM)** "Threatened Species" are any species (plant or animal) that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Threatened species are identified by the Secretary of the Interior in accordance with the 1973 Endangered Species Act.

**Timberland** Privately owned land, or land acquired for State forest purposes, which is devoted to and used for growing and harvesting timber, or for growing and harvesting timber and compatible uses, and which is capable of growing an average annual volume of wood fiber of at least 15 cubic feet per acre. (Public Resources Code Section 51104 (f))

**Traditional Well** A well completed without the use of well stimulation methodology

**Trip Distribution** A model of the number of trips that occur between each origin zone and each destination zone. It uses the predicted number of trips originating in each origin zone (trip production model) and the predicted number of trips ending in each destination zone (trip attraction model).

## -U-

**Unique Archaeological Resource** This term is used for the purposes of CEQA and is defined in the CEQA Guidelines (§15064.5) as an archaeological artifact, object, or site, about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it either contains information needed to answer important scientific research questions; has a special and particular quality such as being the oldest of its type or best available example of its type; or, is directly associated with a scientifically recognized important prehistoric or historic event or person.

**Unique Paleontological Resource** There is currently no legislated definition of this term. Current professional practice utilizes a definition parallel to that for Unique Archaeological Resources above. A unique paleontological resource is a fossil or locality about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it either provides information needed to answer important scientific research questions; has a special and particular quality such as being the oldest of its type or best available example of its type; or, is directly associated with a scientifically recognized important natural event.

**Unity** The visual coherence and compositional harmony of the landscape considered as a whole; it frequently attests to the careful design of individual components in the landscape. (FHWA 1981).

## -V-

**View Corridor** A view corridor is typically defined as the line of sight of an observer from a public viewpoint, looking toward an object of significance to the community (e.g., ridgeline, river, historic building) or as the route that directs the viewers' attention. (USFS 1995)

**Viewshed** The landscape that can be directly seen under favorable atmospheric conditions, from a viewpoint or along a transportation corridor. (BLM 1984)

The landscape that can be directly seen under favorable atmospheric conditions, from a viewpoint or along a transportation corridor. (USFS 1995)

**Vintage Production Field** "Vintage Production Field" means a production field where oil and gas activities have been ongoing for several decades or more. The development of these fields often pre-date environmental laws and / or conservation efforts, and as a result they might pose unique restoration and management challenges. (IOGCC 2008)

**Vividness** The visual power or memorability of landscape components as they combine in striking or distinctive visual patterns. (FHWA 1981).

## -W-

**Water Injection** "Water Injection", also referred to as "Water Flooding" is the process of injecting water into the reservoir via an injection well for the purposes of "sweeping" the hydrocarbons to a nearby production well where it can be recovered to the surface.

**Watershed** A watershed is the area of land where all of the water that is under it or drains off of it goes into the same place. (EPA 2012)

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| **Waters of the States (Water Code Section 13050(e)** | Any surface water or groundwater, including saline waters, within the boundaries of the state. |
| **Waters of the United States or Waters of the US (40 CFR 122.2)** | **(a)** All waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;<br>**(b)** All interstate waters, including interstate "wetlands;"<br>**(c)** All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, "wetlands," sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce including any such waters:<br>**(1)** Which are or could be used by interstate or foreign travelers for recreational or other purposes;<br>**(2)** From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or<br>**(3)** Which are used or could be used for industrial purposes by industries in interstate commerce;<br>**(d)** All impoundments of waters otherwise defined as waters of the United States under this definition;<br>**(e)** Tributaries of waters identified in paragraphs (a) through (d) of this definition;<br>**(f)** The territorial sea; and<br>**(g)** "Wetlands" adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) through (f) of this definition. |
| **Well** | Any oil or gas well or well for the discovery of oil or gas; any well on lands producing or reasonable presumed to contain oil or gas; any well drilled for the purpose of injecting fluids or gas for stimulating oil or gas recovery, repressuring, or pressure maintenance of oil or gas reservoirs, or disposing of waste fluids from an oil or gas field; any well used to inject or withdraw gas from an underground storage facility; or any well drilled within or adjacent to an oil or gas pool for the purpose of obtaining water to be used in production stimulation or repressuring operations. (DOGGR 2013a) (State of California 2011) |
| **Wellbore** | The drilled hole or borehole, including the openhole or uncased portion of the well. Borehole may refer to the inside diameter of the wellbore wall, the rock face that bounds the drilled hole. (Schlumberger Limited 2014) |
| **Well Completion** | 1. The activities and methods of preparing a well for the production of oil and gas or for other purposes, such as injection; the method by which one or more flow paths for hydrocarbons are established between the reservoir and the surface. 2. The system of tubulars, packers, and other tools installed beneath the wellhead in the production casing; that is, the tool assembly that provides the hydrocarbon flow path or paths. (OSHA 2014)<br><br>To prepare a wellbore to be shut in and permanently isolated. There are typically regulatory requirements associated with the P&A process to ensure that strata, particularly freshwater aquifers, are adequately isolated. In most cases, a series of |

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| | cement plugs is set in the wellbore, with an inflow or integrity test made at each stage to confirm hydraulic isolation. (Schlumberger Limited 2014) |
| **Wellfield (BLM)** | "Wellfield" is an area containing one or more wells that produce usable amounts of water or oil. |
| **Wellhead** | The system of spools, valves and assorted adapters that provide pressure control of a production well. (Schlumberger Limited 2014) |
| **Well Pad Preparation** | Well pad preparation begins with clearing and grading an area to accommodate the well and any drilling activities or ancillary facilities that may be required. The size of the well pad is dependent upon the size of the drilling rig footprint, the number of wells anticipated to be drilled on the pad, the type of equipment that would be placed on the well during production, the depth of the well, and the number of additional wells (if any) from this well pad. |
| **Well Remedial Operations (Workover)** | (Drilling) The repair or stimulation of an existing production well for the purpose of restoring, prolonging or enhancing the production of hydrocarbons. (Well Workover and Intervention) The process of performing major maintenance or remedial treatments on an oil or gas well. In many cases, workover implies the removal and replacement of the production tubing string after the well has been killed and a workover rig has been placed on location. Through-tubing workover operations, using coiled tubing, snubbing or slickline equipment, are routinely conducted to complete treatments or well service activities that avoid a full workover where the tubing is removed. This operation saves considerable time and expense. (Schlumberger Limited 2014) |
| **Well-Spacing Plan** | A well spacing plan describes the pool to which it applies and set forth the surface and subsurface well spacing pattern for all wells to be drilled or redrilled into the pool. The Supervisor gives the greatest consideration to the minimum spacing, in acres per well, that can be established based on the geologic geometry of the pool and the area that can be effectively and efficiently drained by a well without economic loss. (Section 3609, Public Resources Code.) |
| **Well Stimulation Treatment** | Well stimulation treatment does not include routine well cleanout work; routine well maintenance; routine treatment for the purpose of removal of formation damage due to drilling; bottom hole pressure surveys; routine activities that do not affect the integrity of the well or the formation; the removal of scale or precipitate from the perforations, casing, or tubing; a gravel pack treatment that does not exceed the formation fracture gradient; or a treatment that involves emplacing acid in a well and that uses a volume of fluid that is less than the Acid Volume Threshold for the operation and is below the formation fracture gradient. (Final Text of SB-4. 12-30-14) |

**Williamson Act Lands** Lands preserved for agricultural production under the California Land Conservation Act of 1965 or "Williamson Act." In exchange for a ten-year agreement that agricultural land will not be developed or converted to another use, the land is taxed at a rate based on the actual use of the land for agricultural purposes, as opposed to its unrestricted market value.

**Woodlands** Forest lands composed mostly of hardwood species such as oak (Public Resources Code Section 12220 (l))

**Workover Rig** A portable rig used for working over a well. (OSHA 2014)

## -Z-

**Zonal Isolation** Zonal Isolation means that oil and gas coming up a well form the productive, underground geologic zone will not escape the well and migrate into other geologic zones, including zones that might contain fresh water. Zonal Isolation also means that the fluids an oil and gas operator puts down a well for any purpose will stay in that zone and not migrate to another zone. (California Department of Conservation 2012)

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