Draft
Environmental Impact Report

SCH# 2019100659

Volume 2

Appendices A through F

LOST HILLS COMPOSTING AND BIOENERGY

by Lost Hills Environmental, LLC *(PP8111)*

Modification No. 1, CUP #1, Map 28; CUP #13, Map 28
Modification No. 2, CUP #9, Map 28

Kern County
Planning and Natural Resources Department
Bakersfield, California

May 2021

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Appendix A

Notice of Preparation/Initial Study and Comment Letters

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Lorelei H. Oviatt, AICP, Director
2700 "M" Street, Suite 100
Bakersfield, CA 93301-2323
Phone: (661) 862-8600
Fax: (661) 862-8601 TTY Relay 1-800-735-2929
Email: planning@kerncounty.com
Web Address: http://kernplanning.com/

PLANNING AND NATURAL RESOURCES DEPARTMENT

Planning
Community Development
Administrative Operations

NOTICE OF PREPARATION

DATE: October 31, 2019

TO: See Attached Mailing List

FROM: Kern County Planning and Natural Resources Department
Attn: Ronelle Candia
2700 "M" Street, Suite 100
Bakersfield, CA 93301
(661) 862-8997
candiar@kerncounty.com

SUBJECT: NOTICE OF PREPARATION OF A DRAFT ENVIRONMENTAL IMPACT REPORT

The Kern County Planning and Natural Resources Department as Lead Agency pursuant to California Environmental Quality Act (CEQA) Guidelines Section 15052 has required that an Environmental Impact Report (EIR) pursuant to CEQA Guidelines Section 15161 be prepared for the project identified below. The Planning and Natural Resources Department solicits the views of your agency as to the scope and content of the environmental information which is germane to your agency's statutory responsibilities in connection with the proposed project. Your agency will need to use the EIR prepared by our agency when considering your permit or other approval of projects.

Due to the limits mandated by State law, your response must be received by **December 2, 2019 at 5:00 p.m.** In addition, comments can be submitted at a **scoping meeting** that will be held at the Kern County Planning and Natural Resources Department on **November 22, 2019 at 1:30 p.m.** at the address shown above.

PROJECT TITLE: Lost Hills Composting and Waste to Energy Project by Lost Hills Environmental LLC. Modification No. 2, CUP No. 9, Map 28; Modification No. 1, CUP No. 1, Map 28; and issuance of new CUP 13, Map 28 (PP18111).

PROJECT LOCATION: The project site is located at the east and west side of Holloway Road, approximately 2 miles north of Highway 46, at the GP Road junction, and approximately 3.5 miles northwest of the unincorporated community of Lost Hills, in central Kern County on Assessor's Parcel Numbers (APNs) 057-220-16; & 057-240-29,50 & 60. The site is located in Section(s) 24 and 25 of Township 26 South, Range 20 East and Section 30 of Township 26 South, Range 21 East of the Mount Diablo Base and Meridian (MDB&M.)

PROJECT DESCRIPTION: The project includes a request for land use entitlements necessary to facilitate the expanded and continued use of a Class III Non-Hazardous Industrial Waste Landfill facility and the establishment of a new Waste to Energy Biomass Gasification Facility. Implementation of the proposed project will require the following:

a) **Mod. No. 1, Conditional Use Permit (CUP) No. 1, Map 28**
Amendment to the boundaries of the CUP No.1, Map 28 of the existing mining facility to remove six (6) acres of the project site, which will become the location for the proposed Waste to Energy Biomass Gasification Facility.

b) **Issuance of CUP No. 13, Map 28**
Establishment of a new CUP that would facilitate the construction of a 3-megawatt (MW) [net] Waste-to-Energy biomass gasification facility.

c) **Mod No. 2, CUP No. 9, Map 28**
Amendment to CUP No. 9, Map 28 of the existing Class III Non-Hazardous Industrial Waste Landfill to include:

- a revision in the allowable waste streams permitted at the landfill to allow the acceptance and disposal of various materials, with a maximum of 1,000 tons per day of organic material;
- a revision to allow for an increase in permitted hours of operation, tonnage, and traffic volume; and
- a new 640,000 ton per year (tpy) extended aerated static Pile (eASP) composting facility sited on 136.2 acres within the current landfill permitted facility boundary. Material accepted for composting at the facility would include up to 320,000 tpy of biosolids, green waste, food waste, and manure, and up to 320,000 tpy of wood waste, for a total 640,000 tpy.

Site Access: The project site is accessible via Holloway Road. No new site access is proposed.

Water: Water for the project is proposed to be provided by Berrenda Mesa Water District through an agreement with Blackwell Land Co, and an on-site drainage and rainwater collection sump.

Sewer: The project site is currently served by an on-site wastewater disposal system. The project would either provide additional wastewater disposal facilities (i.e., septic systems) or portable bathroom facilities to accommodate use by employees located at the bioenergy facility.

Document can be viewed online at: https://kernplanning.com/planning/notices-of-preparation/

Signature: 

Name: Ronelle Candia, Supervising Planner
Planning and Natural Resources Department
By: Cindi L. Hoover, Planner II

CUP 9, Mod 2, CUP 1, CUP 13 Map 28
Lost Hills Enviro Compost & Waste to Energy
es (10/21/2019)
I:\Planning\WORKGRPS\WP\LABELS\28cup9mod2cup1cup13_EIR_Cindi.docx

EIR Mailing Labels

City of Arvin
P.O. Box 548
Arvin, CA 93203

Bakersfield City Planning Dept
1715 Chester Avenue
Bakersfield, CA 93301

Bakersfield City Public Works Dept
1501 Truxtun Avenue
Bakersfield, CA 93301

California City Planning Dept
21000 Hacienda Blvd.
California City, CA 93515

Delano City Planning Dept
P.O. Box 3010
Delano, CA 93216

City of Maricopa
P.O. Box 548
Maricopa, CA 93252

City of McFarland
401 West Kern Avenue
McFarland, CA 93250

City of Ridgecrest
100 West California Avenue
Ridgecrest, CA 93555

City of Shafter
336 Pacific Avenue
Shafter, CA 93263

City of Taft
Planning & Building
209 East Kern Street
Taft, CA 93268

City of Tehachapi
Attn: John Schlosser
115 South Robinson Street
Tehachapi, CA 93561-1722

City of Wasco
764 E Street
Wasco, CA 93280

Inyo County Planning Dept
P.O. Drawer "L"
Independence, CA 93526

Kings County Planning Agency
1400 West Lacey Blvd, Bldg 6
Hanford, CA 93230

Los Angeles Co Reg Planning Dept
320 West Temple Street
Los Angeles, CA 90012

San Bernardino Co Planning Dept
385 North Arrowhead Avenue, 1st Floor
San Bernardino, CA 92415-0182

San Luis Obispo Co Planning Dept
Planning and Building
976 Osos Street
San Luis Obispo, CA 93408

Santa Barbara Co Resource Mgt Dept
123 East Anapamu Street
Santa Barbara, CA 93101

Tulare County Planning & Dev Dept
5961 South Mooney Boulevard
Visalia, CA 93291

Ventura County RMA Planning Div
800 South Victoria Avenue, L1740
Ventura, CA 93009-1740

U.S. Bureau of Land Management
Caliente/Bakersfield
3801 Pegasus Drive
Bakersfield, CA 93308-6837

U. S. Fish & Wildlife Service
Division of Ecological Services
2800 Cottage Way #W-2605
Sacramento, CA 95825-1846

North West Kern Resource Cons Dist
5080 California Avenue, Suite 150
Bakersfield, CA 93309

Environmental Protection Agency
Region IX Office
75 Hawthorn Street
San Francisco, CA 94105

U.S. Dept of Agriculture/NRCS
5080 California Avenue, Ste 150
Bakersfield, CA 93309-0711

State Air Resources Board
Stationary Resource Division
P.O. Box 2815
Sacramento, CA 95812

So. San Joaquin Valley Arch Info Ctr
California State University of Bkfd
9001 Stockdale Highway
Bakersfield, CA 93311

Caltrans/Dist 6
Planning/Land Bank Bldg.
P.O. Box 12616
Fresno, CA 93778

State Clearinghouse
Office of Planning and Research
1400 - 10th Street, Room 222
Sacramento, CA 95814

State Dept of Conservation
Director's Office
801 "K" Street, MS 24-01
Sacramento, CA 95814-3528

State Dept of Conservation
Division of Oil & Gas
4800 Stockdale Highway, Ste 108
Bakersfield, CA 93309

State Dept of Conservation
Div Recycling Cert. Sec.
801 "K" Street, MS 19-01
Sacramento, CA 95814

California State University
Bakersfield - Library
9001 Stockdale Highway
Bakersfield, CA 93309

California Energy Commission
James W. Reed, Jr.
1516 Ninth Street
Mail Stop 17
Sacramento, CA 95814

California Fish & Wildlife
1234 East Shaw Avenue
Fresno, CA 93710

State Dept of Food & Agriculture
1220 "N" Street
Sacramento, CA 95814

California Highway Patrol
Planning & Analysis Division
P.O. Box 942898
Sacramento, CA 94298-0001

Integrated Waste Management
P.O. Box 4025, MS #15
Sacramento, CA 95812-4025

State Water Resources Control Board
Division of Drinking Water
Attn: Jesse Dhaliwal, Sr. Sanitary Eng
4925 Commerce Drive, Suite 120
Bakersfield, CA 93309

Public Utilities Comm Energy Div
505 Van Ness Avenue
San Francisco, CA 94102

California Regional Water Quality
Control Board/Central Valley Region
1685 E Street
Fresno, CA 93706-2020

CalRecycle
Dept of Resources, Recycling, and Recovery
1001 "I" Street
Sacramento, CA 95812

Kern County
Agriculture Department

Kern County Administrative Officer

Kern County Public Works Department/
Building & Development/Floodplain

Kern County Public Works Department/
Building & Development/Survey

Kern County
Env Health Services Department

Kern County Fire Dept
David Witt, Fire Chief

Kern County Fire Dept
Cary Wright, Fire Marshall

Kern County Library/Beale
Local History Room

Kern County Library/Beale
Andie Sullivan

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

Kern County Sheriff's Dept
Administration

Kern County Public Works Department/
Building & Development/Development Review

Kern County Public Works Department/Operations &
Maintenance/Regulatory Monitoring & Reporting

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

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

Kern County Superintendent of Schools
Attention Mary Baker
1300 17th Street
Bakersfield, CA 93301

KernCOG
1401 19th Street - Suite 300
Bakersfield, CA 93301

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

Kern County Water Agency
P.O. Box 58
Bakersfield, CA 93302-0058

San Joaquin Valley
Air Pollution Control District
1990 East Gettysburg Avenue
Fresno, CA 93726

West Side Mosquito
Abatement Dist.
P.O. Box 205
Taft, CA 93268

Adams, Broadwell, Joseph & Cardozo
Attention: Janet M. Laurain
601 Gateway Boulevard, Suite 1000
South San Francisco, CA 94080

U.S. Air Force
Attn: David Bell/AFCEC CZPW
Western Regional/Leg Branch
510 Hickam Avenue, Bld 250-A
Travis AFD, CA 94535-2729

U.S. Army
Attn: Philip Crosbie, Chief
Strategic Plans, S3, NTC
P.O. Box 10172
Fort Irwin, CA 92310

U.S. Army
Attn: Tim Kilgannon, Region 9 Coordinator
Office of Strategic Integration
721 - 19th Street, Room 427
Denver, CO 80202

U.S. Navy
Attn: Steve Chung
Regional Community Plans & Liaison Officer
1220 Pacific Highway
San Diego, CA 92132-5190

U.S. Marine Corps
Commanding General
MCIWEST-MCB CamPen
Attn: A/CS, G7
Box 555010
Camp Pendleton, CA 92055-5246

Los Angeles Audubon
926 Citrus Avenue
Los Angeles, CA 90036-4929

Center on Race, Poverty
& the Environment
Attn: Marissa Alexander
1999 Harrison Street – Suite 650
San Francisco, CA 94612

Center on Race, Poverty
& the Environmental/
CA Rural Legal Assistance Foundation
1012 Jefferson Street
Delano, CA 93215

Defenders of Wildlife/
Kim Delfino, California Dir
980 - 9th Street, Suite 1730
Sacramento, CA 95814

Native American Heritage Council
of Kern County
Attn: Gene Albitre
3401 Aslin Street
Bakersfield, CA 93312

Pacific Gas & Electric Co
Land Projects
650 "O" Street, First Floor
Fresno, CA 93760-0001

Sierra Club/Kern Kaweah Chapter
P.O. Box 3357
Bakersfield, CA 93385

Southern California Edison
2244 Walnut Grove, Ave, GO-1 Quad 2C
Rosemead, CA 91770

Verizon California, Inc.
Attention Engineering Department
520 South China Lake Boulevard
Ridgecrest, CA 93555

Chumash Council of Bakersfield
2421 "O" Street
Bakersfield, CA 93301-2441

David Laughing Horse Robinson
P.O. Box 20849
Bakersfield, CA 93390

Kern Valley Indian Council
Attn: Robert Robinson, Chairperson
P.O. Box 401
Weldon, CA 93283

Kern Valley Indian Council
Historic Preservation Office
P.O. Box 401
Weldon, CA 93283

Santa Rosa Rancheria
Ruben Barrios, Chairperson
P.O. Box 8
Lemoore, CA 93245

Tejon Indian Tribe
Kathy Morgan, Chairperson
1731 Hasti-acres Drive, Suite 108
Bakersfield, CA 93309

Kitanemuk & Yowlumne Tejon Indians
Chairperson
115 Radio Street
Bakersfield, CA 93305

Tubatulabals of Kern County
Attn: Robert Gomez, Chairperson
P.O. Box 226
Lake Isabella, CA 93240

Tule River Indian Tribe
Neal Peyron, Chairperson
P.O. Box 589
Porterville, CA 93258

San Fernando Band of Mission Indians
Attn: John Valenzuela, Chairperson
P.O. Box 221838
Newhall, CA 91322

Terra-Gen Power, LLC
Randy Hoyle
11512 El Camino Real, Suite 370
San Diego, CA 92130-3025

Renewal Resources Group
Holding Company
Rupal Patel
113 South La Brea Avenue, 3rd Floor
Los Angeles, CA 90036

David Walsh
22941 Banducci Road
Tehachapi, CA 93561

Congentrix Sunshine, LLC
Rick Neff
9405 Arrowpoint Blvd
Charlotte, NC 28273

Fotowatio Renewable Ventures
Sean Kiernan
44 Montgomery Street, Suite 2200
San Francisco, CA 94104

EDP Renewables Company
North America, LLC
53 SW Yamhill Street
Portland, OR 97204

Structure Cast
Larry Turpin, Precast Sales Manager
8261 McCutchen Road
Bakersfield, CA 93311

Wind Stream, LLC
Albert Davies
1275 - 4th Street, No. 107
Santa Rosa, CA 95404

Darren Kelly
Sr. Business Manager
Terra-Gen Power, LLC
1095 Ave of the Americas – FL 25, Ste A
New York, NY 10036-6797

Bill Barnes
Dir of Asset Mgmt
AES Midwest Wind Gen
P.O. Box 2190
Palm Springs, CA 92263-2190

Sarah K. Friedman
Beyond Coal Campaign/Sierra Club
1417 Calumet Avenue
Los Angeles, CA 90026

Robert Burgett
9261 - 60th Street, West
Mojave, CA 93501

Lozeau Drury LLP
1939 Harrison Street, Suite 150
Oakland, CA 94612

PG&E
Steven Ng, Manager
Renewal Dev, T&D Intercon
77 Beal Street, Room 5361
San Francisco, CA 94105

Wayne Mayes
Iberdrola Renewables
Dir Tech Serv
1125 NW Couch St, Ste 700, 7th Fl
Portland, OR 97209

Michael Strickler
Iberdrola Renewables, Sr Proj Mgr
1125 NW Couch St, Ste 700, 7th Fl
Portland, OR 97209

Recurrent Energy
Seth Israel
300 California Street, 8th Floor
San Francisco, CA 92109

Kate Kelly
Kelly Group
P.O. Box 868
Winters, CA 95694

Carol Lawhon
Association Executive, IOM
Tehachapi Area Assoc of Realtors
803 Tucker Road
Tehachapi, CA 93561

LIUNA
Attn: Danny Zaragoza
2201 "H" Street
Bakersfield, CA 93301

Sierra Club/Kern Kaweah Chapter
P.O. Box 3357
Bakersfield, CA 93385

Lozeau Drury LLP
1939 Harrison Street, Suite 150
Oakland, CA 94612

Rio Bravo Water Storage District
846 Allen Road
Bakersfield, CA 93314

Berrenda Mesa Water Storage District
14823 Highway 33
Lost Hills, CA 93249

Southern California Edison
P.O. Box 410
Long Beach, CA 90801

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 # _____

Project Title: Lost Hills Composting and Waste to Energy Project by Lost Hills Environmental, LLC

Lead Agency: Kern County Planning Department | Contact Person: Ronelle Candia

Mailing Address: 2700 "M" Street Suite 100 | Phone: (661) 862-8997

City: Bakersfield | Zip: 93301-2323 | County: Kern

Project Location: County: Kern | City/Nearest Community: Lost Hills

Cross Streets: Holloway Road & GP Road | Zip Code: 93249

Lat. / Long.: 35.64138°N / 119.76580° W | Total Acres: 337

Assessor's Parcel No.: 057-220-16; 057-240-29,50 & 60 | Section: 24; 25 | Twp.: 26S | Range: 20E | Base: MDB&M

Within 2 Miles: State Hwy #: 46 | Waterways: California Aqueduct

Airports: _____ | Railways: _____ | Schools: _____

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 ☐ Other _____

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 Bioenergy MW 3
☐ Waste Treatment: Type _____ MGD _____
☐ Hazardous Waste: Type _____
☒ Other: Non-Hazardous Waste Disposal & Composting

Project Issues Discussed in Document:

☒ Aesthetic/Visual
☐ Agricultural Land
☒ Air Quality
☒ Archeological/Historical
☒ Biological Resources
☐ Coastal Zone
☒ Drainage/Absorption
☐ Economic/Jobs
☐ 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
☐ Other _____

Present Land Use/Zoning/General Plan Designation:

Existing Class III Non-Hazardous Landfill and Surface Mining. Kern County General Plan: *3.4(Solid Waste Facilities); 3.4.1 ((Solid Waste Disposal Facility Buffer); Zoning:* A (Exclusive Agriculture).

Project Description: The project includes a request for land use entitlements necessary to facilitate the continued and expanded use of an existing Class III Non-Hazardous Landfill; the future construction and operation of an extended Aeration composting facility; and the future construction and operation of a Waste-to-Energy biomass gasification facility and associated infrastructure to generate a combined 3 megawatts of renewable electrical energy on approximately 337 acres of privately-owned land. Implementation of the project as proposed would require: a) Modification No. 1 of Conditional Use Permit (CUP) No. 1, Map 28; b) Issuance of CUP No. 13, Map 28; and c) Modification No. 2 of CUP No. 9, Map 28.

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		Office of Historic Preservation
S	California Highway Patrol		Office of Public School Construction
	CalFire		Parks & Recreation
S	Caltrans District # 6		Pesticide Regulation, Department of
	Caltrans Division of Aeronautics	S	Public Utilities Commission
	Caltrans Planning (Headquarters)	S	Regional WQCB # Central
	Central Valley Flood Protection Board	X	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
S	Conservation, Department of		Santa Monica Mountains Conservancy
	Corrections, Department of		State Lands Commission
	Delta Protection Commission		SWRCB: Clean Water Grants
	Education, Department of	S	SWRCB: Water Quality
S	Energy Commission		SWRCB: Water Rights
S	Fish & Game Region # Fresno		Tahoe Regional Planning Agency
S	Food & Agriculture, Department of	X	Toxic Substances Control, Department of
	General Services, Department of	S	Water Resources, Department of
	Health Services, Department of		
	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 October 31, 2019 Ending Date December 2, 2019

Lead Agency (Complete if applicable):

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

Signature of Lead Agency Representative: /s/ **Date:** 10/31/2019

Ronelle Candia, Supervising Planner

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

INITIAL STUDY/NOTICE OF PREPARATION

Lost Hills Composting and Waste to Energy Project by Lost Hills Environmental LLC

Modification No. 1, Conditional Use Permit No. 1, Map 28;

Modification No. 2, Conditional Use Permit No. 9, Map 28;

Conditional Use Permit No. 13, Map 28

PLN 18-01978
(PP18111)

LEAD AGENCY:

Kern County Planning and Natural Resources Department
2700 M Street, Suite 100
Bakersfield, California 93301-2370

Contact: Ms. Ronelle Candia
(661) 862-8997
candiar@kerncounty.com

October 2019

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1.0 PROJECT DESCRIPTION

1.1 PROJECT LOCATION

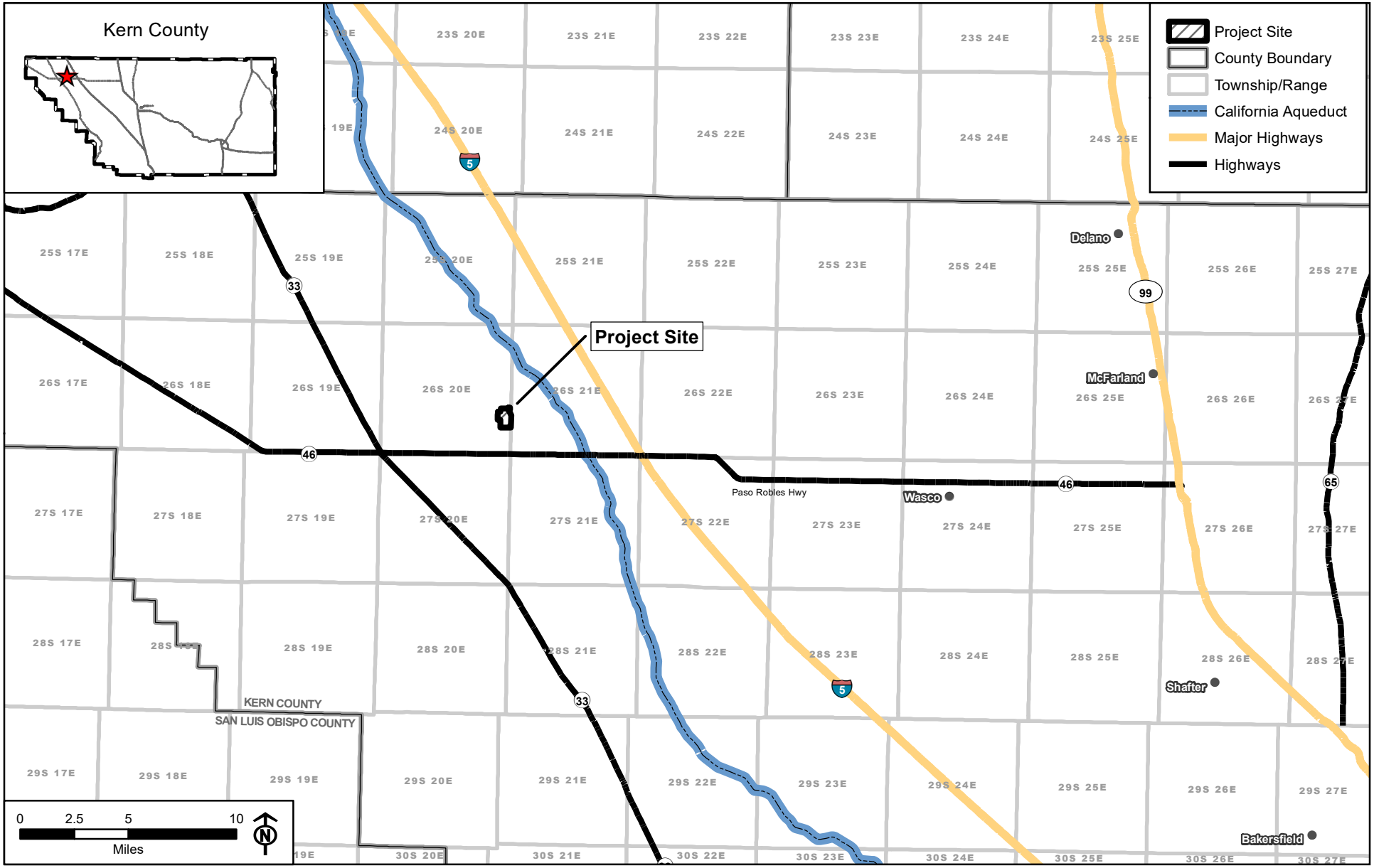
The Lost Hills Composting and Waste to Energy Project (project) site is in the unincorporated area of western Kern County, California (Figure 1, *Regional Vicinity*). The project site is bordered to the north by HM Holloway Gypsum Mine, to the south by the Kern County Landfill (inactive), to the west by undeveloped lands and fallowed agricultural lands, and to the east by Lost Hills Oil Fields. Nearby land uses include row crops, orchard crops including nut tree and citrus tree crops, petroleum production and ancillary uses, surface mining, biosolids/green waste composting operation, and two state highways. The California Aqueduct runs parallel to the project site, approximately 2 miles east. The nearest populated area to the project site is the unincorporated community of Lost Hills, approximately 3.5 miles southeast of the project.

The project is in a relatively flat section of the County, where elevation ranges from approximately 410 feet above mean sea level (amsl) to approximately 425 feet amsl and is located within the U.S. Geological Survey (USGS) 7.5-minute series, Antelope Plain, California, topographic quadrangle. The project site is located within portions of Sections 24 and 25, Township 26 South, Range 20 East, in the Mount Diablo Base and Meridian (Sec(s) 24 & 25, T31S, R28E, M. D. B. & M.).

The project site is on two adjacent sites separated by Holloway Road. The first site (Site A) is an existing class III non-hazardous industrial waste landfill facility located at 14045 Holloway Road on the west side of Holloway Road at the GP Road junction, and the second site (Site B) is an equipment staging and storage lot on the east side of Holloway Road, north of GP Road (Figure 2, *Site Vicinity*). The sites are approximately 1.5 miles and 2.25 miles, respectively, north of State Route 46. Lost Hills Environmental, LLC (the project proponent) owns and operates the project, which has been in operation since 1997, of which approximately 331 acres are currently included in the conditional use permit (CUP) No. 9, Map 28 boundary. No boundary changes are proposed to CUP No. 9, Map 28. Lost Hills Mining, LLC owns Site B and utilizes the site for equipment staging and storage for the HM Holloway Gypsum Mine. Site B is currently included in CUP No. 1, Map 28. The project proponent has requested 6 acres comprising Site B be removed from CUP No. 1, Map 28, and a new CUP be issued to allow for a waste-to-energy biomass gasification facility. The complete project site is on Assessor's Parcel Numbers (APNs) 057-220-16, 057-220-21, 057-240-29, 057-240-50, and 057-240-60.

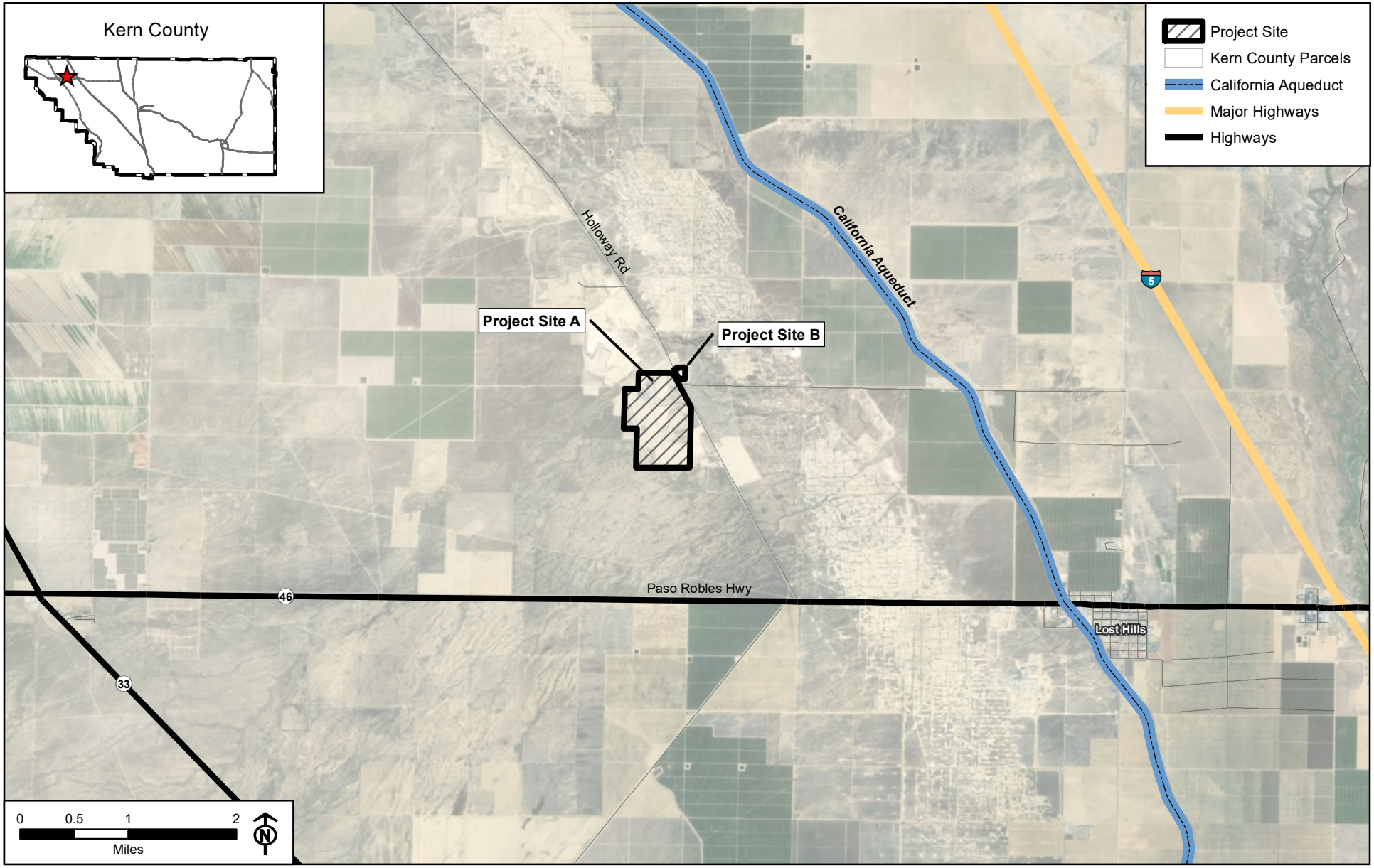
Site A has been used as a landfill facility since 1997; it was previously known as HM Holloway Inc. Landfill, and prior to that the HM Holloway Gypsum Mine. The project site is situated on 331 acres of previously mined land consisting of three separate pits known as Pit "F," Pit "G," and Pit "E," as well as a connecting pit referred to as Pit "FG," for a total disposal footprint of 193 gross acres and 176 net acres; the remaining 138 acres are utilized for ancillary activities, including, but not limited to, overburden storage, monitoring equipment, a leachate system, water storage, truck washing station, and a required buffer area around the facility. HM Holloway Inc. continues to operate a gypsum mine facility located immediately north/northwest of the project, but not included within this project.

As shown in Figure 2, *Site Vicinity*, Site A is primarily accessible from three entrance/exit points on the west side of Holloway Road, and Site B is currently accessible from access along the east side of Holloway Road. Both project sites would continue to utilize the current site accesses with the addition of directional traffic flow identifying ingress and egress for each site; no new site access is proposed.



Mod. No. 1, CUP No. 1, Map 28; Mod. No. 2, CUP No. 9, Map 28; CUP No. 13, Map 28

Figure 1. Regional Vicinity



Mod. No. 1, CUP No. 1, Map 28; Mod. No. 2, CUP No. 9, Map 28; CUP No. 13, Map 28

Figure 2. Site Vicinity

1.2 ENVIRONMENTAL SETTING

Land within the project vicinity is generally characterized as sparsely developed, rural, oil field and surface mining area located in western Kern County. Two State Highways (State Route [SR-] 46 and SR-33) are located 1.6 miles and 6.4 miles, respectively, from the project site. Interstate 5 (I-5) is located approximately 5 miles east of the project site. The climate in the area is semi-arid with total annual precipitation over the past 30 years averaging about 5.70 inches with a range of 1 to 14 inches. Rainfall occurs generally between the months of January and March. Occasional thunderstorms may occur in August, but do not account for much of the annual precipitation. Winter months are mild with temperatures averaging 20 degrees Fahrenheit (° F) to 50° F. Summers are harsh and dry with temperatures ranging from 60° F to over 100° F.

The project site, as currently permitted, is extensively disturbed and developed with a 331-acre landfill facility that has been in continuous operation since it was permitted via CUP in 1997 (Site A), and with staging and storage for large equipment that was permitted in 1982 for gypsum mining and reclamation, although it has been continuously used for mining operations for over 70 years (Site B). Vegetation throughout the site is primarily ruderal. Land use records indicate that, prior to development of the project site with the existing landfill facility, the entire project site was historically used for surface mining of gypsum.

The closest residences are approximately 2 miles east at Munger Farms. The unincorporated community of Lost Hills is approximately 3.5 miles to the southeast. The City of Wasco is approximately 20 miles to the east. The Cities of Delano and Shafter are 25 miles northeast and 27 miles southeast, respectively (Figure 1, *Regional Vicinity*).

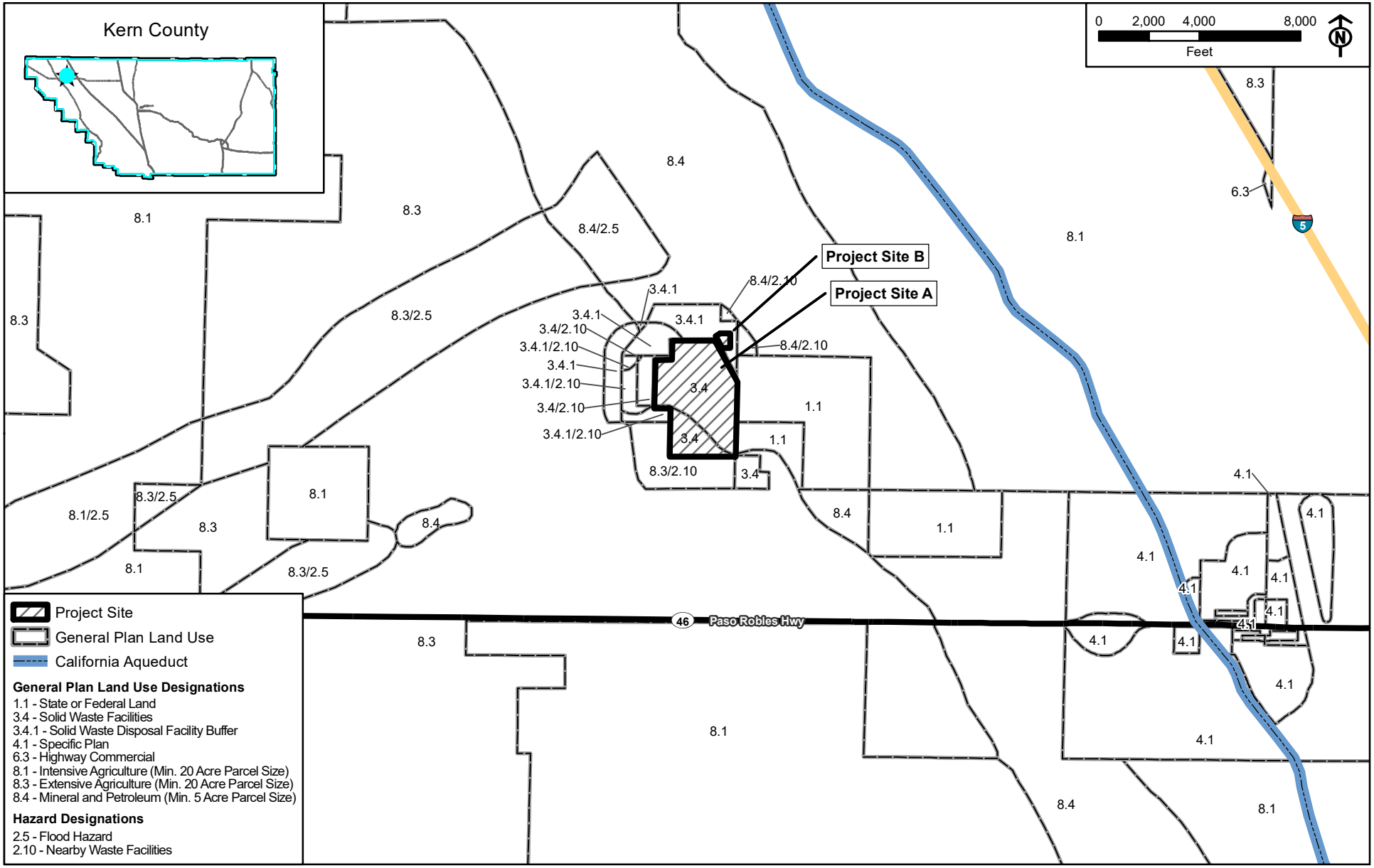
The project is not within the boundaries of any airport as identified in the Kern County Airport Land Use Compatibility Plan (ALUCP). The closest public airport is the Lost Hills Airport, approximately 4 miles to the east. The project is within the San Joaquin Valley Air Basin.

According to the California Department of Conservation Kern County Important Farmland 2016 Map, the project site is identified as Vacant or Disturbed Land on all project site APNs. No lands within the project boundary are subject to a Williamson Act Land Use contract. The project site is excluded from Kern County Agricultural Preserve No. 5.

The project lies within the boundaries of the Kern County General Plan (KCGP) (Figure 3, *Existing General Plan Designations)*. The project is also subject to the provisions of the Kern County Zoning Ordinance (Figure 4, *Existing Zoning Classifications*). The KCGP existing general plan designations and zoning classifications for the site and surrounding land uses are listed below in Table 1, *Project Site and Surrounding Land Uses*.

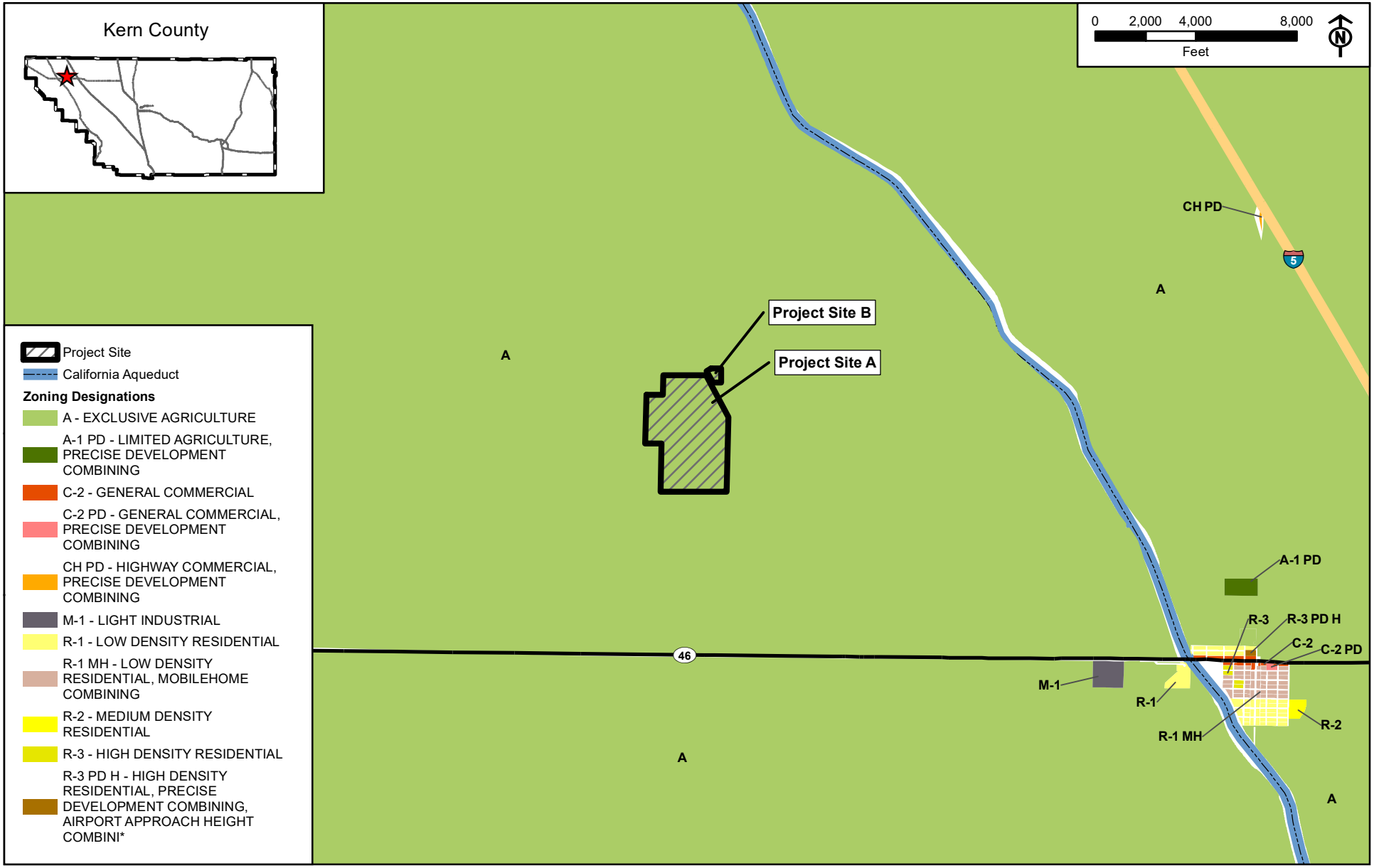
1.2.1 Surrounding Land Uses

Surrounding land uses include the HM Holloway Gypsum Mine to the north, undeveloped Federal land and the Lost Hills Oil Field (owned and operated by various producers) to the east (approximately 3,300 acres), a closed Kern County (County) landfill and other undeveloped land to the south, and undeveloped land to the west. Other adjacent or nearby land uses include orchard and row-crop farming, a biosolids/green waste composting operation (Liberty Composting), and two State Highways (SR-46 and SR-33). The California Aqueduct is the nearest major waterway, located approximately 2.13 miles to the east.



Mod. No. 1, CUP No. 1, Map 28; Mod. No. 2, CUP No. 9, Map 28; CUP No. 13, Map 28

Figure 3. Existing General Plan Land Use Designations



Mod. No. 1, CUP No. 1, Map 28; Mod. No. 2, CUP No. 9, Map 28; CUP No. 13, Map 28

Figure 4. Existing Zoning

Table 1: Project Site and Surrounding Land Uses

	Existing Land Use	Existing Map Code Designation	Existing Zoning Classifications
Site A	Developed with Landfill Facility	3.4 (Solid Waste Disposal Facility)	A (Exclusive Agriculture)
Site B	HM Holloway Equipment Yard	3.4.1 (Solid Waste Disposal Facility Buffer)	A (Exclusive Agriculture)
North	HM Holloway Gypsum Mine	3.4.1 (Solid Waste Disposal Facility Buffer) 8.4/2.10 (Mineral and Petroleum (5-acre min.)/Nearby Solid Waste Disposal Facility)	A (Exclusive Agriculture)
South	Undeveloped; Inactive Kern County Landfill	8.3 (Extensive Agriculture, 20-acre min) 8.3/2.10 (Extensive Ag, 20-acre min)/Nearby Solid Waste Disposal Facility) 3.4 (Solid Waste Disposal Facility)	A (Exclusive Agriculture)
East	Lost Hills Oilfield and Undeveloped Federal Land	8.4/2.10 (Mineral and Petroleum (5-acre min.)/Nearby Solid Waste Disposal Facility) 1.1 (State and Federal Land)	A (Exclusive Agriculture)
West	Undeveloped Land	8.3/2.10 (Extensive Ag, 20-acre min)/Nearby Solid Waste Disposal Facility) 3.4.1/2.10 (Solid Waste Disposal Facility Buffer/Nearby Solid Waste Disposal Facility) 3.4 (Solid Waste Disposal Facility)	A (Exclusive Agriculture)

1.3 PROJECT SITE HISTORY AND EXISTING OPERATIONS

1.3.1 Lost Hills Environmental, LLC Landfill (Site A)

Historically, the 331-acre project Site A was a portion of the HM Holloway open pit gypsum mine, which has operated for over 70 years. The project site is currently developed as a Class III non-hazardous industrial landfill facility approved to accept fly ash, lime cake, auto shredder waste, spent sandblast media, and Class A and B dewatered biosolids. As described above, the existing landfill facility was initially approved in 1997 via a CUP (CUP 7, Map 28), which was subsequently rescinded and replaced by the approval of CUP 9, Map 28, which was then modified in 2013, 2016, and 2017 to result in the current site boundary, disposal pit boundary, days and hours of operation, ancillary equipment, and waste streams. One Environmental Impact Report (EIR), two Addendum EIRs, and one Negative Declaration have been prepared and adopted for the project site. In addition to the approved CUP, the facility operates under California Regional Water Quality Control Board (RWQCB) Central Valley Region Wastewater Discharge Requirements (WDRs) Order number R5-2010-0123, and Solid Waste Facility Permit (SWFP) (SWIS 15-AA-0308) issued by the Local Enforcement Agency (LEA) (Kern County Environmental Health Services Division acting as the LEA for the California Department of Resources Recycling and Recovery [CalRecycle]). As noted above, the current project includes a request to modify the existing landfill CUP. Subsequent to modification of CUP 9, Map 28, the project would require modification of the existing WDRs, SWFP, and Authority to Construct (ATC) and Permit to Operate (PTO).

As allowed by CUP 9, Map 28, the facility operates from 6:00 a.m. to 4:00 p.m., 7 days a week. Employees are on site 10 hours per day. Within a 24-hour period, there are currently 10 employees working at the landfill. Waste material is delivered to the facility by truck/trailer combination with

approximately 25-yards capacity. CUP 9, Map 28 allows for up to 91 trucks per day, with a maximum of 564 trucks per week allowed to enter the facility; total deliveries of up to 2,000 tons per day (tpd), with a maximum of 12,000 tons per week authorized. Trucks utilize I-5 to SR-46 to access Holloway Road from the south and I-5 to Twisselman Road to access Holloway Road from the north. Trucks traveling from coastal areas utilize U.S. Route 101 (US 101) to SR-46 from the west.

Class A and B dewatered biosolids, auto shredder waste, fly ash, and lime filter cake are currently approved for landfill acceptance and are noted below in Table 2, *Currently Permitted Operations*. Waste streams are separated into assigned landfill pits by material. Pit "E" is at grade and is approved to receive treated auto shredder waste, fly ash, and lime filter cake. Pit "F" receives spent sandblast media, fly ash, treated auto shredder waste, and lime filter cake. Pit "G" and connecting Pit "F/G" are approved to receive dewatered Class A and B biosolids and fly ash as co-disposal; additionally, spent sandblast media, treated auto shredder waste, and lime cake may also be disposed of in both pits ("G" and "FG"), but are kept segregated from the biosolids disposal area. Waste materials are transported from areas throughout central California, southern California, and coastal areas to the project site using commercial trucking.

Table 2: Currently Permitted Operations

CUP Boundary	Disposal Footprint	Disposal Capacity	Days and Hours of Operations	Maximum Number of Trucks Delivering Waste to the Landfill	Maximum Tonnage of Waste Accepted
331 Acres	193 acres (gross) 176 acres (net)	8.35 MCY	7 days per week, 6:00 a.m. to 4:00 p.m.	91 Trucks (daily) 546 Trucks (weekly)	2,000 Tons (daily) 12,000 Tons (weekly)

Upon arrival at the landfill, trucks delivering waste materials are weighed at a scale located at the Holloway, LLC administration office directly across Holloway Road from the landfill entrance gate. Once weighed and registered, trucks access the landfill via a gate located at the northernmost edge of the landfill via a private dirt road that separates the landfill facility from the mining facility. The deliveries are directed to the appropriate pit and off loaded to a laydown area near the corresponding disposal pit. Biosolids and fly ash are placed in windrows and mixed by employees using a dozier with a blade and then placed into the appropriate pit. Trucks exit through a truck rinse area where debris is rinsed from the truck and trailer. The truck then returns to the scale for weighing prior to leaving the facility.

1.3.2 Lost Hills Mine, LLC (Site B)

Site B is comprised of 6 acres currently sited within a portion of the Holloway Gypsum Mine CUP boundary (CUP 1, Map 28). The site has historically been used for large equipment storage and staging. It is located directly east of the existing Lost Hills Environmental Landfill site, across Holloway Road, and directly south of the existing facility parking and administrative buildings used for both the mine site and the landfill site. An EIR was prepared for the site in 1982 when it was originally permitted. The project includes a request to remove Site B from CUP 1, Map 28, and issue a new CUP to allow for the construction and operation of a waste-to-energy biomass gasification facility.

1.3.3 Previous Operational Approvals

2008 (Original CUP – Approved). The original HM Holloway Landfill was approved, and an EIR (State Clearinghouse No. 2002111102) was certified by the Board of Supervisors on April 2, 2008.

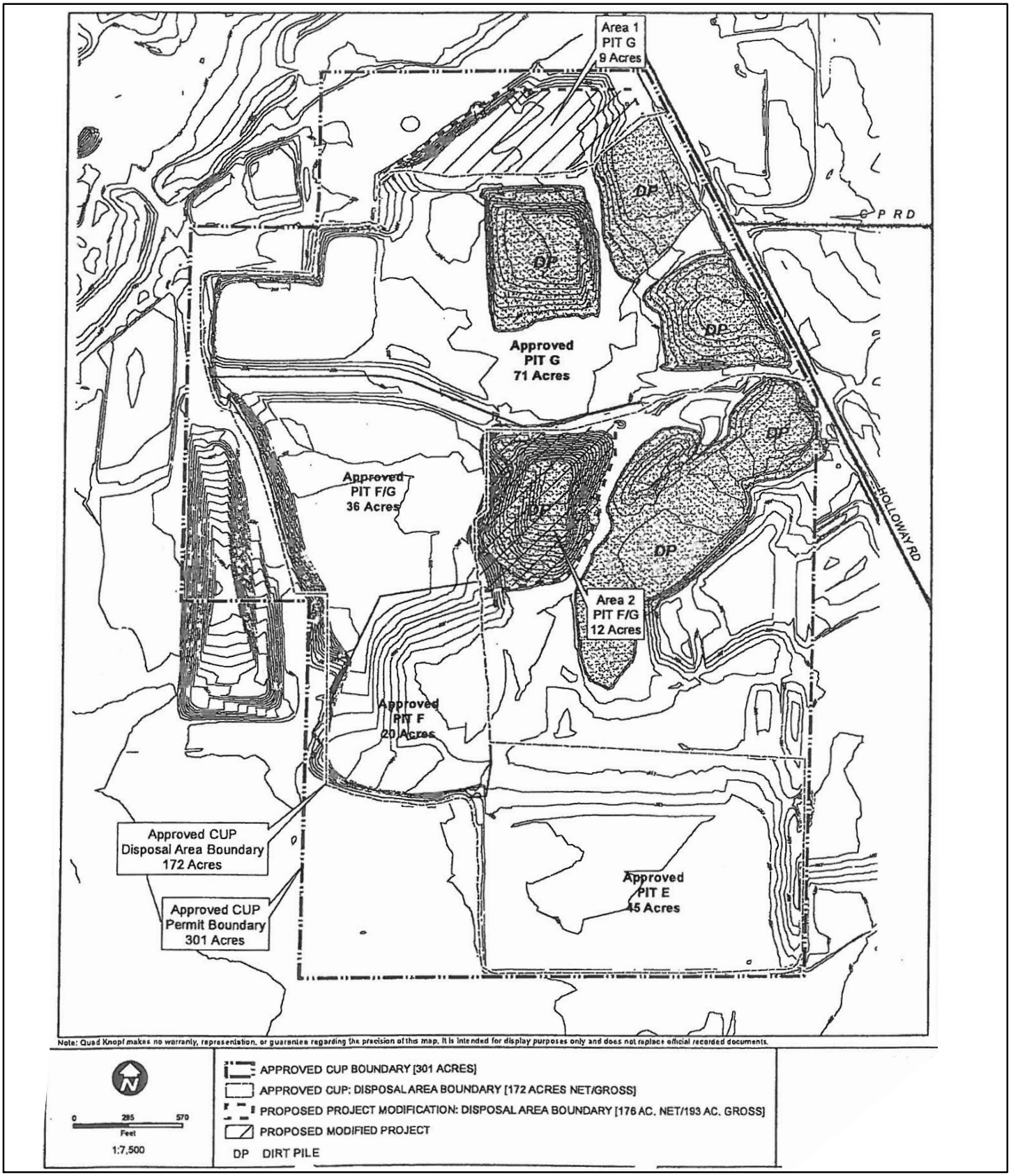
The originally approved project consisted of the development of a Class III non-hazardous industrial waste landfill on 301 acres of land with a total disposal capacity of 8.35 million cubic yards (MCY). The approved project area consists of four contiguous disposal pits identified as Pits E, F, and G and the Pit F/G Connection area. The approvals and current request are summarized in Table 3, *Currently Permitted Waste Streams*.

2013 (1st Modification to CUP – Approved). Since approval of the landfill in 2008, the applicant has participated in ongoing compliance with the regulatory requirements of the RWQCB and the California Occupational Health Association (CalOSHA). As a result of required compliance activities, such as the installation of a leachate system, the increased slope of pit walls and floors, and the installation of berms separating the pits and buffering the gas monitoring well, the total capacity of the landfill was reduced. In 2013 the project proponent requested to modify the existing footprint of the two disposal pits in order to maintain the landfill capacities as identified in the originally approved project (Table 2, *Currently Permitted Operations*), and the request was approved by the Planning Commission on October 24, 2013 (Resolution 102-13). The 2013 approval increased the size of the disposal pit boundaries, which required a modification of the previously approved CUP 9, Map 28. The proposed modification revised the site plan to increase the size and location of the boundaries of Pit G and the Pit F/G Connections area (Figure 5, *2013 Site Plan*). The aforementioned modification added approximately 9 acres to Pit G and approximately 12 acres to the Pit F/G Connection area. At that time, the applicant did not request any changes to the approved CUP boundary for the landfill, changes to the landfill's capacity, increases in permitted daily volume of incoming materials, or changes to allowed waste streams.

2016 (2nd Modification to CUP – Approved). The project proponent submitted a request in 2015, which was approved by the Board of Supervisors on March 15, 2016, to revise the approved project as follows:

1. A General Plan Amendment to Map Code 3.4/2.10 for the approximately 30-acre expansion area, and a General Plan Amendment to Map Code 3.4.1 and 3.4.1/2.10 for the approximately 128-acre buffer area of 1,320-feet around the facility. The policies of the KCGP require each solid waste disposal facility to obtain a 3.4 land use designation, as well as a buffer area of 1,320 feet around the facility;
2. Amend Appendix E of the KCGP to replace HM Holloway Solid Waste Facility Map; and
3. Amend project boundaries and conditions of CUP 9, Map 28 to allow for the relocation of required monitoring equipment and adjustment in facility closure date in an A (Exclusive Agriculture) District. This proposal did not include a request to increase the total disposal capacity or location of disposal pits to the previously approved project site.

2017 (3rd Modification to CUP – Approved). The project proponent submitted a request in 2016, which was approved, for a modification to the previously approved HM Holloway Landfill Project by HM Holloway, Inc., to amend condition of approval (rr) to modify the days of operation for the facility from 6 days per week (i.e., Monday through Saturday) to 7 days per week, and to restrict daily operating hours to 10 hours per day (i.e., 6:00 a.m. and 4:00 p.m.). The applicant indicated the Kern County Public Health Department/Environmental Health Services Division approved SWFP No. 15-AA-0308, allowing the landfill to operate 7 days per week, between the hours of 6:00 a.m. and 4:00 p.m. The proposal intended to allow for consistency in the permitted hours/days of operation for the landfill between CUP 9, Map 28 and the aforementioned SWFP.



Mod. No. 1, CUP No. 1, Map 28; Mod. No. 2, CUP No. 9, Map 28; CUP No. 13, Map 28

Figure 5. 2013 Site Plan

Table 3: Currently Permitted Waste Streams*

Waste Stream Category	Description	Disposal Pit
Fly Ash (Cogeneration Ash) (2008)	Very high temperature combustion byproduct of oil field cogeneration facility burning, consisting primarily of very fine silica shards.	"E," "F;" "G," "FG" (co-disposal of Biosolids)
Lime Cake (2008)	Loose granular calcium carbonate solid that is used in bulk form within water clarifier or filtration systems of oil field production systems.	"E," "F;" "G" (segregated from Biosolids)
Treated Auto Shredder Waste (2008)	Predominately non-metallic solid material including plastic, broken glass, rubber, soil, and fabric that have been separated from the recyclable metals; prior to disposal in a landfill, auto shredder waste is treated off-site by the generator to chemically bind soluble heavy metals.	"E," "F;" "G,""FG" (segregated from Biosolids)
Dewatered Class A & B Biosolids (2008)	Treated solid, semi-solid, or liquid residues generated during the treatment of sewage in a wastewater treatment works that meet 40 Code of Federal Regulations (CFR) Part 503 requirements specified in 503.32(b) for pathogen reduction, 503.33 for vector attraction reduction, and 503.13, Table 1 for pollutant concentrations; these residues include, but are not limited to, scum or solids removed in primary, secondary or advanced wastewater treatment processes, and material derived from sewage sludge (2008)	"G," "FG"
Spent Sandblast Media (2008)	Waste that results from preparing the surfaces of steel structures and tanks for recoating to provide corrosion protection for the surface consisting of the abrasive debris and the paint/primer and metal surface residues that are generated during the sandblasting surface preparation phase	"F;" "G," "FG" (segregated from Biosolids)

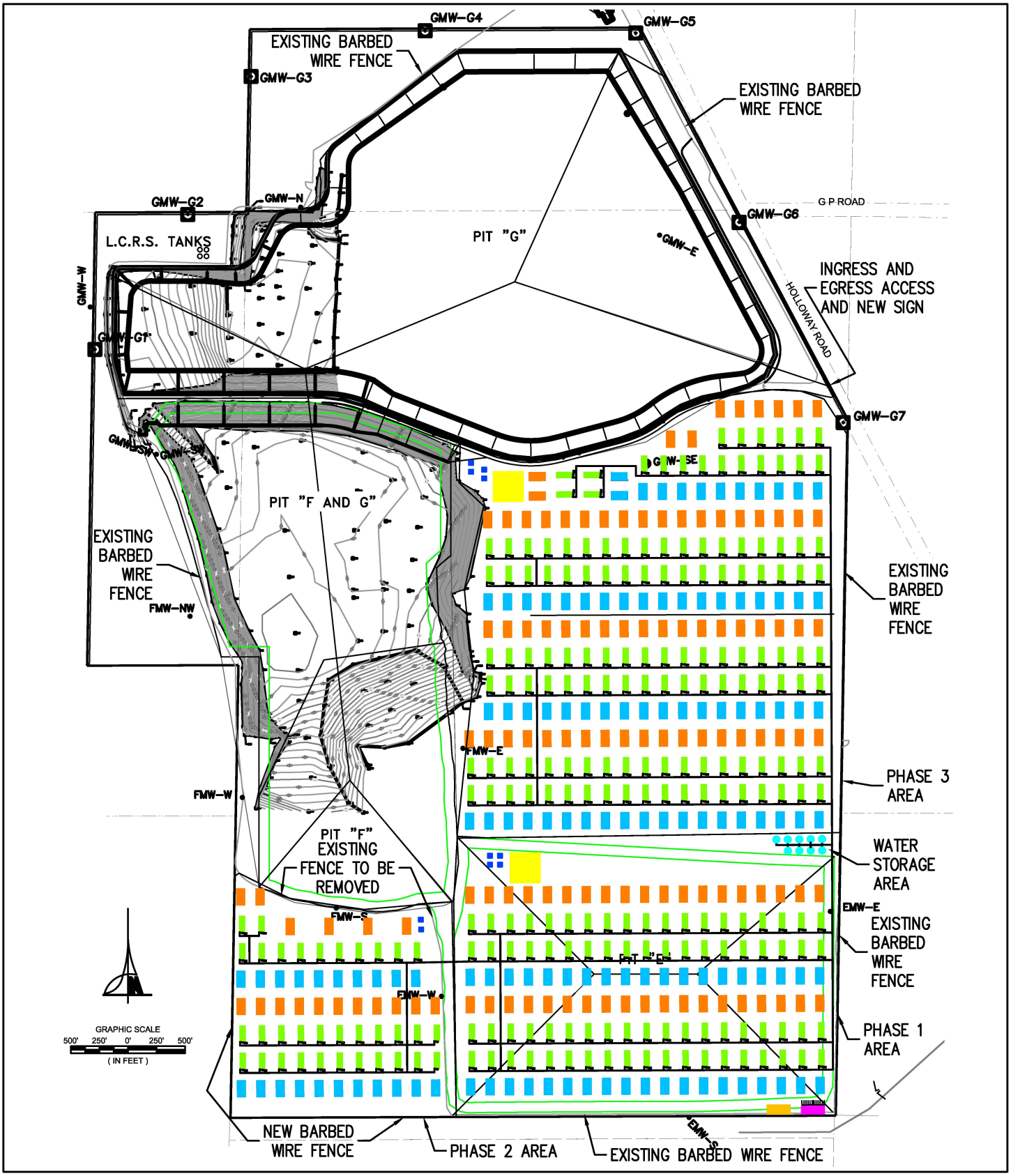
* As listed in 2008 Environmental Impact Report and as approved by Board of Supervisors on July 13, 2010, and February 22, 2011.

1.4 PROPOSED MODIFICATIONS

The project includes a request for land use entitlements necessary to facilitate the construction and operation of extended aerated static pile composting operation on a portion of the landfill that has reached capacity, to facilitate the following modifications to the existing landfill permits to allow for additional waste streams to be disposed of within the landfill, and to extend the hours of operation to 24 hours a day, 365 days per year. See Figure 6A, *Composting Facility Site Layout*, and Figure 6B, *Typical Pile Layout*, for a detailed site plan for the composting operation.

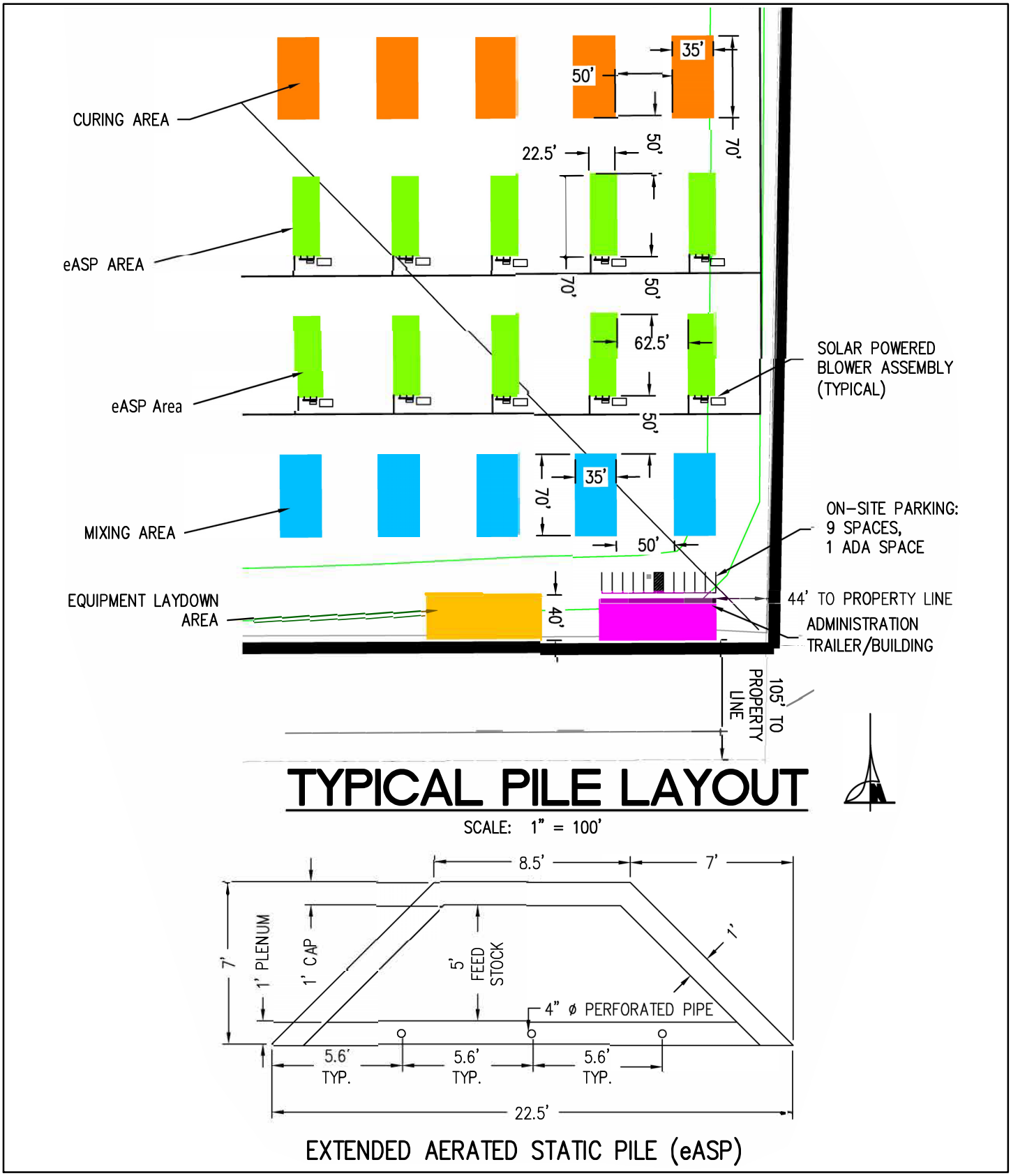
Additionally, the project includes a request for land use entitlements necessary to facilitate the construction and operation of a 3-megawatt (MW) (net) waste-to-energy biomass gasification (bioenergy) facility on a portion of the Holloway Gypsum Mine. Modification of CUP 1, Map 28 would be necessary to remove the bioenergy project site (Site B) from the existing mine site CUP. A new CUP is requested for the bioenergy project site. See Figures 7A through 7G, *Bioenergy Facility Site Layout*, for a detailed site plan for the bioenergy facility.

The components of each portion of the proposed project are discussed in detail below.



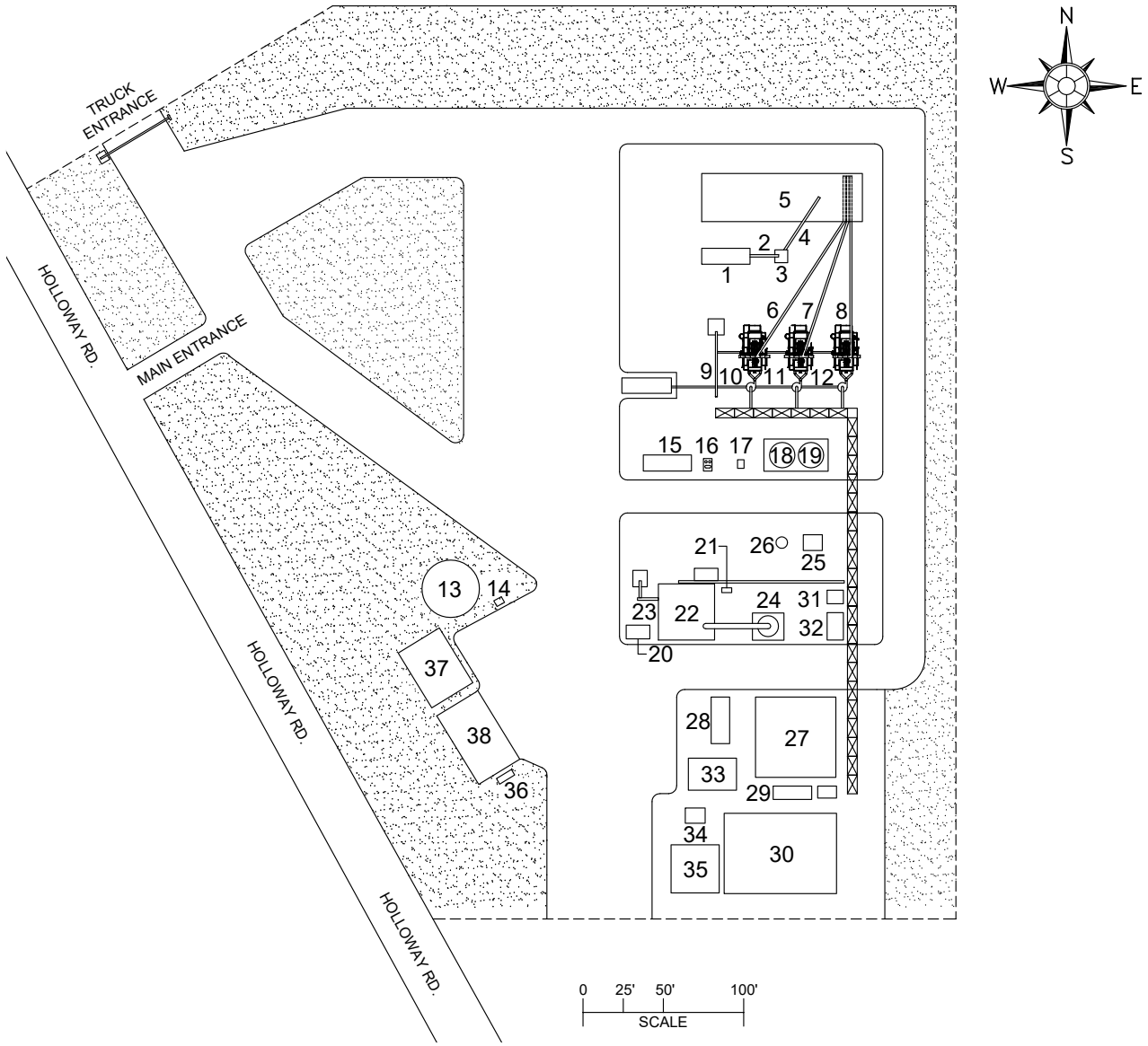
Mod. No. 1, CUP No. 1, Map 28; Mod. No. 2, CUP No. 9, Map 28; CUP No. 13, Map 28

Figure 6A. Composting Facility Site Layout



Mod. No. 1, CUP No. 1, Map 28; Mod. No. 2, CUP No. 9, Map 28; CUP No. 13, Map 28

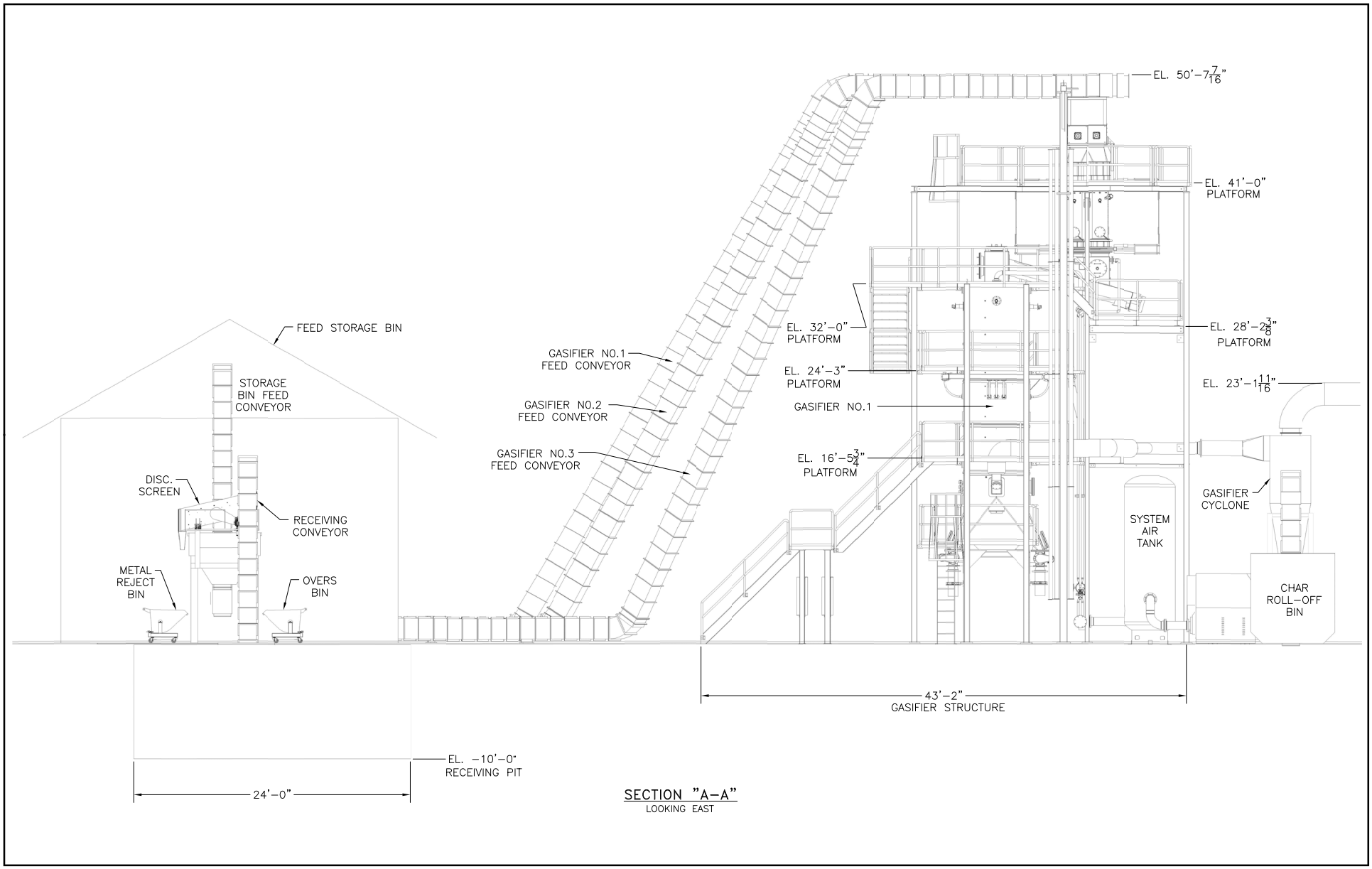
Figure 6B. Typical Pile Layout



ARIES EQUIPMENT		
NO.	TAG	DESC.
1	SC-1101	CHAIN RECLAIMER
2	CO-1101	RECEIVING CONVEYOR
3	DS-1101	DISC. SCREEN
4	CO-1102	STORAGE BIN FEED CONVEYOR
5	BN-1102	FEED STORAGE BIN
6	CO-1104	GASIFIER NO.1 FEED CONVEYOR
7	CO-1105	GASIFIER NO.2 FEED CONVEYOR
8	CO-1106	GASIFIER NO.3 FEED CONVEYOR
9	SC-7101	MAIN CHAR COOLING AUGER
10	GA-3301	GASIFIER NO.1
11	GA-3401	GASIFIER NO.2
12	GA-3501	GASIFIER NO.3
13	TK-9301	RAW WATER TANK
14	PKG-9302	FIRE WATER PUMP PACKAGE
15	E-9101	WATER COOLER
16	V-9101 P-9101A/B E-9101	COOLING WATER TANK/PUMPS/WATER COOLER PACKAGE
17	BL-4201	COMBUSTION AIR BLOWER
18	TO-4101	THERMAL OXIDIZER
19	HX-4201	HEAT RECOVERY NO.1
20	P-5101	AQUA AMMONIA PUMP SKID
21	BL-5102	SORBENT BLOWER
22	FL-5101	EMISSION CONTROL FILTER
23	SC-5102/5103	WASTE SCREW CONVEYOR NO.1 & 2
24	HX-4102	HEAT RECOVERY NO.2
25	FN-5102	I.D. FAN
26	ST-5101	STACK
27	ORC-6101	ORC BUILDING
28	TK-6101	ORC AUX. TANK
29	E-6102	ORC REGENERATOR
30	ACC-6101	ACC ARRAY
31	NA	HO PACKAGE
32	HX-4202	OIL COOLER
33	NA	SUB STATION
34	NA	XFMR
35	NA	HIGH VOLTAGE SWITCHYARD
36	NA	EMERGENCY GEN.
37	NA	BOP / WATER SYSTEMS / UTILITY BUILDING
38	NA	CONTROL ROOM AND MCC BUILDING

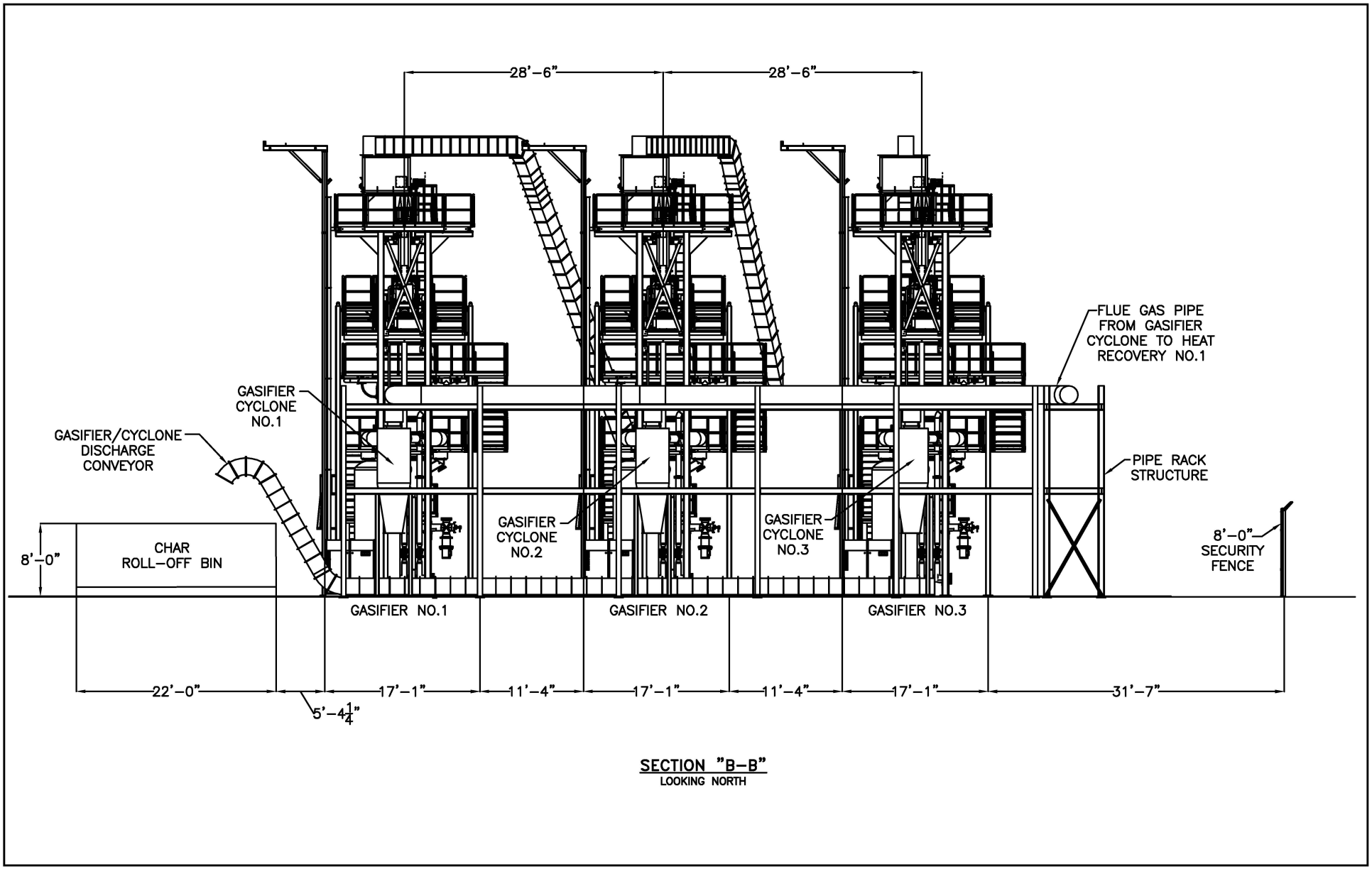
Mod. No. 1, CUP No. 1, Map 28; Mod. No. 2, CUP No. 9, Map 28; CUP No. 13, Map 28

Figure 7A. Bioenergy Facility Site Layout



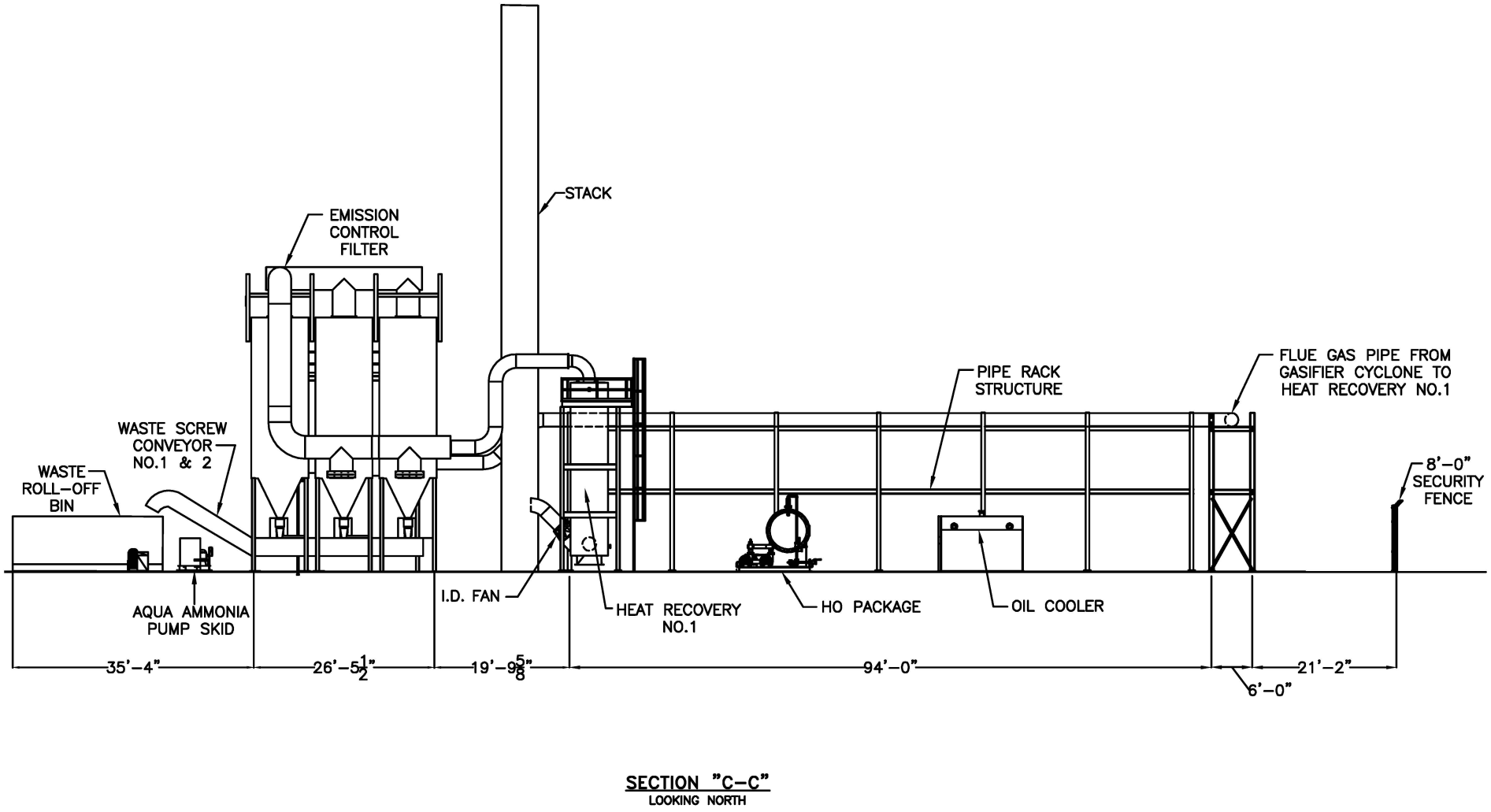
Mod. No. 1, CUP No. 1, Map 28; Mod. No. 2, CUP No. 9, Map 28; CUP No. 13, Map 28

Figure 7B. Section A-A, Bioenergy Facility



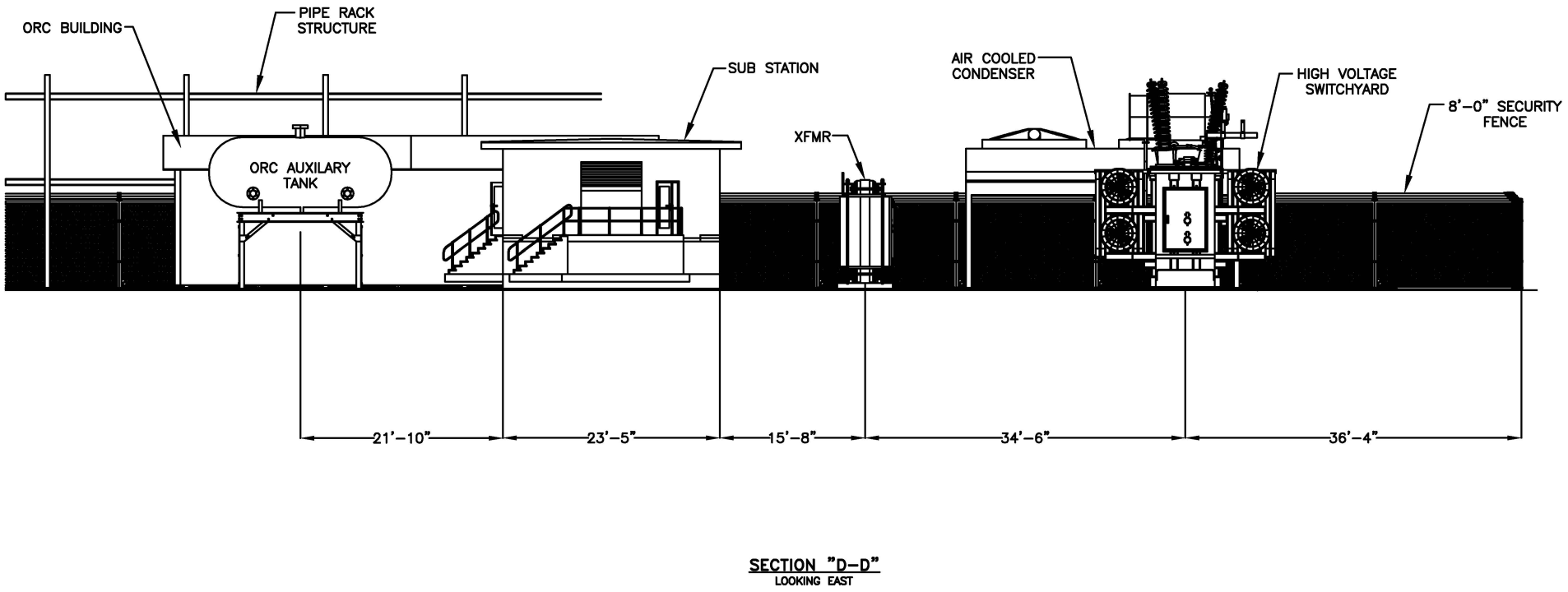
Mod. No. 1, CUP No. 1, Map 28; Mod. No. 2, CUP No. 9, Map 28; CUP No. 13, Map 28

Figure 7C. Section B-B, Bioenergy Facility



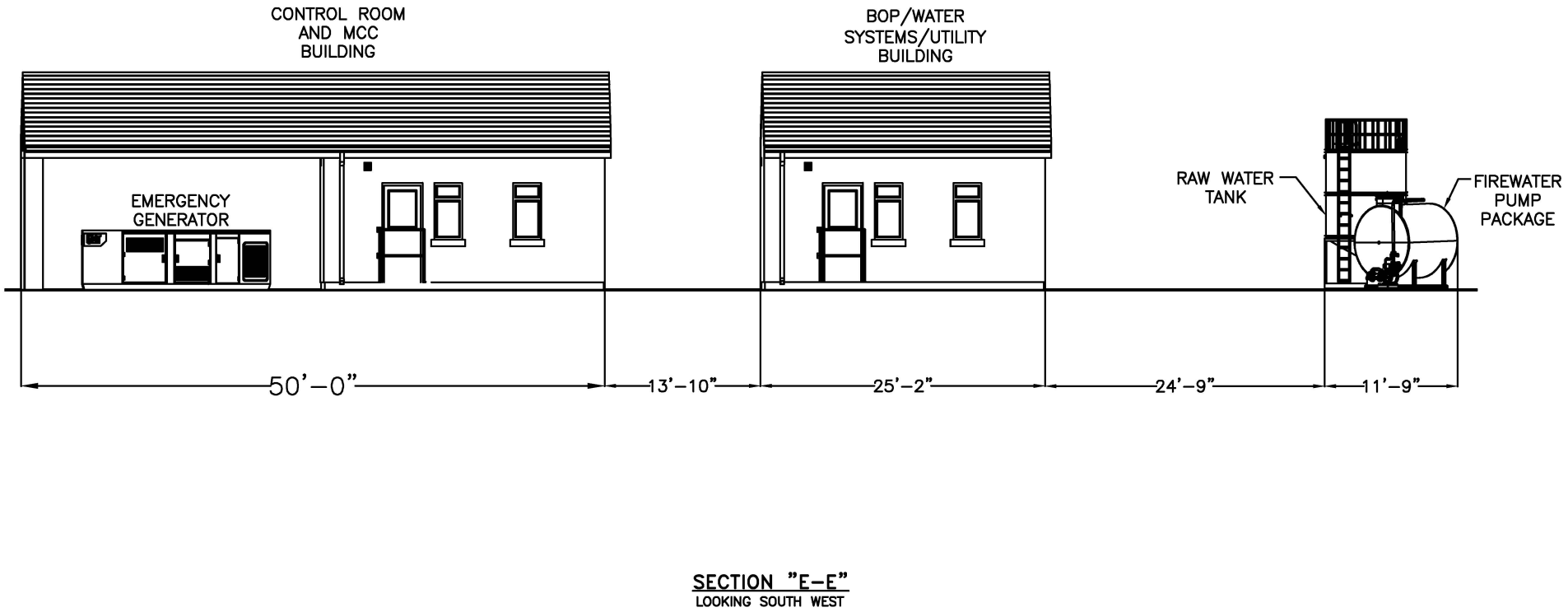
SECTION "C-C"
LOOKING NORTH

Mod. No. 1, CUP No. 1, Map 28; Mod. No. 2, CUP No. 9, Map 28; CUP No. 13, Map 28 **Figure 7D. Section C-C, Bioenergy Facility**



SECTION "D-D"
LOOKING EAST

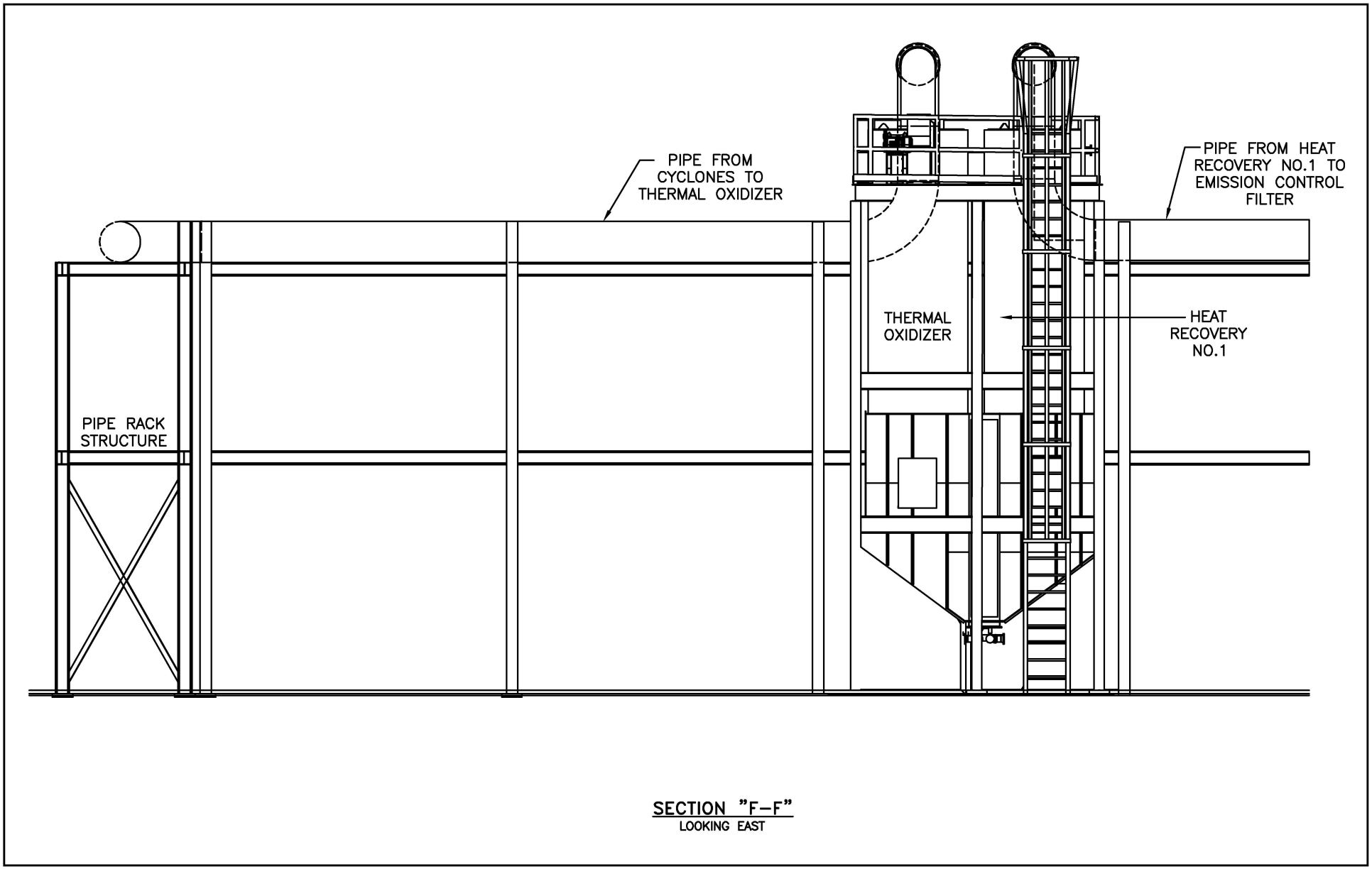
Mod. No. 1, CUP No. 1, Map 28; Mod. No. 2, CUP No. 9, Map 28; CUP No. 13, Map 28 **Figure 7E. Section D-D, Bioenergy Facility**



SECTION "E–E"
LOOKING SOUTH WEST

Mod. No. 1, CUP No. 1, Map 28; Mod. No. 2, CUP No. 9, Map 28; CUP No. 13, Map 28

Figure 7F. Section E-E, Bioenergy Facility



Mod. No. 1, CUP No. 1, Map 28; Mod. No. 2, CUP No. 9, Map 28; CUP No. 13, Map 28

Figure 7G. Section F-F, Bioenergy Facility

1.4.1 Project Component Overview

1.4.1.1 eASP Composting System

The State of California continues to pass legislation directing more diversion from landfills, which results in a higher demand for resource recovery, recycling, and composting. Approximately 30 percent of what currently goes to landfills is organic material and should be composted or recycled. Notable recent bills signed by Governor Brown include Assembly Bill (AB) 341, which is designed to help meet California's recycling goal of 75 percent by 2020; AB 1594, which eliminates the use of green waste as alternative daily cover at a landfill to be considered diversion; Senate Bill (SB) 1383, which establishes targets to achieve a 50 percent reduction in the level of the statewide disposal of organic waste by 2020 and a 75 percent reduction by 2025; and AB 1826, which requires commercial businesses in 2016 to separate their food and yard wastes for composting and anaerobic digestion. This will result in a greater demand for composting of food and green organic materials. Reducing emissions from waste landfills is also an important component of the state's greenhouse gas (GHG) reduction and climate programs. The tonnage of available compostable food waste is unknown at this time but is anticipated to gradually increase as communities begin to implement food waste collection programs.

The composting process involves the breakdown of organic material by aerobic bacteria in the presence of oxygen. The provision of oxygen (or aeration) is a key component in the composting process. Traditional composting utilizes an open windrow process, which involves placing organic material into elongated open piles ("windrows") and using equipment to regularly turn the material to provide adequate air flow. A forced air system, or aeration system, would utilize technology to provide a consistent source of oxygen for the composting process. Aeration systems not only provide more efficiency but can also reduce the space and time needed for the process. Constant airflow has the potential to provide significant odor control by maintaining aerobic conditions, thereby reducing the potential for anaerobic conditions that cause odors. Aeration systems can also reduce volatile organic compounds (VOC) emissions that would otherwise escape into the atmosphere. In 2011, the San Joaquin Valley Air Pollution Control District (SJVAPCD) implemented Rule 4566, a measure to control VOC emissions from composting operations. Aeration systems are considered an approved technology for VOC reduction under Rule 4566. The aeration system would include a bio-filter and/or bio-cover of cured compost in compliance with Rule 4566.

Similar to the aerated composting process detailed above, an extended aeration static composting system utilizes air forced through abutting rows of feedstock during the active composting phase. Adding an aeration system only changes the active composting phase. The shape would depend on the selected technology, but typically the high efficiency of aeration systems allows for larger active composting piles. As proposed, the composting piles would have a maximum height and slope to provide for the best aeration depending on the design of the final system selected. Active composting is proposed to take place over twenty-eight days. The material would be moisture conditioned and kept at the appropriate temperatures for pathogen reduction. During the composting process, a temperature probe will be used to take measurements daily to ensure minimum temperature standards are maintained per Section 17868.3 of Title 14 of the California Code of Regulations. In order to meet these requirements, a temperature of 131 degrees Fahrenheit must be maintained for a period of at least three days.

Site Preparation

In preparation for the composting operation, the Pit "E" area of the site would undergo final closure construction. This would be completed by partially excavating the material in Pit "E", re-compacting, and sealing the closure cover with clay soil found onsite to provide a stable surface

for heavy equipment to operate. The areas adjacent to Pit "E," as seen in Figure 5, *2013 Site Plan*, currently used for overburden storage, would be graded to provide a level surface for composting operations during the proposed phases two and three (Figures 6A and 6B). Additional site improvements may be required by the State Water Resources Control Board (SWRCB) as part of the approval process for this project. The facility currently has site-specific Waste Discharge Requirements (WDRs). These would need to be revised to reflect operational changes associated with this project and additional regulatory requirements imposed by the SWRCB.

Construction

The project proponent proposes the construction of an extended aeration composting system on 136.2 acres in the general area of Pit "E" (including the areas adjacent to Pit "E" which are currently used for overburden storage) and would include infrastructure to force air flow into compost material during the active compost phase. At full buildout, the compost facility would include 240 compost pads (active composting piles and compost curing piles) and would be capable of accepting up to 640,000 tons per year (tpy) of compostable materials, including up to 320,000 tpy of green waste, herbivore manure, food material, digestate, and Class A and B biosolids; and 320,000 tons per year of wood waste. Installation of the full composting system would be implemented in three phases. The construction schedule will depend on demand for compost, but it is assumed that the construction of all three phases will be complete no later than 2030. Construction of Phase 1 would occur in 2020; Phase 2 in 2025; and Phase 3 in 2030. The infrastructure for each phase would take approximately 30 to 60 days to complete and become operational once approvals have been obtained. The construction of the compost facility would consist primarily of the grading of the sites, the excavation of retention ponds, and the installation of solar-powered blowers for aerating compost piles.

Operations

The proposed 640,000 tpy composting operation would be constructed in three phases over an approximately 10-year timeframe, depending on market demand. Table 4, *Compost Area Organic Feedstock Tonnage and Sites per Phase*, below, shows the breakdown of area, number of composting sites (rows), and tonnage (not including wood waste for each phase and full buildout).

Table 4: Compost Area Organic Feedstock Tonnage and Sites per Phase

Phase	Area	Composting Sites	Tons per Year (tpy) *Not Including Wood Waste
1	47.3 acres	76 rows	101,308 tpy
2	21.2 acres	34 rows	45,322 tpy
3	67.7 acres	130 rows	173,290 tpy
Total at Full Buildout	**136.2 acres**	**240 rows**	**319,920 tpy**

The composting process would take place on 240 composting sites in the facility. Each composting site would be equipped with a pair of 1.5-horsepower blower motors powered by a small array of solar cells with a backup battery supply. The blowers would be connected to a manifold that would lead to three 4-inch perforated pipes that would run down the center of the compost pile. These pipes would be covered with approximately one foot of woody biomass material. The goal is to create an aeration zone beneath the active compost pile that allows for uniform airflow up through the active compost material.

All compostable materials would be chipped and ground off site and would be trucked to the site and off-loaded in a mixing area adjacent to the composting sites. It is expected that a 50/50 mixture by volume of woody biomass to biosolids/food organic materials would be mixed with a Scarab-style windrow turner. The mixture would then be moved to the composting row via a front-end loader. On top of the aeration zone, the 50/50 mixture would be placed into cells 70 feet long and 22.5 feet wide with a height of between five to nine feet containing approximately 318 cubic yards. It is assumed that the biosolids/food waste and wood waste would have sufficient moisture to begin the composing process, and additional moisture would not need to be added during the mixing process. After the pile has been mixed and formed, the pile would be covered with a one-foot-deep layer of cured compost, which acts as a biofilter. The layer would be put in place by the front-end loader that formed the pile, assisted by an additional loader with a rake attachment to spread the cured compost over the top of the pile. This biofilter layer would serve to reduce the VOC emissions from the compost pile. After the pile has been covered, a sprinkler system would be placed along the top of the pile to maintain the moisture in the top layer.

Instead of turning, as is used in traditional windrow composting, proper oxygen would be provided by the solar-powered, forced aeration system. The piles would be aerated by the blower motors for two minutes out of every 20 and the sprinklers would run approximately every four hours to maintain proper moisture content. After the initial 28 days of composting, the piles would then be scooped up with a front-end loader and flipped into a new pile in the designated compost curing area to cure (Figures 6A and 6B). In order to reduce the chances of contamination of the composted pile, a separate front-end loader designated to move only cured compost would be used for this operation. The pile would then be left to cure for an additional 28 days. The curing process helps bring compost to full maturity. Each pile would then be tested for pathogens prior to being moved to the finished compost stockpile after curing is complete, the material would be screened on a trommel screen for material size sorting, and either used as cover for a new eASP rows or shipped off site for bulk sale.

Additional water supply would be needed for both the construction and operation of the compost facility. Beyond what is already being utilized by the existing landfill, it is anticipated the composting operation would have a water demand of approximately 20.4 acre-feet per month at full buildout. Water will be piped in from off-site wells and stored in 100,000-gallon tanks. The breakdown of expected water usage per phase of operation is shown in Table 5, *Compost Facility Water Usage*.

Table 5: Compost Facility Water Usage

Phase	1	2	3	4
# of active sites	76	34	130	240
Gallons per day for eASP	60,800	27,200	104,000	192,000
Gallons per day for dust control	8,000	4,000	15,000	27,000
Total Water Demand per day (gallons)	68,800	31,200	119,000	219,000
Total Water Demand per month (gallons)	2,092,667	949,000	3,619,583	6,661,250
Total Water Demand per month (acre ft)	6.4	2.9	11.1	20.4
Total Water Demand per year (acre ft)	76.8	34.8	133.2	244.8

Additional Waste Streams for Composting

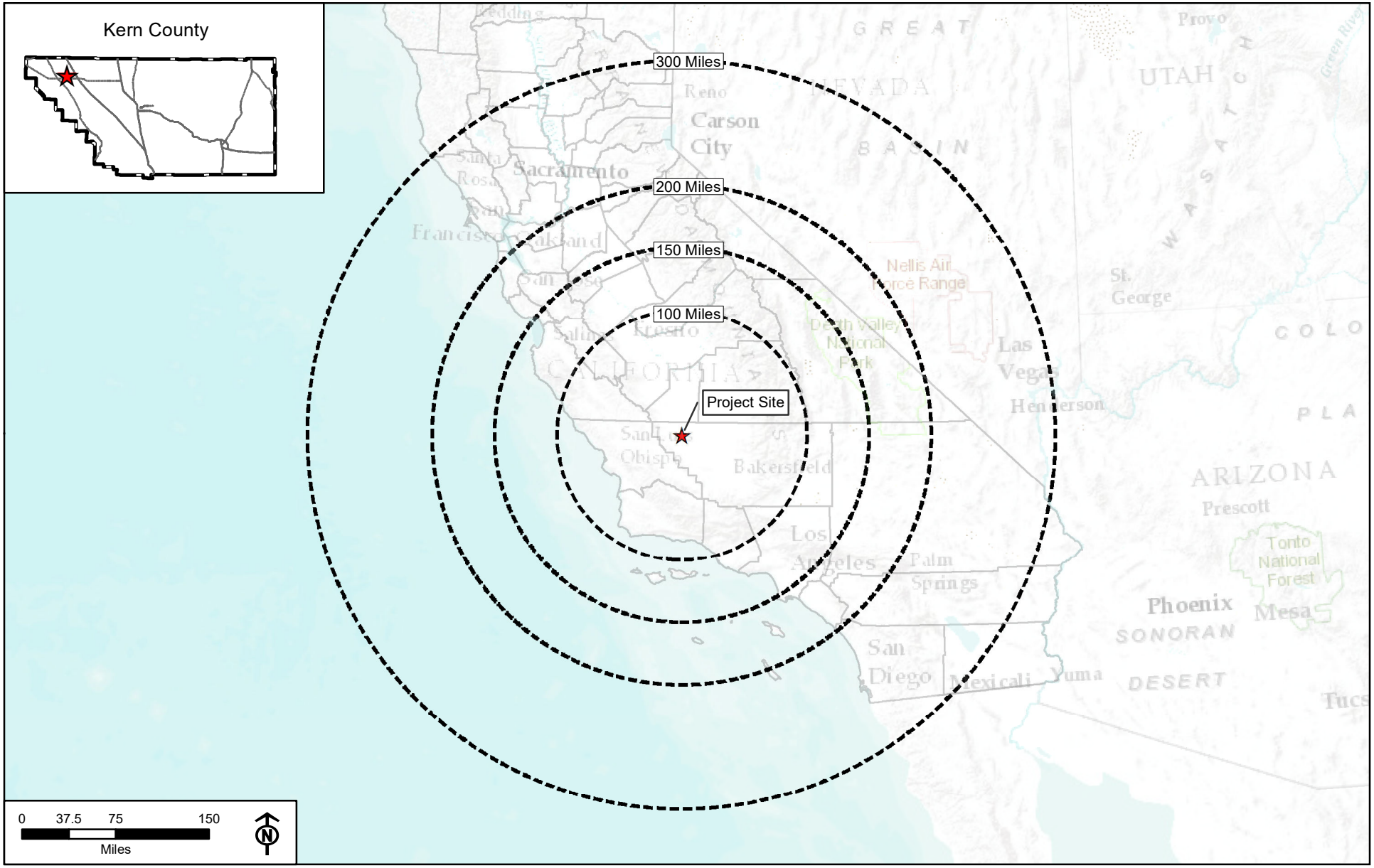
The project proponent is requesting to accept up to 320,000 tons per year (tpy) of composting feedstock composed of the following: green waste, herbivore manure, food material, digestate, and Class A and B biosolids; and 320,000 tons per year of wood waste. The project proponent proposes a blanket tonnage limit of 1,753 tons per day for all approved composting feedstocks. This would allow for operational flexibility to combine various feedstock types and quantities in order to create the highest quality product, without the constraint of sub-limits for specific types of compostable feedstock materials. In addition, specific tonnage limits could impede on goals to divert organic materials from the landfill.

Table 6, *Proposed Compost Feedstock*, lists the proposed feedstock list for the facility. Feedstock definitions listed in Table 7, *Feedstock Definitions for Feedstocks to be Accepted for Composting Under the Proposed Project (No Breakdown Limits)*, are taken directly from California Code of Regulation (CCR) Title 14 Section 17852. Incoming feedstock material would come from locations within a radius of 150-miles from the proposed project site. Figure 8, *Radius Map*, identifies the 150 mile range. Biosolids and manure would be accepted from various producers within the 200-mile radius and wood waste and green waste would be primarily accepted from Kern County farmers and the City of Bakersfield Mt. Vernon Recycling and Compost Facility. The majority of the material would be transported to the proposed facility in long-haul trucks. Incoming material may also be delivered directly by route trucks, transfer long hauls, or commercial haulers from Kern County and other surrounding communities.

Feedstock receipt and composition varies from day to day based on seasonality, market conditions, customer participation, etc. The various types of feedstock materials are typically combined to achieve optimal carbon-nitrogen ratio, moisture levels, and porosity. Best practices for the composition of balanced compost is to combine one- to two- parts green waste per one-part food waste because food waste provides more moisture and green waste provides better porosity. Feedstocks such as wood waste are typically high carbon ingredients, whereas food waste, green waste, biosolids, and manure are high nitrogen ingredients.

Table 6: Proposed Compost Feedstock

• Class A and B Biosolids • Woody Biomass • Excess Green Matter • Pistachio and Almond Hulls • Grass • Branches • Leaves • Other Plant Matter • Compost and Compost-derived Waste • Anaerobic Digestate	• Winery Pulp • Cannabis/Marijuana Discards • Fats, Oils, and Greases (FOG) • Food • Paper and Cardboard • Poultry Manure and Processing • Material • Cattle/Livestock Manure • Crop Residue



Mod. No. 1, CUP No. 1, Map 28; Mod. No. 2, CUP No. 9, Map 28; CUP No. 13, Map 28

Figure 8. Radius Map

Table 7: Feedstock Definitions for Feedstocks to be Accepted for Composting Under the Proposed Project (No Breakdown Limits)

Approved Feedstocks	Description
Green Material	Green material includes, but is not limited to, yard trimmings, untreated wood wastes, natural fiber products, and construction and demolition wood waste. Green material does not include food material, biosolids, mixed solid waste, material processes from commingled collection, wood containing lead-based paint or wood preservative, and mixed construction or mixed demolition debris. Sources of green material include commercial and residential sources.
Food Material	Any material that was acquired for animal or human consumption is separated from the municipal solid waste stream, and that does not meet the definition of "agricultural material." Food material may include material from food facilities as defined in Health and Safety Code section 113785, grocery stores, institutional cafeterias (such as, prisons, schools and hospitals) or residential food scrap collection. Sources of food material include commercial and residential sources.
Manure	Agricultural material and means accumulated herbivore or avian excrement. This includes feces and urine, and any bedding material, spilled feed, or soil that is mixed with feces or urine.
Biosolids	The nutrient-rich organic byproduct material resulting from the treatment of sewage sludge and wastewater.
Shredded Wood Waste	Material consisting of wood pieces or particles which are generated from the manufacturing or production of wood products, harvesting, processing, or storage of raw wood materials, or construction and demolition activities.
Total Maximum Daily Intake:	***1,753 tons per day (640,000 tpy/365 days)***

Vehicle Limit

The facility's CUP currently allows waste to arrive at the facility at a rate of 91 trucks per 24-hour period. Truck trips for landfill waste streams would remain unchanged under the proposed project. The project proponent is requesting to increase daily truck trips for the delivery of feedstock materials for composting and removal of finished compost for off-site sale. The composting facility would accept up to 111 trucks per day brining in compostable materials at full build out. Finished compost is proposed to be shipped out at the rate of up to 111 trucks per day at full build out.

The following truck trips counts are proposed for each phase of construction, as shown in Table 8, *Daily Vehicle Traffic Counts*, which will be further analyzed in applicable technical report(s).

Table 8: Daily Vehicle Traffic Counts

Process/Phase	Vehicle Count	Approved/Proposed
Landfill	91	Approved
Composting Phase 1 Incoming	35	Proposed
Composting Phase 2 Incoming	16	Proposed
Composting Phase 3 Incoming	60	Proposed
Finished Compost Outgoing (no phasing)	111	Proposed
Total Maximum Vehicle Count at Full Build Out	313	

Finished Compost Product Sold

At full build out of the compost facility, it is expected that 50 to 111 25-yard truck loads per day of finished material would be removed from the site. A large portion of outgoing finished compost material would be shipped to agricultural customers within Kern County. The facility may occasionally ship finished compost material to customers outside of Kern County, using the same 150-mile radius as is identified in Figure 8, *Radius Map*, for inbound feedstock materials.

1.4.1.2 Class III Solid Waste Disposal Landfill

Site A has been used as a landfill facility since 1997 and prior to that the HM Holloway Gypsum Mine. The landfill is a Class III non-hazardous industrial waste landfill with a waste containment system made up of: naturally occurring geologic materials that have been conditioned to prevent the migration of waste constituents to groundwater and to convey leachate to the leachate collection sump; a leachate collection and removal system drainage layer consisting of either appropriate selection geologic materials and a geonet/geocushion; and an operations layer designed to protect the leachate collection and removal system. This project proposes the following modifications to the existing landfill facility, which are discussed in detail below:

- Allowance for additional waste streams for acceptance and disposed at the landfill; and
- An extension of the hours of operation to 24 hours a day, 365 days per year.

Waste Streams for Landfill

The project proponent is requesting to modify the CUP to allow an increase in the allowable waste streams for disposal in the landfill as shown in Table 9, *Currently Allowed and Proposed Landfill Waste Streams to be Accepted for Disposal Under the Proposed Project (with a Maximum of 1,000 Tons of Organic Material Daily),* below. The CUP currently allows for acceptance of up to a total of 2,000 tons per day, in any combination, of the following waste streams: Class A and B Biosolids, Fly Ash, Treated Auto Shredder Waste, and Lime Filter Cake. Per WDR Order R5-2010-0123, it has been demonstrated that the landfill's site characteristics alone, without a liner, meet the performance goal contained in 27 CCR 20310 and will not impair the beneficial uses of the surface water or groundwater beneath or adjacent to the landfill in accordance with 27 CCR 20260(b)(1).

Incoming materials that are mandated for diversion by CalRecycle regulations would be diverted, as feasible, to either the compost facility or bioenergy facility. The project proponent is not requesting an increase in daily tonnage limits of waste streams coming to the landfill; however, it should be noted the maximum daily tonnage coming to the facility would increase to 3,753 tons per day to accommodate both landfill disposal and composting operations.

Table 9: Currently Allowed and Proposed Landfill Waste Streams to be Accepted for Disposal Under the Proposed Project (with a Maximum of 1,000 Tons of Organic Material Daily)

Allowed Existing Disposal Waste Streams	Proposed Additional Waste Streams for Disposal	
• Class A and B Biosolids • Treated Auto Shredder Waste • Cogeneration Ash (Fly Ash) • Spent Sand Blast Media • Lime Filter Cake	• Paper and Cardboard • Drywall • Flooring • Roofing Materials • Tile & Windows • Clean Dirt	• Construction and • Demolition (C&D) Wood • Wood Waste • Green Waste • Combination Wood

Table 9: Currently Allowed and Proposed Landfill Waste Streams to be Accepted for Disposal Under the Proposed Project (with a Maximum of 1,000 Tons of Organic Material Daily)

Allowed Existing Disposal Waste Streams	Proposed Additional Waste Streams for Disposal	
	• Clay • Silt • Drill Cuttings • Slag • Clean Asphalt • Concrete • Combination Rock • Concrete with Rebar • Gravel • Brick • Asphalt Grindings • Granulated Silica • Shredded Plastic Pipe • Food Waste • Wastewater Sloughing	• Dimensional Lumber • Pistachio Hulls • Almond Hulls • Grass • Branches and Leaves • Other Plant Matter • Excess Compost • Compost-derived Waste • Winery Pulp/Waste • Cannabis Waste • Wastewater Grit • Poultry Waste • Digestates • Sand

Ancillary Operations/Facility Operating Hours

As allowed by CUP 9, Map 28 the facility operates from 6:00 am to 4:00 pm, 7 days a week. Employees are on site 10 hours per day. Within a 24-hour period there are currently 10 employees working at the facility. The project proposes to increase the facility's hours of operation to 24-hours per day, 365 days per year to meet demand and minimize the amount of daytime traffic.

1.4.1.3 Waste-to-Energy Biomass Gasification Facility

The Lost Hills Bioenergy I, LLC waste-to-energy biomass gasification (bioenergy) project involves the construction of a renewable power plant, which would primarily utilize woody agricultural wastes as a feedstock, to produce 3 Megawatts (net) of electrical power for export to the grid via the Pacific Gas and Electric Company (PG&E) under the BioMat program (Category 2 – agricultural feedstocks). The proposed site for this project is a 6-acre parcel of land within the HM Holloway facility, located at 14045 Holloway Road, Lost Hills, CA.

Construction

Construction of the bioenergy facility would take approximately 11 months to complete and would begin as soon as the environmental process is complete and all permits necessary to construct and operate the facility are obtained. The plant would include a maintenance and utility building, a control building, a motor control center, and a high-voltage switchyard. The bioenergy facility would also require the following systems and structures to be constructed as shown on Figures 7A through 7G, *Bioenergy Facility Site Layout*:

- Instrument & Plant Air
- Firewater and fire protection system
- Water Tank and Plant Water System

- Potable water system and tank
- Safety showers
- Nitrogen storage area
- Natural gas metering and supply
- Storm water drainage
- Process area drains & sump(s)
- Wastewater collection (in-mobile tanks) and reuse area
- Fuel and chemical unloading and storage areas

Feedstocks

Feedstocks would accept up to 165 tons per day (tpd) of orchard & vineyard pruning's, woody arbor waste and chipped branches, stumps, and whole trees sourced from agricultural operations and diverted from green waste processing facilities. Some almond and pistachio nut shells could also be included in the feedstock mix. Feedstocks would not contain paints, wood preservatives or toxic materials. As the BioMAT program requires that at least 80 percent of the sourced feedstock is sourced from agricultural operations, it is possible that up to 20 percent of the feedstock could be sourced from non-agricultural sources, including urban wood, forest biomass, urban pruning's, and biosolids. Orchard removal trees are pushed over and allowed to dry in the field for approximately four weeks (to less than 20 percent moisture). After drying, the trees are ground in the field to a three inch minus specifications and the chips are loaded into tractor trailers for transport to the plant. Feedstocks are expected to be sourced in the San Joaquin Valley, within a 100-mile radius of the plant.

Bio Gasification System Operations

Lost Hills Bioenergy I, LLC proposes to install a three train down draft gasifier system designed to use agricultural waste as the feedstock. The gasification system converts the agricultural waste into a synthetic gas (syngas) by heating the waste in an oxygen starved vessel (gasifier). The syngas is then combusted to produce thermal energy (hot air) that is used to drive an Organic Rankine Cycle (ORC) generator to produce three (3) MWs of electricity (net). The electricity generated from the system would be delivered to grid through a Power Purchase Agreement (PPA) with PG&E under the BioMat program.

The feedstock would be chipped and screened off-site prior to delivery and would be delivered to the site by self-unloading trailers. The feedstock would be conveyed into the gasification system to create syngas and biochar. The syngas is sent to a Thermal Oxidizer (TO) where it is combusted at approximately 1800 degrees Fahrenheit. The hot flue gas is used to heat a thermal fluid loop used to provide the energy to the Organic Rankine Cycle (ORC) power generation unit. In addition, the hot flue gas is used to preheat process air to the gasifiers.

The ORC utilizes an organic working fluid in a closed and sealed system. Heat transferred from the flue gas, via the heating oil, is used to vaporize the organic working fluid, which drives a turbine connected to a generator. The organic working fluid leaving the turbine is condensed in a bank of air coolers and pumped back to the closed loop. The ORC generator would produce 3 Megawatts (net) of electricity to be fed into the grid under the BIOMAT program.

The biomass remaining from the gasification process exits the system as biochar. The biochar is a carbon rich product that can be used as a soil amendment in the central valley or be used for other sources. The estimated amount biochar is approximately 10% by mass of the input feedstock. A

summary of the bioenergy facility operations is provided in Table 10, *Bioenergy Facility Operations Summary*, below:

Table 10: Bioenergy Facility Operations Summary

Operation	Total Amount
Feedstock	165 tons/day
Power Generation (Gross)	3.9 MW
Power Generation (Net)	3.0 MW
Biochar Production	20 tons/day

Potable water would be supplied from the existing Holloway shop building adjacent to the site. The remaining water would be provided by Holloway from water supplied by Berrenda Mesa Water District through an agreement with Blackwell Land Co. This water will be delivered to an onsite Raw Water Tank. The Raw Water Tank would maintain the minimum water inventory required for emergency firewater requirements in addition to water required for daily use. Water usage could be further reduced if it is possible to intermittently transfer water from the onsite wastewater sump and/or mobile wastewater tanks to the Raw Water Tank, after filtration. Expected water usage for the facility is provided in Table 11, *Water Usage*, below:

Table 11: Water Usage

Water Usage	Total Amount
Safety Shower Testing (Average)	25 GPD
Firewater Pump Testing (Average)	250 GPD
Hose Stations	375 GPD
Biochar Conditioning	1,835GPD
Other	130 GPD
Total	**2615 GPD**
Total Acre Ft/Month	**0.244**
Total Acre ft/year	**2.93**

Facility Operating Hours

The plant would be designed to operate twenty-four hours (24) a day and 365 days a year. The operations of the plant are engineered to provide baseload electricity to the grid. Truck deliveries would be primarily scheduled for dayshift on weekdays.

Vehicle Limits

The waste-to energy facility would accept up to 12 trucks per day for the delivery of feedstock materials and for the removal of biochar from the facility to be sold off-site.

1.5 PROJECT OBJECTIVES

The project proponent has defined the following objectives for the project:

4. Provide regional composting capacity to meet the organic waste diversion requirements enacted by recent California legislation (AB 341, AB 1826, SB 1383 etc.);
5. Allow for the installation of a compost facility using a variety of compostable organic streams with a forced aeration system to increase the efficiency of the composting process;
6. Provide a service area, within approximately one hundred fifty (150) miles of the project site, to improve quality and quantity of finished composting products for use by agriculture and landscaping operators;
7. Increase diversion of organic materials from landfills by providing an approved expanded feedstock list which includes digestates as well as herbivore and avian manure for composting;
8. To divert organic material from landfills and produce high quality compost for the agricultural community and other customers while also reducing GHG emissions by keeping organics out of landfills in accordance with SB 1383;
9. Provide economic benefits to Kern County through employment of local residents and via expansion of operational activities and construction of new processing equipment, which has the potential to create new job opportunities;
10. Continue to comply with San Joaquin Valley Air Pollution Control District's rules and regulations, and changes with those regulations in the future;
11. Facilitate the accomplishment of AB 341, which directs CalRecycle to increase statewide diversion of solid wastes to 75 percent by 2020;
12. Enhance business owners' ability to comply with AB 1826, which requires that as of April 1, 2016, businesses that generate a specified amount of organic waste per week must arrange for recycling services for that organic waste in a specified manner (such as composting) to substantially reduce landfill disposal of food wastes; and
13. Continue to accept waste materials by utilizing exhausted mining space without having to open a new landfill pit.

1.6 PROPOSED DISCRETIONARY ACTIONS/REQUIRED APPROVALS

The project may require certain discretionary actions and approvals including, but not limited to, the following:

1.6.1 State

- Regional Water Quality Control Board (RWQCB)
  - Waste Discharge Requirements
- California Department of Resources Recycling and Recovery (CalRecycle)
  - Odor Impact Minimization Plan
  - Solid Waste Facility Permit
- California Department of Industrial Relations, Division of Occupational Safety and Health (Cal/OSHA)
  - Safety Management Procedures

1.6.2 Local

- County of Kern
  - Certification of Environmental Impact Report
  - Adoption of 15091 Findings and 15093 Statement of Overriding Considerations
  - Adoption of Mitigation Monitoring Reporting Program
  - Amendment to Conditional Use Permit
- Kern County Environmental Health Services Department, acting as the Local Enforcement Agency for CalRecycle
  - Solid Waste Facilities Permits
  - Odor Impact Minimization Plan
  - Report of Compost Site Information (RCSI)
- Kern County Environmental Health Services Department, Certified Unified Program Agency (CUPA)
  - Hazardous Materials Business Plan
  - Spill Prevention Control and Countermeasure Plan
- Kern County Public Works - Building and Development- Flood Plain & Survey
  - Plan for the Disposal of Drainage Waters
  - Grading and Building Plans
- Kern County Public Works – Traffic
  - Access Road Design and Encroachment Permit
- Kern County Fire Department
  - Fire Safety Plan
- San Joaquin Valley Air Pollution Control District
  - Fugitive Dust Control Plan
  - Authority to Construct
  - Permit to Operate

2.0 KERN COUNTY ENVIRONMENTAL CHECKLIST FORM

2.1 ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a Potentially Significant Impact, as indicated by the checklist on the following pages.

☒ Aesthetics	☐ Agriculture/Forestry Resources	☒ Air Quality
☒ Biological Resources	☒ Cultural Resources	☒ Energy
☒ 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	☒ Tribal Cultural Resources
☒ Utilities and Service Systems	☒ Wildfire	☒ Mandatory Findings of Significance

2.2 DETERMINATION

On the basis of this initial evaluation:

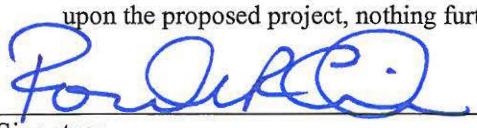
☐ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☐ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

☒ I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect (a) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and (b) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENT IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.



Signature	October 31, 2019 Date
Ronelle R. Candia Printed Name	Kern County Planning and Natural Resources Dept. For

3.0 EVALUATION OF ENVIRONMENTAL IMPACTS

(1) A brief explanation is required for all answers except "No Impact" answers that are adequately supported by the information sources a lead agency cites in the parentheses following each question. A "No Impact" answer is adequately supported if the referenced information sources show that the impact simply does not apply to projects like the one involved (e.g., the project falls outside a fault rupture zone). A "No Impact" answer should be explained where it is based on project-specific factors as well as general standards (e.g., the project will not expose sensitive receptors to pollutants, based on a project-specific screening analysis).

(2) All answers must take account of the whole action involved, including offsite as well as onsite, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts.

(3) Once the lead agency has determined that a particular physical impact may occur, then the checklist answers must indicate whether the impact is potentially significant, less than significant with mitigation, or less than significant. "Potentially Significant Impact" is appropriate if there is substantial evidence that an effect may be significant. If there are one or more "Potentially Significant Impact" entries when the determination is made, an EIR is required.

(4) Negative Declaration: "Less than Significant with Mitigation Incorporated" applies where the incorporation of mitigation measures has reduced an effect from "Potentially Significant Impact" to a "Less-than-Significant Impact." The lead agency must describe the mitigation measure and briefly explain how they reduce the effect to a less than significant level (mitigation measures from Section XVII, "Earlier Analyses," may be cross-referenced).

(5) Earlier analyses may be used where, pursuant to the tiering, program EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR or negative declaration, Section 15063(c)(3)(D). In this case, a brief discussion should identify the following:

   (a) Earlier Analysis Used. Identify and state where they are available for review.

   (b) Impacts Adequately Addressed. Identify which effects from the above checklist where within the scope of and adequately analyzed in an earlier document pursuant to applicable legal standards, and state whether such effects were addressed by mitigation measures based on the earlier analysis.

   (c) Mitigation Measures. For effects that are "Less than Significant with Mitigation Incorporated," describe the mitigation measures that were incorporated or refined from the earlier document and the extent to which they address site-specific conditions for the project.

(6) Lead agencies are encouraged to incorporate into the checklist references to information sources for potential impacts (e.g., general plans, zoning ordinances). Reference to a previously prepared or outside document should, where appropriate, include a reference to the page or pages where the statement is substantiated.

(7) Supporting Information Sources: A source list should be attached, and other sources used or individuals contacted should be cited in the discussion.

(8) This is only a suggested form, and lead agencies are free to use different formats; however, lead agencies should normally address the questions from this checklist that are relevant to a project's environmental effects in whatever format is selected.

(9) The explanation of each issue should identify:

   (a) The significance criteria or threshold, if any, used to evaluate each question; and

   (b) The mitigation measure identified, if any, to reduce the impact to a less-than–significant level.

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
I. AESTHETICS				
Would the project:				
a. Have a substantial adverse effect on a scenic vista?	☐	☐	☒	☐
b. Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☒	☐
c. In nonurbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage points) If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	☐	☐	☒	☐
d. Create a new source of substantial light or glare which would adversely affect daytime or nighttime views in the area?	☒	☐	☐	☐

RESPONSES:

a. Much of project site is substantially developed as an existing landfill facility with a truck wash, access roads, overburden storage, and equipment storage. The bioenergy facility would be sited in an already disturbed area on the east side of Holloway Road with office and storage buildings and heavy equipment. While the project site is not designated as a scenic vista, as defined by Kern County or any other local governing body, the incorporation of additional processing equipment to the facility, such as extended aerated static pile composting rows, solar collection, and aeration equipment, and siting of the bioenergy facility would result in alteration to the existing viewshed. However, the entire site is extensively disturbed and considered mostly developed and implementation of the proposed project would not add any substantial effect to the scenic vista. The project area is adjacent to an existing mining operation, a closed County landfill, and vacant open space used for oil production. A large berm along Holloway Road blocks much of the view of the landfill from the traveling public. Therefore, impacts from project implementation are not anticipated to have a substantial adverse effect on a scenic vista; however, impacts will be further analyzed in the EIR.

b. There are no Officially Designated State or County Scenic Highways as defined by the California Department of Transportation (Caltrans), Kern County, or any other local governing body adjacent to or within the vicinity of the project site. Additionally, there are no rock outcroppings or known historic buildings in the vicinity of the project. The entire project site is extensively disturbed and considered mostly developed. Therefore, implementation of the proposed project would not substantially damage scenic resources within a state scenic highway; however, impacts will be further analyzed in the EIR.

c. The project is sited in a nonurbanized area and the existing visual character surrounding the site is predominately rural oil and gas industry, mining activities, and a closed County landfill. There are no designated scenic vistas within the project viewshed. The visual change between the existing landfill and the proposed composting process with the addition of processing equipment, such as aeration system equipment, to the facility may result in alteration to the existing viewshed by increasing the height of existing windrows. However, the entire site is extensively disturbed and considered mostly developed. A large berm along Holloway Road blocks much of the view of the landfill from the traveling public. Therefore, implementation of the project would not substantially degrade the existing visual character of the public's view; however, impacts will be further analyzed in the EIR.

d. The facility currently operates 10 hours a day, seven days a week. The modification to the existing CUPs to add additional compost operations and additional feedstocks would not require additional lighting. However, the proposed addition of a waste-to-energy facility, as well as, extended operating hours of the landfill and compost facility would require additional lighting and may adversely affect nighttime views. Additionally, extensive lighting may violate Kern County's Dark Skies Ordinance. This impact is potentially significant. Further analysis of the projects aesthetic impacts is warranted to determine whether the project will create a substantial new light source and, if so, to determine the reasonable and feasible mitigation measures that could be imposed. Therefore, this potential impact will be further evaluated in the EIR.

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
II. AGRICULTURE AND FOREST RESOURCES				
Would the project:				
a. 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 nonagricultural use?	☐	☐	☐	☒
b. Conflict with existing zoning for agricultural use, or Williamson Act contract?	☐	☐	☐	☒
c. Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)) or timberland (as defined in Public Resources Code section 4526) or timberland zoned Timberland Production (as defined by Government Code Section 51104 (g))?	☐	☐	☐	☒
d. Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to nonagricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒
f. 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?	☐	☐	☐	☒

RESPONSES:

a. No lands within or immediately adjacent to the project are identified as "Farmland of Statewide Importance," "Prime Farmland," or "Unique Farmland" by the California Department of Conservation Kern County Important Farmland 2017 map. The site has been continually utilized as a landfill facility since 1997. Due to a lack of farmland on-site, the project does not involve any changes to the existing environment that, due to their location or nature, could result in impacts resulting in the loss of farmland or conversion of farmland to non-agricultural use. No further analysis will be included in the EIR.

b. Lands within or immediately adjacent to the project sites have been previously excluded from Kern County Agricultural Preserve No. 5 and the project sites are not under a Williamson Act Land Use Contract. Site A has been continually utilized as a landfill facility since 1997 and is in the A (Exclusive Agriculture) Zone District, which has a General Plan Map Code of 3.4 (Solid Waste Disposal Facility). Site B is also in the A Zone District and has a General Plan Map Code of 3.4.1 (Solid Waste Disposal Facility Buffer). According to the KCGP Designations and Zone District Consistency Matrix, the "A" Zone District is consistent with Map Codes 3.4 and 3.4.1. The project does not propose additional land disturbance or encroachment into the boundaries of Kern County Agricultural Preserve No. 5. Implementation of the proposed project would not conflict with existing zoning for agricultural use or a Williamson Act contract; therefore, impacts to existing zoning for agricultural uses or a Williamson Act contract are less than significant. No further analysis will be included in the EIR.

c. No lands within or immediately adjacent to the project are zoned forest land or timberland or contain any forested areas. Due to a lack of forest land on-site, the project does not involve any changes to the existing environment that, due to their location or nature, could result in impacts resulting in the loss of forest land or conversion of forest land to non-forest use. Therefore, implementation of the proposed project would have not impact and no further analysis is warranted.

d. No lands within or immediately adjacent to the project are zoned forest land or timberland or contain any forested areas. Due to a lack of forest land on-site, the project does not involve any changes to the existing environment that, due to their location or nature, could result in impacts resulting in the loss of forest land or conversion of forest land to non-forest use. Therefore, implementation of the proposed project would have not impact and no further analysis is warranted.

e. As noted above, the project site and immediate surrounding properties do not contain any forest land or active farming land. The project site is excluded from the Kern County Agricultural Preserve No. 5 boundaries and no parcels within the project site are currently subject to a Williamson Act contract. The project does not propose additional land disturbance or encroachment into the boundaries of Kern County Agricultural Preserve No. 5. Due to a lack of forest land or active farming on-site, the project would not involve any changes to the existing environment that, due to their location or nature, could result in conversion of farmland to non-agricultural use or conversion of forest land to non-forest use; therefore, no further analysis will be included in the EIR.

f. No lands within the project site are subject to a Williamson Act Land Use contract made pursuant to the California Land Conservation Act of 1965 or Farmland Security Zone contract. Therefore, the project would not 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); therefore, no further analysis will be included in the EIR.

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
III. AIR QUALITY				
he significance criteria established by the applicable Air pollution control district shall be relied upon to make the following determinations. Would the project:				
a. Conflict with or obstruct implementation of the applicable air quality plan?	☒	☐	☐	☐
b. 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? Specifically, would implementation of the project (in a specific location) exceed any of the following adopted thresholds:				
i. San Joaquin Valley Air Pollution Control District:	☒	☐	☐	☐
Operational and Area 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	☒	☐	☐	☐
ii. Eastern Kern Air Pollution Control District:				
Operational and Area Sources Reactive organic gases (ROG) 25 tons per year	☐	☐	☒	☐
Oxides of nitrogen (NO_X) 25 tons per year	☐	☐	☒	☐
Particulate matter (PM_{10}) 15 tons per year	☐	☐	☒	☐
Stationary Sources – as Determined by District Rules 25 tons per year	☐	☐	☒	☐

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
III. AIR QUALITY				
c. Expose sensitive receptors to substantial pollutant concentrations?	☒	☐	☐	☐
d. Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.	☒	☐	☐	☐

RESPONSES:

a. The California Air Resources Board (CARB) has divided California into regional air basins according to topographic drainage features. The San Joaquin Valley Air Pollution Control District (APCD) has jurisdiction in eight counties located in the San Joaquin Valley. The U.S. Environmental Protection Agency (EPA), CARB, and the APCD classify an area as attainment, unclassified, or non-attainment depending on whether or not the monitored ambient air quality data shows compliance, insufficient data available, or non-compliance with the ambient air quality standards. The project site is located within the San Joaquin Valley Air Basin, which is designated as nonattainment (level of a criteria air pollutant is higher than the level allowed by the State standards) for Ozone 1 hour, Ozone 8 hour, PM10 (particulate matter 10 micrometers or less in diameter), and PM2.5 (particulate matter 2.5 micrometers or less in diameter) pollutants under State ambient air quality standards. The air basin is also in non-attainment for Ozone 8 hour and PM2.5 pollutants under Federal ambient air quality standards.

The project includes the construction and operation of a 640,000 tons per year (tpy) composting facility and a 3-megawatt (MW) waste-to-energy biomass plant. Construction and operation of the project may result in exceedance of significance thresholds established by the APCD, CARB, and EPA and result in significant impacts to air quality in the area. These impacts are potentially significant. Further analysis of air quality impacts is warranted to determine whether the project would conflict with or obstruct implementation of the applicable plans for attainment and, if so, to determine the reasonable and feasible mitigation measures that could be imposed. An Air Quality and Greenhouse Gas Analysis is being prepared for the project and potential impacts will be evaluated in the EIR.

b.i.-ii. A cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable Federal or State ambient air quality standard could be potentially significant. The San Joaquin Air Basin is a nonattainment area for the Federal and State ozone standards and the State PM10 standard. The SJVAPCD rules and regulations apply to all project activities. The project would occur within the SJVAPCD's jurisdiction, but is not within Eastern Kern Air Pollution Control District's jurisdiction. Operational and cumulative contributions from project implementation could be potentially significant in the San Joaquin Air Basin and will be analyzed in the Air Quality and Greenhouse Gas Analysis in the EIR.

c. Land uses determined to be "sensitive" to air quality include residential areas, schools, convalescent and acute care hospitals, parks and recreational areas, and churches. The nearest residences are located approximately two miles east at Munger Farms, and the unincorporated community of Lost Hills is approximately 3.5 miles to the southeast. Facility construction and operation activities may

result in exhaust emissions from both stationary and non-stationary sources, and dust created from earth-moving work, mixing feedstocks for composting, and biomass gasification that could adversely affect air quality for the workers at the facility and the nearest sensitive receptors. Exposure to Valley Fever from fugitive dust generated during construction is a potentially significant impact. Potential cocci spores could be stirred up during excavation, grading, and earth-moving activities, exposing construction workers to these spores and to the possibility of contracting Valley Fever. While surrounding land uses consist primarily of undeveloped land, there are a few agricultural operations as well as the Lost Hills Oil Field within two miles of the proposed project. Employees of these operations may potentially be exposed to dust and construction related emissions stemming from the proposed project and thus, impacts to sensitive receptors will be further evaluated in the EIR. Impacts will be evaluated in the Air Quality and Greenhouse Gas Analysis in the EIR.

d. The SJVAPCD has screening odor thresholds based on the distance of the odor source within the facility to nearby sensitive receptors and recommends a "case-by-case" analysis of odor impacts, including an evaluation of complaint records for a particular facility as compared to similar facilities. The odors associated with landfill wastes, composting, typical vehicle exhaust of trucks traveling to and from the facility, and maintenance of vehicles on-site may result in substantial odors. The odors associated with facility operations and/or maintenance activities will be evaluated to assess the related impacts to sensitive receptors and this issue will be evaluated in the Air Quality and Greenhouse Gas Analysis in the EIR.

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
IV. BIOLOGICAL RESOURCES				
Would the project:				
a. 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 U.S. Fish and Wildlife Service?	☒	☐	☐	☐
b. 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 U.S. Fish and Wildlife Service?	☐	☐	☒	☐
c. Have a substantial adverse effect on federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☒	☐
d. 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?	☒	☐	☐	☐
e. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☒	☐
f. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☒	☐

RESPONSES:

a. The project area is located within the geographic range of several Federal- and/or State-listed threatened and/or endangered wildlife taxa, including San Joaquin antelope squirrel (*Ammospermophilus nelsoni*; SJAS), Swainson's hawk (*Buteo swainsoni*; BUSW), western snowy plover (*Charadrius alexandrines nivosus*), giant kangaroo rat (*Dipodomys ingens*; GKR), Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*; TKR), blunt-nosed leopard lizard (*Gambelia sila*; BNLL), Buena Vista Lake ornate shrew (*Sorex ornatus relictus*), and San Joaquin kit fox (*Vulpes macrotis mutica*; SJKF). In addition, the site is in the range of special-status plant taxa, including

California jewelflower (*Caulanthus californicus*), Kern mallow (*Eremalche parryi* ssp. *kernensis*), and San Joaquin woolly-threads (*Monolopia congdonii*). All of the potentially occurring listed plant species are annuals. The project area does not include any streams or wetlands but does have the potential to result in impacts to special-status species. Although impacts to candidate, sensitive, or special-status species is unlikely given the highly disturbed nature of the project site, impacts from project implementation are potentially significant and will be further evaluated in the EIR.

b. Riparian habitats are found along rivers, creeks, streams, and lakes and generally consist of plant communities of woody vegetation. The project and surrounding areas do not have rivers, creeks, streams, and lakes; therefore, riparian habitat will not be impacted due to project implementation. The project would not conflict with existing local or regional conservation plans, or local ordinances protecting biological resources. Impacts from project implementation are anticipated to be less than significant but will be further evaluated in the EIR.

c. The National Wetlands Inventory (NWI) provided by the U.S. Fish and Wildlife Service (USFWS) does not identify any wetlands within the project site. The project area is entirely disturbed and does not propose the direct removal, filling, or hydrological interruption of a Federally protected wetland. Impacts from project implementation are anticipated to be less than significant but will be further evaluated in the EIR.

d. The project is not anticipated to interfere substantially with the movement of any native resident or migratory fish or wildlife species. The project area is entirely disturbed and no established native resident or migratory wildlife corridors or nursery sites exist on-site. However, as stated in Response (a), the project site is located within the geographic range of several Federal- and/or State-listed threatened and/or endangered wildlife taxa that may forage or transverse the site. Impacts from project implementation are potentially significant and will be further evaluated in the EIR.

e. The project would not conflict with local policies or ordinances that protect biological resources. The KCGP incorporates an Oak Tree Conservation component; however, no oak trees are present at the project site. As proposed, the project is not anticipated to conflict with any local policies or ordinances protecting biological resources; however, potential impacts will be further evaluated in the EIR.

f. The proposed project is not situated within the boundaries of an adopted Habitat Conservation Plan (HCP), Natural Community Conservation Plan, or other approved State, regional, or local HCP, including the locally adopted Metropolitan Bakersfield HCP. Therefore, impacts are anticipated to be less than significant; however, further analysis will be presented in the EIR.

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
V. CULTURAL RESOURCES				
Would the project:				
a. Cause a substantial adverse change in the significance of a historical resource as defined in CEQA Guidelines Section 15064.5?	☐	☐	☒	☐
b. Cause a substantial adverse change in the significance of an archaeological resource pursuant to CEQA Guidelines § 15064.5?	☐	☐	☒	☐
c. Disturb any human remains, including those interred outside of dedicated cemeteries?	☐	☐	☒	☐

RESPONSES:

a. In general, CEQA considers a historical resource as any resource that: (1) is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage; (2) is associated with lives of persons important in our past; (3) embodies the distinctive characteristic of a type, period, region, or method of construction or represents the work of an important creative individual, or possesses high artistic value; or (4) has yielded, or may be likely to yield, information important in prehistory or history.

The project does not involve the demolition, destruction, relocation, or alteration of historical resources as defined under CEQA. The existing landfill facility has been in operation on the site since 1997 and was historically used for surface mining purposes prior to being a landfill facility. The entire project area is extensively disturbed and considered mostly developed. It is unlikely that any previously recorded cultural or archeological resources will be identified at the site. However, cultural resources and archaeological resources records searches will be conducted at the Southern San Joaquin Valley Information Center (SSJVIC) at California State University, Bakersfield to determine if any such resources have been recorded at the facility or in the vicinity. Mitigation Measures will be identified in the EIR in the event there are any unexpected resources uncovered during the project.

b. No National Register of Historic Places (NRHP) or National Landmark sites exist within, or in proximity to, the project area. No California Register of Historical Resources (CRHR) Sites, California State Historical Landmarks, or Points of Historic Interest exist within, or adjacent to, the project area.

An archaeological artifact, object, or site is considered a unique archaeological resource if "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: (1) contains information needed to answer important scientific research questions and there is a demonstrable public interest in that information; (2) has a special and particular quality such as being the oldest of its type or the best available example of its type; or (3) is directly associated with a scientifically recognized important prehistoric or historic event or person."

Due to the history of disturbance and previous activities at the project site, it is unlikely that intact archaeological resources are present. However, impacts will be further evaluated in the EIR and Mitigation Measures will be identified in the event there are any unexpected resources uncovered during the project.

c. As stated above, due to the history of disturbance and previous activities at the project site, it is unlikely that human remains would be present; however, impacts will be further evaluated in the EIR.

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
VI. ENERGY				
Would the project:				
a. Result in potentially significant environmental impact due to wasteful, inefficient or unnecessary consumption of energy resources, during project construction or operation?	☒	☐	☐	☐
b. Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☐	☐	☒	☐

RESPONSES:

a. An Energy Study will be prepared for the proposed project to analyze the consumption of energy related to electricity, fuel, and other related energy sources during construction and operation of the composting and bioenergy facilities. Impacts related to energy use are potentially significant and will be further analyzed and evaluated in the EIR.

b. It is not anticipated that implementation of the project would conflict with or obstruct a State or local plan for energy efficiency. Operation of the project would lead to an overall increase in the County's Renewable Energy Portfolio and would align with the stated KCGP policy to encourage the development of renewable energy within Kern County. Impacts are considered less than significant; however, further analysis is warranted, and this topic will be discussed and analyzed in the EIR.

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
VII. GEOLOGY AND SOILS				
Would the project:				
a. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i. Rupture of a known earthquake fault, as delineated on the most recent Alquist Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☒	☐
ii. Strong seismic ground shaking?	☐	☐	☒	☐
iii. Seismic-related ground failure, including liquefaction?	☒	☐	☐	☐
iv. Landslides?	☐	☐	☒	☐
b. Result in substantial soil erosion or the loss of topsoil?	☒	☐	☐	☐
c. 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 on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?	☒	☐	☐	☐
d. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (19914), creating substantial risks to life or property?	☒	☐	☐	☐
e. 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?	☐	☐	☒	☐
f. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.	☐	☐	☒	☐

RESPONSES:

a.i. The project site is not located within any earthquake fault zone or seismic hazard zone as established pursuant to the Alquist-Priolo Earthquake Fault Zoning Act. The nearest active fault is the San

Andreas Fault, which is located approximately 22 miles west of the western extent of the proposed project site.

Construction of the project would be subject to all applicable ordinances of the Kern County Building Code (Chapter 17.08). Kern County has adopted the California Building Code (CBC) 2016 Edition (CCR Title 24) effective January 1, 2017, which imposes substantially the same requirements as the International Building Code (IBC), 2015 Edition, with some modifications and amendments. Adherence to all applicable regulations would reduce any potential impacts associated with the project. Impacts from project implementation are expected to be less than significant; however, further analysis in the EIR is warranted.

a.ii. Due to the location of active faults in the general region, strong seismic ground shaking could occur at the project site, resulting in damage to structures that are not properly designed to withstand strong ground shaking. The project would include the construction of a compost and bioenergy gasification facilities, including operation and maintenance buildings, a control building, a motor control center, and a high voltage switchyard. Should strong seismic ground shaking occur at the project site, damage to the composting and bioenergy gasification facilities (and associated structures) could result. However, construction of the project would be subject to all applicable ordinances of the Kern County Building Code (Chapter 17.08) and IBC and CBC earthquake construction standards, including those relating to soil characteristics. Impacts from project implementation are anticipated to be less than significant; however, further analysis in the EIR is warranted.

a.iii. Liquefaction potential occurs when there is a combination of unconsolidated soil type and high groundwater combined with high potential seismic activity. The potential for substantial adverse effects to the project due to seismic-related ground failure, including liquefaction, will be examined in the EIR.

a.iv. The project site is not considered to be a high-risk area for landslides, as it is relatively flat and is not subject to movement of rock, debris, or soil; however, the potential for substantial adverse effects to the project due to landslides will be examined in the EIR.

b-c. The project is located within an area that has been historically used as surface mining land and is developed with established landfill operations. Soil disturbances will occur with the project as movement of vehicles and equipment necessary to conduct project activities could potentially result in the erosion and loss of topsoil. The EIR will examine the composition and baseline stability of the soils that underlie the project site.

d. Expansive soils are fine-grained soils (generally high plasticity clays) that can undergo a significant increase in volume with an increase in water content and a significant decrease in volume with a decrease in water content. Changes in the water content of a highly expansive soil can result in severe distress to structures constructed on or against the soil. The EIR will confirm the presence or absence of expansive soils within the project area.

e. The project site is currently served by an alternative wastewater disposal system. The project would either provide additional wastewater disposal facilities (i.e., septic systems) or portable bathroom facilities to accommodate use by employees located at the bioenergy facility. Implementation of the project is not anticipated to result in any significant impacts. Nevertheless, impacts from these facilities warrant further evaluation in the EIR.

f. Kern County is rich in paleontological resources. If paleontologically sensitive formations are located under the project, ground disturbance could result in potentially significant impacts to paleontological resources. While the landfill site has been completely disturbed, minor ground disturbance will occur during the construction of the bioenergy facility. While impacts are anticipated to be less than significant, further evaluation in the EIR is warranted.

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
VIII. GREENHOUSE GAS EMISSIONS				
Would the project:				
a. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☒	☐	☐	☐
b. Conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases?	☒	☐	☐	☐

RESPONSES:

a. Greenhouse gas (GHG) emissions emitted by human activity are implicated in global climate change or global warming. The principal GHGs are carbon dioxide (CO_2), methane (CH_4), nitrogen oxides (NOx), ozone, water vapor, and fluorinated gases. The construction and operation of the eASP composting facility, which would involve use of heavy off-road equipment (for construction and operations), on-road trucks (for deliveries and hauling), and construction worker commute trips, would generate GHGs. However, as a biomass energy facility, the project is expected to displace traditional sources of electricity production, which involve high emission fossil fuel energy sources (e.g., burning coal, fuel oil, natural gas). As such, the provision of clean, renewable energy by the project would produce low-emission electricity that is anticipated to offset GHGs that would otherwise be generated by traditional sources of electricity. Additionally, eASP composting helps keep organic materials out of landfills, subsequently helping reduce the anaerobic breakdown that results in the generation of methane, a GHG. Composting is an aerobic process that can reduce GHG emissions from organic material. The project proposes the use of a solar-powered aeration system applied to the active composting phase of the inbound compost feedstock material to further reduce GHG emissions during the active composting phase. The potential impacts associated with GHG emissions generated during construction of the project and the potential GHG offsets resulting from operation of the project will be further evaluated in the EIR.

b. California has passed several bills and the governor has signed executive orders regarding GHGs. AB 32 (the Global Warming Solutions Act) was passed by the California legislature on August 31, 2006, which requires the State's global warming emissions to be reduced to 1990 levels by 2020. The reduction will be accomplished through an enforceable statewide cap on GHG emissions that was phased in starting in 2012. Additionally, in 2016 SB 1383 was signed into law establishing methane reduction targets in a statewide effort to reduce emissions of short-lived climate pollutants. SB 1383 establishes targets to achieve a 50 percent reduction in the level of the statewide disposal of organic waste from the 2014 level by 2020 and a 75 percent reduction by 2025.

In 2002, California established its Renewable Portfolio Standards (RPS) Program, with the goal of increasing the percentage of renewable energy in the State's electricity mix to 20 percent renewable energy by 2017. In 2006, under SB 107, the RPS Program codified the 20 percent goal. The RPS Program required electric utilities and providers to increase procurement from eligible renewable energy resources by at least one percent of their retail sales annually until they reach 20 percent by 2017. On November 17, 2008, the governor signed Executive Order S-14-08, requiring California

utilities to reach the 33 percent renewable goal by 2020. In 2015 SB 350 was enacted to increase the RPS to 50 percent and reduce greenhouse gas emissions by 40 percent by the year 2030.

The project's potential to conflict with any applicable GHG plan, policy, or regulation will be further evaluated in the EIR.

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
IX. HAZARDS AND HAZARDOUS MATERIALS				
Would the project:				
a. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☒	☐
b. 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?	☐	☐	☒	☐
c. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 1/4 mile of an existing or proposed school?	☐	☐	☐	☒
d. Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code § 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☒	☐
e. For a project located within the adopted Kern County Airport Land Use Compatibility Plan, would the project result in a safety hazard or excessive noise for people residing or working in the project area?	☐	☐	☒	☐
f. Impair implementation of, or physically interfere with, an adopted emergency response plan or emergency evacuation plan?	☐	☐	☒	☐
g. Expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires?	☐	☐	☒	☐
h. Would implementation of the project 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, mosquitoes, cockroaches, rodents, and/or any other vectors associated with the project is significant when				

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
IX. HAZARDS AND HAZARDOUS MATERIALS				
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. Disseminate widely from the property; and	☒	☐	☐	☐
iv. Cause detrimental effects on the public health or well-being of the majority of the surrounding population.	☒	☐	☐	☐

RESPONSES:

a. Site A of the project is a class III, non-hazardous industrial landfill and, therefore, hazardous waste is not accepted for disposal. Site B is an existing maintenance yard and office building. The project would require the transport, storage, and use of fuels and other fluids for fueling/servicing of construction and operation equipment. As an existing landfill, this practice is already in place for current operations. The bioenergy facility would require approximately 10,000 gallons of (19 wt%) aqueous ammonia, to be stored on-site. The ammonia would be delivered to the site via truck and unloaded into the storage tank. Additional materials needed for operation of the bioenergy facility include the Organic Rankine Cycle (ORC) working fluid, heating oil, and Sorbacal SP (a high surface area hydrated lime). Transportation, storage, and disposal/recycling of such products is extensively regulated at the Federal, State, and local levels. Current and future construction activities associated with the project would be required to be in compliance with these regulations. Impacts from project implementation are anticipated to be less than significant; however, this impact will be further evaluated in the EIR.

b. As stated above, as a class III industrial solid waste disposal facility, hazardous waste is not accepted for disposal at the landfill. The facility is not open to the general public and the concentration of hazardous waste inadvertently entering the facility is minimal. Transport of hazardous waste on public roads conforms to all legal requirements, including those of Caltrans, the California Highway Patrol, and the guidelines of the California Department of Toxic Substance Control (DTSC). During project construction and operations, proper management and control measures would be implemented to prevent threats to human health and the environment. The existing landfill operates under the site's Report of Disposal Site Information and Emergency Preparedness Plan, which would be revised to include additional waste streams and composting operations. A separate Emergency Preparedness Plan, as well as a Hazardous Materials Business Plan, if deemed necessary, would be prepared for the bioenergy facility. Impacts from project implementation are anticipated to be less than significant; however, this impact will be further evaluated in the EIR.

c. The project is not located within 0.25 mile of an existing or proposed school. The nearest schools to the project site are Lost Hills Elementary School and A.M Thomas Middle School, located within the Lost Hills Unified School District, approximately 3.5 miles to the southeast of the project site. No new schools are planned to be constructed within a 0.25 mile of the project site. The project would not emit hazardous materials or involve handling hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school; however, this impact will be further evaluated in the EIR.

d. A review of the California Environmental Protection Agency (CalEPA) DTSC's latest list of parcels relating to hazardous wastes pursuant to Section 65962.5 of the California Government Code has been conducted and has determined the project site is not listed; nevertheless, this topic will be further discussed in the EIR.

e. The nearest public airport identified by the Kern County ALUCP is the Lost Hills Airport, located approximately four miles from the proposed project site. The project site is not within the sphere of influence (SOI) of any airport identified by the Kern County ALUCP; however, this impact will be further discussed in the EIR.

f. The project would not interfere with any known existing emergency response plans, emergency vehicle access, or personnel access to the project site. The project site is located in a remote area with two access roads available to access the property in the event of an emergency. Therefore, no impacts related to impairment of the implementation of, or physical interference with, an adopted emergency response plan or emergency evacuation plan are anticipated; nevertheless, impacts will be further evaluated in the EIR.

g. Construction and operation of the proposed project would not result in increased risk of wildfires in the area. The proposed project would comply with all applicable wildland fire management plans and policies established by the California Department of Forestry and Fire Protection (CAL FIRE) and the Kern County Fire Department (KCFD). Accordingly, the proposed project is not expected to expose people or structures to a significant risk of loss, injury, or death involving wildland fires. Impacts are expected to be less than significant; however, further analysis of this issue will be discussed in the EIR.

h.i.-iv. The facility has been in operation since 1997 and currently accepts waste streams that have the potential to generate vectors; such as flies, mosquitoes, and rodents. The addition of feedstocks for landfilling, composting, and bioenergy would introduce the potential to generate additional vectors during the composting process. Vectors at the landfill and compost facility would be managed properly in accordance with CalRecycle regulations (CCR Titles 14 and 27) and enforced by the Local Enforcement Agency through the SWFP. The proposed design, layout, and management methods for the proposed project would be designed to reduce the potential for vector generation. The pre-grinding process, the immediate placement of the organic materials into the windrows, and the high temperature and forced aeration during the active composting phase are natural deterrents to flies and destroy fly larvae, pupae, and eggs. In addition, the aerobic windrow process generally does not attract birds or rodents. However, impacts from the additional proposed waste streams and feedstocks, as well as the composting facility and bioenergy facility, are potentially significant and will be evaluated in the EIR for the potential to generate vectors.

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
X. HYDROLOGY AND WATER QUALITY				
Would the project:				
a. Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	☐	☐	☒	☐
b. Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	☒	☐	☐	☐
c. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or through the addition of impervious surfaces, in a manner which would:				
i. result in a substantial erosion or siltation on- or off-site	☐	☐	☒	☐
ii. substantially increase the rate of amount of surface runoff in a manner which would result in flooding on-or offsite;	☐	☐	☒	☐
iii. create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or	☐	☐	☒	☐
iv. impeded or redirect flood flows?	☐	☐	☒	☐
d. In flood hazard, tsunami, seiche zones, risk release of pollutants due to project inundation?	☐	☐	☒	☐
e. Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☒	☐	☐	☐

RESPONSES:

a. The existing landfill operations are conducted in compliance with the requirements of CCR Titles 14 and 27. Current landfill operations comply with existing WDRs (Order No. R5-2010-0123), adopted and enforced by the RWQCB Central Valley Region. Requirements of the WDRs include implementing best management practices and facility design features to minimize the impacts to groundwater degradation. For the proposed composting operation, activities shall comply with the General Waste Discharge Requirements for Composting Operations (Order No. 2015-0121-DWQ).

Dependent upon agency direction, the project Proponent may apply for individual WDRs for composting operations or incorporate composting operations into the facility's existing WDRs. Composting has a potential to impact groundwater quality; however, the project would incorporate design, construction, and operation requirements to limit impacts to surface and ground water quality.

Currently, there is an extensive environmental monitoring system for the landfill to monitor groundwater quality and control landfill gas associated with landfill operations. There are currently three groundwater monitoring wells associated with Pit "E," four associated with Pit "F," and five associated with Pit "G." The "F & G Connection Area" is covered by wells associated with both Pits "F" and "G." All 12 groundwater monitoring wells are within the 331-acre permitted facility boundary. The landfill's passive gas vent system was upgraded in March 2016 to an active gas collection system, which includes a system to treat, collect, and transport the gas to an off-site processing facility, a solar-powered flare system, and a 55-gallon activated carbon filter canister as a backup for the solar-powered flare system. This upgrade allows HM Holloway to recover landfill gas from the site for a beneficial use. The off-site processing facility converts the methane into beneficial products, such as bio-plastics, through an alternative carbon conversion process.

Due to the design of the bioenergy facility, including the utilization of air coolers, there would be no wastewater generated from the operation of the bioenergy plant itself. Stormwater runoff from the process unit curbed areas, as well as the safety shower, hose stations, and firewater pump runoff would be collected in an on-site retention pond. After testing, the water would either be returned to the water tank for use, pumped out and disposed of, or allowed to evaporate in-situ.

The project's compliance with the above referenced regulations, implementation of facility design features, and impacts on water quality associated with the proposed project are anticipated to be less than significant, but will be further analyzed in the EIR.

b. As an existing landfill, water is used during operations primarily for fugitive dust control. Based on existing water use, the landfill utilizes an average of 40 to 55 acre-feet per year. Water is supplied by Berrenda-Mesa Water District via a purchase agreement with Blackwell Land. This water is typically sourced from the State Water Project and does not generally come from groundwater. Additional tanks are stored as needed during the summer months due to the demand for water in the dry, arid climate conditions. At full build-out, it is anticipated that the project would utilize approximately 20.4 acre-feet of water per month or 245 acre-feet per year. Water would be piped into the site from off-site pumps and pipelines, and will be stored in 100,000-gallon tanks. Water for the composting project and associated dust control is proposed to be provided by a water purchase agreement with Buena Vista Water Storage District, and supplied by Berrenda-Mesa Water District. As with the landfill operation, this water supply generally comes from the State Water Project and is not typically sourced from groundwater. Impacts are potentially significant and will be evaluated in the EIR.

c. The landfill is designed and constructed to comply with CCR Title 27 drainage control requirements. The construction and operation of the composting facility would be in compliance with CCR Titles 14 and 27 and the RWQCB WDRs to minimize drainage impacts and control erosion and surface runoff. The project site is almost entirely disturbed and no surface streams are on or near the site. There are no river tributaries or natural wetlands near the facility. Implementation of the project would not impede or redirect flood flows. Therefore, implementation of the project on existing drainage patters is less than significant; however, further analysis will be included in the EIR.

d. According to the Federal Emergency Management Agency (FEMA) Flood Map Service Center, the project site is located within flood map 06029C1200E, effective September 26, 2008, and shows the project site is in Zone X (area of minimal flood hazard). The project is not located near an ocean or enclosed body of water and would not be subject to inundation by seiche or tsunami. Stormwater

diversion design for existing and planned activities shall meet the RWQCB's requirements. Therefore, impacts from project implementation are anticipated to be less than significant, but will be further analyzed in the EIR.

e. The project site is located within the Berrenda-Mesa Water District and is not in an adjudicated basin. The Berrenda-Mesa Water District has an Agricultural Water Management Program that was updated in 2015. Evaluation of impacts to existing sustainable groundwater management plans are potentially significant and will be further analyzed in the EIR.

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
XI. LAND USE AND PLANNING				
Would the project:				
a. Physically divide an established community?	☐	☐	☒	☐
b. Cause a significant environmental impact due to a conflict with any land use plan, policy or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	☒	☐	☐	☐

RESPONSES:

a. The proposed project is sited in a rural agricultural area with no established community. Surrounding KCGP Designations, Zone Districts, and land use in the area would make it unlikely that a community would be established in the future. Therefore, implementation of the proposed project would not physically divide an established community and no impacts are anticipated to occur; however, further analysis will be conducted in the EIR.

b. The project is within the boundaries of the KCGP and the Kern County Zoning Ordinance. Site A is designated as Map Code 3.4 (Solid Waste Disposal Facility) and land surrounding the landfill is designated Map Code 3.4.1 (Solid Waste Disposal Facility Buffer) and is in the A (Exclusive Agricultural) Zone District. Site B is designated as Map Code 8.4 (Mineral and Petroleum – Min. 5-Acre Parcel)/2.10 (Nearby Waste Facility) and is in the A Zone District. No zone district or land use designation changes are proposed as part of project implementation. The most recent adopted versions of the KCGP and Kern County Zoning Ordinance will be reviewed to determine if implementation of the proposed project is consistent with these plans. The evaluation will be presented in the EIR.

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
XII. MINERAL RESOURCES				
Would the project:				
a. 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?	☒	☐	☐	☐
b. 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?	☐	☐	☒	☐

RESPONSES:

a. The 331-acre Site A is a former surface mine that was converted into a class III non-hazardous industrial waste landfill in 1997. Once mining operations ceased in this area, the mine was reclaimed as a waste processing and disposal site, thus avoiding the need to construct a new landfill and keeping industrial wastes out of the public landfills. In 2008 a separate new CUP was issued to cover landfill operations, and in 2009 the 331-acre landfill site was removed from the boundaries of the existing mining CUP. Surface mining operations are still occurring adjacent to the northern boundary of the landfill site. The proposed compost project would be sited on top of the existing landfill that has reached capacity and would not prohibit mining activities from occurring outside of Site A. Site B, while currently within the boundaries of the mining CUP, has not been excavated or mined. This area is currently used as an equipment maintenance and storage yard and for office buildings. The removal of Site B from the mining CUP is not anticipated to result in the loss of availability of known mineral resources; however, impacts will be further analyzed in the EIR.

b. The project is within the boundaries of the KCGP and the Kern County Zoning Ordinance but is not located within the administrative boundaries of the Bakersfield Production Consumption Region as classified by the State Geologist from "Special Report 210 – Update of Land and Mineral Classification: Aggregate Mineral in the Bakersfield Production-Consumption Region (2009)." However, Site B is within the boundaries of an existing mining operation; therefore, potential impacts will be further analyzed in the EIR.

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
XIII. NOISE				
Would the project result in:				
a. Generation of a substantial temporary or permanent increase in the ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance or applicable standards of other agencies?	☐	☐	☒	☐
b. Generation of, excessive ground borne vibration or ground borne noise levels?	☐	☐	☒	☐
c. A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☒	☐
d. 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?	☐	☐	☒	☐

RESPONSES:

a. Land uses determined to be "sensitive" to noise as defined by the KCGP include residential areas, schools, convalescent and acute care hospitals, parks and recreation areas, and churches. The project is sited in a rural area and the landfill has the required designated landfill buffer to prevent encroachment of residential or sensitive receptor development. The nearest residences are located approximately two miles east at Munger Farms, and the unincorporated community of Lost Hills is approximately 3.5 miles to the southeast.

The project site is an operational landfill, adjacent to an active mining operation, and surrounded by other industrial-type land uses. The existing permitted operation utilizes heavy construction equipment to push and compact wastes and to move and maintain soils (e.g., bulldozers, scrapers, water trucks). Heavy truck traffic is a normal part of the permitted activities. There is no record of noise complaints from the surrounding landowners. As required by the KCGP, the project site is surrounded by a designated landfill buffer, which prevents the encroachment of land uses that would be adversely affected by construction and operation noise. The project's potential noise impacts would result from the operation of additional heavy equipment (both for construction and operations) and from additional truck traffic proposed at the facility. Temporary noise impacts are anticipated during the construction of the composting facility and bioenergy facility; however, construction activities would be consistent with the Kern County Noise Element and would not generate construction noise between the hours of 9:00 p.m. and 6:00 a.m. on weekdays. Project construction would not use heavy equipment impact devices and would utilize similar equipment that is already at the site. Therefore, the project is not anticipated to create substantial temporary or permanent increase in noise levels due to the fact the existing project site is an operating sanitary

landfill, surrounded by industrial uses, where heavy equipment operations and truck traffic is already in use; however, further analysis will be included in the EIR.

b. Ground-borne vibration and ground-borne noise would originate from earth movement during the construction phases of the project as well as from operation and maintenance of the various facilities. As mentioned in Response (a), existing landfill operations utilize heavy equipment and heavy equipment and in-bound and out-bound trucks, which create some ground-borne vibration. The project proposes to increase the truck traffic coming to the facility and will include the phased construction of the compost facility and bioenergy plant. The project would be expected to comply with all applicable requirements for long-term operations, as well as measures to reduce excessive ground borne vibration and noise to ensure that the project would not expose persons or structures to excessive ground borne vibration. The project site is surrounded by designated landfill buffer, which prevents the encroachment of land uses that would be adversely affected by vibrations and ground-borne noise caused by construction and operation of the project. Therefore, impacts are anticipated to be less than significant, but will be further analyzed in the EIR.

c. Existing noise levels at the project site (as identified in Responses (a) and (b)) are a result of heavy equipment associated with landfilling activities and heavy-duty trucks bringing material to the landfill for disposal. However, due to existing landfill operations and surrounding mining and industrial uses, it is not anticipated that the continued operation of the existing landfill and construction and operation of a phased compost facility and bioenergy plant will result in a substantial permanent increase in ambient noise levels then what is already existing. However, further analysis will be included in the EIR.

d. Consistent with the analysis of the previously certified Final EIR, the proposed project does not fall within any specific airport sphere of influence identified in the Kern County ALUCP. The closest public airport is the Lost Hills Airport, located approximately four miles to the east. Therefore, impacts are anticipated to be less than significant as a result of the proposed project; however, further analysis will be conducted in the EIR.

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
XIV. POPULATION AND HOUSING				
Would the project:				
a. Induce substantial unplanned 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)?	☐	☐	☒	☐
b. Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☒	☐

RESPONSES:

a. Currently, the Holloway Management Group, LLC employs 70 full-time employees combined for the gypsum mining facility and the landfill. The project would provide new employment consistent with the adopted KCGP goals, plans, and policies. It is anticipated that approximately 90 temporary workers would be needed to complete the construction of the project and approximately 20 new full-time employees would be needed to operate the new compost facility and bioenergy plant. It is expected that the construction workforce would commute to the site from various local communities and the number of workers expected to relocate to the surrounding area is not expected to be substantial. Therefore, implementation of the project would not directly or indirectly induce the development of new housing or businesses.

Typical established local thresholds of significance for housing and population growth pursuant to the State CEQA Guidelines, Section 15064.7, include effects that would induce substantial growth or concentration of a population beyond Kern County projections; alter the location, distribution, density, or growth rate of the population beyond that projected in the KCGP Housing Element; result in a substantial increase in demand for additional housing; or create a development that significantly reduces the ability of Kern County to meet housing objectives set forth in the KCGP Housing Element. The effects of the project in relation to these local thresholds are minimal. Therefore, impacts regarding substantial population growth is anticipated to be less than significant, however further analysis will be conducted in the EIR.

b. The proposed project is located on a landfill adjacent to an active gypsum mine with no existing housing on-site. As such, the proposed project would not displace any existing housing such that it would necessitate the construction of replacement housing elsewhere. Therefore, displacement of existing housing is not likely to occur, however further evaluation will be conducted in the EIR.

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
XV. PUBLIC SERVICES				
Would the project:				
a. 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 to other performance objectives for any of the public services:				
Fire protection?	☒	☐	☐	☐
Police protection?	☐	☐	☒	☐
Schools?	☐	☐	☒	☐
Parks?	☐	☐	☒	☐
Other public facilities?	☐	☐	☒	☐

RESPONSES:

a. Since the opening of the gypsum mine and landfill, no significant impact has been documented on the available public services for this area. Implementation of the proposed project is not anticipated to require additional public services beyond that which already exists in the area. Existing services are adequate to serve the proposed project and would not result in altering and creating new governmental and public services.

The KCFD provides fire suppression and medical emergency services currently to the project. The nearest fire station to the project site is Station 26 located at 14670 Lost Hills Road, approximately 4.5 miles southeast of the site. The KCFD will review the proposed composting facility and bioenergy plant plans and determined the facility layout and design provides adequate emergency access and availability of fire water to support the extinguishment of a fire. Implementation of the project's construction and operational activities may result in an increased risk of fire, which could impact firefighting capacity in the area. Therefore, potential impacts are potentially significant and will be further evaluated in the EIR.

The Kern County Sheriff Department provides police protection services in the area. The Sheriff's Wasco substation is approximately 27 miles southeast of the project site. Although the potential is low, the project may attract vandals and the project would result in increased traffic volumes in the project area that could increase demand on law enforcement services. Impacts to sheriff services are considered to be less than significant but will be further evaluated in the EIR.

The project is not located within 0.25 mile of an existing or proposed school. The nearest schools to the project site are Lost Hills Elementary School and A.M Thomas Middle School, located within

the Lost Hills Unified School District, approximately 3.5 miles to the southeast of the project site. It is anticipated that approximately 90 temporary workers would be needed to complete the construction of the project and approximately 20 new full-time employees would be needed to operate the new compost facility and bioenergy plant. It is expected that the construction workforce would commute to the site from various local communities and the number of workers expected to relocate to the surrounding area is not expected to be substantial. Therefore, implementation of the proposed project is not anticipated to have a significant increase in the number of users at local schools; however, it will be further evaluated in the EIR.

Implementation of the project is expected to have less than significant impacts on parks and other public facilities, such as post office and/or library services. However, due to the increase in temporary construction workers and new full-time employees as part of the project, potential impacts will be further evaluated in the EIR.

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
XVI. RECREATION				
Would the project:				
a. Would the project 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?	☐	☐	☐	☒
b. Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☐	☒

RESPONSES:

a-b. The project does not include new recreational facilities and would not appreciably increase demands on existing facilities. The average daily workforce during construction is expected to consist of approximately 90 personnel. The temporary increase in use of recreation facilities during construction that might be caused by an influx of workers would be minimal. The project would require employees for operation and maintenance activities but would likely be drawn from the local labor force and would commute from their existing permanent residences to the project site during those times. However, even if the full-time employees were hired from out of the area and relocated to eastern Kern County, the resulting addition of families to this area would not result in a substantial increase in the number of users at local parks. As a result, there would not be a detectable increase in the use of parks or other recreational facilities. Impacts are not anticipated to occur, and further analysis is not warranted in the EIR.

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
XVII. TRANSPORTATION AND TRAFFIC				
Would the project:				
a. Conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	☒	☐	☐	☐
b. Conflict or be inconsistent with CEQA Guidelines § 15064.3 (b)	☒	☐	☐	☐
c. Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☒	☐
d. Result in inadequate emergency access?	☐	☐	☒	☐

RESPONSES:

a. The project site can be accessed from various routes. Trucks utilize I-5 to SR-46 to access Holloway Road from the south and I-5 to Twisselman Road to access Holloway Road from the north. Trucks traveling from coastal areas utilize US 101 to SR-46 from the west. Due to the rural nature of the project site, no bus stops or designated bicycle lanes exist on the roadways likely to be used during construction and operation of the project. The project does propose an increase in traffic and would result in an increase of vehicle miles traveled. Impacts are potentially significant. A traffic impact study will be prepared and the EIR will analyze the project for consistency with state and local guidance.

b. The project is located in unincorporated Kern County. Construction and operation of the project would result in an increase in truck traffic at the site; therefore, it is anticipated that the project may exceed any level of service (LOS) standard established by the Kern County Congestion Management Plan for designated roads or highways. Implementation of the proposed project would generate traffic on the existing roadway network. As such, impacts are considered potentially significant. This impact will be discussed and analyzed in the EIR.

c. The existing roadways in the project area are already utilized by large tractor-trailer trucks for mining, landfill, and oil field operations. The project does not propose a change in traffic patterns or traffic volumes, and therefore would not increase hazards due to a geometric design feature (sharp curves or dangerous intersections) or conflict with existing and compatible uses (farm equipment and service vehicles). Impacts are anticipated to be less than significant; however, impacts will be further analyzed in the EIR.

d. The project would not alter or block any existing emergency access routes, nor change existing patterns of emergency access. No changes in traffic patterns are proposed. The project would not result in inadequate emergency access. Therefore, impacts from project implementation are less than significant; however, impacts will be further analyzed in the EIR.

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
XVIII. TRIBAL CULTURAL RESOURCES				
Would the project:				
a. Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code §21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:				
i. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources defined in Public Resources Code §5020.1 (k) or	☒	☐	☐	☐
ii. A recourse determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code §5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code §5024.1, the lead agency shall consider the significance of the resource to a California Native America tribe.	☒	☐	☐	☐

RESPONSES:

a.i.-ii. The proposed project could potentially impact tribal cultural resources. All tribes with possible cultural affiliation and that have expressed, in writing, their interest in project located within the project area will be notified, per AB 52. Further evaluation in the EIR is warranted to identify potential impacts to tribal cultural resources and to formulate avoidance and mitigation measures, if applicable.

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
XIX. UTILITIES AND SERVICE SYSTEMS				
Would the project:				
a. Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	☒	☐	☐	☐
b. Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?	☒	☐	☐	☐
c. Result in a determination by the waste water treatment provider which 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?	☐	☐	☒	☐
d. Generate solid waste in excess of state or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	☐	☐	☒	☐
e. Comply with federal, State, and local management and reduction statutes and regulations related to solid waste	☐	☐	☒	☐

RESPONSES:

a. It is not anticipated that the project would require the relocation or construction of new or expanded wastewater treatment or stormwater drainage, natural gas, or telecommunications facilities. Southern California Gas Company (SoCalGas) has a natural gas main adjacent to the proposed bioenergy plant site. A natural gas line and metering yard would be proposed to supply natural gas to the plant; however, it is not anticipated that SoCalGas would need to provide additional or expanded services to provide natural gas for the project. The proposed compost facility would primarily use solar-generated power to operate and would only have a PG&E electrical connection to use as a backup supply. The bioenergy plant would produce 3 MW (net) of electrical power to feed back into the grid. Water for use as dust control and in landfill activities is piped in from off-site and is generally sourced from surface water from the State Water Project. The addition of composting operations and the bioenergy facility, in addition to existing landfill operations, would increase the quantity of water used at the site. This increase is potentially significant, and impacts will be further evaluated in the EIR.

b. Additional water supply would be needed for both the construction and operation of the compost facility and the bioenergy facility. Beyond what is already being utilized by the existing landfill, it

is anticipated the composting operation would have a water demand of approximately 20.4 acre-feet per month at full buildout and the bioenergy facility would utilize approximately 6,200 gallons per day of water for its operations. A water supply assessment will be completed for the project and further analysis will be discussed in the EIR.

c. It is not anticipated that the project would create significant amounts of wastewater. It is expected that the operation of the compost facility would generate a small amount of wastewater. It is intended that this water, along with any rainfall, be retained on-site. Stormwater runoff from the process unit area of the bioenergy facility, as well as the safety shower, hose stations, and firewater pump runoff from these areas, would be collected in an on-site wastewater sump and stored in mobile water tanks. After testing, the water may be returned to the water tank for reuse, with or without filtration or treatment or disposed of or utilized off-site. Impacts from project implementation are anticipated to be less than significant; however, further analysis will be completed in the EIR.

d. Site A of the project is located within the permitted facility boundary of the existing HM Holloway Landfill. Any residual construction related waste and ongoing solid waste generation resulting from the project would be served by the landfill and diversion operation itself. The estimated date the landfill would reach permitted capacity is 2030. The capacity of the landfill would not be impacted by project implementation. The bioenergy plant would produce approximately 20 tons per day of biochar, two tons per day of feedstock rejects, and 1.5 tons per day of FGD filter cake. Biochar would be tested and characterized in accordance with EPA requirements. The biochar would be utilized as a soil amendment within a 300-mile radius of the plant. Filter cake would also undergo testing and characterization, but it is anticipated the residual could be landfilled safely as non-hazardous waste. Feedstock reject material primarily consists of rocks, dirt, and miscellaneous tramp materials included in the incoming feedstock materials and would be landfilled safely as non-hazardous waste. Impacts from project implementation are anticipated to be less than significant; however, further analysis will be completed in the EIR.

e. The existing landfill is in compliance with applicable Federal, State, and local management and reduction statutes and regulations related to solid waste. H.M. Hollway, Inc is a Class III industrial waste landfill, permitted to operate under the provision of CCR Title 27. The site is identified by CalRecycle as SWIS No. 15-AA-0308. Monthly inspections by the Kern County Public Health Department – Environmental Health Division, acting as the Local Enforcement Agency, ensure that all facility operations operate in accordance with applicable statutes, regulations, and state minimum standards. CalRecycle conducts an 18-month inspection of the landfill along with the Local Enforcement Agency. The proposed project is served by the landfill itself.

In September 2016, Governor Brown signed SB 1383 establishing methane emissions reduction targets in a statewide effort to reduce emissions of short-lived climate pollutants, including methane emissions reductions from organic wastes. SB 1383 established targets to achieve a 50 percent reduction in the level of the statewide disposal of organic wastes (compostable feedstocks, green materials, food material, vegetative food material, etc.) from the 2014 level by 2020 and a 75 percent reduction by 2025. Therefore, the project is a function of the implementation of SB 1383 and serves as an effort to meet State mandates and meet the regional needs for organics handling and processing. Therefore, impacts will be less than significant as a result of the proposed project; however, further analysis will be included in the EIR.

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
XX. WILDFIRE				
If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:				
a. Substantially impair an adopted emergency response plan or emergency evacuation plan?	☐	☐	☒	☐
b. Due to slope, prevailing winds, or other factors, exacerbate wildfire risks, and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	☐	☐	☒	☐
c. Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	☒	☐	☐	☐
d. Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	☐	☐	☒	☐

RESPONSES:

a. The project is not classified as a high fire severity zone and is not anticipated to physically impede the existing emergency response plans, emergency vehicle access, or personnel access to the site. The site is located in a rural, sparsely developed area with limited population. The project site is not located along an identified emergency evacuation route and is not identified in any adopted emergency evaluation plan. Therefore, less-than-significant impacts related to impairment of the implementation of, or physical interference with, an adopted emergency response plan or emergency evacuation plan are anticipated; nevertheless, further analysis will be conducted in the EIR.

b. Given the topography of the project site, it is not anticipated the project would expose project occupants to pollutant concentrations from a wildfire or uncontrolled spread of a wildfire due to slope, prevailing winds, and other factors; nevertheless, further analysis will be conducted in the EIR.

c. The project would require the installation of the additional infrastructure, including power lines and natural gas lines, that may have the potential to exacerbate the fire risk or cause temporary or ongoing impacts to the environment; therefore, further analysis will be included in the EIR.

d. The project site is not considered to be a high-risk area for landslides as it is relatively flat and is not subject to post-fire slope instability or drainage changes that would expose people or structures to significant risks; nevertheless, further analysis will be conducted in the EIR.

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
XXI. MANDATORY FINDINGS OF SIGNIFICANCE				
a. Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory?	☒	☐	☐	☐
b. Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project 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.)	☒	☐	☐	☐
c. Does the project have environmental effects that would cause substantial adverse effects on human beings, either directly or indirectly?	☒	☐	☐	☐

RESPONSES:

a. Impacts to biological resources are currently unknown. Biota studies for the project are currently being conducted. The EIR's biological resources section will discuss specific project impacts on plants and wildlife, including avian species, and impacts to cultural and tribal cultural resources. The document will also evaluate the project's contribution of cumulative biological, cultural, and tribal cultural resources impacts and propose mitigation that will reduce potential impacts to less-than-significant levels, where feasible.

b. The project has the potential to cumulative contribute to air quality, GHG emissions, hazards, and traffic impacts. The proposed project may have the potential to affect air quality in the San Joaquin Valley Air Basin, which is currently designated as "non-attainment" for ozone, PM_{10}, and $PM_{2.5}$ according to Federal and State standards. An air quality analysis will be presented in the EIR to evaluate the impacts. Additionally, the proposed project has the potential to generate GHG and VOC emissions that may have a significant impact on the environment, either directly or indirectly. The EIR will evaluate the project's contribution to cumulative impacts in these and other resource areas.

c. The project has the potential to result in significant impacts on the environment and on human beings. The EIR will include a comprehensive review of existing conditions and potential project impacts related specifically to air quality, GHG emissions, and hazards and hazardous materials. The EIR will recommend mitigation measures to reduce the level of significance of substantial adverse effects on human beings, either directly or indirectly, along with a summary of findings and feasible mitigation measures.

SUMMARY OF PROCEEDINGS

KERN COUNTY AGENCY SCOPING MEETING

Kern County Planning Department
2700 M Street, Suite 100
Bakersfield, California

Conference Room

Date November 22, 2019

STAFF ATTENDANCE: Katrina Slayton, Division Chief
Ronelle Candia, Supervising Planner
Cindi Hoover, Planner II

The meeting convened at 1:30 p.m. with Ms. Candia introducing Staff in attendance and outlining the purpose of the scoping meeting. Items were then discussed in order as identified on the agenda.

NOTICE OF PREPARATION PROJECT:

EIR – Notice of Preparation:
Lost Hills Environmental Composting and Waste to Energy Project by Lost Hills Environmental, LLC

- Ms. Candia introduced and described the proposed project.
- Ms. Candia opened the meeting for comments. Summary of the comments received are as follows:

    - Mr. Tony Bonanno, Mr. Chuck Magee, Mr. Brandon Fontes, and Mr. Craig Pope – Requested clarification on source locations of waste streams, processing and separation of waste streams from feedstocks, and disposal tracking and reporting.
        - Mr. Bowman and Mr. Bernard Brown (applicant representative) – Provided clarification on the source radiuses identified in the NOP, acceptance of source sorted material, and explained current tracking and reporting processes for the existing landfill.

    - Mr. Tony Bonanno, Mr. Chuck McGee, Mr. Brandon Fontes, and Mr. Craig Pope – Stated written comments will follow.

    - Mr. Warren Maxwell – Requested that a Traffic Impact Analysis including a structural capacity analysis be prepared for the project and provided to Public Works – Development Review for review.

No other public comments were presented.

Public testimony closed at approximately 2:02 p.m.

Notes prepared by
Cindi Hoover, Planner II

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STATE OF CALIFORNIA

Governor's Office of Planning and Research

State Clearinghouse and Planning Unit

Gavin Newsom
Governor

Kate Gordon
Director

Notice of Preparation

October 31, 2019

To: Reviewing Agencies

Re: Lost Hills Composting and Waste to Energy Project by Lost Hills Environmental, LLC
SCH# 2019100659

Attached for your review and comment is the Notice of Preparation (NOP) for the Lost Hills Composting and Waste to Energy Project by Lost Hills Environmental, LLC draft Environmental Impact Report (EIR).

Responsible agencies must transmit their comments on the scope and content of the NOP, focusing on specific information related to their own statutory responsibility, within 30 days of receipt of the NOP from the Lead Agency. This is a courtesy notice provided by the State Clearinghouse with a reminder for you to comment in a timely manner. We encourage other agencies to also respond to this notice and express their concerns early in the environmental review process.

Please direct your comments to:

Ronelle Candia
Kern County
2700 "M" Street, Suite 100
Bakersfield, CA 93301-2323

with a copy to the State Clearinghouse in the Office of Planning and Research at state.clearinghouse@opr.ca.gov . Please refer to the SCH number noted above in all correspondence concerning this project on our website: https://ceqanet.opr.ca.gov/2019100659/2.

If you have any questions about the environmental document review process, please call the State Clearinghouse at (916) 445-0613.

Sincerely,

RECEIVED
NOV 12 2019
Kern County Planning &
Natural Resources Dept.

Scott Morgan
Director, State Clearinghouse

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 # 2019100659

Project Title: Lost Hills Composting and Waste to Energy Project by Lost Hills Environmental, LLC

Lead Agency: Kern County Planning Department | Contact Person: Ronelle Candia

Mailing Address: 2700 "M" Street Suite 100 | Phone: (661) 862-8997

City: Bakersfield | Zip: 93301-2323 | County: Kern

Project Location: County: Kern | City/Nearest Community: Lost Hills

Cross Streets: Holloway Road & GP Road | Zip Code: 93249

Lat. / Long.: 35.64138°N / 119.76580° W | Total Acres: 337

Assessor's Parcel No.: 057-220-16; 057-240-29,50 & 60 | Section: 24; 25 | Twp.: 26S | Range: 20E | Base: MDB&M

Within 2 Miles: State Hwy #: 46 | Waterways: California Aqueduct

Airports: | Railways: | Schools:

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

Governor's Office of Planning & Research

OCT 31 2019

STATE CLEARINGHOUSE

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 ☐ Other

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 Bioenergy MW 3
☐ Waste Treatment: Type MGD
☐ Hazardous Waste: Type
☒ Other: Non-Hazardous Waste Disposal & Composting

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:

Existing Class III Non-Hazardous Landfill and Surface Mining. Kern County General Plan: *3.4(Solid Waste Facilities); 3.4.1 ((Solid Waste Disposal Facility Buffer); Zoning:* A (Exclusive Agriculture).

Project Description: The project includes a request for land use entitlements necessary to facilitate the continued and expanded use of an existing Class III Non-Hazardous Landfill; the future construction and operation of an extended Aeration composting facility; and the future construction and operation of a Waste-to-Energy biomass gasification facility and associated infrastructure to generate a combined 3 megawatts of renewable electrical energy on approximately 337 acres of privately-owned land. Implementation of the project as proposed would require: a) Modification No. 1 of Conditional Use Permit (CUP) No. 1, Map 28; b) Issuance of CUP No. 13, Map 28; and c) Modification No. 2 of CUP No. 9, Map 28.

Reviewing Agencies Checklist

NOP Distribution List

County: KERN **SCH#**

Resources Agency

- [ ] **Resources Agency**
  Nadell Gayou
- [ ] **Dept. of Boating & Waterways**
  Denise Peterson
- [ ] **California Coastal Commission**
  Allyson Hitt
- [ ] **Colorado River Board**
  Elsa Contreras
- [ ] **Dept. of Conservation**
  Crina Chan
- [ ] **Cal Fire**
  Dan Foster
- [ ] **Central Valley Flood Protection Board**
  James Herota
- [ ] **Office of Historic Preservation**
  Ron Parsons
- [ ] **Dept of Parks & Recreation**
  Environmental Stewardship Section
- [ ] **S.F. Bay Conservation & Dev't. Comm.**
  Steve Goldbeck
- [ ] **Dept. of Water Resources**
  Resources Agency
  Nadell Gayou

Fish and Wildlife

- [ ] **Depart. of Fish & Wildlife**
  Scott Flint
  Environmental Services Division
- [ ] **Fish & Wildlife Region 1**
  Curt Babcock
- [ ] **Fish & Wildlife Region 1E**
  Laurie Harnsberger
- [ ] **Fish & Wildlife Region 2**
  Jeff Drongesen
- [ ] **Fish & Wildlife Region 3**
  Craig Weightman
- [ ] **Fish & Wildlife Region 4**
  Julie Vance
- [ ] **Fish & Wildlife Region 5**
  Leslie Newton-Reed
  Habitat Conservation Program
- [ ] **Fish & Wildlife Region 6**
  Tiffany Ellis
  Habitat Conservation Program
- [ ] **Fish & Wildlife Region 6 I/M**
  Heidi Calvert
  Inyo/Mono, Habitat Conservation Program
- [ ] **Dept. of Fish & Wildlife M**
  William Paznokas
  Marine Region

Other Departments

- [ ] **California Department of Education**
  Lesley Taylor
- [ ] **OES (Office of Emergency Services)**
  Monique Wilber
- [ ] **Food & Agriculture**
  Sandra Schubert
  Dept. of Food and Agriculture
- [ ] **Dept. of General Services**
  Cathy Buck
  Environmental Services Section
- [ ] **Housing & Comm. Dev.**
  CEQA Coordinator
  Housing Policy Division

Independent Commissions,Boards

- [ ] **Delta Protection Commission**
  Erik Vink
- [ ] **Delta Stewardship Council**
  Anthony Navasero
- [ ] **California Energy Commission**
  Eric Knight
- [ ] **Native American Heritage Comm.**
  Debbie Treadway
- [ ] **Public Utilities Commission**
  Supervisor
- [ ] **Santa Monica Bay Restoration**
  Guangyu Wang
- [ ] **State Lands Commission**
  Jennifer Deleong
- [ ] **Tahoe Regional Planning Agency (TRPA)**
  Cherry Jacques

Cal State Transportation Agency CalSTA

- [ ] **Caltrans - Division of Aeronautics**
  Philip Crimmins
- [ ] **Caltrans – Planning HQ LD-IGR**
  Christian Bushong
- [ ] **California Highway Patrol**
  Suzann Ikeuchi
  Office of Special Projects

Dept. of Transportation

- [ ] **Caltrans, District 1**
  Rex Jackman
- [ ] **Caltrans, District 2**
  Marcelino Gonzalez
- [ ] **Caltrans, District 3**
  Susan Zanchi
- [ ] **Caltrans, District 4**
  Patricia Maurice
- [ ] **Caltrans, District 5**
  Larry Newland
- [ ] **Caltrans, District 6**
  Michael Navarro
- [ ] **Caltrans, District 7**
  Dianna Watson
- [ ] **Caltrans, District 8**
  Mark Roberts
- [ ] **Caltrans, District 9**
  Gayle Rosander
- [ ] **Caltrans, District 10**
  Tom Dumas
- [ ] **Caltrans, District 11**
  Jacob Armstrong
- [ ] **Caltrans, District 12**
  Maureen El Harake

Cal EPA

Air Resources Board

- [ ] **Airport & Freight**
  Jack Wursten
- [ ] **Transportation Projects**
  Nesamani Kalandiyur
- [ ] **Industrial/Energy Projects**
  Mike Tollstrup
- [ ] **California Department of Resources, Recycling & Recovery**
  Kevin Taylor/Jeff Esquivel
- [ ] **State Water Resources Control Board**
  Regional Programs Unit
  Division of Financial Assistance
- [ ] **State Water Resources Control Board**
  Cindy Forbes – Asst Deputy
  Division of Drinking Water
- [ ] **State Water Resources Control Board**
  Div. Drinking Water #_____
- [ ] **State Water Resources Control Board**
  Student Intern, 401 Water Quality Certification Unit
  Division of Water Quality
- [ ] **State Water Resouces Control Board**
  Phil Crader
  Division of Water Rights
- [ ] **Dept. of Toxic Substances Control Reg. #_____**
  CEQA Tracking Center
- [ ] **Department of Pesticide Regulation**
  CEQA Coordinator

Regional Water Quality Control Board (RWQCB)

- [ ] **RWQCB 1**
  Cathleen Hudson
  North Coast Region (1)
- [ ] **RWQCB 2**
  Environmental Document Coordinator
  San Francisco Bay Region (2)
- [ ] **RWQCB 3**
  Central Coast Region (3)
- [ ] **RWQCB 4**
  Teresa Rodgers
  Los Angeles Region (4)
- [ ] **RWQCB 5S**
  Central Valley Region (5)
- [ ] **RWQCB 5F**
  Central Valley Region (5)
  Fresno Branch Office
- [ ] **RWQCB 5R**
  Central Valley Region (5)
  Redding Branch Office
- [ ] **RWQCB 6**
  Lahontan Region (6)
- [ ] **RWQCB 6V**
  Lahontan Region (6)
  Victorville Branch Office
- [ ] **RWQCB 7**
  Colorado River Basin Region (7)
- [ ] **RWQCB 8**
  Santa Ana Region (8)
- [ ] **RWQCB 9**
  San Diego Region (9)

- [ ] **Other** _____

_____

_____

- [ ] _____
  Conservancy

Last Updated 5/22/18

NATIVE AMERICAN HERITAGE COMMISSION
Cultural and Environmental Department
1550 Harbor Blvd., Suite 100
West Sacramento, CA 95691 Phone: (916) 373-3710
Email: nahc@nahc.ca.gov
Website: http://www.nahc.ca.gov

November 1, 2019

Ronelle Candia
Kern County
2700 "M" Street, Suite 100
Bakersfield, CA 93301-2323

RE: SCH# 2019100659, Lost Hills Composting and Waste to Energy Project, Kern County

Dear Ms. Candia:

The Native American Heritage Commission (NAHC) has received the Notice of Preparation (NOP), Draft Environmental Impact Report (DEIR) or Early Consultation for the project referenced above. The California Environmental Quality Act (CEQA) (Pub. Resources Code §21000 et seq.), specifically Public Resources Code §21084.1, states that a project 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. (Pub. Resources Code § 21084.1; Cal. Code Regs., tit.14, §15064.5 (b) (CEQA Guidelines §15064.5 (b)). If there is substantial evidence, in light of the whole record before a lead agency, that a project may have a significant effect on the environment, an Environmental Impact Report (EIR) shall be prepared. (Pub. Resources Code §21080 (d); Cal. Code Regs., tit. 14, § 5064 subd.(a)(1) (CEQA Guidelines §15064 (a)(1)). In order to determine whether a project will cause a substantial adverse change in the significance of a historical resource, a lead agency will need to determine whether there are historical resources within the area of potential effect (APE).

CEQA was amended significantly in 2014. Assembly Bill 52 (Gatto, Chapter 532, Statutes of 2014) (AB 52) amended CEQA to create a separate category of cultural resources, "tribal cultural resources" (Pub. Resources Code §21074) and provides that a project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment. (Pub. Resources Code §21084.2). Public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource. (Pub. Resources Code §21084.3 (a)). **AB 52 applies to any project for which a notice of preparation, a notice of negative declaration, or a mitigated negative declaration is filed on or after July 1, 2015.** If your project involves the adoption of or amendment to a general plan or a specific plan, or the designation or proposed designation of open space, on or after March 1, 2005, it may also be subject to Senate Bill 18 (Burton, Chapter 905, Statutes of 2004) (SB 18). **Both SB 18 and AB 52 have tribal consultation requirements**. If your project is also subject to the federal National Environmental Policy Act (42 U.S.C. § 4321 et seq.) (NEPA), the tribal consultation requirements of Section 106 of the National Historic Preservation Act of 1966 (154 U.S.C. 300101, 36 C.F.R. §800 et seq.) may also apply.

The NAHC recommends consultation with California Native American tribes that are traditionally and culturally affiliated with the geographic area of your proposed project as early as possible in order to avoid inadvertent discoveries of Native American human remains and best protect tribal cultural resources. Below is a brief summary of portions of AB 52 and SB 18 as well as the NAHC's recommendations for conducting cultural resources assessments.

Consult your legal counsel about compliance with AB 52 and SB 18 as well as compliance with any other applicable laws.

AB 52

AB 52 has added to CEQA the additional requirements listed below, along with many other requirements:

1. Fourteen Day Period to Provide Notice of Completion of an Application/Decision to Undertake a Project: Within fourteen (14) days of determining that an application for a project is complete or of a decision by a public agency to undertake a project, a lead agency shall provide formal notification to a designated contact of, or tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice, to be accomplished by at least one written notice that includes:
   a. A brief description of the project.
   b. The lead agency contact information.
   c. Notification that the California Native American tribe has 30 days to request consultation. (Pub. Resources Code §21080.3.1 (d)).
   d. A "California Native American tribe" is defined as a Native American tribe located in California that is on the contact list maintained by the NAHC for the purposes of Chapter 905 of Statutes of 2004 (SB 18). (Pub. Resources Code §21073).

2. Begin Consultation Within 30 Days of Receiving a Tribe's Request for Consultation and Before Releasing a Negative Declaration, Mitigated Negative Declaration, or Environmental Impact Report: A lead agency shall begin the consultation process within 30 days of receiving a request for consultation from a California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project. (Pub. Resources Code §21080.3.1, subds. (d) and (e)) and prior to the release of a negative declaration, mitigated negative declaration or Environmental Impact Report. (Pub. Resources Code §21080.3.1(b)).
   a. For purposes of AB 52, "consultation shall have the same meaning as provided in Gov. Code §65352.4 (SB 18). (Pub. Resources Code §21080.3.1 (b)).

3. Mandatory Topics of Consultation If Requested by a Tribe: The following topics of consultation, if a tribe requests to discuss them, are mandatory topics of consultation:
   a. Alternatives to the project.
   b. Recommended mitigation measures.
   c. Significant effects. (Pub. Resources Code §21080.3.2 (a)).

4. Discretionary Topics of Consultation: The following topics are discretionary topics of consultation:
   a. Type of environmental review necessary.
   b. Significance of the tribal cultural resources.
   c. Significance of the project's impacts on tribal cultural resources.
   d. If necessary, project alternatives or appropriate measures for preservation or mitigation that the tribe may recommend to the lead agency. (Pub. Resources Code §21080.3.2 (a)).

5. Confidentiality of Information Submitted by a Tribe During the Environmental Review Process: With some exceptions, any information, including but not limited to, the location, description, and use of tribal cultural resources submitted by a California Native American tribe during the environmental review process shall not be included in the environmental document or otherwise disclosed by the lead agency or any other public agency to the public, consistent with Government Code §6254 (r) and §6254.10. Any information submitted by a California Native American tribe during the consultation or environmental review process shall be published in a confidential appendix to the environmental document unless the tribe that provided the information consents, in writing, to the disclosure of some or all of the information to the public. (Pub. Resources Code §21082.3 (c)(1)).

6. Discussion of Impacts to Tribal Cultural Resources in the Environmental Document: If a project may have a significant impact on a tribal cultural resource, the lead agency's environmental document shall discuss both of the following:
   a. Whether the proposed project has a significant impact on an identified tribal cultural resource.
   b. Whether feasible alternatives or mitigation measures, including those measures that may be agreed to pursuant to Public Resources Code §21082.3, subdivision (a), avoid or substantially lessen the impact on the identified tribal cultural resource. (Pub. Resources Code §21082.3 (b)).

7. Conclusion of Consultation: Consultation with a tribe shall be considered concluded when either of the following occurs:
    a. The parties agree to measures to mitigate or avoid a significant effect, if a significant effect exists, on a tribal cultural resource; or
    b. A party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached. (Pub. Resources Code §21080.3.2 (b)).

8. Recommending Mitigation Measures Agreed Upon in Consultation in the Environmental Document: Any mitigation measures agreed upon in the consultation conducted pursuant to Public Resources Code §21080.3.2 shall be recommended for inclusion in the environmental document and in an adopted mitigation monitoring and reporting program, if determined to avoid or lessen the impact pursuant to Public Resources Code §21082.3, subdivision (b), paragraph 2, and shall be fully enforceable. (Pub. Resources Code §21082.3 (a)).

9. Required Consideration of Feasible Mitigation: If mitigation measures recommended by the staff of the lead agency as a result of the consultation process are not included in the environmental document or if there are no agreed upon mitigation measures at the conclusion of consultation, or if consultation does not occur, and if substantial evidence demonstrates that a project will cause a significant effect to a tribal cultural resource, the lead agency shall consider feasible mitigation pursuant to Public Resources Code §21084.3 (b). (Pub. Resources Code §21082.3 (e)).

10. Examples of Mitigation Measures That, If Feasible, May Be Considered to Avoid or Minimize Significant Adverse Impacts to Tribal Cultural Resources:
    a. Avoidance and preservation of the resources in place, including, but not limited to:
        i. Planning and construction to avoid the resources and protect the cultural and natural context.
        ii. Planning greenspace, parks, or other open space, to incorporate the resources with culturally appropriate protection and management criteria.
    b. Treating the resource with culturally appropriate dignity, taking into account the tribal cultural values and meaning of the resource, including, but not limited to, the following:
        i. Protecting the cultural character and integrity of the resource.
        ii. Protecting the traditional use of the resource.
        iii. Protecting the confidentiality of the resource.
    c. Permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places.
    d. Protecting the resource. (Pub. Resource Code §21084.3 (b)).
    e. Please note that a federally recognized California Native American tribe or a non-federally recognized California Native American tribe that is on the contact list maintained by the NAHC to protect a California prehistoric, archaeological, cultural, spiritual, or ceremonial place may acquire and hold conservation easements if the conservation easement is voluntarily conveyed. (Civ. Code §815.3 (c)).
    f. Please note that it is the policy of the state that Native American remains and associated grave artifacts shall be repatriated. (Pub. Resources Code §5097.991).

11. Prerequisites for Certifying an Environmental Impact Report or Adopting a Mitigated Negative Declaration or Negative Declaration with a Significant Impact on an Identified Tribal Cultural Resource: An Environmental Impact Report may not be certified, nor may a mitigated negative declaration or a negative declaration be adopted unless one of the following occurs:
    a. The consultation process between the tribes and the lead agency has occurred as provided in Public Resources Code §21080.3.1 and §21080.3.2 and concluded pursuant to Public Resources Code §21080.3.2.
    b. The tribe that requested consultation failed to provide comments to the lead agency or otherwise failed to engage in the consultation process.
    c. The lead agency provided notice of the project to the tribe in compliance with Public Resources Code §21080.3.1 (d) and the tribe failed to request consultation within 30 days. (Pub. Resources Code §21082.3 (d)).

The NAHC's PowerPoint presentation titled, "Tribal Consultation Under AB 52: Requirements and Best Practices" may be found online at: http://nahc.ca.gov/wp-content/uploads/2015/10/AB52TribalConsultation_CalEPAPDF.pdf

SB 18

SB 18 applies to local governments and requires local governments to contact, provide notice to, refer plans to, and consult with tribes prior to the adoption or amendment of a general plan or a specific plan, or the designation of open space. (Gov. Code §65352.3). Local governments should consult the Governor's Office of Planning and Research's "Tribal Consultation Guidelines," which can be found online at: https://www.opr.ca.gov/docs/09_14_05_Updated_Guidelines_922.pdf.

Some of SB 18's provisions include:

1. Tribal Consultation: If a local government considers a proposal to adopt or amend a general plan or a specific plan, or to designate open space it is required to contact the appropriate tribes identified by the NAHC by requesting a "Tribal Consultation List." If a tribe, once contacted, requests consultation the local government must consult with the tribe on the plan proposal. **A tribe has 90 days from the date of receipt of notification to request consultation unless a shorter timeframe has been agreed to by the tribe.** (Gov. Code §65352.3 (a)(2)).
2. No Statutory Time Limit on SB 18 Tribal Consultation. There is no statutory time limit on SB 18 tribal consultation.
3. Confidentiality: Consistent with the guidelines developed and adopted by the Office of Planning and Research pursuant to Gov. Code §65040.2, the city or county shall protect the confidentiality of the information concerning the specific identity, location, character, and use of places, features and objects described in Public Resources Code §5097.9 and §5097.993 that are within the city's or county's jurisdiction. (Gov. Code §65352.3 (b)).
4. Conclusion of SB 18 Tribal Consultation: Consultation should be concluded at the point in which:
    a. The parties to the consultation come to a mutual agreement concerning the appropriate measures for preservation or mitigation; or
    b. Either the local government or the tribe, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached concerning the appropriate measures of preservation or mitigation. (Tribal Consultation Guidelines, Governor's Office of Planning and Research (2005) at p. 18).

Agencies should be aware that neither AB 52 nor SB 18 precludes agencies from initiating tribal consultation with tribes that are traditionally and culturally affiliated with their jurisdictions before the timeframes provided in AB 52 and SB 18. For that reason, we urge you to continue to request Native American Tribal Contact Lists and "Sacred Lands File" searches from the NAHC. The request forms can be found online at: http://nahc.ca.gov/resources/forms/

NAHC Recommendations for Cultural Resources Assessments

To adequately assess the existence and significance of tribal cultural resources and plan for avoidance, preservation in place, or barring both, mitigation of project-related impacts to tribal cultural resources, the NAHC recommends the following actions:

1. Contact the appropriate regional California Historical Research Information System (CHRIS) Center (http://ohp.parks.ca.gov/?page_id=1068) for an archaeological records search. The records search will determine:
    a. If part or all of the APE has been previously surveyed for cultural resources.
    b. If any known cultural resources have already been recorded on or adjacent to the APE.
    c. If the probability is low, moderate, or high that cultural resources are located in the APE.
    d. If a survey is required to determine whether previously unrecorded cultural resources are present.

2. If an archaeological inventory survey is required, the final stage is the preparation of a professional report detailing the findings and recommendations of the records search and field survey.
    a. The final report containing site forms, site significance, and mitigation measures should be submitted immediately to the planning department. All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum and not be made available for public disclosure.
    b. The final written report should be submitted within 3 months after work has been completed to the appropriate regional CHRIS center.

3. Contact the NAHC for:
    a. A Sacred Lands File search. Remember that tribes do not always record their sacred sites in the Sacred Lands File, nor are they required to do so. A Sacred Lands File search is not a substitute for consultation with tribes that are traditionally and culturally affiliated with the geographic area of the project's APE.
    b. A Native American Tribal Consultation List of appropriate tribes for consultation concerning the project site and to assist in planning for avoidance, preservation in place, or, failing both, mitigation measures.

4. Remember that the lack of surface evidence of archaeological resources (including tribal cultural resources) does not preclude their subsurface existence.
    a. Lead agencies should include in their mitigation and monitoring reporting program plan provisions for the identification and evaluation of inadvertently discovered archaeological resources per Cal. Code Regs., tit. 14, §15064.5(f) (CEQA Guidelines §15064.5(f)). In areas of identified archaeological sensitivity, a certified archaeologist and a culturally affiliated Native American with knowledge of cultural resources should monitor all ground-disturbing activities.
    b. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the disposition of recovered cultural items that are not burial associated in consultation with culturally affiliated Native Americans.
    c. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the treatment and disposition of inadvertently discovered Native American human remains. Health and Safety Code §7050.5, Public Resources Code §5097.98, and Cal. Code Regs., tit. 14, §15064.5, subdivisions (d) and (e) (CEQA Guidelines §15064.5, subds. (d) and (e)) address the processes to be followed in the event of an inadvertent discovery of any Native American human remains and associated grave goods in a location other than a dedicated cemetery.

If you have any questions or need additional information, please contact me at my email address: Andrew.Green@nahc.ca.gov.

Sincerely,

Andrew Green

Andrew Green
Staff Services Analyst

cc: State Clearinghouse

Department of Toxic Substances Control

Jared Blumenfeld
Secretary for
Environmental Protection

Meredith Williams, Ph.D.
Acting Director
8800 Cal Center Drive
Sacramento, California 95826-3200

Gavin Newsom
Governor

November 18, 2019

Ms. Ronelle Candia
Kern County Planning Department
2700 "M" Street, Suite 100
Bakersfield, California 93301-2323

NOTICE OF PREPARATION (NOP) FOR THE LOST HILLS COMPOSTING AND WASTE TO ENERGY PROJECT BY LOST HILLS ENVIRONMENTAL, LLC DRAFT ENVIRONMENTAL IMPACT REPORT – DATED OCTOBER 31, 2019 (STATE CLEARINGHOUSE NUMBER: 2019100659)

Dear Ms. Candia:

The Department of Toxic Substances Control (DTSC) received a Notice of Preparation for a Draft Environmental Impact Report (EIR) for the Lost Hills Composting and Energy Project by Lost Hills Environmental, LLC Draft Environmental Impact Report.

The proposed project includes a request for land use entitlements necessary to facilitate the continued and expanded use of an existing Class III Non-Hazardous Landfill; the future construction and operation of an extended Aeration composting facility; and the future construction and operation of a Waste-to-Energy biomass gasification facility and associated infrastructure to generate a combined 3 megawatts of renewable electrical energy on approximately 337 acres of privately owned-land.

DTSC recommends that the following issues be evaluated in the EIR, Hazards and Hazardous Materials section:

1. The EIR should acknowledge the potential for project site activities to have resulted in the release of hazardous wastes/substances. In instances in which releases have occurred, further studies should be carried out to delineate the nature and extent of the contamination, and the potential threat to public health and/or the environment should be evaluated. The EIR should also identify the mechanism(s) to initiate any required investigation and/or remediation and the

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government agency who will be responsible for providing appropriate regulatory oversight.

2. If buildings or other structures are to be demolished on any project sites included in the proposed project, surveys should be conducted for the presence of lead-based paints or products, mercury, asbestos containing materials, and polychlorinated biphenyl caulk. Removal, demolition and disposal of any of the above-mentioned chemicals should be conducted in compliance with California environmental regulations and policies. In addition, sampling near current and/or former buildings should be conducted in accordance with DTSC's 2006 *Interim Guidance Evaluation of School Sites with Potential Contamination from Lead Based Paint, Termiticides, and Electrical Transformers* (https://dtsc.ca.gov/wpcontent/uploads/sites/31/2018/09/Guidance_Lead_Contamination_050118.pdf).

3. If any projects initiated as part of the proposed project require the importation of soil to backfill any excavated areas, proper sampling should be conducted to ensure that the imported soil is free of contamination. DTSC recommends the imported materials be characterized according to *DTSC's 2001 Information Advisory Clean Imported Fill Material* (https://dtsc.ca.gov/wp-content/uploads/sites/31/2018/09/SMP_FS_Cleanfill-Schools.pdf).

4. If any sites included as part of the proposed project have been used for agricultural, weed abatement or related activities, proper investigation for organochlorinated pesticides should be discussed in the EIR. DTSC recommends the current and former agricultural lands be evaluated in accordance with DTSC's 2008 *Interim Guidance for Sampling Agricultural Properties (Third Revision)* (https://dtsc.ca.gov/wp-content/uploads/sites/31/2018/09/Ag-Guidance-Rev-3-August-7-2008-2.pdf).

DTSC appreciates the opportunity to review the EIR. Should you need any assistance with an environmental investigation, please submit a request for Lead Agency Oversight Application, which can be found at: https://dtsc.ca.gov/wp-content/uploads/sites/31/2018/09/VCP_App-1460.doc. Additional information regarding voluntary agreements with DTSC can be found at: https://dtsc.ca.gov/brownfields/.

If you have any questions, please contact me at (916) 255-3710 or via email at Gavin.McCreary@dtsc.ca.gov.

Sincerely,

Gavin McCreary
Project Manager
Site Evaluation and Remediation Unit
Site Mitigation and Restoration Program
Department of Toxic Substances Control

cc: (via email)

Governor's Office of Planning and Research
State Clearinghouse
State.clearinghouse@opr.ca.gov

Ms. Lora Jameson, Chief
Site Evaluation and Remediation Unit
Department of Toxic Substances Control
Lora.Jameson@dtsc.ca.gov

Mr. Dave Kereazis
Office of Planning & Environmental Analysis
Department of Toxic Substances Control
Dave.Kereasis@dtsc.ca.gov

California
Department of Conservation
Division of Oil, Gas, and Geothermal Resources

Gavin Newsom, Governor
David Shabazian, Director
801 K Street, MS 18-05
Sacramento, CA 95814
T: (916) 445-9686

11/22/2019

Ronelle Candia
2700 M Street, Suite 100, Bakersfield, CA 93301, USA

Construction Site Well Review (CSWR) ID: 1011737

Assessor Parcel Number(s): 05722016, 05724029, 05724050, 05724060

Property Owner(s): Lost Hills Environmental, LLC

Project Location Address: East and West side of Holloway Rd, approx. 2 miles north of Hwy 46, Lost Hills, California, 93249

Project Title: Lost Hills Composting and Waste to Energy Project by Lost Hills Environmental, LLC.

Public Resources Code (PRC) § 3208.1 establishes well reabandonment responsibility when a previously plugged and abandoned well will be impacted by planned property development or construction activities. Local permitting agencies, property owners, and/or developers should be aware of, and fully understand, that significant and potentially dangerous issues may be associated with development near oil, gas, and geothermal wells.

The Division of Oil, Gas, and Geothermal Resources (Division) has received and reviewed the above referenced project dated 11/21/2019. To assist local permitting agencies, property owners, and developers in making wise land use decisions regarding potential development near oil, gas, or geothermal wells, the Division provides the following well evaluation.

The project is located in County, within the boundaries of the following fields:

Lost Hills

The parcel is located within the Lost Hills administrative boundaries. In addition to the plugged & abandoned wells, there might be pipelines associated to oil and gas production.

Our records indicate there are 14 known oil or gas wells located within the project boundary as identified in the application.

- Number of wells Not Abandoned to Current Division Requirements as Prescribed by Law and Projected to Be Built Over or Have Future Access Impeded by this project: 9
- Number of wells Not Abandoned to Current Division Requirements as Prescribed by Law and Not Projected to Be Built Over or Have Future Access Impeded by this project: 0
- Number of wells Abandoned to Current Division Requirements as Prescribed by Law and Projected to Be Built Over or Have Future Access Impeded by this project: 5
- Number of wells Abandoned to Current Division Requirements as Prescribed by Law and

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801 K Street, MS 18-05
Sacramento, CA 95814
T: (916) 445-9686

Not Projected to Be Built Over or Have Future Access Impeded by this project: 0

The Division categorically advices against building over, or in any way impeding access to, oil, gas, or geothermal wells. Impeding access to a well could result in the need to remove any structure or obstacle that prevents or impedes access including, but not limited to, buildings, housing, fencing, landscaping, trees, pools, patios, sidewalks, roadways, and decking. Maintaining sufficient access is considered the ability for a well servicing unit and associated necessary equipment to reach a well from a public street or access way, solely over the parcel on which the well is located. A well servicing unit, and any necessary equipment, should be able to pass unimpeded along and over the route, and should be able to access the well without disturbing the integrity of surrounding infrastructure.

There are no guarantees a well abandoned in compliance with current Division requirements as prescribed by law will not start leaking in the future. It always remains a possibility that any well may start to leak oil, gas, and/or water after abandonment, no matter how thoroughly the well was plugged and abandoned. The Division acknowledges wells plugged and abandoned to the most current Division requirements as prescribed by law have a lower probability of leaking in the future, however there is no guarantees that such abandonments will not leak.

The Division advises that all wells identified on the development parcel prior to, or during, development activities be tested for liquid and gas leakage. Surveyed locations should be provided to the Division in Latitude and Longitude, NAD 83 decimal format. The Division expects any wells found leaking to be reported to it immediately.

Failure to plug and reabandon the well may result in enforcement action, including an order to perform reabandonment well work, pursuant to PRC § 3208.1, and 3224.

PRC § 3208.1 give the Division the authority to order or permit the re-abandonment of any well where it has reason to question the integrity of the previous abandonment, or if the well is not accessible or visible. Responsibility for re-abandonment costs may be affected by the choices made by the local permitting agency, property owner, and/or developer in considering the general advice set forth in this letter. The PRC continues to define the person or entity responsible for reabandonment as:

1. The property owner - If the well was plugged and abandoned in conformance with Division requirements at the time of abandonment, and in its current condition does not pose an immediate danger to life, health, and property, but requires additional work solely because the owner of the property on which the well is located proposes construction on the property that would prevent or impede access to the well for purposes of remedying a currently perceived future problem, then the owner of the property on which the well is located shall obtain all rights necessary to reabandon the well and be responsible for the reabandonment.

2. The person or entity causing construction over or near the well - If the well was plugged and abandoned in conformance with Division requirements at the time of plugging

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David Shabazian, Director
801 K Street, MS 18-05
Sacramento, CA 95814
T: (916) 445-9686

and abandonment, and the property owner, developer, or local agency permitting the construction failed either to obtain an opinion from the supervisor or district deputy as to whether the previously abandoned well is required to be reabandoned, or to follow the advice of the supervisor or district deputy not to undertake the construction, then the person or entity causing the construction over or near the well shall obtain all rights necessary to reabandon the well and be responsible for the reabandonment.

3. The party or parties responsible for disturbing the integrity of the abandonment - If the well was plugged and abandoned in conformance with Division requirements at the time of plugging and abandonment, and after that time someone other than the operator or an affiliate of the operator disturbed the integrity of the abandonment in the course of developing the property, then the party or parties responsible for disturbing the integrity of the abandonment shall be responsible for the reabandonment.

No well work may be performed on any oil, gas, or geothermal well without written approval from the Division. Well work requiring approval includes, but is not limited to, mitigating leaking gas or other fluids from abandoned wells, modifications to well casings, and/or any other re-abandonment work. The Division also regulates the top of a plugged and abandoned well's minimum and maximum depth below final grade. CCR §1723.5 states well casings shall be cut off at least 5 feet but no more than 10 feet below grade. If any well needs to be lowered or raised (i.e. casing cut down or casing riser added) to meet this regulation, a permit from the Division is required before work can start.

The Division makes the following additional recommendations to the local permitting agency, property owner, and developer:

1. To ensure that present and future property owners are aware of (a) the existence of all wells located on the property, and (b) potentially significant issues associated with any improvements near oil or gas wells, the Division recommends that information regarding the above identified well(s), and any other pertinent information obtained after the issuance of this letter, be communicated to the appropriate county recorder for inclusion in the title information of the subject real property.

2. The Division recommends that any soil containing hydrocarbons be disposed of in accordance with local, state, and federal laws. Please notify the appropriate authorities if soil containing significant amounts of hydrocarbons is discovered during development.

As indicated in PRC § 3106, the Division has statutory authority over the drilling, operation, maintenance, and abandonment of oil, gas, and geothermal wells, and attendant facilities, to prevent, as far as possible, damage to life, health, property, and natural resources; damage to underground oil, gas, and geothermal deposits; and damage to underground and surface waters suitable for irrigation

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801 K Street, MS 18-05
Sacramento, CA 95814
T: (916) 445-9686

or domestic purposes. In addition to the Division's authority to order work on wells pursuant to PRC §§ 3208.1 and 3224, it has authority to issue civil and criminal penalties under PRC §§ 3236, 3236.5, and 3359 for violations within the Division's jurisdictional authority. The Division does not regulate grading, excavations, or other land use issues.

If during development activities, any wells are encountered that were not part of this review, the property owner is expected to immediately notify the Division's construction site well review engineer in the Inland district office, and file for Division review an amended site plan with well casing diagrams. The District office will send a follow-up well evaluation letter to the property owner and local permitting agency.

Should you have any questions, please contact me at (661) 326-6016 or via email at Victor.Medrano@conservation.ca.gov

Sincerely,

Cameron Campbell
District Deputy

Gavin Newsom, Governor
David Shabazian, Director
801 K Street, MS 18-05
Sacramento, CA 95814
T: (916) 445-9686

Wells Not Abandoned to Current Division Requirements as Prescribed by Law & Projected to be Built Over or Have Future Access Impeded

The wells listed below are not abandoned to current Division requirements as prescribed by law, and based upon information provided, are projected to be built over or have future access impeded. **The Division expects these wells to be reabandoned in compliance with current California law, prior to development activities.**

API	Well Designation	Operator	Well Evaluations
0402939945	Occidental 1	California Lands, Inc.	§ 1723.5. Surface Plugging: The hole and all annuli shall be plugged at the surface with at least a 25-foot cement plug.
0402939944	Vaughey-Occidental Lands 1	Tri-Union Development Corporation	§ 1723.5. Surface Plugging: The hole and all annuli shall be plugged at the surface with at least a 25-foot cement plug.
0403052439	Blackwell Land Co. 378	Seneca Resources Company, LLC	
0403028562	Blackwell Land Co. 3	Seneca Resources Company, LLC	

Gavin Newsom, Governor
David Shabazian, Director
801 K Street, MS 18-05
Sacramento, CA 95814
T: (916) 445-9686

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API	Well Designation	Operator	Well Evaluations
0403052440	Blackwell Land Co. 379	Seneca Resources Company, LLC	
0403066895	Blackwell TI-7X	Seneca Resources Company, LLC	
0403034321	Blackwell Land Co. 4	Seneca Resources Company, LLC	
0403048788	Blackwell Land Co. 377	Seneca Resources Company, LLC	

Gavin Newsom, Governor
David Shabazian, Director
801 K Street, MS 18-05
Sacramento, CA 95814
T: (916) 445-9686

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API	Well Designation	Operator	Well Evaluations
0403028635	Security CH6	Seneca Resources Company, LLC	

Gavin Newsom, Governor
David Shabazian, Director
801 K Street, MS 18-05
Sacramento, CA 95814
T: (916) 445-9686

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The wells listed below are abandoned to current Division requirements as prescribed by law, and based upon information provided, are projected to be built over or have future access impeded.

API	Well Designation	Operator	Well Evaluations
04030156 43	Blackwell Land Co. 1	Seneca Resources Company, LLC	
04029611 66	Lost Hills Minerals Corp. 1	Chevron U.S.A. Inc.	
04029771 69	Blackwell 24-1	Deuel Petroleum Company, Inc.	
04029852 52	Jason 1	Fairbanks and Haas, Inc.	

Gavin Newsom, Governor
David Shabazian, Director
801 K Street, MS 18-05
Sacramento, CA 95814
T: (916) 445-9686

Wells Abandoned to Current Division Requirements as Prescribed by Law & Projected to be Built Over or Have Future Access Impeded

The wells listed below are abandoned to current Division requirements as prescribed by law, and based upon information provided, are projected to be built over or have future access impeded.

API	Well Designation	Operator	Well Evaluations
0402969767	Blackwell Section 25 1	Aera Energy LLC	

State of California – The Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
Central Region
1234 East Shaw Avenue
Fresno, California 93710
(559) 243-4005
www.wildlife.ca.gov

GAVIN NEWSOM, Governor
CHARLTON H. BONHAM, Director

November 22, 2019

Ronelle Candia
Kern County Planning and Natural Resources Department
2700 "M" Street, Suite 100
Bakersfield, California 93301

Subject: Lost Hills Composting and Waste to Energy Project (Project), Notice of Preparation for the Environmental Impact Report SCH No. 2019100659

Dear Ms. Candia:

The California Department of Fish and Wildlife (CDFW) received a Notice of Preparation (NOP) of a Draft Environmental Impact Report (EIR) from Kern County Planning and Natural Resources Department for the above-referenced Project pursuant the California Environmental Quality Act (CEQA) and CEQA Guidelines.[1]

Thank you for the opportunity to provide comments and recommendations regarding those activities involved in the Project that may affect California fish and wildlife. Likewise, CDFW appreciates the opportunity to provide comments regarding those aspects of the Project that CDFW, by law, may be required to carry out or approve through exercise of its own regulatory authority under the Fish and Game Code.

CDFW ROLE

CDFW is California's **Trustee Agency** for fish and wildlife resources and holds those resources in trust by statute for all the people of the State. (Fish & G. Code, §§ 711.7, subd. (a) & 1802; Pub. Resources Code, § 21070; CEQA Guidelines § 15386, subd. (a).) CDFW, in its trustee capacity, has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and habitat necessary for biologically sustainable populations of those species. (*Id.*, § 1802.) Similarly, for purposes of CEQA, CDFW is charged by law to provide, as available, biological expertise during public agency environmental review efforts, focusing specifically on projects and related activities that have the potential to adversely affect fish and wildlife resources.

CDFW is also submitting comments as a **Responsible Agency** under CEQA. (Pub. Resources Code, § 21069; CEQA Guidelines, § 15381.) CDFW expects that it may

[1] CEQA is codified in the California Public Resources Code in section 21000 et seq. The "CEQA Guidelines" are found in Title 14 of the California Code of Regulations, commencing with section 15000.

need to exercise regulatory authority as provided by the Fish and Game Code. As proposed, for example, construction associated with the Project may be subject to CDFW's lake and streambed alteration regulatory authority. (Fish & G. Code, § 1600 *et seq.*) Likewise, to the extent implementation of the Project as proposed may result in "take" as defined by State law of any species protected under the California Endangered Species Act (CESA) (Fish & G. Code, § 2050 *et seq.*), related authorization as provided by the Fish and Game Code will be required.

Nesting Birds: CDFW has jurisdiction over actions with potential to result in the disturbance or destruction of active nest sites or the unauthorized take of birds. Fish and Game Code sections that protect birds, their eggs and nests include sections 3503 (regarding unlawful take, possession or needless destruction of the nest or eggs of any bird), 3503.5 (regarding the take, possession or destruction of any birds-of-prey or their nests or eggs), and 3513 (regarding unlawful take of any migratory nongame bird).

PROJECT DESCRIPTION SUMMARY

Proponent: Lost Hills Environmental, LLC

Objective: The Project includes a request for land use entitlements necessary to facilitate the expanded and continued use of a Class III Non-Hazardous Industrial Waste Landfill facility and the establishment of a new Waste to Energy Biomass Gasification Facility.

Location: The Project is located at the east and west side of Holloway Road, approximately 2 miles north of Highway 46, at the GP Road junction and approximately 3.5 miles northwest of the unincorporated community of Lost Hills, California in Kern County. The proposed site for the Waste to Energy Biomass Gasification Facility is a 6-acre parcel located at 14045 Holloway Road, Lost Hills. Assessor's Parcel Numbers for the entire Project area are 057-220-16 and -21, and 057-240-29, -50, and -60.

Timeframe: Unspecified.

COMMENTS AND RECOMMENDATIONS

CDFW offers the comments and recommendations below to assist Kern County in adequately identifying and/or mitigating the Project's significant, or potentially significant, direct and indirect impacts on fish and wildlife (biological) resources. Editorial comments or other suggestions may also be included to improve the document.

Currently, the NOP acknowledges that the Project area is within the geographic range of several special-status animal species including the State threatened San Joaquin

antelope squirrel (*Ammospermophilus nelsoni*), the State Threatened Swainson's hawk (*Buteo swainsoni*), the State Species of Special Concern western snowy plover (*Charadrius alexandrines nivosus*), the State and federally Endangered giant kangaroo rat (*Dipodomys ingens*), the State and federally Endangered Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*), the State and federally Endangered and State fully protected blunt-nosed leopard lizard (*Gambelia sila*), and the State threatened and federally Endangered San Joaquin kit fox (*Vulpes macrotis mutica*). The NOP also acknowledges that the Project area is in the range of several special-status plant species including the State endangered and California Rare Plant Ranked (CRPR) 1B.1 California jewelflower (*Caulanthus californicus*) and the CRPR 1B.2 Kern mallow (*Eremalche parryi ssp. kernensis*) and San Joaquin woollythreads (*Monolopia congdonii*). In addition to these species, CDFW is concerned regarding potential of the Project to impact other special-status species not mentioned in the NOP including, but not limited to, the State species of special concern burrowing owl (*Athene cunicularia*). As such, CDFW requests that the EIR fully identify potential impacts to biological resources, including the above-mentioned species. Further, CDFW recommends that biological surveys be conducted and that the results of these surveys be used to inform the analysis of impacts to resources and to provision suitable avoidance, minimization, and mitigation measures to reduce impacts to less than significant levels.

I. Environmental Setting and Related Impact

Would the Project 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 CDFW or the United States Fish and Wildlife Service (USFWS)?

COMMENT 1: San Joaquin Antelope Squirrel (SJAS)

Issue: The Project area is within the range of SJAS and, based on review of aerial imagery, appears to be located adjacent to undeveloped habitat. SJAS have been documented to occur within 1 mile of the Project area (CDFW 2019a) and may occur on-site where there are potential habitat features (e.g., burrows) or disperse across the Project site between higher quality habitat patches.

Specific impact: Without appropriate avoidance and minimization measures for SJAS, potential significant impacts include burrow abandonment, which may result in reduced reproductive success such as reduced health or vigor of young and direct mortality.

Evidence impact is potentially significant: Habitat loss resulting from development is the primary threat to SJAS. Very little suitable habitat for this species remains along the western floor of the San Joaquin Valley (ESRP 2019a).

The vicinity of the Project area represents some of the only remaining undeveloped land in the area. As a result, ground-disturbing activities within the Project area have the potential to significantly impact local populations of SJAS.

Recommended Potentially Feasible Mitigation Measure(s)

To evaluate potential Project-related impacts to SJAS, CDFW recommends conducting the following evaluation of the Project area and including the following measures in the EIR.

Recommended Mitigation Measure 1: SJAS Surveys

CDFW recommends that daytime line transect surveys to search for SJAS and potential habitat features (e.g., burrows). CDFW recommends these surveys ensure 100% visual coverage of the Project area and be conducted between April 1 and September 20 when antelope squirrels are more active and thus, more likely to be detected (CDFG 1990).

Recommended Mitigation Measure 2: SJAS Avoidance

If suitable habitat is determined to be present within the Project area and surveys are not feasible, CDFW advises maintenance of a 50-foot minimum no-disturbance buffer around all small mammal burrows of suitable size for SJAS.

Recommended Mitigation Measure 3: SJAS Take Authorization

SJAS detection warrants consultation with CDFW to discuss how to avoid take, or if avoidance is not feasible, to acquire an Incidental Take Permit (ITP) prior to ground-disturbing activities, pursuant to Fish and Game Code section 2081(b).

COMMENT 2: Giant kangaroo rat (GKR) and Tipton kangaroo rat (TKR)

Issue: The Project area is within the range of GKR and TKR. Review of aerial imagery indicates that portions of the Project area are adjacent to undeveloped land, increasing the likelihood of occurrence.

Specific impact: Without appropriate avoidance and minimization measures for GKR and TKR, potential significant impacts associated with the Project's construction include burrow collapse, inadvertent entrapment, reduced reproductive success, reduction in health and vigor of young, and direct mortality of individuals.

Evidence impact would be significant: Habitat loss resulting from development is the primary threat to GKR and TKR. Very little suitable habitat remains along the

western floor of the San Joaquin Valley (USFWS 1998a). The land adjacent to the Project area represents some of the only remaining undeveloped land in the vicinity and therefore, may support GKR and TKR. As a result, ground-disturbing activities at the Project area have the potential to significantly impact local populations of GKR and TKR.

Recommended Potentially Feasible Mitigation Measure(s)

To evaluate potential Project-related impacts to GKR and TKR, CDFW recommends conducting the following evaluation of the Project area and including the following measures in the EIR.

Recommended Mitigation Measure 4: GKR and TKR Avoidance

In order to avoid take of GKR or TKR, CDFW recommends a minimum 50-foot no-disturbance buffer be employed around all burrows that could be used by these species.

Recommended Mitigation Measure 5: GKR and TKR Surveys

If burrow avoidance is not feasible, CDFW recommends focused protocol-level trapping surveys be conducted by a qualified wildlife biologist that is permitted to do so by both CDFW and USFWS to determine if GKR or TKR occur in the Project area. CDFW advises that these surveys be conducted in accordance with USFWS's (2013) *"Survey Protocol for Determining Presence of San Joaquin Kangaroo Rats,"* well in advance of ground-disturbing activities in order to determine if impacts to GKR or TKR could occur.

Recommended Mitigation Measure 6: GKR and TKR Take Authorization

If GKR or TKR are identified during surveys, consultation with CDFW is warranted to determine if the Project can avoid take. If take cannot be avoided, acquisition of take authorization through issuance of an ITP by CDFW, pursuant to Fish and Game Code section 2081(b), is necessary to comply with CESA. Alternatively, the Project proponent has the option of assuming presence of GKR and TKR and securing an ITP.

COMMENT 3: Blunt-nosed leopard lizard (BNLL)

Issue: BNLL have been documented to occur on parcels adjacent to the Project area (CDFW 2019a). Suitable BNLL habitat includes areas of grassland and upland scrub that contain requisite habitat elements, such as small mammal burrows. BNLL also use open space patches between suitable habitats, including disturbed sites

and unpaved access roadways. Review of aerial imagery indicates that the Project area and its vicinity are comprised of these habitat features, making it potentially suitable for BNLL.

Specific impact: Without appropriate avoidance and minimization measures for BNLL, potential significant impacts associated with the Project's construction include burrow collapse, nest abandonment, reduced nest success, reduced health and vigor of eggs and/or young, and direct mortality.

Evidence impact is potentially significant: Habitat loss resulting from development is the primary threat to BNLL (ESRP 2019b). Little suitable habitat for BNLL remains in central Kern County (USFWS 1998b). Lands adjacent to the Project area represent some of the only remaining undeveloped land in the vicinity. Therefore, the ground-disturbing and development activities associated with the Project have the potential to significantly impact local BNLL populations.

Recommended Potentially Feasible Mitigation Measure(s)

To evaluate potential Project-related impacts to BNLL, CDFW recommends conducting the following evaluation of the Project area and including the following measures in the EIR document.

Recommended Mitigation Measure 7: BNLL Habitat Assessment

CDFW recommends that a qualified biologist conduct a habitat assessment in advance of Project implementation, to determine if the Project area or its immediate vicinity contains suitable habitat for BNLL.

Recommended Mitigation Measure 8: BNLL Surveys

If suitable habitat is determined to be present in the Project area, and prior to initiating any vegetation- or ground-disturbance activities, CDFW recommends conducting surveys in accordance with the "Approved Survey Methodology for the Blunt-nosed Leopard Lizard" (CDFW 2019b). This recommended survey protocol, designed to optimize BNLL detectability, reasonably assures CDFW that ground-disturbance will not result in take of this fully protected species.

CDFW advises completion of BNLL surveys no more than one year prior to initiation of ground disturbance. Please note that protocol-level surveys must be conducted on multiple dates during late spring, summer, and fall and that within these time periods there are specific protocol-level date, temperature, and time parameters which must be adhered to. As a result, protocol-level surveys for BNLL are not synonymous with 30-day "preconstruction surveys" often recommended for other

wildlife species. In addition, the BNLL protocol specifies different survey effort requirements based on whether the disturbance results from maintenance activities or if the disturbance results in habitat removal (CDFW 2019b).

Recommended Mitigation Measure 9: BNLL Take Avoidance

BNLL detection during protocol level surveys warrants consultation with CDFW to discuss how to implement ground-disturbing activities and avoid take. Because BNLL is a State Fully Protected species, no take incidental or otherwise, can be authorized by CDFW.

COMMENT 4: San Joaquin Kit Fox (SJKF)

Issue: SJKF have been documented to occur within the vicinity of the Project area (CDFW 2019a). In addition, SJKF may be attracted to the Project area due to the type and level of ground-disturbing activities and the loose, friable soils resulting from intensive ground disturbance, thus increasing the likelihood of occurrence.

Specific impact: Without appropriate avoidance and minimization measures for SJKF, potential significant impacts associated with Project construction include den collapse, inadvertent entrapment, reduced reproductive success, reduction in health and vigor of young, and direct mortality of individuals.

Evidence impact is potentially significant: Habitat loss resulting from development is the primary threat to SJKF (Cypher et al. 2013). Very little suitable habitat remains in Kern County (Cypher et al. 2013). The Project area is bordered by some of the only remaining suitable habitat in the vicinity, increasing the potential for SJKF to be encountered at the Project site. Therefore, ground-disturbing activities within the Project area have the potential to significantly impact local SJKF populations.

Recommended Potentially Feasible Mitigation Measure(s) (Regarding Environmental Setting and Related Impact Shortcoming)

To evaluate potential Project-related impacts to SJKF, CDFW recommends conducting the following evaluation of the Project area and including the following measures in the EIR.

Recommended Mitigation Measure 10: SJKF Habitat Assessment

CDFW recommends that a qualified biologist conduct a habitat assessment in advance of Project implementation, to determine if the Project area or its immediate vicinity contains suitable habitat for SJKF.

Recommended Mitigation Measure 11: SJKF Surveys

If suitable habitat is determined to be present in the Project area, CDFW recommends assessing presence/absence of SJKF by conducting surveys following the USFWS "Standardized recommendations for protection of the San Joaquin kit fox prior to or during ground disturbance" (2011). Specifically, CDFW advises conducting these surveys in all areas of potentially suitable habitat no less than 14 days and no more than 30 days prior to beginning of ground-disturbing activities.

Recommended Mitigation Measure 12: SJFK Avoidance and Minimization

CDFW recommends that the EIR include all measures as outlined in the USFWS's "Standardized recommendations for the protection of the San Joaquin kit fox prior to or during ground disturbance" (2011).

Recommended Mitigation Measure 13: SJKF Take Authorization

Regardless of the minimization measures recommended above, SJKF detection warrants consultation with CDFW to discuss how to avoid take, or if avoidance is not feasible, to acquire an ITP prior to ground-disturbing activities, pursuant to Fish and Game Code section 2081(b).

COMMENT 5: Burrowing Owl (BUOW)

Issue: BUOW have been documented to occur in the vicinity of the Project area (CDFW 2019a). BUOW occupy open grassland and shrub lands that contain small mammal burrows, a requisite habitat feature used by BUOW for nesting and cover. Lands adjacent to the Project area appear to contain suitable habitat, thus increasing the likelihood of occurrence.

Specific impact: Potentially significant direct impacts associated with the Project's construction include burrow collapse, inadvertent entrapment, nest abandonment, reduced reproductive success, reduction in health and vigor of eggs and/or young, and direct mortality of individuals.

Evidence impact is potentially significant: BUOW rely on burrow habitat year-round for their survival and reproduction. Habitat loss and degradation are considered the greatest threats to BUOW in California's Central Valley (Gervais et al. 2008). Because the Project area is within the range of BUOW and BUOW have been documented to occur in the area, the Project has the potential to significantly impact local BUOW populations.

Recommended Potentially Feasible Mitigation Measure(s) (Regarding Environmental Setting and Related Impact)

To evaluate potential Project-related impacts to BUOW, CDFW recommends conducting the following evaluation of the Project area and including the following measures in the EIR.

Recommended Mitigation Measure 14: BUOW Surveys

CDFW recommends assessing presence/absence of BUOW by having a qualified biologist conduct surveys following the California Burrowing Owl Consortium's "*Burrowing Owl Survey Protocol and Mitigation Guidelines*" (CBOC 1993) and CDFW's *Staff Report on Burrowing Owl Mitigation*" (CDFG 2012). In addition, CDFW advises that surveys include a 500-foot buffer around the Project area.

Recommended Mitigation Measure 15: BUOW Avoidance

CDFW recommends no-disturbance buffers, as outlined in the "*Staff Report on Burrowing Owl Mitigation*" (CDFG 2012), be implemented prior to and during any ground-disturbing activities associated with Project implementation. Specifically, CDFW's Staff Report recommends that impacts to occupied burrows be avoided in accordance with the following table unless a qualified biologist approved by CDFW verifies through non-invasive methods that either: 1) the birds have not begun egg laying and incubation; or 2) that juveniles from the occupied burrows are foraging independently and are capable of independent survival.

Location	Time of Year	Level of Disturbance		
		Low	Med	High
Nesting sites	April 1-Aug 15	200 m*	500 m	500 m
Nesting sites	Aug 16-Oct 15	200 m	200 m	500 m
Nesting sites	Oct 16-Mar 31	50 m	100 m	500 m

* meters (m)

Recommended Mitigation Measure 16: BUOW Passive Relocation and Mitigation

If BUOW are found to occupy the Project site and avoidance is not possible, it is important to note that according to the Staff Report (CDFG 2012), exclusion is not a minimization or mitigation method and is considered a potentially significant impact under CEQA. However, if necessary, CDFW recommends that burrow exclusion be conducted by qualified biologists and only during the non-breeding season, before breeding behavior is exhibited and after the burrow is confirmed empty through non-invasive methods, such as surveillance. CDFW recommends replacement of

occupied burrows with artificial burrows at a ratio of 1 burrow collapsed to 1 artificial burrow constructed (1:1) as mitigation for the potentially significant impact of evicting BUOW. BUOW may attempt to colonize or re-colonize an area that will be impacted; thus, CDFW recommends ongoing surveillance of the Project site during Project activities, at a rate that is sufficient to detect BUOW if they return.

COMMENT 6: Special-status plants

Issue: The Project is within the range of several special-status plants, some of which have been documented to occur within 5 miles of the area (CDFW 2019a). Ground- and vegetation-disturbing activities have the potential to result in take of special-status species. Unauthorized take of species listed as threatened, endangered, or rare pursuant to CESA or the Native Plant Protection Act is a violation of Fish and Game Code.

Specific impact: Without appropriate avoidance and minimization measures for special-status plants, potential significant impacts resulting from ground-and vegetation-disturbing activities associated with the Project include inability to reproduce and direct mortality.

Evidence impact would be significant: Many of the special-status plant species with potential to occur at the Project site, including San Joaquin woollythreads, are threatened by agricultural, urban, energy, and road construction and development. Many historical occurrences of these species are presumed extirpated (CNPS 2019). Though new occurrences have recently been discovered, impacts to existing populations have the potential to significantly impact these species.

Recommended Potentially Feasible Mitigation Measure(s)

To evaluate potential Project-related impacts to special-status plants, CDFW recommends conducting the following evaluation of the Project site and including the following measures in the EIR.

Recommended Mitigation Measure 17: Special-Status Plant Surveys

CDFW recommends that the Project area be surveyed for special-status plants by a qualified botanist following the "Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities" (CDFW 2018). This protocol, which is intended to maximize detectability, includes the identification of reference populations to facilitate the likelihood of field investigations occurring during the appropriate floristic period. In the absence of protocol-level surveys being performed, additional surveys may be necessary.

Recommended Mitigation Measure 18: Special-Status Plant Avoidance

CDFW recommends special-status plant species be avoided whenever possible by delineation and observing a no-disturbance buffer of at least 50 feet from the outer edge of the plant population(s) or specific habitat type(s) required by special-status plant species. If buffers cannot be maintained, then consultation with CDFW is warranted to determine appropriate minimization and mitigation measures for impacts to special-status plant species.

Recommended Mitigation Measure 19: State-listed Plant Take Authorization

If a plant species listed pursuant to CESA or the Native Plant Protection Act is identified during botanical surveys, consultation with CDFW is warranted to determine if the Project can avoid take. If take cannot be avoided, take authorization prior to any ground-disturbing activities may be warranted. Take authorization would occur through issuance of an ITP by CDFW, pursuant to Fish and Game Code section 2081(b).

II. Editorial Comments and/or Suggestions

Nesting birds: CDFW encourages Project implementation occur during the bird non-nesting season. However, if ground-disturbing activities must occur during the breeding season (February through mid-September), the Project's applicant is responsible for ensuring that implementation of the Project does not result in violation of the Migratory Bird Treaty Act or relevant Fish and Game Codes as referenced above.

To evaluate Project-related impacts on nesting birds, including western snowy plover, CDFW recommends that a qualified wildlife biologist conduct pre-activity surveys for active nests no more than 10 days prior to the start of ground disturbance to maximize the probability that nests that could potentially be impacted are detected. CDFW also recommends that surveys cover a sufficient area around the work site to identify nests and determine their status. A sufficient area means any area potentially affected by the Project. In addition to direct impacts (i.e. nest destruction), noise, vibration, and movement of workers or equipment could also affect nests. Prior to initiation of construction activities, CDFW recommends a qualified biologist conduct a survey to establish a behavioral baseline of all identified nests. Once construction begins, CDFW recommends a qualified biologist continuously monitor nests to detect behavioral changes resulting from the Project. If behavioral changes occur, CDFW recommends the work causing that change cease and CDFW consulted for additional avoidance and minimization measures.

If continuous monitoring of identified nests by a qualified wildlife biologist is not feasible, CDFW recommends a minimum no-disturbance buffer of 250 feet around active nests of non-listed bird species and a 500-foot no-disturbance buffer around active nests of non-listed raptors. These buffers are advised to remain in place 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. Variance from these no-disturbance buffers is possible when there is compelling biological or ecological reason to do so, such as when the construction area would be concealed from a nest site by topography. CDFW recommends that a qualified wildlife biologist advise and support any variance from these buffers and notify CDFW in advance of implementing a variance.

Federally Listed Species: CDFW recommends consulting with the USFWS on potential impacts to federally listed species including, but not limited to, GKR, TKR, BNLL and SJKF. Take under the Federal Endangered Species Act (FESA) is more broadly defined than CESA; take under FESA also includes significant habitat modification or degradation that could result in death or injury to a listed species by interfering with essential behavioral patterns such as breeding, foraging, or nesting. Consultation with the USFWS in order to comply with FESA is advised well in advance of any ground-disturbing activities.

ENVIRONMENTAL DATA

CEQA requires that information developed in environmental impact reports and negative declarations be incorporated into a database that may be used to make subsequent or supplemental environmental determinations. (Pub. Resources Code, § 21003, subd. (e)). Accordingly, please report any special status species and natural communities detected during Project surveys to the California Natural Diversity Database (CNDDB). The CNDDB field survey form can be found at the following link: https://www.wildlife.ca.gov/Data/CNDDB/Submitting-Data. The completed form can be mailed electronically to CNDDB at the following email address: CNDDB@wildlife.ca.gov. The types of information reported to CNDDB can be found at the following link: https://www.wildlife.ca.gov/Data/CNDDB/Plants-and-Animals.

FILING FEES

The Project, as proposed, has the potential to impact fish and/or wildlife, and assessment of filing fees may be necessary. Fees are payable upon filing of the Notice of Determination by the Lead Agency and serve to help defray the cost of environmental review by CDFW. Payment of the fee is required in order for the underlying project approval to be operative, vested, and final. (Cal. Code Regs, tit. 14, § 753.5; Fish & G. Code, § 711.4; Pub. Resources Code, § 21089.)

CONCLUSION

CDFW appreciates the opportunity to comment on the NOP to assist Kern County in identifying and mitigating subsequent project's impacts on biological resources.

Questions regarding this letter or further coordination should be directed to Jennifer Giannetta, Environmental Scientist, at the address provided on this letterhead, by telephone at (559) 243-4014 extension 216, or by electronic mail at Jennifer.Giannetta@wildlife.ca.gov.

Sincerely,

Julie A. Vance
Regional Manager

REFERENCES

California Burrowing Owl Consortium (CBOC), 1993. Burrowing owl survey protocol and mitigation guidelines. Pages 171-177 *in* Lincer, J. L. and K. Steenhof (editors). 1993. The burrowing owl, its biology and management. Raptor Research Report Number 9.

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California Environmental Protection Agency

Gavin Newsom
California Governor

Jared Blumenfeld
Secretary for
Environmental Protection

Scott Smithline
CalRecycle Director

CalRecycle

Department of
Resources Recycling and Recovery

December 2, 2019

Governor's Office of Planning & Research

DEC 02 2019

STATE CLEARINGHOUSE

Ronelle Candia,
2700 M Street, Suite 100
Bakersfield, CA 93301
candiar@kerncounty.com

Subject: SCH No. 2019100659 - Notice of Preparation (NOP) of an Environmental Impact Report (EIR) for the Lost Hills Composting and Waste to Energy Project by Lost Hills Environmental LLC. Modification No.2, CUP No.9, Map 28: Modification No. 1, CUP No. 1, Map 28; and issuance of new CUP 13, Map 28 (PP18111) aka, H. M. Holloway Inc. Landfill, Facility No. 15-AA-0308, Kern County

Dear Ms. Candia:

Thank you for allowing the Department of Resources Recycling and Recovery (CalRecycle) staff to provide comments on the proposed project and for your agency's consideration of these comments as part of the California Environmental Quality Act (CEQA) process. If the proposed project description below varies substantially from the project as understood CalRecycle as a responsible Agency, CalRecycle staff requests clarifications of any comments or interpretations of the project references be included in the Final Environmental Impact Report.

PROJECT DESCRIPTION

The proposed project is located at 14045 Holloway Road Lost Hills CA and is owned and operated by Lost Hills Environmental LLC. The proposed project includes a request for land use entitlements necessary to facilitate the expanded and continued use of a Class III Non-Hazardous Industrial Waste Landfill facility and the establishment of a new Waste to Energy Biomass Gasification Facility. Implementation of the proposed project will require the following:

a) Amendment to the boundaries of the CUP No.1, Map 28 of the existing mining facility to remove six (6) acres of the project site, which will become the location for the proposed Waste to Energy Biomass Gasification Facility.
b) Establishment of a new CUP No. 13, Map 28 that would facilitate construction of a 3 megawatt (MW) (net) Waste to Energy biomass gasification facility.
c) Amendment to CUP No. 9, Map 28 of the existing Class III Non-Hazardous Waste Landfill to include:

- A revision in the allowable waste streams permitted at the landfill to allow the acceptance and disposal of various materials, with a maximum of 1000 tons per day of organic material;
- A revision to allow for an increase in permitted hours of operation, tonnage, and traffic volume and;
- A new 640,000 ton per year (tpy) extended aerated static pile (eSAP) composting facility sited on 136.2 acres within the current landfill facility boundary. Material accepted for composting at the facility would include up to 320,000 tpy of biosolids, green waste, food waste, and manure; and up to 320,000 tpy of wood waste for a total 640,000 tpy. All compostable materials would be chipped and ground off-site. Incoming feedstock material would come from locations within a 150-mile radius. Biosolids and manure would be accepted from within 200-mile radius and wood and green waste would be primarily accepted from Kern County farmers and the City of Bakersfield Mt. Vernon Recycling and Compost Facility. At full buildout the composting and curing will occur within 240 compost pads.

The project includes the construction and operation of a new extended aerated static pile composting activity on a portion of the landfill (Pit E) that has reached capacity (to occur in 3 phases over 10 years), additional waste stream types to be disposed of within the landfill, and to extend the hours of operation to 24 hours a day, 365 days per year. Vehicles accessing the site per day (vpd) would increase from 91 vpd to 313 vpd.

The approved waste types allowed for disposal consist of Class A and B biosolids, Treated Auto Shredder Waste, Cogeneration Ash (Fly Ash), spent Sand Blast Media, and Lime Filter Cake. The proposed additional waste types consist of CDI materials, Agricultural Materials, Green Waste, Granulated Silica, Wastewater Sloughing. Allowing for up to 1000 TPD of organic material.

COMMENTS

CalRecycle staff's comments on the proposed project are included below. Please ensure the comments will be addressed throughout all sections of the NOP. Implementation of the proposed project is likely to require a revision to the existing H. M. Holloway Landfill Inc. Solid Waste Facilities Permit (SWFP). This permit revision will require action by CalRecycle as a responsible agency. CalRecycle will need to utilize the CEQA document to support its concurrence on issuance of the permit by the Local Enforcement Agency.

DAILY TONNAGE

Please provide clarification as to whether the increase in the types of material accepted (1000 tons of organics) will affect the maximum daily tonnage disposed of at the landfill which is currently permitted for 2000 TPD.

LANDFILL CLOSURE/CLEAN CLOSURE

It is unclear from the Notice of Preparation project description how the landfill closure at the portion of Pit "E" that has reached capacity will occur. The FEIR should provide additional details of this aspect of the project including the type of closure activity planned and where materials removed will be

disposed. Any landfill closure plan whether, complete/final, partial, or clean closure activities are subject to review and approval by the Local Enforcement Agency, CalRecycle, as well as the Central Valley Regional Water Quality Control Board.

SOLID WASTE REGULATORY OVERSIGHT

The Kern County Department of Environmental Health is the Local Enforcement Agency (LEA) and is responsible for providing regulatory oversight of solid waste handling activities, including inspections. Please contact the LEA, Karen Sanford at 661-862-8703 or KARENS@kerncounty.com.
to discuss the regulatory requirements for the proposed project.

CONCLUSION

CalRecycle staff thanks the Lead Agency for the opportunity to review and comment on the environmental document and hopes that this comment letter will be useful to the Lead Agency preparing the NOP and in carrying out their responsibilities in the CEQA process. CalRecycle staff requests copies of any subsequent environmental documents, copies of public notices and any Notices of Determination for this proposed project.
If the environmental document is adopted during a public hearing, CalRecycle staff requests 10 days advance notice of this hearing. If the document is adopted without a public hearing, CalRecycle staff requests 10 days advance notification of the date of the adoption and proposed project approval by the decision making body. CalRecycle staff may have further comments on the project as proposed copies of the Final Environmental Impact Report, Findings and Statement of Overriding Considerations (if one is required), Mitigation Monitoring and Reporting Program, Public Notices and any Notices of Determination.

If you have any questions regarding these comments, please contact me at 916.341.6304 or by e-mail at Christine.Karl@calrecycle.ca.gov.

Sincerely,

Christine Karl
Environmental Scientist
Permitting & Assistance Branch, North Section
Waste Permitting, Compliance & Mitigation Division

cc: Diane Vlach, Supervisor
Permitting & Assistance Branch – North Unit

Karen Sanford, Supervisor
Kern County Environmental Health Department

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San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

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NOV 2 7 2019

Lorelei H. Oviatt
County of Kern
Planning and Natural Resources Department
2700 "M" Street, Suite 100
Bakersfield, CA, 93301

Project: Notice of Preparation of a Draft Environmental Impact Report for the Lost Hills Composting and Waste to Energy Project

District CEQA Reference No: 20191270

Dear Ms. Oviatt:

The San Joaquin Valley Unified Air Pollution Control District (District) has reviewed the Notice of Preparation (NOP) for the Lost Hills Composting and Waste to Energy Project. The proposed project consists of request for land use entitlements necessary to facilitate the expanded and continued use of a Class III Non-Hazardous Industrial Waste Landfill facility and the establishment of a new Waste to Energy Biomass Gasification Facility. (Project). Implementation of the Project will require the following actions:

- **Mod. No. 1, Conditional Use Permit (CUP) No. 1, Map 28** Amendment to the boundaries of the CUP No. I , Map 28 of the existing mining facility to remove six (6) acres of the project site, which will become the location for the proposed Waste to Energy Biomass Gasification Facility.

- **Issuance of CUP No. 13, Map 28** Establishment of a new CUP that would facilitate the construction of a 3-megawatt (MW) [net] Waste-to-Energy biomass gasification facility.

- **Mod No. 2, CUP No. 9, Map 28** Amendment to CUP No. 9, Map 28 of the existing Class III Non-Hazardous Industrial Waste Landfill to include:

    - A revision in the allowable waste streams permitted at the landfill to allow the acceptance and disposal of various materials, with a maximum of 1,000 tons per day of organic material;

    - A revision to allow for an increase in permitted hours of operation, tonnage, and traffic volume; and

Samir Sheikh
Executive Director/Air Pollution Control Officer

Northern Region
4800 Enterprise Way
Modesto, CA 95356-8718
Tel: (209) 557-6400 FAX: (209) 557-6475

Central Region (Main Office)
1990 E. Gettysburg Avenue
Fresno, CA 93726-0244
Tel: (559) 230-6000 FAX: (559) 230-6061

Southern Region
34946 Flyover Court
Bakersfield, CA 93308-9725
Tel: 661-392-5500 FAX: 661-392-5585

www.valleyair.org www.healthyairliving.com

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- A new 640,000 ton per year (tpy) extended aerated static Pile (eASP) composting facility sited on 136.2 acres within the current landfill permitted facility boundary. Material accepted for composting at the facility would include up to 320,000 tpy of biosolids, green waste, food waste, and manure, and up to 320,000 tpy of wood waste, for a total 640,000 tpy.

The District offers the following comments:

Emissions Analysis

1) At the federal level for the National Ambient Air Quality Standards (NAAQS), the District is currently designated as extreme nonattainment for the 8-hour ozone standards; nonattainment for the PM2.5 standards; and attainment for the 1-Hour ozone, PM10 and CO standards. At the state level, the District is currently designated as nonattainment for the 8-hour ozone, PM10, and PM2.5 California Ambient Air Quality Standards (CAAQS). The District recommends that the Air Quality section of an Environmental Impact Report (EIR) include a discussion of the following impacts:

   a) **Criteria Pollutants:** Project related criteria pollutant emissions should be identified and quantified. The discussion should include existing and post-project emissions.

      i) Construction Emissions: Construction emissions are short-term emissions and should be evaluated separately from operational emissions. For reference, the District's annual criteria thresholds of significance for construction are: 100 tons per year of carbon monoxide (CO), 10 tons per year of oxides of nitrogen (NOx), 10 tons per year of reactive organic gases (ROG), 27 tons per year of oxides of sulfur (SOx), 15 tons per year of particulate matter of 10 microns or less in size (PM10), or 15 tons per year of particulate matter of 2.5 microns or less in size (PM2.5).

         - *Recommended Measure:* To reduce impacts from construction related exhaust emissions, the District recommends the cleanest reasonably available off-road construction fleets, as set forth in §2423 of Title 13 of the California Code of Regulations, and Part 89 of Title 40 Code of Federal Regulations.

      ii) Operational Emissions: The District faces unique challenges due to the features of the San Joaquin Valley Air Basin. There are two major arteries within the San Joaquin Valley, Highway 5 and Highway 99, which include a high volume of Heavy Duty Truck travel through the San Joaquin Valley. Motor

vehicles are the largest source of air pollution in the San Joaquin Valley Air Basin and make up over 85% of the Valley's NOx emissions, the primary driver in the formation of ozone and PM2.5 emissions.

Due to these challenges, the District recommends that all efforts be made to not bring additional organic waste material and associated transportation-related emissions into the San Joaquin Valley.

- If the expansion of the organic waste facility will involve transportation of organic waste materials into the San Joaquin Valley from locations outside of the San Joaquin Valley, the developer shall demonstrate the necessity to transport organic waste into the San Joaquin Valley through a detailed explanation and analysis. This demonstration should be part of the lead agency's CEQA environmental review process for this Project. As such, the EIR should include a requirement for a demonstration of necessity.

- In the event organic waste material is being transported from outside the San Joaquin Valley to this facility within the San Joaquin Valley, the analysis should include quantification of mobile source criteria pollutant emissions, and assess emissions increases such as those from additional Vehicle Miles Traveled (VMT). All new transport into the San Joaquin Valley is considered an increase in emissions.

  For organic waste material generated within the San Joaquin Valley and transported to this facility in the San Joaquin Valley, the analysis for such project should include quantification of pre- and post-project mobile source criteria pollutant emissions to determine if there is an increase in VMT and mobile source-related emissions.

  In both cases, for all increases in mobile source emissions, such as those resulting from an increase in VMT, the facility owner and/or operator shall be required to use of zero-emissions or near-zero-emissions heavy duty trucks. Therefore, the EIR shall include a requirement that project-specific criteria pollutant emissions be quantified, and that owners and/or operators be required to use zero-emissions or near-zero-emissions heavy duty trucks for all transport related increases in emissions resulting from the facility expansion.

- In case the EIR concludes that the Project will result in an increase in criteria pollutant emissions related to transportation (mobile sources), such emission increases should be fully mitigated to net zero via implementation of a Voluntary Emission Reduction Agreement (VERA) with the District. VERAs are designed to provide developers with an enforceable and legally defensible means to mitigate significant emission increases. A VERA is a mitigation measure by which the project proponent provides pound-for-pound mitigation of air emissions increases through a process that funds and implements emission reduction projects, which are administered through the District's emission reduction incentive grant programs. A VERA can be implemented to address air quality impacts from both construction and operational phases of a project. The emission reductions secured through VERAs are "surplus" of existing regulations, achieving reductions contemporaneously with the emissions increases caused by a project.

  Funding provided by the project proponent is reinvested in the Valley to reduce emissions. Utilizing the District's highly successful emission reduction incentive grant administration program, the funds generated under VERAs are awarded to Valley businesses, residents, and municipalities to generate real quantifiable reductions in emissions.

  Because the District quantifies and enforces the emission reductions generated by the VERA program, the District will certify that the project proponent has mitigated a specific target of emissions increases caused by the construction and operation of a development project, adding a level of defensibility to the use of VERAs as California Environmental Quality Act (CEQA) mitigation.

  VERAs have been found to be a feasible mitigation measure under CEQA. As such, the District is requiring VERA mitigation be implemented by expanding organic waste facilities within the scope of this EIR. To assist the Lead Agency and project proponent(s) with CEQA compliance, the District recommends the EIR require a VERA as a measure to mitigate all mobile source emissions associated with these projects.

  The EIR should include a requirement that any increase in the project-specific criteria pollutant emissions from mobile sources be fully mitigated to net zero via implementation of a VERA with the District.

Regarding emission analysis, permitted (stationary) and non-permitted (mobile) sources should be analyzed separately. For reference, the annual criteria thresholds of significance for operation of permitted and non-permitted sources each are: 100 tons per year of carbon monoxide (CO), 10 tons per year of oxides of nitrogen (NOx), 10 tons per year of reactive organic gases (ROG), 27 tons per year of oxides of sulfur (SOx), 15 tons per year of particulate matter of 10 microns or less in size (PM10), or 15 tons per year of particulate matter of 2.5 microns or less in size (PM2.5).

- *Recommended Measure:* Project related impacts on air quality can be reduced through incorporation of design elements, for example, that increase energy efficiency, reduce vehicle miles traveled, and reduce operational related emissions.

iii) Recommended Model: Project related criteria pollutant emissions from construction and operation of non-permitted (limited to equipment not subject to District permits) should be identified and quantified as outlined previously. Emissions analysis should be performed using CalEEMod (**Cal**ifornia **E**mission **E**stimator **Mod**el), which uses the most recent approved version of relevant Air Resources Board (ARB) emissions models and emission factors. CalEEMod is available to the public and can be downloaded from the CalEEMod website at: www.caleemod.com.

b) **Nuisance Odors:** The Project should be evaluated to determine the likelihood that the Project would result in nuisance odors. Nuisance orders are subjective, thus the District has not established thresholds of significance for nuisance odors. Nuisance odors may be assessed qualitatively taking into consideration of Project design elements and proximity to off-site receptors that potentially would be exposed objectionable odors.

c) **Health Risk Screening/Assessment:** A Health Risk Screening/Assessment identifies potential Toxic Air Contaminants (TAC's) impact on surrounding sensitive receptors such as hospitals, daycare centers, schools, work-sites, and residences. TAC's are air pollutants identified by the Office of Environmental Health Hazard Assessment/California Air Resources Board (OEHHA/CARB) (https://www.arb.ca.gov/toxics/healthval/healthval.htm) that pose a present or potential hazard to human health. A common source of TACs can be attributed to diesel exhaust emitted from both mobile and stationary sources.

The District recommends the Project be evaluated for potential health impacts to surrounding receptors (on-site and off-site) resulting from operational and multi-year construction TAC emissions.

i) The District recommends conducting a screening analysis that includes all sources of emissions. A screening analysis is used to identify projects which may have a significant health impact. A prioritization, using CAPCOA's updated methodology, is the recommended screening method. A prioritization score of 10 or greater is considered to be significant and a refined Health Risk Assessment (HRA) should be performed. For your convenience, the District's prioritization calculator can be found at: http:www.valleyair.org/busind/pto/emission_factors/Criteria/Toxics/Utilities/PRIORITIZATION%20RMR%202016.XLS.

ii) The District recommends a refined HRA for projects that result in a prioritization score of 10 or greater. Prior to performing an HRA, it is recommended that the Project proponent contact the District to review the proposed modeling protocol. The Project would be considered to have a significant health risk if the HRA demonstrates that the Project related health impacts would exceed the Districts significance threshold of 20 in a million for carcinogenic risk and 1.0 for the Acute and Chronic Hazard Indices, and would trigger all feasible mitigation measures. The District recommends that Projects that result in a significant health risk not be approved.

For HRA submittals, please provide the following information electronically to the District for review:

- HRA AERMOD model files
- HARP2 files
- Summary of emissions source locations, emissions rates, and emission factor calculations and methodology.

More information on toxic emission factors, prioritizations and HRAs can be obtained by:

- E-Mailing inquiries to: hramodeler@valleyair.org; or
- The District can be contacted at (559) 230-6000 for assistance; or
- Visiting the Districts website (Modeling Guidance) at: http://www.valleyair.org/busind/pto/Tox_Resources/AirQualityMonitoring.htm.

d) **Ambient Air Quality Analysis:** An ambient air quality analysis (AAQA) uses air dispersion modeling to determine if emissions increases from a project will cause or contribute to a violation of the ambient air quality standards. The District recommends that an AAQA be performed for the Project if emissions exceed 100 pounds per day of any pollutant.

If an AAQA is performed, the analysis should include emissions from both Project specific permitted and non-permitted equipment and activities. The District recommends consultation with District staff to determine the appropriate model and input data to use in the analysis. Specific information for assessing significance, including screening tools and modeling guidance is available online at the District's website www.valleyair.org/ceqa.

2) In addition to the discussions on potential impacts identified above, the District recommends the EIR also include the following discussions:

   a) A discussion of the methodology, model assumptions, inputs and results used in characterizing the Project's impact on air quality. To comply with CEQA requirements for full disclosure, the District recommends that the modeling outputs be provided as appendices to the EIR. The District further recommends that the District be provided with an electronic copy of all input and output files for all modeling.

   b) A discussion of the components and phases of the Project and the associated emission projections, including ongoing emissions from each previous phase.

   c) A discussion of Project design elements and mitigation measures, including characterization of the effectiveness of each mitigation measure incorporated into the Project.

      i) The following policies/mitigation measures are recommended to reduce or mitigate impacts from criteria pollutant emissions:

         (1) Use of off-road construction fleets shall use the cleanest reasonably available, as set forth in §2423 of Title 13 of the California Code of Regulations, and Part 89 of Title 40 Code of Federal Regulations. Therefore, the District recommends incorporating, as a condition of Project approval, a requirement that off-road construction equipment used on site be the cleanest reasonably available as set forth in state and federal regulations.

         (2) When applicable, for projects exceeding the applicability thresholds identified in Section 2.0 of District Rule 9510, a condition of Project approval requiring demonstration of compliance with Rule 9510, prior to the issuance of grading and/or building permits.

(3) When applicable, for projects subject to District permitting requirements, demonstration of compliance with District Rule 2201, such as a copy of the Authority to Construct (ATC), before issuance of the first building permit, be made a condition of project approval.

ii) The following policies/mitigation measures are recommended to mitigate potential health impacts of individual projects:

(1) Development projects resulting in toxic air contaminant emissions will be located an adequate distance from residential areas and other sensitive receptors in accordance to ARB's *Air Quality and Land Use Handbook: A Community Health Perspective.*

(2) A health risk screening and/or assessment will be performed to assess potential risks to sensitive receptors for the following projects:

(3) Projects whose proposed locations are within the established buffer distances identified in ARB's handbook;

(4) Projects whose land uses are not specifically identified in ARB's handbook (such as shopping centers), but there is sufficient information to reasonably conclude that sensitive receptors would be exposed to significant sources of toxic air contaminants; and

(5) Projects that would otherwise appear to be exempt from CEQA requirements, but there is sufficient information to reasonably conclude that sensitive receptors would be exposed to significant sources of toxic air contaminants, such as industrial use projects allowed by right.

d) A discussion of whether the Project would result in a cumulatively considerable net increase of any criteria pollutant or precursor for which the San Joaquin Valley Air Basin is in non-attainment. More information on the District's attainment status can be found online by visiting the District's website at: http://valleyair.org/aqinfo/attainment.htm.

e) As required by the recent decision in *Sierra Club v. County of Fresno* (2018) 6 Cal.4th 502, a reasonable effort to discuss relevant specifics regarding the connection between potential adverse air quality impacts from the Project with the likely nature and magnitude of potential health impacts. If the potential health impacts from the Project cannot be specifically correlated, explain what is known and why, given scientific constraints, potential health impacts cannot be translated.

District Rules and Regulations

3) The proposed Project may be subject to District rules and regulations, including: Regulation VIII (Fugitive PM10 Prohibitions), Rule 4102 (Nuisance), and Rule 4641 (Cutback, Slow Cure, and Emulsified Asphalt, Paving and Maintenance Operations). In the event an existing building will be renovated, partially demolished or removed, the Project may be subject to District Rule 4002 (National Emission Standards for Hazardous Air Pollutants).

4) This Project will be subject to District Rule 2010 (Permits Required) and Rule 2201 (New and Modified Stationary Source Review) and will require District permits. Prior to construction, the Project proponent should submit to the District an application for an Authority to Construct (ATC). For further information or assistance, the project proponent may contact the District's Small Business Assistance (SBA) Office at (209) 557-6446.

5) Per District Rule 9510 (Indirect Source Review) section 4.4.3, a development project on a facility whose primary functions are subject to District Rule 2201 or District Rule 2010 are exempt from the requirements of the rule. The District has reviewed the information provided and has determined that the primary functions of this Project are subject to District Rule 2201 (New and Modified Stationary Source Review Rule) or District Rule 2010 (Permits Required). As a result, District 9510 requirements and related fees do not apply to the Project referenced above.

   Therefore, the project proponent is required to obtain a District Authority to Construct prior to installation of equipment that controls or may emit air contaminants, including but not limited to emergency internal combustion engines, boilers, and baghouses. For more information please visit http://www.valleyair.org/busind/pto/ptoforms/1ptoformidx.htm or contact the District's Small Business Assistance.

6) The Project may be subject to District Rule 9410 (Employer Based Trip Reduction) if the Project would result in employment of 100 or more "eligible" employees. District Rule 9410 requires employers with 100 or more "eligible" employees at a worksite to establish an Employer Trip Reduction Implementation Plan (eTRIP) that encourages employees to reduce single-occupancy vehicle trips, thus reducing pollutant emissions associated with work commutes. Under an eTRIP plan, employers have the flexibility to select the options that work best for their worksites and their employees. Information about how District Rule 9410 can be found online at: www.valleyair.org/tripreduction.htm. For additional information, you can contact the District by phone at 559-230-6000 or by e-mail at etrip@valleyair.org

7) The above list of rules is neither exhaustive nor exclusive. To identify other District rules or regulations that apply to this Project or to obtain information about District permit requirements, the applicant is strongly encouraged to contact the District's Small Business Assistance (SBA) Office at (661) 392-5665. Current District rules can be found online at the District's website at: www.valleyair.org/rules/1ruleslist.htm.

The District recommends that a copy of the District's comments be provided to the Project proponent. If you have any questions or require further information, please call Eric McLaughlin at (559) 230-5808.

Sincerely,

Arnaud Marjollet
Director of Permit Services

Robert Gilles
Program Manager

AM: em

Ronelle Candia

From: Dave Lee
Sent: Friday, September 20, 2019 3:34 PM
To: Ronelle Candia
Subject: Holloway Compost Facility

Good afternoon, Ronelle. I wanted to let you know that Public Works will be considering a prospective host fee and feedstock reservation for the proposed HM Holloway composting project. Public Works is open to sitting down with the project applicant in the future. If you have any questions in the interim, feel free to reach out to Tony or myself. Thank you and have a great weekend!

Dave Lee - Kern County Public Works
Operations - Waste Planning & Reporting
Waste Management Supervisor
O: (661) 862-8765
C: (661) 496-4674

CRAIG M. POPE, P.E., DIRECTOR
ADMINISTRATION & ENGINEERING
BUILDING & CODE
OPERATIONS

KERN COUNTY
PUBLIC WORKS

2700 "M" STREET, Suite 400
BAKERSFIELD, CA 93301-2370
Phone: (661) 862-5000
FAX: (661) 862-8851
Toll Free: (800) 552-5376 Option 5
TTY Relay: (800) 735-2929

Kern County Planning and Natural Resources Department
Attn: Ronelle Candia
2700 "M" Street, Suite 100
Bakersfield, CA 93301

RE: NOP-DEIR, Lost Hills Composting and Waste-to-Energy Project

Dear Ronelle Candia,

Thank you for the opportunity to comment on the proposed project. The following comments are respectfully submitted by the Kern County Public Works Department (KCPWD):

Traffic and Tonnage Capacity – Disposal Facility
The proposed project includes no expansion of inbound traffic and tonnage into the disposal operation. The HM Holloway Class III, Industrial Disposal Site currently receives organics in the form of Class A and Class B biosolids. Transferring biosolids from disposal to composting and/or to waste-to-energy, should create an opportunity to decrease the allowable inbound disposal tonnage limit to ensure no net mobile source impacts. Restating, inbound trucks with biosolids would be a subset of the proposed compost/WTE operation traffic counts thus creating a mitigation opportunity by decreasing inbound traffic and tonnage limits for disposal.

Expansion of Material Types
KCPWD believes expanding the list of disposal site material types can impact Kern County on a variety of levels. Jurisdictions within Kern County are in compliance with the 50% diversion mandate set through AB 939. Expanding the list of acceptable material types for disposal may create jurisdictional fiscal impacts caused by increased local disposal which, in turn, may create the need for increased diversion to maintain AB 939 compliance.

The proposed list includes construction-demolition waste, excess compost, clean soil, paper, cardboard, lumber, clean asphalt, concrete, brick, gravel, asphalt grindings and most forms of organic waste such as grass, wood and prunings. These material types are routinely diverted from disposal, thus the request for expansion of material types does not appear to be in concert with project objectives. Allowing disposal of these waste streams from Kern County would create a financial burden for Kern County businesses and residents due to the need to increase recycling/diversion tonnages to offset increased disposal. The most fiscally responsible recycling/diversion programs are currently employed locally, thus more expensive options would be required which will significantly increase costs.

Secondly, if the acceptable materials list is expanded, the site may no longer be viewed as an industrial waste site only, thus there is potential that CalRecycle will evaluate disposal modifications differently. Each year, Calrecycle evaluates each jurisdiction's disposal. As part of the evaluation, each jurisdiction has the opportunity to modify (decrease) disposal by petitioning to remove certain waste streams that qualify as non-hazardous or designated wastes. These streams have public health and safety issues and should not be handled through recycling systems. The KCPWD has successfully worked with the state to modify disposal from the Holloway Class III Industrial landfill. However, should the expansion of

material types create more scrutiny and limitations on Kern County disposal modification opportunities, this can create the need to divert more of the current disposal waste stream at higher costs. This concern cannot be substantiated at this time, however should this come to fruition, KCPWD would encourage Lost Hills Environmental (LHE) LLC to consider alternative strategies to avoid disposal.

Kern Unincorporated Disposal Increase Due to Compost Operations
Residuals disposed from the compost operation will count as Kern Unincorporated jurisdictional disposal. Even though the composting operation will serve primarily out-of-county sources, kern unincorporated will show increased annual disposal tonnage since the facility is located in the kern unincorporated area. KCPWD believes this can create a financial burden on Kern County residents and businesses by necessitating additional recycling and diversion to continue to meet state recycling mandates.

Summary
Kern County Public Works Department supports Lost Hills Environmental LLC in its efforts to address the growing need for organics materials handling. Through expanding composting capacity and incorporating new technologies, the LHE LLC project can help integrate out-of-county and localized Kern County organic feedstocks as part of Kern County organics strategic planning.

With that said, in order to remain in compliance with state recycling/diversion regulations, the county would need to divert 1 additional ton of material for every ton of material accepted for disposal at the Holloway facility either from Kern Unincorporated sources or as a result of the proposed compost facility. Given the magnitude of the proposed tonnages, this is expected to have significant negative impacts on county rate payers who would have to subsidize the cost of the additional recycling required.

If you have any questions or comments, please contact Brandon Fontes at (661) 862- 8975 or myself at (661) 862-8971.

Sincerely,

Anthony Bonanno,
Public Works Manager

Kern County
Superintendent of Schools

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Kern County

Office of Mary C. Barlow ...advocates for children

November 1, 2019

Kern County Planning Department
Attn: Cindi Hoover, Planner I
2700 M Street, Suite 100
Bakersfield, CA 93301

Our File No.: CO19-0172

RE: **DEVELOPER FEES FOR**: EIR for MOD No. 2 CUP No. 9; MOD No. 1 CUP No. 1; CUP No. 13, Map No. 28-24 & 25
(East and West side of Holloway Rd, 2 miles north of Hwy 46)

Dear Ms. Hoover,

This office represents the Lost Hills Union and Wasco High School Districts with regard to the imposition of developer fees, and appreciates the opportunity to respond on behalf of the districts regarding the proposed project. This letter is limited to addressing the possible effects which the project might have on school facilities created by students attributable to the project. It is not intended to address other possible environmental concerns which might be identified by the district(s) after reviewing it.

It is our determination that the above mentioned project proposed (a) Amendment to the boundaries of CUP No. 1, of the existing mining facility to remove 6 acres of the project site, which will become the location of the proposed Waste-to-Energy Biomass Gasification Facility, (b) New CUP No. 13 to construct a 3-megawatt Waste-to-Energy biomass gasification facility, (c) Amend CUP No. 9 to revise allowable waste streams, increase hours of operation, tonnage and traffic volume and add new 640,000 ton per year extended aerated static pile composting facility sited on 136.2 acres within the current landfill permitted facility boundary would have no significant effects on these districts' facilities, however, neither district expects the County to impose any condition related to the financing of public facilities at this time.

Thank you for the opportunity to comment on the project. Should you have any questions, or if we can be of any further assistance in this matter, please contact me at 636-4599, or through e-mail at anwatson@kern.org.

Sincerely,

Mary C. Barlow
County Superintendent of Schools

awatson

Andrea Watson, Specialist
School District Facility Services

ALW
cc: District(s)

1300 17th Street – CITY CENTRE | Bakersfield, CA 93301-4533
(661) 636-4000 | FAX (661) 636-4130 | TDD (661) 636-4800 | www.kern.org

Office Memorandum

KERN COUNTY

To: Planning and Natural Resources Department
Ronelle Candia

Date: November 15, 2019

From: Public Works Department
Floodplain Management Section
Kevin Hamilton, by Brian Blase

Phone: (661) 862-5098
Email: BlaseB@kerncounty.com

Subject: Notice of Preparation of Environmental Impact Report
Lost Hills Composting and Waste to Energy Project

Our section has reviewed the attached subject documents and has the following comments:

The subject property is subject to flooding.

Therefore, this section recommends the following be included as Conditions of Approval for this project:

Associated flood hazard requirements will need to be incorporated into the design of this project per the Kern County Floodplain Management Ordinance.

COUNTY OF KERN
PUBLIC WORKS DEPARTMENT
Office Memorandum

To: Lorelei Oviatt, Director
Planning & Natural Resources Department
Attn: Ronelle Candia, Supervising Planner

November 26, 2019

From: Warren D. Maxwell, Development Review Engineer
Administration and Engineering Division

Subject: 7-5.3 Notice of Preparation of Draft Environmental Impact Report and Traffic Impact Study – Lost Hills Composting and Waste to Energy Project by Lost Hills Environmental, LLC.

This Department has reviewed the Notice of Preparation for the Draft Environmental Impact Report for the subject project and have the following comments:

1. This Department has reviewed the Traffic Impact Study dated October 2018 prepared by Ruettgers and Schuler Civil Engineers and has the following comments:

    a. Table 7 on page 19 indicates that the existing Traffic Index (TI) for Holloway Road is 9.0. Please revise this table to reflect the existing TI to be 9.5. This was determined from table 613.3C of the California Highway Design Manual.

    b. Table 8 on page 20 indicates that the Existing Plus Project Traffic Index (TI) for Holloway Road is 10.0. Please revise this table to reflect the Existing Plus Project TI to be 10.5. This was determined from table 613.3C of the California Highway Design Manual.

    c. Revise Table 10 to reflect TI changes.

    d. Revise Table 11 to reflect TI changes.

    e. Revise paragraph four on page 23 to include any updated structural improvements that may change due to the increase in Traffic Indexes.

2. Please submit a signed and stamped Traffic Impact Study (TIS).

3. Under encroachment permit issued by the Kern County Public Works Department, construct asphalt concrete overlay on Holloway Road between State Route 46 and GP Road. This overlay shall be consistent with the approved traffic study and structural analysis.

4. All easements shall be kept open, clear, and free from buildings and structures of any kind pursuant to Chapters 18.50 and 18.55 of the Kern County Land Division Ordinance. All obstructions, including utility poles and lines, trees, pole signs, fences, or similar obstructions, shall be removed from the ultimate road rights-of-way. Compliance with this requirement is the responsibility of the applicant and may result in significant financial expenditures.

Thank you for the opportunity to comment on this project, if you have any questions or comments please contact Joshua Champlin at 862-8844.

Office of the Fire Marshal
Kern County Fire Department

Fire Prevention
2820 M St. • Bakersfield, CA 93301 • www.kerncountyfire.org
Telephone 661-391-3310 • FAX 661-636-0466/67 • TTY Relay 800-735-2929

November 27, 2019

Kern County Planning and Natural Resources Department
2800 M St., Bakersfield, CA 93301
Attn.: Ronelle Candia

Re: Kern County Fire Department Comments Regarding Planning Department Project

To Whom It May Concern,

The Kern County Fire Department (KCFD), as the local fire authority, has received a request for comments regarding **Environmental Impact Report PLN 18-01978**. Upon initial review, it has been determined that all new construction will require the presence of fire water, application for a building permit and fire plan review.

A more detailed review and project comments will be conducted when the building permit is pulled and plans are submitted to KCFD.

Please feel free to call our Fire Prevention Office at 661-391-3310 with any questions.

Sincerely,
Michael Nicholas
Assistant Fire Marshal
Kern County Fire Department

Cindi Hoover

From: Ronelle Candia
Sent: Thursday, November 12, 2020 10:51 AM
To: Jesus Alonso
Cc: Cindi Hoover
Subject: RE: Lost Hills waste to energy

Good Morning,

Thank you for the comments. Please let me know the mailing address you would like the Draft EIR to be mailed to once it is ready for circulation.

Thank you,
Ronelle

Ronelle R. Candia
Supervising Planner – Advanced Planning Division Kern County Planning & Natural Resources Department
2700 "M" Street, Suite 100
Bakersfield, CA 93301
Phone: 661.862.8997
Email: CandiaR@KernCounty.com

-----Original Message-----
From: jalonso@cleanwater.org <jalonso@cleanwater.org>
Sent: Thursday, November 12, 2020 10:18 AM
To: Ronelle Candia <Candiar@kerncounty.com>
Subject: Lost Hills waste to energy

CAUTION: This email originated from outside of the organization. Do not click links, open attachments, or provide information unless you recognize the sender and know the content is safe.

Thank you for taking my call today.

EIR Concerns or questions from Lost Hills Residents:

-Will there be an Air Quality accumulative impact analysis?
-What impact will the increase truck traffic have on the community? Will the route used by trucks go through the community or will it go around?
-As the community will be directly downwind of the proposed project will there be an increase in strong odors?
-what mitigations efforts will be exercised in order to balance the expected increase in air pollution?

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Appendix B

Air Quality Technical Report and Supporting Information

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Appendix B.1

Air Quality and GHG Technical Report

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Lost Hills Composting and Waste to Energy Projects (PP8111)

Prepared For:

Lost Hills Environmental, LLC
14045 Holloway Road
Lost Hills, CA

And

Aries-Holloway Bioenergy, LLC
13850 Holloway Road
Lost Hills, CA

April 2020

Prepared by:

Yorke ENGINEERING, LLC
www.YorkeEngr.com

Office Locations:
Los Angeles, Orange, Riverside, Ventura, Kern, San Diego, Fresno, Merced, Alameda, Sacramento, and Santa Clara Counties

Tel: (949) 248-8490
Fax: (949) 248-8499

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Lost Hills Composting and Waste to Energy Projects – Air Quality and GHG Technical Report

Lost Hills Composting and Waste to Energy Projects (PP8111)

Air Quality and GHG Technical Report

Prepared for:

Lost Hills Environmental LLC
14045 Holloway Road,
Lost Hills, CA

And

Aries-Holloway Bioenergy, LLC
13850 Holloway Road,
Lost Hills, CA

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Much of the emissions calculation methodologies, health risk prioritization methodology, description of the existing environment, report figures, and the odor impact assessment were developed by Mike Kelly of Vector Environmental, Inc. The emissions calculations and impact analyses were revised or completed by Yorke Engineering, LLC as needed to reflect updated baseline information, project description, and refinement of the emissions calculation assumptions using this initial development work as a starting point.

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List of Acronyms, Abbreviations, and Symbols

AADT	Annual Average Daily Traffic
AAQA	Ambient Air Quality Analysis
AAQS	Ambient Air Quality Standards
AB	Assembly Bill
ADMRT	Air Dispersion Modeling and Risk Tool
AP-42	EPA Compilation of Air Pollutant Emission Factors
AQAP	Air Quality Attainment Plan
AQRV	Air Quality Related Value
Aries	Aries Clean Energy
ARM2	Ambient Ratio Method 2
ATC	Authority to Construct
ATSDR	Agency for Toxic Substances and Disease Registry
BAAQMD	Bay Area Air Quality Management District
BACT	Best Available Control Technology
BAU	Business as Usual
BPIPPRM	Building Profile Input Program for PRIME
BPS	Best Performance Standards
Btu	British Thermal Unit
C&D	Construction and Demolition
CA	California
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CalEEMod	California Emissions Estimator Model®
CalRecycle	California Department of Resources Recycling and Recovery
Caltrans	California Department of Transportation
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resources Board
CAS	Chemical Abstracts Service
CCR	California Code of Regulations
CDC	Center for Disease Control and Prevention
CDPH	California Department of Public Health
CERF	[United Nations] Central Emergency Response Fund
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CH_4	Methane
CIWMB	California Integrated Waste Management Board
C:N	Carbon to Nitrogen Ratio
CO	Carbon Monoxide
CO_2	Carbon Dioxide

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CO_2e	Carbon Dioxide Equivalent
CTI	California Toxics Inventory
CUP	Conditional Use Permit
DOORS	Diesel Off-Road Online Reporting System
DPM	Diesel Particulate Matter
DRI	Desert Research Institute
D/T	Dilutions to Threshold
eASP	Extended Aerated Static Pile
e.g.	Exempli gratia, a Latin phrase meaning “for example”
e-GGRT	electronic Greenhouse Gas Reporting Tool
EIR	Environmental Impact Report
EISA	Energy Independence and Security Act
EPA	[United States] Environmental Protection Agency
EO	Executive Order
ERC	Emission Reduction Credit
et al.	Et alia, a Latin phrase meaning “and the others”
FAH	Fraction of Time at Home
FLAG	Federal Land Managers’ Air Quality Related Values Work Group
FLM	Federal Land Manager
FOD	First order of decay
FOG	Fats, Oils, and Greases
ft^2	Square feet
GAMAQI	[SJVAPCD] Guide for Assessing and Mitigating Air Quality Impacts
GCS	Gas Collection System
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GLC	Ground-Level Concentration
g/s	Gram per second
GWP	Global Warming Potential
H_2S	Hydrogen Sulfide
H_2SO_4	Sulfuric Acid Mist
H&SC	[California] Health & Safety Code
HAP	Hazardous Air Pollutant
HARP2	Hotspots Analysis and Reporting Program, Version 2
HCM	Highway Capacity Model
HEPA	High Efficiency Particulate Air
HIA	Acute Hazard Index
HIC	Chronic Hazard Index
Holloway	H. M. Holloway, Inc. or the Holloway Group
hp	Horsepower
hr	Hour

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HRA	Health Risk Assessment
HSDB	Hazardous Substances Data Bank
I-5	Interstate 5
ID	Identification
i.e.	Id est, a Latin phrase meaning “that is”
IPCC	International Panel on Climate Change
IQ	Intelligence Quotient
ISR	Indirect Source Review
m	Meter
m^2	Square meter
m^3	Cubic meter
KCOG	Kern Council of Governments
KCPD	Kern County Planning and Natural Resources Department
KCPHSD	Kern County Public Health Services Department
km	kilometer
lb(s)	Pound(s)
LCFS	Low Carbon Fuel Standard
LEA	Local Enforcement Agency
LFG	Landfill Gas
LLC	Limited Liability Company
LOS	Level of Service
MEIR	Maximally Exposed Individual Resident
MEIW	Maximally Exposed Individual Worker
mg	Milligram
MMBtu/hr	Million British Thermal Units per Hour
MMT	Million Metric Tons
mph	Miles per hour
MPO	Metropolitan Planning Organization
MRR	[GHG] Mandatory Reporting Regulation
MSW	Municipal Solid Waste
MT	Metric Ton
MW	Megawatts
NAAQS	National Ambient Air Quality Standards
NAD	North American Datum
NATA	National Air Toxics Assessment
NED	National Elevation Dataset
NEI	Net Emissions Increase
NESHAP	National Emission Standards for Hazardous Air Pollutants
NH_3	Ammonia
NIOSH	National Institute for Occupational Safety and Health
NMOC	Non-Methane Organic Compounds

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N_2O	Nitrous Oxide
NO_x	Oxides of Nitrogen
NO_2	Nitrogen Dioxide
NOP	Notice of Preparation
NPS	National Park Service
NSPS	New Source Performance Standard
NSR	New Source Review
NWS	National Weather Service
O_3	Ozone
ODT	Odor Detection Threshold
OEHHA	[California] Office of Environmental Health Hazard Assessment
OER	Odor Emission Rate
OIMP	Odor Impact Minimization Plan
OLM	Ozone Limiting Method
OPR	[Governor's] Office of Planning and Research
ORC	Organic Rankine Cycle
OU	Odor Unit
PAH	Polycyclic Aromatic Hydrocarbon
Pb	Lead
PM	Particulate Matter
$PM_{2.5}$	Fine Particulate Matter (Less Than 2.5 Microns in Size)
PM_{10}	Respirable Particulate Matter (Less Than 10 Microns in Size)
PMI	Point of Maximum Impact
Projects	Lost Hills Composting and Waste to Energy Projects (PP8111)
ppb	Parts per Billion
ppbv	Parts per Billion by Volume
ppm	Parts per Million
ppmv	Parts per Million by Volume
PSD	Prevention of Significant Deterioration
PTE	Potential to Emit
PTO	Permit to Operate
PVC	Polyvinyl chloride
PVMRM	Plume Volume Molar Ratio Method
REL	Reference Exposure Levels
ROG	Reactive Organic Gas
RTECS	Registry of Toxic Effects of Chemical Substances
RTP	Regional Transportation Plan
SANDAG	San Diego Association of Governments
SAR	Second Annual Report [of the IPCC]
SB	Senate Bill
SCR	Selective Catalytic Reduction

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SCS	Sustainable Communities Strategy
SIDS	Sudden Infant Death Syndrome
SIL	Significant Impact Level
SIP	State Implementation Plan
SJVAB	San Joaquin Valley Air Basin
SJVAPCD	San Joaquin Valley Air Pollution Control District
SLAMS	State and Local Air Monitoring Station
SO_2	Sulfur Dioxide
SO_x	Oxides of Sulfur
SOER	Surface Odor Emission Rate
S.R.	State Route
SSIPE	Stationary Source Increase in Permitted Emissions
SSPE1	Modified Stationary Source Potential to Emit
SSPE2	New Stationary Source Potential to Emit
SWMF	Solid Waste Management Facility
TAC	Toxic Air Contaminant
TPD	Tons per Day
TPY	Tons per Year
TRS	Total Reduced Sulfur
TS	Total Score
UNFCCC	United Nations Framework Convention on Climate Change
URF	Unit Risk Factor
U.S.	United States
U.S.C.	United States Code
USGS	United States Geological Survey
UTM	Universal Transverse Mercator
VDECS	Verified Diesel Emission Control Strategies
VERA	Voluntary Emission Reduction Agreement
VFA	Volatile Fatty Acid
VOC	Volatile Organic Compound
WAF	Worker Adjustment Factor
WDR	Waste Discharge Requirements
WWTP	Wastewater Treatment Plant
yr	Year
ZEV	Zero Emissions Vehicle
°C	Degrees Centigrade
°F	Degrees Fahrenheit
µm	Micron
$\mu g/m^3$	Micrograms per Cubic Meter
%	Percent
X/Q	Average Pollutant Concentration Normalized by Source Strength

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EXECUTIVE SUMMARY

Project Overview

Lost Hills Environmental LLC, an affiliate of H.M. Holloway, Inc. (Holloway), owns and operates the Lost Hills Solid Waste Management Facility (SWMF or Lost Hills Facility), a nonhazardous industrial waste landfill facility located in Kern County near Lost Hills, CA. Lost Hills Environmental LLC has submitted an application to Kern County to amend the Conditional Use Permit (CUP) for the SWMF to include the proposed Lost Hills Composting and Waste to Energy Projects (PP8111).

Modifications proposed for the existing Lost Hills SWMF CUP include:

- Allowance for additional waste streams to be disposed of within the landfill;
- An extension of the hours of operation of the landfill to 24 hours a day, 365 days per year; and
- Addition of a composting operation on 136.2 acres within the existing landfill boundaries.

In addition, 6 acres on the east side of Holloway Road are being removed from the Lost Hills SWMF CUP Map 28 to facilitate the development of a waste to energy biomass gasification ("bioenergy") facility. The bioenergy facility will be constructed and operated under a joint development agreement between Aries Clean Energy (Aries) and Holloway, as Aries-Holloway Bioenergy, LLC. The bioenergy facility will be issued a separate CUP.

Although these modifications and new facilities are being developed as separate projects and will have separate CUPs, they are being analyzed in the same Environmental Impact Report (EIR) due to their proximity to one another and coincident timing to ensure that combined impacts are sufficiently analyzed.

The proposed Projects would support the State of California's goal in complying with California's Mandatory Commercial Recycling Law, approved by the Office of Administrative Law on May 7, 2012, under Assembly Bill (AB) 341, which directs the California Department of Resources Recycling and Recovery (CalRecycle) to increase statewide diversion of solid waste to 75% by 2020. The Projects would also support AB 1826, which requires public agencies and businesses that generate designated quantities of food, poultry, biosolids, and green waste to segregate and arrange for appropriate processing (e.g., composting) of such discarded materials to further reduce landfilling. Furthermore, the Projects will help to support CalRecycle's Senate Bill (SB) 1383, which establishes targets to achieve a 50 percent reduction in the level of the statewide disposal of organic waste from the 2014 level by 2020, and a 75 percent reduction by 2025.

This Air Quality and Greenhouse Gas (GHG) Technical Report has been prepared by Yorke Engineering, LLC (Yorke) to analyze the impacts on air quality from criteria pollutant and toxic air contaminant (TAC) emissions due to the proposed modifications at the Lost Hills SWMF, including the new composting area, and the new bioenergy facility (i.e., the proposed Projects). The construction and operation of the proposed new compost area and an assessment of the additional types of wastes to be processed/disposed at this landfill facility up to a projected 2030 closure date are analyzed, and the results are presented in this report. The air quality impacts of emissions from the Aries–Holloway Bioenergy Project are also analyzed. A discussion of the

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combined effects of both projects is included. GHG emissions are also estimated and the potential impacts of these emissions are discussed for the combined projects.

Emissions Calculations

The Lost Hills landfill is currently permitted to accept up to 2,000 tons per day (TPD) of waste and is proposed to remain at this level. Most of the current landfill operations are not expected to change related to the proposed Project, and hence the associated emissions from the existing landfill operation are not analyzed in this report. And although the landfill has been permitted since 2009 to accept Class A and B biosolids (i.e., biodegradable organic wastes), an assessment was done of the landfill gas (LFG) emissions related to the decay of biodegradable organic wastes, which are now proposed to include a wider variety of waste types, out to a projected closure date of 2030. Because the amount of total wastes (both inert and biosolids) have been below the maximum 2,000 TPD permitted level, actual disposal rates from 2009 through 2019 were used for the calculation of baseline emissions for the LFG analyses contained in this report.

The increased emissions of criteria pollutants, TACs, and GHGs from 1) the operation of the landfill with additional waste streams, 2) construction and operation of the proposed composting area, and 3) construction and operation of the bioenergy facility, are analyzed in this report.

Construction Emissions

The changes proposed to the permit for the landfill include extending the hours of operation and allowing additional types of waste to be disposed, neither of which require construction activities.

The compost facility operations will be phased in over a number of years depending on demand for product. The construction of the infrastructure for each of three phases of the composting operation is expected to take from 30 to 60 days. Construction of the composting facility will consist primarily of grading the SWMF property that is generally already flat and installation of the solar-powered blower systems. Compost area construction requires the use of onroad and offroad vehicles and equipment that are similar to the equipment that will be used for compost facility operations. The intensity of vehicle and equipment activity during compost area construction during each phase is expected to be lower than the intensity during normal operations of the compost. Further, the construction of the compost facility would occur concurrent with landfill operations and would not be a separate, discrete activity. Construction emissions for the compost area were estimated and determined to be much lower than compost operating emissions. This finding confirms that operations emissions during phase 3 would represent the worst case scenario over any other concurrent operations and construction periods for Phases 1 and 2.

Activities associated with the construction of the bioenergy plant will last for approximately 11 months. Emissions associated with construction will occur from the construction equipment associated with the ground disturbance for grading, construction of the structures, paving, trucks delivering equipment, and workers commuting.

Criteria pollutant emissions from construction activities were estimated to be well below the San Joaquin Valley Air Pollution Control District (SJVAPCD) significance thresholds for construction for both the compost area and the bioenergy plant.

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Operations Emissions

The LFG emissions related to actual amounts of biosolids deposited in the landfill from 2009 to 2019 were estimated, and a projection of the LFG emissions associated with assumed organic waste disposal from 2020 until closure in 2030 was made. Emissions from the operation of the new compost area, including onroad trucks to deliver feedstock for composting and transport compost products to the market, as well as the emissions related to the composting operation, were estimated. Operations emissions from the bioenergy plant were also estimated.

Table ES-1 shows the summary of the annual criteria pollutant emissions calculations for these project operations in tons per year (TPY) and compares these emissions to CEQA thresholds applicable to each pollutant. The SJVAPCD has indicated that each of the three operations, i.e., the landfill, compost area, and bioenergy project, are separate stationary sources and will each be issued a separate air permit. Based on the SJVAPCD Guide for Assessing and Mitigating Air Quality Impacts (GAMAQI), sources subject to permitting are compared to the California Environmental Quality Act (CEQA) criteria separately from sources not required to obtain permits, such as onroad mobile sources.

For emissions from sources that are required to be permitted and are over the applicable offset thresholds, the operator must obtain emissions reductions credits (ERCs) to offset the emissions to meet the new source review (NSR) requirements of the SJVAPCD. The offset thresholds are the same as the annual CEQA emissions thresholds, e.g., 10 TPY for oxides of nitrogen (NO_x) and volatile organic compounds (VOC). Table ES-1 indicates that ERCs may be required by the SJVAPCD for NO_x emissions from the bioenergy plant and for VOC emissions associated with the LFG emissions, however actual offset requirements may vary to reflect determinations by the SVJAPCD during permit application processing and/or when the emissions would reach these levels. For instance, the LFG VOC emissions may only reach the levels shown in Table ES-1 if the maximum permitted amount of organic wastes is deposited in the landfill every year. VOC ERCs will definitely be required by SJVAPCD for the compost facility and would be surrendered to the SJVAPCD when each phase is constructed. Offsets are not expected to be required for any other criteria pollutant emissions.

Emissions from sources that are not required to be permitted, e.g., mobile sources, are also shown in Table ES-1 and are compared separately to the CEQA annual emissions thresholds for non-permitted sources, as dictated by the GAMAQI. In this case, only the NO_x emissions from non-permitted sources at the compost facility have the potential to exceed the CEQA threshold once Phase 3 is developed. NSR offsets are not required for non-permitted source emissions. However, Lost Hills Environmental LLC would enter into a Voluntary Emissions Reduction Agreement (VERA) with the SJVAPCD if needed once Phase 3 of the compost facility is constructed, based on NO_x emissions calculated for the non-permitted sources expected for the compost area at that time. With the provision of a VERA for compost area mobile source NO_x emissions during Phase 3 operations, all criteria pollutant emissions from non-permitted sources would be below the applicable CEQA thresholds.

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Table ES-1: Comparison of Criteria Pollutant Operations Emissions to CEQA Thresholds

Category	Source	Annual Operations Emissions (TPY)					
		NO_x	VOC	CO	SO_x	PM_{10}	$PM_{2.5}$
Permitted Source Emissions	Baseline Landfill (LFG)	0.0	9.8	0.0	0.0	0.0	0.0
	Landfill (LFG + Flare)	4.7	15.6	1.5	0.2	1.6	1.6
	ERCs Potentially Required?	No	Yes [a]	No	No	No	No
	Compost Area Phase 1	--	63.2	--	--	0.01	0.01
	Compost Area Phase 2	--	28.3	--	--	0.01	0.01
	Compost Area Phase 3	--	108.0	--	--	0.02	0.02
	ERCs Required?	No	Yes	No	No	No	No
	Bioenergy Project	13.3	0.2	1.9	17.1	3.3	3.2
	ERCs Potentially Required?	Yes [b]	No	No	No	No	No
CEQA Permitted Source Threshold		10	10	100	27	15	15
Exceed Threshold After ERCs? [c]		No	No	No	No	No	No
Non-Permitted Source Emissions	Landfill (no change)	0.0	0.0	0.0	0.0	0.0	0.0
	Compost Area Phase 1	6.5	0.5	8.8	0.03	4.6	0.7
	Compost Area Phase 2	2.9	0.2	3.9	0.01	2.0	0.3
	Compost Area Phase 3	11.0	0.9	14.9	0.05	7.8	1.3
	VERA Potentially Needed? [d]	Yes	No	No	No	No	No
	Bioenergy Project	3.2	0.1	1.2	0.02	4.1	0.8
CEQA Non-Permitted Source Threshold		10	10	100	27	15	15
Exceed Threshold After VERA?		No	No	No	No	No	No

Notes:

a. Landfill emissions reflect projected LFG emissions minus the baseline. A flare is required to be used after the LFG emissions reach a specific level. ERC requirements will be based on emissions increases over the currently permitted levels. ERCs would be required for VOC emissions over 10 TPY, but LFG emissions are cumulative over time based on actual amounts of organics in the waste, so this level may not be reached.

b. For permitting, the bioenergy plant may accept a permit limit below the 10 TPY offset threshold for NO_x emissions.

c. The CEQA threshold for permitted sources is applied to each stationary source separately. If ERCs are required, that stationary source's emissions would be offset to below the CEQA thresholds.

d. If non-permitted source emissions are over the CEQA thresholds (which are applied separately to each project), a VERA can be provided to mitigate these mobile source emissions. The bioenergy plant's emissions are below the thresholds and the compost area only has the potential to exceed the 10 TPY significance level for NO_x once Phase 3 of the compost area is developed. The Applicant will evaluate if non-permitted source NO_x emissions for the total compost operation are projected to be over the 10 TPY threshold when Phase 3 is developed, and if so, may be required to enter into a VERA with the SJVAPCD at that time.

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Ambient Air Quality Analyses

Since some criteria pollutant emissions shown in Table ES-1 are over the applicable emissions thresholds (before accounting for ERCs), ambient air quality analyses (AAQAs) were prepared to determine if the emissions have the potential to cause or contribute to an exceedance of the National or California Ambient Air Quality Standards (NAAQS/CAAQS).

The AAQA for nitrogen dioxide (NO_2), carbon monoxide (CO), and sulfur dioxide (SO_2), including both permitted and non-permitted source emissions for all sources, indicated that impacts will be below all applicable NAAQS and CAAQS. However, since background respirable particulate matter (PM_{10}) concentrations are greater than the 24-hour and annual CAAQS and background fine particulate matter ($PM_{2.5}$) concentrations are greater than the NAAQS and CAAQS, the procedure specified in the GAMAQI is to compare the modeled concentrations for these pollutants to the Significant Impact Levels (SILs) as defined by the SVJAPCD rather than the NAAQS and CAAQS. Further, the procedure is to perform this SIL analysis for emissions from permitted sources separately from fugitive emissions sources.

The model-predicted PM_{10} and $PM_{2.5}$ concentrations from all onsite exhaust sources from the combined facilities are less than the 24-hour and annual SILs. However, some of the PM_{10} and $PM_{2.5}$ concentrations from the onsite fugitive dust sources were over the respective SILs. Although emissions from the onsite fugitive dust sources from the combined facilities have the potential to cause model-predicted concentrations to be greater than the PM_{10} and $PM_{2.5}$ fugitive dust SILs, these concentrations decrease rapidly with distance from the emission sources.

Modeled PM_{10} and $PM_{2.5}$ concentrations over the SILs were found to occur close to the Lost Hills SWMF in an area that is uninhabited, unoccupied by workers, and covered by desert scrub, with the majority of the predicted impact coming from the unpaved road dust from the equipment and truck travel. Due to the predicted SIL exceedances occurring in a location that the public is unlikely to access, the combined facilities are not likely to contribute substantially to an existing air quality violation.

In addition to the AAQA, several other impact assessments were performed, including a CO "Hot Spots" analysis, odor assessment, and visibility review. All of these other analyses indicated that the potential for air quality impacts would be less than significant.

Health Risk Prioritization

The SJVAPCD and Kern County Planning Department (KCPD) require the examination of the TAC emissions from the Project to determine the need for a Health Risk Assessment (HRA), which estimates the potential acute, chronic, and carcinogenic health risks from the Project. A two-step process can be followed, where initially a screening risk prioritization is conducted. If the potential for high health risks is found, then an HRA may be required.

The California Air Pollution Control Officers (CAPCOA) prioritization guidelines outline a technique for calculating a prioritization score that helps air districts identify priority facilities for risk assessment, which involves consideration of potency, toxicity, quantity of emissions, and proximity to sensitive receptors such as hospitals, daycare centers, schools, worksites, and residences. If the prioritization score exceeds the intermediate risk level after consideration of

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additional factors or the high risk level given below, a refined HRA is recommended to determine if the Project's potential health risks are significant.

- Low Score: Projects having a total score (TS) less than 1 are low risk and are not likely to have an adverse health risk.
- Intermediate Score: Projects having a TS at least 1 and less than 10 need to evaluate additional factors to determine if the project's TAC emissions will have a less than significant health risk.
- High Score: Projects having a TS equal to or over 10 may have high risk. A refined HRA may be necessary to demonstrate that the project's TAC emissions will have a less than significant health risk.

To assess the potential health risk from the proposed Lost Hills SWMF and Bioenergy Projects, a prioritization score was calculated at the nearest residential receptor and the results are shown in Table ES-2. The nearest residential receptor is a farmhouse located approximately 2.3 miles east of the project site. Since the prioritization score is intermediate and there are no sensitive receptors within 2 miles, a refined HRA is not necessary to determine that the projects' TAC emissions will have a less than significant health risk.

Table ES-2: Prioritization Scores at the Nearest Residential Receptor to the Combined Facilities

Facility	Acute	Chronic	Cancer
Lost Hills SWMF Projects	0.06	0.09	1.14
Aries – Holloway Bioenergy Facility	0.009	0.006	0.07
Combined Facilities	0.069	0.096	1.21

GHG Emissions

As noted in the Project Overview, the proposed Projects will assist in meeting many of California's goals related to waste diversion and recycling. By diverting organic wastes from landfills to composting facilities, methane emissions from landfills are avoided. Additionally, compost application to agricultural fields increases soil health while providing multiple co-benefits, such as reducing the amount of synthetic fertilizer needed, decreasing soil erosion, and reducing the use of herbicides. Additional benefits (not quantified) include the energy saved through reduced water use, increased crop yield, and increased microbial activity, which result in healthier soils.

The proposed Lost Hills SWMF Projects and baseline GHG emissions are summarized in Table ES-3. The baseline LFG emissions are subtracted from the projected LFG emissions related to the landfill plus the emissions from the proposed compost facility to provide the net emissions change due to the proposed Projects. The GHG emissions presented for the landfill and the compost facility do not include carbon dioxide (CO_2) emissions because they are biogenic. The GHG emissions from the construction of the compost area are included as an amortized value over a 30-year life for the facility. The credit for compost application (i.e., usage in agriculture) is then also subtracted from the total carbon dioxide equivalents (CO_2e) to provide an overall net decrease in GHG emission for the Lost Hills SWMF Projects of more than 245,000 Metric Tons per year (MT/Yr).

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Table ES-3: Proposed Lost Hills SWMF Projects GHG Emissions and Net Emission Change

Category	CO_2 (MT/Yr)	CH_4 (MT/Yr)	N_2O (MT/Yr)	Total CO_2e (MT/Yr)
Landfill Operation	--[a]	2,565	0.3	74,451
Compost Area Construction (amortized) [b]	35.7	--	--	35.7
Compost Area Operation	--[a]	1,133	235	(261,912) [c]
Baseline	(0.0)	(2,783)	(0.1)	(58,452)
Net Emission Increase or (Decrease)	***0.0***	***915***	***235***	***(245,877)***

Notes:

a. CO_2 emissions from the landfill and compost area are excluded because they are biogenic.

b. Total compost area construction for all three phases were estimated, and then amortized over a 30-year period.

c. The total CO_2e for the compost area reflects the credit for use of compost in agricultural operations

The GHG emissions for the Aries–Holloway Bioenergy Project were estimated as well. A summary of these GHG emissions for construction and operation of the Aries–Holloway Bioenergy Project is provided in Table ES-4. The construction GHG emissions were amortized over a 30-year project life and added to the operation emissions. The thermal oxidizer GHG emissions are from the burning of a synthesis gas (syngas) produced from biomass or other organic material, and hence are considered biogenic. Biogenic emissions are not included in the total CO_2e.

Based on this analysis, the combination of the GHG emissions from the proposed Projects would have an overall net decrease in GHG emissions, and hence have no adverse impact.

Table ES-4: Aries–Holloway Bioenergy Project Construction and Operation GHG Emissions

Category	CO_2 (MT/Yr)	CH_4 (MT/Yr)	N_2O (MT/Yr)	Total CO_2e (MT/Yr)
Construction	963	0.13	0.0	966
Operation [a]	1,456	0.22	0.00	1,461
Total GHG – Amortized Construction plus Operation				1,493

Notes:

a. CO_2 emissions from the thermal oxidizer are excluded because they are biogenic.

Project Features

The following project features will be incorporated into the project design:

- Dedicated project offroad equipment will employ Tier 4 engines where feasible/available;
- A landfill gas collection system (GCS) with 75% collection efficiency vented to a flare that achieves 98% control, or better, will be employed as needed to meet regulatory and permit requirements;

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- The compost facility will feature an extended aerated static pile (eASP) design and include a biofiltration layer comprised of cured compost to reduce emissions of VOCs, ammonia (NH_3), and GHGs;
- As required by SJVAPCD Regulation VIII, the facility's dust control plan will continue to be implemented;
- A Valley Fever Dust Management Plan will be implemented (see Section 4.3); and
- The California Integrated Waste Management Board requires all commercial composting facilities in California to prepare, implement, and maintain a site-specific Odor Impact Minimization Plan (OIMP) to minimize odors (see Section 4.4).

In addition to these features, the projects will obtain authorities to construct and permits to operate (ATC/PTOs) from the SJVAPCD to reflect the proposed modified and new sources. The permits must ensure that all regulations are met and that NSR is implemented, including obtaining ERCs as required. If NO_x emissions from non-permitted sources are calculated to exceed the 10 TPY CEQA threshold at the start of Phase 3 operation of the compost facility, a VERA may be required at that time related to emissions that exceed this threshold.

Conclusions

Each of the CEQA Guidelines Appendix B checklist questions were reviewed to determine mitigation requirements and significance of the impact. In summary, the findings are as follows:

- The projects would not conflict with or obstruct implementation of the applicable air quality plan. Vehicle use and emissions related to waste management have been accounted for in the planning emissions inventories and forecasts. Compliance with the SJVAPCD's NSR program and other regulations deemed necessary during the permitting process will ensure that the projects are consistent with these plans.
- Some of the criteria pollutant emissions exceeded screening thresholds, and an AAQA was performed to demonstrate that the combined emissions from the proposed projects would not cause or contribute to an existing exceedance of a NAAQS or CAAQS. Concentrations modeled for the attainment criteria pollutants, i.e., those that are measured to be below the ambient standards, were shown to not cause a violation of the applicable standards. However, for PM_{10} where the background value is close to the CAAQS and $PM_{2.5}$ which is nonattainment of the NAAQS and CAAQS, modeling results were instead compared to SJVAPCD SILs. These results indicated that modeled concentrations due to fugitive dust emissions might be over these low levels in uninhabited desert scrub areas near the landfill property boundary and active roadways where it is unlikely that the public would access. Given these results, impacts are thought to be less than significant.
- Impacts from TAC emissions were found to have an intermediate risk prioritization score at the nearest residential receptor. Because there are no residential receptors within 2 miles of the project location, an intermediate score indicates that the combined projects should have a less than significant health risk impact.

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- An analysis of the KCPD-identified cumulative projects indicated that only the Liberty composting operation has the potential for cumulative impacts with the two projects, but given the distance to sensitive receptors and programs in place to minimize emissions and odors, the cumulative impacts would not be considerable.
- An assessment of the potential for odors to be a nuisance was performed. In this case, sensitive receptors are located more than a mile away, which is the SJVAPCD screening distance within which odors from composting and waste management may be detected. A more detailed assessment was also done related to odors from the composting facility, which also indicated odors are unlikely to be detected at the distance to the nearest residence.
- The Lost Hills SWMF Project will support California's goals related to waste diversion and will reduce GHG emissions by composting rather than landfilling. Reducing GHG emissions would have a beneficial impact on the environment and would be consistent with applicable plans.

Given the analysis above and in this report, with the implementation of the project features, all air quality impacts would be less than significant. GHG emissions would be reduced with the implementation of the proposed Projects and hence would have a beneficial impact.

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1.0 INTRODUCTION

1.1 Project Overview

Lost Hills Environmental LLC, an affiliate of H.M. Holloway, Inc. (Holloway), owns and operates the Lost Hills Solid Waste Management Facility (SWMF or Lost Hills Facility), a Class III nonhazardous industrial waste landfill facility located in Kern County near Lost Hills, CA. The Lost Hills Facility is sited on approximately 331 acres that was formerly used for surface mining operations by Holloway. Reclaiming the open-pit gypsum mine for waste processing and disposal is an ecologically responsible solution that helps avoid the need to construct new landfills.

Lost Hills Environmental LLC has submitted an application to Kern County to amend the Conditional Use Permit (CUP) for the Lost Hills Facility. Modifications to the CUP proposed for the existing landfill include an allowance for additional waste streams to be disposed of within the landfill, an extension of the daily hours of operation, and the addition of a new composting area on 136.2 acres within the existing SWMF boundaries.

The Lost Hills Facility currently accepts Class A and B biosolids and inert wastes, including treated auto shredder residual, fly-ash, sandblast media, and lime cake. It is proposed that the landfill be allowed to accept additional inert wastes, such as drywall, cardboard, dirt, and concrete, and organic matter streams, such as biosolids from Wastewater Treatment Plants (WWTPs), shredded wood and cellulose waste, biological waste from local farms including poultry agricultural waste (droppings and processing waste), and food waste.

In addition to the existing permitted landfill modifications and new compost area, 6 acres on the east side of Holloway Road are being carved out of the Lost Hills SWMF CUP Map 28 to facilitate the development of a waste to energy biomass gasification ("bioenergy") facility. The bioenergy facility will be constructed and operated under a joint development agreement between Aries Clean Energy (Aries) and Holloway, as Aries-Holloway Bioenergy, LLC. The bioenergy facility will be issued a separate CUP. The proposed bioenergy plant would accept biomass and organic wastes, gasify the biomass into a synthesis gas (syngas), which would then be used to generate up to 3.7 megawatts (MW) gross of renewable energy.

These proposed Projects would support the State of California's goal in complying with California's Mandatory Commercial Recycling Law, approved by the Office of Administrative Law on May 7, 2012, under Assembly Bill (AB) 341, which directs the California Department of Resources Recycling and Recovery (CalRecycle) to increase statewide diversion of solid waste to 75% by 2020. The proposed Projects would also support AB 1826, which requires public agencies and businesses that generate designated quantities of food, poultry, biosolids, and green waste to segregate and arrange for appropriate processing (e.g., composting) of such discarded materials to further reduce landfilling. Furthermore, the Projects will help to support CalRecycle's Senate Bill (SB) 1383, which establishes targets to achieve a 50 percent reduction in the level of the statewide disposal of organic waste from the 2014 level by 2020, and a 75 percent reduction by 2025.

This Air Quality and Greenhouse Gas (GHG) Technical Report has been prepared by Yorke Engineering, LLC (Yorke) to analyze the impacts on air quality from criteria pollutant and toxic air contaminant (TAC) emissions due to the proposed modifications and impacts related to GHG emissions. The landfill is currently permitted to accept up to 2,000 tons per day (TPD) of waste and is proposed to remain at this level. Most of the current landfill operations are not expected to

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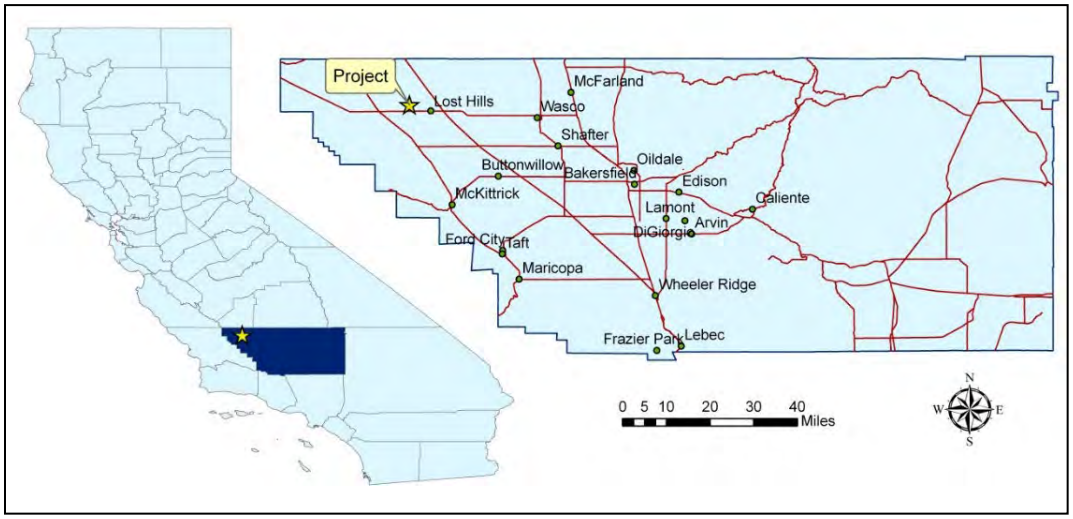
change related to the proposed CUP modifications, and hence the associated emissions from the existing landfill operation, including the haul trucks bringing waste to the landfill are not analyzed in this report. Although the landfill has been permitted since 2009 to accept Class A and B biosolids, a biodegradable organic waste, an assessment was done of the landfill gas (LFG) emissions related to the decay of biodegradable organic wastes, which are now proposed to include a wider variety of waste type, out to a projected closure date of 2030. Because the amount of total wastes (both inert and biosolids) have been below the maximum 2,000 TPD permitted level, the actual disposal rates from 2009 through 2019 were used as the baseline for the determination of impacts related to LFG emissions analyses contained in this report.

This report focuses on the air quality and GHG impacts due to the LFG emissions that are greater than baseline levels related to the Lost Hills landfill, as well as the impacts due to the operation of the new compost area, which together are the Lost Hills SWMF Project. The impacts related to the construction and operation of the bioenergy facility, i.e., the Bioenergy Project, are also addressed in this report, including a separate Air Quality and GHG Technical Report in Appendix F. The report addresses the combined impacts of these proposed Projects on ambient air quality, health risks, and odors. A cumulative analysis of other nearby projects is also addressed.

1.2 Project Location and Surrounding Land Uses

The proposed Projects are located along the west flank of the Lost Hills Oil Field in a rural undeveloped area of northwestern Kern County, north of State Route (S.R.) 46. The nearest town is the community of Lost Hills, approximately 4 miles southeast of the Project sites. The property is remotely located and is surrounded by open areas to the north, south, and west. The eastern side of the property abuts the Lost Hills Oilfield. The Lost Hills Mining LLC Gypsum Mine is an adjacent land use north of the proposed Project site. Other adjacent or nearby land uses include row-crop farming, a biosolids/green waste composting operation, an inactive County-operated sanitary landfill, an oilfield, two State highways (S.R. 46 and S.R. 33), and Interstate 5. The composting operation (Liberty Composting) is located approximately 3.6 miles north of the proposed Project on Holloway Road. An inactive sanitary landfill is located immediately south of the proposed Lost Hills Project. The facilities will be located within the jurisdiction of the SJVAPCD. The regional location of the Lost Hills SWMF is shown in Figure 1-1.

Figure 1-1: Regional Location of the Lost Hills Facility



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1.3 Lost Hills SWMF Permitting History

The Lost Hills Facility has been in operation since 1993 when the facility was approved to accept inert nonhazardous material for beneficial reclamation of depleted mining pits. A modification was approved in 1997 for the disposal of additional imported waste streams of asphalt products, construction cement/concrete, shredded plastic pipe, and shredded auto tires under a new CUP No. 7, Map 28. An Environmental Impact Report (EIR) for the H. M. Holloway Landfill was previously completed by the Kern County Planning and Natural Resources Department (KCPD) in 2008. In May 2009, the facility was permitted to accept inert nonhazardous wastes and Class A and Class B biosolids for disposal in Pits "E", "F", "G", and the "F&G" connection area within an official landfill footprint of 331 acres.

An Addendum to the EIR was approved in 2013, and in March 2016, the Kern County Board of Supervisors approved modifications to the landfill to: (1) move the west landfill permit boundary approximately 630 feet to the west; (2) shift the existing 1,320 feet of required buffer zone along with the expanded CUP boundary; (3) install two new gas monitoring wells at or near the proposed CUP boundary; and (4) replace the landfill closure date of 2019 in the CUP to read "when landfill cover is complete." In February 2017, the Kern County Planning Commission approved modification of the CUP to adjust the days of facility operation to 7 days a week and operating hours to 6:00 a.m. to 4:00 p.m.

An air permit for the landfill was originally issued by the SJVAPCD in August 2011 (Facility ID S-7754) and subsequently renewed. At the direction of the SJVAPCD, separate applications for Authority to Construct (ATC) permits for 1) the modifications to the Lost Hills Landfill, 2) the proposed addition of the Lost Hills Compost Area, and 3) the Aries – Holloway Bioenergy Project were submitted to the SJVAPCD in September and July 2019, respectively. All three ATC applications have been deemed complete by the SJVAPCD and are to be processed concurrently with the California Environmental Quality Act (CEQA) analyses for the EIR.

1.4 Current Lost Hills SWMF Operations

The Lost Hills Facility is permitted to accept up to 2,000 TPD of inert nonhazardous waste and Class A or Class B biosolids. The facility consists of a 331-acre area located on the southern end of 3,200 acres of property owned by Holloway. The 331-acre area includes a 129-acre area for conducting "marshaling activities" and a 172-acre area for conducting disposal activities. The disposal area consists of four pits (waste management units) commonly referred to as Pit E, Pit F, Pit G, and Pit FG. The pits are approximately 50 feet deep and currently have a combined disposal capacity of about 8,152,794 cubic yards. Figure 1-2 shows the locations of the disposal pits.

Although no changes are proposed to the 2,000 TPD limit and the disposal of up to this level of organic biosolids is currently allowed, there would be an increase in LFG emissions compared to the existing baseline LFG emissions related to the accumulation of organic waste until landfill closure in 2030. For assessment of air quality impacts, the baseline typically reflects the most recent 2-year period where data are readily available before issuance of the Notice of Preparation (NOP) of the EIR. However, because wastes deposited in a landfill may generate LFG for decades (even after closure of the landfill), the total quantity of LFG generated at any point in time reflects the cumulative organic waste disposal. Thus, for this analysis, the baseline conditions reflect the total organic waste disposed in the landfill starting when the landfill was permitted to accept organic wastes in 2009 through 2019, the year prior to the proposed Lost Hills SWMF Project.

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The tonnage of various wastes disposed of at the landfill during this period is provided in Table 1-1.

Figure 1-2: Lost Hills Facility Disposal Pits

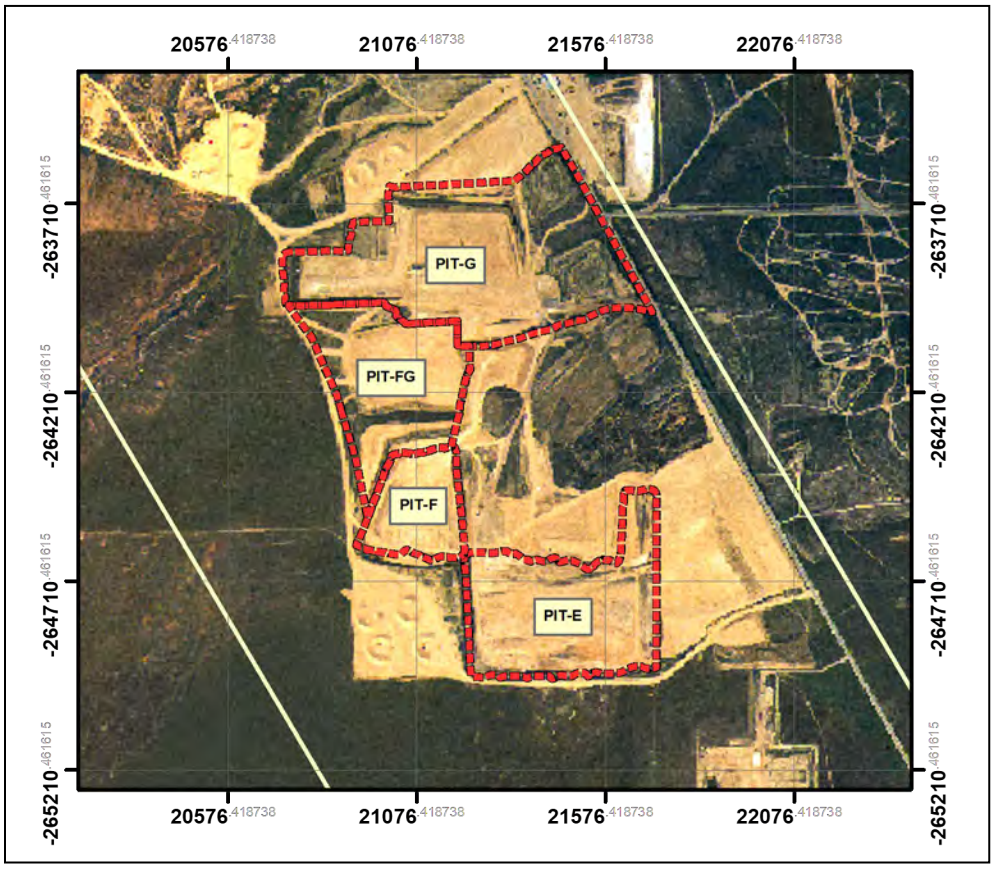


Table 1-1: Waste Disposal Amounts for the Baseline Period of 2009 - 2019

Period	Biosolids (Tons)	Inert Wastes (Tons)	Total (Tons)
2009 [a]	34,738.88	317,059.82	351,798.70
2010	25,586.36	301,385.77	326,972.13
2011	31,347.37	500,519.21	531,866.58
2012	42,298.52	536,369.28	578,667.80
2013	71,902.22	510,925.09	582,827.31
2014	96,865.63	502,610.21	599,475.84
2015	115,425.43	347,655.50	463,080.93
2016	111,378.16	241,692.93	353,071.09
2017	183,422.27	246,783.80	430,206.07
2018	358,324.42	282,708.23	641,032.65
2019 [b]	358,324.42	282,708.23	641,032.65

Notes:

a. Biosolids allowed at the Lost Hills Facility in 2009, previously only inert wastes allowed
b. Estimated

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Waste material is delivered to the facility by heavy-duty diesel trucks having a capacity of about 22 tons per load (about 25 CY/load). The landfill services customers within approximately 150 miles of the facility. Once on the property, the delivery trucks access the disposal pits via travel on unpaved landfill roads (haul roads). Access to the disposal pits requires about ¼ mile of travel in each direction (i.e., a round-trip equal to ½ mile per load).

The material is unloaded directly to the disposal pits. Earthmoving equipment is subsequently used to form the material into "lifts" and apply a 6-inch layer of cover material. All waste handling and disposal activities at the facility are conducted using offroad mobile source equipment.

1.5 Proposed Projects

As noted in Section 1.0, the proposed Lost Hills SWMF Project consists of:

- Allowance for additional waste streams to be disposed of within the landfill;
- An extension of the hours of operation to 24 hours a day, 365 days per year; and
- Addition of a composting operation on the site.

The Aries – Holloway Bioenergy Project to be located east of the landfill has been analyzed and the results are presented in a separate air quality and GHG technical report (Appendix F), as well as the impacts are discussed in combination with the proposed Lost Hills SWMF Project in Sections 4, 5 and 6 of this report.

1.5.1 Construction

Construction activities related to the proposed Projects are described below.

1.5.1.1 Landfill

The changes proposed to the CUP for the landfill of extending the hours of operation and allowing additional types of waste to be disposed do not require construction activities.

1.5.1.2 Compost Facility

The facility compost operations will be phased in over a number of years depending on demand for product. At full buildout, the facility will include 240 compost pads (active composting piles and compost curing piles) and will be capable of accepting up to 640,000 tons per year (TPY) of compostable materials

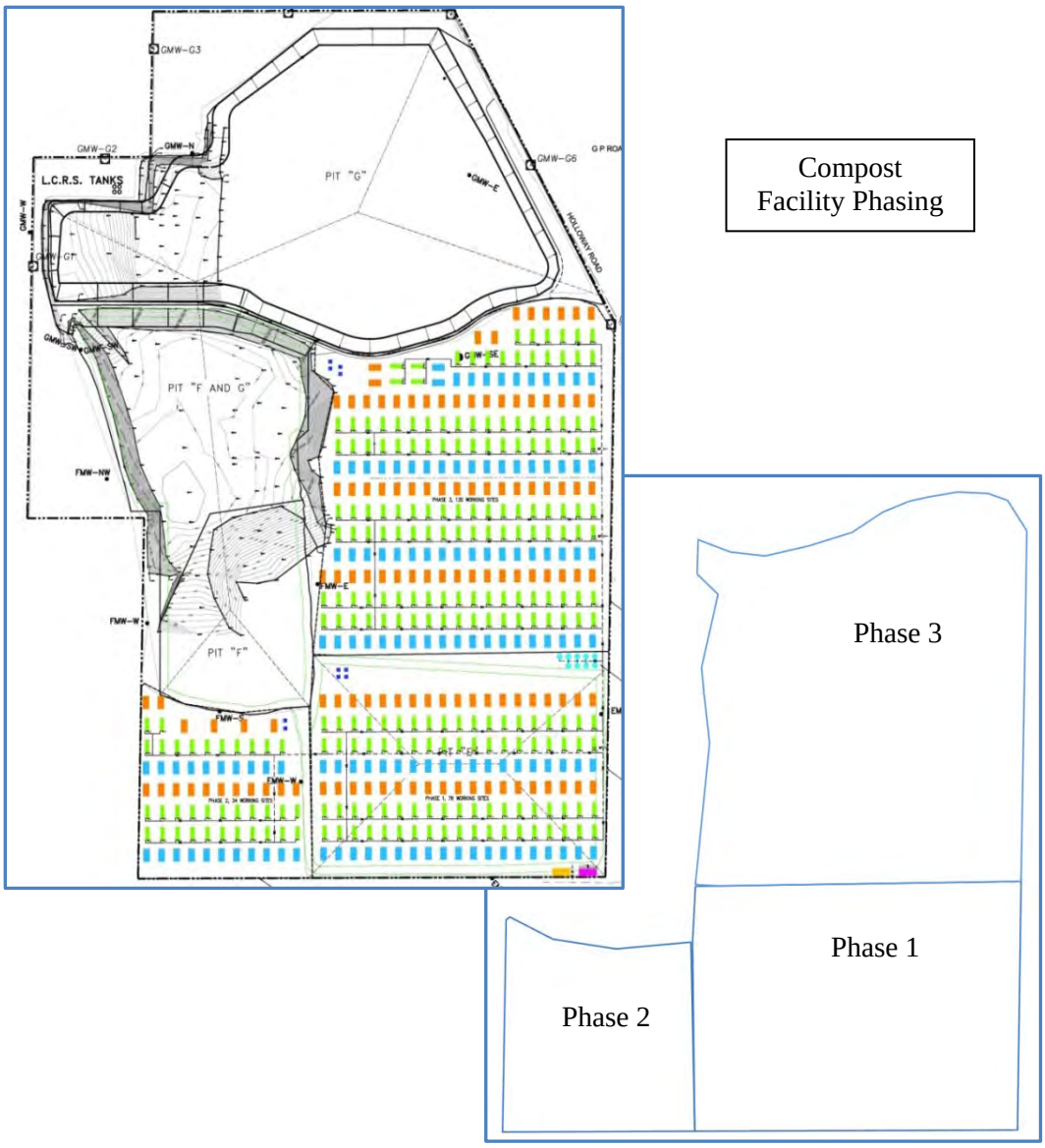
The proposed composting operation will be set up in phases. The tonnage of organic feedstock for each phase is shown in Table 1-2. Figure 1-3 depicts the locations of the compost piles for each phase.

Table 1-2: Compost Area Organic Feedstock Tonnage and Sites Per Phase

Phase	Area (acres)	Composting Sites	Capacity	
			(TPY)	(Truckloads/Day)
1	47.3	76	202,575	30 to 35
2	21.2	34	90,520	14 to 16
3	67.7	130	346,750	52 to 60
Total	136.2	240	640,000	96 to 111

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Figure 1-3: Lost Hills Facility Proposed Compost Piles by Phase



The construction of the compost facility consists primarily of the grading of the sites, the excavation of retention ponds, and the installation of solar-powered blowers for aerating compost piles.

The construction schedule for each phase will depend on demand for compost, but it is assumed that the construction of all three phases will be complete no later than 2030. Holloway plans to begin construction of Phase 1 in 2020; Phase 2 will be constructed in 2025; and Phase 3 will be constructed in 2030. The infrastructure for each phase will take 30 to 60 days to complete and become operational once approvals have been obtained.

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1.5.1.3 Bioenergy Project

The Aries-Holloway Bioenergy Project will require biomass and biochar material handling, as well as equipment for the gasification process and production of electricity. Hoppers used for biomass storage will be installed. The Aries down draft biomass gasifier technology will be employed for this project and three Large Format (LF) gasifiers will be installed. A thermal oxidizer and an Organic Rankine Cycle (ORC) power generation unit are also planned.

Activities associated with the construction of the Bioenergy Project will last for approximately 11 months. Emissions associated with construction will occur from the construction equipment associated with the ground disturbance for grading, construction of the structures, paving, trucks delivering equipment, and workers commuting.

1.5.2 Operations

Lost Hills Environmental LLC is proposing to modify the CUP for the Lost Hills Facility to expand the list of allowable waste types permitted for disposal and extend the hours of operation. The Lost Hills Facility will also be permitted to conduct composting operations using a variety of feedstocks, including Class A and Class B dewatered biosolids. A new bioenergy plant is also proposed. The landfill, proposed compost area, and bioenergy project operations activities are described below.

1.5.2.1 Landfill

The proposed Lost Hills SWMF Project would increase the hours of operation of the SWMF from 6:00 a.m. to 4:00 p.m., 7 days a week, to 24 hours per day, 7 days per week. The list of the types of waste accepted at the landfill will be expanded but would still consist of the broad categories of inert and organic waste that is currently allowed. The current operations at the landfill are described below, and none of these procedures are proposed to be changed.

No changes are proposed related to the number of waste delivery trucks or the types of equipment to be used for the landfill to accommodate the additional waste streams. The waste streams are delivered to the Lost Hills landfill by commercial trucking. All trucks delivering approved waste streams are weighed and unloaded. Waste streams are accepted only if the waste conforms with the Waste Acceptance Criteria for Discharge pursuant to Title 27 of the California Code of Regulations (CCR), or the standards and guidelines set by the Project's Waste Discharge Requirements (WDRs). During unloading, any load that has been checked and found to contain unauthorized substances are reloaded and returned to the generator by the transporter. The dispatcher on duty notifies the generator and the contracted transport company whose load was rejected. The Lost Hills Facility does not receive any hazardous waste materials and there will be no burning of any waste.

All trucks are first be directed to the scale area for weighing, where they must submit 1) a nonhazardous manifest and 2) a weight ticket from the generator. The trucks are then be directed to the disposal site, where the load is deposited on the pit floor. Unloading of waste materials is confined to as small an area as possible

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to accommodate the number of vehicles using the area without resulting in traffic, personnel, or safety hazards. Workers who face potential exposure to airborne particulate matter associated with waste materials wear respirators in accordance with the Holloway Respiratory Protection Plan. Waste streams are discharged to designated areas within each pit based on the type of material and the source(s) of the material.

The Lost Hills Facility currently accepts Class A and B biosolids and inert waste, such as fly ash, auto shredder residual, spent sandblast media, and lime cake. The currently allowed and proposed waste streams are listed in Table 1-3, some of which are proposed for the near term and others which would be considered in the future if allowed by the County. The impacts of all of the wastes shown in Table 1-3, including the listed future waste streams, would not increase emissions over what is currently allowed, and hence would not cause additional impacts. Other wastes not listed in Table 1-3 may also be disposed in the landfill upon approval by the County. The proposed organic matter streams would only go to the landfill to the extent that they are non-compostable.

Table 1-3: Currently Allowed and Proposed Landfill Waste Streams

Allowed Existing Waste Streams	Proposed Additional Waste Streams	Potential Future Additional Waste Streams
▪ Class A, B Biosolids ▪ Treated Automobile Shredder Waste ▪ Fly Ash ▪ Spent Sand Blast Media ▪ Lime Cake	▪ Drill Cuttings ▪ Slag ▪ Granulated Silica ▪ Shredded Plastic Pipe (PVC only) ▪ Dead Animals ▪ Non-Friable Asbestos ▪ Destructed Cannabis/Marijuana, including Consumables ▪ Wastewater grit ▪ Wastewater Sloughing ▪ Poultry Waste (non-manure) ▪ Industrial Sand Based Waste ▪ Non-Compostable Winery Pulp/Waste ▪ Compost-derived Waste ▪ Digestates	▪ Tile and Windows ▪ Flooring ▪ Insulation ▪ Electrical Wiring ▪ Drywall ▪ Lumber with nails ▪ Roofing Material ▪ Tile Roofing ▪ Wood Shake Roofing ▪ Excess Compost

Upon arrival at the disposal pit, the waste is unloaded and formed into 6-inch lifts using scrapers or dozers. Each load of waste is subsequently covered by one scraper load of native soil, which is equivalent to about 1 ton of cover material per ton of waste. Self-loading scrapers, bulldozers, and loaders are used for processing (compacting, mixing, moving, etc.) the waste material.

There are no plans to increase the daily or annual waste acceptance rate, which is limited to 2,000 TPD (730,000 TPY) and a maximum of 91 round-trip truckloads

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of waste per day. Operational activities that produce air emissions include motor vehicles used for transporting waste material to the landfill, employee commute and business travel, and earthmoving equipment and activities required for waste disposal.

A daily cover is applied on the waste material. Stockpiled overburden from the prior mining operation is used for this cover. The overburden cover is transported approximately 1,200 feet from the stockpile to the waste areas. Alternative daily cover may also be used, with the potential materials shown in Table 1-4.

Water is applied to unpaved road surfaces for dust control of fugitive road dust emissions from trucks hauling waste to the landfill. In addition to water, gravel and other appropriate materials as shown in Table 1-4 may also be applied to the haul roads to reduce fugitive road dust emissions. Water is also used to control dust from equipment movement around the active landfill site (e.g., truck unloading, building the bench, unloading the daily cover, and leveling the materials).

Table 1-4: Alternative Daily Cover and Haul Road Materials

Alternative Daily Cover Materials	Haul Road Stockpile Materials
▪ Fly Ash ▪ Automobile Shredder Waste ▪ Pistachio and Almond Shells/Hulls ▪ Construction and Demolition (C&D) Materials ▪ Compost and Green Materials ▪ Contaminated Sediment ▪ Biosolids ▪ Dirt, Clay, and Silt	▪ Clean Asphalt ▪ Concrete ▪ Combination Rock ▪ Gravel ▪ Brick ▪ Asphalt Grindings

Since none of the above landfill activities are proposed to be changed, the emissions associated with these activities are not quantified or analyzed in this report. Although the landfill has been permitted since 2009 to accept Class A and B biosolids, a biodegradable organic waste, an assessment was done of the LFG emissions related to the decay of biodegradable organic wastes, which are now proposed to include a wider variety of waste type, out to a projected closure date of 2030. Because the amount of total wastes (both inert and biosolids) have been below the maximum 2,000 TPD permitted level, actual disposal rates from 2009 through 2019 were used as the baseline for the LFG analyses contained in this report.

1.5.2.2 Compost Area

At maximum capacity, the compost area as designed could accept approximately 640,000 TPY of organic feedstock, including Class A and Class B biosolids, woody biomass from local farmers, and a variety of other organic feedstocks from the City of Bakersfield (see Table 1-4). The materials would be delivered to the site by truck and trailer. It is expected that approximately 96 to 111 25-cubic yard trucks a day would be needed to deliver biosolids, food waste, wood waste, and other allowed organic materials to the site at full operation. The compost operation is

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expected to produce 50 to 70 25-cubic yard truck loads per day of finished compost that would be removed from the site. The trucks that bring the organic feedstock to the site will be washed out onsite after emptying and then used to transport the finished compost from the site for sale and use elsewhere. Since the same trucks are used for both feedstock delivery and product transport, a maximum of 111 round-trip truckloads of material per day (feedstock and finished compost product) were assumed for the analyses.

Although feedstock deliveries and product shipments may come from and go to locations throughout the service area (roughly a 150-mile radius), most trips are expected to be within 50 to 100 miles of the facility. Therefore, a trip distance of 200 miles round trip (100 miles for feedstock delivery and 100 miles for compost product shipment) for each of the 111 truckloads was assumed for the emissions calculations.

Lost Hills Environmental LLC intends to accept biosolids from various WWTPs within the service area, shredded wood and green biomass from the City of Bakersfield and local farms, and biological materials from local farms for composting. The biological materials may include poultry droppings, processing material, and discarded food. The proposed organic composting feedstocks are listed in Table 1-5. Other organic materials not listed in Table 1-5 may also be composted if allowed by the County.

Table 1-5: Proposed Compost Feedstocks

Proposed Compost Feedstocks	
▪ Class A and B Biosolids ▪ Woody Biomass ▪ Excess Green Matter ▪ Pistachio and Almond Shells/Hulls ▪ Grass ▪ Branches ▪ Leaves ▪ Other Plant Matter ▪ Winery Pulp	▪ Cannabis/Marijuana/Hemp Discards ▪ Fats, Oils, and Greases (FOG) ▪ Food ▪ Paper and Cardboard ▪ Poultry Manure and Processing Material ▪ Cattle/Livestock Manure ▪ Crop Residue ▪ Anaerobic Digestate ▪ Dimensional Lumber

The compost facility will be constructed and operated using the "extended aerated static pile" (eASP) composting system as described in "Green Waste Compost Site Emissions Reductions from Solar-powered Aeration and Biofilter Layer," published by the SJVAPCD (2019a).

The composting process will take place on 240 composting sites in the facility. Each composing site would be equipped with a pair of 1.5-horsepower blower motors powered by a small array of solar cells with a backup battery supply, as described in the above-referenced report. The blowers would be connected to a manifold that leads to three 4-inch perforated pipes that will run down the center of each compost pile. These pipes would be covered with approximately 1 foot of woody biomass material. The goal is to create an aeration zone beneath the active

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compost pile that allows for uniform airflow up through the active compost material.

Compostable materials will be trucked to the site and dumped in a mixing area adjacent to the composting sites. It is expected that a 50/50 mixture by volume of woody biomass and biosolids/food organic materials would be mixed with a Scarab-style windrow turner. The mixture would then be moved to the composting area via a front-end loader. The equipment types proposed for the compost operation are listed below:

- Two 3,800-gallon International water trucks;
- One 14-foot-wide PT170 Compost Turner with Massey Ferguson 7619 farm tractor;
- Three Caterpillar 962K wheel loaders (for moving cured compost);
- Three Caterpillar 962K wheel loaders with rake attachment (for spreading compost over the top of the extended aerated static pile [eASP]); and
- Three Michigan 175B loaders (for moving raw compost).

On top of the aeration zone, the 50/50 mixture would be placed into cells 70 feet long and 22.5 feet wide with a height of between 5 and 9 feet containing approximately 318 cubic yards. It is assumed that the biosolids/food material and woody biomass would have sufficient moisture to begin the composing process, and additional moisture would not need to be added during the mixing process.

After the pile has been mixed and formed, the pile will be covered with a 1-foot-deep layer of cured compost which acts as a biofilter. This biofilter layer will serve to reduce the volatile organic compound (VOC) emissions from the compost pile. The layer will be put in place by the front-end loader that formed the pile, assisted by an additional loader with a rake attachment to spread the cured compost over the top of the pile. After the pile has been covered, a sprinkler system will be placed along the top of the pile to maintain the moisture in the top layer.

Each eASP will then be allowed to compost for 4 weeks (28 days). The piles will be aerated by the blower motors for 2 minutes out of every 20, and the sprinklers run approximately every 4 hours.

Water is used for maintaining the proper moisture content of the biofilter layer of the compost piles and the top layer of the curing piles to control VOC emissions from the composting process. The optimum amount of water to place on the piles is 3 inches per day. Therefore, it is estimated that each pile will require 0.35 acre-feet of water per month to maintain optimum moisture levels. If dust suppression operations are accounted for, the fully operational site is estimated to use 81 acre-feet of water per month.

Water is also used for dust control of fugitive road dust emissions from trucks hauling raw material to the compost facility and finished compost from the facility and from equipment movement around the piles (e.g., mixing wastes, building the compost piles, moving stable compost to the curing piles, and loading trucks with

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finished compost). The breakdown of expected water usage per phase of operation is shown in Table 1-6. Water will be piped into the site from offsite wells and stored in two existing portable 50,000-gallon poly tanks.

Table 1-6: Compost Area Expected Water Usage by Phase

Phase	1	2	3	Total
# of active sites	76	34	130	240
Gallons per day for eASP	60,800	27,200	104,000	192,000
Gallons per day for dust control	8,000	4,000	15,000	27,000
Total water demand per day (gallons)	68,800	31,200	119,000	219,000
Total water demand per month (gallons)	2,092,667	949,000	3,619,583	6,661,250
Total water demand per month (acre*ft)	6.4	2.9	11.1	20.4

During the composting process, a temperature probe will be used to take measurements daily to ensure minimum temperature standards are maintained per Section 17868.3 of CCR Title 14. In order to meet these requirements, a temperature of 131 degrees Fahrenheit (°F) must be maintained in the compost pile for a period of 3 days.

After the initial 28 days of composting, the piles will then be scooped up and flipped into a new pile just north of composting site to cure. In order to reduce the chances of contamination of the composted pile, a separate front-end loader designated to move only cured compost will be used for this operation. The pile will then be left to cure for an additional 28 days. Each pile will then be tested for pathogens prior to being moved to the finished compost stockpile and either used as cover for a new eASP pile or shipped offsite via trucks.

It is expected that the operation will generate a small amount of wastewater from storm water runoff and leachate from the compost and curing piles. It is intended that this water, along with any rainfall, be retained on site. For this purpose, all surface drainage will be diverted to the area labeled “Pit F and G.” There is no need for evaporation ponds.

The total composting area is expected to be approximately 136.2 acres when fully developed (see Figure 1-3).

1.5.2.3 Bioenergy Project

At maximum capacity, the bioenergy facility could accept approximately 165 TPD of organic feedstock, including woody biomass from local farmers, and a variety of other biomass feedstocks (see Table 1-7). Other types of biomass feedstocks not listed in Table 1-7 may also be used as biomass feedstock for the bioenergy facility if allowed by the County. The biomass feedstock would be delivered to the site by truck and trailer. The bioenergy facility will process the biomass feedstock to generate renewable electricity. The feedstock will be processed through three downdraft gasifiers to produce syngas. The syngas will be oxidized in a thermal oxidizer to generate heat. The heat generated will then be used to drive an ORC

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turbine generator to produce up to 3.7 MW gross (3.0 MW net) of renewable electricity. The facility would also produce a co-product called biochar, which can be used in agricultural operations as a soil amendment. Each of these components is described further in Appendix F.

Table 1-7: Proposed Bioenergy Facility Biomass Feedstocks

Proposed Biomass Feedstocks	
▪ Agricultural/Forestry/Urban Wood Residue o Branches o Stumps o Whole Trees o Construction Debris - (untreated board waste) o Wood Processing Debris – (untreated mill or board processing wood waste)	▪ Agricultural Residue o Cannabis and Hemp Waste o Pistachio and Almond Shells and Hulls ▪ Other Plant Matter ▪ Wastewater Treatment Plant Biosolids o Class A o Class B ▪ Digestates ▪ Non-recyclable paper waste

1.5.3 Landfill Closure

At the end of the landfill's life, the landfill will be capped. Landfill closure is currently expected to occur in 2030. The landfill gas collection system will continue to operate as the waste material continues to decay. The Lost Hills Facility will be closed according to its existing Closure Plan.

The landfill cap will be constructed from onsite native material (soil and clay) and will consist of a 2-foot-thick foundation layer, a 1-foot-thick barrier layer, and a 1-foot-thick vegetative layer. The landfill cap will cover the 172-acre disposal area.

The construction of the landfill cap will require the use of a water truck, several self-loading scrapers, a tamping roller, and a track-mounted auger. The construction activities related to closure will result in exhaust emissions from onroad and offroad equipment, fugitive dust emissions from travel on paved and unpaved roads, and a small amount of fugitive hydrocarbons (i.e., VOC). Allowing for inclement weather and contingency, the construction of the landfill cap is expected to take about 18 months to complete.

Since landfill closure is not an activity specifically related to the currently proposed Project, emissions related to closure were not calculated or analyzed in this report.

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2.0 EXISTING AIR QUALITY SETTING

The solid waste disposal facility is located in the southern part of the San Joaquin Valley near the community of Lost Hills in Kern County, CA. This section discusses the existing setting related to topography, meteorology, and climate; pollutant health effects and air quality background; statewide and regional emissions; and air quality regulatory framework. Similar topics related to GHG emissions are contained in Section 6.

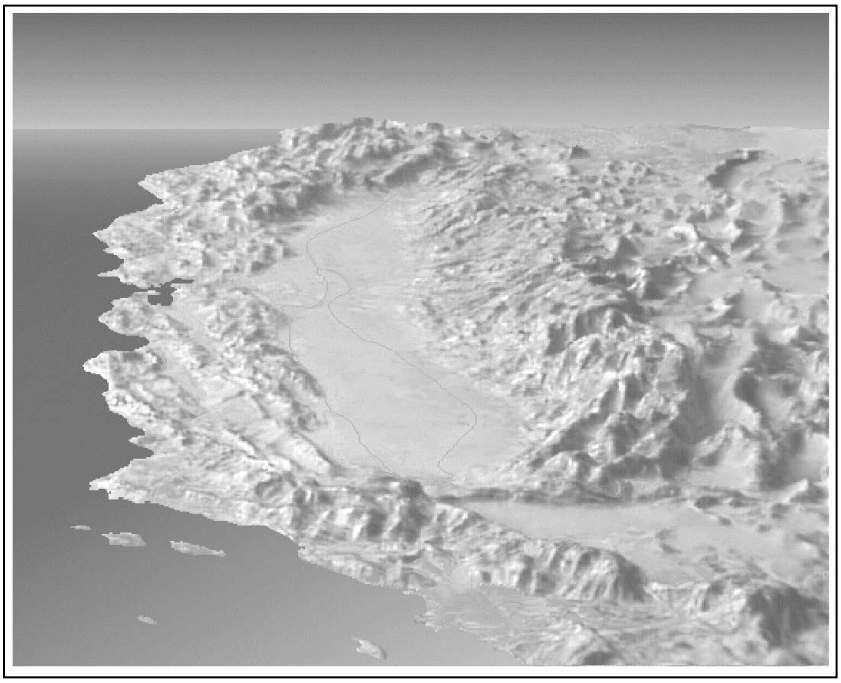
2.1 Existing Environment

The transport and dispersion of air pollutants within the valley are influenced by many complex factors. Global and regional weather patterns, local topography, and climate affect the way that pollutants are formed and dispersed.

2.1.1 Topography

The project is located in a rural industrial area about 3.5 miles northeast of the community of Lost Hills and about 55 miles northwest of Bakersfield, CA. Lost Hills is located in the extreme south end of the greater San Joaquin Valley and is partially surrounded by a horseshoe-shaped rim of mountains with an open side to the northwest with the crest at an average distance of 40 miles. An aerial view of the San Joaquin Valley is shown in Figure 2-1.

Figure 2-1: Aerial View of the San Joaquin Valley



Source: SJVAPCD 2015a

The Sierra Nevada Mountains run along the entire eastern side of the valley, dividing California from the Great Basin. The mountains form a major barrier to air flow from the north and west, uplifting the air mass to create precipitation/snow, which provides water to the valley for irrigation and other uses.

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The coast range lies to the west, and the ocean shore is about 75 to 100 miles away.

The Tehachapi Mountains form the southern boundary of the valley and act as an obstruction to northwest wind, causing heavier precipitation on the windward slopes, high wind velocity over the ridges, and, at times, continuing cloudiness in the south end of the valley after skies have cleared elsewhere.

Because of the nature of the surrounding topography, there are large climatic variations within relatively short distances. These zones of variation may be classified as valley, mountain, and desert areas.

2.1.2 Climate

The overall climate of the valley is warm and semi-arid. 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, with only a trace occurring in about 1 out of every 7 years. Thunderstorms seldom occur in the valley. Summers are cloudless, hot, and dry.

Winters are mild and semi-arid, yet fairly humid. Severe freezes seldom occur, and there are occasional years with no frost at all. December and January are characterized by frequent fog, mostly nocturnal, which prevails when marine air is trapped in the valley by a high-pressure system (inversion). In extreme cases, this fog may last continuously for 2 or 3 weeks. Its depth is usually less than 3,000 feet.

Temperatures below freezing are unusual. Average high temperatures in the winter are in the 50s, but highs in the 30s and 40s can occur on days with persistent fog and low cloudiness. The average daily low temperature is 45 degrees Fahrenheit (°F). Based on the 1951-1980 period, the average first occurrence of 32°F in the fall is December 11 and the average last occurrence in the winter is January 31.

During summer months, northwest sea breezes frequent the area about twice weekly. When above-normal temperatures prevail for several days, the gradient builds up sufficiently to draw in cooler air from the coastal section. During prolonged periods of drought, this late afternoon breeze may carry varying amounts of dust, and thermal instability sometimes causes the dust to rise as high as 7,000 feet. Summer high temperatures often exceed 100°F, averaging in the low 90s in the north and high 90s in the south. In the San Joaquin Valley, high daily temperature readings in summer average 95°F. Daily summer temperature variation can be as much as 30 degrees.

2.1.3 Wind Speed and Direction

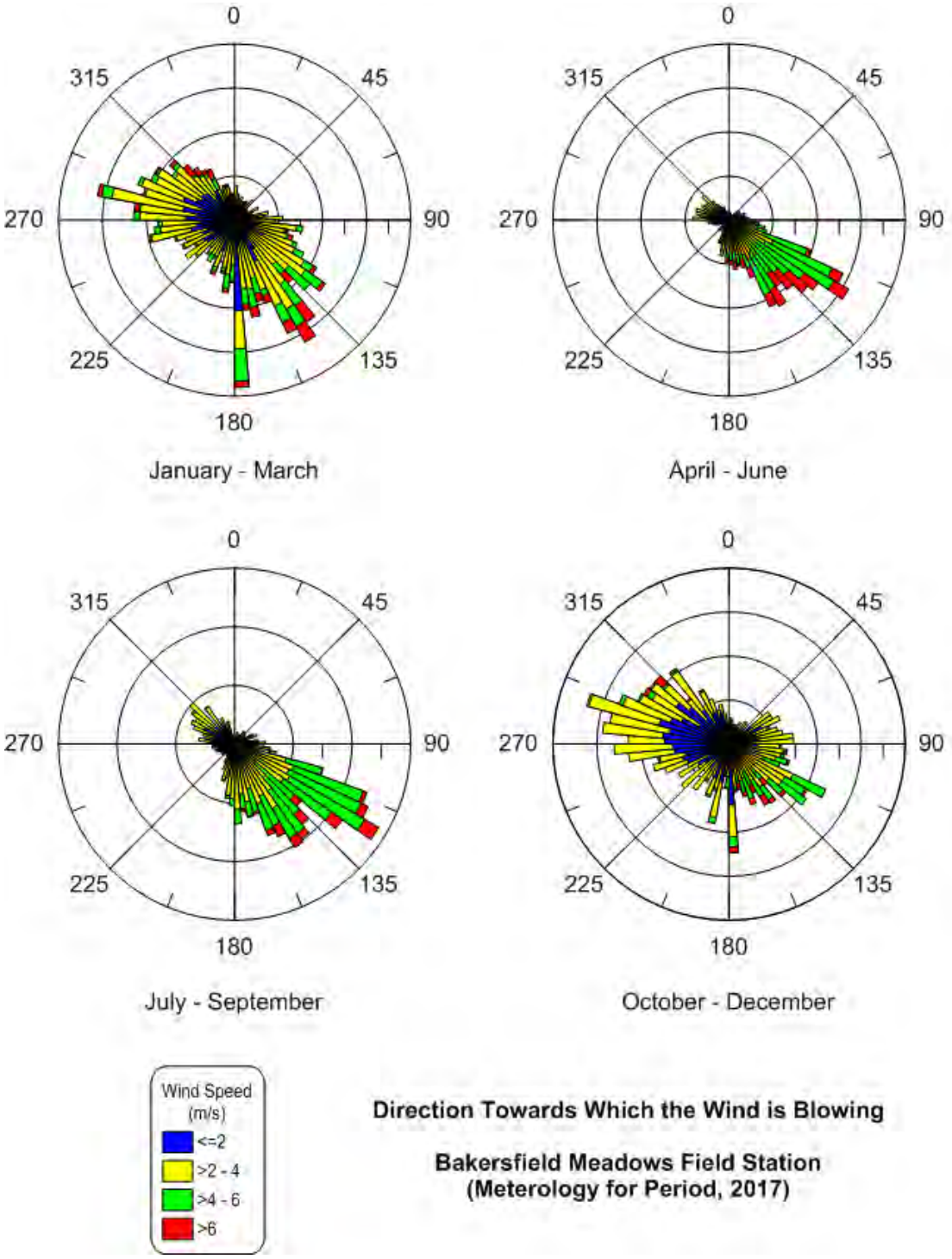
Wind at the surface and aloft can disperse pollution by mixing vertically and by transporting it to other locations. Wind is the natural horizontal motion of the atmosphere.

Wind is caused by differences in pressure in the atmosphere. The pressure is the weight of the atmosphere at a given point. The height and temperature of a column of air determine the atmospheric weight. Cool air is heavier than warm air. Consequently, a high-pressure area consists of cool, heavy air and a low-pressure area consists of air that is warmer and lighter. Differences in pressure cause air to move from high-pressure areas to low-pressure areas, resulting in wind.

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Wind speed can greatly affect the pollutant concentration in a local area. The higher the wind speed, the lower the pollutant concentration. Wind helps to disperse pollutants throughout the immediate area. Seasonal wind roses which show the distribution of wind speed and direction for Bakersfield are provided in Figure 2-2.

Figure 2-2: Wind Rose Diagrams of Seasonal Wind Patterns at Bakersfield



Source: Kelly 2019

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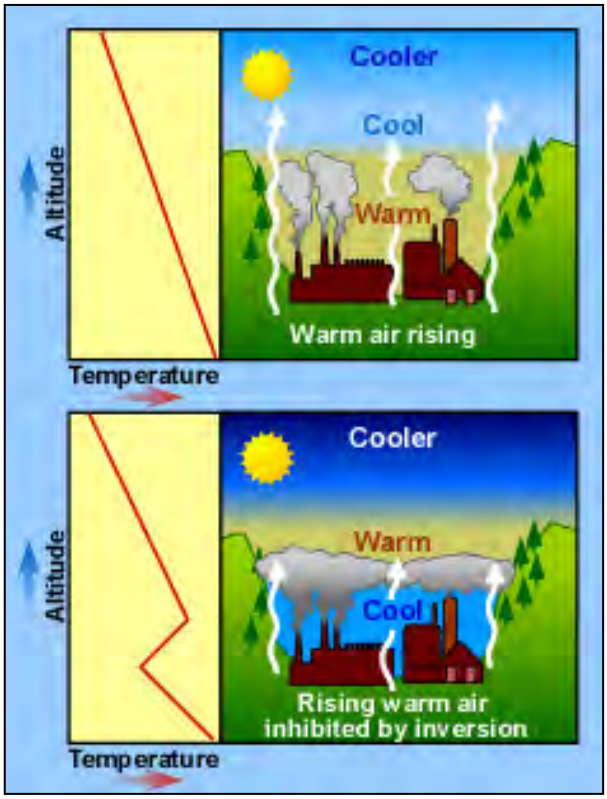
During the summer, wind speed and direction data indicate that summer wind usually originates at the north end of the San Joaquin Valley and flows in a south-southeasterly direction, through the valley and the Tehachapi pass into the Southeast Desert Air Basin. During the winter months, the San Joaquin Valley experiences light, variable winds less than 10 miles per hour (mph). Wind speed and direction data indicate that wind occasionally originates from the south end of the valley and flows in a north-northwesterly direction.

Superimposed on this seasonal regime is the diurnal wind cycle. This cycle takes the form of a combination of sea breeze-land breeze and mountain-valley regimes. The sea breeze-land breeze regime has a sea breeze flowing into the valley from the north during the day and a land breeze flowing out of the valley at night. The mountain-valley regime has an upslope (mountain) flow during the day and a downslope (valley) flow at night.

2.1.4 Atmospheric Stability

Atmospheric stability refers to the vertical motion of the atmosphere. Unstable atmospheric conditions result in vertical mixing. Typically, the air near the surface of the earth is warmed during the day due to absorption of energy from the sun. The warmer, lighter air at the surface rises and mixes with the cooler, heavier air in the upper atmosphere. The vertical movement of air from the surface to the upper atmosphere helps to disperse pollutants and reduce ambient concentrations. Figure 2-3 shows a diagram of atmospheric conditions with and without an inversion.

Figure 2-3: Diagram of Atmospheric Conditions With and Without An Inversion



Source: Kelly 2019, KCPD 2008

Stable atmospheric conditions usually occur when warm air is above cool air. Because of the cooling of the atmosphere with height, air temperature usually decreases with altitude. A reversal of this atmospheric state, where the air temperature increases with height, is termed temperature inversion. Temperature inversion layers limit the vertical mixing depth. Under atmospheric conditions which may exist in the valley at certain times of the year, the mixing (vertical dispersion) of air pollutants may be limited by temperature inversion layers. Inversions can exist at the surface or at any height above the ground. The height of the base of the inversion is known as the "mixing height." This is the level to which pollutants can mix vertically. The two principal types of inversions that occur in the San Joaquin Valley are radiation inversion and subsidence inversion.

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Radiation (or surface) inversions are formed when the ground surface becomes cooler than the air above it during the night. The inversion is destroyed when heat from the sun warms the ground, which in turn heats the lower layers of air, causing the air to rise up through the surface inversion layer.

During summer, daytime inversion layers are typically encountered at 2,000 to 2,500 feet above the valley floor. During winter, temperature inversions are more stable, and inversion layers may be encountered at 500 to 1,000 feet above the valley floor. Temperature inversions in the southern part of the valley are more frequent and persistent than in the north due to the lack of marine air intrusion.

Subsidence inversions occur as air is pushed downward and the pressure increases, causing temperature to rise. The warm layer of air will descend to some relatively static elevation above the ground, creating a low inversion layer. This type of inversion layer may be persistent because radiant heat from the ground may not be sufficient to cause the breakup of the inversion layer.

Concentration levels 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.

2.2 Existing Air Quality

The Clean Air Act of 1970 identified certain pollutants where exposure to these substances can cause health effects, such as heart or lung disease, respiratory damage, or premature death, and property damage. The United States Environmental Protection Agency (EPA) has established health-based National Ambient Air Quality Standards (NAAQS) for seven air pollutants, commonly referred to as "criteria pollutants." California has also adopted ambient air quality standards (CAAQS) for these seven pollutants, which are, in some cases, more stringent than the NAAQS, and which include standards for four additional air pollutants. These pollutants are called criteria pollutants because standards (i.e., criteria) have been established for each of them to meet to protect the public health (primary standards) and welfare (secondary standards).

Each of these criteria pollutants and their health effects are described below, as well as a description of TACs and an infectious agent. These descriptions are followed by data regarding maximum concentrations observed and the attainment status of the standards in the local area. Sections 2.2.1 and Section 2.2.2 were obtained from the Kern County Planning and Natural Resources Department (KCPD) *Guidelines for Preparing Air Quality Assessments for Use in Environmental Impact Reports*, 2006, with some slight updates as made in a more recent EIR.

2.2.1 Characteristics of Common Air Pollutants

The general characteristics and health effects of air pollutants are summarized below. As required by the KCPD guidelines, all criteria pollutants and precursors are discussed, even if the proposed Project does not generate those pollutants.

Ozone

Ozone (O_3) occurs in two layers of the atmosphere. The layer surrounding the earth's surface is the troposphere. Here, ground level or "bad" ozone is an air pollutant that damages human health, vegetation, and many common materials. It is a key ingredient of urban smog. The troposphere extends to a level about 10 miles up, where it meets the

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second layer, the stratosphere. The stratospheric or "good" ozone layer extends upward from about 10 to 30 miles and protects life on earth from the sun's harmful ultraviolet rays (UV-B).

"Bad" ozone is what is known as a photochemical pollutant. It needs volatile organic compounds (VOC), oxides of nitrogen (NO_x), and sunlight. VOC and NO_x are emitted from various sources throughout Kern County. In order to reduce ozone concentrations, it is necessary to control the emissions of these ozone precursors.

Significant ozone formation generally requires an adequate amount of precursors in the atmosphere and several hours in a stable atmosphere with strong sunlight.

Ozone is a regional air pollutant. It is generated over a large area and is transported and spread by wind. Ozone, the primary constituent of smog, is the most complex, difficult to control, and pervasive of the criteria pollutants. Unlike other pollutants, ozone is not emitted directly into the air by specific sources. Ozone is created by sunlight acting on other air pollutants (called precursors), specifically NO_x and VOC. Sources of precursor gases to the photochemical reaction that form ozone number in the thousands. Common sources include agricultural operations, consumer products, gasoline vapors, chemical solvents, oil and gas operations, and combustion products of various fuels.

Originating from gas stations, motor vehicles, large industrial facilities, and small businesses such as bakeries and dry cleaners, the ozone-forming chemical reactions often take place in another location, catalyzed by sunlight and heat. High ozone concentrations can form over large regions where emissions from motor vehicles and stationary sources are carried hundreds of miles from their origins. Approximately 50 million people lived in counties with air quality levels above the EPA's health-based national air quality standard in 1994. The highest levels of ozone were recorded in Los Angeles. High levels also persist in other heavily populated areas including the Texas Gulf Coast and much of the Northeast.

Health Effects: 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, and damages agricultural crops and some man-made materials, such as rubber, paint, and plastics. Societal costs from ozone damage include increased medical costs, the loss of human and animal life, accelerated replacement of industrial equipment, and reduced crop yields.

High levels of ozone may negatively impact 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 of 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, as they are more likely than adults

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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 a powerful oxidant – it can be compared 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 asthma 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 leads to lung inflammation, lung tissue damage, and reduced lung intake. Evidence has also linked the onset of asthma to exposure to elevated ozone levels in exercising children.

Hydrocarbons (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 VOCs and ROGs. ROGs include all hydrocarbons except those exempted by the California Air Resources Board (CARB). Therefore, 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 exempt from the definition of VOC is included by the SJVAPCD and is presented in District Rule 1020, section 3.53. Both VOCs and ROGs 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.

Health Effects: 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 California AAQS for hydrocarbons. Hazardous hydrocarbons are considered TACs. Examples include benzene (a carcinogenic TAC) and toluene (a non-carcinogenic TAC). The health effects of individual hydrocarbon TACs are described in Section 2.3.4.

Carbon Monoxide

Carbon Monoxide (CO) is emitted by mobile and stationary sources as a result of incomplete combustion of hydrocarbons or other carbon-based fuels. CO is an odorless, colorless, poisonous gas.

CO is 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

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overall downward trend in concentrations and emissions of CO, some metropolitan areas still experience high levels of CO.

Health Effects: CO enters the bloodstream and binds more readily to hemoglobin than oxygen, reducing the oxygen-carrying capacity of blood and 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. 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 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 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 (SIDS), 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 can result in symptoms ranging from common flu and cold symptoms (shortness of breath on mild exertion, mild headaches, and nausea) to unconsciousness and death. Hexter and Goldsmith (1971) reported an association between daily death rate and exposure to ambient CO in Los Angeles County. They postulate that a concentration of 20.2 parts per million, or ppm (the highest daily concentration recorded during a 4-year period) contributed 11 out of 159 deaths (Hexter and Goldsmith 1971). Additional studies conducted in Los Angeles and Sao Paulo also suggest a relationship between daily death rates and CO concentrations (Canova et al. 2018).

Nitrogen Oxides

Nitrogen oxides (NO_x) comprise a family of highly reactive gases that are a primary precursor to the formation of ground-level ozone and react in the atmosphere to form acid rain. NO_x is emitted from combustion processes in which fuel is burned at high temperatures, principally from motor vehicle exhaust and stationary sources such as electric utilities and industrial boilers. From a health perspective, two of the most significant nitrogen oxides are nitric oxide (NO) and nitrogen dioxide (NO_2). NO is a sharp sweet-smelling gas at room temperature, whereas NO_2 has a strong harsh odor and is a liquid at room temperature, becoming a reddish-brown gas above 70°F.

Health Effects: NO_x is an ozone precursor that combines with ROG/VOC to form ozone. See the ozone section above for a discussion of the health effects of ozone.

Direct inhalation of NO_2 can also cause a wide range of health effects. NO_2 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 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

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include 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_2 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 and is a major component of acid rain in California.

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_x increases susceptibility to respiratory infections, lowering their resistance to such diseases 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 hospital admissions for respiratory conditions.

NO_x contributes to a wide range of environmental effects directly and when combined with other precursors to form ozone and acid rain. 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.

Particulate Matter

Particulate matter (PM_{10} and $PM_{2.5}$) pollution consists of very small liquid and solid particles floating in the air. Some particles are large or dark enough to be seen as soot or smoke. Others are so small they can be detected only with an electron microscope. Particulate matter is a mixture of materials that can include smoke, soot, dust, salt, acids, and metals. Particulate matter also forms when gases emitted from motor vehicles and industrial sources undergo chemical reactions in the atmosphere. Respirable particulate matter, or PM_{10}, refers to particles less than or equal to 10 microns in aerodynamic diameter. Fine particulate matter, or $PM_{2.5}$, refers to particles less than or equal to 2.5 microns in aerodynamic diameter and is a subset of PM_{10}.

In the western United States, there are sources of PM_{10} in both urban and rural areas. PM_{10} and $PM_{2.5}$ are emitted from stationary and mobile sources, including diesel trucks and other motor vehicles; power plants; industrial processing; wood-burning stoves and fireplaces; wildfires; dust from roads, construction, landfills, and agriculture; and fugitive windblown dust. Because particles originate from a variety of sources, their chemical and physical compositions vary widely.

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Health Effects: PM_{10} and $PM_{2.5}$ particles are small enough – about $1/7^{th}$ the thickness of a human hair, or smaller – to be inhaled into, and lodge in, the deepest parts of the lung, evading the respiratory system's natural defenses. Health problems begin as the body reacts to these foreign particles.

Acute and chronic health effects associated with high particulate levels include the aggravation of chronic respiratory diseases, heart and lung disease, and coughing, bronchitis, and respiratory illnesses in children. Mortality studies have shown a statistically significant direct association between mortality and daily concentrations of particulate matter in the air. Non-health-related effects include reduced visibility and soiling of buildings. PM_{10} can increase the number and severity of asthma attacks, cause or aggravate bronchitis and other lung diseases, and reduce the body's ability to fight infections. PM_{10} and $PM_{2.5}$ can aggravate respiratory disease and cause lung damage, cancer, and premature death.

Although particulate matter can cause health problems for everyone, certain people are especially vulnerable to adverse health effects of PM_{10}. These "sensitive populations" include children, the elderly, exercising adults, and those suffering from chronic lung disease, such as asthma or bronchitis. Of greatest concern are recent studies that link PM_{10} exposure to the premature deaths of people who already have heart and lung disease, especially the elderly. Acidic PM_{10} can also damage man-made materials and is a major cause of reduced visibility in many parts of the U.S.

Premature deaths linked to particulate matter are now at levels comparable to deaths from traffic accidents and second-hand smoke. As one of the most dangerous pollutants, fine particulate matter (e.g., from diesel exhaust and fireplace soot) not only bypasses the body's defense mechanisms and becomes embedded in the deepest recesses of the lung, but also can disrupt cellular processes. Population-based studies in hundreds of cities in the U.S. and around the world have demonstrated a strong link between elevated particulate levels and premature deaths, hospital admissions, emergency room visits, and asthma attacks. Long-term studies of children's health conducted in California have demonstrated that particulate pollution may significantly reduce lung function growth in children.

Attaining the California PM standards would annually prevent about 6,500 premature deaths, or 3% of all deaths. These premature deaths shorten lives by an average of 14 years. This is roughly equivalent to the number of deaths (4,200-7,400) linked to second-hand smoke in the year 2000. In comparison, motor vehicle crashes caused 3,300 deaths and homicides were responsible for 2,100 deaths in the year 2000. Attaining the California PM and ozone standards would annually prevent 4,000 hospital admissions for respiratory disease, 3,000 hospital admissions for cardiovascular disease, and 2,000 asthma-related emergency room visits. Exposure to diesel PM causes about 250 excess cancer cases per year in California.

One study provides evidence that exposure to particulate air pollution is associated with lung cancer. This study found that residents who live in an area that is severely impacted by particulate air pollution are at risk of lung cancer at a rate comparable to non-smokers exposed to second-hand smoke. This study also found an approximately 16% excess risk of dying from lung cancer due to fine particulate air pollution.

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Another study shows that individuals with existing cardiac disease can be in a potentially life-threatening situation when exposed to high levels of ultrafine air pollution. Fine particles can penetrate the lungs and may cause the heart to beat irregularly or cause inflammation, which could lead to a heart attack.

Sulfur Dioxide

Sulfur dioxide (SO_2) is a colorless, irritating gas with a "rotten egg" smell formed primarily by the combustion of sulfur-containing fossil fuels. In the late 1970s, SO_2 was a pollutant of concern in the Kern County portion of the San Joaquin Valley Air Basin (SJVAB), but with the successful application of regulations, the levels have been reduced significantly.

Health Effects: 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 a main contributor to poor visibility. (See also the discussion of health effects of particulate matter.)

SO_2 not only has a bad odor, it can irritate the respiratory system. Exposure to high concentrations for short periods of time can constrict the bronchi and increase mucous flow, making breathing difficult. SO_2 can also:

- Immediately irritate the lung and throat at concentrations greater than 6 ppm in many people;
- Impair the respiratory system's defenses against foreign particles and bacteria when exposed to concentrations less than 6 ppm for longer time periods; and
- 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 include:

- Health problems, such as episodes of bronchitis requiring hospitalization associated with lower-level acid concentrations;
- Self-reported respiratory conditions, such as chronic cough and difficult breathing, associated with acid aerosol concentrations (asthmatic individuals are especially susceptible to these effects, and the elderly and those with chronic respiratory conditions may also be affected at lower concentrations than the general population);

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- Increased respiratory tract infections associated with longer-term, lower-level exposures to SO_2 and acid aerosols; and
- Subjective symptoms, such as headaches and nausea, in the absence of pathological abnormalities due to long-term exposure.

SO_2 can be injurious to a wide variety of plant species, 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.) Sulfur oxides (SO_x) 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.

Sulfates

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). Data collected in Kern County identify levels of sulfates that are significantly less than the applicable health standards.

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 (e.g., gasoline and diesel fuel) that contain sulfur. This sulfur is oxidized to sulfur dioxide (SO_2) during the combustion process and subsequently converted to sulfate compounds in the atmosphere. The conversion of SO_2 to sulfates takes place comparatively rapidly and completely in urban areas of California due to regional meteorological features.

Health Effects: The 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 cardio-pulmonary disease. Sulfates are particularly effective in degrading visibility and, due to the fact that they are usually acidic, can harm ecosystems and damage materials and property.

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Lead

Lead (Pb) is a metal that is a natural constituent of air, water, and the biosphere. Lead is neither created nor destroyed in the environment, so it essentially persists forever. Lead was used until the early 1990's to increase the octane rating in auto fuel. Historically, gasoline-powered automobile engines were a major source of airborne lead due to the use of leaded fuels. Because most leaded fuel use in fuels has been phased out, ambient concentrations of lead have dropped dramatically.

Health Effects: 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.

Hydrogen Sulfide

Hydrogen sulfide (H_2S) is associated with geothermal activity, oil and gas production, refining, sewage treatment plants, and confined animal feeding operations (CARB 2009a).

Health Effects: Exposure to low concentrations of H_2S may cause irritation to the eyes, nose, or throat. It may also cause difficulty in breathing for some asthmatics. Exposure to higher concentrations (above 100 ppm) 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 (0.00011-0.00033 ppm). Deaths due to breathing in 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.

Visibility-Reducing Particles

This standard is a measure of visibility. The CARB does not yet have a measuring method with enough accuracy or precision to designate areas in the State as attainment or nonattainment. The entire State is labeled 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 PVC pipes, pipefittings, and plastics.

Health Effects: In humans, epidemiological studies of occupationally exposed workers have linked vinyl chloride exposure to development of a rare cancer, liver angiosarcoma, and have suggested a relationship between exposure and lung and brain cancers.

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Short-term exposure to vinyl chloride has been linked with the following acute health effects:

- 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, lung and kidney irritation, and inhibition of blood clotting in humans and cardiac arrhythmias in animals; and
- Tests involving acute exposure of mice have shown vinyl chloride to have high acute toxicity from inhalation exposure.

Long-term exposure to vinyl chloride concentrations has been linked with the following chronic health effects:

- Liver damage may result in humans from chronic exposure to vinyl chloride through both inhalation and oral exposure;
- Development of symptoms termed “vinyl chloride disease,” characterized by Raynaud's phenomenon (blanching of fingers and a feeling of numbness and discomfort after 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); and
- 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).

Several reproductive/developmental health effects from vinyl chloride exposure have been identified, which include the following:

- Affects to male sexual performance, identified in several case reports. However, these studies are limited by a lack of quantitative exposure information and possible co-occurring exposure to other chemicals;
- Increased incidence of birth defects associated with vinyl chloride exposure in pregnant women, reported by several epidemiological studies. However, other studies have not reported similar findings;
- An association between men occupationally exposed to vinyl chloride and miscarriages in their wives' pregnancies, suggested by some epidemiological studies. However, other studies have not supported these findings;
- Cancer risk associated with long term vinyl chloride exposure;
- Increased risk of a rare form of liver cancer (angiosarcoma of the liver) in humans associated with inhaled vinyl chloride; and
- Increased incidence of angiosarcoma of the liver and cancer of the liver associated with inhaled vinyl chloride, demonstrated by animal studies.

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2.2.2 Toxic Air Contaminants

"Hazardous air pollutant" (HAP) is a term used by the federal Clean Air Act that includes a variety of pollutants generated or emitted by industrial production activities. Referred to as "Toxic Air Contaminants" (TAC) under the California Clean Act, ten have been identified through ambient air quality data as posing the most substantial health risk in California. Direct exposure to these pollutants has been shown to cause cancer, birth defects, damage to brain and nervous system and respiratory disorders.

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.

Brief discussions of the potential health effects of each of these 10 TACs are provided below.

Acetaldehyde

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.

Health Effects: Acetaldehyde is classified as a federal HAP and as a California TAC. Acetaldehyde is a carcinogen that also causes chronic non-cancer toxicity in the respiratory system. Symptoms of chronic intoxication of acetaldehyde in humans resemble those of alcoholism.

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

Approximately 87% of the benzene emitted in California comes from motor vehicles, including evaporative leakage and unburned fuel exhaust (CARB 2009b). Currently, the benzene content of gasoline is less than 1%.

Health Effects: Benzene is highly carcinogenic and occurs throughout California. Benzene also has non-cancer health effects. 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.

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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 liquid and vapor 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 disorders in the blood in humans. Benzene specifically 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 occupationally exposed to benzene.

1,3-Butadiene

The majority of 1,3-butadiene emissions comes from incomplete combustion of gasoline and diesel fuels. Mobile sources account for 53% of total air basin emissions. Area-wide sources such as agricultural waste burning, and open burning contribute approximately 21% of statewide emissions (CARB 2009b).

Health Effects: 1,3-Butadiene has been identified as a carcinogen in California. Butadiene vapors cause neurological effects at very high levels, 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 (due to rapid vaporization).

One epidemiological study reported that chronic exposure to 1,3-butadiene via 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

The primary sources of carbon tetrachloride in California include chemical and allied product manufacturers.

Health Effects: In California, carbon tetrachloride has been identified as a carcinogen. Carbon tetrachloride is also a central nervous system depressant and mild eye and respiratory tract irritant. The EPA has classified carbon tetrachloride as a Group B2, probable human carcinogen.

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

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include headache, weakness, lethargy, nausea, and vomiting. Delayed pulmonary edema (fluid in lungs) has been observed in humans 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 lungs. Chronic inhalation or oral exposure to carbon tetrachloride produces liver and kidney damage in humans and animals.

Hexavalent Chromium

Mobile sources account for 52 percent of total statewide hexavalent chromium (or chromium-VI) emissions. Stationary sources (chromium plating, chromic acid anodizing, and glass furnace firebrick lining) account for 46 percent of total statewide hexavalent chromium emissions (CARB 2009b).

Health Effects: In California, chromium-VI has been identified as a carcinogen. There is epidemiological evidence that exposure to inhaled chromium-VI may result in lung cancer. The principal acute effects are renal toxicity, gastrointestinal hemorrhage, and intravascular hemolysis.

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 reported effects on the respiratory tract, with perforations and ulcerations of the septum, bronchitis, decreased pulmonary function, pneumonia, asthma, and nasal itching and soreness. 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 (p)-Dichlorobenzene

The primary sources of p-dichlorobenzene include consumer products such as non-aerosol insect repellents and solid/gel air fresheners. These sources contribute almost 100% of statewide p-dichlorobenzene emissions (CARB 2009b).

Health Effects: In California, p-dichlorobenzene has been identified as a carcinogen. Acute exposure to p-dichlorobenzene via inhalation in humans results in irritation to the eyes, skin, and throat. In addition, long-term inhalation exposure may affect the liver, skin, and central nervous system in humans (e.g., cerebellar ataxia, dysarthria, weakness in limbs, and hyporeflexia).

Formaldehyde

Formaldehyde is both directly emitted into the atmosphere and formed in the atmosphere as a result of photochemical oxidation. Directly emitted formaldehyde is a product of incomplete combustion. One of the primary sources of formaldehyde is vehicular exhaust. Formaldehyde is also used in resins, can be found in many consumer products as an antimicrobial agent, and is used in fumigants and soil disinfectants. About 82 percent of direct formaldehyde emissions are estimated to come from the combustion of fossil fuels from mobile sources (CARB 2009b).

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Health Effects: 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 eye, nose, and throat irritation. 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. The EPA considers formaldehyde to be a probable human carcinogen (cancer-causing agent) and has ranked it in the EPA's Group B1. In California, formaldehyde has been identified as a carcinogen.

Methylene Chloride

Methylene chloride is used as a solvent, a blowing and cleaning agent in the manufacture of polyurethane foam and plastics, and a solvent in paint stripping operations. Paint removers account for the largest use of methylene chloride in California.

Health Effects: Case studies of methylene chloride poisoning during paint stripping operations have demonstrated that inhalation exposure to extremely high levels can be fatal to humans. Acute inhalation exposure to high levels of methylene chloride in humans has resulted in effects on 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. The EPA considers methylene chloride to be a probable human carcinogen and has ranked it in the EPA's Group B2. California considers methylene chloride to be carcinogenic.

Perchloroethylene

Perchloroethylene is used as a solvent in dry cleaning operations. Perchloroethylene is also used in degreasing operations, paints and coatings, adhesives, aerosols, specialty chemical production, printing inks, silicones, rug shampoos, and laboratory solvents. Stationary sources (dry cleaning plants, aircraft part and equipment manufacturers, and fabricated metal product manufacturers) account for 57 percent of the statewide emissions of perchloroethylene. Area-wide sources (automotive brake cleaners and tire sealants and inflators) contribute approximately 43 percent (CARB 2009b).

Health Effects: In California, perchloroethylene has been identified as a carcinogen. Perchloroethylene vapors are irritating to the eyes and respiratory tract. Following chronic exposure, workers have shown signs of liver toxicity, kidney dysfunction, and neurological disorders.

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Diesel Particulate Matter

Diesel particulate matter (DPM) is emitted from both mobile and stationary sources. In California, onroad diesel-fueled engines are estimated to contribute approximately 38% of the total, with an additional 60% attributed to other mobile sources such as construction and mining equipment, agricultural equipment, and transport refrigeration units. Stationary sources contribute about 1% of total DPM (CARB 2009b).

Health Effects: 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 to develop lung cancer than workers who were not exposed to diesel emissions. 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 (CARB 2009b). Other researchers and scientific organizations, including the National Institute for Occupational Safety and Health, have calculated cancer risks from diesel exhaust that are similar to those developed 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 those 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 also reduce lung function in children. In California, diesel exhaust particles have been identified as a carcinogen.

2.2.3 Infectious Agents

Valley Fever (Coccidioidomycosis)

Coccidioidomycosis, more commonly known as "Valley Fever," is primarily a disease of the lungs caused by inhalation of spores of the *Coccidioides immitis* fungus. The spores are found in the soil, become airborne when the soil is disturbed, 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.

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The ecologic factors conductive to survival and replication of the spores appear to be high summer temperatures, mild winters, sparse rainfall, and alkaline sandy soils.

Health Effects: Valley Fever symptoms generally occur within 1 to 4 weeks of exposure. Approximately 60 percent of Valley Fever cases are mild and display flu-like symptoms or no symptoms at all. Of those who are exposed and seek medical treatment, the most common symptoms are fatigue, cough, chest pain, fever, rash, headache, and joint aches. In some cases, painful red bumps may develop. These symptoms are not unique to Valley Fever and may be caused by other illnesses as well. 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 6 months and will have a lifelong immunity to the fungal spores (Valley Fever Center for Excellence 2019).

In 2017, there were 14,364 cases of Valley Fever reported to Center for Disease Control and Prevention (CDC 2019). Most of these cases were in people who live in Arizona or California. On average, there were approximately 200 coccidioidomycosis-associated deaths each year. The number of Valley Fever cases reported to CDC likely underestimates the true number of Valley Fever cases. Tens of thousands more illnesses likely occur and may be misdiagnosed because many patients are not tested for Valley Fever.

In Kern County from 2008-2018, there were on average about 2,000 cases per year with an average of 16 deaths annually (KCPHSD 2019). The highest incidence rates (cases per 100,000 population) in Kern County have occurred in the Valley West area which includes the Project site.

New residents to the San Joaquin Valley have usually never been exposed to Valley Fever and are particularly susceptible to infection. Longtime residents of the valley are less prone to infection.

2.2.4 Criteria Pollutant Attainment Status

The NAAQS established by the EPA apply to all areas throughout the nation. In most cases, the NAAQS define the maximum acceptable concentration that may be reached, but not exceeded more than once per year. The CAAQS are in some cases more stringent than the NAAQS and are not to be exceeded. These standards are designed to protect the public with a reasonable margin of safety. Areas that meet the ambient standards are designated as "attainment", areas where the measured concentrations exceed the ambient standards are designated "nonattainment", and areas where insufficient data exist to make a determination are "unclassified".

The SJVAB is currently designated as attainment for the NAAQS and the CAAQS for NO_2, CO, SO_2, and Pb. The air basin is designated as nonattainment for federal and State standards for O_3, PM_{10}, and $PM_{2.5}$. Within the SJVAB, the emissions and resultant concentrations of criteria pollutants have declined due to stringent control requirements promulgated by the SJVAPCD, CARB, and EPA. However, the NAAQS and/or CAAQS established for ozone, PM_{10}, and $PM_{2.5}$ are still exceeded in the SJVAB.

Attaining air quality standards in the San Joaquin Valley has proven to be challenging due to the unique topographical and meteorological conditions found in the region. The valley encompasses nearly 25,000 square miles and is surrounded by mountain ranges to the west,

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east, and south. The airflow through the valley can be constrained by these mountain ranges, leading to limited dispersion. During the winter, high-pressure systems can cause the atmosphere to become stagnant for longer periods of time, where wind flow is calm and air movement is minimal. These stagnant weather systems can also cause severe nighttime temperature inversions, which exacerbate the buildup of air contaminants.

Despite these challenges, significant progress has been made in attaining the NAAQS and improving public health for valley citizens. Due to the efforts made by San Joaquin Valley businesses and residents and stringent regulatory programs by the SJVAPCD and CARB, the valley's emissions are at historically low levels and air quality over the past few years has been better than any other time on record. Emissions from stationary sources have been reduced by 85%, cancer risk from exposure to TACs has been reduced by 95%, population exposure to elevated $PM_{2.5}$ levels have been reduced by 85%, and population exposure to elevated ozone levels has been reduced by 90% (SJVAPCD 2018).

The NAAQS and CAAQS are summarized in Table 2-1, along with the current air quality designations for the SJVAB.

Table 2-1: Ambient Air Quality Standards and SJVAB Attainment Status

Pollutant and Averaging Period		NAAQS	CAAQS	SJVAB Attainment Status	
				NAAQS	CAAQS
Ozone (O_3)	1-Hour	–	0.09 ppm	–	Nonattainment
	8 Hour	0.070 ppm	0.070 ppm	Nonattainment	Nonattainment
NO_2	1-Hour	0.100 ppm	0.18 ppm	Attainment	Attainment
	Annual	0.053 ppm	0.030 ppm	Attainment	Attainment
CO	1-Hour	35 ppm	20 ppm	Attainment	Attainment
	8-Hour	9 ppm	9.0 ppm	Attainment	Attainment
PM_{10}	24-Hour	150 µg/m^3	50 µg/m^3	Attainment	Nonattainment
	Annual	–	20 µg/m^3	–	Nonattainment
$PM_{2.5}$	24-Hour	35 µg/m^3	–	Nonattainment	–
	Annual	12.0 µg/m^3	12 µg/m^3	Nonattainment	Nonattainment
SO_2	1-Hour	0.075 ppm	0.25 ppm	Attainment	Attainment
	24-Hour	0.14 ppm	0.04 ppm	Attainment	Attainment
	Annual	0.03 ppm	–	Attainment	–
Lead	Month	–	1.5 µg/m^3	–	Attainment
	Quarter	1.5 µg/m^3	–	Attainment	–

ppm = parts per million; µg/m^3 = micrograms per cubic meter

Sources: CARB 2016, CARB 2018b, EPA 2018: SJVAPCD 2019b.

2.2.5 Local Air Quality Background

CARB and the SJVAPCD operate a regional monitoring network that measures the ambient concentrations of criteria pollutants and TACs. Locations of the State and local air monitoring (SLAM) sites operated within the SJVAB are shown in Figure 2-4.

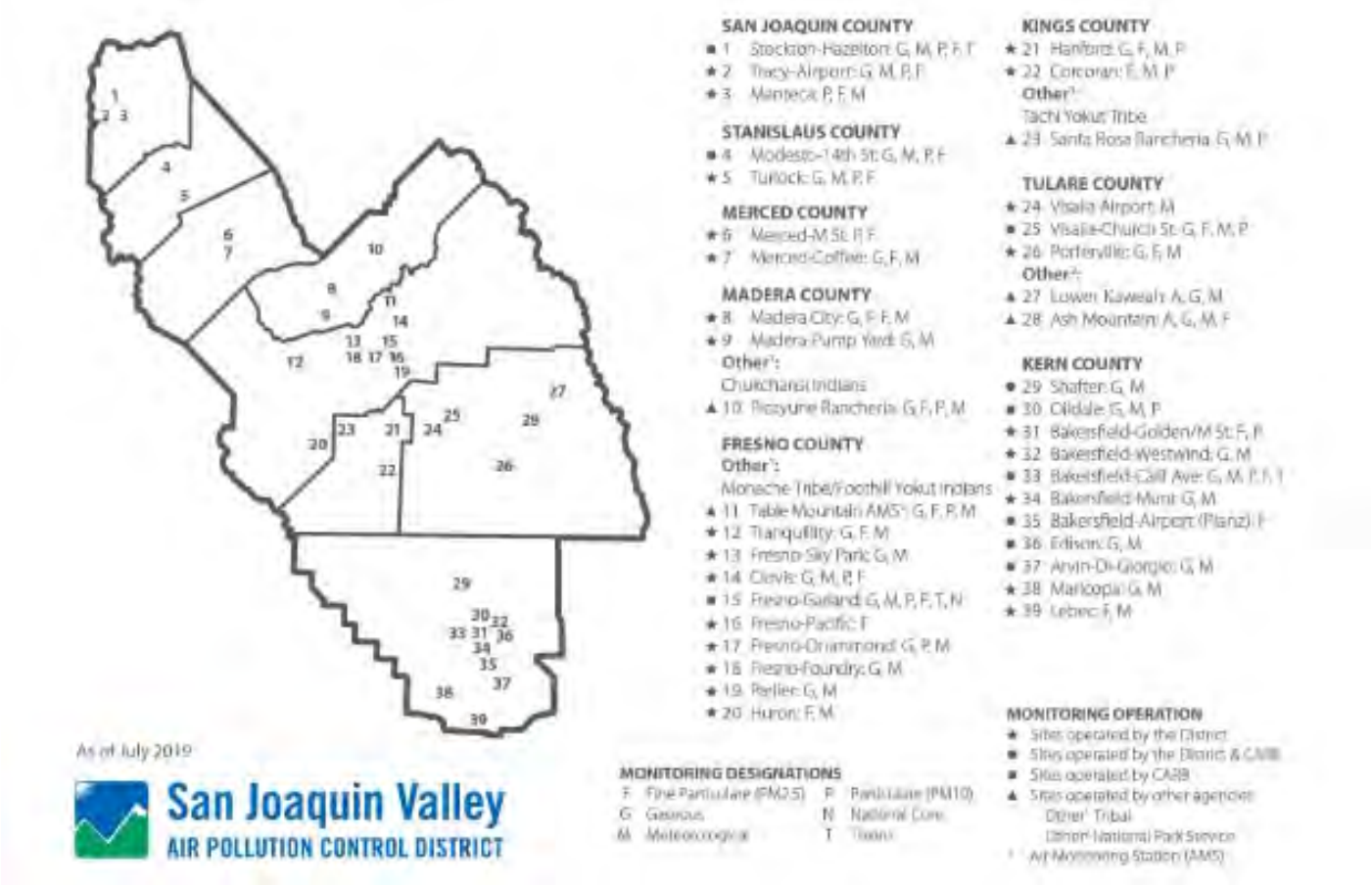
The monitoring sites in the network include instruments that measure ambient levels of gaseous and particulate air pollutants and, in some cases, meteorological parameters. The

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air quality trends at these monitoring stations are typically considered to be representative of the ambient air quality in the surrounding areas. Local air quality within a given area is affected by how pollutants are dispersed into the atmosphere, the types and quantities of emissions released, prevailing wind patterns, and atmospheric conditions.

Background air quality representative of the proposed Project area was determined from maximum concentrations recorded at nearby monitoring stations operated by CARB or the SJVAPCD. Monitored concentrations within the project area at the closest monitoring station to the Project for the most recent 3 years available are summarized in Table 2-2. The closest monitoring station for ozone and NO_2 is the Shafter Walker Street station, located about 30 miles to the east-southeast; for PM_{10} and $PM_{2.5}$ is the Bakersfield California Avenue station, located about 44 miles to the southeast; and for CO is the Bakersfield Muni South Union Avenue station, located about 48 miles to the southeast. SO_2 is not monitored in Kern County; the nearest station is in Fresno.

Figure 2-4: San Joaquin Valley Air Monitoring Sites



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Table 2-2: Maximum Observed Criteria Pollutant Concentrations and Number of Days Over the Applicable Ambient Air Quality Standard

Pollutant and Averaging Period		2015		2016		2017	
		Max. Conc.*	Days Exceeded	Max. Conc.*	Days Exceeded	Max. Conc. *	Days Exceeded
O_3	State 1-Hour	104	–	96	–	94	–
	National 8-Hour	90	34	87	49	82	27
NO_2	State 1-Hour	45.4	0	47.8	0	47.6	0
	National 1-Hour	36.7	0	36.7	0	39.6	0
	Annual	9	0	9		9	0
CO	1-Hour	1.70	0	1.44	0	1.85	0
	8-Hour	1.0	–	1.1	–	1.2	–
SO_2	1-Hour	10.8	0	8.0	0	7.7	0
	3-Hour	6.3	0	5.3	0	4.5	0
	24-Hour	2.4	0	2.0	0	2.3	0
PM_{10}	State 24-Hour	103.6	20	92.2	21	143.6	16
	State Annual	44.1	0	40.9	0	42.6	0
	National 24-Hour	104.7	0	90.9	0	138.0	0
$PM_{2.5}$	State Annual	16.6	–	16.0	–	15.9	–
	National 24-Hour	57.2	29	47.0	23	71.8	28
	National Annual	18.3	–	16.5	–	15.7	–

* O_3, NO_2, SO_2, maximum concentrations in parts per billion (ppb); CO in parts per million (ppm) and PM_{10}, and $PM_{2.5}$ in micrograms per cubic meter ($\mu g/m^3$).

Source: CARB 2019b, EPA 2019

2.3 Existing and CARB Projected Basin-Wide Emissions

California is a diverse state with many sources of air pollution. Sources of air pollutants include stationary sources, area-wide sources, mobile sources, and natural sources. Stationary source emissions include fuel combustion, waste disposal, petroleum production, and other industrial processes. Emissions from area-wide sources may be either from small individual sources, such as residential fireplaces, or from widely distributed sources that cannot be tied to a single location, such as farming operations, construction and demolition, and dust from unpaved roads. Mobile sources include onroad cars, trucks, and buses and other sources such as boats, offroad recreational vehicles, farm equipment, aircraft, and trains. Natural sources include geogenic and biogenic hydrocarbon emissions, natural wind-blown dust, and wildfires. These emissions are widely dispersed throughout the environment and affect the existing air quality within the valley.

CARB has compiled emissions inventories broken down by source categories for all areas within the State, available by air basin and county portion of the air basin. Emissions inventory data are available for the years 2000 through 2035 (based on projections), with the data most recently updated in July 2018. The CARB emissions inventory data for selected years for the entire SJVAB and the Kern County portion of the SJVAB are summarized in Tables 2-3 and 2-4, respectively.

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The years selected to be presented in these tables are 2017 and 2018, representative of the baseline years, and 2020 and 2030 for future years. Emissions are presented for NO_x, ROG, CO, oxides of sulfur (SO_x), PM_{10}, $PM_{2.5}$, and ammonia (NH_3). The large variation in pollutant emissions for natural sources in 2017 compared to later years is due to a large contribution from wildfires that year, while later years remain a projected value.

Table 2-3: Pollutant Emissions Within the SJVAB (TPD)

2017	NO_x	ROG	CO	SO_x	PM_{10}	$PM_{2.5}$	NH_3
Stationary Source	29.14	89.17	27.51	6.35	14.45	8.58	14.57
Area-Wide Source	8.01	151.57	53.23	0.32	235.30	41.50	308.65
On-Road Mobile	119.20	31.57	222.88	0.64	7.74	3.72	3.88
Other Mobile	76.96	29.07	188.60	0.28	5.64	5.14	0.03
Natural Sources	11.69	807.89	1,809.30	9.61	169.38	143.51	25.18
2017 Total for SJVAB	245.00	1,109.27	2,301.52	17.21	432.51	202.44	352.32
2018	**NO_x**	**ROG**	**CO**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**	**NH_3**
Stationary Source	29.09	89.79	27.71	6.42	14.67	8.67	14.78
Area-Wide Source	7.99	151.99	53.24	0.32	235.84	41.61	308.11
On-Road Mobile	110.69	28.91	201.33	0.64	7.64	3.56	3.78
Other Mobile	73.61	28.03	188.16	0.29	5.43	4.95	0.03
Natural Sources	3.21	719.73	550.00	2.80	51.21	43.40	12.59
2018 Total for SJVAB	224.59	1,018.46	1,020.44	10.47	314.80	102.19	339.30
2020	**NO_x**	**ROG**	**CO**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**	**NH_3**
Stationary Source	28.61	91.33	27.66	6.51	14.94	8.72	15.20
Area-Wide Source	7.86	152.82	53.24	0.32	236.81	41.81	307.04
On-Road Mobile	96.95	24.87	167.86	0.64	7.62	3.42	3.60
Other Mobile	69.83	27.16	196.22	0.33	5.48	5.04	0.03
Natural Sources	3.21	719.73	550.00	2.80	51.21	43.40	12.59
2020 Total for SJVAB	206.46	1,015.92	994.98	10.60	316.06	102.40	338.47
2030	**NO_x**	**ROG**	**CO**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**	**NH_3**
Stationary Source	27.12	102.50	27.92	7.02	16.55	9.29	17.73
Area-Wide Source	7.13	157.31	53.11	0.33	236.85	42.39	301.75
On-Road Mobile	47.66	16.10	97.71	0.58	8.15	3.37	3.41
Other Mobile	43.59	21.71	202.39	0.34	3.92	3.63	0.04
Natural Sources	3.21	719.73	550.00	2.80	51.21	43.40	12.59
2030 Total for SJVAB	128.70	1,017.35	931.12	11.07	316.68	102.08	335.52

Source: CARB 2018a

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Table 2-4: Pollutant Emissions Within the Kern County Portion of the SJVAB (TPD)

2017	NO_x	ROG	CO	SO_x	PM_{10}	$PM_{2.5}$	NH_3
Stationary Source	8.36	30.51	11.40	1.18	4.37	3.35	6.92
Area-Wide Source	1.25	19.63	5.24	0.04	30.80	5.63	44.43
On-Road Mobile	28.40	5.97	40.16	0.14	1.66	0.81	0.83
Other Mobile	12.73	3.91	27.28	0.04	0.66	0.59	0.00
Natural Sources	0.21	108.54	8.04	0.09	0.87	0.74	1.07
2017 Total for Kern County in SJVAB	50.95	168.56	92.12	1.50	38.37	11.12	53.25
2018	**NO_x**	**ROG**	**CO**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**	**NH_3**
Stationary Source	8.30	30.57	11.38	1.16	4.39	3.34	7.03
Area-Wide Source	1.24	19.70	5.23	0.04	30.82	5.65	44.17
On-Road Mobile	26.62	5.56	36.84	0.14	1.65	0.77	0.82
Other Mobile	11.99	3.75	27.20	0.04	0.61	0.55	0.00
Natural Sources	0.41	109.54	22.26	0.20	2.30	1.94	1.21
2018 Total for Kern County in SJVAB	48.56	169.12	102.90	1.59	39.77	12.26	53.24
2020	**NO_x**	**ROG**	**CO**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**	**NH_3**
Stationary Source	8.01	30.73	11.10	1.13	4.37	3.28	7.23
Area-Wide Source	1.23	19.87	5.24	0.04	30.85	5.68	43.65
On-Road Mobile	23.46	4.88	31.35	0.14	1.64	0.74	0.79
Other Mobile	10.78	3.50	27.21	0.04	0.55	0.49	0.00
Natural Sources	0.41	109.54	22.26	0.20	2.30	1.94	1.21
2020 Total for Kern County in SJVAB	43.88	168.51	97.15	1.56	39.71	12.14	52.88
2030	**NO_x**	**ROG**	**CO**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**	**NH_3**
Stationary Source	7.24	32.09	10.40	1.04	4.50	3.23	8.46
Area-Wide Source	1.13	20.66	5.22	0.05	30.74	5.79	41.04
On-Road Mobile	11.32	3.50	20.23	0.13	1.77	0.73	0.79
Other Mobile	6.38	2.81	28.43	0.05	0.33	0.30	0.01
Natural Sources	0.41	109.54	22.26	0.20	2.30	1.94	1.21
2030 Total for Kern County in SJVAB	26.46	168.60	86.53	1.46	39.64	11.98	51.51

Source: CARB 2018a

CARB maintains the California Toxics Inventory (CTI), which provides emissions estimates for 336 toxic compounds. The CTI is developed by speciating CARB estimates of total organic gas (TOG) and particulate matter (PM) for area, mobile, and natural sources using the most recent speciation profiles. Speciated emissions for each source category are then reconciled with reported stationary point source toxics data from each air basin in the State to establish a complete inventory. The toxics emissions inventory for the 27 compounds found to be emitted in Kern County is summarized in Table 2-5, with the Kern County emissions broken down by source type in Table 2-6.

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Table 2-5: California Toxic Emissions Inventory Summary for Kern County* (TPY)

Pollutant	ID	Statewide	SJVAB	Kern County
Acetaldehyde	75070	66,233.73	16,061.22	3,089.18
Diesel Exhaust & Diesel PM	9901	16,320.29	2,520.31	725.61
Formaldehyde	50000	13,654.06	2,317.98	535.80
Benzene	71432	7,909.06	1,021.17	294.49
Perchloroethylene	127184	3,832.54	448.01	78.05
Methylene chloride	75092	4,806.82	247.17	41.44
1,3-Butadiene	106990	3,871.15	435.05	33.70
Acrolein	107028	2,017.26	153.03	26.61
p-Dichlorobenzene	106467	1,254.03	130.31	26.15
Manganese	7439965	780.98	217.92	24.87
Styrene	100425	550.33	95.75	18.65
Trichloroethylene	79016	465.51	45.83	8.68
Chromium	7440473	142.43	34.41	4.23
Lead	7439921	264.99	28.74	3.26
Vinyl chloride	75014	56.53	7.35	1.91
Acrylonitrile	107131	51.64	7.27	1.84
Nickel oxide	1313991	0.75	0.75	0.56
Arsenic	7440382	231.70	5.16	0.50
Cadmium	7440439	14.54	3.43	0.50
Chloroform	67663	12.90	1.76	0.44
Mercury	7439976	10.60	2.24	0.36
Ethylene oxide	75218	1.73	0.15	0.15
Beryllium	7440417	0.13	0.03	0.02
Chromium-VI & Compounds	18540299	0.46	0.18	0.01
Ethylene dichloride	107062	3.02	0.06	0.005
Carbon tetrachloride	56235	2.68	0.02	0.003
Dioxins/Benzofurans	1082	0.01	0.001	0.001

* Data obtained from the most recently available CTI Report published by CARB (CTI, 2010) and the SJVAPCD 2018 Annual Toxic Emissions Inventory Report.

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Table 2-6: Kern County Toxic Emissions Inventory by Source Type* (TPY)

Pollutant	Stationary Sources	Area-Wide	On-Road Mobile	Other Mobile	Natural Sources
Acetaldehyde	26.09	300.81	89.35	54.92	2,618.01
Diesel Exhaust & Diesel PM	49.01	0.17	595.66	80.77	0.0
Formaldehyde	197.24	26.96	192.87	118.73	0.0
Benzene	165.08	2.05	83.84	43.02	0.51
Perchloroethylene	52.48	25.58	0.0	0.0	0.0
Methylene chloride	11.15	30.29	0.0	0.0	0.0
1,3-Butadiene	0.57	6.57	14.92	8.61	3.03
Acrolein	3.19	13.92	3.54	5.96	0.0
p-Dichlorobenzene	3.81	22.34	0.0	0.0	0.0
Manganese	1.04	23.17	0.63	0.02	0.02
Styrene	12.34	0.65	3.85	1.81	0.0
Trichloroethylene	2.06	6.62	0.0	0.0	0.0
Chromium	0.07	3.67	0.47	0.02	0.0
Lead	0.30	2.84	0.05	0.06	0.01
Vinyl chloride	1.91	0.0	0.0	0.0	0.0
Acrylonitrile	1.84	0.0	0.0	0.0	0.0
Nickel oxide	0.56	0.0	0.0	0.0	0.0
Arsenic	0.11	0.38	0.01	0.001	0.01
Cadmium	0.09	0.39	0.01	0.01	0.0
Chloroform	0.44	0.0	0.0	0.0	0.0
Mercury	0.08	0.28	0.003	0.002	0.0
Ethylene oxide	0.15	0.0	0.0	0.0	0.0
Beryllium	0.02	0.0	0.0	0.0	0.0
Chromium-VI & Compounds	0.01	0.0	0.001	0.001	0.0
Ethylene dichloride	0.005	0.0	0.0	0.0	0.0
Carbon tetrachloride	0.003	0.0	0.0	0.0	0.0
Dioxins/Benzofurans	0.001	0.0	0.0	0.0	0.0

* Data obtained from the most recently available CTI Report published by CARB (CTI, 2010) and the SJVAPCD 2018 Annual Toxic Emissions Inventory Report.

2.4 Regulatory Setting

California contains a wide variety of climates, physical features, and emissions sources. This variety makes the task of improving air quality complex, because what works in one area may not be effective in another area. To better manage common air quality problems, California is divided into 15 air basins. An air basin generally has similar meteorological and geographical conditions throughout. To the extent possible, the air basin boundaries follow along political boundary lines and are defined to include both the source area and the receptor area.

Air quality is managed through federal (EPA), State (CARB), and regional (or local) air quality management districts. This section describes regulations related to air quality, including TACs and odors. Regulations related to GHG emissions are included in Section 5.

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2.4.1 Federal Regulation

The EPA is responsible for implementing programs established under the Federal Clean Air Act (CAA), most recently amended in 1990, such as establishing and reviewing the NAAQS, and for judging the adequacy of State Implementation Plans (SIPs). 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. The EPA also has regulatory and enforcement jurisdiction over emissions 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 sets federal vehicle and stationary source emission standards as well as providing research and guidance in air pollution programs. The EPA may also delegate authority to implement some federal programs to the states while retaining oversight authority to ensure that the programs are properly implemented.

Title V of the Federal CAA, as amended in 1990, created an operating permits program for certain defined sources. One of the primary Title V applicability criteria is based on the facility's potential to emit and varies by the attainment status of the local area. For example, owner/operators of industrial or commercial sources that emit more than 100 TPY of NO_x and ROGs must process a Title V permit. If a source is located in a federal ozone nonattainment area classified as "Serious Nonattainment", this threshold is lowered to 50 TPY. For "Severe Nonattainment" areas, the threshold is lowered to 25 TPY, and for "Extreme Nonattainment" areas, the threshold is further lowered to 10 TPY. The lowering of the thresholds results in more businesses having to comply with Title V permitting requirements in areas with worse air quality. The EPA defined the basic requirements of the Title V program under the Code of Federal Regulations (CFR) Title 40 Part 70, and each air management agency, including the SJVAPCD, has adopted rules specific to their area to implement the Title V program. The SJVAPCD Title V program is regulated under Rule 2520, as discussed in Section 2.4.4. Title V is not meant to impose any new air pollution standards, require installation of any new controls on the affected facilities, or require reductions in emissions. Title V does enhance public and EPA participation in the permitting process and requires additional recordkeeping and reporting by businesses, which may result in additional administrative requirements.

The EPA also establishes New Source Performance Standards (NSPS) and National Emissions Standards for Hazardous Air Pollutants (NESHAP) for a variety of stationary sources of emissions, codified in 40 CFR Part 60, 40 CFR Part 61, and 40 CFR Part 63. Delegation for implementation and enforcement of these standards has been given to the SJVAPCD. These standards are addressed in Section 2.4.4 regarding SJVAPCD regulations.

2.4.2 California Regulation

CARB is responsible for establishing and reviewing the CAAQS, compiling the California SIP (composed of attainment plans from each air district classified as nonattainment of the NAAQS and/or CAAQS), and securing approval of that plan from the EPA. CARB acts as an oversight agency for activities conducted by air quality management districts, which are organized at the regional or county level. CARB is also responsible for the following types of activities:

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- **Mobile Sources and Portable Equipment:** CARB is responsible for establishing tailpipe standards and regulating emissions from onroad and offroad mobile sources and portable equipment;
- **Regulating TAC Emissions:** Identifying TACs, developing air toxic control measures (ATCM), and overseeing implementation of the regulations, including the Air Toxics "Hot Spots" Program (AB 2588), which requires air toxics emissions inventories, health risk assessments (HRAs), and risk reduction programs; and
- **Greenhouse Gases (AB 32):** Implementing regulations designed to reduce emissions of GHGs, such as methane and carbon dioxide (AB 32). This assembly bill requires that California implement regulations designed to reduce GHG emissions (See Section 6 for additional detail).

Applicable California regulations are discussed below.

- **CCR Title 13, Chapter 9, Article 4.8, Section 2449**: CARB has enacted a regulation for the reduction of diesel particulate matter (DPM) and criteria pollutant emissions from in-use offroad diesel-fueled vehicles. This regulation provides target emission rates for PM and NO_x emissions from owners of fleets of diesel-fueled offroad vehicles and applies to equipment fleets of three specific size categories. The target emission rates are reduced over time (CARB 2012c).
- **California Health and Safety Code (H&SC) 41700 (Health Risk Assessment):** These requirements are generally implemented through the local air pollution control districts. Pursuant to SJVAPCD Policy APR 1905 – Risk Management Policy for Permitting New and Modified Sources, for an increase in TAC emissions associated with a proposed new source or modification, an analysis is needed to determine the potential health risk impacts to the nearest resident or worksite.
- **California Diesel Fuel Regulations:** With the California Diesel Fuel Regulations, CARB set sulfur limitations for diesel fuel sold in California for use in onroad and offroad motor vehicles. Under this rule, diesel fuel used in motor vehicles, except harbor craft and intrastate locomotives, is limited to 15 ppm, effective September 1, 2006.
- **CCR Title 14, Chapter 3.1, §17863.4; California Integrated Waste Management Board:** All commercial composting facilities in California are required to "prepare, implement, and maintain" a site-specific Odor Impact Minimization Plan (OIMP).

  OIMPs must provide guidance to onsite operation personnel by describing the following items:

  - An odor monitoring and data collection protocol for onsite odor sources, which describes the proximity of possible odor receptors and a method for assessing odor impacts at the locations of the possible odor receptors;
  - A description of meteorological conditions affecting migration of odors and/or transport of odor-causing material offsite. Seasonal variations that affect wind velocity and direction shall also be described;

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- A complaint response and recordkeeping protocol;
- A description of design considerations and/or projected ranges of optimal operation to be employed in minimizing odor, including method and degree of aeration, moisture content of materials, feedstock characteristics, airborne emission production, process water distribution, pad and site drainage and permeability, equipment reliability, personnel training, weather event impacts, utility service interruptions, and site specific concerns as applicable; and
- A description of operating procedures for minimizing odor, including aeration, moisture management, feedstock quality, drainage controls, pad maintenance, wastewater pond controls, storage practices (e.g., storage time and pile geometry), contingency plans (i.e., equipment, water, power, and personnel), biofiltration, and tarping as applicable.

- **In-Use Off-Road Diesel Fueled Fleets Regulation:** All self-propelled offroad diesel vehicles 25 horsepower (hp) or greater used in California and most two-engine vehicles (except on-road two-engine sweepers) are subject to the Regulation for In-Use Off-Road Diesel Fueled Fleets (Off-Road Regulation). This includes vehicles that are rented or leased (rental or leased fleets).

  The overall purpose of the Off-Road Regulation is to reduce emissions of NO_x and PM from offroad diesel vehicles operating within California. The Off-Road Regulation:

  - Imposes limits on idling, requires a written idling policy, and requires a disclosure when selling vehicles;
  - Requires all vehicles to be reported to CARB [using the Diesel Off-Road Online Reporting System (DOORS)] and labeled;
  - Restricts the adding of older vehicles into fleets starting on January 1, 2014; and
  - Requires fleets to reduce their emissions by retiring, replacing, or repowering older engines or installing Verified Diesel Emission Control Strategies (VDECS) (i.e., exhaust retrofits).

- **California Environmental Quality Act (CEQA):** CEQA requires each public agency to adopt objectives, criteria, and specific procedures consistent with CEQA Statutes and the CEQA Guidelines for administering its responsibilities under CEQA, including the orderly evaluation of projects and preparation of environmental review documents. The purpose of CEQA is to:

  - Inform governmental decisionmakers and the public about the potential significant environmental effects of proposed activities;
  - Identify the ways that environmental damage can be avoided or significantly reduced;

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- Prevent significant avoidable damage to the environment by requiring changes in projects through the use of alternatives or mitigation measures when the governmental agency finds the changes to be feasible; and
- Disclose to the public the reasons why a governmental agency approved the project in the manner the agency chose, if significant environmental effects are involved.

2.4.3 SJVAPCD Regional Air Quality Attainment Plans

The CAA requires that each State develop a SIP that demonstrates how NAAQS will be achieved, maintained, and enforced. Each air district has the responsibility for developing the portion of the air quality attainment plan (AQAP) for the region under their jurisdiction. Air districts such as the SJVAPCD are responsible for regulating stationary sources at industrial and commercial facilities and for preparing the AQAPs that are required under the Federal CAA and California CAA.

The management of air quality in the SJVAB is the responsibility of the SJVAPCD. The SJVAPCD is responsible for monitoring air quality within the valley, preparing AQAPs to ensure that all NAAQS are attained as expeditiously as practical, implementing regulations/rules that have been identified in the AQAP, and developing control measures to reduce existing emissions and improve air quality. To that end, the SJVAPCD has developed AQAPs demonstrating attainment of the NAAQS for ozone, PM_{10}, and $PM_{2.5}$. Air Quality Plans applicable to the proposed Project are summarized below.

- **8-Hour Extreme Ozone Attainment Demonstration Plan**

  The SJVAPCD's governing board approved the 2016 plan for the 2008 8-hour ozone standard on June 16, 2016. The comprehensive strategy in this plan will reduce NO_x emissions by over 60% between 2012 and 2031 and will bring the San Joaquin Valley into attainment of the EPA's 2008 8-hour ozone standard as expeditiously as practicable, but no later than December 31, 2031.

- **Upcoming Plan for the 2015 8-Hour Ozone Standard**

  The EPA set the newest NAAQS for 8-hour ozone at 70 ppb effective December 28, 2015. On August 3, 2018, the EPA designated the San Joaquin Valley as an extreme ozone nonattainment area for the revised 2015 ozone standard. Addressing the 2015 8-hour ozone standard will be challenging given the naturally high background ozone levels and ozone transport into the San Joaquin Valley from the surrounding air basins.

  The SJVAPCD is expected to commence the development of the plan in 2019. Given that the SJVAPCD has significantly reduced NO_x emissions from stationary sources, the plan is expected to focus on achieving reductions in NO_x emissions from mobile sources.

- **The 2007 PM_{10} Maintenance Plan**

  The SJVAPCD adopted the "2007 PM_{10} Maintenance Plan" in September 2007 to formally request that the EPA redesignate the valley as a PM_{10} attainment area and to ensure continued attainment of the PM_{10} standards.

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On September 12, 2008, the EPA redesignated the San Joaquin Valley as an attainment area for the PM_{10} NAAQS. The EPA noted that the maintenance plan retains all PM_{10} controls and monitoring for the SJVAB, provides a demonstration that the area will continue to attain until 2020, and provides for contingency measures if the area does not continue to attain.

- **2018 Integrated Plan for the $PM_{2.5}$ Standards (1997, 2006, 2012)**

  The San Joaquin Valley is designated as a serious nonattainment area for the annual and 24-hour NAAQS for $PM_{2.5}$. The SJVAPCD has prepared multiple plans for addressing the $PM_{2.5}$ NAAQS, which was promulgated in 1997, and plans prepared in 2006 and 2012.

  On October 15, 2018, the SJVAPCD adopted the "2018 Integrated Plan for the $PM_{2.5}$ NAAQS." The AQAP includes a strategy that demonstrates attainment with the following $PM_{2.5}$ standards by December 2025:

  - 1997 $PM_{2.5}$ Standard (24-hour 65 μg/m³ and annual 15 μg/m³);
  - 2006 $PM_{2.5}$ Standard (24-hour 35 μg/m³); and
  - 2012 $PM_{2.5}$ Standard (annual 12 μg/m³).

  For the past 3 years, the SJVAPCD, along with CARB, has led an extensive public process, including several public workshops and Public Advisory Workgroup meetings, to develop the attainment strategy for the $PM_{2.5}$ NAAQS. Input and comments received through the public engagement process have been integral to the development of this $PM_{2.5}$ attainment strategy and have resulted in the identification of a comprehensive list of potential new measures to achieve additional emissions reductions from both stationary and mobile sources. Modeling conducted by CARB has shown that the plan will achieve attainment with the applicable $PM_{2.5}$ standards by no later than December 31, 2025.

2.4.4 SJVAPCD Rules and Regulations

The SJVAPCD is responsible for establishing and enforcing local air quality rules and regulations that address requirements of federal and State air pollution laws. Applicable SJVAPCD regulations are detailed in this section. Federal regulations have been incorporated into SJVAPCD rules and the applicability of each federal program is described. There are also California regulations enforced through CARB that apply to this Project that are described.

- **Rule 2010 – Permits Required**

  Rule 2010 requires that an Authority to Construct (ATC) permit [a new source review (NSR) permit] and a Permit to Operate (PTO) be obtained prior to constructing, altering, replacing, or operating any device which emits or may emit air contaminants.

- **Rule 2201 – New and Modified Stationary Source Review**

  Rule 2201 provides for the review of new and modified stationary sources of air pollution and provides mechanisms, including emission offsets, by which ATCs of

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such sources may be granted without interfering with the attainment or maintenance of AAQS. The SJVAPCD NSR rule applies to all new stationary sources and all modifications to existing stationary sources which are subject to SJVAPCD permit requirements. The rule generally requires that new or modified equipment include best available control technology (BACT) and that emission increases above specified thresholds be offset.

- **Best Available Control Technology**

  Pursuant to Section 4.1 of Rule 2201, BACT is triggered on a pollutant-by-pollutant basis and on an emissions unit-by-emissions unit basis. The proposed Project results in an increase in VOC emissions over 2 pounds per day and will trigger BACT for VOCs. The facility already has a landfill gas collection and abatement system, including a flare, which met BACT when installed. The compost facility will be constructed with the eASP technology for aerating the compost piles and be operated with a biofilter layer of cured compost. Aerated piles with a biofilter satisfy BACT for composting.

- **Offsets**

  Pursuant to Section 4.5.3 of Rule 2201, offsets are triggered on a pollutant-by-pollutant basis and are required if the post-Project stationary source potential to emit (PTE) is equal to or greater than the emissions offset threshold levels listed in Rule 2201. Based on the emission estimates for the project (see Section 3), VOC emission offsets will be required for this Project due to an increase in VOC emissions from the landfill and compost facility. The facility's emissions from permitted sources will not exceed the offset threshold for any other criteria pollutants.

- **Public Notification**

  Pursuant to Section 5.4 of Rule 2201, public notification and publication are required for the following types of applications:

  - New Major Sources, Federal Major Modifications, and SB 288 Major Modification;
  - Any new emission unit with a potential to emit greater than 100 pounds during any one day for any one affected pollutant;
  - Modifications that increase the Stationary Source Potential to Emit (SSPE1) from a level below the emissions offset threshold level to a level exceeding the emissions offset threshold level for one or more pollutants;
  - New stationary sources with SSPE2 exceeding the emissions offset threshold level for one or more pollutants; and
  - Any permitting action resulting in a Stationary Source Increase in Permitted Emissions (SSIPE) exceeding 20,000 pounds per year for any one pollutant.

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The facility is a new major source based on the emission calculations for this project. Therefore, public notification is required and will be done pursuant to the requirements.

- **Ambient Air Quality Analysis (AAQA)**

  Rule 2201 requires an AAQA to determine whether a new or modified stationary source will cause or make worse a violation of an air quality standard.

- **Rule 2410 – Prevention of Significant Deterioration (PSD)**

  The SJVAPCD was delegated authority to implement the federal PSD Program in 2012. Rule 2410 incorporates the PSD requirements from 40 CFR 51. PSD applies to pollutants for which the SJVAPCD is in attainment or unclassified, such as NO_x and CO, as well as projects resulting in significant increases of other regulated pollutants. The proposed Project is not one of the 28 listed categories under PSD, and hence it would only be subject to the PSD program if the stationary source potential to emit (PTE) for attainment criteria pollutants is greater than 250 TPY or the project will impact a federal Class I area. Since neither of these conditions apply, the Project is not expected to be subject to PSD.

- **Rule 2520 – Federally Mandated Operating Permits**

  Operating permits are required for major sources with a PTE over specific thresholds that are based on the attainment status of the area, major sources of hazardous air pollutants (HAPs), or which are subject to certain federal regulations. This requirement comes from Title V of the Clean Air Act Amendments of 1990. Consequently, these types of operating permits are frequently called Title V permits.

  In the San Joaquin Valley, Title V permits are issued by the SJVAPCD pursuant to Rule 2520.

  The PTE for the proposed Project is expected to exceed the SJVAPCD major source threshold of 10 TPY for VOCs. The facility is also subject to Title V permitting due to the applicability of NSPS (see below). The rule requires a completed application to be filed within 12 months of becoming subject to the rule.

- **Rule 4001 – New Source Performance Standards**

  This rule incorporates NSPS from 40 CFR Part 60 and applies to new sources of air pollution and modifications of existing sources of air pollution listed in 40 CFR Part 60 which meet the applicability requirements. The following NSPS are potentially applicable to municipal solid waste (MSW) landfills:

  - **Subpart Cf – Emission Guidelines and Compliance Times for Municipal Solid Waste Landfills**

    This subpart is applicable to MSW landfills commencing construction prior to May 30, 1991. The facility began operation in 1993 and is assumed to have commenced construction after May 30, 1991. Therefore, the facility is not subject to this subpart.

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- **Subpart WWW – Standards of Performance for Municipal Solid Waste Landfills**

  This subpart is applicable to MSW landfills commencing construction, reconstruction, or modification after May 30, 1991. The facility began operation in 1993 and is assumed to have commenced construction after May 30, 1991. Further, pursuant to 40 CFR 60.752(b), Subpart WWW is applicable to any MSW landfill having a design capacity equal to or greater than 2.5 million cubic meters. The existing facility has a design capacity of about 12 million cubic meters. Therefore, the facility is subject to the applicable requirements of Subpart WWW. The requirements are included in 40 CFR 60.752(b) and are summarized as follows:

  - The MSW landfill is subject to 40 CFR Part 70 or 71 (Title V) permitting requirements;
  - If the calculated non-methane organic compounds (NMOC) emission rate is less than 50 megagrams per year, the owner or operator shall:

    (i) Submit an annual emissions report to the Administrator, except as provided for in §60.757(b)(1)(ii); and

    (ii) Recalculate the NMOC emission rate annually using the procedures specified in §60.754(a)(1) until such time as the calculated NMOC emission rate is equal to or greater than 50 megagrams per year, or the landfill is closed; and
  - If the NMOC emission rate, upon recalculation required in paragraph (b)(1)(ii) of this section, is equal to or greater than 50 megagrams per year, the owner or operator shall install a collection and control system in compliance with 40 CFR §60.757(b)(2).

  Currently the Lost Hills SWMF NMOC emissions are below 50 megagrams per year; thus, annual emissions calculations and reporting are required. However, the NMOC emissions are expected to exceed this threshold at some point during the life of the landfill with the projected accumulation of organic wastes through 2030. At that point, a landfill gas collection system would be required pursuant to Subpart WWW.

- **Subpart XXX – Standards of Performance for Municipal Solid Waste Landfills That Commence Construction, Reconstruction, or Modification after July 17, 2014**

  This subpart is applicable to MSW landfills that commenced construction, reconstruction, or modification after July 17, 2014. These standards incorporate improved technology and operating requirements for reducing emissions of landfill gas relative to Subpart WWW. Further, pursuant to 40 CFR 60.752(b), Subpart WWW is applicable to any MSW landfill having a design capacity equal to or greater than 2.5 million cubic meters. The existing facility has a design capacity of about 12 million cubic meters.

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The proposed Project which only entails extended hours of operation and an expanded list of approved wastes is not a modification as defined by the rule. Therefore, 40 CFR 60 Subpart XXX is not applicable to the landfill as a result of the proposed Project.

- **Rule 4002 – National Emission Standards for Hazardous Air Pollutants**

  This rule incorporates the NESHAPs from both 40 CFR Part 61 and 40 CFR Part 63 and applies to sources of HAPs as defined in each subpart.

  - **Subpart AAAA – NESHAP for Municipal Solid Waste Landfills**

    Pursuant to 40 CFR 63.1935(a)(1), NESHAP Subpart AAAA is applicable to an MSW landfill that is a major source for HAPs. Towards the end of the useful life of the landfill, methanol emissions may exceed 10 tons per year, triggering the applicability of this subpart. This subpart requires the operation of a gas collection and control system that meets the criteria in 40 CFR 60.752(b)(2)(v) of 40 CFR Part 60, Subpart WWW. As discussed above, the facility is subject to Subpart WWW and has installed a gas collection system (GCS) and a control device to achieve compliance with the rule.

- **Rule 4101 – Visible Emissions**

  Rule 4101 prohibits visible air contaminant discharge into the atmosphere for a period or periods aggregating more than 3 minutes in any 1 hour, with 20% opacity or greater.

- **Rule 4102 – Nuisance**

  Rule 4102 prohibits discharge of air contaminants which could cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public; endanger the comfort, repose, health, or safety of any such person or the public; or cause or have a natural tendency to cause injury or damage to business or property.

- **Rule 4105 – Commercial Offsite Multiuser Hazardous Waste and Nonhazardous Waste Disposal Facilities**

  This rule applies to any commercial offsite multi-user hazardous or nonhazardous waste disposal facility licensed under the provisions of Division 20, Chapter 6.5 of the California Health and Safety Code. The rule requires that prior to the construction, modification, or operation of any such facility, an ATC and a permit to operate must be obtained.

- **Rule 4201 – Particulate Matter Concentration**

  Rule 4201 applies to sources which emit or may emit dust, fumes, or total suspended particulate. Section 3.0 prohibits discharge of dust, fumes, or total particulate into the atmosphere from any single source operation in excess of 0.1 grain per dry standard cubic foot. The expected PM emission concentrations are less than 0.1 grain/dscf, and compliance with this rule is expected.

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- **Rule 4202 – Particulate Matter Emission Rate**

  Rule 4202 limits PM emissions by establishing allowable emission rates. Per Section 4.0 of Rule 4202, PM emissions from any source operation shall not exceed the allowable hourly emission rate (E) as determined by the Rule 4202. Compliance with Rule 4202 is expected.

- **Rule 4311 – Flares**

  The purpose of this rule is to limit the emissions of VOCs and NO_x from the operation of flares. Pursuant to Section 4.2 of this rule, flares subject to NSPS Subpart WWW are exempt. The facility is subject to NSPS Subpart WWW and is exempt from the requirements of this rule.

- **Rule 4565 – Biosolids, Animal Manure, and Poultry Litter Operations**

  Receipt of biosolids and animal waste material is proposed as part of this Project. Therefore, the requirements of this rule apply to the handling and processing of these materials. For landfills, the rule requires that biosolids, animal manure, or poultry litter be covered with 6 inches of compost or soil or a waterproof covering within 24 hours of disposal. For compost operations processing more than 100,000 wet tons per year, the rule requires that the facility implement mitigation measures as specified in the rule. The facility is expected to be in compliance with the applicable rule requirements for the biosolids and animal waste disposal and composting.

- **Rule 4566 – Composting Operations**

  A new composting operation is proposed that is subject to the provisions of this rule. The rule requires that active composting be initiated within 3 days following receipt of the organic material, covered with a waterproof material, or removed from the site. While composting, the facility must implement mitigation measures as specified in the rule. The facility is expected to be in compliance with the applicable rule requirements.

- **Rule 4642 – Solid Waste Disposal Facilities**

  This rule is intended to reduce VOC emissions from solid waste disposal sites. The rule applies to any solid waste disposal site which has a GCS. Section 4.1.2 of this rule exempts solid waste sites subject to NSPS. This facility is subject to NSPS Subpart WWW and hence is exempt from the requirements of this rule.

- **Rule 4801 – Sulfur Compounds**

  This rule limits the emissions of sulfur compounds. The rule applies to any discharge to the atmosphere of sulfur compounds which would exist as a liquid or a gas at standard conditions. The rule prohibits the discharge into the atmosphere of sulfur compounds in concentrations greater than 2,000 ppmv as SO_2 on a dry basis averaged over 15 consecutive minutes. The facility is expected to operate in compliance with this rule.

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- **Rule 8011 – General Requirements**

  The purpose of Regulation VIII (Fugitive PM_{10} Prohibitions) is to reduce ambient concentrations of PM_{10} by requiring actions to prevent, reduce, or mitigate fugitive dust emissions. The rules contained in Regulation VIII have been developed pursuant to EPA guidance for serious PM_{10} nonattainment areas. The rules are applicable to specified anthropogenic fugitive dust sources. Fugitive dust contains PM_{10} and particles larger than PM_{10}.

- **Rule 8021 – Construction, Demolition, Excavation, Extraction, and Other Earthmoving Activities**

  This rule limits fugitive dust emissions from construction, demolition, excavation, extraction, and other earthmoving activities. This rule applies to any such activity 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. This rule also applies to the construction of new landfill disposal sites or modification to existing landfill disposal sites prior to commencement of landfilling activities.

- **Rule 8031 – Bulk Materials**

  The purpose of the rule is to limit fugitive dust emissions from the outdoor handling, storage, and transport of bulk materials. The rule applies to the outdoor handling, storage, and transport of any bulk material.

- **Rule 8041 – Carryout and Track-Out**

  This rule limits fugitive dust emissions from carryout and track-out. The rule applies to all sites that are subject to any of the following rules where carryout or track-out has occurred or may occur on paved public roads or the paved shoulders of a paved public road: Rules 8021 (Construction, Demolition, Excavation, Extraction, and Other Earthmoving Activities), 8031 (Bulk Materials), 8061 (Paved and Unpaved Roads), and 8071 (Unpaved Vehicle and Equipment Traffic Areas).

- **Rule 8051 – Open Areas**

  The purpose of this rule is to limit fugitive dust emissions from open areas. This rule applies to any open area having 0.5 acres or more within urban areas or 3.0 acres or more within rural areas that contains at least 1,000 square feet of disturbed surface area.

- **Rule 8061 – Paved and Unpaved Roads**

  This rule limits fugitive dust emissions from paved and unpaved roads by implementing control measures and design criteria. This rule applies to any new or existing public or private paved or unpaved road, road construction project, or road modification project.

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- **Rule 8071 – Unpaved Vehicle/Equipment Traffic Areas**

  The purpose of this rule is to limit fugitive dust emissions from unpaved vehicle and equipment traffic areas. This rule applies to any unpaved vehicle/equipment traffic area.

- **Rule 9110 – General Conformity**

  This rule specifies the criteria and procedures for determining the conformity of federal actions with the SJVAPCD's air quality implementation plan. The rule generally applies to federal actions (federal approval of projects) which would result in regionally significant emissions increases or a major increase in emissions of nonattainment pollutants that are not otherwise subject to NSR.

  This project is not subject to federal approval (i.e., is not a "federal action") and does not trigger requirements for conducting a general conformity analysis.

- **Rule 9510 – Indirect Source Review**

  The purpose of Indirect Source Review (ISR) is to reduce emissions of NO_x and PM_{10} from new development projects. New development projects may contribute to the air pollution problem in the valley by increasing the number of vehicles and vehicle miles traveled.

  Rule 9510 applies to development projects that have not yet gained discretionary approval. However, there are several sources that are exempt. These include transportation projects that meet certain conditions, reconstruction projects that result from a natural disaster, and development projects on a facility whose primary functions are subject to Rule 2201 (New and Modified Stationary Source Review Rule) or Rule 2010 (Permits Required), including solid waste landfills.

  This project is not subject to ISR. The project is exempt from ISR requirements pursuant to Rule 9510, Section 4.4.3.

2.4.5 Kern County – General Plan

- **General Plan Policies Regarding Air Quality**

  The Kern County General Plan, adopted on June 15, 2004, contains the following policies and implementation measures pertaining to air quality (taken from the Kern County Land Use/Conservation/Open Space Element, Approved June 15, 2004):

  - The air quality implications of new discretionary land use proposals shall be considered in approval of major developments. Special emphasis will be placed on minimizing air quality degradation in the desert to enable effective military operations and in the valley region to meet attainment goals;
  - In considering discretionary projects for which an EIR must be prepared pursuant to CEQA, the appropriate decision-making body, as part of its deliberations, will ensure that:
    - **All Feasible Mitigation:** All feasible mitigation to reduce significant adverse air quality impacts has been adopted, and the

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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 CEQA; and

- **Include Fugitive Dust Controls**: 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 SJVAPCD and the Eastern Kern Air Pollution Control District (EKAPCD) on ministerial permits. The County shall support air districts' efforts to reduce PM_{10} and $PM_{2.5}$ emissions;

- Kern County shall continue to work with the SJVAPCD and EKAPCD toward air quality attainment with federal, State, and local standards; and
- The County shall continue to implement the local government control measures in coordination with the Kern Council of Governments and the SJVAPCD. Kern County shall consult with transit providers to determine project effects and ensure that impacts are mitigated.

- **Implementation Measures**
  - All discretionary permits shall be referred to the appropriate air district for review and comment;
  - Discretionary development projects involving the use of tractor-trailer rigs shall incorporate diesel exhaust reduction strategies, including, but not limited to, minimizing idling time and use of electrical overnight plug-ins; and
  - Discretionary projects may use one or more of the following to reduce air quality effects:

    Kern County-Approved Alternatives for Reducing Air Quality Effects

    - Pave dirt roads within the development;
    - Pave outside storage areas;
    - Provide additional low-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 EPA certified, low-emission natural gas fireplaces;
    - Provide bicycle lockers and shower facilities onsite;
    - Increase the amount of landscaping beyond what is required in the Zoning Ordinance (Chapter 19.86);

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- The use and development of park and ride facilities in outlying areas;
- Consider other strategies that may be recommended by the local air pollution control districts;
- Work with transit providers to develop long-range transit strategies based on future and anticipated land use plans; and
- The County should include PM_{10} control measures as conditions of approval for subdivision maps, site plans, and grading permits.

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3.0 EMISSIONS

This Section provides a discussion and summary of the criteria pollutant and TAC emissions associated with construction and operation of the proposed Projects. GHG emissions are discussed in Section 6.

3.1 Construction Emissions

The proposed Lost Hills SWMF Project consists of an expanded list of wastes to be allowed, extended facility operating hours, and a new compost area. The construction associated with the landfill and the new compost area is discussed below. The construction of the Bioenergy Project is also discussed below.

3.1.1 Landfill Construction

The changes proposed to the landfill of extending the hours of operation and allowing additional types of waste to be disposed do not require construction activities.

3.1.2 Compost Area Construction

The construction of the composting facility will occur in three phases. The first phase is expected to commence in 2020, the second phase in 2025, and the third phase in 2030. The construction of each phase is expected to be completed within 1 to 2 months. Construction of the composting facility requires grading of SWMF property that is generally already flat. Construction requires the use of onroad and offroad vehicles and equipment that is similar to the equipment used for compost facility operations.

Construction emissions were calculated and the methodology used is described in Appendix B. As shown in Table 3-1, construction emissions for NO_x, VOC, CO, SO_x, and $PM_{2.5}$ are all less than 6% of the applicable CEQA annual thresholds, and PM_{10} is less than 14% of the threshold. The intensity of vehicle and equipment activity during compost area construction during each phase is lower than the intensity during normal operations of the compost facility, hence compost construction emissions are lower than compost operating emissions. Since the emissions associated with construction of Phases 1, 2, and 3 are lower than Phase 3 operation emissions, the construction emissions were not modeled and only the full Phase 3 buildout scenario was modeled.

Table 1-2: Annual Construction Emissions for the Lost Hills SWMF and Bioenergy Projects

Criteria Pollutant	Compost Area (TPY)			Bioenergy Project (TPY)	SJVAPCD Threshold (TPY)
	Phase 1	Phase 2	Phase 3		
NO_x	0.2	0.1	0.3	4.1	10
VOC	0.1	0.03	0.1	0.5	10
CO	1.7	0.7	2.3	3.5	100
SO_x	0.0	0.0	0.01	0.01	27
PM_{10}	0.7	0.4	1.0	4.6	15
$PM_{2.5}$	0.2	0.1	0.2	0.8	15

Sources: CalEEMod version 2016.3.2
Note: Emissions are for the entire construction period and include offsite vehicle travel.

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3.1.3 Bioenergy Project Construction

Construction emissions for the bioenergy plant were calculated and are discussed in Appendix F. As shown in Table 3-1, construction emissions for VOC, CO, SO_x, and $PM_{2.5}$ are all less than 5% of the applicable CEQA annual thresholds, PM_{10} is less than 31% of the applicable threshold, and NO_x is less than 41% of the applicable threshold.

3.2 Operating Emissions

The proposed Lost Hills SWMF Project would expand the list of wastes that may be accepted for disposal and expand the hours of operation. While the landfill operations are currently permitted to dispose of up to 2,000 TPD (730,000 TPY) of inert wastes and Class A and Class B biosolids, disposal quantities have been about 900 TPD during the most recent 2-year period (July 2017-June 2019). As required by the KCPD, this analysis evaluates the impacts of the emissions increases between the baseline period and the proposed Project. As noted elsewhere, because LFG generation is a function of total organic waste deposited, the baseline period is 2009 (the first year the facility was permitted to dispose of organic wastes) through 2019. The LFG generation was assessed at a disposal rate of 2,000 TPD, assumed to begin in 2020 and end with landfill closure in 2030.

The proposed compost facility would process up to 640,000 wet TPY of organic feedstock. The Lost Hills SWMF does not currently conduct composting activities, so the baseline for this operation would be zero.

This section provides a description of the methodologies used for the calculation of criteria pollutant and TAC emissions from the generation of LFG and the various source types involved in the operation of a compost area. Following the discussion of the methodologies, summaries of the emissions calculated for the baseline period and then for the proposed Project operations scenario for the landfill and compost area are provided. The increase in criteria pollutant emissions between the baseline and the proposed Project is then summarized.

The quantification methodologies and emissions estimates presented in the following sections are summaries; more complete discussions of the emissions methodologies and assumptions, along with emission calculation worksheets, are provided in Appendix A for the landfill (including the baseline calculations) and in Appendix B for the compost activities.

3.2.1 Emissions Calculation Methodologies

Criteria pollutant and TAC emissions from the operation of the proposed Project are expected to result from operation of: 1) onroad mobile sources, 2) offroad mobile sources, 3) portable equipment, 4) the landfill (due to decomposition of organic waste), and 5) the compost facility (due to decomposition of organic feedstock). Operational activities will occur throughout the life of the Project. Project-specific effects are determined by evaluating the additional emissions attributed to the LFG generation and additional activities required to operate the compost facility.

Offsite emissions that were analyzed result from the transport of organic feedstock to the compost facility, transport of compost product from the site, and employee travel to the site. Offsite emissions include the exhaust emissions from the onroad mobile sources (motor vehicles) used to transport compost feedstock and product, fugitive hydrocarbon emissions from the vehicle itself, fugitive dust from tire and brake wear, and fugitive dust

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from travel on paved roads. Emissions from motor vehicles used to transport compost feedstock and product change over time in accordance with "fleet characteristics", which reflect socio-economic conditions within the region and regulatory requirements applicable to vehicle fleets.

Onsite emissions from compost processing result from operation of offroad mobile sources (e.g., front-end loaders, tractors) used for blending of the organic feedstocks, building the compost piles, building curing piles, and loading haul trucks with finished compost for shipment to customers. Emissions from composting activity consist primarily of carbon dioxide (CO_2), VOCs, and ammonia (NH_3). CO_2 is generated during the aerobic stabilization of the compost mix.

The landfill is expected to generate LFG [primarily GHGs including methane (CH_4) and CO_2] from the anaerobic decomposition of waste that occurs after disposal. The CO_2 emissions are part of the natural biogenic process and do not contribute to global climate change or other adverse air quality effects.

3.2.1.1 Onroad Mobile Source Emissions

Onroad mobile source emissions result from employee travel to and from the facility, routine business travel, delivery of organic feedstock for composting, and transport of compost products from the site. Onroad vehicle emissions include exhaust emissions of criteria pollutants (NO_x, SO_x, CO, VOC, PM_{10} and $PM_{2.5}$) and TACs from the combustion of fuel.

The operation of the landfill is expected to continue until disposal capacity is reached, which depends on the actual waste acceptance rate, but is expected to occur by 2030, consistent with the existing permits. The changes proposed to the landfill are not expected to result in an increase in employee or business-related travel. The landfill is permitted to handle up to 91 trucks per day to deliver 2,000 TPD of waste. Lost Hills Environmental is not requesting a change to the number of trucks delivering waste for disposal; therefore, onroad mobile source emissions are not expected to change as a result of the project and emissions are not estimated.

At full build-out, operation of the compost facility will require up to 111 truck trips per day to deliver organic materials. Truck emissions are estimated using the CARB-developed model EMFAC2017, which is recommended by State and local agencies to calculate emissions from onroad mobile sources. EMFAC2017 incorporates the fleet characteristics representative of the population of vehicles operated within the San Joaquin Valley. Following compost facility construction, regulations adopted by CARB will require that emissions from onroad vehicles be significantly reduced. These changes are incorporated in EMFAC2017[1], and are reflected in decreasing emissions over time. While per-truck emissions are higher during Phase 1 of compost operation, there will be substantially more trucks in operation supporting the composting operations following construction of Phase 3

[1] The recent federal Safer Affordable Fuel-Efficient (SAFE) Vehicle Rule Part One only affects gasoline fueled passenger cars and light trucks, which account for a very small fraction of the Project-related vehicles, thus the SAFE adjustment factors were not applied.

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in 2030. For this reason, Project emissions peak in 2030, and it is the 2030 emissions that are reported herein.

3.2.1.2 Offroad Emissions

The operation emissions from the compost facility will include the emissions from offroad mobile source equipment (scrapers, loaders, and tractors) used for blending feedstock, building compost and curing piles, and loading finished compost in haul trucks for delivery to customers. Offroad vehicle emissions include exhaust emissions of criteria pollutants (NO_x, SO_x, CO, VOC, PM_{10}, and $PM_{2.5}$) and TACs from the combustion of fuel. The offroad emissions occur within the boundary of the SWMF.

Exhaust emissions from offroad equipment used in the compost operations are estimated based on the type of engine used to power the equipment, the size of the engine [i.e., brake horsepower (BHp)], the engine load, and the operating hours. This information was obtained from equipment manufacturers or was determined using EPA-recommended procedures or factors. Engine exhaust emissions were calculated using EPA nonroad engine emission factors for the EPA "tier" of the engine powering the equipment.

Because Lost Hills Environmental is not requesting changes to the daily or annual waste volumes, the emissions from offroad equipment associated with waste management will not change and are not estimated.

3.2.1.3 Fugitive Dust Emissions

Operations that involve the movement of material or that expose or disturb erodible surfaces may generate fugitive dust. During Project operations, fugitive dust is generated by a variety of activities, such as the transport of material on unpaved roads, the unloading of trucks, and the handling of compost material through the process.

Fugitive dust emissions are characterized by the aerodynamic size of the dust particles. Particles with diameters greater than 10 microns settle out of the air rapidly under gravitational influence and are not transported over large distances. Particles with diameters less than 10 microns may remain suspended and may be transported offsite, where they contribute to ambient concentration of particulate matter (PM_{10} and $PM_{2.5}$).

Most of the PM_{10}/$PM_{2.5}$ emissions generated during operations result from vehicle travel on unpaved haul roads. Emissions from other activities, such as material handling (loading and unloading of trucks and scrapers), contribute the remainder of the fugitive dust emissions.

Windblown dust emissions can result from wind erosion of disturbed surfaces. However, since the aerial extent of the landfill is not being increased, and the project will not result in an increase in the areas that are disturbed (e.g., haul roads), the approval of the Project is not expected to result in an increase in windblown dust. Compost has a high moisture content; windblown dust emissions are not expected to occur.

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The procedures used for calculating fugitive dust emissions from the composting operations vary depending on the type of activity. Accordingly, fugitive dust emissions were calculated using several EPA-recommended equations that generate "predictive emission factors" that are unique to the given activity. The equations and default recommendations were obtained from EPA AP-42 5th Edition. Fugitive dust emissions are estimated for the following source categories:

- Travel on Paved Roads: Travel on paved roads is required for employee commute, business travel, and delivery of compost feedstock to the facility;
- Travel on Unpaved Roads: Travel on unpaved roads is required for accessing the compost area; and
- Material Handling: Material handing generates fugitive dust from transfer of material and processing of material during operations.

Fugitive Dust – Paved Roads

Particulate emissions occur whenever a vehicle travels on a paved roadway surface. The emissions result from resuspension of silt that accumulates on the roadway surface. Emissions from travel on paved roads are estimated using the method described in EPA AP-42 5th Edition, Chapter 13, which relies on the vehicle miles traveled (VMT), the roadway silt loading for each type of roadway traveled[2], and average vehicle weight, with a correction to account for the frequency of rain (which suppresses emissions). Given that the roads are public, control of the roadway surface and generation of fugitive dust for silt loading is beyond the control of the facility and no reductions in emissions are anticipated from the control of this source category.

Fugitive Dust – Unpaved Roads

EPA studies have shown that fugitive dust emissions from travel on unpaved roads at industrial sites vary with roadway silt content and vehicle weight, and the EPA has developed equations to be used to generate predictive emission factors based on these variables. Fugitive dust emissions from travel on unpaved roads has been estimated using the predictive emission factors determined using the equations found in EPA AP-42, Section 13.

Fugitive Dust – Material Handling

Fugitive dust emissions from material handling were calculated using predictive emission factors recommended in EPA AP-42 (Chapter 13.2.4.3, Equation 1). The predictive emission factors account for average wind speed, silt loading, and moisture content of the material being transferred.

Fugitive VOC Emissions: Material Handling – Landfill Operations

Biodegradable organic waste such as biosolids, green waste, food waste, and compost may generate fugitive emissions of VOC, NH_3, and GHGs during handling

[2] Silt loading was based on the default silt loading factors by road type from ARB's Entrained Paved Road Dust emission factors for SJVAPCD (https://ww3.arb.ca.gov/ei/areasrc/pmsjvpavedroadmethod2003.pdf).

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prior to disposal. Inert materials do not degrade and will not emit these pollutants. Because the daily waste volumes do not change as a result of the proposed Project and because biosolids are an organic waste that was previously analyzed, fugitive emissions from waste handling activities of different types of organic wastes will not change and are not calculated.

3.2.1.4 Landfill Gas Emissions

Operation of the landfill results in the generation of landfill gas (LFG) due to the anaerobic decomposition of biodegradable waste. Lost Hills Environmental is seeking approval to accept additional biodegradable waste, such as green waste and woody waste, which will result in the generation of LFG emissions. LFG emissions from waste disposal consist primarily of CO_2, CH_4, and VOCs.

LFG emissions are calculated using LandGEM, a "First Order Decay Rate Model" which embodies assumptions similar to those recommended by the International Panel on Climate Change (the IPCC6 GHG Model). The VOC emissions from the LFG from the Project are calculated based on the total gas volume using the EPA-recommended default value of 835 ppmv and a molecular weight of 86 pounds per pound-mole. VOC emissions during the baseline period are calculated using 200 ppmv based on a laboratory analysis of the LFG collected at the Lost Hills SWMF.

3.2.1.5 Emissions from Composting Activities

The composting facility will include 120 compost "trains"; each train consists of a dedicated mixing pad (35 feet by 70 feet), two active composting pads (22.5 feet by 70 feet), and a compost curing pad (35 feet by 70 feet). Each train will have the capacity to process approximately 636 cubic yards of compostable materials. Active composting is expected to require 28 days to complete. Compost curing will require an additional 28 days to complete.

Feedstock delivered to the composting facility will be unloaded directly to the compost mixing pad. The feedstock materials will be combined (mixed) using a scarab-type windrow turner. After mixing is complete, front-end loaders will be used to transfer the material to the composting pads. Active composting of the feedstock will commence within 3 days of the receipt of the material at the facility. Emissions are estimated using the SJVAPCD co-composting storage pile emission factor, assuming a 3-day period between receipt and deposit on the compost pile.

The composting facility will be designed for co-composting a variety of feedstock, including biosolids, manure, green waste, and food waste. The feedstock will be blended to ensure an optimum carbon to nitrogen (C:N) ratio, typically considered to be a C:N ratio of between 20 and 30 to 1.

Emissions from active composting will be reduced by using static piles with forced aeration. Solar-powered blowers will force air through an active compost pile. Forced aeration helps to eliminate oxygen-depleted areas within the compost pile where anaerobic decomposition could lead to generation of VOCs. The compost pile will be covered with a 12-inch layer of cured compost, which acts as a biofilter to reduce VOC emissions. The combination of the forced aeration system with the

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cured compost biofilter has been shown to reduce VOC emissions by up to 98%. For this analysis, it is conservatively assumed that forced aeration with a cured compost biofilter will reduce VOC emissions from active composting piles by up to 90%.

According to the SJVAPCD, in the San Joaquin Valley, the composting process typically consists of 22 days of active composting followed by 38 days of compost curing (60-day cycle). Based on their review of source tests, the SJVAPCD has concluded that approximately 90% of the emissions occur during the active phase. The remaining 10% of the emissions are attributed to compost curing.

After most of the readily available nutrients in the compost mix have been consumed, the temperature of the compost pile will decline. However, the compost mix may still contain degradable, complex organic materials such as cellulose or lignin. These organic materials decompose more slowly during the curing process. Depending on the compost mix, compost curing can take several weeks to several months to complete.

The emissions from compost curing will be calculated using the SJVAPCD co-composting emission factor for curing and assuming that 10% of the emissions occur during curing, consistent with SJVAPCD guidance.

Holloway expects to complete the composting process in a slightly different time frame (22 to 28 days active/28 days curing). However, for these emission estimates, the emissions from active composting are estimated assuming a 60-day compost cycle, consistent with SJVAPCD assumptions.

After curing is complete, further degradation of the stabilized compost will be minimal, but may occur. Based on the results of source tests conducted on compost product storage piles, the VOC emissions from product storage piles are estimated to be 0.05 lb/year/ton of product. For this analysis, it is assumed that the compost may be stored onsite for up to 30 days.

3.2.1.6 Emissions from the Bioenergy Project

Operations emissions for the bioenergy plant consists of material handling of the biomass feedstock and the biochar, as well as the gasifiers and thermal oxidizer. The methodologies used for estimating emissions from these sources are discussed in detail in Appendix F.

3.2.2 Landfill Criteria Pollutant Operational Emissions

Emission estimates for the landfill related to the proposed Lost Hills SWMF Project were only determined for LFG emissions and follow the methodology outlined in Section 3.2.1.4.

The proposed Project includes a request to allow for additional organic waste streams for the landfill. Although the landfill is currently permitted to dispose of 2,000 TPD of biosolids, the LFG estimate related to organics disposal was updated from prior landfill emissions estimates to reflect the actual amount of organic wastes deposited thus far, i.e., the baseline, and to reflect the projected closure date of 2030.

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Operation of the landfill results in the generation of LFG due to the anaerobic decomposition of biodegradable waste. LFG emissions are "additive" in the sense that waste in place continues to decompose and contribute to the total LFG emissions calculated for a given future year. Consequently, LFG emissions increase over time as waste accumulates. After the landfill is no longer active (i.e., not accepting waste), LFG emissions will gradually decline. The landfill is existing, and the waste previously disposed in the landfill will continue to generate LFG, with or without the proposed Project.

3.2.2.1 Baseline Landfill Gas Criteria Pollutant Emissions

LandGEM was utilized to estimate the baseline LFG emissions generated. For the LandGEM inputs, the biosolids disposal rates from facility records were used for the period of 2009 through 2018 (provided in Table 1-1). The Lost Hills SWMF was initially permitted for biosolids disposal in 2009[3]. The 2018 disposal rate was used for 2019.

For this baseline period, LandGEM predicts VOC emissions that are less than the emissions allowed by the current SJVAPCD air permit, which includes a limit of 19,590 pounds per year of VOC emissions (9.8 TPY). Because this is a permitted limit, this limit is assumed to be the baseline VOC emissions rate for the landfill and the LandGEM results are not reported. If/when the landfill begins to emit more than 19,590 pounds per year of VOCs, the facility will operate its GCS and flare to maintain compliance with its VOC emissions permitted limit.

If the amount of organic wastes disposed at the landfill are at the rates analyzed in this report, then at some point in the future (depending on the actual amounts of organics deposited on an annual basis and the VOC content of the waste), it may be necessary to obtain a modification of the landfill PTO to allow for a higher VOC emission rate.

Baseline emissions based on the current SJVAPCD landfill permit cap are summarized in Table 3-2. Beside VOC, other criteria pollutants shown in the table are not constituents of LFG, and hence not emitted.

Table 3-3: Summary of Landfill Baseline Criteria Pollutant Emissions

Category	NO_x (TPY)	VOC (TPY)	CO (TPY)	SO_x (TPY)	PM_{10} (TPY)	$PM_{2.5}$ (TPY)
LFG	0.00	9.80	0.00	0.00	0.00	0.00
Total - Baseline	0.00	9.80	0.00	0.00	0.00	0.00

3.2.2.2 Project Landfill Gas Criteria Pollutant Emissions

The following assumptions were used as inputs to the LandGEM model to estimate LFG emissions for the proposed Lost Hills SWMF Project:

[3] While the landfill opened in 1993, initially only inert nonhazardous materials were disposed. Inert materials do not generate LFG emissions.

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- The biosolids disposal rates from facility records were used for the period of 2009 through 2018. The 2018 disposal rate was used for 2019.
- Although the landfill is currently allowed to dispose of 2,000 TPD of biosolids, it is assumed that the waste volumes will be roughly 50/50 of inert and organic wastes in the future.
- Proposed Project LFG emissions were determined by calculating the emissions resulting from the disposal of 365,000 TPY (half of 2,000 TPD) of organic waste beginning in 2020 and ending in 2030.
- The landfill currently includes an active GCS (75% collection efficiency). Once gas volumes each 50 megagrams, recovered vapors will be routed to a flare having a destruction efficiency of at least 98%. The emissions from the combined GCS and flare have been calculated using the SJVAPCD-recommended factors. For this analysis, it is assumed that the LFG will contain approximately 32 ppmv H_2S (EPA AP-42 default value).

LFG Emissions from the landfill aspect of the proposed Project are summarized in Table 3-3. Emissions reflect fugitive VOC not collected by the GCS and the rest of the LFG routed through a flare. Detailed calculations of these emissions are provided in Appendix A.

Table 3-4: Summary of Landfill Criteria Pollutant Operational Emissions

Category	NO_x (TPY)	VOC (TPY)	CO (TPY)	SO_x (TPY)	PM_{10} (TPY)	$PM_{2.5}$ (TPY)
LFG	4.73	25.39	1.46	0.22	1.58	1.58
Total – Landfill	**4.73**	**25.39**	**1.46**	**0.22**	**1.58**	**1.58**

3.2.3 Compost Criteria Pollutant Operational Emissions

Compost facility operational emission estimates follow the methodologies outlined in Section 3.2.1. Additional information used to apply the methodologies to the compost portion of the proposed Project is discussed in the following sections. Proposed Project compost emissions are summarized in Table 3-4.

3.2.3.1 Compost Criteria Pollutant Onroad Exhaust Emissions

The onroad vehicle emissions were calculated for the first year of each phase to determine which phase would have the highest emissions. At full build-out, operation of the compost facility will require up to 111 truck trips per day to deliver organic materials and transport finished product to customers. Truck emissions are estimated using the CARB-developed model EMFAC2017. Following compost facility construction, regulations adopted by CARB will require that emissions from onroad vehicles be significantly reduced. These changes are incorporated in EMFAC2017 and are reflected in decreasing emissions over time. While per-truck exhaust emissions are higher during Phase 1 of compost operation, there will be substantially more trucks in operation supporting the composting operations following construction of Phase 3 in 2030. For this reason, emissions peak in 2030, and it is the 2030 emissions that are included in this report.

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3.2.3.2 Compost Criteria Pollutant Offroad Exhaust Emissions

The operation of the composting facility will require the use of offroad mobile source equipment used for mixing feedstock, forming windrows, transporting material, and truck loading. Exhaust emissions from offroad equipment were calculated from the anticipated operating hours, equipment horsepower, and EPA nonroad engine emission factors appropriate for the engines powering the offroad equipment.

3.2.3.3 Fugitive Dust – Paved Roads

Particulate emissions occur whenever a vehicle travels on a paved roadway surface. The emissions result from resuspension of silt that accumulates on the roadway surface. Emissions from travel on paved roads were estimated using the method described in EPA AP-42 5th Edition, Chapter 13, which relies on the VMT, the roadway silt loading for each type of roadway traveled, and average vehicle weight, with a correction to account for the frequency of rain (which suppresses emissions). Paved road dust is based on maximum mileage per year of travel on paved roads by feedstock delivery trucks, finished compost transport trucks, and employee and support vehicle travel.

3.2.3.4 Compost Unpaved Road Fugitive Dust

Fugitive dust will be generated from travel on unpaved roads. Such travel is required for delivery of feedstock to the composting site and access to the site for transfer of finished compost to trucks for delivery to end users. The round-trip travel distance used for calculating fugitive dust emissions resulting from access/egress to the facility is 0.25 miles on unpaved roads. Unpaved road travel also includes employee and support vehicle travel.

3.2.3.5 Compost Material Handling Fugitive Dust

Fugitive dust emissions from material handling result from the transfer of material from one point to another. As the material is "dropped" to the receiving surface, wind may cause a small amount of the material to become airborne. In the case of the composting facility, material handling activities are expected to generate fugitive dust emissions at the following points in the process:

- Transfer of feedstock from delivery trucks to the mixing pad;
- Mixing of the feedstock material using a windrow turner;
- Transfer of material from the mixing pad to the composting pad;
- Transfer of material from the composting pad to the curing pad; and
- Transfer of compost product from the curing pile to delivery trucks or storage.

Fugitive dust emissions from material handling were calculated using predictive emission factors recommended in EPA AP-42 (Chapter 13.2.4.3, Equation 1). The predictive emission factors account for average wind speed and moisture content of the material being handled. Given the high moisture content of the organic

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feedstock and the finished compost (>40%), material handling will not cause appreciable amounts of fugitive dust.

3.2.3.6 Criteria Pollutant Emission Summary for the Compost Operation of the Proposed SWMF Project

Emissions for the compost operation of the proposed Project are summarized in Table 3-4. Detailed calculations of these emissions are provided in Appendix B.

Table 3-5: Compost Facility Criteria Pollutant Emissions

Category	NO_x (TPY)	VOC (TPY)	CO (TPY)	SO_x (TPY)	PM_{10} (TPY)	$PM_{2.5}$ (TPY)
Composting Operations						
Onroad Exhaust	17.65	0.19	1.96	0.10	1.15	0.57
Offroad Exhaust	2.75	1.40	25.55	0.05	0.15	0.15
Fugitive Dust						
Paved Road	---	---	---	---	2.00	0.50
Unpaved Road	---	---	---	---	11.09	1.11
Material Handling	---	---	---	---	0.04	0.01
Composting	---	199.45	---	---	---	---
Total – Compost	**20.40**	**201.04**	**27.51**	**0.14**	**14.42**	**2.33**

3.2.4 Summary of Proposed Projects Criteria Pollutant Operations Emissions

The baseline and proposed Lost Hills SWMF Project criteria pollutant emissions are summarized in Table 3-5. The baseline emissions are subtracted from the emissions related to the landfill to provide the net emissions increase due to the proposed Project. The detailed calculations for the Bioenergy Project are provided in Appendix F. A summary of the emissions for the Bioenergy Project criteria pollutant emissions is also provided in Table 3-5.

Table 3-5: Proposed Projects Annual Criteria Pollutant Operations Emissions

Facility		NO_x (TPY)	VOC (TPY)	CO (TPY)	SO_x (TPY)	PM_{10} (TPY)	$PM_{2.5}$ (TPY)
Landfill	Baseline	0.0	(9.80)	0.0	0.0	0.0	0.0
	Proposed	4.73	25.39	1.46	0.22	1.58	1.58
	Net Emission Increase	4.73	15.59	1.46	0.22	1.58	1.58
Compost Area		20.40	201.04	27.51	0.14	14.42	2.33
Bioenergy Project [a]		16.40	0.03	3.10	17.16	7.37	3.97

Notes:

a. Bioenergy Project NO_x and SO_x emissions are based on syngas from a feedstock composition of 80% agricultural biomass and 20% biosolids, CO, VOC and PM emissions based on syngas from 100% agricultural wood feedstock to reflect worst case by pollutant.

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3.2.5 Toxic Air Contaminant Emissions

TACs are air pollutants that may be present in ambient air in relatively low concentrations but have characteristics such as toxicity or persistence that may make them a hazard to human health. These TACs include volatile and semi-volatile organic compounds, heavy metals, and others.

The emissions of TACs may be calculated using process information for a given activity and an appropriate emission factor, or the emissions may be calculated by "speciating" the PM_{10} and/or VOC emissions using a profile that identifies the weight fraction of the TAC constituent in the parent compound. Both approaches were used to estimate TAC emissions from the proposed Project.

For LFG, the TAC emissions presented herein are for the proposed Project minus baseline (for the compost operation, the baseline is zero). The TAC emissions are limited to onsite emissions and near-site emissions (i.e., emissions that occur within ¼ of a mile from the facility). The TAC calculation methodology is explained in the following sections. Detailed TAC emission calculations and emission summaries are provided in Appendix A (Landfill), Appendix B (Compost), and Appendix F (Bioenergy Project).

3.2.5.1 TAC Emissions from Diesel Combustion

TAC emissions from diesel combustion are based on $PM_{2.5}$ emissions, assuming that 100% of the $PM_{2.5}$ emissions are DPM. Reported DPM emissions include only the compost facility operation, as the landfill operations sources that use diesel fuel do not change. DPM emissions from diesel combustion for the bioenergy plant emergency generator, fire water pump, and mobile sources were also based on the same assumption.

3.2.5.2 TAC Emissions from Gasoline Combustion

TAC emissions from gasoline combustion were estimated by speciating the VOC and PM_{10} emissions using the speciation profile published by EPA: Air Toxic Emissions from Onroad Vehicles in MOVES2014; EPA-420-R-16-016, November 2016. Reported TAC emissions include only the compost facility operation, as the landfill operations that use gasoline do not change.

3.2.5.3 TAC Emissions from Paved Road Dust

TAC emissions from paved road dust were calculated by speciating the PM_{10} emissions according to the speciation profile provided by CARB per Particulate Speciation Profile #422. Hourly emissions assume that the PM_{10} emissions are distributed evenly over the typical 12-hour operating schedule. There are no paved roads inside the facility; reported emissions are for 0.25 miles of travel on paved roads outside of facility, per SJVAPCD CEQA Guidelines. Reported emissions include only the compost facility operation, as the landfill operations related to travel on paved roads do not change.

3.2.5.4 TAC Emissions from Unpaved Road Dust

TAC emissions from unpaved road dust were calculated by speciating the PM_{10} emissions according to the speciation profile provided by SJVAPCD from:

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Unpaved Road Dust; SJVAPCD-approved speciation profile; Toxic Emissions Inventory Plan for the H.M. Holloway Lost Hills Mine; Yu Vu Environmental Specialist, SJVAPCD; August 1, 2018. Hourly emissions assume that the PM_{10} emissions are distributed evenly over the typical 12-hour operating schedule. All unpaved road dust TAC emissions are onsite. Reported TAC emissions include only the compost facility operation, as the landfill operations related to travel on unpaved roads do not change.

3.2.5.5 TAC Emissions from Material Handling

TAC emissions from material handling fugitive dust were calculated by speciating the PM_{10} emissions according to the speciation profile provided by Matthew Cegielski of the SJVAPCD: PM_{10}-based TAC emission factors for dust from co-composting, September 2015. Hourly emissions assume that the PM_{10} emissions are distributed evenly over the typical 12-hour operating schedule. All material handling TAC emissions occur onsite. Reported TAC emissions include only the compost facility operation, as the landfill operations related to material handling do not change.

3.2.5.6 TAC Emissions from Landfill Gas

VOC, ammonia, and hydrogen sulfide emissions are expected from decomposition of organic materials in the landfill. TAC emissions were estimated as follows:

- The VOCs were speciated according to an SJVAPCD-recommended speciation profile (EPA AP-42 5th Edition, Landfill Gas Table 2.4-1, Default Concentration for LFG Constituents for Landfills with Waste in Place on or After 1992);
- Ammonia emissions were calculated as a percentage of the methane production based on a 1990s study on landfill gas. Nitrogenous compounds were estimated to be 7.3% of the methane production, and ammonia is assumed to be 10% of the nitrogenous compound production; and
- Hydrogen sulfide emissions were calculated based on an EPA default concentration of 32 ppmv, recommended by the EPA, and the LFG production predicted by LandGEM.

3.2.5.7 Organic TAC Emissions

The composting VOC emissions may consist of several TACs. The composting organic TAC emissions were calculated by speciating the VOC emissions according to the speciation profile provided by Matthew Cegielski of the SJVAPCD. The TAC profile was derived for VOC-based emission factors for co-composting using the average of SJVAPCD emission factors for green waste composting and SJVAPCD factors for biosolids composting. The average assumes a 50/50 mix of biosolids and green waste. Profiles were provided to Vector by Mr. Cegielski in February 2016.

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3.2.5.8 Thermal Oxidizer TAC Emissions

TAC emissions result from syngas oxidation, natural gas combustion, and ammonia slip from operation of the SCR system. TAC emissions from each of these mechanisms vent through the flue gas stack. The methods used to calculate TAC emissions are discussed below.

TAC emissions from syngas are estimated using emission factors published by the SJVAPCD for Digester Gas External and Internal Combustion (SJVAPCD 2014). The SJVAPCD digester gas factors are assumed to be representative of low Btu gas. Natural gas combustion TAC emissions are calculated using the SJVAPCD Natural Gas Fired External Combustion Equipment emission factors (SJVAPCD 2015d).

Ammonia emissions are expected to occur as a byproduct of ammonia injection into the SCR, which is used to control NO_x emissions. Ammonia slip is assumed to be 10 parts per million (ppm) by volume.

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4.0 AIR QUALITY IMPACT ANALYSIS

CEQA requires that the environmental impacts of a proposed project be identified and assessed. If these impacts are found to be significant, the impacts must be mitigated to the extent feasible.

The KCPD and SJVAPCD have developed CEQA thresholds for determination of significance, and these criteria are described further in Section 5. Based on these significance thresholds, various air quality modeling analyses were conducted to evaluate the significance of the Lost Hills SWMF project-related impacts. The air quality impact analyses discussed in this section include criteria pollutant modeling with respect to the NAAQS and CAAQS, a health risk evaluation, an odor assessment, and a visibility impact determination, as well as other impact discussions.

An analysis of the proposed Lost Hills SWMF Project air quality and health risk impacts, together with the proposed Aries – Holloway Bioenergy Project, is also provided. Lastly, an assessment of cumulative impacts with other nearby (within 6 miles) proposed projects is provided in this section.

4.1 Ambient Air Quality Analysis

The KCPD CEQA guidance requires dispersion modeling to show project compliance with the 24-hour PM_{10} and $PM_{2.5}$ NAAQS and CAAQS. If project criteria pollutant emissions exceed the mass emission significance thresholds, the SJVAPCD GAMAQI and policy APR-2030 require modeling to demonstrate compliance with NAAQS and CAAQS for five primary criteria pollutants, i.e., NO_2, CO, SO_2, PM_{10}, and $PM_{2.5}$ (ozone or VOC modeling are not required for single projects).

As seen in Section 5, the landfill and compost VOC emissions from sources that require a permit and the emissions of NO_x from mobile sources that do not require permits exceed the annual KCPD and SJVAPCD CEQA significance thresholds (presented in Table 5-3). Since the annual emissions exceed the thresholds, daily emissions do not need to be examined to determine if they exceed the SJVAPCD 100 pounds per day threshold. Thus, an Ambient Air Quality Analysis (AAQA) is required for the proposed Project for all five criteria pollutants.

The purpose of the AAQA is to evaluate whether or not criteria pollutant emissions resulting from the proposed Project will cause or contribute significantly to a violation of CAAQS or NAAQS. The dispersion model AERMOD was used to simulate the atmospheric transport and dispersion of airborne pollutants and to quantify the maximum expected ground-level concentrations from Project emissions. The air quality modeling methodology described in this section is based on the SJVAPCD policies APR-1925 (SJVAPCD 2019b), APR-2030 (SJVAPCD 2018a), and Guidance for Air Dispersion Modeling (SJVAPCD 2006).

The AAQA follows the SJVAPCD APR-1925 Level 2 approach, where each pollutant is modeled separately using maximum emission rates for the appropriate averaging time. Step 1 combines the modeled concentration with a conservative background concentration for comparison to the AAQS. If the Project plus background concentration is less than the AAQS, then Project emissions have a less than significant impact. This Step 1 technique was used to assess the impacts of the proposed Project's NO_2, CO, and SO_2 emissions.

Per SJVAPCD guidance, for pollutants where the background concentration is already greater than the AAQS, Step 2 compares the maximum modeled concentration to the corresponding Significant Impact Level (SIL). If the Project concentration is less than the SIL, then Project emissions do not contribute significantly to a violation of CAAQS or NAAQS. SIL modeling was conducted for

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PM_{10} and $PM_{2.5}$ as the background concentrations of these pollutants have been greater than the AAQS, as described previously in Section 2.2.5. As the Lost Hills SWMF is a minor source for $PM_{2.5}$, the modeling examined only primarily emitted $PM_{2.5}$ for comparison to the SILs.

NO_2 modeling for the 1-hour and annual NAAQS followed the EPA Tier 2 technique outlined in the EPA NO_2 clarification memo (EPA 2014), which uses the Ambient Ratio Method 2 (ARM2), which assumes the conversion of between 20-90% of NO_x to NO_2 (Tier 2). A Tier 1 assessment conservatively assumes that all NO_x converts to NO_2. Further modeling refinements, such as use of the Ozone Limiting Method (OLM) or Plume Volume Molar Ratio Method (PVMRM) (Tier 3), were not necessary to show that Project emissions would not cause a violation of the NAAQS.

The NO_2, CO, and SO_2 modeling was conducted using the highest 1-hour emission rate for all averaging times. The PM_{10} and $PM_{2.5}$ modeling used the highest 24-hour emission rate for all averaging times. This approach is conservative for the longer averaging times, especially the annual average.

4.1.1 Background Air Quality

Dispersion modeling to evaluate compliance with AAQS requires the use of measured air pollutant concentrations to account for the contributions of regional emissions, i.e., emission sources not explicitly included in the model simulations.

Table 2-2 presented the maximum observed ambient background data for each pollutant and averaging time at the nearest representative monitoring station for 2015-2017, the most recent data available. The tabulated values were used to represent background levels for the indicated pollutants and averaging times in the AAQA to evaluate compliance with CAAQS or NAAQS. The monitoring data indicate that the air quality in the Project area complies with all federal NAAQS and CAAQS for NO_2, CO, and SO_2. However, the CAAQS and NAAQS are periodically exceeded in the Project area for $PM_{2.5}$ and PM_{10}.

4.1.2 Air Dispersion Model

Air dispersion models calculate the atmospheric transport and fate of pollutants from the emission source. The models calculate the concentration of selected pollutants at specific downwind ground-level points, such as residential or offsite workplace receptors. The transformation (fate) of an airborne pollutant, its movement with the prevailing winds (transport), its crosswind and vertical movement due to atmospheric turbulence (dispersion), and its removal due to dry and wet deposition are influenced by the pollutant's physical and chemical properties and meteorological and environmental conditions. Factors such as distance from the source to the receptor, meteorological conditions, intervening land use and terrain, pollutant release characteristics, and background pollutant concentrations affect the predicted air concentration of an air pollutant. Air dispersion models take all of these factors into consideration when calculating downwind ground-level pollutant concentrations.

The air dispersion model used was AERMOD Version 18081, with the Lakes Environmental Software implementation/user interface, AERMOD View™ Version 9.7.0. For the AAQA, actual emissions for each criteria pollutant and source are used in AERMOD.

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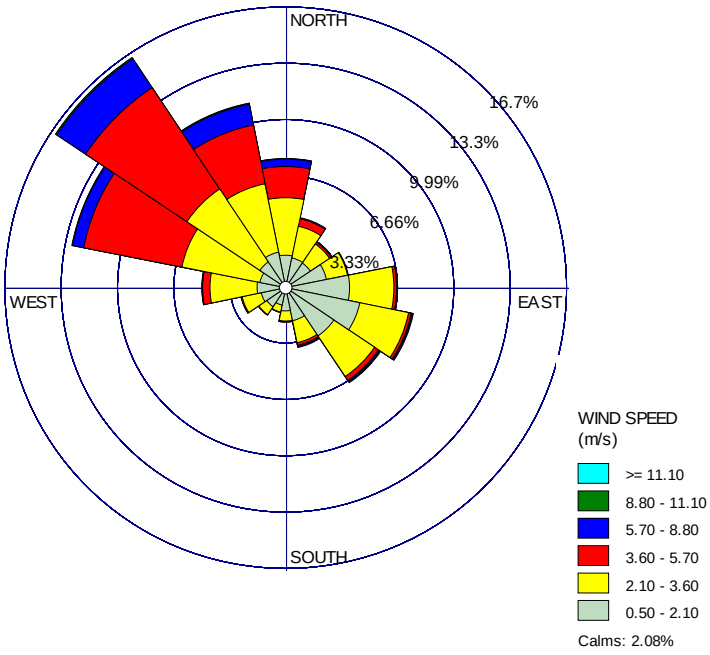
4.1.3 Modeling Options

Regulatory defaults, the "Rural" modeling option, and "Elevated" terrain were used for the analyses. Rural dispersion parameters are conservative because the atmosphere is less turbulent in rural areas, which results in less mixing and, hence, generally higher ambient concentrations downwind from a source.

4.1.4 Meteorological Data

AERMOD-ready pre-processed meteorological data files were downloaded directly from the SJVAPCD website for the Bakersfield Municipal Airport station. This station is the nearest National Weather Service (NWS) meteorological station and most representative of the conditions at the facility. Figure 4-1 presents the wind rose showing the meteorological data for the years 2013-2017. Each petal of the rose represents the frequency and relative strength with which a wind blows from that direction.

Figure 4-1: Bakersfield Municipal Airport Wind Rose 2013-2017



4.1.5 Elevation Data

Digital elevation data were imported into AERMOD and elevations were assigned to receptors, buildings, and emission sources as necessary. Digital elevation data were obtained through the AERMOD View™ WebGIS import feature in the United States Geological Survey's (USGS) Digital Elevation Model (DEM) format, with a resolution of 7.5 minutes or approximately 30 meters. All geographical coordinates referenced in this section and the appendices are in the Universal Transverse Mercator (UTM) coordinate system with the North American Datum (NAD83), Zone 11.

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4.1.6 Receptors

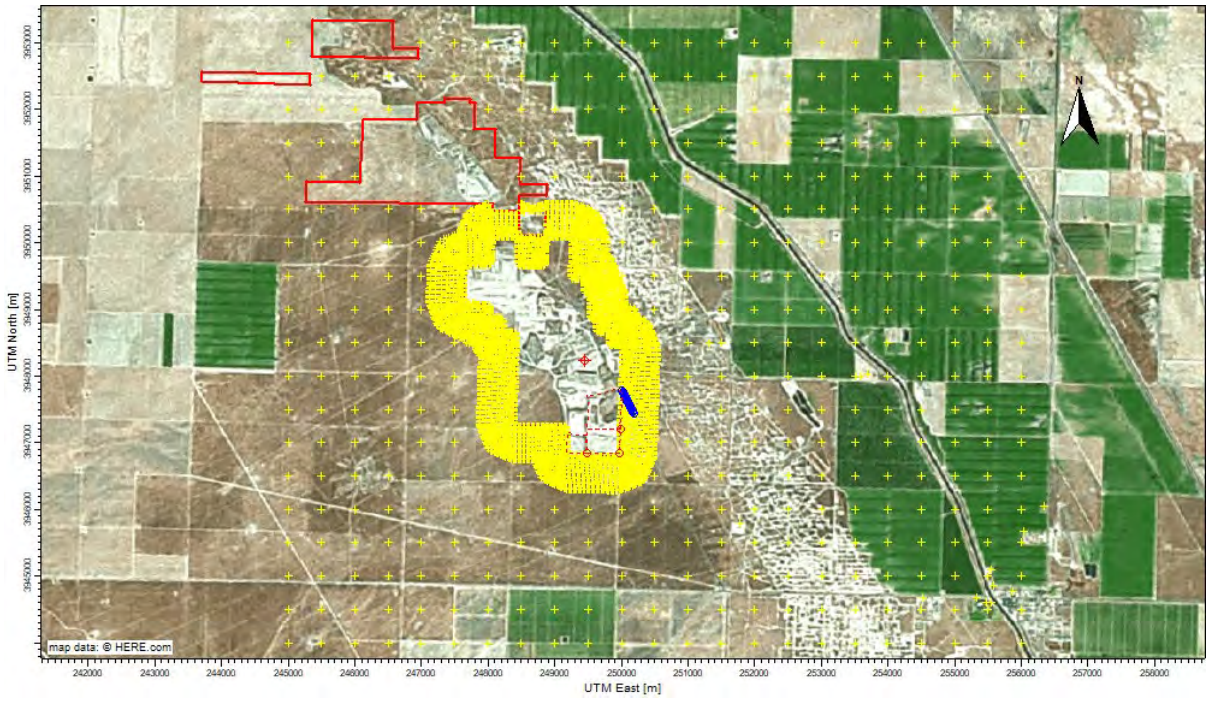
Modeling results were obtained at various locations around the facility. These receptor locations were identified as the facility boundary ("fenceline"), a grid network of receptors to establish the potential impact area, and discrete receptors that were positioned at specific locations of interest.

The facility boundary encompasses the existing Lost Hills SWMF including the proposed Project compost area. Per SJVAPCD guidance, a cascading grid of receptors was used to ensure that impacts will be below the appropriate CEQA thresholds at all locations offsite. These gridded receptors were located as follows:

- Fenceline receptors were placed every 25 meters apart;
- 25-meter spacing from the fenceline out to 100 meters;
- 50-meter spacing from 100 to 250 meters;
- 100-meter spacing from 250 to 500 meters; and
- 500-meter spacing from 500 to 3,000 meters, and out to 6 kilometers (km) to the east to include the town of Lost Hills.

Additional discrete Cartesian receptors were used to evaluate the locations of the closest residential receptor, sensitive receptor, and offsite workplace. The nearest resident is a farmhouse located approximately 2.3 miles east of the Project. The next nearest residents are in the community of Lost Hills, approximately 4 miles southeast of the Project. The nearest schools are in Lost Hills. The closest workplace where workers regularly stay is located in the oil fields approximately 0.9 miles to the east. Figure 4-2 shows the locations of all receptors used in the modeling in yellow and the property line identified in red.

Figure 4-2: Lost Hills SWMF Fenceline and Receptor Locations



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4.1.7 Onsite Buildings

There will not be any significant structures onsite close to the emission sources. Hence, no onsite buildings were included in the modeling for incorporation with the Building Profile Input Program for PRIME (BPIPPRM).

4.1.8 Analysis Scenario and Emission Rates

For the AQAA, "emissions from the proposed Project" refers to the incremental increase in emissions from the baseline to the closure of the Lost Hills SWMF landfill when LFG emissions peak and full buildout at Phase 3 of the compost area development. Only this maximum buildout scenario was evaluated for air quality impacts, and all intermediate scenarios, including concurrent construction of Phase 1 or 2 of the compost area during active use of the landfill, would result in similar types of sources at lower emission rates than at full buildout. This approach ensures that the maximum air quality impacts have been identified.

4.1.9 Emission Sources and Release Parameters

The exhaust stack from the only stationary source, i.e., the landfill flare, was modeled as a point source, as shown in red in Figure 4-3. The near-site delivery trucks were modeled as line volume sources and are shown in blue on Figure 4-3. All composting activities were modeled within the three composting phase area sources as shown by dashed red lines in Figure 4-3. Numerous sources were used for each area to differentiate emissions from the distinct activities, such as vehicle exhaust, unpaved road dust, material handling dust, etc. The release parameters utilized for each source are provided in Appendix C and were derived from SJVAPCD guidance.

Figure 4-3: Operational Source and Fenceline Locations



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4.1.10 AAQA Results

Table 4-1 presents the maximum model-predicted concentrations from the proposed Project emissions, maximum background concentrations, and sum of these concentrations in comparison to the NAAQS and CAAQS. The AAQA modeling results presented in Table 4-1 demonstrate that the Project would not cause an exceedance of the NO_2, SO_2, or CO NAAQS or CAAQS.

Since background PM_{10} concentrations are greater than the 24-hour and annual CAAQS and background $PM_{2.5}$ concentrations are greater than the NAAQS and CAAQS, the modeled concentrations are compared to the SILs.

Table 4-2 shows that the model-predicted PM_{10} and $PM_{2.5}$ concentrations from all onsite exhaust sources are less than the 24-hour and annual SILs. Although calculated maximum emissions from the onsite fugitive dust sources resulted in model-predicted concentrations that are greater than the PM_{10} and $PM_{2.5}$ fugitive dust SILs, these concentrations decrease rapidly with distance from the emission sources. Exceedances of the SILs occur close to the facility in an area that is uninhabited, unoccupied by workers, and covered by desert scrub, with the majority of the predicted impact coming from the unpaved road dust from the equipment and truck travel.

Per policy APR-1925, if modeling show project impacts to be above the AAQS or SIL, then the project can surrender offsets in the form of Emission Reduction Credits (ERCs) or Voluntary Emission Reduction Agreements (VERAs) to mitigate project emissions. However, because the predicted concentrations that are over the SIL are due to fugitive emissions, occur close to the facility in locations that the public are unlikely to access, and a dust control plan will continue to be implemented, the proposed Project is not likely to contribute to public health impacts that are protected by the AAQS.

Therefore, the proposed Project would be unlikely to cause a violation of the NAAQS or CAAQS or contribute substantially to an existing air quality violation, and hence will have a less than significant impact on air quality.

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Table 4-1: AAQA Modeling Results for Lost Hills SWMF Flare Emissions and Compost Area Operation

Pollutant	Averaging Time	Federal or State Standard	Modeled Concentration ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Modeled + Background Concentration ($\mu g/m^3$)	AAQS ($\mu g/m^3$)	Exceed Standard?
NO_2	1-Hour	Federal	72.7	72.1	144.8	188	No
		California	72.7	91.5	164.1	339	No
	Annual	Federal	4.3	17.2	21.5	100	No
		California	4.3	17.2	21.5	57	No
CO	1-Hour	Federal	738.1	2,155	2,893	40,000	No
		California	738.1	2,155	2,893	23,000	No
	8-Hour	Federal	303.8	1,398	1,701	10,000	No
		California	303.8	1,398	1,701	10,000	No
SO_2	1-Hour	Federal	1.5	28.8	30.2	196	No
		California	1.5	28.8	30.2	655	No
	3-Hour	Federal Secondary	0.7	16.8	17.5	1,300	No
	24-Hour	California	0.3	6.4	6.7	105	No
PM_{10}	24-Hour	Federal	34.7	138.0	172.7	150	See SIL Analysis
		California	See SIL Analysis	143.6	-	50	Background Over the CAAQS and/or NAAQS, Go To Step 2 SIL Analysis
	Annual	California	See SIL Analysis	44.1	-	20	
$PM_{2.5}$	24-Hour	Federal	See SIL Analysis	58.8	-	35	
	Annual	Federal	See SIL Analysis	18.3	-	12	
		California	See SIL Analysis	16.6	-	12	

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Table 4-2: PM_{10} and $PM_{2.5}$ SIL Modeling Results for Lost Hills SWMF Flare Emissions and Compost Area Operation

Pollutant	Averaging Time	Modeled Concentration ($\mu g/m^3$)	SIL ($\mu g/m^3$)	Exceed SIL?
PM_{10}	24-Hour	0.47	5.0	No
	Annual	0.13	1.0	No
$PM_{2.5}$	24-Hour	0.47	1.2	No
	Annual	0.13	0.2	No
Fugitive PM_{10}	24-Hour	34.25	10.4	Yes*
	Annual	9.48	2.08	Yes*
Fugitive $PM_{2.5}$	24-Hour	3.43	2.5	Yes*
	Annual	0.95	0.63	Yes*

* Exceedances of the SIL only occurred in a limited area close to the facility fenceline, where the public is unlikely to access.

4.2 Health Risk Assessment

The SJVAPCD and KCPD require the examination of the TAC emissions from the Project to determine the need for an HRA, which estimates the potential acute, chronic, and carcinogenic health risks from the Project. A two-step process can be followed, where initially a screening risk prioritization is conducted. If the potential for high health risks is found, then an HRA may be required. The District's risk management objectives for CEQA are to minimize health risks from new and modified sources of air pollution and to not add significantly to the existing community risk level.

This health risk approach is based on the California Office of Environmental Health Hazard Assessment (OEHHA) hotspot guidance document (OEHHA 2015), the California Air Pollution Control Officers Association (CAPCOA) facility prioritization guidelines (CAPCOA 2016), and SJVAPCD policy APR-1906 (SJVAPCD 2018b).

The CAPCOA prioritization guidelines outline a technique for calculating a prioritization score that helps air districts identify priority facilities for risk assessment, which involves consideration of potency, toxicity, quantity of emissions, and proximity to sensitive receptors such as hospitals, daycare centers, schools, worksites, and residences. If the prioritization score exceeds the thresholds, a refined HRA is recommended to determine if the Project's potential health risks are significant.

To assess the potential health risk from the Project, a prioritization score was calculated at the nearest residential and business receptor. Since the prioritization score was intermediate and there are no sensitive receptors within 2 miles, a refined HRA is not necessary to determine that the proposed Project's TAC emissions will have a less than significant health risk.

4.2.1 Risk Prioritization Score Thresholds

The CAPCOA prioritization score significance criteria are listed below.

Low Score: Projects having a total score (TS) less than 1 are low risk and are not likely to have an adverse health risk.

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Intermediate Score: Projects having a TS at least 1 and less than 10 need to evaluate additional factors to determine if the project's TAC emissions will have a less than significant health risk. Pertinent factors include:

- Population density near the facility;
- Proximity of sensitive receptors to the facility;
- Receptor proximity less than 50 meters;
- Elevated receptors/complex terrain;
- Frequency of nuisance violations; and
- Presence of non-stack (fugitive) emissions.

High Score: Projects having a TS equal to or over 10 may have high risk. A refined HRA may be necessary to demonstrate that the project's TAC emissions will have a less than significant health risk.

4.2.2 Calculation of Risk Prioritization Score

The prioritization score was estimated based on the Project TAC emissions, the distance to the nearest receptor, and the OEHHA cancer unit risk factors (URFs) and acute and chronic reference exposure levels (RELs).

The guideline provides two procedures at different levels of refinement that may be used for calculating risk prioritization scores. Risk prioritization scores for the Project were calculated using the CAPCOA Dispersion Adjustment Procedure.

The Dispersion Adjustment Procedure considers the effects of dispersion by adjusting the risk score based on the height of the release point and the distance to a nearby receptor. Since risk prioritization considers the effects of substances that may have acute or chronic health risk as well as carcinogenic risk, the guideline includes equations for prioritizing non-cancer risk and cancer risk. The CAPCOA equations used for generating prioritization scores for non-cancer risk and cancer risk and the factors used in the equations are shown below.

The cancer risk prioritization score equation is:

$$TS = \sum_{1}^{n} \left(E_{c,h}\right) * \left(P_{c}\right) * \left(D_{h}\right) * \left(RP_{h}\right) * \left(N\right) \qquad \text{(Eq. 4-1)}$$

Where:

TS	=	Total score for all substances with carcinogenic effects
c	=	Specific carcinogenic substance
E_{ch}	=	Emissions of [c, lb/year] at release height of [h]
P_c	=	Unit risk factor for [c, $\mu g/m^3$] at release height of [h]
h	=	Release height (m)
D_h	=	Dispersion adjustment factor for [h]
RP_h	=	Receptor proximity adjustment factor for [h]

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N = Normalization factor = 128

The non-cancer risk prioritization score equation is:

$$TS^{*} = \sum_{1}^{n}\left(E_{t,h} / P_{t}\right) * \left(D_{h}\right) * \left(RP_{h}\right) * N \qquad \text{(Eq. 4-2)}$$

Where:

TS* = Total score for substances with either acute or chronic effects

t = Specific toxic substance

$E_{t,h}$ = Emissions of [t, lb/hour] at release height of [h]

P_t = REL for [t]

h = Release height (m)

D_h = Dispersion adjustment factor for [h]

RP_h = Receptor proximity adjustment factor for [h]

N = Normalization factor (=2.5 for chronic and 25 for acute)

Table 4-3 presents the distance-specific factors used in the prioritization score calculations for the nearest sensitive receptor.

Acute and chronic risk scores are determined separately. When determining acute risk score, the maximum hourly emission rate is used. When determining chronic risk score, the annual average hourly emission rate is used. The score for non-cancer risk is equal to the greater of either the score for the acute risk or the score for chronic risk.

Table 4-3: Factors Used in the Prioritization Score Calculations

D_h, R_h, and Other Assumptions				
Receptor	**Release Height (m)**	**Distance to Receptor (m)**	**Dispersion Adj. Factor (D_h)**	**Proximity Adj. Factor (RP_h)**
Resident	0-20	3,600	60	0.001
Business	0-20	1,500	60	0.002

The prioritization score was estimated at the nearest sensitive receptor, which is a residence located approximately 2.3 miles (3.6 km) east of the Project. The distance was measured from the closest edge of the Project (i.e., eastern edge of the compost area) to the closest portion of the residence's property. To ensure that all potential exposure from the Project was examined, the prioritization score was also estimated at the nearest business receptor, located approximately 0.9 miles (1.5 km) east of the Project.

As presented in Section 3.2.6 and Appendix A, there will be a slight decrease in landfill TAC emissions compared to the baseline, due to the destruction of TACs in the flare that is projected to be required for landfill closure in 2030. As such, no TAC emissions from the landfill portion of the Project are included in the risk prioritization.

The composting emissions represent the maximum composting activities once Phase 3 is operational in 2030. These emissions represent the maximum worst-case emissions that

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could at full buildout of the composting area, not daily for the duration of the Project. Since cancer risk is typically calculated based on a lifetime exposure (70 years), the cancer prioritization score is likely significantly overestimated.

The prioritization scores at the nearest resident and worker receptors are presented in Table 4-4. Detailed TAC emission estimates are provided in Appendix A (landfill sources) and Appendix B (compost sources). The prioritization score calculations are presented in Appendix D.

Table 4-4: Prioritization Scores at the Nearest Receptors for Lost Hills SWMF Project

Receptor	Acute	Chronic	Cancer
Resident	0.06	0.09	1.14
Business	0.12	0.19	2.28

Based on the CAPCOA prioritization score, the use of maximum worst-case emissions, and the absence of any nearby receptors, it is reasonable to conclude that the operation of the Project will not expose sensitive receptors to substantial pollutant concentrations or health risks.

4.3 Valley Fever Analysis

Section 2.3.5.1 discussed the symptoms and health risks from Valley Fever. Since the coccidioidomycosis spores are found in soil and released during soil-disturbing activities, minimizing fugitive dust generation is the best way to reduce the potential for exposure. The Project will implement numerous fugitive dust control design features as required through compliance with SJVAPCD Regulation VIII, which includes implementation of the dust control measures specified in GAMAQI, which will be incorporated into a dust control plan.

In addition, the Project will implement California Department of Public Health (CDPH 2013) Valley Fever control measures, including, but not limited to:

- Train workers about the symptoms of Valley Fever and report these to a supervisor;
- Limit workers' exposure to outdoor dust by suspending work during heavy wind or dust storms and minimize the amount of soil disturbed;
- When soil will be disturbed by heavy equipment or vehicles, wet the soil before disturbing it and continuously wet it while digging to keep dust levels down;
- Provide vehicles with enclosed, air-conditioned cabs and make sure workers keep the windows closed; heavy equipment cabs should be equipped with high efficiency particulate air (HEPA) filters;
- When exposure to dust is unavoidable, provide National Institute for Occupational Safety and Health (NIOSH)-approved respiratory protection with particulate filters;
- Clean tools, equipment, and vehicles with water to remove soil before transporting offsite so that any spores present will not be re-suspended in air and inhaled at a later time; and
- Keep workers' street clothes separate from work clothes to minimize transport of spores.

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The fugitive dust emissions will be minimized through implementation of dust control measures, plus the Valley Fever control measures will further minimize potential expose. Thus, through implementation of these project design features, the potential for exposure to Valley Fever due to Project activities will be less than significant.

4.4 Odor Analysis

The SJVAPCD GAMAQI provides two thresholds of significance for odors.

The SJVAPCD has identified some common types of facilities that have been known to produce odors in the SJVAB and provided recommended distances beyond which sensitive receptors are not expected to notice significant odors. For both landfills and composting facilities, the odor screening distance is 1 mile. This distance can be used as a screening tool to qualitatively assess a project's potential to adversely affect area receptors. If sensitive receptors are closer, a more detailed analysis, such as modeling, should be conducted. Sensitive receptor locations include schools, parks and playgrounds, daycare centers, nursing homes, hospitals, and residential dwelling units.

The nearest sensitive receptor is a residence located approximately 2.3 miles east of the Project, well beyond the SJVAPCD screening distance threshold. Therefore, the Project is not expected to create objectionable odors affecting a substantial number of people.

Second, the SJVAPCD also recommends reviewing historical odor complaints in the Project vicinity. For a project located 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 3-year period, or three unconfirmed complaints per year averaged over a 3-year period.

There have been no complaints logged with the SJVAPCD for the existing Lost Hills SWMF landfill.

At the landfill, the Project will not change the surface area from which odors would emanate, although the addition of new waste streams, such as food and poultry wastes, may add to the potential for odors.

The composting portion of the Project will be a new source of odors. The eASP with a biofilter layer will reduce VOC and NH_3 emissions due to the composting activity by at least 81% and 45%, respectively. These are the primary odorous compounds emitted from composting activities.

In addition, the composting facility will be required to prepare and maintain a site-specific Odor Impact Minimization Plan (OIMP) that is enforced by the Local Enforcement Agency (LEA) for CalRecycle through 14 CCR §17863.4 to reduce potential odors. The OIMP will be designed to provide guidance to onsite operation personnel by describing, at a minimum, the following items:

- An odor monitoring and data collection protocol for onsite odor sources, which describes the proximity of possible odor receptors and a method for assessing odor impacts at the locations of the possible odor receptors;
- A description of meteorological conditions affecting migration of odors and/or transport of odor-causing material offsite. Seasonal variations that affect wind velocity and direction shall also be described;

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- A complaint response and recordkeeping protocol;
- A description of design considerations and/or projected ranges of optimal operation to be employed in minimizing odor, including method and degree of aeration, moisture content of materials, feedstock characteristics, airborne emission production, process water distribution, pad and site drainage and permeability, equipment reliability, personnel training, weather event impacts, utility service interruptions, and site-specific concerns as applicable; and
- A description of operating procedures for minimizing odor, including aeration, moisture management, feedstock quality, drainage controls, pad maintenance, wastewater pond controls, storage practices (e.g., storage time and pile geometry), contingency plans (i.e., equipment, water, power, and personnel), biofiltration, and tarping as applicable.

Due to the potential for new odors from the Project related to the composting, an odor assessment was prepared and is presented in Appendix E. The study determined that the potential new odors from the Project would be well below levels at which odors would be detected by the closest sensitive receptors.

Based on the odor minimization design features that will be implemented at the Project (including the eASP biofilter layer and landfill GCS) and the distance to sensitive receptors, the Project is not expected to create objectionable odors affecting a substantial number of people.

4.5 CO Hotspot Analysis

Throughout California, the emissions and ambient concentrations of CO have decreased greatly. The San Joaquin Valley is designated as attainment or unclassifiable for both the NAAQS and CAAQS for CO. These improvements are largely due to the introduction of lower emitting motor vehicles and cleaner burning fuels. Because elevated CO concentrations are often localized, heavy traffic volumes and congestion can lead to high levels of CO, or CO hotspots.

Both the KCPD and SJVAPCD have established preliminary screening procedures that can be used to determine with fair certainty whether a project will result in an intersection or roadway CO hotspot. The SJVAPCD has determined that a project that would not reduce the level of service (LOS) to E or F, or worsen an already existing LOS at E or F, would not have the potential to cause a violation of the CO standard.

The Lost Hills SWMF is located on Holloway Road, about 2 miles north of S.R. 46. Access to the facility typically occurs via Interstate 5 (I-5) and S.R. 46. Travel to the facility is not expected to reduce the LOS to E or F or worsen an already existing LOS with a rating of E or F.

According to the "Transportation Concept Report" for S.R. 46 published by the California Department of Transportation (Caltrans 2013), S.R. 46 is currently operating at LOS B and planned improvements will ensure that the LOS on travel segments 1, 2, and 3 (shown in Figure 4-4), which are located west of I-5 and are used to access the Lost Hills Facility, will remain above LOS E or LOS F. The LOS for S.R. 46 reported by Caltrans is presented in Table 4-5.

Using the KCPD and SJVAPCD recommended procedures demonstrates that the Project does not have the potential to create a CO hotspot. Therefore, the Project will not cause a violation of the CO NAAQS or CAAQS and will have a less than significant impact on air quality.

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Figure 4-4: Caltrans S.R. 46 Corridor



Table 4-5: Caltrans S.R. 46 Performance Levels

Basic System Operations	S.R. 46 Segment		
	1	2	3
AADT (2012)	7,300	10,000	12,000
AADT (2035)	15,300	17,700	23,400
AADT Growth Rate	3%	2.3%	2.7%
LOS Method	HCM	HCM	HCM
LOS 2012	B	B	B
LOS 2035	B	B	B
LOS Concept	C	C	C

AADT = Annual Average Daily Traffic; LOS = Level of Service; HCM = Highway Capacity Manual

4.6 Visibility Analysis

The KCPD CEQA guidance document requires impacts to visibility to be evaluated for all projects that have components that could generate dust or emissions related to visibility. The analysis needs to examine all Class 1 areas located within 100 kilometers of the project site, Edwards Air Force Base, China Lake Naval Weapons Station, and the entire R-2508 Airspace Complex.

The nearest Class 1 area is San Rafael Wilderness, located approximately 71 km southwest of the Project, with Domelands Wilderness 132 km, Sequoia National Park 116 km, and Kings Canyon National Park 133 km away from the Project. The R-2508 Airspace Complex encompasses the

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Edwards Air Force Base and China Lake Naval Weapons Station, and the nearest edge of this airspace is approximately 112 km to the east.

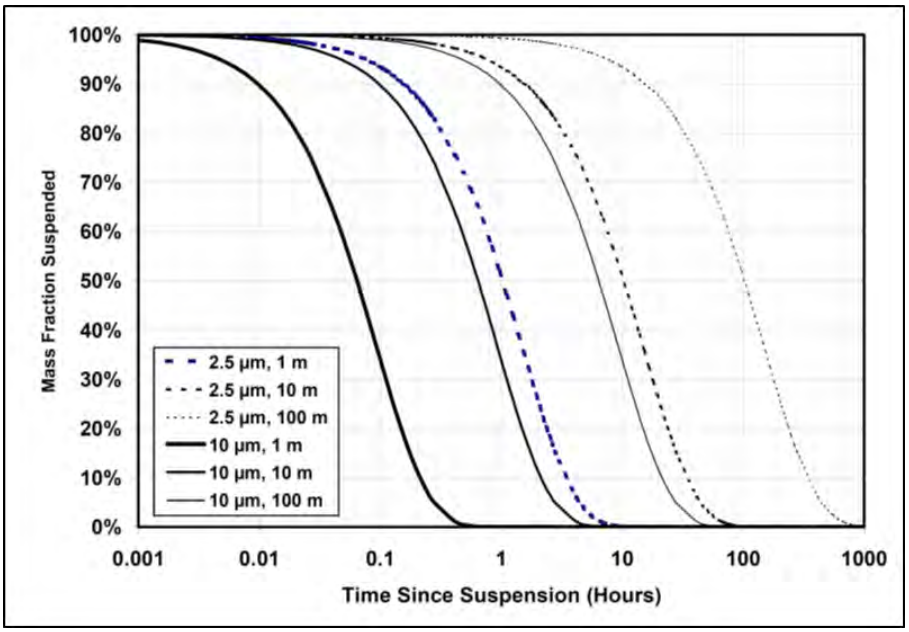
In California, nitrate and organic carbon aerosols are the primary drivers of poor visibility, although sulfates also contribute (CARB 2014). The Project is not expected to result in an adverse effect on visibility at the KCPD designated areas due to the reasons described below.

The majority of the emissions from the facility result from either fugitive VOCs and dust or mobile sources. The fugitive sources include the landfill and composting activities, where the emissions originate at or near ground level. The dust sources are from travel on unpaved roads and material handling, both ground-level or near ground-level sources with mostly course particles. For mobile sources, the exhaust is emitted near the ground or perhaps a few meters above the ground. Consequently, the pollutants are not expected to be vertically mixed throughout the atmosphere, and the maximum concentrations are expected to occur near ground level close to the facility.

The particulate emissions will be minimized through compliance with SJVAPCD Regulation VIII, which includes implementation of the feasible dust control measures specified in GAMAQI, which will be incorporated into a dust control plan. These project design features will significantly reduce the potential for dust-related emissions.

A study from Desert Research Institute (DRI) shows that PM released close to the ground will settle within a short distance. Figure 4-5 shows that based on the gravitational settling velocities of $PM_{2.5}$ and PM_{10}, half of the 10-micron (µm) particles mixed within the first meter are removed after approximately 3.5 minutes, and half of the 2.5-µm particles in this layer are gone after an hour. Less than 10% of the 10-µm particles remain after 12 minutes, with 90% of the 2.5-µm particles depleted after 3.5 hours. Thus, it is expected that the majority of the Project-related PM emissions will rapidly settle out and tend to have localized impacts, rather than travel great distances to affect the KCPD designated areas.

Figure 4-5: Attenuation of Mass Concentration of PM_{10} and $PM_{2.5}$



Note: Attenuation of mass concentrations for 2.5 and 10 µm aerodynamic diameter particles with time and vertical mixing height (1 to 100 m). Source: DRI 2010

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Under the Clean Air Act, Federal Land Managers (FLMs) are responsible to protect the air quality-related values (AQRVs), including visibility, in Federal Class I areas. The FLMs prepared the Federal Land Managers' Air Quality Related Values Work Group (FLAG) Phase I Report (NPS 2010) to aid permitting authorities and potential permit applicants on how to assess the impacts of new and existing sources on AQRVs in Class I areas.

In this guidance document, it was determined that a source located greater than 50 km from a Class I area would have negligible impacts with respect to Class I AQRVs if its total SO_2, NO_x, PM_{10}, and sulfuric acid mist (H_2SO_4) annual emissions (Q) divided by the distance in km (D) from the Class I area (Q/D) is 10 or less.

Since the closest KCPD designated area is beyond 50 km, this screening criteria is applicable and provides a way to determine if the proposed Project will have a significant impact on visibility.

The sum of the SO_2, NO_x, PM_{10}, and H_2SO_4 emissions from all Project-related sources is 41.5 TPY. The distance to the closest Class I area is 71 km. Therefore, Q/D = 0.58, which is well below the screening criteria of 10. Thus, the proposed Project is not expected to cause a significant impact to visibility in the KCPD designated areas.

The combined effects of the localized particulate settling, overall low project emissions, large distance to the KCPD designated areas, dust reduction design features, emission offsets, and other planned mitigation will ensure that visibility impairment from the Project will be less than significant.

4.7 Combined Lost Hills SWMF and Aries – Holloway Bioenergy Project Impacts

As mentioned in Section 1.1, in addition to the proposed Lost Hills SWMF landfill permit modifications and new compost area, the Aries – Holloway Bioenergy Project is being developed on Holloway property on the east side of Holloway Road. Although the applicants for the two projects are different and are seeking separate ATC permits from the SJVAPCD, all three facilities are being evaluated in the same EIR. The air quality impacts of the Aries – Holloway Bioenergy Project have been evaluated and an Air Quality and GHG Emissions technical report is provided in Appendix F. A summary of the combined impacts from the three facilities is provided in this section for both the AAQA and the health risk analyses.

4.7.1 Combined Ambient Air Quality Analysis

The Lost Hills SWMF and the Bioenergy Plant will operate concurrently and are adjacent to each other (on either side of Holloway Road); thus, this section looks at the combined impacts from the facilities. The emissions sources that were included in the combined AQAA and HRA are summarized in Table 4-6.

The Technical Report provided in Appendix F concludes that there would be no significant impacts to air quality from the Aries – Holloway Bioenergy Project. An AAQA was also conducted to evaluate whether or not criteria pollutant emissions from the combined facilities would cause or contribute significantly to a violation of CAAQS or NAAQS. The combined facility AAQA was conducted using the same methodology as outlined in Section 4.1.

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Table 4-6: Sources Included in AAQA and HRA for the Combined Projects

Facility	Source	Exhaust	Fugitive Dust
Lost Hills SWMF Landfill	Landfill flare	x	--
Lost Hills Composting Facility	Compost offsite onroad trucks (paved roads) maximum full build-out	x	x
	Compost onsite off-road equipment (unpaved roads) located in Phases 1, 2 and 3 areas	x	x
	Compost onsite onroad trucks (unpaved roads) located in Phases 1, 2 and 3 areas	x	x
Aries–Holloway Bioenergy Project	Thermal oxidizer	x	--
	Feedstock loading	--	x
	Biochar loadout	--	x
	Fire water pump	x	--
	Emergency generator	x	--
	Onsite trucks (unpaved roads)	x	x
	Offsite trucks (unpaved roads)	x	x
	Offsite trucks (paved roads)	x	x

Table 4-7 presents the maximum model-predicted concentrations from the combined facilities emissions, maximum background concentrations, and sum of these concentrations in comparison to the NAAQS and CAAQS. The AAQA modeling results presented in Table 4-7 show that the combined projects will not cause an exceedance of the NO_2, SO_2, or CO NAAQS or CAAQS.

Since background PM_{10} concentrations are greater than the 24-hour and annual CAAQS and background $PM_{2.5}$ concentrations are greater than the NAAQS and CAAQS, the procedure is to compare the modeled concentrations for these pollutants to the SILs as defined by the SVJAPCD rather than the NAAQS and CAAQS. Further, the procedure is to perform this SIL analysis for emissions from permitted sources separately from fugitive emissions sources.

Table 4-8 shows that the model-predicted PM_{10} and $PM_{2.5}$ concentrations from all onsite exhaust sources from the combined facilities are less than the 24-hour and annual SILs. However, some of the PM_{10} and $PM_{2.5}$ concentrations from the onsite fugitive dust sources were over the respective SILs. Although emissions from the onsite fugitive dust sources from the combined facilities have the potential to cause model-predicted concentrations to be greater than the PM_{10} and $PM_{2.5}$ fugitive dust SILs, these concentrations decrease rapidly with distance from the emission sources.

Modeled PM_{10} and $PM_{2.5}$ concentrations over the SILs were found to occur close to the facility in an area that is uninhabited, unoccupied by workers, and covered by desert scrub, with the majority of the predicted impact coming from the unpaved road dust from the equipment and truck travel.

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Table 4-7: AAQA Modeling Results from the Combined Facilities

Pollutant	Averaging Time	Standard	Modeled Concentration (µg/m^3)	Background Concentration (µg/m^3)	Modeled + Background Concentration (µg/m^3)	AAQS (µg/m^3)	Exceed Standard?
NO_2	1-Hour	Federal	72.7	72.1	144.8	188	No
		California	72.7	91.5	164.2	339	No
	Annual	Federal	6.5	17.2	23.7	100	No
		California	6.5	17.2	23.7	57	No
CO	1-Hour	Federal	738.1	2,155	2,893	40,000	No
		California	738.1	2,155	2,893	23,000	No
	8-Hour	Federal	287.4	1,398	1,685	10,000	No
		California	287.4	1,398	1,685	10,000	No
SO_2	1-Hour	Federal	12.0	28.8	40.7	196	No
		California	12.0	28.8	40.7	655	No
	3-Hour	Federal Secondary	8.0	16.8	24.8	1,300	No
	24-Hour	California	2.9	6.4	9.3	105	No
PM_{10}	24-Hour	Federal	39.2	138.0	177.2	150	See SIL Analysis
		California	See SIL Analysis	143.6	–	50	Background Over the CAAQS and/or NAAQS, Go To Step 2 SIL Analysis
	Annual	California	See SIL Analysis	44.1	–	20	
$PM_{2.5}$	24-Hour	Federal	See SIL Analysis	58.8	–	35	
	Annual	Federal	See SIL Analysis	18.3	–	12	
		California	See SIL Analysis	16.6	–	12	

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Table 4-8: PM_{10} and $PM_{2.5}$ SIL Modeling Results from the Combined Facilities

Pollutant	Averaging Time	Modeled Concentration ($\mu g/m^3$)	SIL ($\mu g/m^3$)	Exceed SIL?
PM_{10}	24-Hour	0.70	5.0	No
	Annual	0.23	1.0	No
$PM_{2.5}$	24-Hour	0.68	1.2	No
	Annual	0.21	0.2	Yes*
Fugitive PM_{10}	24-Hour	34.26	10.4	Yes*
	Annual	9.51	2.08	Yes*
Fugitive $PM_{2.5}$	24-Hour	3.43	2.5	Yes*
	Annual	0.95	0.63	Yes*

* Exceedances of the SIL only occurred in a limited area close to the facility fenceline where the public is unlikely to access.

Due to the predicted SIL exceedances occurring in a location that the public is unlikely to access, the combined facilities are not likely to contribute substantially to an existing air quality violation. Therefore, the combined facilities will not cause a violation of the NAAQS or CAAQS or contribute substantially to an existing air quality violation, and will have a less than significant impact on air quality.

4.7.2 Combined Health Risk Prioritization

To assess the potential health risk from the combined facilities, the prioritization score calculated for the Lost Hills SWMF Project was combined with the score from the Aries–Holloway Bioenergy Project. Both prioritization scores were estimated using the methodology described in Section 4.2.

Table 4-9 presents the prioritization scores from each facility and the combined facilities at the nearest sensitive receptor. Since the prioritization score was estimated to be intermediate level and there are no sensitive receptors within 2 miles, a refined HRA is not necessary to determine that the combined facilities' TAC emissions will have a less than significant health risk.

Based on the prioritization score of less than 10, the use of maximum worst-case emissions, and the absence of any nearby receptors, it is reasonable to conclude that the operation of the combined facilities will not expose sensitive receptors to substantial pollutant concentrations.

Table 4-9: Prioritization Scores at the Nearest Residential Receptor to the Combined Facilities

Facility	Acute	Chronic	Cancer
Lost Hills SWMF Project	0.06	0.09	1.14
Aries – Holloway Bioenergy Project	0.009	0.006	0.07
Combined Facilities	0.069	0.096	1.21

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4.8 Cumulative Analysis

In accordance with CEQA (CEQA Guidelines Section 15130 et seq.), this report analyzes the cumulative impacts of the proposed Project in conjunction with other projects that affect or could affect the project area. According to CEQA, a cumulative impact refers to two or more individual effects that are considerable when taken together or that compound or increase other environmental impacts (CEQA Guidelines Section 15355). CEQA requires the cumulative impacts discussion to reflect the likelihood that the impacts would occur and their severity if they did occur but allows the discussion to contain less detail than must be provided for individual project impacts.

The SJVAPCD GAMAQI states, "By its very nature, air pollution has a cumulative impact. The District's nonattainment status is a result of past and present development within the San Joaquin Valley Air Basin (SJVAB). Furthermore, attainment of ambient air quality standards can be jeopardized by increasing emissions-generating activities in the region. No single project would be sufficient in size, by itself, to result in nonattainment of the regional air quality standards. Instead, a project's emissions may be individually limited, but cumulatively considerable when taken in combination with past, present, and future development within the San Joaquin Valley Air Basin."

It also states, "Thus, if project specific emissions exceed the thresholds of significance for criteria pollutants the project would 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."

4.8.1 Cumulative Impacts Review of Local Projects

Per the KCPD, the cumulative analysis considers localized impacts of projects located within a radius of 1 mile and 6 miles that are located throughout Kern County.

The list of development projects within 1 mile and 6 miles from the Project that were identified by the KCPD is presented in Table 4-10. The majority of the facilities listed in Table 4-10 have negligible operational emissions or are closed; thus, only the Liberty Composting Facility was considered in the cumulative analysis.

The Liberty Composting Facility is located less than 1 mile from the closest property boundary, but approximately 3.6 miles from the nearest portion of the property that will have emission-producing activities. This facility is operational and was permitted through the SJVAPCD, and thus must meet all district rules developed so that permitted projects do not cause violations of the AAQS or expose sensitive receptors to substantial TAC emissions. In addition, the emissions from this facility are reflected in the background air quality data, which were used in the AAQA. Since the distance to the nearest sensitive receptor is more than 2 miles from the Lost Hills SWMF Project and more than 6 miles from the Liberty Composting Facility, no significant cumulative air quality, health risks, or odors are anticipated.

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Table 4-10: KCPD Projects Within 6 Miles

KCPD Case ID	Project Name	Project Description	Status	Location
Within 6 Miles				
226	Bakersfield Cellular	Cellular Tower	*	Portion of Sec. 11, CUP 3, Map 51
432	Blackwell Land Company	Labor Housing	*	E/S Hwy 33, E. of Hwy 46, CUP 2, Map 51, Sec 6
3439	Paramount Farms, Inc.	Water System	*	Lost Hills, CUP 27, Map 5
5737	Pacific Bell	Cellular Tower	*	Twisselman Rd., CUP 1, Map 5
6372	L. Schamun	Cellular Tower	*	Portion E/2 of NW/4 Sec 20, CUP 2, Map 5
6570	Nextel Communication	Cellular Tower	*	21315 Hwy 46, Lost Hills CUP 4, Map 52, Sec 2
7431	Nextel Communication	Cellular Tower	*	21315 Hwy 46, Lost Hills CUP 4, Map 52, Sec 2
10083	Paramount Farms, Inc.	Allow Tank	*	13646 Highway 33, CUP 8, Map 27
10867	Mobile Home	Allow Mobile home	*	21164 Fresno St. CUP 10, Map52, Sec 3
11136	KC E & SSG. Fenton	Allow Drainage Sump	*	Lost Hills, Fresno St. and Lamberton Ave.
11853	Paramount Farms, Inc.	Solar Power Project	*	3,500 Ft E of Hwy 33, 3M N Hwy33 and Hwy46
Within 1 Mile				
843	Chevron USA Inc.	Surface Mining and Reclamation	Closed	PTN of Sec 29
5744	Hondo Chemical	Landfill WO #97242	Never Constructed	Sec 10 NW ¼
9956	Nextel Communication	Cellular Communications Facility	*	Sec 32, PTN W/2
13106	H.M Holloway	Holloway Golden Gypsum Mine	Closed	Adjacent to Disposal Facility
6598	San Joaquin Composting – Liberty Composting	Modify for Transfer/Storage Biosolids	Operational	12421 Holloway Rd

*The construction of these projects has been completed. Due to the nature of these projects, the operational emissions are expected to be negligible.

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4.8.2 SJVAB and Kern County CARB Projected Emissions Comparison

Per the KCPD guidelines, the cumulative analysis should compare project emissions to regional existing sources of air pollutants in the cumulative study area (San Joaquin Valley portion of Kern County, California). Detailed basin wide and county wide emissions are presented in Tables 2-3 and 2-4.

Table 4-11 presents the maximum criteria pollutant net emissions increase due to the proposed Project landfill and composting activities (see Table 3-5), adjusted for the VOC reduction credits (ERCs) that may be required (see Table 5-1), and the Aries – Holloway Bioenergy Project emissions (see Table 2-7 in Appendix F). These combined emissions are then compared to the CARB 2030 projection of the SJVAB total emissions (TPD) and the Kern County portion of the SJVAB (from Tables 2-3 and 2.4).

The combined projects total demonstrates that although small in comparison to the projected basin and county emissions, that the projects at full buildout have the potential to contribute emissions that would add to the basin-wide burden.

Table 4-11: Comparison of Combined Project Emissions and SJVAB Emissions (TPD)

Sources	NO_x	VOC	CO	SO_x	PM_{10}	$PM_{2.5}$
Lost Hills SWMF Project	0.069	0.0*	0.079	0.001	0.044	0.011
Aries – Holloway Bioenergy Project	0.045	0.003	0.039	0.047	0.015	0.010
Combined Projects With ERC for Lost Hills SWMF Permitted Sources	0.114	0.003	0.118	0.048	0.059	0.021
2030 Total for Kern County in SJVAB	26.46	168.60	86.53	1.46	39.64	11.98
2030 Total for SJVAB	128.70	1,017.35	931.12	11.07	316.68	102.08
Combined Projects Total Emissions Percent of Kern County	0.43%	0.002%	0.14%	3.29%	0.15%	0.17%
Combined Projects Total Emissions Percent of SJVAB	0.09%	0.0003%	0.01%	0.43%	0.02%	0.02%

* Lost Hills Compost area VOC emissions will be offset with ERCs, and hence will not add to the emissions burden in Kern County or the San Joaquin Valley.

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5.0 PROJECT FEATURES, MITIGATION, AND AIR QUALITY SIGNIFICANCE FINDINGS

The project features that would serve to reduce the impacts, including NSR-required emissions reductions, are summarized in this section. The CEQA Checklist questions related to air quality from Appendix G of the CEQA Guidelines are also addressed herein.

5.1 Project Features

As discussed in prior sections of this report, the following project features will be incorporated into the project design:

- Dedicated project offroad equipment will employ Tier 4 engines where feasible/available;
- A landfill GCS with 75% collection efficiency vented to a flare that achieves 98% control, or better, will be employed as needed to meet NSPS and permit requirements;
- The compost facility will feature an eASP design and include a biofiltration layer comprised of cured compost to reduce emissions of VOCs, NH_3, and GHG;
- As required by SJVAPCD Regulation VIII, the facility's dust control plan will continue to be implemented;
- A Valley Fever Dust Management Plan will be implemented (see Section 4.3); and
- The California Integrated Waste Management Board requires all commercial composting facilities in California to prepare, implement, and maintain a site-specific OIMP to minimize odors (see Section 4.4).

5.2 Project NSR Requirements

Lost Hills Environmental LLC will be required to obtain an ATC for the new compost area from the SJVAPCD, as well as modify the existing PTO for the landfill to allow additional wastes, extend the hours of operation, and other changes as needed. The Aries – Holloway Bioenergy Project will also be required to obtain ATCs/PTOs from the SJVAPCD. The process equipment that is subject to permit requirements[4], such as the landfill flare (if the current flare is replaced), the compost facility, and the bioenergy plant thermal oxidizer, will be required to meet Best Available Control Technology (BACT) requirements of the SJVAPCD.

Additionally, it is expected that ERCs will be required to offset some of the emissions from sources subject to permits. An analysis of the amount of ERCs potentially required is provided in Table 5-1. SJVAPCD has indicated that each of the three facilities will be permitted separately, so each facility is evaluated to determine the offset requirements. This analysis indicates that approximately 190 tons of VOC emissions will be required to be offset for the compost area. Although Table 5-1 indicates a possible VOC offset requirement of about 6 tons for the landfill, this amount is based on the production of LFG if the maximum levels or organic wastes are disposed of over the next decade. Because it is planned to divert most of the organic material to the compost area, it is considered unlikely that this level of LFG VOC emissions will be reached. Table 5-1 also indicates that the Bioenergy Project may be required to obtain NO_x ERCs, but the applicant is currently planning to accept a permit limit to stay below the threshold. The emissions

[4] The list of equipment subject to permit requirements is based on guidance provided by SJVAPCD in Policy Memo SSP-2050 (SJVAPCD 2009c).

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of the other criteria pollutants from the proposed Projects do not trigger NSR offsets. These estimates are preliminary and subject to determination by the SJVAPCD during the permitting process.

Table 5-1: Preliminary Estimate of Lost Hills SWMF Project Offset Requirements

Facility	Emission Source	NO_x (lb/yr)	VOC (lb/yr)	CO (lb/yr)	SO_x (lb/yr)	PM_{10} (lb/yr)
Lost Hills Landfill	LFG	0	47,907	0	0	0
	Flare	9,456	2,874	2,916	433	3,152
	Subtotal –Landfill	**9,456**	**50,781**	**2,916**	**433**	**3,226**
	Current NSR Balance	38	19,675	986	15	22
	Total Facility Emissions	9,494	31,106	3,902	448	3,248
Offset Threshold		20,000	20,000	200,000	54,750	29,200
Offsets Required (= Total Facility Emissions – Offset Threshold)		0	*11,106*	0	0	0
Lost Hills Compost	Compost Material Handling Fugitive Dust	0	0	0	0	74
	Composting	0	398,907	0	0	0
	Total Facility Emissions		398,907			74
Offset Threshold		20,000	20,000	200,000	54,750	29,200
Offsets Required (= Total Facility Emissions – Offset Threshold)		0	*378,907*	0	0	0
Bioenergy Project	Thermal Oxidizer	26,200	340	3,590	34,280	6,480
	Feedstock and Biochar Loadout	0	0	0	0	59
	Emergency Engines (2)	302	20	300	0	3
	Total Facility Emissions	26,502	360	3,890	34,280	6,542
Offset Threshold		20,000	20,000	200,000	54,750	29,200
Offsets Required (= Total Facility Emissions – Offset Threshold)		*6,502*	0	0	0	0

Notes:

a. Landfill ERC requirements will be based on emissions increases over the currently permitted levels. ERCs would be required for VOC emissions over 10 TPY, but LFG emissions are cumulative over time based on actual amounts of organics in the waste, so this level may not be reached.

b. For permitting, the bioenergy plant may accept a permit limit below the 10 TPY offset threshold for NO_x emissions.

c. Offset values to not include required offset ratio for distance or net air quality benefit.

5.3 CEQA Significance Criteria

The Kern County CEQA Environmental Checklist (KCPD 2012)[5] states that a project would have a significant air quality impact if it would:

[5] Note, these questions have been slightly updated in Appendix G of the CEQA Guidelines that are effective as of January 1, 2019.

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a) Conflict with or obstruct implementation of the applicable air quality plan;

b) Violate any air quality standard as adopted in (c) or as established by the EPA or air district, or contribute substantially to an existing or projected air quality violation;

c) 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 AAQS (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 KCPD thresholds presented in Table 5-2;

d) Expose sensitive receptors to substantial pollutant concentrations; or

e) Create objectionable odors affecting a substantial number of people.

The KCPD CEQA guidance document notes that construction and operations emissions should be compared to both the KCPD and SJVAPCD CEQA thresholds for determination of significance. The SJVAPCD CEQA thresholds are outlined in the GAMAQI and policy APR-2030 (SJVAPCD 2018a). Table 5-2 presents both the KCPD and SJVAPCD thresholds.

Table 5-2: SJVAPCD and KCPD CEQA Emissions Thresholds (TPY)

Pollutant	SJVAPCD			KCPD	
	Construction Emissions	Operational Permitted Equipment and Activities	Operational Non-Permitted Equipment and Activities	Construction, Operational, and Area Sources	Operational Permitted Sources
NO_x	10	10	10	10	10
VOC	10	10	10	10	10
CO	100	100	100	–	–
SO_x	27	27	27	–	–
PM_{10}	15	15	15	15	–
$PM_{2.5}$	15	15	15	–	–

Source: SJVAPCD GAMAQI (2015a), KCPD CEQA Checklist (2012).

SJVAPCD guidelines also set a daily construction and operational permitted and non-permitted emission threshold of 100 pounds per day of any criteria pollutant, above which the applicant is required to determine potentially significant impacts from either construction or operational emissions (SJVAPCD 2013 and 2018a).

If either the daily or annual Project emissions exceed any of these thresholds, then the SJVAPCD requires an AAQA to show that the Project would not have a significant impact.

Tables 5-3 and 5-4 compare the Project permitted and non-permitted source emissions to the annual and daily CEQA significance thresholds, respectively. Only VOCs exceed the annual and daily thresholds for permitted sources for the composting facility and potentially the landfill, and these emissions will be mitigated with ERCs as required by the SJVAPCD. NO_x emissions exceed the annual and daily non-permitted source thresholds for the composting and bioenergy plant, and CO exceeds the daily non-permitted source threshold for the composting facility. These emissions are from the exhaust and fugitive dust from the mobile sources and material handling and may be dealt with through the VERA program with SJVAPCD.

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Since emissions exceed these CEQA thresholds, an AAQA was conducted, and the results are presented in Section 4.1.10 showing that the Project would not cause or contribute significantly to a violation of the NAAQS or CAAQS.

Table 5-3: Project Emissions Compared to Annual CEQA Emissions Thresholds

Category	Source	Annual Operations Emissions (TPY)					
		NO_x	VOC	CO	SO_x	PM_{10}	$PM_{2.5}$
Permitted Source Emissions	Landfill (LFG + Flare)	4.7	15.6	1.5	0.2	1.6	1.6
	CEQA Permitted Source Threshold	10	10	100	27	15	15
	Exceed Threshold After Mitigation?	No	No[a]	No	No	No	No
	Compost Full Buildout	--	199.5	--	--	0.04	0.04
	CEQA Permitted Source Threshold	10	10	100	27	15	15
	Exceed Threshold After Mitigation?	No	No[b]	No	No	No	No
	Bioenergy Project	13.3	0.2	1.9	17.1	3.3	3.2
	CEQA Permitted Source Threshold	10	10	100	27	15	15
	Exceed Threshold After Mitigation?	No[c]	No	No	No	No	No
Non-Permitted Source Emissions	Landfill (no change)	0.0	0.0	0.0	0.0	0.0	0.0
	Compost Area Full Buildout	20.4	1.6	27.6	0.09	14.4	2.3
	CEQA Permitted Source Threshold	10	10	100	27	15	15
	Exceed Threshold After Mitigation?	No[d]	No	No	No	No	No
	Bioenergy Project	3.2	0.1	1.2	0.02	4.1	0.8
	CEQA Permitted Source Threshold	10	10	100	27	15	15
	Exceed Threshold After Mitigation?	No	No	No	No	No	No

Notes:

a. Landfill emissions reflect projected LFG emissions minus the baseline. A flare is required to be used after the LFG emissions reach a specific level. ERC requirements will be based on emissions increases over the currently permitted levels. ERCs would be required for VOC emissions over 10 TPY, but LFG emissions are cumulative over time based on actual amounts of organics in the waste, so this level may not be reached.

b. The composting facility will surrender ERC to offset the VOC emissions, thus the stationary source emissions would be offset to below the CEQA thresholds.

c. For permitting, the bioenergy plant may accept a permit limit below the 10 TPY offset threshold for NO_x emissions.

d. If non-permitted source emissions are over the CEQA thresholds (which are applied separately to each project), a VERA can be provided to mitigate these mobile source emissions. The bioenergy plant's emissions are below the thresholds and the compost area only has the potential to exceed the 10 TPY significance level for NO_x once Phase 3 of the compost area is developed. The Applicant will evaluate if non-permitted source NO_x emissions for the total compost operation are projected to be over the 10 TPY threshold when Phase 3 is developed, and if so, may enter into a VERA with the SJVAPCD at that time.

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Table 5-4: Project Emissions Compared to Daily CEQA Emissions Thresholds

Category	Source	Annual Operations Emissions (lb/day)					
		NO_x	VOC	CO	SO_x	PM_{10}	$PM_{2.5}$
Permitted Source Emissions	Landfill (LFG + Flare)	25.9	85.5	8.0	1.2	8.6	8.6
	CEQA Permitted Source Threshold	100	100	100	100	100	100
	Exceed Threshold After Mitigation?	No	No	No	No	No	No
	Compost Full Buildout	--	1,093	--	--	0.20	0.03
	CEQA Permitted Source Threshold	100	100	100	100	100	100
	Exceed Threshold After Mitigation?	No	No[a]	No	No	No	No
	Bioenergy Project	81.49	5.37	77.90	93.97	18.43	18.16
	CEQA Permitted Source Threshold	100	100	100	100	100	100
	Exceed Threshold After Mitigation?	No	No	No	No	No	No
Non-Permitted Source Emissions	Landfill (no change)	0.0	0.0	0.0	0.0	0.0	0.0
	Compost Area Full Buildout	111.8	8.7	150.8	0.8	78.8	12.6
	CEQA Permitted Source Threshold	100	100	100	100	100	100
	Exceed Threshold After Mitigation?	No[b]	No	No[b]	No	No	No
	Bioenergy Project	0.07	0.00	0.03	0.00	10.72	1.08
	CEQA Permitted Source Threshold	100	100	100	100	100	100
	Exceed Threshold After Mitigation?	No	No	No	No	No	No

Notes:

a. The composting facility will surrender ERC to offset the VOC emissions, thus the stationary source emissions would be offset to below the CEQA thresholds.

b. If non-permitted source emissions are over the CEQA thresholds (which are applied separately to each project), a VERA can be provided to mitigate these mobile source emissions. The bioenergy plant's emissions are below the thresholds and the compost area only has the potential to exceed the 10 TPY significance level for NO_x once Phase 3 of the compost area is developed. The Applicant will evaluate if non-permitted source NO_x emissions for the total compost operation are projected to be over the 10 TPY threshold when Phase 3 is developed, and if so, may enter into a VERA with the SJVAPCD at that time.

Each of the CEQA air quality checklist questions are discussed below.

5.4 Impact AQ-1: Would the Project Conflict with or Obstruct Implementation of the Applicable Air Quality Plan?

5.4.1 Discussion

As discussed in Section 2.4.3, the SJVAPCD has prepared AQAPs for ozone and $PM_{2.5}$ and a maintenance plan for PM_{10}. An "attainment plan" must be prepared for pollutants which exceed the NAAQS, and a maintenance plan is prepared for pollutants for which the valley is designated as attainment or unclassifiable with respect to the NAAQS (e.g., PM_{10},) to ensure that additional emissions of these air contaminants will not adversely affect air quality to the extent that it would result in a violation of the applicable air quality standard.

The SJVAPCD's thresholds of significance for criteria pollutants are based on the SJVAPCD Rule 2201 NSR offset requirements. NSR is a major component of the

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SJVAPCD's attainment strategy. NSR provides mechanisms, including emission trade-offs, by which ATCs/PTOs may be granted, without interfering with the attainment or maintenance of AAQS. SJVAPCD 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. Permitted emissions above offset thresholds must be mitigated to below the thresholds, adjusted for the distance of the source of ERCs to the project and also a factor to provide a net air quality benefit for ozone precursors. Furthermore, the SJVAPCD's NSR program is designed to ensure that project-specific emission increases that are below NSR offset thresholds will not prevent the SJVAPCD from achieving attainment. The SJVAPCD's attainment plans demonstrate that this level of emissions increase will not interfere with attainment or maintenance of AAQS. Consequently, emission impacts from sources permitted consistent with NSR requirements are consistent with the SJVAPCD's AQAPs, and hence are not individually or cumulatively significant.

The SJVAPCD's attainment plans must account for emissions from existing projects and must provide for future growth. The federal nonattainment plans must ensure that on a valley-wide basis (i.e. cumulative basis), there is no increase in emissions of nonattainment pollutants and precursors (NO_x, VOCs, $PM_{2.5}$). District plans must treat future growth as actual "in the air" emissions, and the plans must include control measures that achieve reductions needed to offset (mitigate) such growth and ensure reasonable further progress towards the attainment of the air quality standards.

The 2018 Integrated $PM_{2.5}$ AQAP accounts for current and projected future growth of waste management related emissions. For example, the plan includes 0.3 TPD of $PM_{2.5}$ emissions for the Waste Management category starting in 2020. As shown in Table 4-10, the $PM_{2.5}$ net emissions increase for the proposed Lost Hills SWMF Project is 0.011 TPD, or 4% of the emissions accounted for in the $PM_{2.5}$ AQAP. Therefore, it is reasonable to assume that both the permitted and non-permitted emissions associated with the Lost Hills Facility waste management activities are accounted for and do not conflict with or obstruct implementation of the applicable air quality plan.

5.4.2 Proposed Mitigation

Many design features that will implemented for the proposed Project that will minimize and mitigate emissions, including a dust control plan. A modified ATC/PTO will be issued by SJVAPCD that will require BACT utilized on new sources subject to permitting, ERCs as required by SJVAPCD obtained, and compliance with federal NSPS, CARB, and SJVAPCD rules and regulations (see Section 2.4.4).

5.4.3 Level of Significance After Mitigation

Through the implementation of emissions control plans and compliance the SJVAPCD's NSR and other regulatory requirements, the proposed Project will not conflict with or obstruct implementation of the applicable air quality plan. Therefore, the proposed Project will have a less than significant impact on air quality.

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5.5 Impact AQ-2: Would the Project Violate any Air Quality Standard as Adopted in (c) or as Established by EPA or Air District or Contribute Substantially to an Existing or Projected Air Quality Violation?

5.5.1 Discussion

Section 5.3 provided the five CEQA significance criteria a) through e) from the KCPD CEQA guidelines. The KCPD and SJVAPCD CEQA guidance require project construction and operations emissions to be compared to the CEQA mass thresholds for determination of significance. If all emissions are below these thresholds, then a project would not cause or contribute to a violation of any CAAQS or NAAQS. If emissions exceed these thresholds, an AAQA should be conducted to show that the project would not cause or contribute to a violation of any CAAQS or NAAQS.

SJVAPCD GAMAQI outlines the screening level for a traffic CO hotspot analysis to determine the potential for a project to result in a violation of the CO standard. The District has determined that a project that would not reduce the level of service (LOS) to E or F, or worsen an already existing LOS E or F, would not result in a violation of the CO standard [applicable to criteria (b) and (c)].

A detailed AAQA and CO hotspot analysis for the proposed Project were prepared and the results are presented in Sections 4.1 and 4.5, respectively.

The AAQA demonstrates that the Project will not cause an exceedance of the NO_2, SO_2, or CO NAAQS or CAAQS. Since background PM_{10} and $PM_{2.5}$ concentrations are greater than the NAAQS and CAAQS, the modeled concentrations were compared to the SILs. The model-predicted PM_{10} and $PM_{2.5}$ concentrations from all onsite exhaust sources are less than the SILs. Although calculated maximum emissions from the onsite fugitive dust sources resulted in model-predicted concentrations that are greater than the PM_{10} and $PM_{2.5}$ fugitive dust SILs, these exceedances occur close to the facility in an area that is uninhabited, unoccupied by workers, and covered by desert scrub.

Per SJVAPCD policy APR-1925, if modeling shows project impacts are above the applicable AAQS or SILs, then the project can surrender offsets in the form of ERCs to offset project emissions. The Project will mitigate emissions through the surrender of ERCs as required by SJVAPCD for permitting, although it is possible that the PM_{10} (including $PM_{2.5}$) emissions for sources subject to permitting will be below the offset threshold.

Since the modeled PM_{10} and $PM_{2.5}$ concentrations that are over the respective SILs are due to fugitive dust emissions, occur in a location that the public are unlikely to access, and a dust control plan will continue to be implemented, the Project is not likely to contribute substantially to an existing air quality violation where people would be exposed to levels over the ambient standards.

The CO hotspot analysis determined that there are no intersections near the Project that are or will be reduced to LOS E or F; therefore, the Project does not have the potential to create a CO hotspot. The Project will not cause a violation of the CO NAAQS or CAAQS and will have a less than significant impact on air quality.

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5.5.2 Proposed Mitigation

The proposed Project will implement many design features that will minimize emissions and will mitigate VOC emissions through the surrender of ERCs as required by SJVAPCD for permitting.

The primary emission minimization features include:

- A landfill GCS with 75% collection efficiency vented to a flare that achieves 98% control, or better, will be employed.
- The compost facility will feature an eASP design and include a biofiltration layer comprised of cured compost to reduce emissions.
- A dust control plan will continue to be implemented as required by SJVAPCD Regulation VIII.

5.5.3 Level of Significance After Mitigation

An AAQA was performed which demonstrated that the proposed Project would be unlikely to cause a violation of the NAAQS or CAAQS, or contribute substantially to an existing air quality violation in areas where the public would be exposed. Therefore, the Project will have a less than significant impact on ambient air quality.

5.6 Impact AQ-3: Would the Project 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)?

5.6.1 Discussion

If project-specific effects exceed the thresholds of significance, then the project would also be expected to result in a cumulatively impact. However, project effects that are less than significant can still be cumulatively considerable with respect to a significant impact. Potentially significant impacts may be rendered less than significant through appropriate changes to the project and by providing mitigation that would lessen the impact, such that it complies with the established criteria.

Section 4.7 provides an analysis of the combined impacts from the Lost Hills SWMF LFG generation and new compost area and the Aries – Holloway Bioenergy Project. It includes both an AAQA and a health risk prioritization from the combined facilities. The AAQA determined that the combined facilities will not cause a violation of the NAAQS or CAAQS or contribute substantially to an existing air quality violation of the attainment pollutants. Similar to the proposed Project alone, the maximum concentrations were modeled to be over the PM_{10} and $PM_{2.5}$ SILs, but only in an area near the facility property boundary that is remote and unlikely to be accessed by the public.

The health risk analysis determined that based on the prioritization score of less than 10, the use of maximum worst-case emissions, and the absence of any nearby receptors, it is reasonable to conclude that the operation of the combined facilities will not expose sensitive receptors to substantial pollutant concentrations.

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Section 4.8 provides a detailed cumulative analysis of nearby projects. It determined that there was one facility that had emission-producing activities, the Liberty Composting Facility, that could cause cumulative effects. This facility is permitted through the SJVAPCD, and thus must meet all District rules developed so that permitted projects do not cause violations of the AAQS or expose sensitive receptors to substantial TAC emissions. Since the distance to the nearest sensitive receptor is more than 2 miles from the Lost Hills SWMF Project and more than 6 miles from the Liberty Composting Facility, no significant cumulative air quality, health risks, or odor impacts are anticipated.

5.6.2 Proposed Mitigation

The Project will implement many design features that will minimize and mitigate emissions. In addition, ERCs for VOC emissions, an ozone precursor, will be obtained as required by the SJVAPCD for permitting.

5.6.3 Level of Significance After Mitigation

Based on the analyses provided, the Project is not expected to result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in nonattainment under an applicable NAAQS or CAAQS. Therefore, the Project will have a less than significant cumulative impact on air quality.

5.7 Impact AQ-4: Would the Project Expose Sensitive Receptors to Substantial Pollutant Concentrations?

5.7.1 Discussion

To aid in the assessment of criteria (d) above, the SJVAPCD has set thresholds of significance through policy APR-1906 based on the results of a health risk analysis of the TAC emissions from the operations of both permitted and non-permitted sources. The threshold for the maximally exposed individual is a predicted cancer risk that is less than or equal to 20 in one million, and acute and chronic non-cancer risk predicted to be less than 1.0 (SJVAPCD 2018b).

To assess the potential acute, chronic, and carcinogenic health risks from a project, a two-step process can be followed, where initially a screening risk prioritization is conducted. If the potential for high health risks are found, then an HRA may be required.

A detailed risk prioritization is presented in Section 4.2. It assesses the potential health risk from the Project by calculating a prioritization score at the nearest residential and business receptors. The prioritization score was determined to be an intermediate level. Since there are no sensitive receptors within 2 miles, a refined HRA was not necessary to determine that the proposed Project's TAC emissions would have a substantial health risk.

5.7.2 Proposed Mitigation

The Project will implement many design features that will minimize and mitigate emissions. Most of the TAC emissions are associated with the VOC or PM_{10} emission sources. The primary emission minimization features include:

- A landfill GCS with 75% collection efficiency vented to a flare that achieves 98% control or better will be employed as needed to meet NSPS and permit requirements;

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- The compost facility will feature an eASP design and includes a biofiltration layer comprised of cured compost to reduce TAC emissions; and
- A dust control plan.

In addition, ERCs for VOC emissions, many of which are also TACs, will be obtained as required by the SJVAPCD for permitting.

5.7.3 Level of Significance After Mitigation

Based on the low prioritization score, the use of maximum worst-case emissions, and the absence of any nearby receptors, it is reasonable to conclude that the operation of the Project will not expose sensitive receptors to substantial pollutant concentrations or health risks. Therefore, the Project will have a less than significant impact on sensitive receptors.

5.8 Impact AQ-5: Would the Project Create Objectionable Odors Affecting a Substantial Number of People?

5.8.1 Discussion

SJVAPCD GAMAQI outlines the screening level for potential odor sources as 1 mile for landfills and composting facilities to assess criteria (e). The SJVAPCD also recommends reviewing historical odor complaints in the vicinity of the project.

An analysis of the potential for odorous emissions is presented in Section 4.4. The odor assessment indicates that the nearest sensitive receptor is a residence located approximately 2.3 miles east of the Project, well beyond the SJVAPCD screening distance threshold of 1 mile for both landfills and composting facilities.

Although there have been no complaints logged with the SJVAPCD for the existing Lost Hills SWMF landfill, due to the new potential odor-causing activities at the composting area, a detailed odor study was conducted and is presented in Appendix E. The study determined that the potential for detection of odors from the Project would be well below the level at which odors would be detected by the closest sensitive receptors.

5.8.2 Proposed Mitigation

The California Integrated Waste Management Board requires all commercial composting facilities in California to prepare, implement, and maintain a site-specific OIMP to minimize odors. As listed in Section 4.4, the OIMP features include:

- An odor monitoring and data collection protocol for onsite odor sources, which describes the proximity of possible odor receptors and a method for assessing odor impacts at the locations of the possible odor receptors;
- A description of meteorological conditions affecting migration of odors and/or transport of odor-causing material offsite. Seasonal variations that affect wind velocity and direction shall also be described;
- A complaint response and recordkeeping protocol;
- A description of design considerations and/or projected ranges of optimal operation to be employed in minimizing odor, including method and degree of aeration, moisture content of materials, feedstock characteristics, airborne emission

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production, process water distribution, pad and site drainage and permeability, equipment reliability, personnel training, weather event impacts, utility service interruptions, and site specific concerns as applicable; and

- A description of operating procedures for minimizing odor, including aeration, moisture management, feedstock quality, drainage controls, pad maintenance, wastewater pond controls, storage practices (e.g., storage time and pile geometry), contingency plans (i.e., equipment, water, power, and personnel), biofiltration, and tarping as applicable.

5.8.3 Level of Significance After Mitigation

Based on the odor minimization design features that will be implemented at the Project (including the eASP biofilter layer and landfill GCS as well as the OIMP) and the distance to sensitive receptors, the Project is not expected to create objectionable odors affecting a substantial number of people. Therefore, the proposed Project will have a less than significant impact related to emissions which cause odors.

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6.0 GREENHOUSE GAS ANALYSIS

This Section presents information related to the analysis of greenhouse gas (GHG) emissions from the proposed Projects and the consistency of the Projects with relevant plans and programs that are applicable to the project area. The impact assessment is based upon a review of relevant literature and technical reports that include, but are not limited to, information and guidelines by CARB, EPA, and SJVAPCD, as well as the applicable provisions of CEQA.

Assembly Bill 32 (AB 32), the California Global Warming Solutions Act of 2006, creates a comprehensive, multi-year program to reduce California's GHG emissions to 1990 levels by the year 2020. The AB 32 Scoping Plan contains the main strategies California will use to reduce the GHGs that cause climate change. AB 32 requires that CARB develop GHG reduction strategies that do not interfere with existing air pollution control measures.

The Scoping Plan was first approved by the CARB in 2008 and must be updated every five years. The First Update to the Climate Change Scoping Plan was approved by CARB on May 22, 2014. In 2016, the Legislature passed SB 32, which codifies a 2030 GHG emissions reduction target of 40 percent below 1990 levels. With SB 32, the Legislature passed companion legislation AB 197, which provides additional direction for developing the Scoping Plan. CARB is moving forward with a second update to the Scoping Plan to reflect the 2030 target set by Executive Order (EO) B-30-15 and codified by SB 32.

The Scoping Plan includes several measures for reducing GHG emissions from the recycling and waste industry, including:

- Reducing methane emissions at landfills. Methane emissions from landfills, generated when wastes decompose, account for approximately 1% of California's GHG emissions. GHG emissions can be substantially reduced by properly managing all materials to minimize the generation of waste, maximize the diversion from landfills, and manage them to their highest and best use. Capturing landfill methane results in GHG benefits. In June 2010, CARB adopted a Discrete Early Action measure to reduce methane from municipal solid waste (MSW) landfills. The regulation primarily requires owners and operators of certain uncontrolled MSW landfills to install gas collection and control systems, and requires existing and newly installed gas and control systems to operate in an optimal manner.
- Moving towards zero waste. This goal is primarily achieved by increasing waste diversion, composting and other beneficial uses of organic materials, and mandating commercial recycling. One regulation that has been set to achieve this goal is AB 341, which aims to reduce solid waste generated in the State of California by 75%, including composting as a means of achieving that goal.

This Projects helps to achieve these goals, and in this regard is a GHG reduction measure mandated by law. Specifically, the Projects helps the State reach its goal for reducing solid waste by providing an alternative to landfilling (i.e., composting), consistent with AB 341.

In addition to helping the State reach its goal for reducing solid waste, the Projects are also in line with the State goal of reducing overall GHG emissions. Per CARB methodology (CARB 2017), diverting solid waste from landfills to composting facilities reduces methane emissions from the decomposition of organic material. As further discussed below, methane is a short-lived climate

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pollutant that has a significantly greater impact on climate change than carbon dioxide. Increased operation of the landfill as a result of the Project would further reduce GHG emissions generated from landfilling solid waste. This reduction increases even further when other benefits of composting, such as decreased soil erosion and reduced fertilizer use, are accounted for.

On a per-ton of compost 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. As discussed below, numerous initiatives by the State of California will reduce statewide GHG emissions and certain emissions associated with the Projects, including the Pavley rules that will reduce emissions from automobiles, regulations that will reduce emissions from heavy duty trucks, the Low Carbon Fuel Standard (LCFS) that will reduce emissions from heavy duty trucks and off-road mobile equipment, and the CARB rules discussed above (e.g., AB 32, AB 341).

Based on the foregoing, the proposed Projects 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. In addition, the proposed composting facility is expected to reduce GHG emissions due to the land application of compost.

6.1 Environmental Setting

GHGs and climate change are a cumulative global issue. CARB and EPA regulate GHG emissions within the State of California and the United States, respectively. While CARB has the primary regulatory responsibility within California for GHG emissions, local agencies can also adopt policies for GHG emission reduction.

The California legislature concluded that global climate change poses significant adverse effects to the environment [AB 32, the California Global Warming Solutions Act of 2006]. In addition, the global scientific community has expressed a high confidence that the recent, observed, climate change is predominately man-made, and that climate change could lead to adverse changes around the globe (IPCC 2007). Consequently, the following sections analyze potential GHG emissions that may occur while implementing the proposed Projects.

Global climate change is a change in the average weather of the earth, measured by wind patterns, storms, precipitation, and temperature. Although historical records show that dramatic fluctuations in temperature have occurred in the past, such as during previous ice ages, some data indicate that the current temperature record differs from previous climate changes in both rate and magnitude (IPCC 2007).

6.1.1 Greenhouse Gases

Many chemical compounds found in the Earth's atmosphere act as GHGs. GHGs allow sunlight to enter the atmosphere freely. When sunlight strikes the Earth's surface, some of it is reflected back towards space as infrared radiation (heat). GHGs absorb this infrared radiation and trap the heat in the atmosphere. In the absence of GHGs, the amount of energy sent from the sun to the Earth's surface should be about the same as the amount of energy radiated back into space, leaving the temperature of the Earth's surface roughly constant. With GHGs, the amount of heat retained in the atmosphere increases.

Many gases exhibit these "greenhouse" properties. Some of them occur in nature [e.g., water vapor (H_2O), carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O)], while others are exclusively human made (like gases used as aerosol propellants). Besides water

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vapor, the regulated GHGs are CO_2 CH_4, N_2O, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6).

The principal GHGs resulting from human activity that enter and accumulate in the atmosphere are described below:

- **Carbon dioxide** (CO_2) is an odorless, colorless GHG and is the most abundant in the Earth's atmosphere with a 100-year global warming potential (GWP)[6] of 1. Natural sources include decomposition of organic matter; respiration of bacteria, plants, animals, and fungus; evaporation from oceans; and volcanoes. Man-made sources of carbon dioxide include burning fuels, such as coal, oil, natural gas, and wood. The interaction of man-made sources and natural sources of GHG and how they contribute to the atmospheric levels of GHG is a complex issue. In 2007 concentrations of CO_2 in the atmosphere were approximately 379 parts per million (ppm); some say that concentrations may increase to 1,130 CO_2e ppm by 2100 as a direct result of man-made sources (IPCC 2007). Some predict that this will result in an average global temperature rise of at least 7.2 degrees Fahrenheit (°F) by 2100 (IPCC 2007).
- **Methane** (CH_4), a gas, is the main component of natural gas used in homes and has a GWP of approximately 21[7]. Decaying organic matter in forests and oceans is a natural source of methane. Man-made sources include landfills, fermentation of manure, and cattle. Geological deposits known as natural gas fields contain methane, which is extracted for fuel.
- **Nitrous oxide** (N_2O) is a colorless gas with a GWP of approximately 310. Nitrous oxide is produced by microbial processes in soil and water, including reactions that occur in fertilizer containing nitrogen. In addition to agricultural sources, some industrial processes (e.g., nylon production, nitric acid production) emit N_2O. Nitrous oxide is used in rocket engines, as an aerosol spray propellant, and in race cars. During combustion, NO_x (NO and NO_2) is produced as a criteria pollutant. Very small quantities of N_2O may be formed during fuel combustion by the reaction of nitrogen and oxygen.
- **Chlorofluorocarbons (CFCs) and Hydrofluorocarbons (HFCs)** are synthetic gases formed by replacing all or some hydrogen atoms in methane or ethane with chlorine or fluorine atoms. HFCs have a GWP between 140 and 11,700, with HFC-

[6] GWP is a relative measure, compared to CO_2, of a compound's residence time in the atmosphere and ability to warm the planet. Mass emissions of GHGs are converted into carbon dioxide equivalent (CO_2e) emissions for ease of comparison. CO_2e is a quantity that describes, for a given mixture and amount of greenhouse gas, 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 metric tons of CO_2e (MT CO_2e). CO_2e is calculated by multiplying the metric tons of gas by the appropriate GWP.

[7] As a further complication, the GWP values have been revised as further scientific data are collected. The values presented here are from the IPCC Second Annual Report (SAR). GWP values were updated in the Fourth Annual Report (AR4) and again in the Fifth Annual Report (AR5). Although GWP has been updated by IPCC, the SAR values are used herein to be consistent with CARB's mandatory GHG reporting protocol, which still use the SAR values.

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152a at the low end and HFC-23 at the higher end. CFCs are nontoxic, nonflammable, insoluble in water, and chemically nonreactive in the troposphere (the level of air at the earth's surface). CFCs were first synthesized in 1928 as refrigerants, aerosol propellants, and cleaning solvents. However, they destroy stratospheric ozone and the Montreal Protocol stopped their production in the 1990s.

- **Sulfur hexafluoride** (SF_6) is an inorganic, odorless, colorless, nontoxic, nonflammable gas. Its GWP of 23,900 is the highest of any gas. SF_6 is used for insulation in electric power transmission and distribution equipment, in the magnesium industry, in semiconductor manufacturing, and as a tracer gas for leak detection.

6.1.2 GHG Emissions Calculations and Existing Inventories

The quantification of GHG emissions can be complex and relies on a number of assumptions. GHG emissions are global because emissions from one location could affect the entire planet, and they are not limited to local impacts.

Emissions are generally classified as either direct or indirect. Direct emissions are associated with the production of GHG emissions at the project site. These include the combustion of fuel in equipment engines and construction vehicles, and fugitive emissions from landfills.

Indirect emissions include the emissions from vehicles delivering materials and equipment to the site and the use of electricity. Electricity also produces GHG emissions because fossil fuel combustion is used to generate electricity.

6.1.2.1 National Greenhouse Gas Emission Inventory

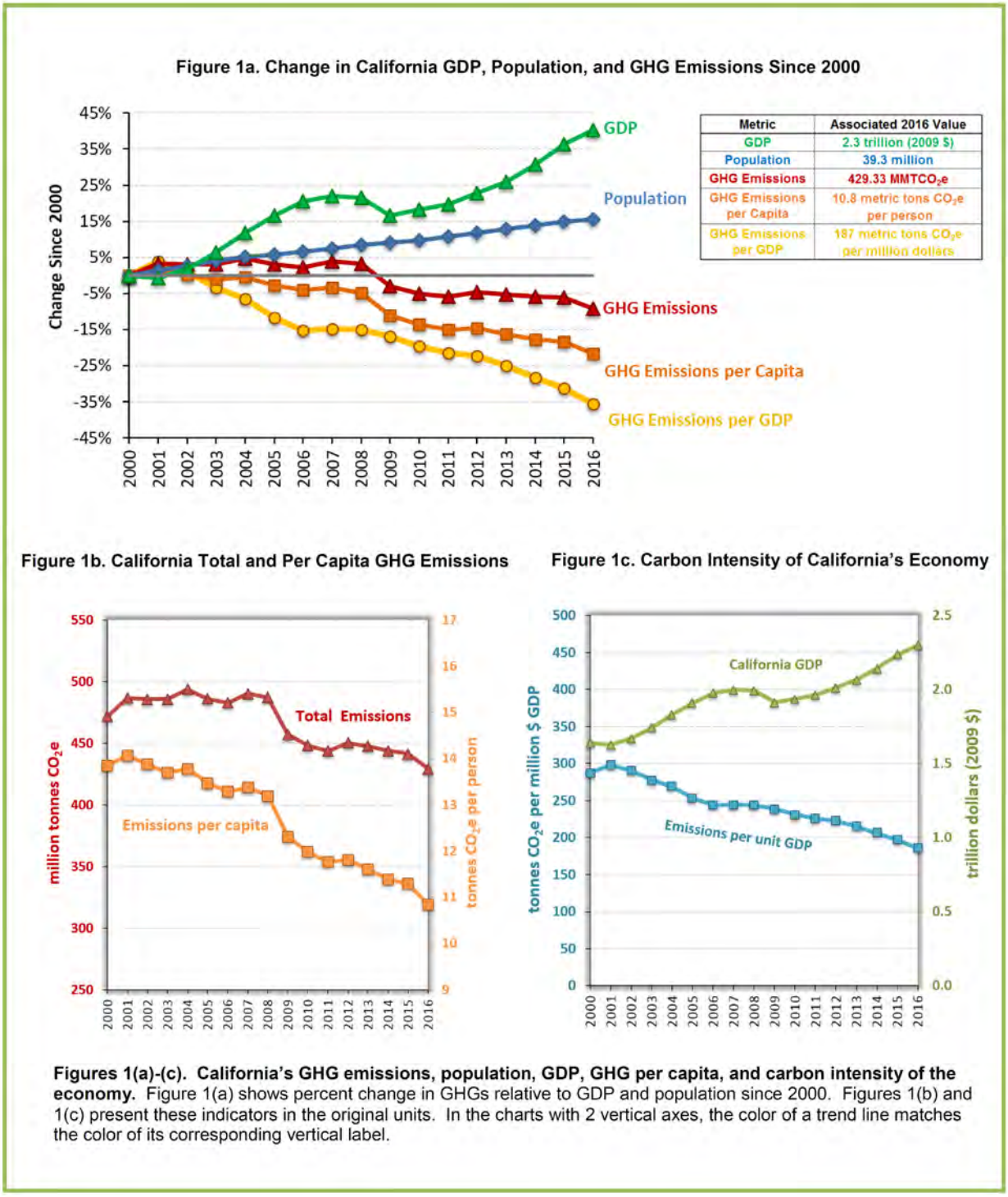
Fossil fuel combustion is responsible for the vast majority of the United States' GHG emissions, and CO_2 is the primary GHG from fuel combustion. In 2011, total U.S. GHG emissions were 6,702 million metric tons of carbon equivalent (MMT CO_2e). GHG emissions peaked at 7,263 MMT in 2007. In 2011, approximately 26% of GHG emissions were associated with transportation, approximately 32% were associated with electricity generation and 12% were associated with industrial activity.

6.1.2.2 Statewide Greenhouse Gas Emissions

With a population of over 35 million, California is the most populous state in the United States. In 2010, California produced 452 MMT CO_2e of GHG emissions (CARB 2013a). Figure 6-1 shows the California GHG emissions trends and Figure 6-2 shows the breakdown of California GHG emissions from 2000 to 2010. The transportation sector is the single largest contributor of California's GHG emissions, producing 38% of the States' total GHG emissions, with electricity generation the second largest contributor at 21%.

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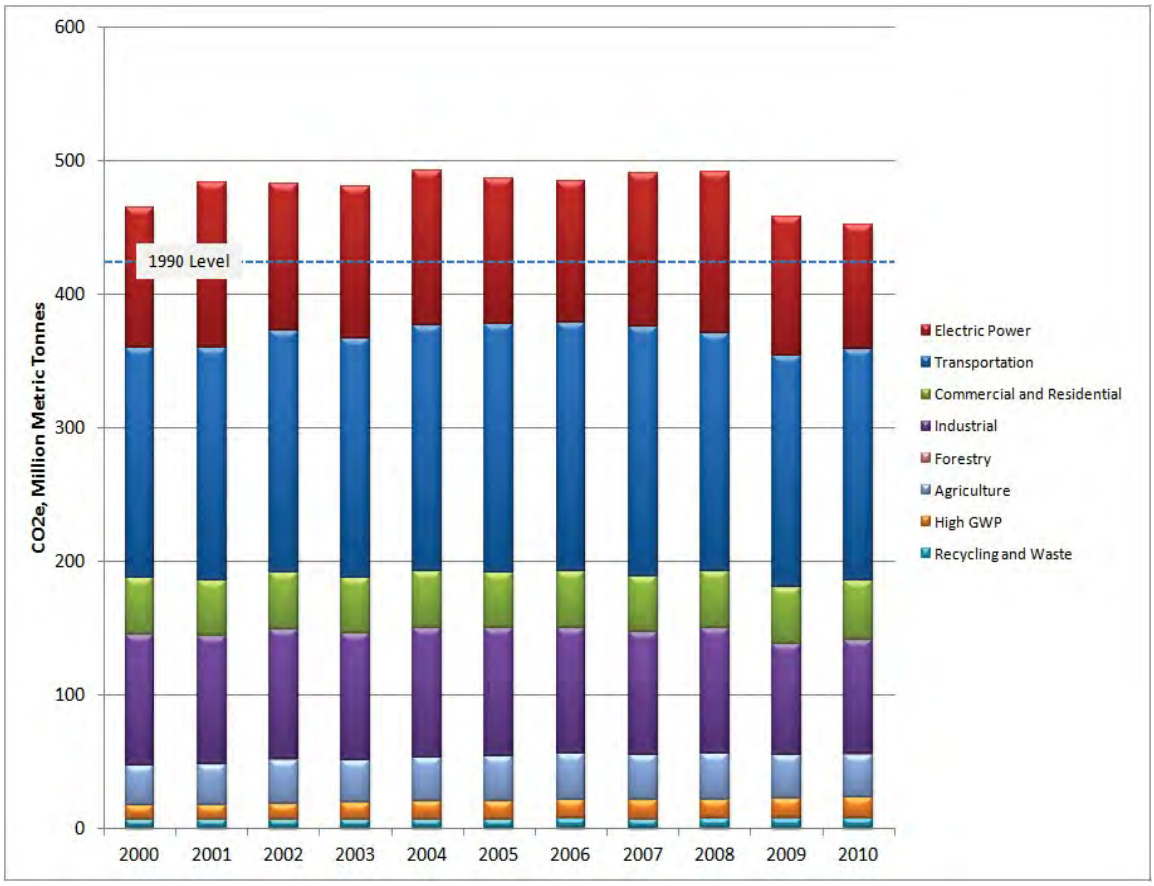
Figure 6-1: California Statewide GHG Emission Trends



Figures 1(a)-(c). California's GHG emissions, population, GDP, GHG per capita, and carbon intensity of the economy. Figure 1(a) shows percent change in GHGs relative to GDP and population since 2000. Figures 1(b) and 1(c) present these indicators in the original units. In the charts with 2 vertical axes, the color of a trend line matches the color of its corresponding vertical label.

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Figure 6-2: California Greenhouse Gas Emissions



Note: Fossil fuel use includes electricity generation

Source: CARB website

6.1.3 Impacts of GHG Emissions

In the Findings and Declarations for AB 32, the Legislature found that: "The potential adverse impacts of global warming include the exacerbation of air quality problems, a reduction in quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to the marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other health-related problems."

Warming of the climate system is evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level. The linear warming trend over the 50 years from 1956 to 2005 (0.13°C per decade) is nearly twice that for the 100 years from 1906 to 2005. Global average sea level rose at an average rate of 1.8 millimeters (mm) per year over 1961 to 2003 and at an average rate of about 3.1 mm per year from 1993 to 2003 (IPCC 2007).

The IPCC Studies (2007) indicate that "In order to stabilize the concentration of GHGs in the atmosphere, emissions would need to peak and decline thereafter. The lower the stabilization level, the more quickly this peak and decline would need to occur." The studies also found that stabilization of atmospheric CO_2 concentrations at less than 450

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ppm would limit temperature rise to less than 3.6 degrees Fahrenheit (°F) by the year 2100 and would require global anthropogenic CO_2 emissions to drop below the year 1990 levels within a few decades (by 2020). If GHG emissions, and atmospheric CO_2 levels, were kept to this "Category I" level (producing increases in global average temperature of less than 1.8-5.4°F above 1980-1999 levels) impacts to gross domestic product (GDP) are projected to "produce market benefits in some places and sectors while, at the same time, imposing costs in other places and sectors" (IPCC 2007). Higher levels of CO_2, ranging above 700 ppm with corresponding temperature increases of 7°F, could cause a reduction in global GDP of more than 5%, with regional losses substantially higher. Therefore, stabilizing GHG emissions levels at 1990 levels over the next two decades would reduce the impacts of climate change to levels that would produce nominal changes in global average GDP and would be less than significant.

Observed and anticipated effects associated with climate change in California, as reported by the California Climate Change Center (California Climate Change Center, 2012), include the following:

- Average statewide temperatures increased by about 1.7°F from 1895 to 2011, with the greatest warming in the Sierra Nevada. By 2050, average statewide temperatures are expected to increase by 2.7°F above 2000 averages – a three-fold increase in the warming rate over the past century. By 2100, statewide average temperatures could increase by 4.1 to 8.6°F, depending on emission levels.
- Earlier snowmelt, higher temperatures, and longer dry periods over a protracted fire season will directly increase wildfire risk. There is an expected long-term increase in fire occurrence associated with a higher GHG emissions scenario, ranging from 58 to 128% above historical levels by 2085. Under the same higher GHG emissions scenario, the estimated burned areas will increase between 57 and 169%, depending on location.
- Increased wildfire occurrence and burned areas, with associated increases in particulate pollution, could offset improvements in particulate and ozone concentrations.
- California's water management challenges could be exacerbated by increasing demand from a growing population as temperatures rise, earlier snowmelt and runoff, and faster-than-historical sea-level rise threatening aging coastal water infrastructure and levees in the Sacramento-San Joaquin Delta. One study shows that by the latter half of the 21st century, "critically dry" water years could occur eight percent more frequently in the Sacramento Valley and 32% more often in the San Joaquin Valley, as compared to the period from 1951 to 2000. During such critically dry years, it is nearly impossible to satisfy the state's water needs, including those for agricultural and environmental purposes.
- Increased statewide average temperatures and more frequent extreme heat events, combined with new residential development, will drive up electricity demand for cooling during the summertime. About 15% of electrical demand is satisfied by hydropower, which is a premium asset during peak-demand summer months. Hydropower generation is already declining and is expected to decrease more

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substantially because of reduced snowpack, earlier runoff, and higher evaporation rates due to climate change.

- Electrical transmission lines lose 7 to 8% of transmitting capacity as temperatures rise. Therefore, more electricity will need to be generated to offset the increased electrical transmission line losses. Furthermore, key electrical transmission corridors are vulnerable to increased frequency and severity of wildfires associated with climate change. One study shows a 40% increase in the probability of wildfire exposure for some major transmission lines, including lines bringing hydropower from the Pacific Northwest into California during peak demand periods.
- The sea level along California's coastline rose about seven inches during the last century, and this rate is expected to accelerate considerably in the future. Assuming that California sea level changes continue to track global trends, sea levels along the state's coastlines could increase by 10 to 18 inches in 2050 and by 31 to 55 inches by the end of the 21st century (as compared to 2000 levels). This will greatly increase the potential for loss of life and property during periodic storm and flood events. Moreover, critical infrastructure (schools, roads, hospitals, emergency facilities, wastewater treatment plants, airports, ports, and energy facilities) located along the coastline will also be at increased risk of damage.
- Findings from one study show that climate is changing conditions so rapidly that some vegetation cannot keep pace. Some climates that currently exist (e.g., alpine climates) could disappear entirely, while other regional climates (e.g., desert climates) could expand considerably. This would result in some species losing their habitats, while other species significantly expanding theirs.
- Climate change is expected to exacerbate stresses on California's agricultural sector. Direct effects (changes in temperatures and water availability) will affect crop yield and availability, making the sector highly sensitive to climate change. Indirect effects will also take a toll: possible further declines in pollinators, increases in pests and disease.

Global warming and climate change have received substantial public attention for more than 20 years. For example, the United States Global Change Research Program was established by the Global Change Research Act of 1990 to enhance the understanding of natural and human-induced changes in the Earth's global environmental system, to monitor, understand, and predict global change, and to provide a sound scientific basis for national and international decision making. Even so, analytical tools have not been developed to determine the effect on worldwide global warming from a particular increase in GHG emissions, or the resulting effects on climate change in a particular locale. The scientific tools needed to evaluate the impacts that a specific project may have on the environment have also not been developed.

6.2 Regulatory Setting

In 1988, the United Nations and the World Meteorological Organization established the Intergovernmental Panel on Climate Change 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

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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 state of California has made the reduction of GHG emissions a priority and reducing GHG emissions in California has been the focus of the state government for approximately two decades. GHG emission targets established by the state legislature include reducing statewide GHG emissions to 1990 levels by 2020 (AB 32) and reducing them to 40 percent below 1990 levels by 2030 (SB 32 of 2016). EO S-3-05 calls for statewide GHG emissions to be reduced to 80 percent below 1990 levels by 2050. EO B-55-18 calls for California to achieve carbon neutrality by 2045 and achieve and maintain net negative GHG emissions thereafter. These targets are in line with the scientifically established levels needed in the United States to limit the rise in global temperature to no more than 2 degrees Celsius (°C), the warming threshold at which major climate disruptions, such as "super droughts" and rising sea levels, are projected; these targets also pursue efforts to limit the temperature increase even further to 1.5°C)

6.2.1 Federal GHG Regulations

On April 2, 2007, in *Massachusetts v. EPA*, 549 U.S. 497, the Supreme Court found that GHGs are air pollutants covered by the Clean Air Act. The Court held that the EPA must determine whether or not emissions of GHGs from new motor vehicles cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare, or whether the science is too uncertain to make a reasoned decision. In making these decisions, the EPA is required to follow the language of section 202(a) of the Clean Air Act (CAA). The Supreme Court decision resulted from a petition for rulemaking under section 202(a) filed by more than a dozen environmental, renewable energy, and other organizations.

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 held a 60-day public comment period, which ended June 23, 2009, and received over 380,000 public comments. These included both written comments as well as testimony at two public hearings in Arlington, Virginia, and Seattle, Washington. The EPA carefully reviewed, considered, and incorporated public comments and issued the final Findings.

The EPA found that six GHGs taken 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 greenhouse gas pollution that endangers public health and welfare under CAA section 202(a). These Findings were based on careful consideration of the full weight of scientific evidence and a thorough review of numerous public comments received on the Proposed Findings published April 24, 2009. These Findings became effective on January 14, 2010.

In October 2012, EPA and the National Highway Traffic Safety Administration, on behalf of the U.S. Department of Transportation, issued final rules to further reduce GHG emissions and improve corporate average fuel economy standards for light-duty vehicles for model years 2017 and beyond (77 Federal Register [FR] 62624). These rules would increase the fuel economy to 54.5 miles per gallon, limiting vehicle emissions for 163 grams of CO_2 per mile for the fleet of cars and light-duty trucks by model year 2025 (77

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FR 62630). However, on April 2, 2018, the EPA administrator announced a final determination that the current standards are not appropriate and should be revised. It is not yet known what revisions will be adopted or when they will be implemented.

Specific GHG Regulations that the EPA has adopted to date are as follows:

6.2.1.1 40 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 metric tons of CO_2e emissions per year. The CO_2 emissions from landfill and composting are considered biogenic and are not counted toward facility GHG emissions according to accepted protocol; however, the combustion of methane in the landfill flare system will generate CO_2 that must be quantified toward the GHG emission trigger.

6.2.1.2 40 CFR Part 52. Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule.

In 2010, EPA issued the Prevention of Significant Deterioration (PSD) and Title V Greenhouse Gas Tailor Rule (EPA 2011). This rule set mass emission-based permitting criteria specifically for carbon dioxide–equivalent (CO_2e) emissions that define when permits under the New Source Review PSD and Title V Operating Permit programs are required for new and existing industrial facilities. This is known as Steps 1 and 2 of the Tailoring Rule for PSD and Title V permitting based on CO_2e emissions.

A new part of the GHG Tailoring Rule, known as Step 3, was issued by EPA in 2012, which revised the regulations to require a source that emits or has the potential to emit levels of CO_2e that exceed established mass emission criteria (i.e., 100,000 tons per year [90,718 metric tons (MT) per year]) of CO_2e, but that has minor source emissions of all other regulated pollutants, to apply for an operating permit. However, in 2014, the U.S. Supreme Court issued its decision in *Utility Air Regulatory Group v. EPA*, 134 S. Ct. 2427 (2014) stating that EPA may not treat GHGs as an air pollutant for purposes of determining whether a source is a major source required to obtain a PSD or Title V permit. The Court also held that PSD permits that are otherwise required (based on emissions of other, non-GHG pollutants) may continue to require limitations on GHG emissions. EPA is undertaking various actions to explain the next steps in GHG permitting and as of the date of this report has not taken further action.

6.2.2 California GHG Regulations

6.2.2.1 Executive Order S-3-05

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 percent below 1990 levels.

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This EO does not include any specific requirements that pertain to the proposed Projects. However, actions taken by the State to implement these goals may affect the Projects, depending on the specific implementation measures that are developed.

6.2.2.2 Assembly Bill 32

AB 32, also known as the California Global Warming Solutions Act of 2006, was established in 2006 to mandate the quantification and reduction of GHGs to 1990 levels by 2020. The law establishes periodic targets for reductions and requires certain facilities to report emissions of GHGs annually. The bill also reserves the ability to reduce emissions targets for certain sectors that contribute the most to emissions of GHGs, including the transportation sector.

California's 2017 Climate Change Scoping Plan, prepared by CARB, outlines the main strategies California will implement to achieve the legislated GHG emission targets. It identifies the reductions needed by key sectors (e.g., transportation, industry, electricity generation, agriculture, waste management and water). Waste Management is listed in Chapter 4 of the plan as one of six Key Sectors contributing to the state's total GHG mainly from methane generation.

6.2.2.3 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. 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 MT CO_2e per year. 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.

6.2.2.4 GHG Reporting

Reporting of GHG emissions by major sources is required by AB 32. The GHG Mandatory Reporting Regulation (MRR) is applicable to electricity generators, industrial facilities, fuel suppliers, and electricity importers. A summary of reported GHG emissions data reported under the MRR are made public each year, and the data used by the Cap-and-Trade Program and included in California Greenhouse Gas Inventory.

All GHG emissions data reports must comply with the regulatory requirements and be submitted via the California electronic greenhouse gas reporting tool (e-GGRT)

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system. Reporting guidance documents and training materials are provided to clarify rule applicability and assist reporters in complying with the Regulation.

The CARB implements and oversees a third-party verification program to support mandatory GHG reporting. All GHG reports subject to the Cap-and-Trade Program must be independently verified by CARB-accredited verification bodies and verifiers.

6.2.2.5 Senate Bill 32 of 2016

In September 2016, Governor Brown signed SB 32, which mandated a greenhouse gas emissions reduction target of 40% below 1990 emission levels by 2030. This effectively extended the efforts already in effect associated with AB 32 implementation.

6.2.2.6 Senate Bill 605, Senate Bill 1383, and Assembly Bill 1826

SB 605 (Chapter 523, Statutes of 2014) requires CARB to develop a plan to reduce emissions of short-lived climate pollutants, such as methane. AB 1826 (Chapter 727, Statutes of 2014) requires businesses to recycle their organic waste beginning in 2016. And SB 1383 (Chapter 249, Statutes of 2016) requires CARB to approve and implement a plan by January 2018 to achieve these reductions. SB 1383 also sets a target for reduction of methane emissions of 40% below 2013 levels by 2030. Pursuant to SB 605 and SB 1383, CARB subsequently developed the Short-lived Climate Pollutant Reduction Strategy, adopted in March 2017. As part of this strategy, the California Department of Resources Recycling and Recovery (CalRecycle), in consultation with CARB, is developing regulations to reduce the level of statewide disposal of organic waste by 50% of 2014 levels by 2020 and 75% of 2014 levels by 2025. CalRecycle is currently considering adoption of these regulations by the end of 2019 to take effect on or after January 1, 2022. The mandated diversions of recyclables and organic material from landfills will require improvements to existing infrastructure to handle these materials. The diversion mandates will result in an increase in compost production as well as anaerobic digestion of organic material throughout California. The proposed Projects will provide composting capacity needed to achieve the mandatory diversion goals.

6.2.2.7 Executive Order B-55-18

On September 10, 2018, Governor Brown signed this EO establishing a statewide goal to "achieve carbon neutrality as soon as possible, and no later than 2045, and maintain and achieve negative emissions thereafter." EOs are not legally binding and depend on the legislative approval for implementation. This effectively extends the efforts already in effect associated with AB 32 implementation, as documented in the 2017 Climate Change Scoping Plan, which has a timeline for GHG reductions spanning to 2050.

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6.2.2.8 Assembly Bill 1493

On July 22, 2002, Governor Gray Davis signed AB 1493, also known as the Pavley Regulations or the Clean Car Standards. AB 1493 required the State to develop and adopt regulations that achieve the maximum feasible and cost-effective reduction of GHG emissions emitted by passenger vehicles and light-duty trucks. Subsequent regulations were adopted by CARB in September 2004.

The regulations were threatened by automaker lawsuits and were stalled by the EPA's initial denial to allow California to implement GHG standards for passenger vehicles. The EPA later granted California the authority to implement GHG emission reduction standards for new passenger cars, pickup trucks, and sport utility vehicles on June 30, 2009. On September 24, 2009, CARB adopted amendments to the Pavley regulations that reduce GHG emissions in new passenger vehicles from 2009 through 2016.

6.2.3 Local Plans

6.2.3.1 Senate Bill 375

In addition to regulations that address tailpipe emissions and transportation fuels, the State legislature has passed regulations to address the amount of driving by onroad vehicles. Since the passage of SB 375 in 2008, CARB requires metropolitan planning organizations (MPOs) to adopt plans showing reduction in GHG emissions from passenger cars and light-duty trucks in their respective regions for 2020 and 2035. These plans link land use and housing allocation to transportation planning and related mobile-source emissions. The Kern Council of Governments (KCOG), which serves as the MPO for Kern County, adopted its latest Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) in 2018 (KCOG 2018).

6.2.3.2 SJVACPCD Climate Change Action Plan (CCAP)

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") (SJVAPCD 2009a); and
- District Policy: Addressing GHG Emission Impacts for Stationary Source Projects Under CEQA When Serving as the Lead Agency (SJVAPCD 2009b).

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

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GHG emissions" (SJVAPCD 2009b). 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 CARB's GHG Cap-and-Trade Regulation" (Policy APR-2025; "CEQA Cap-and-Trade Policy") (SJVAPCD 2014). 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 CARB'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 affected sectors 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 the 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 2009b).

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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 2009a).

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; and 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.

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6.2.3.3 Kern County General Plan

The Kern County General Plan (KCGP) of 2009 provides a cohesive land use planning for areas that are within the County's jurisdiction.

The KCGP cites policies to provide decisionmakers with long-range guidance that may affect the future character of the area. The elements within the KCGP provide goals, policies, and implementation measures to reduce impacts of projects on air quality, including GHG emissions.

6.3 Proposed Project GHG Emissions

GHG emissions are global because emissions from one location could affect the entire planet, and they are not limited to local impacts. Therefore, total Project GHG emissions are included in the analysis (i.e., onsite plus offsite).

6.3.1 Construction Emissions

The proposed Projects consists of an expanded list of inorganic and organic wastes allowed for disposal and expanded hours of operation for the landfill and a new compost area. There is no construction associated with the proposed changes to the landfill. The construction of the new compost area is also discussed below. The construction of the Bioenergy Project is also discussed below.

6.3.1.1 Landfill Construction

The changes proposed to the landfill of extending the hours of operation and allowing additional types of waste to be disposed do not require construction activities.

6.3.1.2 Compost Area Construction

Construction of the composting facility requires grading of the SWMF property that is generally already flat. Construction requires the use of onroad and offroad vehicles and equipment that is similar to the equipment used for compost facility operations. The intensity of vehicle and equipment activity during compost area construction during each phase is expected to be lower than the intensity during normal operations of the compost facility. Thus, compost construction emissions are expected to be lower than compost operating emissions. Further, the construction of the compost facility would occur concurrent with landfill operations and would not be a separate, discrete activity. For these reasons, compost construction GHG emissions have not been estimated or analyzed.

6.3.1.3 Bioenergy Project Construction

Construction emissions for the bioenergy facility were calculated and are discussed in Appendix F and shown in Table 6-5.

6.3.2 Operating Emissions

The proposed Projects would allow for additional organic waste streams to be disposed in the landfill and extend the hours of operation. While the landfill operations are currently permitted to dispose of up to 2,000 TPD (730,000 TPY) of inert wastes and Class A and Class B biosolids, disposal quantities have been less than that in recent years. As required

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by the KCPD, this analysis evaluates the impacts of the emissions increases between the baseline period of 2009 through 2019 and emissions due to the proposed Project at a disposal rate of 2,000 TPD. The proposed compost facility would process up to 640,000 TPY of organic feedstock. The Lost Hills Facility does not currently conduct composting activities.

This section provides a description of the methodologies used for the calculation of GHG emissions from the various source types involved in the operation of the landfill and compost area. Following the discussion of the methodologies, summaries of the emissions calculated for the baseline period and for the proposed Project maximum operations scenario for the landfill and compost area are provided. The increase in GHG emissions between the baseline and the proposed Project is then summarized.

The quantification methodologies and GHG emission estimates presented in the following sections are summaries; more complete discussions of the emissions methodologies and assumptions, along with emission calculation worksheets, are provided in Appendix A for the landfill (including the baseline calculations), and in Appendix B for the compost activities.

6.3.2.1 Emissions Calculation Methodologies

Baseline GHG emissions are expected to result from operation of the landfill (due to decomposition of organic waste). Lost Hills Environmental is not requesting changes to the number of truck trips for waste delivery or to the waste tonnage disposed; therefore, mobile sources such as onroad delivery trucks and offroad equipment such as tractors and dozers are not included in the baseline GHG inventory for this analysis because they are approved, permitted activities.

Proposed Project GHG emissions are expected to result from operation of onroad and offroad mobile sources associated with compost delivery and management, the landfill (due to decomposition of organic waste), and the compost facility (due to decomposition of organic feedstock). Operational activities would occur throughout the life of the Project. Project-specific effects are determined by evaluating changes in LFG emissions and any additional activities required to operate the compost facility.

6.3.2.1.1 Onroad Vehicle Exhaust GHG Emissions

Onroad mobile source emissions result from employee travel, routine business travel, and the transport of compost feedstock material to the facility. The changes proposed to the facility are not expected to result in an increase in employee or business-related travel.

The facility is permitted to handle up to 91 trucks per day to deliver 2,000 TPD of waste to the landfill. Lost Hills Environmental is not requesting a change to the truck traffic; therefore, onroad mobile source emissions are not expected to change and emissions are not estimated.

Onroad mobile source emissions result from delivery of organic feedstock for composting and transport of finished compost products from the site. Onroad vehicle emissions include exhaust emissions of GHG from the

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combustion of fuel. GHG emissions were estimated using the CARB-developed model EMFAC2017, which is recommended by State and local agencies to calculate emissions from onroad mobile sources. EMFAC2017 incorporates the fleet characteristics representative of the population of vehicles operated within the San Joaquin Valley. Onroad emissions are reported for 2030, which is when Phase 3 of the compost area will be operational and because that is the year in which the peak GHG emissions are predicted to occur.

6.3.2.1.2 Offroad Vehicle Exhaust GHG Emissions

Because Lost Hills Environmental is not requesting changes to the daily or annual waste volumes, the emissions associated with waste management will not change and are not estimated.

The operation emissions from the compost facility will include the emissions from offroad mobile source equipment (scrapers, loaders, and tractors) used for blending feedstock, building compost and curing piles, and loading finished compost in haul trucks for delivery to customers. Offroad vehicle emissions include exhaust emissions of GHG from the combustion of fuel.

Portable equipment used to support onsite composting activities and the emissions from the equipment are calculated using procedures similar to those for offroad mobile sources. The exhaust emissions from three water trucks used for applying water on the facility haul roads are calculated using methods similar to the offroad mobile equipment and portable equipment.

GHG emissions from offroad equipment used to support composting activities are estimated based on estimated fuel use and GHG emission factors from the IPCC Second Annual Report (SAR), which are provided in units of pounds (or kilograms) per gallon of fuel.

6.3.2.1.3 Landfill Gas Emissions

Operation of the landfill results in the generation of LFG due to the anaerobic decomposition of biodegradable waste. LFG emissions from waste disposal consist primarily of CO_2 and CH_4. Note that CO_2 emissions from the decomposition of organic waste in the landfill are not reported because the emissions are biogenic and do not contribute to global warming.

LFG GHG emissions are calculated using LandGEM, a “First Order Decay Rate Model” which embodies assumptions similar to those recommended by the International Panel on Climate Change (the IPCC6 GHG Model).

6.3.2.1.4 Emissions from Composting Activities

Composting will emit GHGs, including CO_2, CH_4, and N_2O. CO_2 emissions from the decomposition of organic feedstock during composting are considered part of the natural carbon cycle and, therefore, do not contribute to global warming. Therefore, CO_2 emissions are not estimated.

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The GHG emissions from composting are estimated using SJVAPCD, CARB, or IPCC factors, as follows:

- The combined factors for CH_4 are from the "Method for Estimating Greenhouse Gas Emission Reductions from Diversion of Organic Waste from Landfills to Compost Facilities," Final Draft, (CARB 2017).
- Feedstock CH_4 emission factors are from the "Inland Empire" source tests, conducted by the SCAQMD and CARB.
- Methane emissions are split between composting and curing using the SJVAPCD recommended ratio (90% compost, 10% curing).
- The N_2O factor for green waste is from a CARB report.
- The N_2O Factor for co-composting is from IPCC.
- According to the literature, most (>90%) of the N_2O emissions occur late in the composting cycle or during compost curing. Consequently, the N_2O emissions are split 10% for composting and 90% for curing.
- Emission factors for N_2O from feedstock storage were unavailable. Given that N_2O emissions typically occur late in the composting cycle after available carbon is depleted, it is assumed that the N_2O emissions from short-term feedstock storage are equal to zero.
- Methods for estimating GHG emissions from product storage were unavailable. Therefore, the GHG emissions from product storage were assumed to be equal to the compost curing factors divided by the SJVAPCD-recommended curing days (38 days).
- After curing is complete, further degradation of the stabilized compost will be minimal but may occur. Emission factors are based on the results of source tests conducted on compost product storage piles. For this analysis, it is assumed that the compost may be stored onsite for up to 30 days.
- The composting operation utilizes an eASP system, along with a 12-inch-thick biofiltration layer of cured compost, to control emissions. Emission control efficiency ranges from approximately 9% for CH_4 control to over 70% for N_2O control.

6.3.2.1.5 GHG Emissions from Electricity Usage

The proposed Project is not expected to use electricity in quantities that differ from the baseline conditions. The eASP system will use solar panels to run the blowers for aeration. For this reason, GHG emissions from electricity usage have been omitted from this analysis.

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6.3.2.2 Landfill Baseline GHG Operational Emissions

Baseline emission estimates follow the methodologies outlined in Section 6.3.2.1.3. Additional information used to apply the methodologies to baseline conditions are discussed below.

The landfill is existing, and the waste previously disposed in the landfill will continue to generate LFG with or without the proposed Project. The LFG is comprised primarily of methane and CO_2. The CO_2 is biogenic and not counted towards the GHG emissions from the proposed Project. The methane that is emitted as fugitive emissions is counted towards the GHG emissions from the proposed Project.

- The biosolids disposal rates from facility records were used for the period of 2009 through 2018. The 2018 disposal rate was used for 2019.
- The landfill currently includes an active GCS (75% collection efficiency). Once gas volumes each 50 megagrams, recovered vapors will be routed to a flare having a destruction efficiency of at least 98%. However, the flare was not required to be used during the baseline (gas volumes were below the required level), so it was assumed LFG is emitted as fugitive emissions.

Baseline GHG emissions are summarized in Table 6-1.

Table 6-1: Summary of Baseline Operational GHG Emissions

Category	CO_2 (MT/Yr)	CH_4 (MT/Yr)	N_2O (MT/Yr)	Total CO_2e (MT/Yr)
LFG	0.0	2,783	0.0	58,452
Total – Baseline	0.0	2,783	0.0	58,452

6.3.2.3 Landfill Project GHG Operational Emissions

Landfill operational emission estimates follow the methodologies outlined in Section 6.3.2.1.3. Additional information used to apply the methodologies to the landfill portion of the proposed Project are discussed below.

The following assumptions were used as inputs to the LandGEM model for the proposed Project:

- The biosolids disposal rates from facility records were used for the period of 2009 through 2018. The 2018 disposal rate was used for 2019.
- Although the landfill is currently allowed to dispose of 2,000 TPD of biosolids, it is assumed that the waste volumes will be roughly 50/50 of inert and organic wastes in the future.
- Proposed Project LFG emissions were determined by calculating the emissions resulting from the disposal of 365,000 TPY (half of 2,000 TPD) of organic waste beginning in 2020 and ending in 2030.

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- The landfill will include an active GCS (75% collection efficiency) and recovered gases/vapors will be routed to a flare having a destruction efficiency of at least 98%.
- The methane that is captured and converted to CO_2 via the GCS and flare is biogenic and not counted towards the GHG emissions from the proposed Project. The methane that is emitted as fugitive emissions (i.e., not captured by the GCS) is counted towards the GHG emissions from the proposed Project.

Emissions for the landfill portion of the proposed Project are summarized in Table 6-2. Detailed calculations are provided in Appendix A.

Table 6-2: Summary of Project Landfill Operational GHG Emissions

Category	CO_2 (MT/Yr)	CH_4 (MT/Yr)	N_2O (MT/Yr)	Total CO_2e (MT/Yr)
LFG Fugitives	--[a]	2,418	0.0	50,784
LFG Stack	--[a]	145	0.0	3,047
Flare Combustion	20,516	1	0.2	20,619
Total – Landfill	**20,516**	**2,565**	**0.3**	**74,451**

Notes:

a. CO_2 emissions from the landfill are excluded because they are biogenic.

6.3.2.4 Compost GHG Operational Emissions

Compost facility operational GHG emission estimates follow the methodologies outlined in Section 6.3.2.1. Additional information used to apply the methodologies to the compost portion of the proposed Project are discussed in the following sections. Proposed Project compost GHG emissions are summarized in Table 6-3.

6.3.2.4.1 Compost GHG Onroad Exhaust Emissions

The annual onroad vehicle emissions were calculated assuming 111 truckloads of material per day (organic feedstock delivery and finished compost shipment) and a trip distance of 100 miles on paved roads and 0.25 miles on unpaved site roads (one-way trip). GHG emissions are reported for operating year 2030 (when Phase 3 of the compost area becomes operational), as that is the year predicted to have the peak onroad emissions.

6.3.2.4.2 Compost GHG Offroad Exhaust Emissions

Fuel use for the proposed compost facility was estimated based on the projected equipment requirements, including engine horsepower, maximum operating hours, brake-specific fuel consumption of the engine, and anticipated engine load. GHG emissions are reported for operating year 2030, as that is the year predicted to have the peak offroad exhaust emissions.

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6.3.2.4.3 Composting GHG Emissions

Composting emissions are based on composting up to 640,000 wet TPY (=1,753 wet TPD average) of organic material. Composting CO_2 emissions are not reported, as they are part of the natural carbon cycle and do not contribute to global warming.

6.3.2.4.4 Cap-and-Trade Allowances

As discussed in Section 6.2.2.4, AB 32 requires that fuel suppliers provide allocations for vehicle fuels. As such, the GHG emissions associated with the operation of onroad and offroad vehicles are offset by Cap-and-Trade allowances. Those allowances are identified in Table 6-3.

6.3.2.4.5 Emission Reductions Associated with Compost Usage

By diverting organic wastes to composting facilities, methane emissions from landfills are avoided. Additionally, compost application to agricultural fields increases soil health while providing multiple co-benefits, such as reducing the amount of synthetic fertilizer needed, decreasing soil erosion, and reducing the use of herbicides. Additional benefits (not quantified) include the energy saved through reduced water use, increased crop yield, and increased microbial activity, which result in healthier soils. Equation 6-1 was used to calculate the compost emission reduction factor (CERF):

$$CERF = (ALF_b + ((E_b + F_b + H_b) * C_{use})) – E_{total} \quad \text{(Eq. 6-1)}$$

Where:

CERF	=	Compost emission reduction factor (MT CO_2e/ton of feedstock)
ALF_b	=	Emission reductions associated with the avoidance of methane emissions at landfills (MT CO_2e/ton of feedstock)
E_b	=	Emission reduction associated with decreased soil erosion (MT CO_2e/ton of compost)
F_b	=	Factor to account for the reduced fertilizer use (MT CO_2e/ton of compost)
H_b	=	Factor to account for the reduced herbicide use (MT CO_2e/ton of compost)
C_{use}	=	Conversion factor used to convert from tons of compost to tons of feedstock
E_{total}	=	Emissions due to the composting process (MT CO_2e/ton of feedstock)

Following the methodology, the net reductions from the application of compost are 0.56 MT CO_2e per wet ton of organic material composted. For

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this Project, the GHG emission reductions total 358,400 MT per year (=640,000 ton/yr x 0.56 MT/ton).

6.3.2.4.6 GHG Emission Summary for the Compost Portion of the Proposed Project

Emissions for the landfill portion of the proposed Project are summarized in Table 6-3. Detailed calculations of these emissions are provided in Appendix B.

Table 6-3: Summary of Project Compost Operational GHG Emissions

Category	CO_2 (MT/Yr)	CH_4 (MT/Yr)	N_2O (MT/Yr)	Total CO_2e (MT/Yr)
Onroad Exhaust	9,194	0.78	1.85	9,784
Offroad Exhaust	4,739	265	121	47,701
Cap-and-Trade Allowances for Transportation Fuels	(13,933)	(265)	(123)	(57,486)
Composting	--[a]	1,133	235	96,488
Compost Application	–	–	–	(358,400)
Total – Composting	**0**	1,133	235	**(261,912)**

Notes:

a. CO_2 emissions from the compost area are excluded because they are biogenic.

6.3.2.5 Summary of Proposed Project GHG Operations Emissions

The proposed Project and baseline GHG emissions are summarized in Table 6-4. The baseline emissions are subtracted from the emissions related to the landfill and compost facility to provide the net emissions change due to the proposed Project. The credit for compost application is then also subtracted from the total CO_2e, to provide a net decrease in GHG emission of more than 245,000 MT per year.

Table 6-4: Proposed Lost Hills SWMF Projects GHG Emissions and Net Emission Change

Category	CO_2 (MT/Yr)	CH_4 (MT/Yr)	N_2O (MT/Yr)	Total CO_2e (MT/Yr)
Landfill Operation	--[a]	2,565	0.3	74,451
Compost Area Construction (amortized) [b]	35.7	--	--	35.7
Compost Area Operation	--[a]	1,133	235	(261,912) [c]
Baseline	(0.0)	(2,783)	(0.1)	(58,452)
Net Emission Increase or (Decrease)	***0.0***	***915***	***235***	***(245,877)***

Notes:

a. CO_2 emissions from the landfill and compost area are excluded because they are biogenic.

b. Total compost area construction for all three phases were estimated, and then amortized over a 30-year period.

c. The total CO_2e for the compost area reflects the credit for use of compost in agricultural operations

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6.3.2.6 Bioenergy Project GHG Operational Emissions

The GHG emissions for the Aries–Holloway Bioenergy Project were estimated as described in Appendix F. A summary of these GHG emissions for construction and operation of the Aries–Holloway Bioenergy Project is provided in Table 6-5. The construction GHG emissions were amortized over a 30-year project life and added to the operation emissions. The thermal oxidizer GHG emissions are from the burning of a syngas produced from biomass or other organic material, and hence are considered biogenic. Biogenic emissions are not included in the total CO_2e.

Table 6-5: Aries–Holloway Bioenergy Project GHG Emissions and Net Emission Increase

Category	CO_2 (MT/Yr)	CH_4 (MT/Yr)	N_2O (MT/Yr)	Total CO_2e (MT/Yr)
Construction	963	0.13	0.0	966
Operation *	1,456	0.22	0.00	1,461
Total GHG – Amortized Construction plus Operation				1,493

* Excludes biogenic CO_2 emissions from the thermal oxidizer

Due to the decrease in GHG emissions from the proposed Lost Hills SWMF Projects, even when combined with the Aries–Holloway Bioenergy Project GHG emissions, overall GHG emissions are still an overall decrease, and hence have no adverse impact.

6.4 Project Impacts

Climate change impacts are inherently global and cumulative, and not project specific. The SJVAPCD's GAMAQI observes:

> *"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".*

6.4.1 GHG Emissions Significance Criteria

The Kern County CEQA Implementation Document and Kern County Environmental Checklist (KCPD 2012), following the "Environmental Checklist Form," Appendix G to the Statewide CEQA Guidelines as amended by the California National Resources Agency and effective on January 1, 2019, 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.

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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 would have less-than-significant GHG emission impacts.

As indicated above, 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.

The 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 2015 GAMAQI, which states that a project whose emissions have been reduced or mitigated consistent with AB 32 should be considered to have a less than significant impact on global climate change (SJVAPCD 2015a).

This approach would include both the CARB's GHG Cap-and-Trade Program and other adopted GHG-reducing regulations (such as AB 341 and SB 605) as adopted GHG emissions reduction plans. Under the SJVAPCD's tiered approach in assessing the 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 2015a).

Finally, the Newhall court[8] has identified the following "pathways to compliance" that Lead Agencies may use to determine the significance of a project's GHG emissions:

1. Business as Usual (BAU) Model: While the Court cautioned that the Scoping Plan may not be appropriate at the project level, the BAU model might be used to determine what level of reduction from business as usual a new land use development at the proposed location must contribute in order to comply with statewide goals pursuant to AB 32.
2. Compliance with Regulatory Programs Designed to Reduce GHG Emissions: The Court suggests that a Lead Agency could rely on a showing of compliance with

[8] In its recent decision, Center for Biological Diversity v. Department of Fish and Wildlife (2015) 62 Cal.4th 204 (Newhall), the California Supreme Court evaluated the California Department of Fish and Wildlife's (CDFW) analysis of potential impacts caused by GHG emissions contained in the EIR for the proposed land development called Newhall Ranch (California Supreme Court 2015). In the Newhall EIR, the CDFW analyzed the required GHG emission reduction under AB 32 using the business-as-usual (BAU) comparison as its sole criterion of significance.

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regulatory programs designed to reduce GHG emissions in order to demonstrate consistency with AB 32's goals. The Court clarifies that a significance analysis based on compliance with such statewide regulations only goes to impacts within the area governed by the regulations.

3. Local Climate Action Plan or Other "Geographically Specific Greenhouse Gas Emission Reduction Plans": The Court points out that these plans may provide a basis for the tiering or streamlining of project-level CEQA analysis, so long as the plan is "sufficiently detailed and adequately supported."
4. Regional Sustainable Community Strategy (SCS): The Court also articulates that a Lead Agency need not additionally analyze GHG emissions from automobiles and light trucks in CEQA documents for certain residential, mixed use, and transit priority projects that are consistent with an applicable SCS adopted pursuant to SB 375.
5. Numerical GHG Significance Thresholds: Although noting that use of numerical thresholds are not required, the Court favorably cited the Bay Area Air Quality Management District (BAAQMD) GHG significance thresholds based on compliance with AB 32, which use a "service population" GHG ratio threshold for land use projects and a 10,000-MT CO_2e annual GHG emission threshold for industrial projects. The Court remanded for further consideration the application of the 29% overall Scoping Plan metric, which is used by several air districts and, like the favorably cited BAAQMD metric, is based on meeting the GHG emission reduction goal of AB 32.
6. EOs Nos. S-3-05 and B-30-15: Regarding these two EOs, the Court cautioned that those EIRs taking a goal-consistency approach to CEQA significance may "in the near future" need to consider the project's effects on meeting emissions reduction targets beyond 2020.

As discussed below, to demonstrate the Project's consistency with AB 32's statewide GHG reduction goals, this analysis utilizes the "compliance regulatory programs" and "regional sustainable community strategy" pathways to compliance identified by the Newhall court.

For informational purposes, this analysis also evaluates the Project's consistency with EO Nos. S-3-05 and B-30-15, as discussed below.

6.4.2 Impact GHG-1: Would the Project Generate Greenhouse Gas Emissions, Either Directly or Indirectly, that May Have a Significant Impact on the Environment?

6.4.2.1 Discussion

For purposes of Impact GHG-1, this analysis evaluates project compliance with regulatory programs designed to reduce GHG emissions and that contribute to the achievement of AB 32's goals as the primary significance criterion, in accordance with Newhall.

Construction Emissions. GHG emissions will occur during construction activities associated with the Projects. Offroad equipment assumed to be used during construction includes graders, dozers, scrapers, off-highway trucks, compactors,

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and rollers. Onroad mobile sources assumed to be used during construction include haul trucks (e.g., concrete, gravel), delivery vehicles, and employee commute vehicles. Consistent with industry practice, construction emissions are amortized over a 30-year project life. As shown in Table 6-4, the composting facility construction emissions are far less than operating emissions. Table 6-5 shows the construction emissions associated with the bioenergy facility. Finally, as shown, the proposed Projects shows a net reduction in GHG emissions.

Operational Emissions. GHG emissions from the operation of the Projects include direct emissions from composting fugitives, offroad equipment (e.g., compost turners, excavators, graders, off-highway tractors, off-highway trucks, sweepers/scrubbers, compactors, and loaders), mobile sources (e.g., haul trucks, vendor delivery vehicles, and employee commute vehicles), and the thermal oxidizer associate with the bioenergy facility. Since electricity use is not expected to be different from the baseline, indirect emissions associated with electricity usage are not included in this analysis.

When developing the emissions inventory for project sources and activities, biogenic CO_2 emissions were excluded from the GHG inventory (i.e., CO_2 is considered part of the natural carbon cycle and does not contribute to global warming). Furthermore, GHG allowances were applied for vehicle emissions due to Cap-and-Trade regulations. Finally, GHG emission reductions that would be generated as a result of the Projects were estimated. Specifically, GHG emissions that are avoided by compost land application enabled by the compost Project are considered in the operational emissions assessment. Such GHG emissions reductions are due to the GHG-reducing benefits of composting, including decreased soil erosion and decreased fertilizer usage. These emissions reductions have been quantified following CARB's "Method for Estimating Greenhouse Gas Emission Reductions from Diversion of Organic Waste from Landfills to Compost Facilities" (CARB 2017).

Tables 6-4 and 6-5 present the estimated annual GHG emissions associated with proposed Lost Hills SWMF Project and Bioenergy Project, respectively, with the reductions described above. Table 6-4 presents baseline emissions and emissions from the Project compost area at full build-out.

The Projects will implement GHG reduction measures in accordance with the laws, rules, and regulations, as described below, to reduce net GHG emissions from landfills by expanding composting operations with the eASP system and compliance with air district rules to reduce VOC emissions. The GHG emission reductions achieved by compost land application and diversion of organic materials from landfills result in an overall reduction in GHG emissions of more than 244,000 MT CO_2e per year as a result of the proposed Projects.[9]

[9] Calculated in accordance with the methods described in "Method for Estimating Greenhouse Gas Emission Reductions from Diversion of Organic Waste from Landfills to Compost Facilities", CARB, 2017, based on an organic material throughput of 640,000 wet tons per year.

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Mobile Source 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, oil and gas production facilities, and fuel suppliers) 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 MT CO_2e of GHG emissions. 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.

In general, the total number of allowances available statewide for each calendar year decreases annually through 2020, thus establishing the cap. The cap will decline approximately 3% each year beginning in 2013, representing an 18% reduction from the statewide 1990 baseline, ultimately achieving an 80% reduction from 1990 levels by 2050 (CARB 2017).

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 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.

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Project-related GHG emissions include categories that 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. While these emissions do not create a compliance obligation for Lost Hills Environmental or Aries-Holloway Bioenergy, 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 CARB 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."*

Thus, Project sources covered by the Cap-and-Trade Regulation would be consistent with the Cap-and-Trade Regulation because emissions from those sources (i.e., fuel combustion, electricity) are subject to the Cap-and-Trade Regulation.

Non-permitted sources/activities associated with the proposed Projects could also be affected by the following California Climate Change Scoping Plan measures:

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 approach is consistent with the 2014 appellate court decision in Cleveland National Forest Foundation, et al. v. San Diego Association of Governments (2014) 231 Cal.App.4th 1056 (SANDAG). However, upon review by the California Supreme Court in 2017, the court concluded that SANDAG did not abuse its discretion by declining to explicitly engage in an analysis of the consistency of projected 2050 greenhouse gas emissions with the goals in the executive order. The EIR sufficiently informed the public, based on the information available at the time, about the regional plan's greenhouse gas impacts and its potential inconsistency with state climate change goals. Nevertheless, the Supreme Court did not hold that the analysis of GHG impacts employed by SANDAG in that case will necessarily be sufficient going forward. CEQA requires public agencies like SANDAG to ensure that such analysis stay in step with evolving scientific knowledge and state regulatory schemes.

This consistency analysis is provided for informational purposes only. Kern County has not established the statewide goals set forth in the EOs as thresholds of significance under CEQA. Rather, AB 32, which requires a reduction of statewide

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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.

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 has 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 waste management industry to help achieve the statewide 2030 and 2050 targets. Assigning an across-the-board 40% or 80% reduction from 1990 levels to the waste management industry in Kern County is not consistent with the manner in which GHG reductions have been and are being achieved under AB 32.

CARB designed the Cap-and-Trade Program so that most of the future cumulative GHG emission reductions from 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 assurance that California's 2020 limit will be met because the regulation sets a firm limit on 85% of California's GHG emissions". 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" (CARB 2014a). 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 the Scoping Plan Update, ["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 covered 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 proposed Projects 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. Thus, the proposed Projects are consistent with the goals of both EOs.

On a per-ton of compost 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. As discussed above, numerous initiatives by the State of California will reduce statewide GHG emissions and certain emissions associated with the Projects, including the Pavley rules that will reduce emissions from automobiles, regulations that will reduce emissions from heavy duty trucks, the LCFS that will reduce emissions from heavy duty trucks and off-road mobile equipment, and the CARB rules discussed above. The Projects would comply with all applicable regulatory programs to reduce GHG emissions. Moreover, on balance, the Projects will cause an overall reduction in GHG emissions and the Projects' would have no adverse impact related to its GHG emissions.

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Based on the foregoing, and in accordance with the "compliance with regulatory standards" pathway to compliance identified by the Newhall court, the proposed Projects 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. In addition, the Projects are expected to reduce GHG emissions due to the land application of compost. Therefore, the Projects will not have an adverse impact related to GHG emissions.

6.4.2.2 Mitigation Measures

As discussed, AB 32's Cap-and-Trade Program provides mitigation for the Projects' vehicles (waste delivery, organic material delivery, employee commute, offroad equipment). The LFG collection system reduces methane emissions from the landfill by almost 75%. The use of compost provides GHG reduction by diverting organic wastes to composting facilities, as methane emissions from landfills are avoided. Additionally, compost application to agricultural fields increases soil health while providing multiple co-benefits such as, reducing the amount of synthetic fertilizer needed, decreasing soil erosion, and reducing the use of herbicides.

6.4.2.3 Level of Significance after Mitigation

Since the Projects would provide a net decrease in GHG emissions, there would be no adverse impacts related to GHG emissions, and instead would provide a benefit.

6.4.3 Impact GHG-2: Would the Project Conflict with any Applicable Plan, Policy, or Regulation Adopted for the Purpose of Reducing the Emissions of Greenhouse Gases?

6.4.3.1 Discussion

As discussed above, the Newhall court articulates that a lead agency need not additionally analyze GHG emissions from automobiles and light trucks in CEQA documents for certain residential, mixed use, and transit priority projects that are consistent with an applicable SCS adopted pursuant to Senate Bill (SB) 375. Moreover, consistent with Newhall, under the SJVAPCD's CEQA guidance for GHG, a project would not have a significant GHG impact if it is consistent with an applicable plan to reduce GHG emissions, and a CEQA-compliance analysis was completed for the GHG reduction plan.

In Kern County, the applicable MPO is the KCOG. KCOG's RTP was adopted in 2018, and provides regional-scale measures to regulate, monitor, and control GHG emissions in Kern County. The RTP is an applicable plan adopted for the purpose of reducing GHGs from land use and transportation sectors in Kern County, and was adopted after completion of a programmatic EIR.

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

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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.

The Projects, which concerns improvements to a facility that has existed well before the 2018 adoption of the RTP, is consistent with the land use and transportation management strategies and assumptions set forth in the RTP. Accordingly, pursuant to the "consistency with an applicable SCS" pathway to compliance identified by the Newhall court, the Projects' impacts related to GHG emissions could be considered less than significant on the project level.

6.4.3.2 Mitigation Measures

None required.

6.4.3.3 Level of Significance after Mitigation

No adverse impact.

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APPENDIX A – LANDFILL EMISSIONS

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Lost Hills Composting and Waste-To-Energy Projects (PP8111) – Air Quality and GHG Technical Report

Lost Hills Environmental LLC
14045 Holloway Road
Lost Hills, CA

August 2019

Prepared by:

Yorke ENGINEERING, LLC
www.YorkeEngr.com

Office Locations:
Los Angeles, Orange County, Riverside, Ventura, San Diego, Fresno, Berkeley, San Jose, Bakersfield

Tel: (949) 248-8490
Fax: (949) 248-8499

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Appendix A: Landfill Emissions

Lost Hills Composting and Waste to Energy Projects (PP8111) Air Quality and GHG Technical Report

Appendix A: Landfill Emissions

Prepared for:

Lost Hills Environmental LLC
14045 Holloway Road
Lost Hills, CA

August 2019

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ATTACHMENT A-1 – LANDFILL GAS CALCULATION WORKSHEETS

ATTACHMENT A-2 – LABORATORY ANALYSIS

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List of Acronyms and Abbreviations

CARB	California Air Resources Board
CAS No.	Chemical Abstract System Number
C&D	Construction and Demolition
CFR	Code of Federal Regulations
CH_4	Methane
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_2e	Carbon dioxide equivalents
CY	Cubic Yard
EIR	Environmental Impact Report
EPA	(United States) Environmental Protection Agency
GCS	Gas Collection System
GHG	Greenhouse Gas
H_2S	Hydrogen Sulfide
Hr	Hour
KCPD	Kern County Planning Department
Kg	Kilogram
Lb	Pound(s)
LFG	Landfill Gas
MG	Megagram
MMBtu	Million British thermal units
MT	Metric Ton
N_2O	Nitrous Oxide
NH_3	Ammonia
NMOC	Non-Methane Organic Compound
NOP	Notice of Preparation
NO_x	Nitrogen Oxides
O_2	Oxygen
$PM_{2.5}$	Fine particulate matter
PM_{10}	Respirable particulate matter
ppmv	Parts per million by volume
SJVAPCD	San Joaquin Valley Air Pollution Control District
SO_x	Sulfur Oxides
SWMF	Solid Waste Management Facility
TAC	Toxic Air Contaminant
TPD	Tons per Day
TPY	Tons per Year
VOC	Volatile Organic Compounds
Yr	Year

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Appendix A: Landfill Emissions

1.0 OVERVIEW OF PROPOSED MODIFICATIONS

Lost Hills Environmental LLC, an affiliate of H.M. Holloway, Inc. (Holloway), is proposing to modify the Solid Waste Management Facility (SWMF or Lost Hills Facility) to expand the list of wastes accepted for disposal in the landfill and to add a compost area. This Appendix A addresses the changes to the landfill and Appendix B addresses the emissions related to the compost area.

The existing permits[1] allow 2,000 tons per day (TPD) or 730,000 tons per year (TPY) of waste material, including an unspecified amount of Class A and Class B biosolids, to be accepted for disposal in depleted mining pits; there are no changes proposed to the maximum daily or annual waste acceptance rates. The wastes are delivered by up to 91 haul trucks per day; no change is proposed to the daily number of trucks delivering waste. The existing permits allow for a landfill height of up to 39 feet above grade; there is no change to the vertical height or areal footprint of the landfill proposed for this project.

Operation of the landfill requires the use on onroad and offroad vehicles and equipment which results in exhaust emissions from the combustion of fuel. Handling waste will result in emissions of fugitive dust (respirable and fine particulate matter [PM_{10} and $PM_{2.5}$]), volatile organic compounds (VOC), ammonia (NH_3) and greenhouse gases (GHG). These operations, vehicles, and equipment were considered as emission sources for the project previously and analyzed in the prior Environmental Impact Report (EIR) prepared by Kern County Planning Department (KCPD) for this SWMF in 2007. Because the currently proposed SWMF Project does not seek to increase the truck traffic or waste disposal volumes related to the landfill, emissions from these sources are not expected to change and are not estimated. Additional discussion is provided below.

- **Onroad Mobile Sources.** Onroad mobile source emissions result from employee travel, routine business travel, and the transport of waste material to the facility. The changes proposed to the facility are not expected to result in an increase in employee or business-related travel. The facility is permitted to handle up to 91 trucks per day to deliver 2,000 TPD of waste. Lost Hills Environmental is not requesting a change to the truck traffic; therefore, onroad mobile source emissions are not expected to change and emissions are not estimated.
- **Offroad Mobile Sources.** Waste is delivered to the landfill by heavy-heavy-duty diesel trucks having a capacity of about 22 tons per load. Upon arrival at the disposal pit, the waste is unloaded and formed into 6-inch "lifts" using scrapers or dozers. Each load of waste is subsequently covered by one scraper load of native soil, which is equivalent to about 1 ton of cover material per ton of waste. The offroad mobile source emissions are a direct result of equipment operation used to manage the waste. Because Lost Hills Environmental is not requesting changes to the daily or annual waste volumes, the emissions associated with waste management will not change and are not estimated.
- **Fugitive Dust Emissions.** Fugitive dust source may be generated from a variety of activities at the landfill, including travel on paved roads, travel on unpaved roads, and

[1] Conditional Use Permit No. 9, Map 28 and Solid Waste Facility Permit SWIS No. 15-AA-0308.

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material handling. As discussed above, because the onroad and offroad vehicle travel do not change as a result of the proposed SWMF Project, paved and unpaved road dust emissions will not change and are not calculated. Similarly, because the waste volumes do not change as a result of the project, fugitive dust emissions from waste handling activities will not change and are not calculated.

- **Fugitive VOC, NH_3, and GHG Emissions.** Biodegradable organic waste such as biosolids, green waste, food waste, and compost may generate fugitive emissions of VOC, NH_3, and GHGs during handling prior to disposal. Inert materials do not degrade and will not emit these pollutants. Because the daily waste volumes do not change as a result of the proposed SWMF Project and because biosolids are an organic waste that were previously analyzed, fugitive emissions from waste handling activities or different types of organic wastes will not change and are not calculated.

The Lost Hills Facility is currently permitted to accept Class A and B biosolids and various inert, nonhazardous wastes, such as fly ash, auto shredder residual, spent sandblast media, and lime cake. These waste materials will continue to be accepted at this SWMF. The proposed SWMF Project would allow additional biodegradable organic wastes to be accepted. The currently allowed and proposed waste streams are listed in Table 1-1, some of which are proposed for the near term and others which would be considered in the future if allowed by the County. The impacts of all of the wastes shown in Table 1-1, including the listed future waste streams, would not increase emissions over what is currently allowed, and hence would not cause additional impacts. Other wastes not listed in Table 1-1 may also be disposed in the landfill upon approval by the County. The proposed organic matter streams would only go to the landfill to the extent that they are non-compostable.

Table 1-1: Currently Allowed and Proposed Landfill Waste Streams

Allowed Existing Waste Streams	Proposed Additional Waste Streams	Potential Future Additional Waste Streams
▪ Class A, B Biosolids ▪ Treated Automobile Shredder Waste ▪ Fly Ash ▪ Spent Sand Blast Media ▪ Lime Cake	▪ Drill Cuttings ▪ Slag ▪ Granulated Silica ▪ Shredded Plastic Pipe (PVC only) ▪ Dead Animals ▪ Non-Friable Asbestos ▪ Destructed Cannabis/Marijuana, including Consumables ▪ Wastewater grit ▪ Wastewater Sloughing ▪ Poultry Waste (non-manure) ▪ Industrial Sand Based Waste ▪ Non-Compostable Winery Pulp/Waste ▪ Compost-derived Waste ▪ Digestates	▪ Tile and Windows ▪ Flooring ▪ Insulation ▪ Electrical Wiring ▪ Drywall ▪ Lumber with nails ▪ Roofing Material ▪ Tile Roofing ▪ Wood Shake Roofing ▪ Excess Compost

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At the request of the KCPD, this analysis evaluates the proposed SWMF Project emissions relative to the selected "baseline" years. Although disposal of organic waste (i.e., biosolids) is currently allowed by the SWMF permits, this analysis evaluates the landfill gas (LFG) emissions resulting from the accumulation of organic waste over the life of the landfill. The accumulation of organic waste in the landfill through 2030 will result in LFG emissions in excess of the LFG generated over that analyzed in the prior 2007 EIR and greater than the Baseline rates.

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2.0 LANDFILL GAS EMISSIONS

Disposal of organic materials in a landfill will generate LFG through anaerobic decomposition. Current permits reflect a closure date of 2030 for the landfill. As the total accumulated volume of biosolids and other organic wastes disposed in the landfill increases, the quantity of LFG generated will increase. The emission estimates provided herein reflect both an increase in the daily disposal quantity of organic wastes relative to the Baseline and the 2030 closure date for the landfill.

2.1 Baseline and Project Disposal Rates

The proposed SWMF Project would continue to be permitted for 2,000 TPD and 730,000 TPY of waste disposal. While the facility is currently permitted to operate at this level, the facility has historically operated below 2,000 TPD. At the request of the KCPD, the proposed changes to the landfill have been evaluated as the increase in emissions between the Baseline period and 2,000 TPD of maximum waste disposal.

Normally a baseline period would be the two years immediately proceeding the issuance of the Notice of Preparation (NOP) for an Environmental Impact Report (EIR). However, in the case of LFG, the emissions from the landfill depend on the tonnage of biodegradable waste that have been put in the landfill over time and represent an accumulation of organic wastes that lead to the emissions that occur prior to the proposed SWMF Project. Therefore, this longer period is considered to the Baseline for this analysis.

2.1.1 Project Baseline

Wastes deposited in a landfill may generate LFG for decades, and the total quantity of LFG generated at any point in time reflects the cumulative organic waste disposal. Thus for this analysis, Baseline conditions reflect the total organic waste disposed in the landfill since the landfill was permitted to accept organic wastes in 2009 through 2019, the year prior to the proposed SWMF Project. The tonnage of various wastes disposed of at the landfill during the Baseline period are provided in Table 2-1.

Table 2-1: Waste Disposal Amounts for the Baseline Period of 2009 - 2019

Period	Biosolids (Tons)	Inert Wastes (Tons)	Total (Tons)
2009[1]	34,738.88	317,059.82	351,798.70
2010	25,586.36	301,385.77	326,972.13
2011	31,347.37	500,519.21	531,866.58
2012	42,298.52	536,369.28	578,667.80
2013	71,902.22	510,925.09	582,827.31
2014	96,865.63	502,610.21	599,475.84
2015	115,425.43	347,655.50	463,080.93
2016	111,378.16	241,692.93	353,071.09
2017	183,422.27	246,783.80	430,206.07
2018	358,324.42	282,708.23	641,032.65
2019[2]	358,324.42	282,708.23	641,032.65

Notes:
1. Biosolids allowed at the Lost Hills Facility in 2009, previously only inert wastes allowed
2. Estimated

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2.1.2 Proposed SWMF Project

The landfill is currently permitted to accept up to 2,000 TPD of inert materials and dewatered Class A and Class B biosolids. Based on past experience and projections of future disposal patterns, the waste accepted for disposal is assumed to consist of approximately equal amounts of inert materials and organic wastes. Although California has adopted a landfill diversion mandate that may reduce the relative proportion of organics to total waste disposed, to ensure that emissions are not underestimated, emissions from the proposed SWMF Project were estimated based on disposal of up to 1,000 TPD of biodegradable organic waste. This assumption is considered to be a reasonable but conservative estimate for emissions calculations and is not intended to be a limit on the amount of organic waste disposal. The current permits do not limit the amount of biosolids in the total wastes and allow up to 2,000 TPD or 730,000 TPY.

2.2 LFG Emissions Calculation Procedure

Biogas generation was estimated using the emission model LandGEM (v3.02, 2005), which is based on first-order decay rate equations. LandGEM is an Excel-based public-domain software available from the U.S. Environmental Protection Agency (EPA).

2.3 Uncontrolled LFG Emissions

Detailed LandGEM files and spreadsheets showing the LFG emissions for each year up to 2133[2] are included in Attachment A-1.

LFG emissions calculated by LandGEM include criteria pollutants/precursors, GHGs, and toxic air contaminants (TACs). The primary constituent emissions are discussed in this section, with additional information about the TAC emissions in Section 2.7. Note, carbon dioxide (CO_2) emissions that result from the decay of organic waste are considered biogenic and thus would not contribute to global warming. For this reason, direct CO_2 emissions from the landfill are not reported in this analysis.

2.3.1 LFG Methane Emissions

Landfill methane (CH_4) emissions were calculated directly using LandGEM. The following assumptions were used as inputs to the LandGEM model:

- The landfill is existing, and the waste previously disposed in the landfill will continue to generate LFG, with or without the proposed SWMF Project. The organic waste disposed in the landfill from 2009 (when disposal of biosolids was first allowed) through 2018 from company records was input to LandGEM. The 2018 disposal rate was used as the estimate for 2019.
- Baseline LFG emissions were determined based on the volume of LFG generated in 2020 (LFG emissions peak one year after the last year of disposal).
- Proposed SWMF Project LFG emissions were determined by calculating the emissions resulting from the disposal of 365,000 TPY (i.e., 50% of the 730,000

[2] LFG will continue to be emitted after the landfill closes in 2030. LandGEM reports emissions through 2133.

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TPY limit) of organic waste beginning in 2020 and ending in 2030. The peak year of LFG emissions occurs in 2031.

Baseline and Project CH_4 emissions are summarized in Table 2-2.

2.3.2 LFG Volatile Organic Compound Emissions

VOC emissions for the Baseline period were calculated using a VOC concentration of 200 parts per million by volume (ppmv), as determined by laboratory analysis of the LFG. A copy of the laboratory report is provided in Attachment A-2.

VOC emissions for the proposed SWMF Project were calculated using the EPA-recommended default concentration of VOC contained in LFG of 838 ppmv as hexane, which is taken from EPA AP-42 5th Edition (Section 2.4, Municipal Solid Waste Landfills).

Baseline and Project VOC emissions are summarized in Table 2-2.

2.3.3 LFG Ammonia Emissions

Little information exists on NH_3 emissions from Municipal Solid Waste landfills. The ammonia inventories prepared by the EPA and the California Air Resources Board (CARB) rely on an emission factor based on studies completed during the 1990s, which concluded that nitrogenous emissions equate to 7.3% of CH_4 emissions and that 10% of the nitrogenous emissions are in the form of NH_3.

Per EPA recommendations, the NH_3 emissions from the landfill were calculated using an emission factor of 0.0073 pounds NH_3 per pound CH_4. The results of the calculation for LFG emissions of NH_3 are summarized in Table 2-2.

2.3.4 LFG Hydrogen Sulfide Emissions

The hydrogen sulfide (H_2S) emissions from the landfill were calculated for the total LFG volume (assuming 50% CO_2 and 50% methane by volume) and the EPA default concentration of 32 ppmv. The results of the emission calculations are summarized in Table 2-2.

2.3.5 LFG Nitrous Oxide Emissions

Nitrous oxide (N_2O) is a GHG emitted by landfills. N_2O emissions from the landfill were calculated using the CARB emission factor of 3.05×10^{-5} g of N_2O per standard cubic foot of LFG. The N_2O factor was applied to the total amount of LFG predicted to be generated from the disposal of a given waste stream. The results of the emission calculations are summarized in Table 2-2.

Table 2-2: Summary of Uncontrolled Baseline and Project LFG Emissions

Pollutant (Unit of Measure)	Uncontrolled Baseline Emissions	Uncontrolled Project Emissions
CH_4 (Metric Ton [MT]/Yr)	2,783	9,673
VOC (TPY)	9.80	95.81
NH_3 (TPY)	16.80	42.63
H_2S (TPY)	0.42	1.47
N_2O (MT/Yr)	0.0068	0.02

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2.4 Controlled LFG Emissions

Federal regulations (40 Code of Federal Regulations [CFR] Part 60, Subpart WWW) require the capture and control of LFG once the non-methane organic compound (NMOC) emissions reach 50 megagrams (MG) (≈ 110,000 pounds) per year. The landfill NMOC emissions are predicted to exceed that level before 2030, provided organic wastes are disposed at the assumed rate of 365,000 TPY TPD and the VOC concentration in the LFG is as high as the EPA default concentrations. Lost Hills Environmental monitors both the LFG generation rate and VOC concentration regularly to ensure compliance with its San Joaquin Valley Air Pollution Control District (SJVAPCD) air permit and 40 CFR 60 Subpart WWW.

For the proposed SWMF Project, the peak LFG emissions will occur in 2031 (the highest rate with continued disposal through 2030, followed by a drop off in emissions as the wastes continue to decay over time). At that time, NMOC emissions are predicted to exceed 50 MG per year, and thus Subpart WWW requires the use of a gas collection system (GCS) and control device. The GCS system will be designed to capture at least 75% of the LFG. This LFG will be routed to the flare, where it will be combusted with a control efficiency of 98%. This control efficiency is assumed to apply to CH_4, VOC, NH_3, and H_2S. The flare is assumed to not control emissions of N_2O. The remaining 25% of the LFG (i.e., that portion not captured by the GCS) would be released as fugitive emissions.

For the Baseline case, Lost Hills Environmental operated the GCS (which exhausts through a carbon adsorption system), but did not operate the flare. The landfill currently has a SJVAPCD permit limiting VOC emissions from the landfill to 19,590 pounds per year. The landfill does not currently exceed that limit; thus, the existing flare is not required to be operated. For the purpose of this analysis, the SJVAPCD permit limit of 19,590 pounds per year of VOC is the Baseline VOC emission rate from the landfill. The CH_4, NH_3, N_2O, and H_2S emissions are based on the LFG production rate that occurs in 2020, the year with peak emissions attributed to the Baseline. The LFG emissions for both the Baseline and the proposed SWMF Project are summarized in Table 2-3.

Table 2-3: Summary of Fugitive and Controlled Baseline and SWMF Project LFG Emissions

Pollutant (Unit of Measure)	Baseline	Proposed SWMF Project		
	Total Emissions	Fugitive Emissions	Flare Stack Emissions	Total Emissions
CH_4 (MT/Yr)	2,783	2,418	145	2,563
VOC (TPY)	9.80	23.95	1.44	25.39
NH_3 (TPY)	16.80	10.66	0.64	11.30
H_2S (TPY)	0.42	0.37	0.02	0.39
N_2O (MT/Yr)	0.0068	0.0043	0.0003	0.0045

2.5 Flare Combustion Emissions

The combustion of LFG will result in emissions of the criteria pollutants nitrogen oxides (NO_x), sulfur oxides (SO_x), carbon monoxide (CO), VOC, and PM_{10}. The criteria pollutant emissions from the control device were calculated using the SJVAPCD-recommended factors. It is assumed that the flare will operate with a low-NO_x burner (20 ppmv NO_x @ 3% oxygen [O_2]). The LFG is assumed to contain approximately 32 ppmv H_2S (EPA AP-42 default value) prior to treatment. To

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reduce emissions of SO_x, the LFG will be treated to reduce the H_2S concentration by at least 90% prior to the combustion of the LFG.

The emissions from the operation of the flare were calculated using the maximum CH_4 emissions which would occur in 2031. As noted above, the flare did not operate during the Baseline period. The emissions are summarized in Tables 2-4 and 2-5.

Table 2-4: Flare Criteria Pollutant Emissions

Pollutant	Emission Factor (Lb/MMBtu)	Project Emissions (TPY)	Baseline Emissions[1] (TPY)
NO_x	0.024	4.73	0.00
VOC	2% of VOC	1.44	0.00
CO	0.0074	1.46	0.00
SO_x	0.0011	0.22	0.00
PM_{10}	0.008	1.58	0.00

Notes:
1. The flare was not operated during the Baseline period.

Table 2-5: Flare GHG Emissions

Pollutant	Emission Factor (Kg/MMBtu)	Project Emissions (MT/Yr)	Baseline Emissions[1] (MT/Yr)
CO_2	52.07	20,516	0.0
CH_4	3.20E-03	1.26	0.0
N_2O	6.30E-04	0.25	0.0
CO_2e	–	20,619	0.0

Notes:
1. The flare was not operated during the Baseline period.

2.6 Summary of LFG Emissions

Baseline and proposed SWMF Project emissions are summarized in Tables 2-6 and 2-7.

Table 2-6: Summary of LFG Criteria Pollutant and Precursor Emissions

Source	NO_x (TPY)	VOC (TPY)	CO (TPY)	SO_x (TPY)	PM_{10} (TPY)	NH_3 (TPY)	H_2S (TPY)
Baseline							
LFG Fugitives	0.00	9.80	0.00	0.00	0.00	16.80	0.42
Baseline Total	0.00	9.80	0.00	0.00	0.00	16.80	0.42
Project							
LFG Fugitives	0	23.95	0	0	0	10.66	0.37
LFG Stack	0	1.44	0	0	0	0.64	0.02
Flare Combustion	4.73	0.00	1.46	0.22	1.58	0	0
Project Total	4.73	25.39	1.46	0.22	1.58	11.30	0.39
Net Emission Increase	4.73	15.60	1.46	0.22	1.58	-5.51	-0.03

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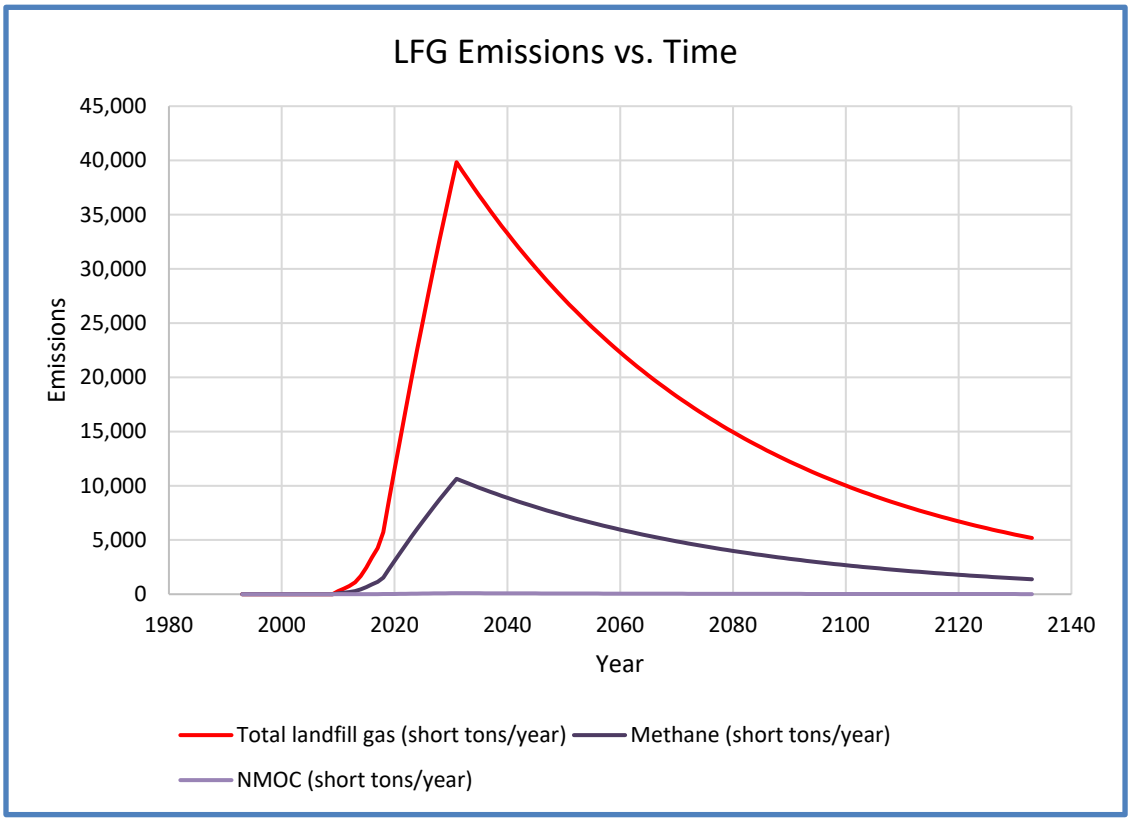
Table 2-7: Summary of LFG GHG Emissions

Source	CO_2 (MT/Yr)[1]	CH_4 (MT/Yr)	N_2O (MT/Yr)	CO_2e (MT/Yr)
Baseline				
LFG Fugitives	0.0	2,783	0.0	58,452
Baseline Total	0.0	2,783	0.0	58,452
Project				
LFG Fugitives	0.0	2,418	0.0	50,784
LFG Stack	0.0	145	0.0	3,047
Flare Combustion	20,516	1	0.2	20,619
Project Total	20,516	2,565	0.3	74,451
Net Emission Increase	20,516	-219	0.2	15,998

Notes:
1. CO_2 from the LFG is considered biogenic and does not contribute to global warming, however, CO_2 from the combustion of the LFG in the flare is included.

As noted in Section 2.4, the proposed SWMF Project emissions are the maximum predicted emissions that would occur in 2031. In practice, the LFG emissions ramp up to the peak levels while disposal is on-going, and then immediately begin to decline. Figure 2-1 illustrates the LFG emission rate by year for the proposed SWMF Project, and the 103 years following landfill closure. The average emissions of each pollutant are approximately 41% of the peak emissions over the life of the landfill and post-closure period (through 2133).

Figure 2-1: Landfill Gas Emissions Profile



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2.7 LFG Toxic Air Contaminant Emissions

Toxic air contaminants (TACs) are air pollutants that may be present in ambient air in relatively low concentrations but have characteristics such as toxicity or persistence that may make them a hazard to human health. These TACs include volatile and semi-volatile organic compounds, heavy metals, and others.

VOC and NH_3 emissions are expected from decomposition of organic materials in the landfill. The VOC emissions were speciated according to an SJVAPCD-recommended speciation profile (EPA AP-42 5th Edition, Landfill Gas Table 2.4-1, Default Concentration for LFG Constituents for Landfills with Waste in Place On or After 1992). The TAC emissions were estimated based on a maximum LFG volume of 1024 million standard cubic feet per year that was projected to occur in 2031. At that level, the emissions will be controlled by a flare with an overall control efficiency of 73.5% (= 75% capture by the GCS x 98% control by the flare). The speciated LFG TAC emissions are summarized in Table 2-8.

TAC emissions presented herein are for the proposed SWMF Project minus Baseline. As shown, a net emission reduction is expected for all TAC. This can be attributed to the operation of the GCS and flare for the proposed SWMF Project, and uncontrolled emissions for the Baseline period.

Table 2-8: TAC Emissions from LFG

Chemical Compound	CAS No.	Concentration (ppmv)	TAC Emissions	
			(Lb/Hr)	(Lb/Yr)
1,1,1-Trichloroethane	71556	0.2430	-2.27E-04	-1.99
1,1,2,2-Tetrachloroethane	79345	0.5350	-6.29E-04	-5.51
1,1,2-Trichloroethane	79005	0.1580	-1.48E-04	-1.29
1,1-Dichloroethane	75343	2.0800	-1.44E-03	-12.63
1,1-Dichloroethene (1,1-Dichloroethylene)	75354	0.1600	-1.09E-04	-0.95
1,2,4-Trichlorobenzene	120821	0.0055	-7.00E-06	-0.06
1,2-Dibromoethane (Ethylene dibromide)	106934	0.0048	-6.32E-06	-0.06
1,2-Dichloroethane (Ethylene dichloride)	107062	0.1590	-1.10E-04	-0.97
1,2-Dichloropropane	78875	0.0520	-4.12E-05	-0.36
1,3-Butadiene (Vinyl ethylene)	106990	0.1660	-6.29E-05	-0.55
1,4-Dioxane (1,4-Diethylene dioxide)	123911	0.0083	-5.12E-06	-0.04
2,2,4-Trimethylpentane	540841	0.6140	-4.91E-04	-4.30
2-Butanone (Methyl ethyl ketone)	78933	4.0100	-2.03E-03	-17.74
2-Propanol (Isopropyl alcohol)	67630	1.8000	-7.58E-04	-6.64
4-Methyl-2-pentanone (MIBK)	108101	0.8830	-6.19E-04	-5.43
Acetaldehyde	75070	0.0774	-2.39E-05	-0.21
Acetonitrile	75058	0.5560	-1.60E-04	-1.40
Acrylonitrile	107131	0.0000	0.00E+00	0.00
Benzene	71432	2.4000	-1.31E-03	-11.50
Benzyl chloride	100447	0.0181	-1.60E-05	-0.14
Bromomethane (Methyl bromide)	74839	0.0210	-1.40E-05	-0.12
Carbon disulfide	75150	0.1470	-7.84E-05	-0.69
Carbon tetrachloride	56235	0.0080	-8.60E-06	-0.08

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Chemical Compound	CAS No.	Concentration (ppmv)	TAC Emissions	
			(Lb/Hr)	(Lb/Yr)
Carbonyl sulfide (Carbon oxysulfide)	463581	0.1220	-5.13E-05	-0.45
Chlorobenzene	108907	0.4840	-3.82E-04	-3.34
Chlorodifluoromethane (Freon 22)	75456	0.7960	-4.82E-04	-4.22
Chloroethane (Ethyl chloride)	75003	3.9500	-1.78E-03	-15.63
Chloromethane (Methyl chloride)	74873	0.2440	-8.63E-05	-0.76
Dichlorobenzene	106467	0.9400	-9.68E-04	-8.48
Dichloromethane (Methylene chloride)	75092	6.1500	-3.66E-03	-32.05
Ethylbenzene	100414	4.8600	-3.61E-03	-31.66
Formaldehyde	50000	0.0117	-2.46E-06	-0.02
Hexane	110543	3.1000	-1.87E-03	-16.39
Hydrogen sulfide[2]	7783064	32.0000	-7.62E-03	-66.76
Isopropylbenzene (Cumene)	98828	0.4300	-3.62E-04	-3.17
Mercury (total)	7439976	0.0001	-1.71E-07	0.00
Mercury (elemental)	7439976	0.0001	-1.08E-07	0.00
Mercury (monomethyl)	51176126	0.0000	-5.83E-10	0.00
Mercury (dimethyl)	627441	0.0000	-4.58E-09	0.00
Methyl tert-butyl ether (MTBE)	1634044	0.1180	-7.29E-05	-0.64
Naphthalene	91203	0.1070	-9.61E-05	-0.84
Propene	115071	3.3200	-9.79E-04	-8.57
Styrene (Vinylbenzene)	100425	0.4110	-3.00E-04	-2.63
Tetrachloroethylene (Perchloroethylene)	127184	2.0300	-2.36E-03	-20.65
Toluene (Methyl benzene)	108883	29.5000	-1.90E-02	-166.78
Tribromomethane (Bromoform)	75252	0.0124	-2.20E-05	-0.19
Trichloroethylene (Trichloroethene)	79016	0.8280	-7.62E-04	-6.68
Trichloromethane (Chloroform)	8013545	0.0708	-5.92E-05	-0.52
Vinyl acetate	85306269	0.2480	-1.50E-04	-1.31
Vinyl chloride (Chloroethene)	75014	1.4200	-6.22E-04	-5.45
Total Xylene	1330207	9.2300	-6.86E-03	-60.13
Ammonia[3]	7664417	---	-1.26	-11,012.20

Notes:

1. Calculated emissions include 2% for flare passthrough. Emissions were calculated assuming 75% gas collection control efficiency and a 98% VOC destruction efficiency (per the SJVAPCD).
2. H_2S emissions were discussed in Section 2.3.4 as a criteria pollutant, and reported as both a criteria pollutant and a TAC.
3. Ammonia emissions were in Section 2.3.3 as a criteria pollutant precursor, and reported as both a criteria pollutant precursor and a TAC.

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ATTACHMENT A-1 – LANDFILL GAS CALCULATION WORKSHEETS

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Summary Report

Landfill Name or Identifier: Holloway Proposed Project

Date: Friday, August 23, 2019

Description/Comments:
This is the proposed project calculation. The landfill is assumed to have disposed of 344 tons per day of biosolids (the 2016-2017 average) beginning in 1993 and ending in 2020. From 2020 to 2060, the landfill is assumed to dispose of 1000 tons per day of biosolids. 1000 tons/day was selected based on the proposed project of 2,000 tons/day and an assumed ratio of 50% inerts and 50% biosolids.

About LandGEM:

First-Order Decomposition Rate Equation:

$$Q_{CH_4} = \sum_{i=1}^{n} \sum_{j=0.1}^{1} kL_o \left(\frac{M_i}{10} \right) e^{-kt_{ij}}$$

Where,
Q_{CH4} = annual methane generation in the year of the calculation ($m^3/year$)
i = 1-year time increment
n = (year of the calculation) - (initial year of waste acceptance)
j = 0.1-year time increment
k = methane generation rate ($year^{-1}$)
L_o = potential methane generation capacity (m^3/Mg)
M_i = mass of waste accepted in the ith year (Mg)
t_{ij} = age of the jth section of waste mass M_i accepted in the ith year (*decimal years*, e.g., 3.2 years)

LandGEM is based on a first-order decomposition rate equation for quantifying emissions from the decomposition of landfilled waste in municipal solid waste (MSW) landfills. The software provides a relatively simple approach to estimating landfill gas emissions. Model defaults are based on empirical data from U.S. landfills. Field test data can also be used in place of model defaults when available. Further guidance on EPA test methods, Clean Air Act (CAA) regulations, and other guidance regarding landfill gas emissions and control technology requirements can be found at http://www.epa.gov/ttnatw01/landfill/landflpg.html.

LandGEM is considered a screening tool — the better the input data, the better the estimates. Often, there are limitations with the available data regarding waste quantity and composition, variation in design and operating practices over time, and changes occurring over time that impact the emissions potential. Changes to landfill operation, such as operating under wet conditions through leachate recirculation or other liquid additions, will result in generating more gas at a faster rate. Defaults for estimating emissions for this type of operation are being developed to include in LandGEM along with defaults for convential landfills (no leachate or liquid additions) for developing emission inventories and determining CAA applicability. Refer to the Web site identified above for future updates.

Input Review

LANDFILL CHARACTERISTICS

Landfill Open Year	**1993**	
Landfill Closure Year (with 80-year limit)	**2019**	
Actual Closure Year (without limit)	***2019***	
Have Model Calculate Closure Year?	**No**	
Waste Design Capacity	**14,000,000**	*short tons*

MODEL PARAMETERS

Methane Generation Rate, k	**0.020**	*year $^{-1}$*
Potential Methane Generation Capacity, L_o	**170**	*m^3/Mg*
NMOC Concentration	**200**	*ppmv as hexane*
Methane Content	**50**	*% by volume*

GASES / POLLUTANTS SELECTED

Gas / Pollutant #1:	**Total landfill gas**
Gas / Pollutant #2:	**Methane**
Gas / Pollutant #3:	**Carbon dioxide**
Gas / Pollutant #4:	**NMOC**

WASTE ACCEPTANCE RATES

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
1993	0	0	0	0
1994	0	0	0	0
1995	0	0	0	0
1996	0	0	0	0
1997	0	0	0	0
1998	0	0	0	0
1999	0	0	0	0
2000	0	0	0	0
2001	0	0	0	0
2002	0	0	0	0
2003	0	0	0	0
2004	0	0	0	0
2005	0	0	0	0
2006	0	0	0	0
2007	0	0	0	0
2008	0	0	0	0
2009	31,581	34,739	0	0
2010	23,260	25,586	31,581	34,739
2011	28,497	31,347	54,841	60,325
2012	38,453	42,298	83,338	91,672
2013	65,365	71,902	121,791	133,970
2014	88,060	96,866	187,156	205,872
2015	104,932	115,425	275,216	302,738
2016	101,253	111,378	380,148	418,163
2017	166,747	183,422	481,401	529,541
2018	325,749	358,324	648,148	712,963
2019	325,750	358,325	973,897	1,071,287
2020	0	0	1,299,647	1,429,612
2021	0	0	1,299,647	1,429,612
2022	0	0	1,299,647	1,429,612
2023	0	0	1,299,647	1,429,612
2024	0	0	1,299,647	1,429,612
2025	0	0	1,299,647	1,429,612
2026	0	0	1,299,647	1,429,612
2027	0	0	1,299,647	1,429,612
2028	0	0	1,299,647	1,429,612
2029	0	0	1,299,647	1,429,612
2030	0	0	1,299,647	1,429,612
2031	0	0	1,299,647	1,429,612
2032	0	0	1,299,647	1,429,612

WASTE ACCEPTANCE RATES (Continued)

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
2033	0	0	1,299,647	1,429,612
2034	0	0	1,299,647	1,429,612
2035	0	0	1,299,647	1,429,612
2036	0	0	1,299,647	1,429,612
2037	0	0	1,299,647	1,429,612
2038	0	0	1,299,647	1,429,612
2039	0	0	1,299,647	1,429,612
2040	0	0	1,299,647	1,429,612
2041	0	0	1,299,647	1,429,612
2042	0	0	1,299,647	1,429,612
2043	0	0	1,299,647	1,429,612
2044	0	0	1,299,647	1,429,612
2045	0	0	1,299,647	1,429,612
2046	0	0	1,299,647	1,429,612
2047	0	0	1,299,647	1,429,612
2048	0	0	1,299,647	1,429,612
2049	0	0	1,299,647	1,429,612
2050	0	0	1,299,647	1,429,612
2051	0	0	1,299,647	1,429,612
2052	0	0	1,299,647	1,429,612
2053	0	0	1,299,647	1,429,612
2054	0	0	1,299,647	1,429,612
2055	0	0	1,299,647	1,429,612
2056	0	0	1,299,647	1,429,612
2057	0	0	1,299,647	1,429,612
2058	0	0	1,299,647	1,429,612
2059	0	0	1,299,647	1,429,612
2060	0	0	1,299,647	1,429,612
2061	0	0	1,299,647	1,429,612
2062	0	0	1,299,647	1,429,612
2063	0	0	1,299,647	1,429,612
2064	0	0	1,299,647	1,429,612
2065	0	0	1,299,647	1,429,612
2066	0	0	1,299,647	1,429,612
2067	0	0	1,299,647	1,429,612
2068	0	0	1,299,647	1,429,612
2069	0	0	1,299,647	1,429,612
2070	0	0	1,299,647	1,429,612
2071	0	0	1,299,647	1,429,612
2072	0	0	1,299,647	1,429,612

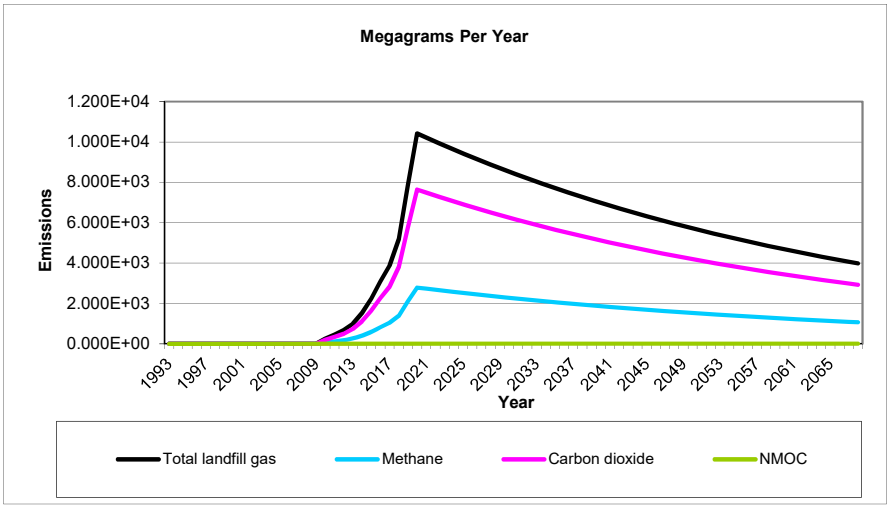
Pollutant Parameters

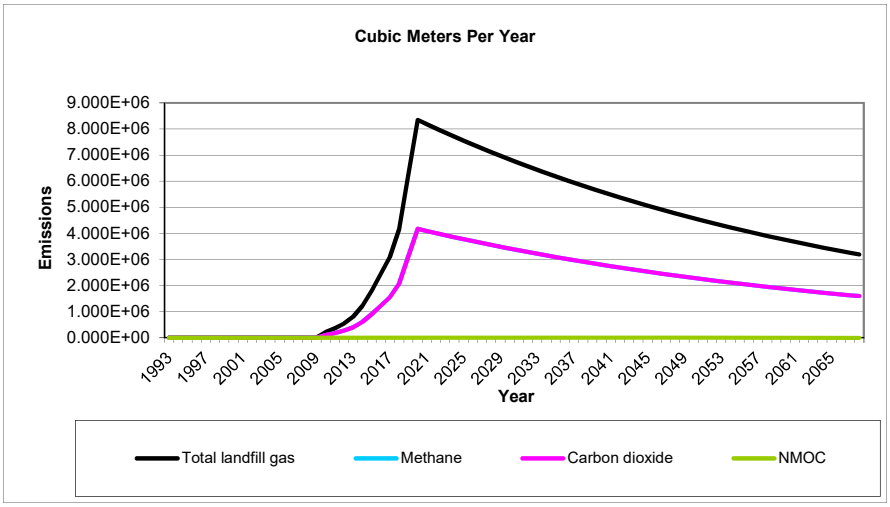
		Gas / Pollutant Default Parameters:		*User-specified Pollutant Parameters:*	
	Compound	Concentration (*ppmv*)	Molecular Weight	Concentration (*ppmv*)	Molecular Weight
Gases	Total landfill gas		0.00		
	Methane		16.04		
	Carbon dioxide		44.01		
	NMOC	4,000	86.18		
Pollutants	1,1,1-Trichloroethane (methyl chloroform) - HAP	0.48	133.41		
	1,1,2,2-Tetrachloroethane - HAP/VOC	1.1	167.85		
	1,1-Dichloroethane (ethylidene dichloride) - HAP/VOC	2.4	98.97		
	1,1-Dichloroethene (vinylidene chloride) - HAP/VOC	0.20	96.94		
	1,2-Dichloroethane (ethylene dichloride) - HAP/VOC	0.41	98.96		
	1,2-Dichloropropane (propylene dichloride) - HAP/VOC	0.18	112.99		
	2-Propanol (isopropyl alcohol) - VOC	50	60.11		
	Acetone	7.0	58.08		
	Acrylonitrile - HAP/VOC	6.3	53.06		
	Benzene - No or Unknown Co-disposal - HAP/VOC	1.9	78.11		
	Benzene - Co-disposal - HAP/VOC	11	78.11		
	Bromodichloromethane - VOC	3.1	163.83		
	Butane - VOC	5.0	58.12		
	Carbon disulfide - HAP/VOC	0.58	76.13		
	Carbon monoxide	140	28.01		
	Carbon tetrachloride - HAP/VOC	4.0E-03	153.84		
	Carbonyl sulfide - HAP/VOC	0.49	60.07		
	Chlorobenzene - HAP/VOC	0.25	112.56		
	Chlorodifluoromethane	1.3	86.47		
	Chloroethane (ethyl chloride) - HAP/VOC	1.3	64.52		
	Chloroform - HAP/VOC	0.03	119.39		
	Chloromethane - VOC	1.2	50.49		
	Dichlorobenzene - (HAP for para isomer/VOC)	0.21	147		
	Dichlorodifluoromethane	16	120.91		
	Dichlorofluoromethane - VOC	2.6	102.92		
	Dichloromethane (methylene chloride) - HAP	14	84.94		
	Dimethyl sulfide (methyl sulfide) - VOC	7.8	62.13		
	Ethane	890	30.07		
	Ethanol - VOC	27	46.08		

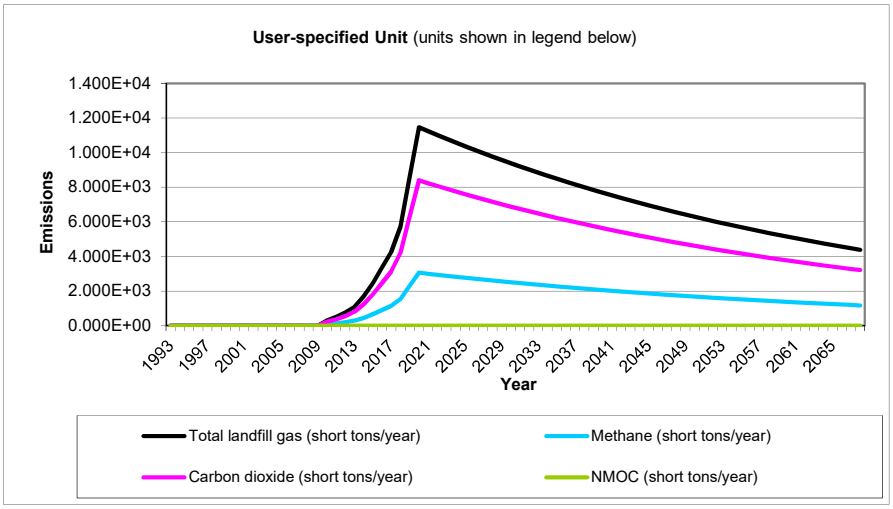
Pollutant Parameters (Continued)

		Gas / Pollutant Default Parameters:		*User-specified Pollutant Parameters:*	
	Compound	Concentration (*ppmv*)	Molecular Weight	Concentration (*ppmv*)	Molecular Weight
Pollutants	Ethyl mercaptan (ethanethiol) - VOC	2.3	62.13		
	Ethylbenzene - HAP/VOC	4.6	106.16		
	Ethylene dibromide - HAP/VOC	1.0E-03	187.88		
	Fluorotrichloromethane - VOC	0.76	137.38		
	Hexane - HAP/VOC	6.6	86.18		
	Hydrogen sulfide	36	34.08		
	Mercury (total) - HAP	2.9E-04	200.61		
	Methyl ethyl ketone - HAP/VOC	7.1	72.11		
	Methyl isobutyl ketone - HAP/VOC	1.9	100.16		
	Methyl mercaptan - VOC	2.5	48.11		
	Pentane - VOC	3.3	72.15		
	Perchloroethylene (tetrachloroethylene) - HAP	3.7	165.83		
	Propane - VOC	11	44.09		
	t-1,2-Dichloroethene - VOC	2.8	96.94		
	Toluene - No or Unknown Co-disposal - HAP/VOC	39	92.13		
	Toluene - Co-disposal - HAP/VOC	170	92.13		
	Trichloroethylene (trichloroethene) - HAP/VOC	2.8	131.40		
	Vinyl chloride - HAP/VOC	7.3	62.50		
	Xylenes - HAP/VOC	12	106.16		

Graphs


Megagrams Per Year
Emissions
1.200E+04
1.000E+04
8.000E+03
6.000E+03
4.000E+03
2.000E+03
0.000E+00
1993 1997 2001 2005 2009 2013 2017 2021 2025 2029 2033 2037 2041 2045 2049 2053 2057 2061 2065
Year
Total landfill gas
Methane
Carbon dioxide
NMOC


Cubic Meters Per Year
Emissions
9.000E+06
8.000E+06
7.000E+06
6.000E+06
5.000E+06
4.000E+06
3.000E+06
2.000E+06
1.000E+06
0.000E+00
1993 1997 2001 2005 2009 2013 2017 2021 2025 2029 2033 2037 2041 2045 2049 2053 2057 2061 2065
Year
Total landfill gas
Methane
Carbon dioxide
NMOC


User-specified Unit (units shown in legend below)
Emissions
1.400E+04
1.200E+04
1.000E+04
8.000E+03
6.000E+03
4.000E+03
2.000E+03
0.000E+00
1993 1997 2001 2005 2009 2013 2017 2021 2025 2029 2033 2037 2041 2045 2049 2053 2057 2061 2065
Year
Total landfill gas (short tons/year)
Methane (short tons/year)
Carbon dioxide (short tons/year)
NMOC (short tons/year)

Results

Year	Total landfill gas			Methane		
	(Mg/year)	*(m^3/year)*	*(short tons/year)*	*(Mg/year)*	*(m^3/year)*	*(short tons/year)*
1993	0	0	0	0	0	0
1994	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1995	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1996	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1997	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1998	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1999	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2000	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2001	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2002	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2003	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2004	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2005	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2006	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2007	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2008	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2009	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2010	2.658E+02	2.128E+05	2.924E+02	7.099E+01	1.064E+05	7.809E+01
2011	4.563E+02	3.654E+05	5.019E+02	1.219E+02	1.827E+05	1.341E+02
2012	6.871E+02	5.502E+05	7.558E+02	1.835E+02	2.751E+05	2.019E+02
2013	9.971E+02	7.984E+05	1.097E+03	2.663E+02	3.992E+05	2.930E+02
2014	1.527E+03	1.223E+06	1.680E+03	4.080E+02	6.116E+05	4.488E+02
2015	2.238E+03	1.792E+06	2.462E+03	5.979E+02	8.962E+05	6.577E+02
2016	3.077E+03	2.464E+06	3.385E+03	8.219E+02	1.232E+06	9.041E+02
2017	3.868E+03	3.098E+06	4.255E+03	1.033E+03	1.549E+06	1.137E+03
2018	5.195E+03	4.160E+06	5.715E+03	1.388E+03	2.080E+06	1.526E+03
2019	7.834E+03	6.273E+06	8.617E+03	2.092E+03	3.136E+06	2.302E+03
2020	1.042E+04	8.344E+06	1.146E+04	2.783E+03	4.172E+06	3.062E+03
2021	1.021E+04	8.179E+06	1.124E+04	2.728E+03	4.089E+06	3.001E+03
2022	1.001E+04	8.017E+06	1.101E+04	2.674E+03	4.008E+06	2.942E+03
2023	9.813E+03	7.858E+06	1.079E+04	2.621E+03	3.929E+06	2.883E+03
2024	9.619E+03	7.702E+06	1.058E+04	2.569E+03	3.851E+06	2.826E+03
2025	9.429E+03	7.550E+06	1.037E+04	2.518E+03	3.775E+06	2.770E+03
2026	9.242E+03	7.400E+06	1.017E+04	2.469E+03	3.700E+06	2.715E+03
2027	9.059E+03	7.254E+06	9.965E+03	2.420E+03	3.627E+06	2.662E+03
2028	8.879E+03	7.110E+06	9.767E+03	2.372E+03	3.555E+06	2.609E+03
2029	8.704E+03	6.969E+06	9.574E+03	2.325E+03	3.485E+06	2.557E+03
2030	8.531E+03	6.831E+06	9.384E+03	2.279E+03	3.416E+06	2.507E+03
2031	8.362E+03	6.696E+06	9.199E+03	2.234E+03	3.348E+06	2.457E+03
2032	8.197E+03	6.564E+06	9.016E+03	2.189E+03	3.282E+06	2.408E+03
2033	8.034E+03	6.434E+06	8.838E+03	2.146E+03	3.217E+06	2.361E+03
2034	7.875E+03	6.306E+06	8.663E+03	2.104E+03	3.153E+06	2.314E+03
2035	7.719E+03	6.181E+06	8.491E+03	2.062E+03	3.091E+06	2.268E+03
2036	7.567E+03	6.059E+06	8.323E+03	2.021E+03	3.029E+06	2.223E+03
2037	7.417E+03	5.939E+06	8.158E+03	1.981E+03	2.970E+06	2.179E+03
2038	7.270E+03	5.821E+06	7.997E+03	1.942E+03	2.911E+06	2.136E+03
2039	7.126E+03	5.706E+06	7.839E+03	1.903E+03	2.853E+06	2.094E+03
2040	6.985E+03	5.593E+06	7.683E+03	1.866E+03	2.797E+06	2.052E+03
2041	6.847E+03	5.482E+06	7.531E+03	1.829E+03	2.741E+06	2.012E+03
2042	6.711E+03	5.374E+06	7.382E+03	1.793E+03	2.687E+06	1.972E+03

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	*(m^3/year)*	*(short tons/year)*	*(Mg/year)*	*(m^3/year)*	*(short tons/year)*
2043	6.578E+03	5.267E+06	7.236E+03	1.757E+03	2.634E+06	1.933E+03
2044	6.448E+03	5.163E+06	7.093E+03	1.722E+03	2.582E+06	1.895E+03
2045	6.320E+03	5.061E+06	6.952E+03	1.688E+03	2.530E+06	1.857E+03
2046	6.195E+03	4.961E+06	6.815E+03	1.655E+03	2.480E+06	1.820E+03
2047	6.072E+03	4.862E+06	6.680E+03	1.622E+03	2.431E+06	1.784E+03
2048	5.952E+03	4.766E+06	6.547E+03	1.590E+03	2.383E+06	1.749E+03
2049	5.834E+03	4.672E+06	6.418E+03	1.558E+03	2.336E+06	1.714E+03
2050	5.719E+03	4.579E+06	6.291E+03	1.528E+03	2.290E+06	1.680E+03
2051	5.605E+03	4.489E+06	6.166E+03	1.497E+03	2.244E+06	1.647E+03
2052	5.494E+03	4.400E+06	6.044E+03	1.468E+03	2.200E+06	1.614E+03
2053	5.386E+03	4.313E+06	5.924E+03	1.439E+03	2.156E+06	1.582E+03
2054	5.279E+03	4.227E+06	5.807E+03	1.410E+03	2.114E+06	1.551E+03
2055	5.175E+03	4.144E+06	5.692E+03	1.382E+03	2.072E+06	1.520E+03
2056	5.072E+03	4.061E+06	5.579E+03	1.355E+03	2.031E+06	1.490E+03
2057	4.972E+03	3.981E+06	5.469E+03	1.328E+03	1.991E+06	1.461E+03
2058	4.873E+03	3.902E+06	5.360E+03	1.302E+03	1.951E+06	1.432E+03
2059	4.777E+03	3.825E+06	5.254E+03	1.276E+03	1.912E+06	1.403E+03
2060	4.682E+03	3.749E+06	5.150E+03	1.251E+03	1.875E+06	1.376E+03
2061	4.589E+03	3.675E+06	5.048E+03	1.226E+03	1.837E+06	1.348E+03
2062	4.498E+03	3.602E+06	4.948E+03	1.202E+03	1.801E+06	1.322E+03
2063	4.409E+03	3.531E+06	4.850E+03	1.178E+03	1.765E+06	1.296E+03
2064	4.322E+03	3.461E+06	4.754E+03	1.154E+03	1.730E+06	1.270E+03
2065	4.237E+03	3.392E+06	4.660E+03	1.132E+03	1.696E+06	1.245E+03
2066	4.153E+03	3.325E+06	4.568E+03	1.109E+03	1.663E+06	1.220E+03
2067	4.070E+03	3.259E+06	4.477E+03	1.087E+03	1.630E+06	1.196E+03
2068	3.990E+03	3.195E+06	4.389E+03	1.066E+03	1.597E+06	1.172E+03
2069	3.911E+03	3.132E+06	4.302E+03	1.045E+03	1.566E+06	1.149E+03
2070	3.833E+03	3.070E+06	4.217E+03	1.024E+03	1.535E+06	1.126E+03
2071	3.757E+03	3.009E+06	4.133E+03	1.004E+03	1.504E+06	1.104E+03
2072	3.683E+03	2.949E+06	4.051E+03	9.838E+02	1.475E+06	1.082E+03
2073	3.610E+03	2.891E+06	3.971E+03	9.643E+02	1.445E+06	1.061E+03
2074	3.539E+03	2.834E+06	3.893E+03	9.452E+02	1.417E+06	1.040E+03
2075	3.469E+03	2.777E+06	3.815E+03	9.265E+02	1.389E+06	1.019E+03
2076	3.400E+03	2.722E+06	3.740E+03	9.081E+02	1.361E+06	9.990E+02
2077	3.333E+03	2.669E+06	3.666E+03	8.902E+02	1.334E+06	9.792E+02
2078	3.267E+03	2.616E+06	3.593E+03	8.725E+02	1.308E+06	9.598E+02
2079	3.202E+03	2.564E+06	3.522E+03	8.553E+02	1.282E+06	9.408E+02
2080	3.138E+03	2.513E+06	3.452E+03	8.383E+02	1.257E+06	9.222E+02
2081	3.076E+03	2.463E+06	3.384E+03	8.217E+02	1.232E+06	9.039E+02
2082	3.015E+03	2.415E+06	3.317E+03	8.055E+02	1.207E+06	8.860E+02
2083	2.956E+03	2.367E+06	3.251E+03	7.895E+02	1.183E+06	8.685E+02
2084	2.897E+03	2.320E+06	3.187E+03	7.739E+02	1.160E+06	8.513E+02
2085	2.840E+03	2.274E+06	3.124E+03	7.585E+02	1.137E+06	8.344E+02
2086	2.784E+03	2.229E+06	3.062E+03	7.435E+02	1.114E+06	8.179E+02
2087	2.728E+03	2.185E+06	3.001E+03	7.288E+02	1.092E+06	8.017E+02
2088	2.674E+03	2.142E+06	2.942E+03	7.144E+02	1.071E+06	7.858E+02
2089	2.621E+03	2.099E+06	2.884E+03	7.002E+02	1.050E+06	7.703E+02
2090	2.570E+03	2.058E+06	2.827E+03	6.864E+02	1.029E+06	7.550E+02
2091	2.519E+03	2.017E+06	2.771E+03	6.728E+02	1.008E+06	7.400E+02
2092	2.469E+03	1.977E+06	2.716E+03	6.595E+02	9.885E+05	7.254E+02
2093	2.420E+03	1.938E+06	2.662E+03	6.464E+02	9.689E+05	7.110E+02

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	*(m^3/year)*	*(short tons/year)*	*(Mg/year)*	*(m^3/year)*	*(short tons/year)*
2094	2.372E+03	1.899E+06	2.609E+03	6.336E+02	9.497E+05	6.970E+02
2095	2.325E+03	1.862E+06	2.558E+03	6.210E+02	9.309E+05	6.832E+02
2096	2.279E+03	1.825E+06	2.507E+03	6.087E+02	9.125E+05	6.696E+02
2097	2.234E+03	1.789E+06	2.457E+03	5.967E+02	8.944E+05	6.564E+02
2098	2.190E+03	1.753E+06	2.409E+03	5.849E+02	8.767E+05	6.434E+02
2099	2.146E+03	1.719E+06	2.361E+03	5.733E+02	8.593E+05	6.306E+02
2100	2.104E+03	1.685E+06	2.314E+03	5.619E+02	8.423E+05	6.181E+02
2101	2.062E+03	1.651E+06	2.268E+03	5.508E+02	8.256E+05	6.059E+02
2102	2.021E+03	1.619E+06	2.223E+03	5.399E+02	8.093E+05	5.939E+02
2103	1.981E+03	1.587E+06	2.179E+03	5.292E+02	7.933E+05	5.821E+02
2104	1.942E+03	1.555E+06	2.136E+03	5.187E+02	7.776E+05	5.706E+02
2105	1.904E+03	1.524E+06	2.094E+03	5.085E+02	7.622E+05	5.593E+02
2106	1.866E+03	1.494E+06	2.052E+03	4.984E+02	7.471E+05	5.482E+02
2107	1.829E+03	1.465E+06	2.012E+03	4.885E+02	7.323E+05	5.374E+02
2108	1.793E+03	1.436E+06	1.972E+03	4.789E+02	7.178E+05	5.267E+02
2109	1.757E+03	1.407E+06	1.933E+03	4.694E+02	7.036E+05	5.163E+02
2110	1.722E+03	1.379E+06	1.895E+03	4.601E+02	6.896E+05	5.061E+02
2111	1.688E+03	1.352E+06	1.857E+03	4.510E+02	6.760E+05	4.961E+02
2112	1.655E+03	1.325E+06	1.820E+03	4.420E+02	6.626E+05	4.862E+02
2113	1.622E+03	1.299E+06	1.784E+03	4.333E+02	6.495E+05	4.766E+02
2114	1.590E+03	1.273E+06	1.749E+03	4.247E+02	6.366E+05	4.672E+02
2115	1.559E+03	1.248E+06	1.714E+03	4.163E+02	6.240E+05	4.579E+02
2116	1.528E+03	1.223E+06	1.680E+03	4.081E+02	6.116E+05	4.489E+02
2117	1.497E+03	1.199E+06	1.647E+03	4.000E+02	5.995E+05	4.400E+02
2118	1.468E+03	1.175E+06	1.615E+03	3.921E+02	5.877E+05	4.313E+02
2119	1.439E+03	1.152E+06	1.583E+03	3.843E+02	5.760E+05	4.227E+02
2120	1.410E+03	1.129E+06	1.551E+03	3.767E+02	5.646E+05	4.144E+02
2121	1.382E+03	1.107E+06	1.521E+03	3.692E+02	5.534E+05	4.061E+02
2122	1.355E+03	1.085E+06	1.490E+03	3.619E+02	5.425E+05	3.981E+02
2123	1.328E+03	1.063E+06	1.461E+03	3.547E+02	5.317E+05	3.902E+02
2124	1.302E+03	1.042E+06	1.432E+03	3.477E+02	5.212E+05	3.825E+02
2125	1.276E+03	1.022E+06	1.404E+03	3.408E+02	5.109E+05	3.749E+02
2126	1.251E+03	1.002E+06	1.376E+03	3.341E+02	5.008E+05	3.675E+02
2127	1.226E+03	9.817E+05	1.349E+03	3.275E+02	4.909E+05	3.602E+02
2128	1.202E+03	9.623E+05	1.322E+03	3.210E+02	4.811E+05	3.531E+02
2129	1.178E+03	9.432E+05	1.296E+03	3.146E+02	4.716E+05	3.461E+02
2130	1.155E+03	9.245E+05	1.270E+03	3.084E+02	4.623E+05	3.392E+02
2131	1.132E+03	9.062E+05	1.245E+03	3.023E+02	4.531E+05	3.325E+02
2132	1.109E+03	8.883E+05	1.220E+03	2.963E+02	4.441E+05	3.259E+02
2133	1.087E+03	8.707E+05	1.196E+03	2.904E+02	4.353E+05	3.195E+02

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	*(m^3/year)*	*(short tons/year)*	*(Mg/year)*	*(m^3/year)*	*(short tons/year)*
1993	0	0	0	0	0	0
1994	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1995	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1996	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1997	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1998	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1999	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2000	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2001	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2002	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2003	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2004	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2005	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2006	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2007	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2008	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2009	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2010	1.948E+02	1.064E+05	2.143E+02	1.526E-01	4.257E+01	1.678E-01
2011	3.344E+02	1.827E+05	3.678E+02	2.619E-01	7.307E+01	2.881E-01
2012	5.036E+02	2.751E+05	5.539E+02	3.944E-01	1.100E+02	4.339E-01
2013	7.308E+02	3.992E+05	8.038E+02	5.724E-01	1.597E+02	6.296E-01
2014	1.119E+03	6.116E+05	1.231E+03	8.769E-01	2.446E+02	9.645E-01
2015	1.640E+03	8.962E+05	1.805E+03	1.285E+00	3.585E+02	1.413E+00
2016	2.255E+03	1.232E+06	2.481E+03	1.766E+00	4.928E+02	1.943E+00
2017	2.835E+03	1.549E+06	3.119E+03	2.221E+00	6.195E+02	2.443E+00
2018	3.807E+03	2.080E+06	4.188E+03	2.982E+00	8.320E+02	3.281E+00
2019	5.741E+03	3.136E+06	6.315E+03	4.497E+00	1.255E+03	4.947E+00
2020	7.637E+03	4.172E+06	8.401E+03	5.982E+00	1.669E+03	6.580E+00
2021	7.486E+03	4.089E+06	8.234E+03	5.863E+00	1.636E+03	6.450E+00
2022	7.337E+03	4.008E+06	8.071E+03	5.747E+00	1.603E+03	6.322E+00
2023	7.192E+03	3.929E+06	7.911E+03	5.633E+00	1.572E+03	6.197E+00
2024	7.050E+03	3.851E+06	7.755E+03	5.522E+00	1.540E+03	6.074E+00
2025	6.910E+03	3.775E+06	7.601E+03	5.413E+00	1.510E+03	5.954E+00
2026	6.773E+03	3.700E+06	7.451E+03	5.305E+00	1.480E+03	5.836E+00
2027	6.639E+03	3.627E+06	7.303E+03	5.200E+00	1.451E+03	5.720E+00
2028	6.508E+03	3.555E+06	7.158E+03	5.097E+00	1.422E+03	5.607E+00
2029	6.379E+03	3.485E+06	7.017E+03	4.996E+00	1.394E+03	5.496E+00
2030	6.253E+03	3.416E+06	6.878E+03	4.897E+00	1.366E+03	5.387E+00
2031	6.129E+03	3.348E+06	6.742E+03	4.800E+00	1.339E+03	5.281E+00
2032	6.007E+03	3.282E+06	6.608E+03	4.705E+00	1.313E+03	5.176E+00
2033	5.888E+03	3.217E+06	6.477E+03	4.612E+00	1.287E+03	5.073E+00
2034	5.772E+03	3.153E+06	6.349E+03	4.521E+00	1.261E+03	4.973E+00
2035	5.658E+03	3.091E+06	6.223E+03	4.431E+00	1.236E+03	4.875E+00
2036	5.545E+03	3.029E+06	6.100E+03	4.344E+00	1.212E+03	4.778E+00
2037	5.436E+03	2.970E+06	5.979E+03	4.258E+00	1.188E+03	4.683E+00
2038	5.328E+03	2.911E+06	5.861E+03	4.173E+00	1.164E+03	4.591E+00
2039	5.223E+03	2.853E+06	5.745E+03	4.091E+00	1.141E+03	4.500E+00
2040	5.119E+03	2.797E+06	5.631E+03	4.010E+00	1.119E+03	4.411E+00
2041	5.018E+03	2.741E+06	5.520E+03	3.930E+00	1.096E+03	4.323E+00
2042	4.918E+03	2.687E+06	5.410E+03	3.852E+00	1.075E+03	4.238E+00

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	*(m^3/year)*	*(short tons/year)*	*(Mg/year)*	*(m^3/year)*	*(short tons/year)*
2043	4.821E+03	2.634E+06	5.303E+03	3.776E+00	1.053E+03	4.154E+00
2044	4.726E+03	2.582E+06	5.198E+03	3.701E+00	1.033E+03	4.072E+00
2045	4.632E+03	2.530E+06	5.095E+03	3.628E+00	1.012E+03	3.991E+00
2046	4.540E+03	2.480E+06	4.994E+03	3.556E+00	9.921E+02	3.912E+00
2047	4.450E+03	2.431E+06	4.895E+03	3.486E+00	9.725E+02	3.834E+00
2048	4.362E+03	2.383E+06	4.798E+03	3.417E+00	9.532E+02	3.759E+00
2049	4.276E+03	2.336E+06	4.703E+03	3.349E+00	9.344E+02	3.684E+00
2050	4.191E+03	2.290E+06	4.610E+03	3.283E+00	9.159E+02	3.611E+00
2051	4.108E+03	2.244E+06	4.519E+03	3.218E+00	8.977E+02	3.540E+00
2052	4.027E+03	2.200E+06	4.430E+03	3.154E+00	8.799E+02	3.470E+00
2053	3.947E+03	2.156E+06	4.342E+03	3.092E+00	8.625E+02	3.401E+00
2054	3.869E+03	2.114E+06	4.256E+03	3.030E+00	8.454E+02	3.334E+00
2055	3.792E+03	2.072E+06	4.172E+03	2.970E+00	8.287E+02	3.267E+00
2056	3.717E+03	2.031E+06	4.089E+03	2.912E+00	8.123E+02	3.203E+00
2057	3.644E+03	1.991E+06	4.008E+03	2.854E+00	7.962E+02	3.139E+00
2058	3.571E+03	1.951E+06	3.929E+03	2.797E+00	7.804E+02	3.077E+00
2059	3.501E+03	1.912E+06	3.851E+03	2.742E+00	7.650E+02	3.016E+00
2060	3.431E+03	1.875E+06	3.775E+03	2.688E+00	7.498E+02	2.957E+00
2061	3.364E+03	1.837E+06	3.700E+03	2.635E+00	7.350E+02	2.898E+00
2062	3.297E+03	1.801E+06	3.627E+03	2.582E+00	7.204E+02	2.841E+00
2063	3.232E+03	1.765E+06	3.555E+03	2.531E+00	7.062E+02	2.784E+00
2064	3.168E+03	1.730E+06	3.484E+03	2.481E+00	6.922E+02	2.729E+00
2065	3.105E+03	1.696E+06	3.415E+03	2.432E+00	6.785E+02	2.675E+00
2066	3.043E+03	1.663E+06	3.348E+03	2.384E+00	6.650E+02	2.622E+00
2067	2.983E+03	1.630E+06	3.281E+03	2.337E+00	6.519E+02	2.570E+00
2068	2.924E+03	1.597E+06	3.216E+03	2.290E+00	6.390E+02	2.519E+00
2069	2.866E+03	1.566E+06	3.153E+03	2.245E+00	6.263E+02	2.470E+00
2070	2.809E+03	1.535E+06	3.090E+03	2.201E+00	6.139E+02	2.421E+00
2071	2.754E+03	1.504E+06	3.029E+03	2.157E+00	6.018E+02	2.373E+00
2072	2.699E+03	1.475E+06	2.969E+03	2.114E+00	5.898E+02	2.326E+00
2073	2.646E+03	1.445E+06	2.910E+03	2.072E+00	5.782E+02	2.280E+00
2074	2.593E+03	1.417E+06	2.853E+03	2.031E+00	5.667E+02	2.235E+00
2075	2.542E+03	1.389E+06	2.796E+03	1.991E+00	5.555E+02	2.190E+00
2076	2.492E+03	1.361E+06	2.741E+03	1.952E+00	5.445E+02	2.147E+00
2077	2.442E+03	1.334E+06	2.687E+03	1.913E+00	5.337E+02	2.104E+00
2078	2.394E+03	1.308E+06	2.633E+03	1.875E+00	5.231E+02	2.063E+00
2079	2.347E+03	1.282E+06	2.581E+03	1.838E+00	5.128E+02	2.022E+00
2080	2.300E+03	1.257E+06	2.530E+03	1.802E+00	5.026E+02	1.982E+00
2081	2.255E+03	1.232E+06	2.480E+03	1.766E+00	4.927E+02	1.943E+00
2082	2.210E+03	1.207E+06	2.431E+03	1.731E+00	4.829E+02	1.904E+00
2083	2.166E+03	1.183E+06	2.383E+03	1.697E+00	4.734E+02	1.866E+00
2084	2.123E+03	1.160E+06	2.336E+03	1.663E+00	4.640E+02	1.829E+00
2085	2.081E+03	1.137E+06	2.289E+03	1.630E+00	4.548E+02	1.793E+00
2086	2.040E+03	1.114E+06	2.244E+03	1.598E+00	4.458E+02	1.758E+00
2087	2.000E+03	1.092E+06	2.200E+03	1.566E+00	4.370E+02	1.723E+00
2088	1.960E+03	1.071E+06	2.156E+03	1.535E+00	4.283E+02	1.689E+00
2089	1.921E+03	1.050E+06	2.113E+03	1.505E+00	4.198E+02	1.655E+00
2090	1.883E+03	1.029E+06	2.072E+03	1.475E+00	4.115E+02	1.623E+00
2091	1.846E+03	1.008E+06	2.031E+03	1.446E+00	4.034E+02	1.590E+00
2092	1.809E+03	9.885E+05	1.990E+03	1.417E+00	3.954E+02	1.559E+00
2093	1.774E+03	9.689E+05	1.951E+03	1.389E+00	3.876E+02	1.528E+00

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	*(m^3/year)*	*(short tons/year)*	*(Mg/year)*	*(m^3/year)*	*(short tons/year)*
2094	1.738E+03	9.497E+05	1.912E+03	1.362E+00	3.799E+02	1.498E+00
2095	1.704E+03	9.309E+05	1.874E+03	1.335E+00	3.724E+02	1.468E+00
2096	1.670E+03	9.125E+05	1.837E+03	1.308E+00	3.650E+02	1.439E+00
2097	1.637E+03	8.944E+05	1.801E+03	1.282E+00	3.578E+02	1.411E+00
2098	1.605E+03	8.767E+05	1.765E+03	1.257E+00	3.507E+02	1.383E+00
2099	1.573E+03	8.593E+05	1.730E+03	1.232E+00	3.437E+02	1.355E+00
2100	1.542E+03	8.423E+05	1.696E+03	1.208E+00	3.369E+02	1.328E+00
2101	1.511E+03	8.256E+05	1.662E+03	1.184E+00	3.303E+02	1.302E+00
2102	1.481E+03	8.093E+05	1.630E+03	1.160E+00	3.237E+02	1.276E+00
2103	1.452E+03	7.933E+05	1.597E+03	1.137E+00	3.173E+02	1.251E+00
2104	1.423E+03	7.776E+05	1.566E+03	1.115E+00	3.110E+02	1.226E+00
2105	1.395E+03	7.622E+05	1.535E+03	1.093E+00	3.049E+02	1.202E+00
2106	1.367E+03	7.471E+05	1.504E+03	1.071E+00	2.988E+02	1.178E+00
2107	1.340E+03	7.323E+05	1.474E+03	1.050E+00	2.929E+02	1.155E+00
2108	1.314E+03	7.178E+05	1.445E+03	1.029E+00	2.871E+02	1.132E+00
2109	1.288E+03	7.036E+05	1.417E+03	1.009E+00	2.814E+02	1.110E+00
2110	1.262E+03	6.896E+05	1.389E+03	9.888E-01	2.759E+02	1.088E+00
2111	1.237E+03	6.760E+05	1.361E+03	9.692E-01	2.704E+02	1.066E+00
2112	1.213E+03	6.626E+05	1.334E+03	9.500E-01	2.650E+02	1.045E+00
2113	1.189E+03	6.495E+05	1.308E+03	9.312E-01	2.598E+02	1.024E+00
2114	1.165E+03	6.366E+05	1.282E+03	9.128E-01	2.546E+02	1.004E+00
2115	1.142E+03	6.240E+05	1.256E+03	8.947E-01	2.496E+02	9.842E-01
2116	1.120E+03	6.116E+05	1.232E+03	8.770E-01	2.447E+02	9.647E-01
2117	1.097E+03	5.995E+05	1.207E+03	8.596E-01	2.398E+02	9.456E-01
2118	1.076E+03	5.877E+05	1.183E+03	8.426E-01	2.351E+02	9.268E-01
2119	1.054E+03	5.760E+05	1.160E+03	8.259E-01	2.304E+02	9.085E-01
2120	1.034E+03	5.646E+05	1.137E+03	8.095E-01	2.258E+02	8.905E-01
2121	1.013E+03	5.534E+05	1.114E+03	7.935E-01	2.214E+02	8.729E-01
2122	9.930E+02	5.425E+05	1.092E+03	7.778E-01	2.170E+02	8.556E-01
2123	9.733E+02	5.317E+05	1.071E+03	7.624E-01	2.127E+02	8.386E-01
2124	9.541E+02	5.212E+05	1.049E+03	7.473E-01	2.085E+02	8.220E-01
2125	9.352E+02	5.109E+05	1.029E+03	7.325E-01	2.044E+02	8.058E-01
2126	9.167E+02	5.008E+05	1.008E+03	7.180E-01	2.003E+02	7.898E-01
2127	8.985E+02	4.909E+05	9.884E+02	7.038E-01	1.963E+02	7.742E-01
2128	8.807E+02	4.811E+05	9.688E+02	6.898E-01	1.925E+02	7.588E-01
2129	8.633E+02	4.716E+05	9.496E+02	6.762E-01	1.886E+02	7.438E-01
2130	8.462E+02	4.623E+05	9.308E+02	6.628E-01	1.849E+02	7.291E-01
2131	8.294E+02	4.531E+05	9.124E+02	6.497E-01	1.812E+02	7.146E-01
2132	8.130E+02	4.441E+05	8.943E+02	6.368E-01	1.777E+02	7.005E-01
2133	7.969E+02	4.353E+05	8.766E+02	6.242E-01	1.741E+02	6.866E-01



Summary Report

Landfill Name or Identifier: Holloway Proposed Project

Date: Friday, August 23, 2019

Description/Comments:
This is the proposed project calculation. The landfill is assumed to have disposed of 344 tons per day of biosolids (the 2016-2017 average) beginning in 1993 and ending in 2020. From 2020 to 2060, the landfill is assumed to dispose of 1000 tons per day of biosolids. 1000 tons/day was selected based on the proposed project of 2,000 tons/day and an assumed ratio of 50% inerts and 50% biosolids.

About LandGEM:

First-Order Decomposition Rate Equation:

$$Q_{CH_4} = \sum_{i=1}^{n} \sum_{j=0.1}^{1} kL_o \left(\frac{M_i}{10} \right) e^{-kt_{ij}}$$

Where,

Q_{CH4} = annual methane generation in the year of the calculation ($m^3/year$)
i = 1-year time increment
n = (year of the calculation) - (initial year of waste acceptance)
j = 0.1-year time increment
k = methane generation rate ($year^{-1}$)
L_o = potential methane generation capacity (m^3/Mg)
M_i = mass of waste accepted in the ith year (Mg)
t_{ij} = age of the jth section of waste mass M_i accepted in the ith year (*decimal years*, e.g., 3.2 years)

LandGEM is based on a first-order decomposition rate equation for quantifying emissions from the decomposition of landfilled waste in municipal solid waste (MSW) landfills. The software provides a relatively simple approach to estimating landfill gas emissions. Model defaults are based on empirical data from U.S. landfills. Field test data can also be used in place of model defaults when available. Further guidance on EPA test methods, Clean Air Act (CAA) regulations, and other guidance regarding landfill gas emissions and control technology requirements can be found at http://www.epa.gov/ttnatw01/landfill/landflpg.html.

LandGEM is considered a screening tool — the better the input data, the better the estimates. Often, there are limitations with the available data regarding waste quantity and composition, variation in design and operating practices over time, and changes occurring over time that impact the emissions potential. Changes to landfill operation, such as operating under wet conditions through leachate recirculation or other liquid additions, will result in generating more gas at a faster rate. Defaults for estimating emissions for this type of operation are being developed to include in LandGEM along with defaults for convential landfills (no leachate or liquid additions) for developing emission inventories and determining CAA applicability. Refer to the Web site identified above for future updates.

Input Review

LANDFILL CHARACTERISTICS

Landfill Open Year	**1993**	
Landfill Closure Year (with 80-year limit)	**2030**	
Actual Closure Year (without limit)	***2030***	
Have Model Calculate Closure Year?	**No**	
Waste Design Capacity	**14,000,000**	*short tons*

MODEL PARAMETERS

Methane Generation Rate, k	**0.020**	*year $^{-1}$*
Potential Methane Generation Capacity, L_o	**170**	*m^3/Mg*
NMOC Concentration	**838**	*ppmv as hexane*
Methane Content	**50**	*% by volume*

GASES / POLLUTANTS SELECTED

Gas / Pollutant #1:	**Total landfill gas**
Gas / Pollutant #2:	**Methane**
Gas / Pollutant #3:	**Carbon dioxide**
Gas / Pollutant #4:	**NMOC**

WASTE ACCEPTANCE RATES

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
1993	0	0	0	0
1994	0	0	0	0
1995	0	0	0	0
1996	0	0	0	0
1997	0	0	0	0
1998	0	0	0	0
1999	0	0	0	0
2000	0	0	0	0
2001	0	0	0	0
2002	0	0	0	0
2003	0	0	0	0
2004	0	0	0	0
2005	0	0	0	0
2006	0	0	0	0
2007	0	0	0	0
2008	0	0	0	0
2009	31,581	34,739	0	0
2010	23,260	25,586	31,581	34,739
2011	28,497	31,347	54,841	60,325
2012	38,453	42,298	83,338	91,672
2013	65,365	71,902	121,791	133,970
2014	88,060	96,866	187,156	205,872
2015	104,932	115,425	275,216	302,738
2016	101,253	111,378	380,148	418,163
2017	166,747	183,422	481,401	529,541
2018	325,749	358,324	648,148	712,963
2019	325,750	358,325	973,897	1,071,287
2020	331,818	365,000	1,299,647	1,429,612
2021	331,818	365,000	1,631,465	1,794,612
2022	331,818	365,000	1,963,284	2,159,612
2023	331,818	365,000	2,295,102	2,524,612
2024	331,818	365,000	2,626,920	2,889,612
2025	331,818	365,000	2,958,738	3,254,612
2026	331,818	365,000	3,290,556	3,619,612
2027	331,818	365,000	3,622,375	3,984,612
2028	331,818	365,000	3,954,193	4,349,612
2029	331,818	365,000	4,286,011	4,714,612
2030	331,818	365,000	4,617,829	5,079,612
2031	0	0	4,949,647	5,444,612
2032	0	0	4,949,647	5,444,612

WASTE ACCEPTANCE RATES (Continued)

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
2033	0	0	4,949,647	5,444,612
2034	0	0	4,949,647	5,444,612
2035	0	0	4,949,647	5,444,612
2036	0	0	4,949,647	5,444,612
2037	0	0	4,949,647	5,444,612
2038	0	0	4,949,647	5,444,612
2039	0	0	4,949,647	5,444,612
2040	0	0	4,949,647	5,444,612
2041	0	0	4,949,647	5,444,612
2042	0	0	4,949,647	5,444,612
2043	0	0	4,949,647	5,444,612
2044	0	0	4,949,647	5,444,612
2045	0	0	4,949,647	5,444,612
2046	0	0	4,949,647	5,444,612
2047	0	0	4,949,647	5,444,612
2048	0	0	4,949,647	5,444,612
2049	0	0	4,949,647	5,444,612
2050	0	0	4,949,647	5,444,612
2051	0	0	4,949,647	5,444,612
2052	0	0	4,949,647	5,444,612
2053	0	0	4,949,647	5,444,612
2054	0	0	4,949,647	5,444,612
2055	0	0	4,949,647	5,444,612
2056	0	0	4,949,647	5,444,612
2057	0	0	4,949,647	5,444,612
2058	0	0	4,949,647	5,444,612
2059	0	0	4,949,647	5,444,612
2060	0	0	4,949,647	5,444,612
2061	0	0	4,949,647	5,444,612
2062	0	0	4,949,647	5,444,612
2063	0	0	4,949,647	5,444,612
2064	0	0	4,949,647	5,444,612
2065	0	0	4,949,647	5,444,612
2066	0	0	4,949,647	5,444,612
2067	0	0	4,949,647	5,444,612
2068	0	0	4,949,647	5,444,612
2069	0	0	4,949,647	5,444,612
2070	0	0	4,949,647	5,444,612
2071	0	0	4,949,647	5,444,612
2072	0	0	4,949,647	5,444,612

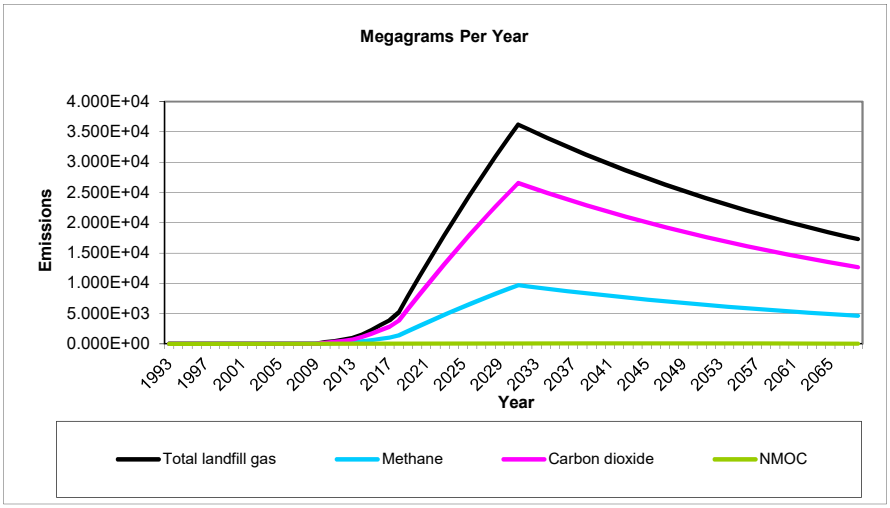
Pollutant Parameters

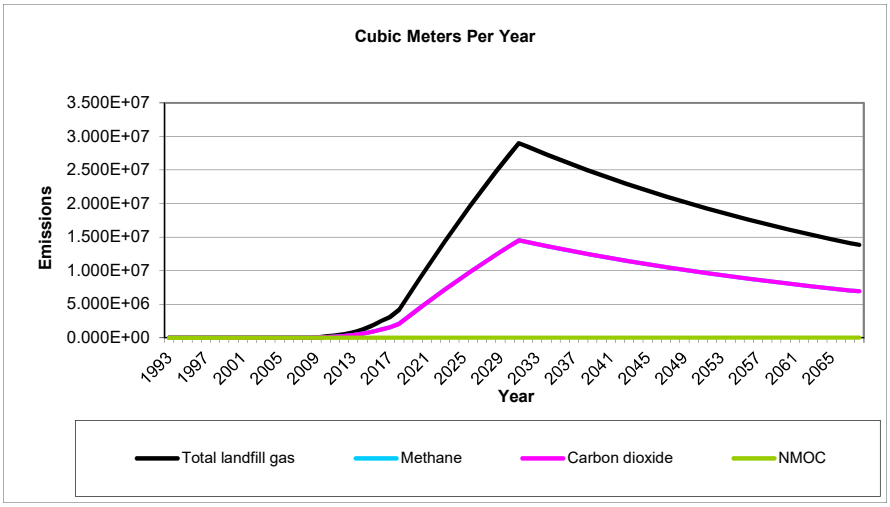
		Gas / Pollutant Default Parameters:		*User-specified Pollutant Parameters:*	
	Compound	Concentration (*ppmv*)	Molecular Weight	Concentration (*ppmv*)	Molecular Weight
Gases	Total landfill gas		0.00		
	Methane		16.04		
	Carbon dioxide		44.01		
	NMOC	4,000	86.18		
Pollutants	1,1,1-Trichloroethane (methyl chloroform) - HAP	0.48	133.41		
	1,1,2,2-Tetrachloroethane - HAP/VOC	1.1	167.85		
	1,1-Dichloroethane (ethylidene dichloride) - HAP/VOC	2.4	98.97		
	1,1-Dichloroethene (vinylidene chloride) - HAP/VOC	0.20	96.94		
	1,2-Dichloroethane (ethylene dichloride) - HAP/VOC	0.41	98.96		
	1,2-Dichloropropane (propylene dichloride) - HAP/VOC	0.18	112.99		
	2-Propanol (isopropyl alcohol) - VOC	50	60.11		
	Acetone	7.0	58.08		
	Acrylonitrile - HAP/VOC	6.3	53.06		
	Benzene - No or Unknown Co-disposal - HAP/VOC	1.9	78.11		
	Benzene - Co-disposal - HAP/VOC	11	78.11		
	Bromodichloromethane - VOC	3.1	163.83		
	Butane - VOC	5.0	58.12		
	Carbon disulfide - HAP/VOC	0.58	76.13		
	Carbon monoxide	140	28.01		
	Carbon tetrachloride - HAP/VOC	4.0E-03	153.84		
	Carbonyl sulfide - HAP/VOC	0.49	60.07		
	Chlorobenzene - HAP/VOC	0.25	112.56		
	Chlorodifluoromethane	1.3	86.47		
	Chloroethane (ethyl chloride) - HAP/VOC	1.3	64.52		
	Chloroform - HAP/VOC	0.03	119.39		
	Chloromethane - VOC	1.2	50.49		
	Dichlorobenzene - (HAP for para isomer/VOC)	0.21	147		
	Dichlorodifluoromethane	16	120.91		
	Dichlorofluoromethane - VOC	2.6	102.92		
	Dichloromethane (methylene chloride) - HAP	14	84.94		
	Dimethyl sulfide (methyl sulfide) - VOC	7.8	62.13		
	Ethane	890	30.07		
	Ethanol - VOC	27	46.08		

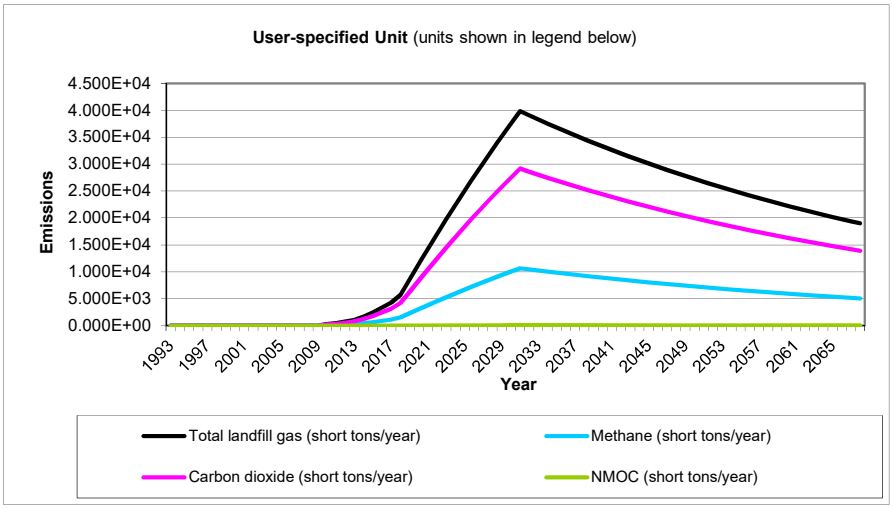
Pollutant Parameters (Continued)

		Gas / Pollutant Default Parameters:		*User-specified Pollutant Parameters:*	
	Compound	Concentration (*ppmv*)	Molecular Weight	Concentration (*ppmv*)	Molecular Weight
Pollutants	Ethyl mercaptan (ethanethiol) - VOC	2.3	62.13		
	Ethylbenzene - HAP/VOC	4.6	106.16		
	Ethylene dibromide - HAP/VOC	1.0E-03	187.88		
	Fluorotrichloromethane - VOC	0.76	137.38		
	Hexane - HAP/VOC	6.6	86.18		
	Hydrogen sulfide	36	34.08		
	Mercury (total) - HAP	2.9E-04	200.61		
	Methyl ethyl ketone - HAP/VOC	7.1	72.11		
	Methyl isobutyl ketone - HAP/VOC	1.9	100.16		
	Methyl mercaptan - VOC	2.5	48.11		
	Pentane - VOC	3.3	72.15		
	Perchloroethylene (tetrachloroethylene) - HAP	3.7	165.83		
	Propane - VOC	11	44.09		
	t-1,2-Dichloroethene - VOC	2.8	96.94		
	Toluene - No or Unknown Co-disposal - HAP/VOC	39	92.13		
	Toluene - Co-disposal - HAP/VOC	170	92.13		
	Trichloroethylene (trichloroethene) - HAP/VOC	2.8	131.40		
	Vinyl chloride - HAP/VOC	7.3	62.50		
	Xylenes - HAP/VOC	12	106.16		

Graphs


Megagrams Per Year
Emissions
4.000E+04
3.500E+04
3.000E+04
2.500E+04
2.000E+04
1.500E+04
1.000E+04
5.000E+03
0.000E+00
1993 1997 2001 2005 2009 2013 2017 2021 2025 2029 2033 2037 2041 2045 2049 2053 2057 2061 2065
Year
Total landfill gas
Methane
Carbon dioxide
NMOC


Cubic Meters Per Year
Emissions
3.500E+07
3.000E+07
2.500E+07
2.000E+07
1.500E+07
1.000E+07
5.000E+06
0.000E+00
1993 1997 2001 2005 2009 2013 2017 2021 2025 2029 2033 2037 2041 2045 2049 2053 2057 2061 2065
Year
Total landfill gas
Methane
Carbon dioxide
NMOC


User-specified Unit (units shown in legend below)
Emissions
4.500E+04
4.000E+04
3.500E+04
3.000E+04
2.500E+04
2.000E+04
1.500E+04
1.000E+04
5.000E+03
0.000E+00
1993 1997 2001 2005 2009 2013 2017 2021 2025 2029 2033 2037 2041 2045 2049 2053 2057 2061 2065
Year
Total landfill gas (short tons/year)
Methane (short tons/year)
Carbon dioxide (short tons/year)
NMOC (short tons/year)

Results

Year	Total landfill gas			Methane		
	(Mg/year)	*(m^3/year)*	*(short tons/year)*	*(Mg/year)*	*(m^3/year)*	*(short tons/year)*
1993	0	0	0	0	0	0
1994	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1995	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1996	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1997	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1998	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1999	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2000	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2001	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2002	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2003	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2004	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2005	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2006	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2007	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2008	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2009	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2010	2.658E+02	2.128E+05	2.924E+02	7.099E+01	1.064E+05	7.809E+01
2011	4.563E+02	3.654E+05	5.019E+02	1.219E+02	1.827E+05	1.341E+02
2012	6.871E+02	5.502E+05	7.558E+02	1.835E+02	2.751E+05	2.019E+02
2013	9.971E+02	7.984E+05	1.097E+03	2.663E+02	3.992E+05	2.930E+02
2014	1.527E+03	1.223E+06	1.680E+03	4.080E+02	6.116E+05	4.488E+02
2015	2.238E+03	1.792E+06	2.462E+03	5.979E+02	8.962E+05	6.577E+02
2016	3.077E+03	2.464E+06	3.385E+03	8.219E+02	1.232E+06	9.041E+02
2017	3.868E+03	3.098E+06	4.255E+03	1.033E+03	1.549E+06	1.137E+03
2018	5.195E+03	4.160E+06	5.715E+03	1.388E+03	2.080E+06	1.526E+03
2019	7.834E+03	6.273E+06	8.617E+03	2.092E+03	3.136E+06	2.302E+03
2020	1.042E+04	8.344E+06	1.146E+04	2.783E+03	4.172E+06	3.062E+03
2021	1.301E+04	1.041E+07	1.431E+04	3.474E+03	5.207E+06	3.822E+03
2022	1.554E+04	1.244E+07	1.710E+04	4.151E+03	6.222E+06	4.566E+03
2023	1.803E+04	1.443E+07	1.983E+04	4.815E+03	7.217E+06	5.297E+03
2024	2.046E+04	1.639E+07	2.251E+04	5.466E+03	8.193E+06	6.012E+03
2025	2.285E+04	1.830E+07	2.513E+04	6.103E+03	9.148E+06	6.714E+03
2026	2.519E+04	2.017E+07	2.771E+04	6.728E+03	1.009E+07	7.401E+03
2027	2.748E+04	2.201E+07	3.023E+04	7.341E+03	1.100E+07	8.075E+03
2028	2.973E+04	2.381E+07	3.270E+04	7.942E+03	1.190E+07	8.736E+03
2029	3.194E+04	2.557E+07	3.513E+04	8.530E+03	1.279E+07	9.383E+03
2030	3.410E+04	2.730E+07	3.751E+04	9.107E+03	1.365E+07	1.002E+04
2031	3.621E+04	2.900E+07	3.983E+04	9.673E+03	1.450E+07	1.064E+04
2032	3.550E+04	2.842E+07	3.905E+04	9.481E+03	1.421E+07	1.043E+04
2033	3.479E+04	2.786E+07	3.827E+04	9.294E+03	1.393E+07	1.022E+04
2034	3.410E+04	2.731E+07	3.751E+04	9.110E+03	1.365E+07	1.002E+04
2035	3.343E+04	2.677E+07	3.677E+04	8.929E+03	1.338E+07	9.822E+03
2036	3.277E+04	2.624E+07	3.604E+04	8.752E+03	1.312E+07	9.628E+03
2037	3.212E+04	2.572E+07	3.533E+04	8.579E+03	1.286E+07	9.437E+03
2038	3.148E+04	2.521E+07	3.463E+04	8.409E+03	1.260E+07	9.250E+03
2039	3.086E+04	2.471E+07	3.394E+04	8.243E+03	1.236E+07	9.067E+03
2040	3.025E+04	2.422E+07	3.327E+04	8.080E+03	1.211E+07	8.888E+03
2041	2.965E+04	2.374E+07	3.261E+04	7.920E+03	1.187E+07	8.712E+03
2042	2.906E+04	2.327E+07	3.197E+04	7.763E+03	1.164E+07	8.539E+03

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	*(m^3/year)*	*(short tons/year)*	*(Mg/year)*	*(m^3/year)*	*(short tons/year)*
2043	2.849E+04	2.281E+07	3.134E+04	7.609E+03	1.141E+07	8.370E+03
2044	2.792E+04	2.236E+07	3.071E+04	7.458E+03	1.118E+07	8.204E+03
2045	2.737E+04	2.192E+07	3.011E+04	7.311E+03	1.096E+07	8.042E+03
2046	2.683E+04	2.148E+07	2.951E+04	7.166E+03	1.074E+07	7.883E+03
2047	2.630E+04	2.106E+07	2.893E+04	7.024E+03	1.053E+07	7.726E+03
2048	2.578E+04	2.064E+07	2.835E+04	6.885E+03	1.032E+07	7.573E+03
2049	2.527E+04	2.023E+07	2.779E+04	6.749E+03	1.012E+07	7.423E+03
2050	2.476E+04	1.983E+07	2.724E+04	6.615E+03	9.915E+06	7.276E+03
2051	2.427E+04	1.944E+07	2.670E+04	6.484E+03	9.719E+06	7.132E+03
2052	2.379E+04	1.905E+07	2.617E+04	6.356E+03	9.527E+06	6.991E+03
2053	2.332E+04	1.868E+07	2.565E+04	6.230E+03	9.338E+06	6.853E+03
2054	2.286E+04	1.831E+07	2.515E+04	6.106E+03	9.153E+06	6.717E+03
2055	2.241E+04	1.794E+07	2.465E+04	5.985E+03	8.972E+06	6.584E+03
2056	2.196E+04	1.759E+07	2.416E+04	5.867E+03	8.794E+06	6.454E+03
2057	2.153E+04	1.724E+07	2.368E+04	5.751E+03	8.620E+06	6.326E+03
2058	2.110E+04	1.690E+07	2.321E+04	5.637E+03	8.449E+06	6.201E+03
2059	2.069E+04	1.656E+07	2.275E+04	5.525E+03	8.282E+06	6.078E+03
2060	2.028E+04	1.624E+07	2.230E+04	5.416E+03	8.118E+06	5.957E+03
2061	1.987E+04	1.591E+07	2.186E+04	5.309E+03	7.957E+06	5.840E+03
2062	1.948E+04	1.560E+07	2.143E+04	5.204E+03	7.800E+06	5.724E+03
2063	1.910E+04	1.529E+07	2.100E+04	5.100E+03	7.645E+06	5.611E+03
2064	1.872E+04	1.499E+07	2.059E+04	4.999E+03	7.494E+06	5.499E+03
2065	1.835E+04	1.469E+07	2.018E+04	4.900E+03	7.345E+06	5.391E+03
2066	1.798E+04	1.440E+07	1.978E+04	4.803E+03	7.200E+06	5.284E+03
2067	1.763E+04	1.411E+07	1.939E+04	4.708E+03	7.057E+06	5.179E+03
2068	1.728E+04	1.384E+07	1.901E+04	4.615E+03	6.918E+06	5.077E+03
2069	1.694E+04	1.356E+07	1.863E+04	4.524E+03	6.781E+06	4.976E+03
2070	1.660E+04	1.329E+07	1.826E+04	4.434E+03	6.646E+06	4.878E+03
2071	1.627E+04	1.303E+07	1.790E+04	4.346E+03	6.515E+06	4.781E+03
2072	1.595E+04	1.277E+07	1.754E+04	4.260E+03	6.386E+06	4.686E+03
2073	1.563E+04	1.252E+07	1.720E+04	4.176E+03	6.259E+06	4.594E+03
2074	1.532E+04	1.227E+07	1.686E+04	4.093E+03	6.135E+06	4.503E+03
2075	1.502E+04	1.203E+07	1.652E+04	4.012E+03	6.014E+06	4.413E+03
2076	1.472E+04	1.179E+07	1.620E+04	3.933E+03	5.895E+06	4.326E+03
2077	1.443E+04	1.156E+07	1.587E+04	3.855E+03	5.778E+06	4.240E+03
2078	1.415E+04	1.133E+07	1.556E+04	3.779E+03	5.664E+06	4.156E+03
2079	1.387E+04	1.110E+07	1.525E+04	3.704E+03	5.552E+06	4.074E+03
2080	1.359E+04	1.088E+07	1.495E+04	3.630E+03	5.442E+06	3.993E+03
2081	1.332E+04	1.067E+07	1.465E+04	3.558E+03	5.334E+06	3.914E+03
2082	1.306E+04	1.046E+07	1.436E+04	3.488E+03	5.228E+06	3.837E+03
2083	1.280E+04	1.025E+07	1.408E+04	3.419E+03	5.125E+06	3.761E+03
2084	1.255E+04	1.005E+07	1.380E+04	3.351E+03	5.023E+06	3.686E+03
2085	1.230E+04	9.848E+06	1.353E+04	3.285E+03	4.924E+06	3.613E+03
2086	1.205E+04	9.653E+06	1.326E+04	3.220E+03	4.826E+06	3.542E+03
2087	1.182E+04	9.461E+06	1.300E+04	3.156E+03	4.731E+06	3.472E+03
2088	1.158E+04	9.274E+06	1.274E+04	3.094E+03	4.637E+06	3.403E+03
2089	1.135E+04	9.090E+06	1.249E+04	3.032E+03	4.545E+06	3.336E+03
2090	1.113E+04	8.910E+06	1.224E+04	2.972E+03	4.455E+06	3.270E+03
2091	1.091E+04	8.734E+06	1.200E+04	2.913E+03	4.367E+06	3.205E+03
2092	1.069E+04	8.561E+06	1.176E+04	2.856E+03	4.281E+06	3.141E+03
2093	1.048E+04	8.392E+06	1.153E+04	2.799E+03	4.196E+06	3.079E+03

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	*(m^3/year)*	*(short tons/year)*	*(Mg/year)*	*(m^3/year)*	*(short tons/year)*
2094	1.027E+04	8.225E+06	1.130E+04	2.744E+03	4.113E+06	3.018E+03
2095	1.007E+04	8.063E+06	1.108E+04	2.689E+03	4.031E+06	2.958E+03
2096	9.869E+03	7.903E+06	1.086E+04	2.636E+03	3.951E+06	2.900E+03
2097	9.674E+03	7.746E+06	1.064E+04	2.584E+03	3.873E+06	2.842E+03
2098	9.482E+03	7.593E+06	1.043E+04	2.533E+03	3.796E+06	2.786E+03
2099	9.295E+03	7.443E+06	1.022E+04	2.483E+03	3.721E+06	2.731E+03
2100	9.111E+03	7.295E+06	1.002E+04	2.434E+03	3.648E+06	2.677E+03
2101	8.930E+03	7.151E+06	9.823E+03	2.385E+03	3.575E+06	2.624E+03
2102	8.753E+03	7.009E+06	9.629E+03	2.338E+03	3.505E+06	2.572E+03
2103	8.580E+03	6.870E+06	9.438E+03	2.292E+03	3.435E+06	2.521E+03
2104	8.410E+03	6.734E+06	9.251E+03	2.246E+03	3.367E+06	2.471E+03
2105	8.244E+03	6.601E+06	9.068E+03	2.202E+03	3.301E+06	2.422E+03
2106	8.080E+03	6.470E+06	8.888E+03	2.158E+03	3.235E+06	2.374E+03
2107	7.920E+03	6.342E+06	8.712E+03	2.116E+03	3.171E+06	2.327E+03
2108	7.763E+03	6.217E+06	8.540E+03	2.074E+03	3.108E+06	2.281E+03
2109	7.610E+03	6.094E+06	8.371E+03	2.033E+03	3.047E+06	2.236E+03
2110	7.459E+03	5.973E+06	8.205E+03	1.992E+03	2.986E+06	2.192E+03
2111	7.311E+03	5.855E+06	8.042E+03	1.953E+03	2.927E+06	2.148E+03
2112	7.167E+03	5.739E+06	7.883E+03	1.914E+03	2.869E+06	2.106E+03
2113	7.025E+03	5.625E+06	7.727E+03	1.876E+03	2.813E+06	2.064E+03
2114	6.886E+03	5.514E+06	7.574E+03	1.839E+03	2.757E+06	2.023E+03
2115	6.749E+03	5.404E+06	7.424E+03	1.803E+03	2.702E+06	1.983E+03
2116	6.616E+03	5.297E+06	7.277E+03	1.767E+03	2.649E+06	1.944E+03
2117	6.485E+03	5.193E+06	7.133E+03	1.732E+03	2.596E+06	1.905E+03
2118	6.356E+03	5.090E+06	6.992E+03	1.698E+03	2.545E+06	1.868E+03
2119	6.230E+03	4.989E+06	6.853E+03	1.664E+03	2.494E+06	1.831E+03
2120	6.107E+03	4.890E+06	6.718E+03	1.631E+03	2.445E+06	1.794E+03
2121	5.986E+03	4.793E+06	6.585E+03	1.599E+03	2.397E+06	1.759E+03
2122	5.867E+03	4.698E+06	6.454E+03	1.567E+03	2.349E+06	1.724E+03
2123	5.751E+03	4.605E+06	6.326E+03	1.536E+03	2.303E+06	1.690E+03
2124	5.637E+03	4.514E+06	6.201E+03	1.506E+03	2.257E+06	1.656E+03
2125	5.526E+03	4.425E+06	6.078E+03	1.476E+03	2.212E+06	1.624E+03
2126	5.416E+03	4.337E+06	5.958E+03	1.447E+03	2.169E+06	1.591E+03
2127	5.309E+03	4.251E+06	5.840E+03	1.418E+03	2.126E+06	1.560E+03
2128	5.204E+03	4.167E+06	5.724E+03	1.390E+03	2.084E+06	1.529E+03
2129	5.101E+03	4.085E+06	5.611E+03	1.363E+03	2.042E+06	1.499E+03
2130	5.000E+03	4.004E+06	5.500E+03	1.336E+03	2.002E+06	1.469E+03
2131	4.901E+03	3.924E+06	5.391E+03	1.309E+03	1.962E+06	1.440E+03
2132	4.804E+03	3.847E+06	5.284E+03	1.283E+03	1.923E+06	1.411E+03
2133	4.709E+03	3.771E+06	5.180E+03	1.258E+03	1.885E+06	1.384E+03

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	*(m^3/year)*	*(short tons/year)*	*(Mg/year)*	*(m^3/year)*	*(short tons/year)*
1993	0	0	0	0	0	0
1994	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1995	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1996	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1997	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1998	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1999	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2000	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2001	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2002	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2003	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2004	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2005	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2006	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2007	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2008	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2009	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2010	1.948E+02	1.064E+05	2.143E+02	6.393E-01	1.784E+02	7.032E-01
2011	3.344E+02	1.827E+05	3.678E+02	1.097E+00	3.062E+02	1.207E+00
2012	5.036E+02	2.751E+05	5.539E+02	1.653E+00	4.611E+02	1.818E+00
2013	7.308E+02	3.992E+05	8.038E+02	2.398E+00	6.691E+02	2.638E+00
2014	1.119E+03	6.116E+05	1.231E+03	3.674E+00	1.025E+03	4.041E+00
2015	1.640E+03	8.962E+05	1.805E+03	5.384E+00	1.502E+03	5.922E+00
2016	2.255E+03	1.232E+06	2.481E+03	7.401E+00	2.065E+03	8.142E+00
2017	2.835E+03	1.549E+06	3.119E+03	9.305E+00	2.596E+03	1.023E+01
2018	3.807E+03	2.080E+06	4.188E+03	1.250E+01	3.486E+03	1.375E+01
2019	5.741E+03	3.136E+06	6.315E+03	1.884E+01	5.257E+03	2.073E+01
2020	7.637E+03	4.172E+06	8.401E+03	2.506E+01	6.992E+03	2.757E+01
2021	9.532E+03	5.207E+06	1.049E+04	3.128E+01	8.728E+03	3.441E+01
2022	1.139E+04	6.222E+06	1.253E+04	3.738E+01	1.043E+04	4.112E+01
2023	1.321E+04	7.217E+06	1.453E+04	4.336E+01	1.210E+04	4.769E+01
2024	1.500E+04	8.193E+06	1.650E+04	4.922E+01	1.373E+04	5.414E+01
2025	1.675E+04	9.148E+06	1.842E+04	5.496E+01	1.533E+04	6.046E+01
2026	1.846E+04	1.009E+07	2.031E+04	6.059E+01	1.690E+04	6.665E+01
2027	2.014E+04	1.100E+07	2.216E+04	6.611E+01	1.844E+04	7.272E+01
2028	2.179E+04	1.190E+07	2.397E+04	7.151E+01	1.995E+04	7.866E+01
2029	2.341E+04	1.279E+07	2.575E+04	7.681E+01	2.143E+04	8.450E+01
2030	2.499E+04	1.365E+07	2.749E+04	8.201E+01	2.288E+04	9.021E+01
2031	2.654E+04	1.450E+07	2.919E+04	8.710E+01	2.430E+04	9.581E+01
2032	2.601E+04	1.421E+07	2.862E+04	8.538E+01	2.382E+04	9.392E+01
2033	2.550E+04	1.393E+07	2.805E+04	8.369E+01	2.335E+04	9.206E+01
2034	2.499E+04	1.365E+07	2.749E+04	8.203E+01	2.289E+04	9.023E+01
2035	2.450E+04	1.338E+07	2.695E+04	8.041E+01	2.243E+04	8.845E+01
2036	2.401E+04	1.312E+07	2.642E+04	7.881E+01	2.199E+04	8.670E+01
2037	2.354E+04	1.286E+07	2.589E+04	7.725E+01	2.155E+04	8.498E+01
2038	2.307E+04	1.260E+07	2.538E+04	7.572E+01	2.113E+04	8.330E+01
2039	2.262E+04	1.236E+07	2.488E+04	7.422E+01	2.071E+04	8.165E+01
2040	2.217E+04	1.211E+07	2.439E+04	7.276E+01	2.030E+04	8.003E+01
2041	2.173E+04	1.187E+07	2.390E+04	7.131E+01	1.990E+04	7.845E+01
2042	2.130E+04	1.164E+07	2.343E+04	6.990E+01	1.950E+04	7.689E+01

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	*(m^3/year)*	*(short tons/year)*	*(Mg/year)*	*(m^3/year)*	*(short tons/year)*
2043	2.088E+04	1.141E+07	2.297E+04	6.852E+01	1.912E+04	7.537E+01
2044	2.046E+04	1.118E+07	2.251E+04	6.716E+01	1.874E+04	7.388E+01
2045	2.006E+04	1.096E+07	2.206E+04	6.583E+01	1.837E+04	7.241E+01
2046	1.966E+04	1.074E+07	2.163E+04	6.453E+01	1.800E+04	7.098E+01
2047	1.927E+04	1.053E+07	2.120E+04	6.325E+01	1.765E+04	6.958E+01
2048	1.889E+04	1.032E+07	2.078E+04	6.200E+01	1.730E+04	6.820E+01
2049	1.852E+04	1.012E+07	2.037E+04	6.077E+01	1.695E+04	6.685E+01
2050	1.815E+04	9.915E+06	1.996E+04	5.957E+01	1.662E+04	6.552E+01
2051	1.779E+04	9.719E+06	1.957E+04	5.839E+01	1.629E+04	6.423E+01
2052	1.744E+04	9.527E+06	1.918E+04	5.723E+01	1.597E+04	6.295E+01
2053	1.709E+04	9.338E+06	1.880E+04	5.610E+01	1.565E+04	6.171E+01
2054	1.675E+04	9.153E+06	1.843E+04	5.499E+01	1.534E+04	6.049E+01
2055	1.642E+04	8.972E+06	1.807E+04	5.390E+01	1.504E+04	5.929E+01
2056	1.610E+04	8.794E+06	1.771E+04	5.283E+01	1.474E+04	5.811E+01
2057	1.578E+04	8.620E+06	1.736E+04	5.178E+01	1.445E+04	5.696E+01
2058	1.547E+04	8.449E+06	1.701E+04	5.076E+01	1.416E+04	5.584E+01
2059	1.516E+04	8.282E+06	1.668E+04	4.975E+01	1.388E+04	5.473E+01
2060	1.486E+04	8.118E+06	1.635E+04	4.877E+01	1.361E+04	5.365E+01
2061	1.457E+04	7.957E+06	1.602E+04	4.780E+01	1.334E+04	5.258E+01
2062	1.428E+04	7.800E+06	1.570E+04	4.686E+01	1.307E+04	5.154E+01
2063	1.399E+04	7.645E+06	1.539E+04	4.593E+01	1.281E+04	5.052E+01
2064	1.372E+04	7.494E+06	1.509E+04	4.502E+01	1.256E+04	4.952E+01
2065	1.345E+04	7.345E+06	1.479E+04	4.413E+01	1.231E+04	4.854E+01
2066	1.318E+04	7.200E+06	1.450E+04	4.325E+01	1.207E+04	4.758E+01
2067	1.292E+04	7.057E+06	1.421E+04	4.240E+01	1.183E+04	4.664E+01
2068	1.266E+04	6.918E+06	1.393E+04	4.156E+01	1.159E+04	4.571E+01
2069	1.241E+04	6.781E+06	1.365E+04	4.074E+01	1.136E+04	4.481E+01
2070	1.217E+04	6.646E+06	1.338E+04	3.993E+01	1.114E+04	4.392E+01
2071	1.193E+04	6.515E+06	1.312E+04	3.914E+01	1.092E+04	4.305E+01
2072	1.169E+04	6.386E+06	1.286E+04	3.836E+01	1.070E+04	4.220E+01
2073	1.146E+04	6.259E+06	1.260E+04	3.760E+01	1.049E+04	4.136E+01
2074	1.123E+04	6.135E+06	1.235E+04	3.686E+01	1.028E+04	4.054E+01
2075	1.101E+04	6.014E+06	1.211E+04	3.613E+01	1.008E+04	3.974E+01
2076	1.079E+04	5.895E+06	1.187E+04	3.541E+01	9.880E+03	3.896E+01
2077	1.058E+04	5.778E+06	1.163E+04	3.471E+01	9.684E+03	3.818E+01
2078	1.037E+04	5.664E+06	1.140E+04	3.403E+01	9.492E+03	3.743E+01
2079	1.016E+04	5.552E+06	1.118E+04	3.335E+01	9.304E+03	3.669E+01
2080	9.961E+03	5.442E+06	1.096E+04	3.269E+01	9.120E+03	3.596E+01
2081	9.764E+03	5.334E+06	1.074E+04	3.204E+01	8.940E+03	3.525E+01
2082	9.570E+03	5.228E+06	1.053E+04	3.141E+01	8.763E+03	3.455E+01
2083	9.381E+03	5.125E+06	1.032E+04	3.079E+01	8.589E+03	3.387E+01
2084	9.195E+03	5.023E+06	1.011E+04	3.018E+01	8.419E+03	3.320E+01
2085	9.013E+03	4.924E+06	9.914E+03	2.958E+01	8.252E+03	3.254E+01
2086	8.835E+03	4.826E+06	9.718E+03	2.899E+01	8.089E+03	3.189E+01
2087	8.660E+03	4.731E+06	9.526E+03	2.842E+01	7.929E+03	3.126E+01
2088	8.488E+03	4.637E+06	9.337E+03	2.786E+01	7.772E+03	3.064E+01
2089	8.320E+03	4.545E+06	9.152E+03	2.731E+01	7.618E+03	3.004E+01
2090	8.155E+03	4.455E+06	8.971E+03	2.677E+01	7.467E+03	2.944E+01
2091	7.994E+03	4.367E+06	8.793E+03	2.624E+01	7.319E+03	2.886E+01
2092	7.836E+03	4.281E+06	8.619E+03	2.572E+01	7.174E+03	2.829E+01
2093	7.680E+03	4.196E+06	8.448E+03	2.521E+01	7.032E+03	2.773E+01

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	*(m^3/year)*	*(short tons/year)*	*(Mg/year)*	*(m^3/year)*	*(short tons/year)*
2094	7.528E+03	4.113E+06	8.281E+03	2.471E+01	6.893E+03	2.718E+01
2095	7.379E+03	4.031E+06	8.117E+03	2.422E+01	6.756E+03	2.664E+01
2096	7.233E+03	3.951E+06	7.956E+03	2.374E+01	6.623E+03	2.611E+01
2097	7.090E+03	3.873E+06	7.799E+03	2.327E+01	6.491E+03	2.560E+01
2098	6.949E+03	3.796E+06	7.644E+03	2.281E+01	6.363E+03	2.509E+01
2099	6.812E+03	3.721E+06	7.493E+03	2.236E+01	6.237E+03	2.459E+01
2100	6.677E+03	3.648E+06	7.345E+03	2.191E+01	6.113E+03	2.410E+01
2101	6.545E+03	3.575E+06	7.199E+03	2.148E+01	5.992E+03	2.363E+01
2102	6.415E+03	3.505E+06	7.057E+03	2.105E+01	5.874E+03	2.316E+01
2103	6.288E+03	3.435E+06	6.917E+03	2.064E+01	5.757E+03	2.270E+01
2104	6.164E+03	3.367E+06	6.780E+03	2.023E+01	5.643E+03	2.225E+01
2105	6.042E+03	3.301E+06	6.646E+03	1.983E+01	5.532E+03	2.181E+01
2106	5.922E+03	3.235E+06	6.514E+03	1.944E+01	5.422E+03	2.138E+01
2107	5.805E+03	3.171E+06	6.385E+03	1.905E+01	5.315E+03	2.096E+01
2108	5.690E+03	3.108E+06	6.259E+03	1.867E+01	5.210E+03	2.054E+01
2109	5.577E+03	3.047E+06	6.135E+03	1.830E+01	5.106E+03	2.013E+01
2110	5.467E+03	2.986E+06	6.013E+03	1.794E+01	5.005E+03	1.974E+01
2111	5.358E+03	2.927E+06	5.894E+03	1.759E+01	4.906E+03	1.934E+01
2112	5.252E+03	2.869E+06	5.778E+03	1.724E+01	4.809E+03	1.896E+01
2113	5.148E+03	2.813E+06	5.663E+03	1.690E+01	4.714E+03	1.859E+01
2114	5.046E+03	2.757E+06	5.551E+03	1.656E+01	4.620E+03	1.822E+01
2115	4.946E+03	2.702E+06	5.441E+03	1.623E+01	4.529E+03	1.786E+01
2116	4.848E+03	2.649E+06	5.333E+03	1.591E+01	4.439E+03	1.750E+01
2117	4.752E+03	2.596E+06	5.228E+03	1.560E+01	4.351E+03	1.716E+01
2118	4.658E+03	2.545E+06	5.124E+03	1.529E+01	4.265E+03	1.682E+01
2119	4.566E+03	2.494E+06	5.023E+03	1.499E+01	4.181E+03	1.648E+01
2120	4.476E+03	2.445E+06	4.923E+03	1.469E+01	4.098E+03	1.616E+01
2121	4.387E+03	2.397E+06	4.826E+03	1.440E+01	4.017E+03	1.584E+01
2122	4.300E+03	2.349E+06	4.730E+03	1.411E+01	3.937E+03	1.552E+01
2123	4.215E+03	2.303E+06	4.637E+03	1.383E+01	3.859E+03	1.522E+01
2124	4.132E+03	2.257E+06	4.545E+03	1.356E+01	3.783E+03	1.492E+01
2125	4.050E+03	2.212E+06	4.455E+03	1.329E+01	3.708E+03	1.462E+01
2126	3.970E+03	2.169E+06	4.367E+03	1.303E+01	3.635E+03	1.433E+01
2127	3.891E+03	2.126E+06	4.280E+03	1.277E+01	3.563E+03	1.405E+01
2128	3.814E+03	2.084E+06	4.195E+03	1.252E+01	3.492E+03	1.377E+01
2129	3.738E+03	2.042E+06	4.112E+03	1.227E+01	3.423E+03	1.350E+01
2130	3.664E+03	2.002E+06	4.031E+03	1.203E+01	3.355E+03	1.323E+01
2131	3.592E+03	1.962E+06	3.951E+03	1.179E+01	3.289E+03	1.297E+01
2132	3.521E+03	1.923E+06	3.873E+03	1.155E+01	3.224E+03	1.271E+01
2133	3.451E+03	1.885E+06	3.796E+03	1.133E+01	3.160E+03	1.246E+01

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Table 1 Other Pollutants

Pollutant	Emission Factors		Uncontrolled Project Emissions (ton/yr)	Uncontrolled Baseline Emissions (ton/yr)
Ammonia	0.0073	ton/NH3 per ton CH4	42.6	16.8
Pollutant	**Emission Factors**		**Uncontrolled Project Emissions (lbs/yr)**	**Uncontrolled Baseline Emissions (lbs/yr)**
N2O	6.72E-08	lbs/SCF of LFG	37.79	14.90
H2S	32.00	ppmv	2939.8	845.9

Emissions Data

Ammonia	0.0073	ton/NH3 per ton CH4
N2O	3.05E-05	g/SCF of LFG
H2S	32	ppmv

LFG Data

Project LFG Volume	2.90E+07	M3/yr
Project LFG Volume	1.02E+03	MMscf/yr
Baseline LFG Volume	8.34E+06	M3/yr
Baseline LFG Volume	2.95E+02	MMscf/yr

Misc Data

Conversion	453.54	gr/lb
Molecular weight H2S	34	lb/lb-mol
Molar Volume	379	scf/lb-mol
Conversion	35.3147	scf/M3
Molar Volume	379	scf/lb-mol

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Table 2 Summary of LFG Emissions

Pollutant (Unit of Measure)	Uncontrolled Baseline Emissions	Uncontrolled Project Emissions
CH4 (MT/Yr)	2,783	9,673
VOC (TPY)	9.80	95.81
Ammonia (TPY)	16.80	42.63
N2O (MT/Yr)	6.76E-03	0.02
H2S (Lb/Yr)	845.90	2,939.77

Pollutant (Unit of Measure)	Baseline Fugitive Emissions	Project Fugitive Emissions	Project Flare Stack Emissions	Total Project Emissions
CH4 (MT/Yr)	2,783	2,418	145	2,563
VOC (TPY)	9.80	23.95	1.44	25.39
Ammonia (TPY)	16.80	10.66	0.64	11.30
N2O (MT/Yr)	0.0068	0.0043	0.0003	0.0045
H2S (Lb/Yr)	845.90	734.94	44.10	779.04

Data and Parameters

Capture Efficiency	75%	
Control Efficiency	98%	
Landfill Permit Limit	19590	lbs/yr

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Table 3 Flare Combustion Emissions

Pollutant	Emission Factor (Lb/MMBtu)	Project Emissions (TPY)	Baseline Emissions (TPY)	Net Increase (TPY)
NO_x	0.024	4.73	0.00	4.73
VOC		1.44	0.00	1.44
CO	0.0074	1.46	0.00	1.46
SO_x	0.0011	0.22	0.00	0.22
PM_{10}	0.008	1.58	0.00	1.58
Pollutant	**Emission Factor (Kg/MMBtu)**	**Project Emissions (MT/Yr)**	**Baseline Emissions (MT/Yr)**	**Net Increase (MT/Y)**
CO2	52.07	20,516	-	20,516
CH4	3.20E-03	1.26	-	1.26
N2O	6.30E-04	0.25	-	0.25
CO2e	---	20,619	-	20,619

Proposed Project	75%	flare capture efficiency				Max Flare rating	
Methane Production	10874236.44	m3/yr	LFG to flare	10874236	m3/yr		
Methane Production	384020397.4	ft3/yr		384	mmscf/yr	0.04	mmscf/hr
Heat Rate	394004.9278	MMBtu/yr		241933	MMBtu/yr	28	MMBtu/hr
Baseline	0%	flare capture efficiency					
Methane Production	0	m3/yr					
Methane Production	0	ft3/yr					
Heat Rate	0	MMBtu/yr					
Conversion	35.3147	ft3/m3					
HHV	1026	Btu/ft3	LFG HHV	630	Btu/ft3		
Conversion	2000	lbs/ton					
Conversion	2.2	lbs/kg					
GWP CO2	1						
GWP CH4	21						
GWP N2O	310						

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Table 4 Project LFG Criteria Pollutant Emission Summary

Source	NOx (TPY)	VOC (TPY)	CO (TPY)	SOx (TPY)	PM10 (TPY)	NH3 (TPY)	H2S (Lb/Yr)
Baseline							
LFG Fugitives	0.00	9.80	0.00	0.00	0.00	16.80	845.90
Baseline Total	0.00	9.80	0.00	0.00	0.00	16.80	845.90
Project							
LFG Fugitives	0	23.95	0	0	0	10.66	734.94
LFG Stack	0	1.44	0	0	0	0.64	44.10
Flare Combustion	4.73	0.00	1.46	0.22	1.58	0	0
Project Total	4.73	25.39	1.46	0.22	1.58	11.30	779.04
Net Increase	4.73	15.60	1.46	0.22	1.58	-5.51	-66.86

Table 5 Project LFG GHG Emission Summary

Source	CO2 (MT/Yr)	CH4 (MT/Yr)	N2O (MT/YrY)	CO2e (MT/Yr)
Baseline				
LFG Fugitives	0.0	2,783	0.0	58,452
Baseline Total	0	2,783	0.0	58,452
Project				
LFG Fugitives	0.0	2,418	0.0	50,784
LFG Stack	0.0	145	0.0	3,047
Flare Combustion	20,516	1	0.2	20,619
Project Total	20,516	2,565	0.3	74,451
Net Increase	20,516	-219	0.2	15,998

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Table 6 LFG TAC Emissions

SJVAPCD - (EPA AP42 5th Edition, Landfill Gas Table 2.4-1)
Default Concentration for LFG Constituents for Landfills with Waste in Place on or After 1992

Calculation Input Category	Methane TPY	CE %	LFG MMSCF/Year (68F, 14.695 Psi) Methane	Carbon Dioxide		Total			
Proposed Project LFG Methane Produced		75.00				1024.05	2.90E+07	M3/yr	Project
Baseline LFG Methane Produced	0.00	75.00	0.00	0.00		294.67	8.34E+06	M3/yr	Baseline

Additional Toxic Air Contaminants (TAC) Emissions from Landfill Gas (Project Only)

Chemical Compound	CASRN	TAC	MW	PPMV	lbs/hr	Lb/Day	Lb/Year	Ton/Year	Ref	SJVAPCD
1,1,1-Trichloroethane	71556	Y	133.40	0.2430	-2.27E-04	-5.45E-03	-1.99	0.00	A	X
1,1,2,2-Tetrachloroethane	79345	Y	167.85	0.5350	-6.29E-04	-1.51E-02	-5.51	0.00	E	X
1,1,2-Trichloroethane	79005	Y	133.40	0.1580	-1.48E-04	-3.54E-03	-1.29	0.00	D	X
1,1-Dichloroethane	75343	Y	98.96	2.0800	-1.44E-03	-3.46E-02	-12.63	-0.01	A	X
1,1-Dichloroethene (1,1- Dichloroethylene)	75354	Y	96.94	0.1600	-1.09E-04	-2.61E-03	-0.95	0.00	A	X
1,2,4-Trichlorobenzene	120821	Y	181.45	0.0055	-7.00E-06	-1.68E-04	-0.06	0.00	C	X
1,2-Dibromoethane (Ethylene dibromide)	106934	Y	187.86	0.0048	-6.32E-06	-1.52E-04	-0.06	0.00	B	X
1,2-Dichloroethane (Ethylene dichloride)	107062	Y	98.96	0.1590	-1.10E-04	-2.64E-03	-0.97	0.00	A	X
1,2-Dichloropropane	78875	Y	112.99	0.0520	-4.12E-05	-9.88E-04	-0.36	0.00	D	
1,3-Butadiene (Vinyl ethylene)	106990	Y	54.09	0.1660	-6.29E-05	-1.51E-03	-0.55	0.00	C	X
1,4-Dioxane (1,4-Diethylene dioxide)	123911	Y	88.11	0.0083	-5.12E-06	-1.23E-04	-0.04	0.00	D	X
2,2,4-Trimethylpentane	540841	Y	114.23	0.6140	-4.91E-04	-1.18E-02	-4.30	0.00	D	X
2-Butanone (Methyl ethyl ketone)	78933	Y	72.11	4.0100	-2.03E-03	-4.86E-02	-17.74	-0.01	C	X
2-Propanol (Isopropyl alcohol)	67630	Y	60.10	1.8000	-7.58E-04	-1.82E-02	-6.64	0.00	C	X
4-Methyl-2-pentanone (MIBK)	108101	Y	100.16	0.8830	-6.19E-04	-1.49E-02	-5.43	0.00	C	X
Acetaldehyde	75070	Y	44.05	0.0774	-2.39E-05	-5.73E-04	-0.21	0.00	D	X
Acetonitrile	75058	Y	41.05	0.5560	-1.60E-04	-3.84E-03	-1.40	0.00	A	X
Acrylonitrile,d	107131	Y	53.06	0.0000	0.00E+00	0.00E+00	0.00	0.00		
Benzene	71432	Y	78.11	2.4000	-1.31E-03	-3.15E-02	-11.50	-0.01	A	X
Benzyl chloride	100447	Y	126.58	0.0181	-1.60E-05	-3.85E-04	-0.14	0.00	A	X
Bromomethane (Methyl bromide)	74839	Y	94.94	0.0210	-1.40E-05	-3.35E-04	-0.12	0.00	C	x
Carbon disulfide	75150	Y	76.14	0.1470	-7.84E-05	-1.88E-03	-0.69	0.00	A	X
Carbon tetrachloride	56235	Y	153.82	0.0080	-8.60E-06	-2.06E-04	-0.08	0.00	A	X
Carbonyl sulfide (Carbon oxysulfide)	463581	Y	60.08	0.1220	-5.13E-05	-1.23E-03	-0.45	0.00	A	X
Chlorobenzene	108907	Y	112.56	0.4840	-3.82E-04	-9.16E-03	-3.34	0.00	A	X
Chlorodifluoromethane (Freon 22)	75456	Y	86.47	0.7960	-4.82E-04	-1.16E-02	-4.22	0.00	D	X
Chloroethane (Ethyl chloride)	75003	Y	64.51	3.9500	-1.78E-03	-4.28E-02	-15.63	-0.01	B	X
Chloromethane (Methyl chloride)	74873	Y	50.49	0.2440	-8.63E-05	-2.07E-03	-0.76	0.00	B	x
Dichlorobenzene,e	106467	Y	147.00	0.9400	-9.68E-04	-2.32E-02	-8.48	0.00	A	X
Dichloromethane (Methylene chloride)	75092	Y	84.93	6.1500	-3.66E-03	-8.78E-02	-32.05	-0.02	A	X
Ethylbenzene	100414	Y	106.17	4.8600	-3.61E-03	-8.67E-02	-31.66	-0.02	B	X
Formaldehyde	50000	Y	30.03	0.0117	-2.46E-06	-5.91E-05	-0.02	0.00	D	X
Hexane	110543	Y	86.18	3.1000	-1.87E-03	-4.49E-02	-16.39	-0.01	B	X
Hydrogen sulfide	7783064	Y	34.00	32.0000	-7.62E-03	-1.83E-01	-66.76	-0.03	A	X
Isopropylbenzene (Cumene)	98828	Y	120.19	0.4300	-3.62E-04	-8.69E-03	-3.17	0.00	D	X
Mercury (total)	7439976	Y	200.59	0.0001	-1.71E-07	-4.11E-06	0.00	0.00	B	X
Mercury (elemental)	7439976	Y	200.59	0.0001	-1.08E-07	-2.60E-06	0.00	0.00	C	
Mercury (monomethyl)	51176126	Y	216.63	0.0000	-5.83E-10	-1.40E-08	0.00	0.00	C	
Mercury (dimethyl)	627441	Y	258.71	0.0000	-4.58E-09	-1.10E-07	0.00	0.00	B	
Methyl tert-butyl ether (MTBE)	1634044	Y	88.15	0.1180	-7.29E-05	-1.75E-03	-0.64	0.00	D	
Naphthalene	91203	Y	128.17	0.1070	-9.61E-05	-2.31E-03	-0.84	0.00	D	X
Propene	115071	Y	42.08	3.3200	-9.79E-04	-2.35E-02	-8.57	0.00	D	X
Styrene (Vinylbenzene)	100425	Y	104.15	0.4110	-3.00E-04	-7.20E-03	-2.63	0.00	B	X
Tetrachloroethylene (Perchloroethylene)	127184	Y	165.83	2.0300	-2.36E-03	-5.66E-02	-20.65	-0.01	A	X
Toluene (Methyl benzene)	108883	Y	92.14	29.5000	-1.90E-02	-4.57E-01	-166.78	-0.08	A	X
Tribromomethane (Bromoform)	75252	Y	252.73	0.0124	-2.20E-05	-5.27E-04	-0.19	0.00	D	X
Trichloroethylene (Trichloroethene)	79016	Y	131.39	0.8280	-7.62E-04	-1.83E-02	-6.68	0.00	A	X
Trichloromethane (Chloroform)	8013545	Y	119.38	0.0708	-5.92E-05	-1.42E-03	-0.52	0.00	A	
Vinyl acetate	85306269	Y	86.09	0.2480	-1.50E-04	-3.59E-03	-1.31	0.00	C	
Vinyl chloride (Chloroethene)	75014	Y	62.50	1.4200	-6.22E-04	-1.49E-02	-5.45	0.00	A	X
Total Xylene	1330207	Y	106.17	9.2300	-6.86E-03	-1.65E-01	-60.13	-0.03	A	X
Ammonia	7664417	Y	17.03		-1.2571	-3.02E+01	-11012.20	-5.51		X

ATTACHMENT A-2 – LABORATORY ANALYSIS

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BC Laboratories, Inc.
Environmental Testing Laboratory Since 1949

Date of Report: 06/19/2018

Dan Allen

H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

Client Project:	Flare Point, Before & After Filter
BCL Project:	Air/Gas Samples
BCL Work Order:	1819145
Invoice ID:	B307219

Enclosed are the results of analyses for samples received by the laboratory on 6/18/2018. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Contact Person: Vanessa Sandoval
Client Service Rep

Stuart Buttram
Technical Director

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.
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1819145-02 - Flare Point (After Filter)

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Chain of Custody and Cooler Receipt Form for 1819145 Page 1 of 2

BC Laboratories, Inc.
Bakersfield, CA 93308
(661) 327-1918

BC LABORATORIES, INC.

18-19145

Chain of Custody Record

Client Contact

Client: H.M. Holloway, Inc.
Attention: Dan Allen
Address: 2019 Westwind Dr. Suite B
City, St, Zip: Bakersfield, CA 93307
Phone: 661 437-4196; danallen@holloway-environmental.com
Fax:
Project: Flare Point, Before & After Filter
Bus. Unit:
P O #:

Billing

Client:
Attention:
Address:
City, St, Zip:
Phone:
Fax:
Sampler:

COC No: Field Contact Chad Wright 661.303-1383. Location 13850 Holloway Rd. Collect two samples from Flare Point: 1 before filter and 1 after filter.

Analysis Turnaround Time **Surcharge

Routine
5 Day**
2 Day**
1 Day**

Sample Identification	Sample Date	Sample Time	Matrix	Preserved	ASTM D 1946, Gas Composition	Sample Notes
Flare Point (before filter) 1	6/18/18	08:05	Gas	--	X	
Flare Point (after filter) 2	6/18/18	08:25	Gas	--	X	

CHK BY DW
DISTRIBUTION
SUB-OUT

Work Order Comments: Kerrie - Schedule Annually in Feb 3 weeks - Call Client before sampling (Vacuum Box required w/ 1/4" tubing)

Relinquished by:	Company: BC Labs	Date/Time: 6/18/18	Received by:	Company:	Date/Time: 6:18:18 14:48
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

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Chain of Custody and Cooler Receipt Form for 1819145 Page 2 of 2

BC LABORATORIES INC. COOLER RECEIPT FORM Page 1 Of 1

Submission #: 1819145

SHIPPING INFORMATION	SHIPPING CONTAINER	FREE LIQUID
Fed Ex ☐ UPS ☐ Ontrac ☐ Hand Delivery ☐ BC Lab Field Service ☒ Other ☐ (Specify)_____	Ice Chest ☐ None ☐ Box ☐ Other ☒ (Specify) Bag	YES ☐ NO ☐ W / S

Refrigerant: Ice ☐ Blue Ice ☐ None ☒ Other ☐ Comments:

Custody Seals Ice Chest ☐ (Intact? Yes / No / N/A) Containers ☐ (Intact? Yes / No / N/A) None ☒ Comments:

All samples received? Yes ☒ No ☐ All samples containers intact? Yes ☒ No ☐ Description(s) match COC? Yes ☒ No ☐

COC Received ☒ YES ☐ NO

Emissivity: ___ Container: Tedlar Thermometer ID: ___ Date/Time 6-18-18

Temperature: (A) Room °C / (C) Temp °C Analyst Init SD 14:48

SAMPLE CONTAINERS	SAMPLE NUMBERS 1	2	3	4	5	6	7	8	9	10
QT PE UNPRES										
4oz / 8oz / 16oz PE UNPRES										
2oz Cr^{+6}										
QT INORGANIC CHEMICAL METALS										
INORGANIC CHEMICAL METALS 4oz / 8oz / 16oz										
PT CYANIDE										
PT NITROGEN FORMS										
PT TOTAL SULFIDE										
2oz. NITRATE / NITRITE										
PT TOTAL ORGANIC CARBON										
PT CHEMICAL OXYGEN DEMAND										
PtA PHENOLICS										
40ml VOA VIAL TRAVEL BLANK										
40ml VOA VIAL										
QT EPA 1664										
PT ODOR										
RADIOLOGICAL										
BACTERIOLOGICAL										
40 ml VOA VIAL- 504										
QT EPA 508/608/8080										
QT EPA 515.1/8150										
QT EPA 525										
QT EPA 525 TRAVEL BLANK										
40ml EPA 547										
40ml EPA 531.1										
8oz EPA 548										
QT EPA 549										
QT EPA 8015M										
QT EPA 8270										
8oz / 16oz / 32oz AMBER										
8oz / 16oz / 32oz JAR										
SOIL SLEEVE										
PCB VIAL										
PLASTIC BAG										
TEDLAR BAG	A	A								
FERROUS IRON										
ENCORE										
SMART KIT										
SUMMA CANISTER										

Comments:

Sample Numbering Completed By: GSP Date/Time: 6/18 1734

A = Actual / C = Corrected

Rev 21 05/23/2016 (S:\WPDocs\WordPerfect\LAB_DOCS\FORMS\SAMREC rev 20)

H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

Reported: 06/19/2018 16:46
Project: Air/Gas Samples
Project Number: Flare Point, Before & After Filter
Project Manager: Dan Allen

Laboratory / Client Sample Cross Reference

Laboratory	Client Sample Information			
1819145-01	**COC Number:**	---	**Receive Date:**	06/18/2018 14:48
	Project Number:	---	**Sampling Date:**	06/18/2018 08:05
	Sampling Location:	---	**Sample Depth:**	---
	Sampling Point:	Flare Point (Before Filter)	**Lab Matrix:**	Gas
	Sampled By:	Rick Ogletree	**Sample Type:**	Gas Chromatography
1819145-02	**COC Number:**	---	**Receive Date:**	06/18/2018 14:48
	Project Number:	---	**Sampling Date:**	06/18/2018 08:25
	Sampling Location:	---	**Sample Depth:**	---
	Sampling Point:	Flare Point (After Filter)	**Lab Matrix:**	Gas
	Sampled By:	Rick Ogletree	**Sample Type:**	Gas Chromatography

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

Reported: 06/19/2018 16:46
Project: Air/Gas Samples
Project Number: Flare Point, Before & After Filter
Project Manager: Dan Allen

BCL Sample ID: 1819145-01 | **Client Sample Name:** Flare Point (Before Filter), 6/18/2018 8:05:00AM, Rick Ogletree

Gas Analysis

Fixed Gases and Hydrocarbon Analysis (ASTM D-1945-03, D-3588-98; GPA 2145-94, 2261-00)

Constituent		Mole %	Weight %	GPM	GPM Fractions	
Oxygen	O2	8.94	7.88			
Nitrogen	N2	33.48	25.82			
Carbon Dioxide	CO2	53.06	64.29			
Carbon Monoxide	CO	0.00	0.00			
Hydrogen	H2	0.00	0.00			
Methane	C1	4.50	1.99			
Ethane	C2	0	0	0	(C2+)=	0.006
Propane	C3	0.00	0.00	0.000	(C3+)=	0.006
IsoButane	C4	0.00	0.00	0.000		
n-Butane	C4	0.00	0.00	0.000		
IsoPentane	C5	0.00	0.00	0.000		
n-Pentane	C5	0.00	0.00	0.000		
Hexanes +	C6	0.01	0.03	0.006		
Totals:		100.00	100.00	0.006		

H/C Ratio: 0.03

Heating Values		CHONS Weight %		F Factors	F_{dry}	F_{wet}
Gross Calorific Value		Carbon	19.05	"F" Factor, DSCF/MMBTU @ 60F	19368	21503
BTU/ft3 dry (Ideal)	46.1	Hydrogen	0.50	"F" Factor, DSCF/MMBTU @ 68F	19663	21830
BTU/ft3 wet (Ideal)	45.3	Oxygen	54.63	"F" Factor, DSCF/MMBTU @ 70F	19738	21913
BTU/lb (Ideal)	481.2	Nitrogen	25.82	"FC" Factor, DSCF CO2/MMBTU @ 60F	12515	13894
Net Calorific Value		Sulfur	0.00	"FC" Factor, DSCF CO2/MMBTU @ 68F	12706	14106
BTU/ft3 dry (Ideal)	41.5	*Sulfur reported at 0.05% or greater*				
BTU/ft3 wet (Ideal)	40.8					
BTU/lb (Ideal)	433.4					

Relative Gas Density; [Air=1] Ideal:	1.2543	**Relative Liquid Density @ 60F/60F:**	0.8061
Specific Gravity; [Air=1] Ideal:	1.2567	**Compressibility, 'z':**	0.9975
Real Gas Density, lb/ft3:	0.0960	**Molecular Wt. (kg/kg-mole):**	36.33
Specific Volume, ft3/lb:	10.4198		
THC - C1-C6+, Weight Percent :	2.02		
VOC - C3-C6+. Weight Percent:	0.03		
VOC/THC Ratio, Weight Percent:	1.49		

Gas Properties calculated @ STP: 60F, 14.696 psia GPM: Gallons per 1000 cubic feet

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H.M. Holloway, INC
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Bakersfield, CA 93303

Reported: 06/19/2018 16:46
Project: Air/Gas Samples
Project Number: Flare Point, Before & After Filter
Project Manager: Dan Allen

BCL Sample ID: 1819145-02 | **Client Sample Name:** Flare Point (After Filter), 6/18/2018 8:25:00AM, Rick Ogletree

Gas Analysis

Fixed Gases and Hydrocarbon Analysis (ASTM D-1945-03, D-3588-98; GPA 2145-94, 2261-00)

Constituent		Mole %	Weight %	GPM	GPM Fractions	
Oxygen	O2	23.17	25.60			
Nitrogen	N2	76.70	74.19			
Carbon Dioxide	CO2	0.12	0.19			
Carbon Monoxide	CO	0.00	0.00			
Hydrogen	H2	0.00	0.00			
Methane	C1	0	0.00			
Ethane	C2	0	0	0	(C2+)=	0.003
Propane	C3	0.00	0.00	0.000	(C3+)=	0.003
IsoButane	C4	0.00	0.00	0.000		
n-Butane	C4	0.00	0.00	0.000		
IsoPentane	C5	0.00	0.00	0.000		
n-Pentane	C5	0.00	0.00	0.000		
Hexanes +	C6	0.01	0.02	0.003		
Totals:		100.00	100.00	0.003		

H/C Ratio: 0.05

Heating Values		CHONS Weight %		F Factors	F_{dry}	F_{wet}
Gross Calorific Value		Carbon	0.07	"F" Factor, DSCF/MMBTU @ 60F	-283330	-305970
BTU/ft3 dry (Ideal)	0.4	Hydrogen	0.00	"F" Factor, DSCF/MMBTU @ 68F	-287640	-310630
BTU/ft3 wet (Ideal)	0.3	Oxygen	25.73	"F" Factor, DSCF/MMBTU @ 70F	-288730	-311810
BTU/lb (Ideal)	4.6	Nitrogen	74.19	"FC" Factor, DSCF CO2/MMBTU @ 60F	4777.2	5159.0
Net Calorific Value		Sulfur	0.00	"FC" Factor, DSCF CO2/MMBTU @ 68F	4849.9	5237.6
BTU/ft3 dry (Ideal)	0.3	*Sulfur reported at 0.05% or greater*				
BTU/ft3 wet (Ideal)	0.3					
BTU/lb (Ideal)	4.3					

Relative Gas Density; [Air=1] Ideal:	0.9999	**Relative Liquid Density @ 60F/60F:**	0.8746
Specific Gravity; [Air=1] Ideal:	0.9997	**Compressibility, 'z':**	0.9996
Real Gas Density, lb/ft3:	0.0763	**Molecular Wt. (kg/kg-mole):**	28.96
Specific Volume, ft3/lb:	13.0984		
THC - C1-C6+, Weight Percent :	0.02		
VOC - C3-C6+. Weight Percent:	0.02		
VOC/THC Ratio, Weight Percent:	100.00		

Gas Properties calculated @ STP: 60F, 14.696 psia GPM: Gallons per 1000 cubic feet

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.
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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

Reported: 06/19/2018 16:46
Project: Air/Gas Samples
Project Number: Flare Point, Before & After Filter
Project Manager: Dan Allen

Notes And Definitions

MDL	Method Detection Limit
PQL	Practical Quantitation Limit

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APPENDIX B – COMPOST EMISSIONS

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Lost Hills Composting and Waste-To-Energy Projects (PP8111) – Air Quality and GHG Technical Report

Lost Hills Environmental LLC
14045 Holloway Road
Lost Hills, CA

August 2019

Prepared by:

Yorke ENGINEERING, LLC
www.YorkeEngr.com

Office Locations:
Los Angeles, Orange County, Riverside, Ventura, San Diego, Fresno, Berkeley, San Jose, Bakersfield

Tel: (949) 248-8490
Fax: (949) 248-8499

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Appendix B: Compost Facility Emissions

Lost Hills Composting and Waste to Energy Projects (PP8111) Air Quality and GHG Technical Report

Appendix B: Compost Facility Emissions

Prepared for:

Lost Hills Environmental LLC
14045 Holloway Road
Lost Hills, CA

August 2019

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List of Acronyms and Abbreviations

ASP	Aerated Static Pile
Avg.	Average
BFL	Bakersfield
BHp	Brake Horsepower
BSFC	Brake Specific Fuel Consumption
C	Carbon
CalEEMod	California Emissions Estimation Model®
CARB	California Air Resources Board
CAS No.	Chemical Abstract Service Number
Cf	Rain correction factor
CH_4	Methane
C:N	Carbon to Nitrogen Ratio
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_2e	Carbon dioxide equivalents
CY	Cubic Yard
DPM	Diesel Particulate Matter
eASP	Extended Aerated Static Pile
EF	Emission Factor
Eng.	Engine
EPA	(United States) Environmental Protection Agency
g	Gram
Gal	Gallon
GHG	Greenhouse Gases
GWP	Global Warming Potential
HDD	Heavy Duty Diesel (truck)
Hr	Hour
IPCC	Intergovernmental Panel on Climate Change
Kg	Kilogram
Lb	Pound(s)
LCD	Local Climatologic Data
LCFS	Low Carbon Fuel Standards
LDT1	Light Duty Truck (EMFAC category 1)
LDT2	Light Duty Truck (EMFAC category 2)
LHD2	Light Heavy-Duty Truck (ENFAC category 2)
m^2	Square meter
mg	Milligram
mph	Mile per hour
Mg	Milligram

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Mi	Mile
MT	Metric Ton
N_2O	Nitrous Oxide
N	Nitrogen
NH_3	Ammonia
NMHC	Non-Methane hydrocarbon
No.	Number
NO_x	Nitrogen Oxides
Op.	Operating Hours
PAH	Polycyclic aromatic hydrocarbons
$PM_{2.5}$	Fine particulate matter
PM_{10}	Respirable particulate matter
SAR	Second Annual Report (of the Intergovernmental Panel on Climate Change [IPCC])
SJVAPCD	San Joaquin Valley Air Pollution Control District
SO_x	Sulfur Oxides
SWMF	Solid Waste Management Facility
TAC	Toxic Air Contaminant
TOG	Total Organic Gases
TPY	Tons per Year
Veh	Vehicle
VMT	Vehicle Mile Traveled
VOC	Volatile Organic Compounds
Wt.	Weight
Yr	Year

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Appendix B: Compost Facility Emissions

1.0 OVERVIEW OF PROPOSED COMPOSTING OPERATIONS

Lost Hills Environmental LLC, an affiliate of H.M. Holloway, Inc. (Holloway), is requesting approval of a composting operation to be located at its existing Solid Waste Management Facility (SWMF or Lost Hills Facility). The composting operations would be phased in over a number of years depending on demand for product. At full buildout, the facility would operate 240 compost pads and 120 compost curing piles, and would be capable of accepting up to 640,000 tons per year (TPY) of compostable organic materials.

The compost facility will be located within the bounds of the Lost Hills Facility. The construction and operation of the composting facility would result in an increase in emissions from the existing SWMF. Consequently, all of the emissions resulting from the construction and operation of the composting facility would add to the emissions within the project area, except as otherwise offset or mitigated.

The compost facility will be constructed and operated in three phases. The timing of a given phase will depend on the demand for composting products. However, California is expected to require 24 million tons of additional composting capacity by 2025. For this analysis, it is assumed that the construction of the facility will commence in 2020, and the construction of all three phases is expected to be complete by 2030. The capacity of each phase and anticipated construction/start-up date are shown in Table 1-1.

Table 1-1: Compost Facility Implementation Plan

Phase	Start-Up	Wet Tons Per Day	Mix Pads	Compost Pads	Curing Pads	Acres
Phase 1	2020	555	3	76	38	47
Phase 2	2025	248	2	34	17	21
Phase 3	2030	950	6	130	65	68
Total	–	1,753	10	240	120	136

Composting will commence as soon as the construction of a given phase is complete. Although the landfill has a closure date of 2030 (see Appendix A), it is assumed that the operation of the compost facility would continue operating after the landfill has closed.

The compost feedstock is expected to consist of variety of materials. The mix of compostable materials will be designed to maintain a carbon-to-nitrogen (C:N) ratio ranging from 20-to-1 to 30-to-1, which will ensure optimum conditions and will minimize emissions of methane (CH_4), volatile organic compounds (VOCs), and odors. The materials likely to be used as feedstock in the composting process are listed in Table 1-2.

The truck traffic for delivery of feedstock and shipping of compost product is estimated to average 111 round trips per day by Phase 3. The same trucks used to transport feedstock to the site will be used to take compost product from the site. The organic material delivery truck would be washed following offloading and then would be loaded with finished compost for delivery to customers. Feedstock for composting is expected to be obtained from sources located within the service area (roughly 150-mile radius) of the facility. Similarly, compost products are expected to be delivered

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to customers located within the service area. Although feedstock deliveries and product shipments may come from and go to locations throughout the service area, most trips are expected to be within 50 to 100 miles of the facility. Therefore, a trip distance of 200 miles round trip (100 miles for feedstock delivery and 100 miles for compost product shipment) for each of the 111 truckloads was assumed for offsite travel, with another 0.5 miles round trip onsite. The trip counts and the potential vehicle miles travelled (VMT) due to truck traffic to and from the Lost Hills Facility are summarized in Table 1-3.

Table 1-2: Properties of Compostable Feedstock Materials

Material Type[1]	Bulk Density (Lb/CY)	Moisture (%)	Carbon (% C) (dry basis)	Nitrogen (% N) (dry basis)	C:N Ratio
Biosolids	1,413	78.0	30.4	1.9	16.0
Food Waste	1,585	69.0	36.0	2.4	15.0
Poultry Manure	1,479	69.0	48.0	8.0	6.0
Cattle Manure	1,458	81.0	45.6	2.4	19.0
Crop Residue	998	53.2	46.6	2.4	19.3
Wood Chips	533	35.0	50.4	0.1	560.0
Green Waste	449	52.8	52.7	2.1	24.8

Notes:

1. Data obtained from: "On Farm Composting Handbook," North East Agricultural Engineering Services, NARES-54, June 1992.
2. Lb =pounds, CY = cubic yard.

Table 1-3: Onroad Transportation Trips and Vehicle Miles Traveled

Material Type	Feedstock/Product[2]		One-Way Trips	One-Way Mileage[1]	Transport Distance	
	Ton/Day	CY/Day			(VMT/Day)	(VMT/Yr)
Transportation of Feedstock						
Organic Feedstock	1,753	2,482.7	111	100.25	11,128	4,061,629
Transportation of Finished Compost						
Compost Product[3,4]	1,410	1,489.63	111	100.25	11,128	4,061,629
Total Trips and Transportation Mileage						
Total Trips and VMT	–	–	111	100.25	22,256	8,123,258

Notes:

1. Trip distance includes 100 miles of travel on paved roads and 0.25 miles on unpaved onsite roads at the Lost Hills SWMF.
2. Assumes that the compost facility operates 365 days per year. Trips based on heavy-heavy-duty diesel trucks having 25 CY capacity.
3. During aerobic composting, the feedstock is stabilized through microbial activity, and volatile solids and degradable carbon are converted to carbon dioxide (CO_2) and water. The conversion of the feedstock typically results in a mass reduction of 25% to 75% and a similar volume reduction. For this analysis, it is assumed that degradation results in a 20% mass reduction and a 40% volume reduction.
4. Natural Resource Conservation Service: https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_043439.pdf.

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2.0 CONSTRUCTION EMISSIONS

Although expected to be minimal, composting area construction emissions were calculated for construction of each phase of the composting facility. For the composting area, construction activities will consist primarily of grading (earthmoving) and installation of the solar-powered blower systems. Emissions associated with construction will occur from the construction equipment used for grading and shaping the extended aerated static piles, trucks delivering equipment, and workers commuting. Construction activites for each phase are estimated to take up to approximately one year.

The construction emission analysis was performed using the California Emissions Estimation Model® (CalEEMod, version 2016.3.2), the official statewide land use computer model designed to provide a uniform platform for estimating potential criteria pollutant and greenhouse gas (GHG) emissions associated with both construction and operations of land use projects under CEQA. CalEEMod was developed by the California Air Pollution Control Officers Association (CAPCOA) in collaboration with the San Joaquin Valley Air Pollution Control District (SJVAPCD) and other California air districts. Default land use data (e.g., emission factors, meteorology, source inventory, etc.) were provided by the various California air districts to account for local requirements and conditions. The model quantifies direct emissions from construction and operations (including vehicle use), as well as indirect emissions, such as GHG emissions from energy use, solid waste disposal, vegetation planting and/or removal, and water use. The mobile source emission factors used in the model, which are published by the California Air Resources Board (CARB), include the Pavley standards and Low Carbon Fuel Standards (LCFS). The model also identifies project design features, regulatory measures, and mitigation measures to reduce criteria pollutant and GHG emissions, along with calculating the benefits achieved from the selected measures.

CalEEMod was run based on information received from the applicant regarding number of workers, number of delivery trucks and trip lengths, and construction equipment schedule. The annual criteria pollutant emissions are shown in Tables 2-1 and GHG emissions are shown in Table 2-2 below. The types of vehicles and the travel distance included in the analysis are presented in the CalEEMod output files in Attachment B-1. As shown by these results, estimated construction emissions are relatively small and well below the SJVAPCD construction thresholds.

Table 2-1: Lost Hills Compost Area Construction Criteria Pollutant Emissions

Criteria Pollutants	Annual Emissions (TPY)			
	Phase 1	Phase 2	Phase 3	Threshold
VOC	0.06	0.03	0.08	10
NO_X	0.21	0.09	0.27	10
CO	1.68	0.74	2.29	100
SO_X	0.00	0.00	0.01	27
Total PM_{10}	0.72	0.35	1.03	15
Total $PM_{2.5}$	0.15	0.07	0.21	15

Notes:

Emissions estimated in CalEEMod version 2016.3.2

Total PM_{10} / $PM_{2.5}$ comprises fugitive dust plus engine exhaust

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Table 2-2: Lost Hills Compost Area Construction Greenhouse Gas Emissions

Greenhouse Gases	Annual Emissions (MT/Yr)		
	Phase 1	Phase 2	Phase 3
Carbon dioxide (CO_2)	350	157	565
Methane (CH_4)	0.10	0.04	0.02
Nitrous Oxide (N_2O)	0.00	0.00	0.00
Total CO_2e	353	158	565

Notes:

Emissions estimated in CalEEMod version 2016.3.2

GHGs and Carbon dioxide equivalents (CO_2e) given in metric tons per year (MT/Yr)

As shown later in this Appendix, emissions associated with the operation of the Phase 3 composting area account for about 50% of the total composting emissions. As shown in Table 2-1, the emissions from the construction of Phase 3 are significantly less than 50% of the total composting facility operational emissions. Therefore, the emissions during Phase 3 operation upon full build-out would far outweigh the emissions during concurrent construction of later phases with earlier phase operational emissions. Hence, the Ambient Air Quality Analyses and Health Risk Assessment only analyzed Phase 3 operation emissions.

The remainder of this report is related to operational emissions for the composting area.

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3.0 ONROAD MOBILE SOURCES

Onroad mobile source emissions result from employee travel, routine business travel, the transport of compostable feedstock material to the facility, and the transport of finished product from the facility. Onroad emission calculation worksheets are provided in Attachment B-2.

3.1 Methodology

Emissions from motor vehicles are estimated using factors that relate emissions of a given air contaminant to VMT. If specific information is available for a given vehicle (make, model, age, etc.), then a specific emission factor, unique to the vehicle, may be derived and used to estimate emissions. However, in practice, emissions from motor vehicles are typically determined using emission factors that are representative of a given vehicle category (e.g., passenger car, light-duty truck) and fuel type that reflect the characteristics of the population of the vehicle type in a given vehicle fleet.

The fleet emission factors reflect the characteristics of the vehicles in the fleet, such as the type of vehicle, the age of the vehicle, the weight of the vehicle, fuel efficiency, etc. The factors also reflect the demographics of the region(s) in which the vehicles are operated and the regulatory requirements applicable to the types of vehicles which comprise the fleet.

The emission factors change on an annual basis as older vehicles are replaced by new vehicles and as regulatory requirements that mandate lower standards become effective. Consequently, the models used to generate these factors are complex. In California, the recommended model for calculating emissions from onroad mobile sources is EMFAC2017, developed and maintained by CARB. The EMFAC2017 model has been used to generate emission factors required for calculating the onroad emissions from the vehicle fleet required for operation of the proposed composting facility.

The fleet consists of the vehicles used to transport personnel and supplies to the facility, conduct routine business activities, deliver compost feed stock, and deliver compost product to end users.

The emissions from onroad mobile sources were calculated using EMFAC2017 emission factors. Emissions were calculated for each vehicle category and fuel type using the total VMT (or other information, depending on the EMFAC2017 component being calculated) for 2030, the first year of Phase 3 activities, as this is the year of full buildout. Calculation procedures are summarized in Table 3-1.

Table 3-1: EMFAC2017 Components Included in Onroad Vehicle Emission Calculations

EMFAC2017 Component			Calculation Procedure
1	Gram (g)/VMT	Running Exhaust	Calculated using annual VMT
2		Tire & Brake Wear	Calculated using annual VMT
3	g/Trip	Startup	Calculated from number of trips
4		Hot Soak	Calculated from number of trips
5		Running Loss	Calculated from number of trips
6	g/Vehicle *Day	Idle Exhaust	Emission Factor (EF) converted to g/trip and emissions calculated from number of trips
7		Resting Loss	EF converted to g/trip and emissions calculated from number of trips
8		Diurnal Loss	EF converted to g/trip and emissions calculated from number of trips

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The exhaust emissions from onroad vehicles were calculated for offsite travel as well as onsite travel. The offsite mileage and the onsite mileage were also used to calculate fugitive dust emissions from travel on paved and unpaved roads, which is discussed in Section 4.0 of this Appendix.

Onroad emissions include running exhaust, idling exhaust, and startup exhaust. Fugitive particulate emissions include tire wear and brake wear. Fugitive hydrocarbon emissions include running loss, resting loss, hot soak, and diurnal emissions. The emissions from each component are included in the total emissions reported.

3.2 Emissions

3.2.1 Fleet and Vehicle Activity

The daily operation of the composting facility will require the use of onroad mobile sources for transport of personnel, conducting routine business the transport of feedstock for composting, and the transport of finished compost. Operational activities are listed in Table 3-2.

Table 3-2: Operational Activities Included in Analysis

Activity	Required Equipment
Employee commute	Light-duty trucks for employee commute
Misc. business activity	Light-duty truck for routine business (3rd party)
Laboratory services	Light-duty trucks for field sampling compost
Delivery of office supplies	Step van for delivery of office supplies
Deliver feedstock	Heavy-Heavy-Duty Diesel Truck (25 CY capacity)
Transport product	Heavy-Heavy-Duty Diesel Truck (25 CY capacity)

Operational emissions will occur throughout the life of the project. For this analysis, it is assumed that composting will commence in 2020. No end date has been identified.

The EMFAC2017 model was used to calculate the onroad vehicle emissions at the average daily rate of 111 truckloads per day expected to occur in 2030 following the start of Phase 3. The information summarized in Table 3-3 was used as input to the EMFAC2017 model to calculate the onroad mobile source emissions at the maximum requested composting rate.

3.2.2 Exhaust Emissions from Onroad Mobile Sources

The annual emissions were calculated for 2030, assuming 111 truckloads of material per day each of feedstock and product and an onroad trip distance of 100.25 miles (one-way trip). The emission estimates are summarized in Tables 3-4 and 3-5 for criteria pollutants and GHG respectively. The EMFAC2017 factors used for calculating emissions from the onroad mobile sources are included in worksheets in Attachment B-2.

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Table 3-3: Onroad Mobile Source Activity for Composting Facility

Vehicle Type	Vehicle Use	Days	# Veh	Trips per Vehicle	Trips per Day	Trips per Year	Offsite (Mi)	Onsite (Mi)	Annual Travel (VMT/Yr)
LDT1	Supervisor	365	1	4	4	1,460	50	1.0	74,460
LDT1	Technical Staff	365	1	4	4	1,460	50	1.0	74,460
LDT1	Mechanic	365	1	2	2	730	50	1.0	37,230
LDT1	Equipment Operators	365	3	2	6	2,190	50	0.5	110,595
LDT1	Personnel for facility	365	3	2	6	2,190	50	0.5	110,595
LDT1	Miscellaneous Business	104	1	2	2	208	50	0.5	10,504
LDT1	Laboratory Services	104	1	2	2	208	50	1.0	10,608
LHD2	Delivery of Office Supplies	104	1	2	2	208	50	0.0	10,400
T7 Tractor	Deliver to Compost Facility	365	111	1	111	40,515	100	0.25	4,061,629
T7 Tractor	Ship from Compost Facility	365	111	1	111	40,515	100	0.25	4,061,629

Notes:
1. LDT1 (Light Duty Truck) and LHD2 (Light-Heavy-Duty) refer to vehicle categories in EMFAC2017.
2. Trips are one way, so worker trips are shown as 2 trips of 50 miles each while haul trucks are shown as 1 trip each of deliveries and shipments since the transport of feedstock and finished compost will occur in the same trucks.
3. Maximum number of trucks for delivery and shipping from the composting facility are based on full buildout in Phase 3.

Table 3-4: Criteria Pollutant Emissions from Onroad Operations Vehicles

Type	NO_x (Lb/Yr)	VOC (Lb/Yr)	CO (Lb/Yr)	SO_x (Lb/Yr)	PM_{10} (Lb/Yr)	$PM_{2.5}$ (Lb/Yr)
Exhaust	35,307	376	3,921	191	510	488
Fugitive		14.7			1,793	652
Total (Lb/Yr)	**35,307**	**391**	**3,921**	**191**	**2,303**	**1,140**
Total (TPY)	**17.65**	**0.20**	**1.96**	**0.10**	**1.15**	**0.57**

Table 3-5: GHG Emissions from Onroad Mobile Source Activity

CO_2 (MT/Yr)	CH_4 (Kg/Yr)	N_2O (Kg/Yr)	Total CO_2e (MT/Yr)
9,194	0.78	1.9	9,784

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4.0 OFFROAD MOBILE SOURCES

Offroad equipment required for the operation of the compost facility consists of one windrow turner to be used for mixing feedstock and wheeled loaders that will be used for moving feedstock and compost between processing pads and loading finished compost product into delivery trucks.

The term "offroad mobile sources" or "offroad equipment" is intended to encompass the onsite fleet of heavy-duty construction equipment (graders, scrapers, bulldozers, loaders, etc.) used for operation of the facility. Exhaust emissions from water trucks used for applying water on the facility haul roads for dust suppression are included.

The exhaust emissions from the use of offroad equipment required for composting are discussed in this section. Calculation worksheets for offroad vehicle emissions are provided in Attachment B-3.

4.1 Methodology

Exhaust emissions from offroad equipment depend on the type of engine used to power the equipment, the size of the engine (i.e., brake horsepower [BHp]), the engine load, and the equipment operating hours. For the equipment expected to be used at the composting facility, most of this information is available. In cases where information was missing, the information was obtained from the equipment manufacturer or determined using United States Environmental Protection Agency (EPA)-recommended procedures or factors[1]. For offroad equipment, the emissions of a given air contaminant were calculated using the Equation 4-1.

$$E\ (Lb/Yr) = (g/BHp)*(BHp)*(Load)*(Hr/Yr)*(Lb/453.6\ g) \qquad \text{(Eq. 4-1)}$$

Where:

E (Lb/Yr)	is the annual emissions of a given pollutant.
g/BHp	is the emission factor for the pollutant for the EPA Tier of the given engine.
BHp	is the engine's maximum brake horsepower rating.
Load	is the engine load; determined from manufacturers' information or obtained from the literature (EPA Nonroad Studies).
Hr/Yr	is the operating hours of the equipment determined by the design of the facility or typical operating hours obtained from the literature (EPA studies, Seabee Planners and Estimators Handbook, etc.).

[1] In most cases, the information used was obtained directly from design of the composting facility. Missing information was completed using data from the EPA document "Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Modeling," EPA-420-R-10-016, NR-005d, July 2010.

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4.2 Offroad Mobile Source Emissions

4.2.1 Offroad Equipment List and Operating Hours

The list of equipment and operating hours required for the processing of organic feedstock at 640,000 wet TPY are summarized in Tables 4-1 and 4-2, respectively.

Table 4-1: Offroad Equipment Description

Unit Count	Equipment Description	Typical Model (or Equivalent)	Equipment Use
1	Windrow Turner	Aeromaster PT170	Pull type windrow turner
1	Wheeled Tractor	Massey Ferguson, 7619	Tractor to pull windrow turner
3	Wheeled Loader	Caterpillar, 962K	Apply cover to eASP piles
3	Wheeled Loader	Caterpillar, 962K	Move cured compost
3	Wheeled Loader	Michigan 175B	Move mix and immature compost
2	Water Trucks	International, 7400 6x4	Water site dust suppression

Table 4-2: Offroad Equipment Information

No. of Units[1]	Equipment Description	EPA Tier[2]	BHp	BSFC[3]	Eng. Load[3]	Hr/ Day[3]	No. of Days	Total Op.[4] (Hr/Yr)
1	Windrow Turner[5]	–	–	–	–	12	365	4,380
1	Wheeled Tractor	4i	200	0.59	0.59	12	365	4,380
3	Wheeled Loader	4i	250	0.59	0.59	12	365	4,380
3	Wheeled Loader	4i	250	0.59	0.59	12	365	4,380
3	Wheeled Loader	4	350	0.59	0.59	12	365	4,380
2	Water Trucks	2010+	350	0.59	0.59	12	365	4,380

Notes:

1. Number of units required to provide necessary level of service.
2. EPA Tier of equipment readily available over life of project.
3. Brake-specific fuel consumption (Lb Fuel/Hr): obtained from EPA nonroad study.
4. Total hours of operation required for equipment (worst-case assumption).
5. The Windrow Turner is a towed device; it does not have an engine.

4.2.2 Equipment Emission Factors

The equipment used for processing organic feedstock and finished compost will be equipped with either Tier 4i or Tier 4-final engines, depending on the availability of the equipment. The emission calculations use Tier 4i engine emission factors. The criteria pollutant and GHG emission factors for the offroad equipment are summarized in Tables 4-3 and 4-4, respectively.

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Table 4-3: Offroad Equipment Criteria Pollutant Emission Factors

Equipment Description	Tier	NO_x (g/BHp* Hr)	VOC (g/BHp* Hr)	CO (g/BHp* Hr)	SO_x (g/BHp* Hr)	PM_{10} (g/BHp* Hr)	$PM_{2.5}$ (g/BHp* Hr)
Wheeled Tractor	4i	0.30	0.14	2.600	0.005	0.015	0.015
Wheeled Loader	4i	0.30	0.14	2.600	0.005	0.015	0.015
Wheeled Loader	4i	0.30	0.14	2.600	0.005	0.015	0.015
Wheeled Loader	4	0.30	0.14	2.600	0.005	0.015	0.015
Water Trucks	2010+	0.200	0.147	2.60	0.005	0.015	0.015

Notes:

1. For combined emission factors (non-methane hydrocarbons [NMHC]+ nitrogen oxides [NO_x]), the individual constituents were determined as recommended by the EPA in "Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling – Compression Ignition," EPA-420-P-04-009, April 2004, NR-009c.
2. Hydrocarbon conversion between NMHC, total organic gases (TOG), VOC, etc. was performed as recommended by the EPA in "Conversion Factors for Hydrocarbon Emission Components," EPA-420-R-10-015, NR-002d, July 2010.
3. Refer to the spreadsheet listing the non-road engine standards and speciated emission factors contained in the appendices.

Table 4-4: Offroad Equipment GHG Emission Factors and GWP

Fuel Type	CO_2 (Kg/Gal)	CH_4 (g/Gal)	N_2O (g/Gal)	Reference
Diesel	10.21	0.57	0.26	EPA, March 2018
GHG Global Warming Potential				
Global Warming Potential: CH_4 = 21, N_2O = 310				

Notes:

1. GWP based on the Second Annual Report (SAR) of the Intergovernmental Panel on Climate Change (IPCC)

4.2.3 Equipment Exhaust Emissions

The exhaust emissions from the equipment were calculated from the equipment operating hours, BHp, and engine load using the EPA tiered engine emission factors for the engines used to power the equipment. The criteria pollutant emissions resulting from operation of the compost facility are presented by equipment type in Tables 4-5 and 4-6. GHG emissions are presented in Table 4-7.

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Table 4-5: Offroad Equipment Exhaust Emissions

Equipment	NO_x (Lb/Day)	VOC (Lb/Day)	CO (Lb/Day)	SO_x (Lb/Day)	PM_{10} (Lb/Day)	$PM_{2.5}$ (Lb/Day)
Wheeled Tractor	0.94	0.44	8.12	0.02	0.05	0.05
Wheeled Loaders	3.51	1.64	30.44	0.06	0.18	0.18
Wheeled Loaders	3.51	1.64	30.44	0.06	0.18	0.18
Wheeled Loaders	4.92	2.29	42.61	0.08	0.25	0.25
Water Trucks	2.19	1.64	28.41	0.05	0.16	0.16
Total (Lb/Day)	**15.06**	**7.65**	**140.01**	**0.27**	**0.81**	**0.81**

Table 4-6: Offroad Equipment Exhaust Emissions

Equipment	NO_x (Lb/Yr)	VOC (Lb/Yr)	CO (Lb/Yr)	SO_x (Lb/Yr)	PM_{10} (Lb/Yr)	$PM_{2.5}$ (Lb/Yr)
Wheeled Tractor	341.83	159.52	2,962.49	5.69	17.09	17.09
Wheeled Loaders	1,281.85	598.19	11,109.33	21.34	64.09	64.09
Wheeled Loaders	1,281.85	598.19	11,109.33	21.34	64.09	64.09
Wheeled Loaders	1,794.58	837.47	15,553.06	29.87	89.73	89.73
Water Trucks	797.59	598.19	10368.70	19.92	59.82	59.82
Total (Lb/Yr)	5,497.7	2,791.6	51102.90	98.2	294.8	294.8
Total (TPY)	**2.75**	**1.40**	**25.55**	**0.05**	**0.15**	**0.15**

Table 4-7: Offroad Equipment Exhaust GHG Emissions

Equipment	Fuel (Gal/Yr)	CO_2 (MT/Yr)	CH_4 (MT/Yr)	N_2O (MT/Yr)	CO_2e (MT/Yr)
Wheeled Tractor	26,905	275	15	7	2,765
Wheeled Loader	100,894	1,030	58	26	10,370
Wheeled Loader	100,894	1,030	58	26	10,370
Wheeled Loader	141,251	1,442	81	37	14,518
Water Trucks	94,168	962	54	24	9,679
Total	**464,111**	**4,739**	**265**	**121**	**47,701**

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5.0 FUGITIVE DUST EMISSIONS

Operations that involve the movement of material or that expose or disturb erodible surfaces may generate fugitive dust. During composting operations, fugitive dust is generated by a variety of activities, such as the transport of material on unpaved roads, unloading of feedstock, and transfer of material.

5.1 Fugitive Dust Source Categories

The procedures used for calculating fugitive dust emissions vary depending on the type of activity and the silt and moisture content of the material. Fugitive dust emissions were calculated using a "suite" of EPA-recommended equations that generate "predictive emission factors" that are specific to the given activity. The equations and default recommendations were obtained from EPA AP-42 5th Edition. Calculation procedures have been developed for the following source categories:

- Travel on Paved Roads;
- Travel on Unpaved Roads; and
- Material Handling.

Windblown dust can result from wind erosion of surfaces and storage piles. However, since the compost feedstock, compost mix, and finished product generally have high moisture contents (>40%), windblown dust emissions are expected to be nominal and are not estimated.

The methodologies and detailed emission calculations are presented in the following sections. Detailed emission calculation worksheets for fugitive emissions are provided in Attachment B-4.

5.2 Fugitive Dust from Travel on Paved Roads

5.2.1 Methodology

Particulate emissions occur whenever a vehicle travels on a paved roadway surface. The emissions result from resuspension of silt that accumulates on the roadway surface. Emissions from travel on paved roads are calculated using Equation 5-1.

$$EF = k \times (sL)^{0.91} \times W^{1.02} \times Cf \qquad \text{(Eq. 5-1)}$$

Where:

EF	=	Emission factor (Lb/VMT)
k	=	Particle size multiplier (dimensionless)
sL	=	Roadway silt loading (g/m^2)
W	=	Average roadway fleet weight (tons)
Cf	=	Rain correction factor to (days ≥ 0.01 inch rain)

According to CARB, the average fleet weight in California is 2.4 tons. Both CARB and the SJVAPCD use this as the default value for calculating emission from paved roads.

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Aerodynamic Particle Size Multiplier				
Multiplier	PM_{30}	PM_{15}	PM_{10}	$PM_{2.5}$
K (Lb/VMT)	0.011	0.0027	0.0022	0.00054

Rain Correction Factors			
Period	Rain Days	Rain Cf	Reference
5-Yr Avg	30	0.979452	LCD BFL Station[3] (2013-2017)

Notes:

1. Per the EPA, Cf = (1-P/4N) where: P is the number of days with at least 0.01" of precipitation and N is the period of interest, in this case 365 days.
2. Reference: EPA AP-42 5th Edition, Chapter 13, Section 13.2.4.3, Equation 1.
3. Local Climatological Data (LCD) Bakersfield (BFL) Station

5.2.2 Paved Road Emission Factors

Emissions from paved roads depend on the roadway silt loading, which in turn depends on the volume of traffic experienced by a given type of roadway. The roadway silt content used in the calculations was obtained from the area source methodology used by the SJVAPCD for calculating fugitive dust emissions from paved roads. The SJVAPCD-recommended silt loading factors by road type are listed in Table 5-1, and the PM_{10} and $PM_{2.5}$ emission factors for each road type are shown in Table 5-2.

Table 5-1: Paved Road Silt Loading

Freeway (g/m^2)	Major (g/m^2)	Collector (g/m^2)	Local (g/m^2)	Rural[1] (g/m^2)
0.020	0.035	0.035	0.320	1.600

Notes:

1. The rural roadway type is a roadway type specific to the SJVAPCD methodology. It is intended to capture roadways that have higher than normal silt loading to the nature of the vehicular traffic (i.e., agricultural, industrial, oilfield).

Table 5-2: Paved Road PM_{10} Emission Factors

Pollutant	Freeway (Lb/VMT)	Major (Lb/VMT)	Collector (Lb/VMT)	Local (Lb/VMT)	Rural (Lb/VMT)
PM_{10}	1.50E-04	2.50E-04	2.50E-04	1.87E-03	8.09E-03
$PM_{2.5}$	3.75E-05	6.24E-05	6.24E-05	4.68E-04	2.02E-03

Notes:

1. Paved road emission factors differ depending on the rain correction factor. The 5-year average count for years 2013-2017 of 30 days of rain per year was used for the emission estimates.

5.2.3 Paved Road VMT

The VMT on a given type of roadway segment was determined by multiplying the total VMT for the activity by the "segment fraction of total travel" on the types of paved roadways in California. The fractions used in the calculations were derived from statistical travel information reported by Caltrans in the "California 2016 Public Roadway Data." The roadway fractions derived from the Caltrans data are shown in Table 5-3.

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Table 5-3: Fraction of VMT by Functional Type of Roadway

Freeway	Major	Collector	Local	Rural[1]
0.4552	0.3611	0.1004	0.0833	–

Notes:

1. The rural roadway type is a roadway type specific to the SJVAPCD methodology. It is not a Caltrans-designated roadway type.

The "fractions" for each type of road were used to distribute the total VMT for a given activity to the VMT per roadway segment. The results are presented in Table 5-4.

Table 5-4: Summary of Onroad VMT by Case and Road Type

Travel Case	Freeway (VMT/Yr)	Major (VMT/Yr)	Collector (VMT/Yr)	Local (VMT/Yr)	Rural[1] (VMT/Yr)	Total Paved Road[2] (VMT/Yr)
Phase 1	1,144,419	907,842	252,416	209,425	51,308	2,565,411
Phase 2	511,380	405,667	112,791	93,581	22,927	1,146,346
Phase 3	1,958,916	1,553,964	432,063	358,475	87,825	4,391,244
Total	3,614,716	2,867,473	797,270	661,480	162,060	8,103,000

Notes:

1. The rural roadway type is a roadway type specific to the SJVAPCD methodology. It is not a Caltrans-designated roadway type. Rural mileage was estimated assuming 2 miles per vehicle trip (distance from State Route 46 to the Lost Hills SWMF).
2. Total paved road distance differs from the mileage presented in Table 1-1 due to 0.25 miles of travel on unpaved roads at the facility for material delivery trucks.

5.2.4 Emissions from Paved Roads

The fugitive dust emissions from motor vehicle travel on paved public roads were calculated from the VMT on a given type of roadway segment and the EPA predictive emission factor corresponding to the roadway segment type. The predicted emissions are summarized in Table 5-5.

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Table 5-5: Emissions from Travel on Paved Roads

Phase	Freeway	Major	Collector	Local	Rural	Total
PM_{10} (Lb/Yr)						
Phase 1	171.7	226.6	63.0	391.6	415.0	1,267.9
Phase 2	76.7	101.3	28.2	175.0	185.4	566.5
Phase 3	293.8	387.9	107.8	670.3	710.4	2,170.2
Total	542.2	715.7	199.0	1,236.9	1,310.8	4,004.7
$PM_{2.5}$ (Lb/Yr)						
Phase 1	42.9	56.6	15.8	97.9	103.8	317.0
Phase 2	19.2	25.3	7.0	43.7	46.4	141.6
Phase 3	73.5	97.0	27.0	167.6	177.6	542.6
Total	135.6	178.9	49.7	309.2	327.7	1,001.2
PM_{10} (TPY)						
Phase 1	0.09	0.11	0.03	0.20	0.21	0.63
Phase 2	0.04	0.05	0.01	0.09	0.09	0.28
Phase 3	0.15	0.19	0.05	0.34	0.36	1.09
Total	0.27	0.36	0.10	0.62	0.66	2.00
$PM_{2.5}$ (TPY)						
Phase 1	0.02	0.03	0.01	0.05	0.05	0.16
Phase 2	0.01	0.01	0.00	0.02	0.02	0.07
Phase 3	0.04	0.05	0.01	0.08	0.09	0.27
Total	0.07	0.09	0.02	0.15	0.16	0.50

5.3 Fugitive Dust from Travel on Unpaved Roads

5.3.1 Methodology

The emissions from unpaved roads account for the majority of fugitive dust from operational activities. Emissions from unpaved roads were estimated using predictive emission factors derived from EPA-recommended equations. The predictive emission factors are a function of the vehicle weight and the silt content of the roadway surface. The total emissions attributed to travel on unpaved roads were calculated from total VMT and the predictive emission factors. The EPA equation used for determining the appropriate factor was obtained from EPA AP-42 5th Edition and is reproduced as Equation 5-2.

$$EF = k \times \left(\frac{s}{12}\right)^{a} \times \left(\frac{W}{3}\right)^{b} \times Cf \qquad \text{(Eq. 5-2)}$$

Where:

EF	=	Emission Factor (Lb/VMT)
K	=	Particle size multiplier
s	=	Material silt content (%)
W	=	Mean vehicle fleet weight (tons)
a, b	=	Empirical constants
Cf	=	Rain correction factor (1-N/365)

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Constant	$PM_{2.5}$	PM_{10}
k	0.15	1.5
a	0.9	0.9
b	0.45	0.45

Notes:

1. Reference: EPA AP-42 5th Edition, Chapter 13, Section 13.2.2, Equation 1a.

5.3.2 Unpaved Road Emission Factors

Emission factors for travel on unpaved roads were calculated using the EPA-recommended procedure. A factor was determined for each type of vehicle travelling on the facility's unpaved roads. The factors were calculated using the average weight (loaded, unloaded) of the vehicle and the roadway silt content. The vehicle weight was determined from the literature or manufacturer specification sheets. The roadway silt was obtained from EPA AP-42, Table 13.2.2-1 (disposal routes at landfills). Emission factors are presented in Table 5-6.

Table 5-6: Unpaved Road Emission Factors for Onroad Vehicles

Equipment Description	Avg. Wt.[1] (Tons)	Rain[2] (Cf)	Silt Loading (%)	EPA Predictive Factor (Lb/VMT)	
				PM_{10}	$PM_{2.5}$
LDT1 (Personnel)	3.1	0.9178	6.4	0.7964	0.0796
LDT2 (Deliver Equip.)	3.6	0.9178	6.4	0.8447	0.0845
LHD2 (Supplies)	5.8	0.9178	6.4	1.0520	0.1052
T7 Tractor (Feedstock)	18.0	0.9178	6.4	1.7505	0.1751
T7 Tractor (Finished Compost)	25.8	0.9178	6.4	2.0573	0.2057
Aeromaster PT170	7.7	0.9178	6.4	1.1950	0.1195
Wheeled Tractor	7.9	0.9178	6.4	1.2088	0.1209
Wheeled Loader	22.5	0.9178	6.4	1.9371	0.1937
Water Truck 5M Gal	19.8	0.9178	6.4	0.0000	0.0000

Notes:

1. Average vehicle weights were calculated from the empty weight of the vehicle and the gross vehicle weight of the loaded vehicle. Additional information is included in the spreadsheets contained in the Attachment B-4.
2. The rain day correction factor is based on the 5-year average of 30 days of rain (2013-2017).

5.3.3 Unpaved Road Data

Unpaved road dust from operational activities was calculated using the EPA-recommended factors and VMT on unpaved roads.

5.3.3.1 Onroad Vehicles –Onsite Mileage

Travel on unpaved roads is required for accessing the composting site, delivery of feedstock, compost processing, and transport of finished product. The VMTs used in the emission calculations are summarized in Table 5-7. Mileage estimates assume that the composting facility is operated at the maximum requested rate of 640,000 wet tons per year of organic feedstock.

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Table 5-7: Unpaved Road Mileage for Onroad Equipment

Vehicle/Purpose	Average Vehicle Wt. (Tons)	No. of Days	Veh. Per Day	Trips Per Day	Trips per Task	Onsite Miles per Trip	Total Onsite VMT
Supervisor	6,250	365	1	4	1,460	1.0	1,460
Technical Staff	6,250	365	1	4	1,460	1.0	1,460
Mechanic	6,250	365	1	2	730	1.0	730
Equipment Operators	6,250	365	3	2	2,190	0.5	1,095
Personnel for facility	6,250	365	3	2	2,190	0.5	1,095
Miscellaneous Business	6,250	104	1	2	208	0.5	104
Laboratory Services	6,250	104	1	2	208	1.0	208
Delivery of Office Supplies	11,603	104	1	2	208	0.0	0
Deliver to Compost Facility	35,974	365	111	1	40,515	0.25	10,129
Ship from Compost Facility	35,974	365	111	1	40,515	0.25	10,129

5.3.3.2 Compost Processing Equipment Onsite Mileage

The use of the compost processing equipment (windrow turner, tractors, and wheeled loaders) will result in fugitive dust from travel on unpaved roads and other unpaved areas. The onsite unpaved road mileage for equipment required for composting was calculated from the number of operating hours per day and typical speed of the offroad equipment. Mileage estimates are summarized in Table 5-8.

Table 5-8: Unpaved Road Mileage for Offroad Equipment

Operations	No. of Units	Total Days	Hr/Day	Avg. mph	Mi/Day	Mi/Yr
Wheeled Tractor	1	365	12	1.0	12.0	4,380
Windrow Turner	1	365	12	0.3	3.6	1,314
Wheeled Loader	3	365	12	4	30.0	10,950
Wheeled Loader	3	365	12	2	30.0	10,950
Wheeled Loader	3	365	12	4	30.0	10,950
Water Trucks	2	365	12	5	120.0	43,800

Notes:

1. Equipment operating speed was obtained from manufacturer's information or was estimated based on a review of the literature. For example, the speeds for the wheeled loaders were estimated from the average first gear [2 miles per hour (mph)] or second gear (4 mph) speed reported by the manufacturers (CAT 962K).

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5.3.4 Unpaved Road Dust Emissions

Emissions were calculated using the unpaved road dust emission factors from Table 5-6, along with the operational data presented in Tables 3-3 and 5-7. Emissions are abated by wet suppression; the expected control efficiency is 80%. The results are shown in Table 5-9.

Table 5-9: Unpaved Road Dust

EMFAC Vehicle Code	Description	Uncontrolled (Lb/Yr)		Controlled (Lb/Yr)	
		PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
Onroad Vehicles					
LDT1	Supervisor	1,162.73	116.27	232.55	23.25
LDT1	Technical Staff	1,162.73	116.27	232.55	23.25
LDT1	Mechanic	581.37	58.14	116.27	11.63
LDT1	Equipment Operators	872.05	87.21	174.41	17.44
LDT1	Personnel for facility	872.05	87.21	174.41	17.44
LDT1	Miscellaneous Business	82.82	8.28	16.56	1.66
LDT1	Laboratory Services	165.65	16.56	33.13	3.31
LHD2	Delivery of Office Supplies	0.00	0.00	0.00	0.00
T7 Tractor	Deliver to Compost Facility	17,730	1,774	3,546	355
T7 Tractor	Ship from Compost Facility	17,730	1,774	3,546	355
Total Unpaved Roads (Lb/Yr)		40,360	4,037	8,072	807
Total Unpaved Roads (TPY)		20.18	2.02	4.04	0.40
Compost Processing Equipment					
Wheeled Tractor		5,294.73	529.47	1,058.95	105.89
Windrow Turner		1,570.20	157.02	314.04	31.40
Wheeled Loader		21,211.55	2,121.16	4,242.31	424.23
Wheeled Loader		21,211.55	2,121.16	4,242.31	424.23
Wheeled Loader		21,211.55	2,121.16	4,242.31	424.23
Water Trucks[1]		0.00	0.00	0.00	0.00
Total Unpaved Roads (Lb/Yr)		70,499.6	7,050.0	14,099.9	1,410.0
Total Unpaved Roads (TPY)		35.2	3.5	7.0	0.7
Total Unpaved Road Dust					
Total Unpaved Roads (Lb/Yr)		110,860	11,087	22,172	2,217
Total Unpaved Roads (TPY)		55.43	5.54	11.09	1.11

Notes:

1. Water trucks are assumed to have no fugitive dust emissions due to the water spray.

5.4 Fugitive Dust from Material Handling

Fugitive dust emissions from material handling can occur during the transfer of material from one point to another. As the material is moved or dropped to a receiving surface, wind may cause some of the material to become airborne.

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Fugitive dust emissions from material handling were calculated using EPA-recommended equations for generating "predictive mission factors" specific to the type of material transferred and type of equipment used for the transfer operation. The methodologies listed in Table 5-10 are used for determining representative emission factors for fugitive dust emissions.

Table 5-10: EPA Equations Used for Calculating Emissions from Open Sources and Material Handling

Activity	Methodology (EPA AP-42 Equation)
Material Unloading	Batch Drop, Section 13.2.4.3 Equation 1
Dozer	Dozer Equation, Table 11.9.1
Compactor	Dozer Equation, Table 11.9.1
Loaders	Batch Drop, Section 13.2.4.3 Equation 1

The particulate emissions depend on the average wind speed and the silt and moisture content of the material. The daily average wind speed used in the calculations was determined using local climatology data obtained from the National Climatic Data Center for the Bakersfield Meadows Field Station. The average wind speed during 2013-2017 was approximately 5.6 mph. Unless otherwise noted, the silt and moisture content of material used in the emission calculations was obtained from EPA AP-42 5th Edition, Table 13.2.4-1 (Materials at Solid Waste Landfills). Silt and moisture content information is summarized in Table 5-11.

Table 5-11: Typical Silt and Moisture Content of Materials

Description	Silt (%)	Moisture (%)		Used to Calculate Emissions
		Typical	Used	
Clay/Dirt Mix	9.2	14	14	Used for site material (soil)
Feedstock	–	40-50	2	Worst-case dry material (leaves)
Compost	–	40-50	40	Finished compost
Green Waste	–	70	40	Green waste
Food Waste	–	70	40	Food waste
Biosolids	–	75	40	Dewatered biosolids

Notes:

1. Biosolids and compost have high moisture content (≈ 50% to 80%). For these materials, transfer operations (i.e., batch drop for material delivery) are not expected to contribute to appreciable amounts of fugitive dust emissions.
2. Food waste, green waste, and woody waste are not expected to contain appreciable amounts of silt and also have high moisture content. The transfer of these materials to the compost pile is not expected to generate appreciable amounts of fugitive dust.

The procedures used for determining the predictive emission factors used for calculating emissions for various types of activities are discussed in the following subsections.

5.4.1 Methodology for Fugitive Dust Emissions from Material "Drop Points"

Fugitive dust emissions from material transfer, such as the delivery of compostable material and the transfer of material using loaders, were calculated using the EPA-recommended predictive emission factor equation for emissions from material handling; reproduced as Equation 5-3.

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$$EF = k * (0.0032) * \frac{\left(\frac{U}{5}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}} \quad \text{(Eq. 5-3)}$$

Where:

EF = Emission factor (Lb/Ton)

k = Particle size multiplier (dimensionless)

U = Mean wind speed (mph)

M = Material moisture content (%)

Aerodynamic Particle Size Multiplier				
< 30 µm	< 15 µm	< 10 µm	< 5 µm	< 2.5 µm
0.74	0.48	0.35	0.20	0.0.053

Reference: EPA AP-42 5th Edition, Chapter 13, Section 13.2.4.3, Equation 1.

5.4.2 Methodology for Fugitive Dust from Dozers and Tractors

Fugitive dust emissions from dozers and tractors were calculated using the EPA-recommended predictive emission factor equation found in EPA AP-42 5th Edition, Table 11.9.1, which is reproduced as Equation 5-4. Although the predictive emission factor equation is recommended for calculating emissions from dozing, in the absence of another available method, it has also been used to estimate emissions from tractors used for composting activities. The emission factors were used to calculate emissions based on the amount of time the equipment is operated.

$$PM_{30} = \frac{5.7 * (s)^{1.2}}{(M)^{1.3}} \qquad PM_{15} = \frac{1.0 * (s)^{1.5}}{(M)^{1.4}} \quad \text{(Eq. 5-4)}$$

Where:

PM = Units of Lb/Hr

s = Silt content (%)

M = Moisture content (%)

$PM_{2.5}$ = 0.105 * PM_{30}

PM_{10} = 0.750 * PM_{15}

Reference: EPA AP-42 5th Edition, Chapter 11, Table 11.9-1.

5.4.3 Predictive Emission Factor Calculations

Equations 5-3 and 5-4 were used to generate predictive emission factors for each type of material and equipment operation. The predictive emission factors used in the calculations are summarized in Table 5-12. The factors were subsequently combined with process information for equipment required for operation of the compost facility.

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Table 5-12: Predictive Emission Factors for Material Handling

Activity	Silt (%)	Moist. (%)	PM_{10} (Lb/Ton)	$PM_{2.5}$ (Lb/Ton)
Deliver Feedstock to Mix Pad	–	40	2.00E-05	3.00E-06
Mix Raw Feedstock Materials	–	40	2.00E-05	3.00E-06
Move Mix to Compost Pad	–	40	2.00E-05	3.00E-06
Move Compost to Curing	–	40	2.00E-05	3.00E-06
Move Cured Compost	–	40	2.00E-05	3.00E-06
Load Cured Compost to Trucks	–	40	2.00E-05	3.00E-06

5.4.4 Compost Processing Activity Data

A windrow turner will be used to mix compost feedstock. Loaders will be used to transfer compost between pads and for loading finished product into delivery trucks. The activity data for the facility at 640,000 wet TPY of organic feedstock is presented in Table 5-13.

Table 5-13: Compost Processing Material Handling Activities

Compost Processing Max. Rate	Process Rate (Ton/Day)	No. of Transfers	Weight Transferred	
			(Ton/Day)	(TPY)
Deliver Feedstock	1,753	1	1,753	640,000
Mix Feedstock	1,753	4	7,012	2,560,000
Move Feedstock	1,753	2	3,507	1,290,000
Compost to Curing	1,403	2	2,805	1,024,000
Curing to Storage	1,403	2	2,805	1,024,000
Load Compost	1,403	2	2,805	1,024,000

Note: Compost feedstock is subject to 20% mass shrinkage and 40% volume shrinkage.

5.4.5 Compost Processing Emissions

The amount of material processed (Table 5-13) was combined with the appropriate emission factors from Table 5-12 to calculate the fugitive dust emissions from material handling. Fugitive dust from material handling will be reduced via wet suppression by at least 50%. Operational fugitive dust emissions from material handling are detailed in Tables 5-14 and 5-15.

Table 5-14: Daily Material Handling Dust Emissions

Compost Processing Max. Daily Rate	Uncontrolled (Lb/Day)		Controlled (Lb/Day)	
	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
Deliver Feedstock	0.034	0.005	0.017	0.003
Mix Feedstock	0.137	0.021	0.069	0.010
Move Feedstock	0.069	0.010	0.034	0.005
Compost to Curing	0.055	0.008	0.027	0.004
Curing to Storage	0.055	0.008	0.027	0.004
Load Compost	0.055	0.008	0.027	0.004
Max. Daily (Lb/Day)	0.405	0.061	0.203	0.031

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Table 5-15: Annual Material Handling Dust Emissions

Compost Processing Max. Annual Rate	Uncontrolled (Lb/Yr)		Controlled (Lb/Yr)	
	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
Deliver Feedstock	12.53	1.90	6.26	0.95
Mix Feedstock	50.12	7.59	25.06	3.79
Move Feedstock	25.06	3.79	12.53	1.90
Compost to Curing	20.05	3.04	10.02	1.52
Curing to Storage	20.05	3.04	10.02	1.52
Load Compost	20.05	3.04	10.02	1.52
Max. Annual (Lb/Yr)	147.9	22.4	73.9	11.2
TPY	0.074	0.011	0.037	0.006

5.5 Operations Fugitive PM_{10} Emission Summary

Operational fugitive dust emissions are summarized by process in Table 5-16.

Table 5-16: Fugitive PM_{10} and $PM_{2.5}$ Emissions from Compost Operations

Activity	Pollutant	
	PM_{10}	$PM_{2.5}$
(Lb/Day)		
Paved Roads	10.97	2.74
Unpaved Roads	60.75	6.07
Material Handling	0.20	0.03
Total	**71.92**	**8.85**
(Lb/Yr)		
Paved Roads	4,004.7	1,001.2
Unpaved Roads	22,172.0	2,217.3
Material Handling	73.9	11.2
Total	**26,250.6**	**3,229.6**
(TPY)		
Paved Roads	2.00	0.50
Unpaved Roads	11.09	1.11
Material Handling	0.04	0.01
Total	**13.13**	**1.61**

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6.0 VOC, AMMONIA, AND GHG EMISSIONS FROM COMPOSTING OPERATIONS

Emissions of VOC, ammonia (NH_3), and GHG were estimated using emission factors recommended by the SJVAPCD or CARB or derived from reports published by these agencies. Emission calculation worksheets for VOC, NH_3, and GHG emissions from composting operations are provided in Attachment B-5.

6.1 Emission Factors

The proposed Project will utilize a composting technology referred to as "extended Aerated Static Pile" (eASP). This technology injects air into a compost windrow to enhance the biological degradation and minimize emissions. A layer of cured compost will be applied to the top of each compost pile that acts as a biofilter to control emissions. The effectiveness of the eASP technology relative to conventional windrow composting has been studied by the SJVAPCD. The emissions from the eASP technology are presented in that study in terms of control efficiency relative to windrow composting. Therefore, these emission estimates developed for this analysis start with uncontrolled windrow composting emission factors. The control efficiency for each pollutant attributed to the eASP and cured compost biofilter is then applied to calculate the controlled emissions.

The uncontrolled emission factors for calculating emissions of VOC and NH_3 from windrow composting facilities are summarized in Table 6-1.

Table 6-1: Windrow Composting VOC and Ammonia Emission Factors

Compost Type[1,2]	Combined Factor (Lb/Wet Ton)		Active Compost (Lb/Wet Ton)		Compost Curing (Lb/Wet Ton)		Feedstock[3] (Lb/Wet Ton Day)	
	VOC	NH_3	VOC	NH_3	VOC	NH_3	VOC	NH_3
Composting								
Co-Composting	1.7800	2.9300	1.6020	2.6370	0.1780	0.2930	0.2825	0.0231
Green, Food	3.7800	0.7800	3.4020	0.7020	0.3780	0.0780	0.6000	0.0062
Product Storage								
	(Lb/Wet Ton Day)		–	–	–	–	–	–
Co-Composting	4.25E-3	7.60E-4	–	–	–	–	–	–
Green, Food	4.25E-3	7.60E-4	–	–	–	–	–	–

Notes:

1. Co-composting with green waste and biosolids or manure. The CARB and SJVAPCD emission factors are the same. Lb/wet ton is assumed to mean Lb/ton feedstock. The SJVAPCD compost cycle used for calculating emissions spans 60 days (22 days active composting and 38 days for curing). Daily factors may be derived by dividing the total by the appropriate number of days.
2. Green waste, food waste, grape pomace, and other compostable materials. The factors are from the SJVAPCD with the exception of ammonia, which is the CARB factor (the SJVAPCD does not publish a factor).
3. The feedstock storage pile VOC emission factor for green waste is from the SJVAPCD/CARB. The VOC emission factor for co-composting storage pile was calculated using the ratio of the green waste pile Emission Factor to the combined green waste factor: = [1.78 x (0.2/3.78)]. The ammonia factors for storage piles were calculated from the curing factor by dividing the curing factor by 38 days (per SJVAPCD curing days).
4. The product storage emission factors are from the SJVAPCD Emission Factor Report: Compost VOC Emission Factors, September 15, 2010: Appendix C, Northern Recycling Zamora Compost Facility Air Emissions Source Test, T.R. Card and C.E. Schmidt, May 2009.

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The emission factors for calculating GHG emissions from uncontrolled windrow composting facilities are shown in Table 6-2.

Table 6-2: Uncontrolled Windrow Composting GHG Emission Factors

Compost Type[1,2]	Combined Factor (Kg/Wet Ton)		Active Compost (Kg/Wet Ton)		Compost Curing (Kg/Wet Ton)		Feedstock[3] (Kg/Wet Ton Day)	
	CH_4	N_2O	CH_4	N_2O	CH_4	N_2O	CH_4	N_2O
Composting								
Co-Composting	1.7781	0.2722	1.6003	0.0272	0.1778	0.2449	0.0226	0.0000
Green, Food	1.7781	0.0680	1.6003	0.0068	0.1778	0.0612	0.0226	0.0000
Product Storage								
	(Kg/Wet Ton Day)		–	–	–	–	–	–
Co-Composting	0.0047	–	–	–	–	–	–	---
Green, Food	0.0047	–	–	–	–	–	–	---

Notes:

1. Combined Factors: The combined factors for CH_4 are from the "Method for Estimating Greenhouse Gas Emission Reductions from Diversion of Organic Waste from Landfills to Compost Facilities," Final Draft, May 2017; CARB. The N_2O factor for green waste is from the CARB report. The N_2O Factor for co-composting is from IPCC (0.3g N_2O/Kg).
2. CH_4 emissions are split between composting and curing using the SJVAPCD-recommended factor (90%/10%). However, according to the literature, most (>90%) of the N_2O emissions occur late in the composting cycle or during compost curing. Consequently, the N_2O emissions are split using 10% for composting and 90% for curing.
3. Feedstock CH_4 emission factors are from the "Inland Empire" source tests conducted by the SCAQMD and CARB. Test Report #1 was conducted during September and October 2001; Test #2 was conducted during November and December 2001. The average CH_4 emissions from feedstock were approximately 0.0226 Lb/wet ton day. Emission factors for N_2O from feedstock storage were unavailable. Given that N_2O emissions typically occur late in the composting cycle after available carbon is depleted, it was assumed that the N_2O emissions from short-term feedstock storage are equal to zero.
4. The GHG emission factors from product storage were unavailable. Therefore, the GHG emissions from product storage were assumed to be equal to the compost curing factors (for GHG) divided by the SJVAPCD curing days (38 days).

6.2 Emission Control Efficiency

Emission factors for this project were developed by adjusting the standard factors for conventional windrow using the control efficiency achieved by the extended aerated static pile (eASP) technology with a cured compost biofilter. Control efficiencies used in the calculations are presented in Tables 6-3 and 6-4.

Table 6-3: VOC and Ammonia Control Efficiency[1,2] for eASP Composting with Biofilter

Combined Factor		Active Compost		Compost Curing		Feedstock	
VOC	NH_3	VOC	NH_3	VOC	NH_3	VOC	NH_3
81%	45%	90%	50%	0.00%	0.00%	0.00%	0.00%

Notes:

1. The VOC and NH_3 control efficiencies are from the CARB Methodology for Composting Facilities (March 2, 2015).
2. CalRecycle/SJVAPCD Report: Greenwaste Compost Site Emission Reductions from Solar Powered Aeration with Biofilter.

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Table 6-4: GHG Control Efficiency[1,2] for eASP Composting with Biofilter

Combined		Active Compost		Compost Curing		Feedstock	
CH_4	N_2O	CH_4	N_2O	CH_4	N_2O	CH_4	N_2O
9%	72%	10%	80%	0.00%	0.00%	0.00%	0.00%

Notes:

1. The CH_4 and N_2O control efficiencies are from the CARB Methodology for Composting Facilities (March 2, 2015).
2. CalRecycle/SJVAPCD Report: Greenwaste Compost Site Emission Reductions from Solar Powered Aeration with Biofilter.

6.3 Emissions

Emissions of VOC, NH_3, and GHG were calculated using the industry-standard emission factors for windrow composting adjusted to account for the control efficiency of the eASP process and biofilter cover layer. The results of the calculations are summarized in Table 6-5.

Table 6-5: VOC and NH_3 Emissions

Constituent	Active	Curing	Feedstock	Product	Total
Daily (Lb/Day)					
VOC	280.90	312.11	495.41	4.47	1,092.90
NH_3	2,311.89	513.75	40.56	0.80	2,867.00
Annual (TPY)					
VOC	51.26	56.96	90.41	0.82	199.45
NH_3	421.92	93.76	7.40	0.15	523.23

Emissions of CH_4 and N_2O were calculated using the industry-standard windrow composting emission factors adjusted for the control efficiency of the eASP process and biofilter cover layer. Carbon dioxide (CO_2) is a major component of the emissions from any composting operation. However, these CO_2 emissions are biogenic (derived from the degradation of organic materials) and do not contribute to global warming. For this reason, CO_2 emissions from composting are estimated for this analysis. The composting GHG emissions are summarized in Table 6-6.

Table 6-6: Composting GHG Emissions

Constituent	Active (MT/Yr)	Curing (MT/Yr)	Feedstock (MT/Yr)	Product (MT/Yr)	Total (MT/Yr)
CH_4	921.8	113.8	43.5	53.9	1132.9
N_2O	3.5	156.8	0.0	74.3	234.5
CO_2e	20,437	50,987	913	24,152	96,488

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7.0 TOXIC AIR CONTAMINANTS EMISSIONS

7.1 Overview

Toxic air contaminants (TACs) are air pollutants that may be present in ambient air in relatively low concentrations but have characteristics such as toxicity or persistence that may make them a hazard to human health. These pollutants include volatile and semi-volatile organic compounds, heavy metals, and others.

The emissions of TAC may be calculated using process information for a given activity and an appropriate emission factor, or the emissions may be calculated by "speciating" the PM_{10} and VOC emissions using a profile that lists the weight fraction of the TAC constituent in the parent compound. Both approaches are used. Emission calculation worksheets for TAC emissions are provided in Attachment B-6.

7.2 TAC Emissions from Diesel Combustion

TAC emissions from diesel combustion are based on PM_{10} emissions, assuming that 100% of the PM_{10} emissions are diesel particulate matter (DPM). The DPM emissions are summarized in Table 7-1 for the onsite and near-site travel. Per SJVAPCD guidance, one-quarter mile of near-site travel should be included in the TAC inventory for the health risk assessment.

Table 7-1: Emissions of DPM from Diesel-Fueled Vehicles

Vehicle Type	Onsite Emissions (Lb/Yr)	Near-site Emissions (Lb/Yr)
Onroad Trucks	1.21	1.21
Offroad Equipment	294.8	0

7.3 TAC Emissions from Gasoline Combustion

TAC emissions from gasoline combustion were calculated by using the speciation profile published by the EPA: Air Toxic Emissions from On-road Vehicles in MOVES2014; EPA-420-R-16-016, November 2016. The gasoline combustion TAC emissions are summarized in Tables 7-2 through 7-5.

Table 7-2: Operating Data – Onroad Gasoline Vehicles

Parameter	Onsite	Near-site
VMT (VMT/Day)	17	17
VOC (Lb/Yr)	0.382	0.382
$PM_{2.5}$ (Lb/Yr)	5.51	5.51

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Table 7-3: Speciated Metal Exhaust TAC Emissions – Gasoline Vehicles

TAC	Emission Factor (g/Mile)	Onsite (Lb/Yr)	Near-site (Lb/Yr)
Arsenic	2.30E-06	3.119E-05	3.119E-05
Chromium-VI	1.20E-08	1.628E-07	1.628E-07
Manganese	1.33E-06	1.804E-05	1.804E-05
Mercury	1.20E-07	1.632E-06	1.632E-06
Nickel	1.50E-6	2.034E-05	2.034E-05

Table 7-4: Speciated Organic Exhaust TAC Emissions – Gasoline Vehicles

Constituent	Fraction VOC	Fraction $PM_{2.5}$	Onsite (Lb/Yr)	Near-site (Lb/Yr)
1,3-Butadiene	0.000E+00	–	0.000E+00	0.000E+00
2,2,4-Trimethylpentane	1.849E-02	–	7.066E-03	7.066E-03
Acetaldehyde	0.000E+00	–	0.000E+00	0.000E+00
Acrolein	6.280E-04	–	2.400E-04	2.400E-04
Benzene	0.000E+00	–	0.000E+00	0.000E+00
Ethanol	2.390E-02	–	9.133E-03	9.133E-03
Ethyl Benzene	1.932E-02	–	7.383E-03	7.383E-03
Formaldehyde	0.000E+00	–	0.000E+00	0.000E+00
Hexane	1.593E-02	–	6.087E-03	6.087E-03
Propionaldehyde	8.600E-04	–	3.286E-04	3.286E-04
Styrene	9.700E-04	–	3.707E-04	3.707E-04
Toluene	8.657E-02	–	3.308E-02	3.308E-02
Xylene	7.032E-02	–	2.687E-02	2.687E-02
Naphthalene	2.070E-03	7.185E-05	1.187E-03	1.187E-03
Acenaphthylene	1.810E-04	2.133E-05	1.867E-04	1.867E-04
Acenapthene	3.990E-05	0.000E+00	1.525E-05	1.525E-05
Fluorene	8.080E-05	0.000E+00	3.088E-05	3.088E-05
Anthracene	3.350E-05	2.211E-05	1.347E-04	1.347E-04
Phenanthrene	2.140E-04	7.742E-05	5.084E-04	5.084E-04
Fluoranthene	5.600E-05	7.798E-05	4.511E-04	4.511E-04
Pyrene	6.400E-05	8.466E-05	4.910E-04	4.910E-04
Benz(a)anthracene	5.400E-06	2.027E-04	1.119E-03	1.119E-03
Chrysene	6.050E-06	1.716E-04	9.477E-04	9.477E-04
Benzo(a)pyrene (BAP)	2.940E-07	5.085E-04	2.803E-03	2.803E-03
Benzo(b)fluoranthene	4.010E-06	2.479E-04	1.367E-03	1.367E-03
Benzo(k)fluoranthene	4.010E-06	2.479E-04	1.367E-03	1.367E-03
Benzo(g,h,i)perylene	0.000E+00	1.376E-03	7.582E-03	7.582E-03
Indeno(1,2,3-cd)pyrene	0.000E+00	5.169E-04	2.848E-03	2.848E-03
Dibenzo(a,h)anthracene	0.000E+00	1.186E-05	6.538E-05	6.538E-05
Total PAH	**2.759E-03**	**3.638E-03**	**2.110E-02**	**2.110E-02**

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Table 7-5: Speciated Exhaust TAC Emissions of Dioxins/Furans – Gasoline Vehicles

Dioxin/Furan Compound	Factor (mg/Mile)	Onsite (Lb/Yr)	Near-site (Lb/Yr)
2,3,7,8-Tetrachlorodibenzo-p-Dioxin (TCDD)	8.270E-10	1.122E-11	1.122E-11
1,2,3,7,8-Pentachlorodibenzo-p-Dioxin	3.700E-10	5.018E-12	5.018E-12
1,2,3,4,7,8-Hexachlorodibenzo-p-Dioxin	3.870E-10	5.249E-12	5.249E-12
1,2,3,6,7,8-Hexachlorodibenzo-p-Dioxin	7.920E-10	1.074E-11	1.074E-11
1,2,3,7,8,9-Hexachlorodibenzo-p-Dioxin	4.930E-10	6.686E-12	6.686E-12
1,2,3,4,6,7,8-Heptachlorodibenzo-p-Dioxin	5.950E-09	8.070E-11	8.070E-11
Octachlorodibenzo-p-dioxin	4.700E-08	6.374E-10	6.374E-10
2,3,7,8-Tetrachlorodibenzofuran	2.760E-09	3.743E-11	3.743E-11
1,2,3,7,8-Pentachlorodibenzofuran	1.320E-09	1.790E-11	1.790E-11
2,3,4,7,8-Pentachlorodibenzofuran	9.680E-10	1.313E-11	1.313E-11
1,2,3,4,7,8-Hexachlorodibenzofuran	1.090E-09	1.478E-11	1.478E-11
1,2,3,6,7,8-Hexachlorodibenzofuran	1.160E-09	1.573E-11	1.573E-11
1,2,3,7,8,9-Hexachlorodibenzofuran	3.170E-10	4.299E-12	4.299E-12
2,3,4,6,7,8-Hexachlorodibenzofuran	1.360E-09	1.845E-11	1.845E-11
1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.210E-08	1.641E-10	1.641E-10
1,2,3,4,7,8,9-Heptachlorodibenzofuran	3.870E-10	5.249E-12	5.249E-12
Octachlorodibenzofuran	1.370E-08	1.858E-10	1.858E-10
Total Dioxins/Furans	**9.098E-08**	**1.234E-09**	**1.234E-09**

7.4 TAC Emissions from Paved Road Dust

TAC emissions from paved road dust are calculated by speciating the PM_{10} emissions according to the speciation profile provided by CARB per Particulate Speciation Profile #422. Near-site paved road PM_{10} emissions are based on total paved road emissions of 10.97 pounds per day (= 4,000.7 pounds per year/ 365 days/year, see Table 4-5) scaled to one-quarter of a mile. The paved road dust TAC emissions are summarized in Table 6-6.

Table 7-6: TAC Emissions from Paved Road Dust

TAC	CAS No.	Concentration (mg/Kg)	Emissions	
			(Lb/Day)	(Lb/Yr)
Arsenic	7440-38-2	16.00	4.49E-07	1.64E-04
Cadmium	7440-43-9	31.00	8.70E-07	3.18E-04
Chromium-VI	18540-29-9	12.45	3.49E-07	1.28E-04
Copper	7440-50-8	210.00	5.90E-06	2.15E-03
Lead	7439-92-1	951.00	2.67E-05	9.74E-03
Manganese	7439-96-5	795.00	2.23E-05	8.15E-03
Mercury	7439-97-6	16.00	4.49E-07	1.64E-04
Nickel	7440-02-0	68.00	1.91E-06	6.97E-04
Selenium	7782-49-2	2.00	5.61E-08	2.05E-05
Vanadium	7440-62-2	291.00	8.17E-06	2.98E-03

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7.5 TAC Emissions from Unpaved Road Dust

TAC emissions from unpaved road dust are calculated by speciating the PM_{10} emissions according to the speciation profile provided by the SJVAPCD from: Unpaved Road Dust; SJVAPCD-approved speciation profile; Toxic Emissions Inventory Plan for the H.M. Holloway Lost Hills Mine; Yu Vu Environmental Specialist, SJVAPCD; August 1, 2018. PM_{10} emissions are 60.75 pounds per day (= 8,072 pounds per year of unpaved road travel by onroad vehicles plus 14,100 pounds per year of unpaved road travel by compost processing equipment, divided by 365 days per year; see Table 5-9). The unpaved road dust TAC emissions are summarized in Table 7-7.

Table 7-7: TAC Emissions from Unpaved Roads

TAC	CAS No.	Concentration (mg/Kg)	Emissions	
			(Lb/Day)	(Lb/Yr)
Arsenic	7440-38-2	3.0	1.82E-04	6.65E-02
Chromium-VI	18540-29-9	1.3	7.90E-05	2.88E-02
Copper	7440-50-8	15.0	9.11E-04	3.33E-01
Manganese	7439-96-5	160.0	9.72E-03	3.55E+00
Nickel	7440-02-0	21.0	1.28E-03	4.66E-01
Vanadium	7440-62-2	30.0	1.82E-03	6.65E-01
Asbestos	1136	0.3	1.82E-05	6.65E-03
Crystal Silica	1175	2.8	1.70E-04	6.21E-02

7.6 TAC Emissions from Material Handling

TAC emissions from material handling fugitive dust are calculated by speciating the PM_{10} emissions according to the speciation profile provided by Matthew Cegielski of SJVAPCD: PM_{10}-based TAC emission factors for dust from co-composting, September 2015. The PM_{10} emissions from material handling are 0.203 pounds per day (see Table 5-14). The material handling fugitive dust TAC emissions are summarized in Table 7-8.

Table 7-8: TAC Emissions from Material Handling

TAC	CAS No.	Concentration (mg/Kg)	Emissions	
			(Lb/Day)	(Lb/Yr)
Arsenic	7440-38-2	3.8	7.70E-07	2.81E-04
Cadmium	7440-43-9	1.3	2.63E-07	9.61E-05
Chromium-VI	18540-29-9	2.5	5.06E-07	1.85E-04
Copper	7440-50-8	180.0	3.65E-05	1.33E-02
Lead	7439-92-1	31.0	6.28E-06	2.29E-03
Manganese	7439-96-5	690.0	1.40E-04	5.10E-02
Mercury	7439-97-6	2.1	4.25E-07	1.55E-04
Nickel	7440-02-0	30.0	6.08E-06	2.22E-03
Selenium	7782-49-2	2.7	5.47E-07	2.00E-04

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7.7 Organic TAC Emissions

The composting VOC emissions may consist of several TACs. The composting organic TAC emissions were calculated by speciating the VOC emissions according to the speciation profile provided by Matthew Cegielski of the SJVAPCD. The TAC profile was derived for VOC-based emission factors for co-composting using the average of the SJVAPCD emission factors for green waste composting and the SJVAPCD factors for biosolids composting. The average assumes a 50/50 mix of biosolids and green waste. Profiles were provided to Vector Environmental by Mr. Cegielski on February 24, 2016, and February 22, 2016. The fugitive VOC emissions from composting operations are 1,092.9 pounds per day (see Table 6-5). The material handling organic TAC emissions are summarized in Table 7-9.

Table 7-9: TAC Emissions from Composting

Chemical Compound	CAS No.	Concentration (mg/Kg)	Emissions	
			(Lb/Day)	(Lb/Yr)
1,1,1-Trichloroethane	71-55-6	104.0	0.114	41.5
1,1-Dichloroethane	75-34-3	137.5	0.150	54.8
Acetaldehyde	75-07-0	700.0	0.765	279.2
Sec-butyl alcohol	78-92-2	1,950.0	2.131	777.9
2-Butanone MEK	78-93-3	4,640.0	5.071	1,850.9
Benzene	71-43-2	23.0	0.025	9.2
Carbon disulfide	75-15-0	520.0	0.568	207.4
Carbonyl sulfide	463-58-1	570.0	0.623	227.4
Isopropyl alcohol	67-63-0	211,550.0	231.202	84,388.7
Methyl Chloride	74-87-3	27.4	0.030	10.9
Methanol	67-56-1	63,950.0	69.891	25,510.1
Methylene chloride	75-09-2	3,380.0	3.694	1,348.3
Naphthalene	91-20-3	2,500.0	2.732	997.3
Propylene	115-07-1	1,100.0	1.202	438.8
Styrene	100-42-5	119.0	0.130	47.5
Tetrachloroethene	127-18-4	230.5	0.252	91.9
Toluene	108-88-3	68.5	0.075	27.3
Vinyl acetate	108-05-4	815.0	0.891	325.1
Ammonia[1]		–	2,867.00	1,046,455

Notes:

1. Ammonia is calculated using emission factors. See Section 6 and Table 6-5. Note that the ammonia reported here is the same ammonia reported in Table 6-5; these are not additional emissions.

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ATTACHMENT B-1 – CONSTRUCTION CALEEMOD OUTPUTS

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Construction On-Road Vehicle List for CalEEMod 2016 - Workers								
Worker Trips per Day (1-way)	**Vehicle Type**	**Class**	**Maximum Workers**	**Trips/day /worker**	**Trips/day**	**Miles/trip**	**Unpaved [0.5 mi]**	**Paved [balance]**
Phase 1	LDA, LDT1, LDT2	LD_Mix	11	2.36	26	51	1.0%	99.0%
Phase 2	LDA, LDT1, LDT2	LD_Mix	11	2.36	26	51	1.0%	99.0%
Phase 3	LDA, LDT1, LDT2	LD_Mix	11	2.36	26	51	1.0%	99.0%

Source: Applicant

Construction On-Road Vehicle List for CalEEMod 2016 - Equipment & Materials								
Truck Trips per Day (1-way)	**Vehicle Type**	**Class**	**Days**	**Trips/day**	**Trips**	**Miles/trip**	**Unpaved [0.5 mi]**	**Paved [balance]**
Phase 1	HHDT Only	HHDT	2	12	24	51	1.0%	99.0%
Phase 2	HHDT Only	HHDT	2	12	24	51	1.0%	99.0%
Phase 3	HHDT Only	HHDT	2	12	24	51	1.0%	99.0%

Source: Applicant

EMFAC 2014 Vehicle Classes - Typical	
Passenger Cars/Minivans/Small SUVs	LDA
1/2 & 3/4 ton Pickups/Vans/Large SUVs	LDT1
1 ton Pickups/Work Trucks	LDT2
2 axles	LHDT1
2 axles	LHDT2
3 axles	MHDT
4+ axles	HHDT

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Construction Offroad Equipment Inventory								
Project Equipment	Diesel Engine Tier	Estimated BHP	BHP Difference	Estimated Load Factor	Load Factor Difference	CalEEMod Default Name	Default BHP	Default Load Factor
Site Prep (Dozer)	4f	700	230%	0.59	37%	Crawler Tractors	212	0.43
Scraper (Haul)	4f	360	-2%	0.59	23%	Scrapers	367	0.48
Compactor	4f	350	338%	0.43	13%	Rollers	80	0.38
Dozer (Excavation)	4f	200	-6%	0.59	37%	Crawler Tractors	212	0.43
Grader (Rough)	4f	200	7%	0.59	44%	Graders	187	0.41
Trenching (Sprinkler)	4f	50	-36%	0.59	18%	Trenchers	78	0.50
Trenching (Drainage)	4f	50	-36%	0.59	18%	Trenchers	78	0.50
Water Truck 5,000 Gal*	2010+ (4f)	275	-32%	0.59	55%	Off-Highway Trucks	402	0.38

Construction Schedule										
Project Element	Acres	Cumulative Acres	Cumulative Acres Percent	Days Construction	Cumulative Days	Cumulative Days Percent	Weeks Construction [5	Construction Start & End Dates [Monday-Monday Weeks]		
Phase 1 - 2020	47.3	47.3	34.7%	115	115	34.3%	23	7/6/2020	12/14/2020	23
Phase 2 - 2025	21.2	68.5	50.3%	55	170	50.7%	11	1/6/2025	3/24/2025	11
Phase 3 - 2030	67.7	136.2	100.0%	165	335	100.0%	33	1/7/2030	8/26/2030	33
Total	**136.2**	—	—	**335**	—	—	**67**	—	—	**67**

Construction Acitivity							
Project Equipment	Quantity [same for each phase]	Phase 1 (total hours)	Phase 1 (hrs/day each)	Phase 2 (total hours)	Phase 2 (hrs/day each)	Phase 3 (total hours)	Phase 3 (hrs/day each)
			115		55		165
Site Prep (Dozer)	2	1,236	5.4	554	5.1	1,769	5.4
Scraper (Haul)	2	286	1.3	128	1.2	410	1.3
Compactor	1	65	0.6	29	0.6	93	0.6
Dozer (Excavation)	1	29	0.3	13	0.3	41	0.3
Grader (Rough)	2	824	3.6	369	3.4	1,180	3.6
Trenching (Sprinkler)	2	17	0.1	8	0.1	29	0.1
Trenching (Drainage)	2	17	0.1	8	0.1	29	0.1
Water Truck 5,000 Gal*	2	1,150	5.0	530	4.9	1,650	5.0

Notes:

* Water truck activity time reduced by half from 10 hrs/day to 5 hrs/day on site for consistency with other activities

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Table 1: Land Use Data for CalEEMod Input - Lost Hills Compost								
Project Element	**Land Use Type**	**Land Use Subtype**	**Unit Amount (phase)***	**Size Metric**	**Lot Acreage (footprint)**	**Square Feet (est.)***	**Cumulative Unit Amount (phase)***	**Cumulative Percent of Buildout**
Phase 1 - 2020	Industrial	General Light Industry	20.60	1,000 sq. ft.	47.3	20,600	20.60	34.7%
Phase 2 - 2025	Industrial	General Light Industry	9.23	1,000 sq. ft.	21.2	9,230	29.83	50.3%
Phase 3 - 2030	Industrial	General Light Industry	29.49	1,000 sq. ft.	67.7	29,490	59.32	100.0%
Project Site					**136.2**	**59,320**	**59.32**	**100.0%**

Source: Applicant 2019, CalEEMod version 2016.3.2

Notes:

* For CalEEMod metrics (convenient scale units) = 1% of phase acreage as "daily active zone"

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Table 3: Construction Emissions Summary and Significance Evaluation - Phase 1				
Criteria Pollutants	**Unmitigated**	**Mitigated**	**Threshold**	**Significance**
	tons/yr	**tons/yr**	**tons/yr**	
ROG (VOC)	0.21	0.06	10	LTS
NO_X	2.24	0.21	10	LTS
CO	1.15	1.68	100	LTS
SO_X	0.00	0.00	27	LTS
Total PM_{10}	1.55	0.72	15	LTS
Total $PM_{2.5}$	0.39	0.15	15	LTS

Sources: SJVAPCD 2015, CalEEMod version 2016.3.2

Notes:

Total PM_{10} / $PM_{2.5}$ comprises fugitive dust plus engine exhaust

LTS - Less Than Significant

LTSM - Less Than Significant with Mitigation Incorporated

PS - Potentially Significant

Table 4: Construction Emissions Summary and Significance Evaluation - Phase 2				
Criteria Pollutants	**Unmitigated**	**Mitigated**	**Threshold**	**Significance**
	tons/yr	**tons/yr**	**tons/yr**	
ROG (VOC)	0.06	0.03	10	LTS
NO_X	0.52	0.09	10	LTS
CO	0.43	0.74	100	LTS
SO_X	0.00	0.00	27	LTS
Total PM_{10}	0.72	0.35	15	LTS
Total $PM_{2.5}$	0.17	0.07	15	LTS

Sources: SJVAPCD 2015, CalEEMod version 2016.3.2

Notes:

Total PM_{10} / $PM_{2.5}$ comprises fugitive dust plus engine exhaust

LTS - Less Than Significant

LTSM - Less Than Significant with Mitigation Incorporated

PS - Potentially Significant

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Table 5: Construction Emissions Summary and Significance Evaluation - Phase 3				
Criteria Pollutants	Unmitigated	Mitigated	Threshold	Significance
	tons/yr	tons/yr	tons/yr	
ROG (VOC)	0.26	0.08	10	LTS
NO_X	0.89	0.27	10	LTS
CO	1.28	2.29	100	LTS
SO_X	0.01	0.01	27	LTS
Total PM_{10}	2.13	1.03	15	LTS
Total $PM_{2.5}$	0.48	0.21	15	LTS

Sources: SJVAPCD 2015, CalEEMod version 2016.3.2

Notes:

Total PM_{10} / $PM_{2.5}$ comprises fugitive dust plus engine exhaust

LTS - Less Than Significant

LTSM - Less Than Significant with Mitigation Incorporated

PS - Potentially Significant

Table 6: Construction Criteria Emissions Summary - Mitigated				
Criteria Pollutants	Phase 1	Phase 2	Phase 3	Threshold
	tons/yr	tons/yr	tons/yr	tons/yr
ROG (VOC)	0.06	0.03	0.08	10
NO_X	0.21	0.09	0.27	10
CO	1.68	0.74	2.29	100
SO_X	0.00	0.00	0.01	27
Total PM_{10}	0.72	0.35	1.03	15
Total $PM_{2.5}$	0.15	0.07	0.21	15

Sources: SJVAPCD 2015, CalEEMod version 2016.3.2

Notes:

Total PM_{10} / $PM_{2.5}$ comprises fugitive dust plus engine exhaust

Table 7: Construction Greenhouse Gas Emissions Summary				
Greenhouse Gases	Phase 1	Phase 2	Phase 3	Threshold
	MT/yr	MT/yr	MT/yr	MT/yr
CO_2	350	157	565	NA
CH_4	0.10	0.04	0.02	NA
N_2O	0.00	0.00	0.00	NA
CO_2e	353	158	565	NA

Source: CalEEMod version 2016.3.2

Notes:

No mitigation applies to construction GHG emissions

No applicable GHG thresholds in SJVAPCD (NA)

Holloway Lost Hills Composting Facility

Kern-San Joaquin County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Light Industry	20.60	1000sqft	47.30	20,600.00	0
General Light Industry	9.23	1000sqft	21.20	9,230.00	0
General Light Industry	29.49	1000sqft	67.70	29,490.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.7	**Precipitation Freq (Days)**	32
Climate Zone	3			**Operational Year**	2031
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Holloway Lost Hills Composting Facility - Kern-San Joaquin County, Annual

Project Characteristics - Phase 1 in 2020; Phase 2 in 2025; Phase 3 in 2030

Land Use - per Applicant

Construction Phase - per Applicant

Off-road Equipment - per Applicant

Off-road Equipment - per Applicant

Off-road Equipment - per Applicant

Grading - per Applicant

Trips and VMT - per Applicant

On-road Fugitive Dust - per Applicant

Vehicle Trips - Construction Only

Fleet Mix - Construction Only

Road Dust - Construction Only

Consumer Products - Construction Only

Area Coating - Construction Only

Landscape Equipment - Construction Only

Energy Use - Construction Only

Water And Wastewater - Construction Only

Solid Waste - Construction Only

Construction Off-road Equipment Mitigation - per Applicant

Area Mitigation -

Table Name	Column Name	Default Value	New Value
tblAreaCoating	Area_Nonresidential_Exterior	29660	0
tblAreaCoating	Area_Nonresidential_Interior	88980	0
tblConstDustMitigation	WaterUnpavedRoadMoistureContent	0.5	1.5
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	15
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	9.00

tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	6.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	12.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	6.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	6.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	6.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	6.00
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstructionPhase	NumDays	310.00	115.00
tblConstructionPhase	NumDays	310.00	55.00
tblConstructionPhase	NumDays	310.00	165.00
tblConstructionPhase	PhaseEndDate	12/2/2022	12/11/2020
tblConstructionPhase	PhaseStartDate	9/25/2021	7/6/2020
tblConsumerProducts	ROG_EF	2.14E-05	1E-07
tblConsumerProducts	ROG_EF_Degreaser	3.542E-07	1E-10
tblConsumerProducts	ROG_EF_PesticidesFertilizers	5.152E-08	1E-11
tblEnergyUse	LightingElect	2.70	0.00
tblEnergyUse	NT24E	4.16	0.00

Holloway Lost Hills Composting Facility - Kern-San Joaquin County, Annual

tblEnergyUse	NT24NG	3.84	0.00
tblEnergyUse	T24E	1.96	0.00
tblEnergyUse	T24NG	17.03	0.00
tblGrading	AcresOfGrading	168.91	47.30
tblGrading	AcresOfGrading	75.97	21.20
tblGrading	AcresOfGrading	242.34	67.70
tblGrading	MaterialExported	0.00	48,300.00
tblGrading	MaterialExported	0.00	21,700.00
tblGrading	MaterialExported	0.00	69,500.00
tblGrading	MaterialImported	0.00	48,300.00
tblGrading	MaterialImported	0.00	21,700.00
tblGrading	MaterialImported	0.00	69,500.00
tblLandscapeEquipment	NumberSummerDays	180	1
tblLandUse	LotAcreage	0.47	47.30
tblLandUse	LotAcreage	0.21	21.20
tblLandUse	LotAcreage	0.68	67.70
tblOnRoadDust	HaulingPercentPave	100.00	99.00
tblOnRoadDust	HaulingPercentPave	100.00	99.00
tblOnRoadDust	HaulingPercentPave	100.00	99.00
tblOnRoadDust	WorkerPercentPave	100.00	99.00
tblOnRoadDust	WorkerPercentPave	100.00	99.00
tblOnRoadDust	WorkerPercentPave	100.00	99.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblSolidWaste	SolidWasteGenerationRate	73.56	0.00
tblTripsAndVMT	HaulingTripLength	20.00	51.00
tblTripsAndVMT	HaulingTripLength	20.00	51.00
tblTripsAndVMT	HaulingTripLength	20.00	51.00

tblTripsAndVMT	HaulingTripNumber	6,038.00	24.00
tblTripsAndVMT	HaulingTripNumber	2,713.00	24.00
tblTripsAndVMT	HaulingTripNumber	8,688.00	24.00
tblTripsAndVMT	WorkerTripLength	16.80	51.00
tblTripsAndVMT	WorkerTripLength	16.80	51.00
tblTripsAndVMT	WorkerTripLength	16.80	51.00
tblTripsAndVMT	WorkerTripNumber	48.00	26.00
tblTripsAndVMT	WorkerTripNumber	48.00	26.00
tblTripsAndVMT	WorkerTripNumber	48.00	26.00
tblVehicleTrips	ST_TR	1.32	0.00
tblVehicleTrips	SU_TR	0.68	0.00
tblVehicleTrips	WD_TR	6.97	0.00
tblWater	IndoorWaterUseRate	13,717,750.00	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.2088	2.2419	1.1536	3.9700e-003	1.4673	0.0809	1.5481	0.3122	0.0744	0.3866	0.0000	350.1636	350.1636	0.0974	0.0000	352.5973
2025	0.0644	0.5159	0.4296	1.7800e-003	0.7053	0.0186	0.7239	0.1497	0.0171	0.1668	0.0000	156.9997	156.9997	0.0440	0.0000	158.0997
2030	0.2595	0.8918	1.2779	5.6600e-003	2.1014	0.0327	2.1340	0.4475	0.0326	0.4802	0.0000	564.8593	564.8593	0.0203	0.0000	565.3670
Maximum	**0.2595**	**2.2419**	**1.2779**	**5.6600e-003**	**2.1014**	**0.0809**	**2.1340**	**0.4475**	**0.0744**	**0.4802**	**0.0000**	**564.8593**	**564.8593**	**0.0974**	**0.0000**	**565.3670**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.0629	0.2058	1.6787	3.9700e-003	0.7116	5.9200e-003	0.7175	0.1413	5.8900e-003	0.1472	0.0000	350.1633	350.1633	0.0974	0.0000	352.5970
2025	0.0263	0.0909	0.7420	1.7800e-003	0.3423	2.6800e-003	0.3450	0.0678	2.6600e-003	0.0705	0.0000	156.9995	156.9995	0.0440	0.0000	158.0995
2030	0.0762	0.2742	2.2920	5.6600e-003	1.0190	8.2800e-003	1.0272	0.2025	8.2500e-003	0.2108	0.0000	564.8587	564.8587	0.0203	0.0000	565.3664
Maximum	**0.0762**	**0.2742**	**2.2920**	**5.6600e-003**	**1.0190**	**8.2800e-003**	**1.0272**	**0.2025**	**8.2500e-003**	**0.2108**	**0.0000**	**564.8587**	**564.8587**	**0.0974**	**0.0000**	**565.3664**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**68.96**	**84.36**	**-64.72**	**0.00**	**51.50**	**87.22**	**52.57**	**54.74**	**86.47**	**58.55**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	**7-6-2020**	**10-5-2020**	1.4003	0.1535
2	**10-6-2020**	**1-5-2021**	1.0214	0.1133
19	**1-6-2025**	**4-5-2025**	0.5665	0.1154
39	**1-6-2030**	**4-5-2030**	0.4446	0.1360
40	**4-6-2030**	**7-5-2030**	0.4535	0.1380
41	**7-6-2030**	**9-30-2030**	0.2442	0.0743
		Highest	1.4003	0.1535

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	1.0800e-003	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.0000e-005	1.0000e-005	0.0000	0.0000	1.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**1.0800e-003**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**1.0000e-005**	**1.0000e-005**	**0.0000**	**0.0000**	**1.0000e-005**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	1.0800e-003	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.0000e-005	1.0000e-005	0.0000	0.0000	1.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**1.0800e-003**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**1.0000e-005**	**1.0000e-005**	**0.0000**	**0.0000**	**1.0000e-005**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Phase 1	Grading	7/6/2020	12/11/2020	5	115	Composting Construction
2	Phase 2	Grading	1/6/2025	3/21/2025	5	55	Composting Construction
3	Phase 3	Grading	1/7/2030	8/23/2030	5	165	Composting Construction

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Holloway Lost Hills Composting Facility - Kern-San Joaquin County, Annual

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Phase 1	Crawler Tractors	2	5.40	700	0.43
Phase 1	Scrapers	2	1.30	360	0.48
Phase 1	Rollers	1	0.60	350	0.38
Phase 1	Crawler Tractors	1	0.30	200	0.43
Phase 1	Graders	2	3.60	200	0.41
Phase 1	Trenchers	2	0.10	50	0.50
Phase 1	Trenchers	2	0.10	50	0.50
Phase 1	Off-Highway Trucks	2	5.00	275	0.38
Phase 2	Crawler Tractors	2	5.10	700	0.43
Phase 2	Scrapers	2	1.20	360	0.48
Phase 2	Rollers	1	0.60	350	0.38
Phase 2	Crawler Tractors	1	0.30	200	0.43
Phase 2	Graders	2	3.40	200	0.41
Phase 2	Trenchers	2	0.10	50	0.50
Phase 2	Trenchers	2	0.10	50	0.50
Phase 2	Off-Highway Trucks	2	4.90	275	0.38
Phase 3	Crawler Tractors	2	5.40	700	0.43
Phase 3	Scrapers	2	1.30	360	0.48
Phase 3	Rollers	1	0.60	350	0.38
Phase 3	Crawler Tractors	1	0.30	200	0.43
Phase 3	Graders	2	3.60	200	0.41
Phase 3	Trenchers	2	0.10	50	0.50
Phase 3	Trenchers	2	0.10	50	0.50
Phase 3	Off-Highway Trucks	2	5.00	275	0.38

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Phase 2	19	26.00	0.00	24.00	51.00	6.60	51.00	LD_Mix	HDT_Mix	HHDT
Phase 3	19	26.00	0.00	24.00	51.00	6.60	51.00	LD_Mix	HDT_Mix	HHDT
Phase 1	19	26.00	0.00	24.00	51.00	6.60	51.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Water Exposed Area

Water Unpaved Roads

Reduce Vehicle Speed on Unpaved Roads

3.2 Phase 1 - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.3785	0.0000	0.3785	0.1941	0.0000	0.1941	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1874	2.2189	0.9970	3.3800e-003		0.0805	0.0805		0.0740	0.0740	0.0000	297.0517	297.0517	0.0961	0.0000	299.4535
Total	**0.1874**	**2.2189**	**0.9970**	**3.3800e-003**	**0.3785**	**0.0805**	**0.4590**	**0.1941**	**0.0740**	**0.2682**	**0.0000**	**297.0517**	**297.0517**	**0.0961**	**0.0000**	**299.4535**

3.2 Phase 1 - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.0000e-004	6.4500e-003	1.0200e-003	2.0000e-005	8.7400e-003	3.0000e-005	8.7700e-003	9.6000e-004	3.0000e-005	9.9000e-004	0.0000	2.0910	2.0910	6.0000e-005	0.0000	2.0925
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0212	0.0165	0.1556	5.6000e-004	1.0801	3.7000e-004	1.0804	0.1171	3.4000e-004	0.1175	0.0000	51.0209	51.0209	1.2200e-003	0.0000	51.0513
Total	**0.0214**	**0.0230**	**0.1566**	**5.8000e-004**	**1.0888**	**4.0000e-004**	**1.0892**	**0.1181**	**3.7000e-004**	**0.1185**	**0.0000**	**53.1119**	**53.1119**	**1.2800e-003**	**0.0000**	**53.1438**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1476	0.0000	0.1476	0.0757	0.0000	0.0757	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0415	0.1828	1.5221	3.3800e-003		5.5300e-003	5.5300e-003		5.5300e-003	5.5300e-003	0.0000	297.0513	297.0513	0.0961	0.0000	299.4531
Total	**0.0415**	**0.1828**	**1.5221**	**3.3800e-003**	**0.1476**	**5.5300e-003**	**0.1531**	**0.0757**	**5.5300e-003**	**0.0812**	**0.0000**	**297.0513**	**297.0513**	**0.0961**	**0.0000**	**299.4531**

3.2 Phase 1 - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.0000e-004	6.4500e-003	1.0200e-003	2.0000e-005	4.5600e-003	3.0000e-005	4.5900e-003	5.5000e-004	3.0000e-005	5.7000e-004	0.0000	2.0910	2.0910	6.0000e-005	0.0000	2.0925
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0212	0.0165	0.1556	5.6000e-004	0.5594	3.7000e-004	0.5598	0.0651	3.4000e-004	0.0654	0.0000	51.0209	51.0209	1.2200e-003	0.0000	51.0513
Total	**0.0214**	**0.0230**	**0.1566**	**5.8000e-004**	**0.5640**	**4.0000e-004**	**0.5644**	**0.0656**	**3.7000e-004**	**0.0660**	**0.0000**	**53.1119**	**53.1119**	**1.2800e-003**	**0.0000**	**53.1438**

3.3 Phase 2 - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1801	0.0000	0.1801	0.0927	0.0000	0.0927	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0570	0.5082	0.3797	1.5400e-003		0.0184	0.0184		0.0169	0.0169	0.0000	134.8783	134.8783	0.0436	0.0000	135.9688
Total	**0.0570**	**0.5082**	**0.3797**	**1.5400e-003**	**0.1801**	**0.0184**	**0.1985**	**0.0927**	**0.0169**	**0.1097**	**0.0000**	**134.8783**	**134.8783**	**0.0436**	**0.0000**	**135.9688**

3.3 Phase 2 - 2025

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.2000e-004	3.1000e-003	7.8000e-004	2.0000e-005	8.7400e-003	1.0000e-005	8.7500e-003	9.6000e-004	1.0000e-005	9.7000e-004	0.0000	1.9481	1.9481	4.0000e-005	0.0000	1.9490
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.2800e-003	4.6200e-003	0.0491	2.2000e-004	0.5165	1.5000e-004	0.5167	0.0560	1.4000e-004	0.0562	0.0000	20.1734	20.1734	3.4000e-004	0.0000	20.1818
Total	**7.4000e-003**	**7.7200e-003**	**0.0499**	**2.4000e-004**	**0.5253**	**1.6000e-004**	**0.5255**	**0.0570**	**1.5000e-004**	**0.0571**	**0.0000**	**22.1214**	**22.1214**	**3.8000e-004**	**0.0000**	**22.1308**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0702	0.0000	0.0702	0.0362	0.0000	0.0362	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0189	0.0832	0.6921	1.5400e-003		2.5100e-003	2.5100e-003		2.5100e-003	2.5100e-003	0.0000	134.8781	134.8781	0.0436	0.0000	135.9687
Total	**0.0189**	**0.0832**	**0.6921**	**1.5400e-003**	**0.0702**	**2.5100e-003**	**0.0727**	**0.0362**	**2.5100e-003**	**0.0387**	**0.0000**	**134.8781**	**134.8781**	**0.0436**	**0.0000**	**135.9687**

3.3 Phase 2 - 2025

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.2000e-004	3.1000e-003	7.8000e-004	2.0000e-005	4.5600e-003	1.0000e-005	4.5700e-003	5.5000e-004	1.0000e-005	5.5000e-004	0.0000	1.9481	1.9481	4.0000e-005	0.0000	1.9490
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.2800e-003	4.6200e-003	0.0491	2.2000e-004	0.2675	1.5000e-004	0.2677	0.0311	1.4000e-004	0.0313	0.0000	20.1734	20.1734	3.4000e-004	0.0000	20.1818
Total	**7.4000e-003**	**7.7200e-003**	**0.0499**	**2.4000e-004**	**0.2721**	**1.6000e-004**	**0.2723**	**0.0317**	**1.5000e-004**	**0.0318**	**0.0000**	**22.1214**	**22.1214**	**3.8000e-004**	**0.0000**	**22.1308**

3.4 Phase 3 - 2030

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.5430	0.0000	0.5430	0.2785	0.0000	0.2785	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.2430	0.8799	1.1698	5.0700e-003		0.0323	0.0323		0.0323	0.0323	0.0000	511.1442	511.1442	0.0196	0.0000	511.6345
Total	**0.2430**	**0.8799**	**1.1698**	**5.0700e-003**	**0.5430**	**0.0323**	**0.5753**	**0.2785**	**0.0323**	**0.3109**	**0.0000**	**511.1442**	**511.1442**	**0.0196**	**0.0000**	**511.6345**

3.4 Phase 3 - 2030

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.2000e-004	2.8200e-003	7.4000e-004	2.0000e-005	8.7400e-003	1.0000e-005	8.7500e-003	9.6000e-004	1.0000e-005	9.7000e-004	0.0000	1.9104	1.9104	4.0000e-005	0.0000	1.9114
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0165	9.0800e-003	0.1073	5.7000e-004	1.5496	3.4000e-004	1.5500	0.1680	3.1000e-004	0.1684	0.0000	51.8048	51.8048	6.5000e-004	0.0000	51.8210
Total	**0.0166**	**0.0119**	**0.1081**	**5.9000e-004**	**1.5584**	**3.5000e-004**	**1.5587**	**0.1690**	**3.2000e-004**	**0.1693**	**0.0000**	**53.7151**	**53.7151**	**6.9000e-004**	**0.0000**	**53.7324**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.2118	0.0000	0.2118	0.1086	0.0000	0.1086	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0596	0.2623	2.1839	5.0700e-003		7.9300e-003	7.9300e-003		7.9300e-003	7.9300e-003	0.0000	511.1435	511.1435	0.0196	0.0000	511.6339
Total	**0.0596**	**0.2623**	**2.1839**	**5.0700e-003**	**0.2118**	**7.9300e-003**	**0.2197**	**0.1086**	**7.9300e-003**	**0.1166**	**0.0000**	**511.1435**	**511.1435**	**0.0196**	**0.0000**	**511.6339**

3.4 Phase 3 - 2030

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.2000e-004	2.8200e-003	7.4000e-004	2.0000e-005	4.5600e-003	1.0000e-005	4.5700e-003	5.5000e-004	1.0000e-005	5.5000e-004	0.0000	1.9104	1.9104	4.0000e-005	0.0000	1.9114
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0165	9.0800e-003	0.1073	5.7000e-004	0.8026	3.4000e-004	0.8030	0.0933	3.1000e-004	0.0937	0.0000	51.8048	51.8048	6.5000e-004	0.0000	51.8210
Total	**0.0166**	**0.0119**	**0.1081**	**5.9000e-004**	**0.8072**	**3.5000e-004**	**0.8075**	**0.0939**	**3.2000e-004**	**0.0942**	**0.0000**	**53.7151**	**53.7151**	**6.9000e-004**	**0.0000**	**53.7324**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Light Industry	0.00	0.00	0.00		
General Light Industry	0.00	0.00	0.00		
General Light Industry	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Light Industry	14.70	6.60	6.60	59.00	28.00	13.00	92	5	3
General Light Industry	14.70	6.60	6.60	59.00	28.00	13.00	92	5	3
General Light Industry	14.70	6.60	6.60	59.00	28.00	13.00	92	5	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Light Industry	0.511582	0.029503	0.180312	0.096495	0.010353	0.003970	0.016485	0.141574	0.001556	0.001374	0.005469	0.000812	0.000515

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Light Industry	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Light Industry	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Light Industry	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Light Industry	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

No Hearths Installed

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	1.0800e-003	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.0000e-005	1.0000e-005	0.0000	0.0000	1.0000e-005
Unmitigated	1.0800e-003	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.0000e-005	1.0000e-005	0.0000	0.0000	1.0000e-005

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	1.0800e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.0000e-005	1.0000e-005	0.0000	0.0000	1.0000e-005
Total	**1.0800e-003**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**1.0000e-005**	**1.0000e-005**	**0.0000**	**0.0000**	**1.0000e-005**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	1.0800e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.0000e-005	1.0000e-005	0.0000	0.0000	1.0000e-005
Total	**1.0800e-003**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**1.0000e-005**	**1.0000e-005**	**0.0000**	**0.0000**	**1.0000e-005**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Light Industry	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Light Industry	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Light Industry	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Light Industry	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

ATTACHMENT B-2 – ONROAD EMISSIONS CALCULATION WORKSHEETS

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Lost Hills - Composting
Onroad Mobile Sources - 2030 Phase 3 (full buildout)

Vehicle Type	Vehicle Use	Days	# Veh	Trips per Vehicle	Trips per Year	onsite trip mileage	offsite trip mileage	Total trip mileage	Onsite Total VMT/yr	Offsite Total VMT/yr	Total VMT/yr
LDT1	Supervisor	365	1	4	1,460	1.0	50	51.0	1,460	73,000	74,460
LDT1	Technical Staff	365	1	4	1,460	1.0	50	51.0	1,460	73,000	74,460
LDT1	Mechanic	365	1	2	730	1.0	50	51.0	730	36,500	37,230
LDT1	Equipment Operators	365	3	2	2,190	0.5	50	50.5	1,095	109,500	110,595
LDT1	Personnel for facility	365	3	2	2,190	0.5	50	50.5	1,095	109,500	110,595
LDT1	Miscellaneous Business	104	1	2	208	0.5	50	50.5	104	10,400	10,504
LDT1	Laboratory Services	104	1	2	208	1.0	50	51.0	208	10,400	10,608
LHD2	Delivery of Office Supplies	104	1	2	208	0.0	50	50.0	0	10,400	10,400
T7 Tractor	Deliver to Compost Facility	365	111	1	40,515	0.25	100	100.25	10,129	4,051,500	4,061,629
T7 Tractor	Ship from Compost Facility	365	111	1	40,515	0.25	100	100.25	10,129	4,051,500	4,061,629

Vehicle Type	Fuel	# Veh	Veh per year	Trips per Year	Onsite Total VMT/yr	Offsite Total VMT/yr	Total VMT/yr
LDT1	gasoline	11	3,493	8,446	6,152	422,300	428,452
LHD2	diesel	1	104	208	0	10,400	10,400
T7 Tractor	diesel	111	81,030	81,030	20,258	8,103,000	8,123,258

Vehicle Miles Travelled for Transport of Personnel, Supplies, Materials and Product (Total at 640,000 Tons/Year)
Mileage is for one-way trips

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Lost Hills - Composting
Onroad Mobile Sources - 2030 Phase 3 (full buildout)

Onroad Mobile Sources - Criteria Pollutant Exhaust Emissions

Pollutant	Vehicle Type	Running Exhaust EF (g/mile)	Idle EF (g/trip)	Start EF (g/trip)	Total Running Exhaust (lb/yr)	Total Idle (lb/yr)	Total Start (lb/yr)	Total Emissions (lb/yr)	Onsite Emissions (lb/yr)	Offsite Emissions (lb/yr)
NOx	LDT1	0.042	0.000	0.171	39.83	0.00	3.18	43.01	0.62	42.39
	LHD2	1.040	0.143	0.000	23.82	0.07	0.00	23.88	0.00	23.88
	T7 Tractor	1.933	1.749	1.866	34,595.08	312.15	333.11	35,240.35	87.88	35,152.47
VOC	LDT1	0.009	0.000	0.189	8.38	0.00	3.52	11.90	0.17	11.73
	LHD2	0.148	0.009	0.000	3.39	0.00	0.00	3.39	0.00	3.39
	T7 Tractor	0.019	0.148	0.000	334.49	26.42	0.00	360.90	0.90	360.00
CO	LDT1	0.620	0.000	1.864	585.57	0.00	34.68	620.24	8.91	611.34
	LHD2	0.711	0.072	0.000	16.28	0.03	0.00	16.31	0.00	16.31
	T7 Tractor	0.162	2.187	0.000	2,894.29	390.31	0.00	3,284.60	8.19	3,276.41
SOx	LDT1	0.003	0.000	0.001	2.44	0.00	0.01	2.45	0.04	2.41
	LHD2	0.005	0.000	0.000	0.12	0.00	0.00	0.12	0.00	0.12
	T7 Tractor	0.010	0.003	0.000	187.83	0.57	0.00	188.40	0.47	187.93
PM10	LDT1	0.001	0.000	0.002	1.11	0.00	0.03	1.14	0.02	1.13
	LHD2	0.024	0.002	0.000	0.54	0.00	0.00	0.54	0.00	0.54
	T7 Tractor	0.028	0.001	0.000	508.02	0.11	0.00	508.13	1.27	506.86
PM2.5	LDT1	0.001	0.000	0.002	1.02	0.00	0.03	1.05	0.02	1.04
	LHD2	0.023	0.002	0.000	0.52	0.00	0.00	0.52	0.00	0.52
	T7 Tractor	0.027	0.001	0.000	486.04	0.11	0.00	486.15	1.21	484.94

EMFAC was run by Vector Environmental

In EMFAC Idle EF is reported as g/vehicle/day. It is converted to g/trip by dividing by the EMFAC value for trip/vehicle/day.

Onroad Mobile Sources - Fugitive VOC Emissions

Pollutant	Vehicle Type	Hot Soak (g/trip)	Running Loss (g/trip)	Resting Loss (g/trip)	Diurnal (g/trip)	Total Hot Soak (lb/yr)	Total Running Loss (lb/yr)	Total Resting Loss (lb/yr)	Total Diurnal (lb/yr)	Total Emissions (lb/yr)	Onsite Emissions (lb/yr)	Offsite Emissions (lb/yr)
VOC	LDT1	0.14	0.49	0.07	0.10	2.5	9.1	1.3	1.8	14.71	0.21	14.50
	LHD2	-	-	-	-	-	-	-	-	-	-	-
	T7 Tractor	-	-	-	-	-	-	-	-	-	-	-

In EMFAC Resting Loss and Diurnal EFs are reported as g/vehicle/day. They are converted to g/trip by dividing by the EMFAC value for trip/vehicle/day.

Onroad Mobile Sources - Fugitive PM Emissions								
Pollutant	**Vehicle Type**	**Tire Wear (g/mile)**	**Break Wear (g/mile)**	**Total Tire Wear (lb/yr)**	**Total Break Wear (lb/yr)**	**Total Emissions (lb/yr)**	**Onsite Emissions (lb/yr)**	**Offsite Emissions (lb/yr)**
PM10	LDT1	0.0080	0.0368	7.55	34.68	42.23	0.61	41.63
	LHD2	0.0120	0.0892	0.27	2.04	2.32	0.00	2.32
	T7 Tractor	0.0360	0.0617	644.14	1,104.69	1,748.83	4.36	1,744.47
PM2.5	LDT1	0.0020	0.0158	1.89	14.86	16.75	0.24	16.51
	LHD2	0.0030	0.0382	0.07	0.88	0.94	0.00	0.94
	T7 Tractor	0.0090	0.0265	161.03	473.44	634.47	1.58	632.89

Onroad Mobile Sources - Greenhouse Gas Exhaust Emissions										
Pollutant	**Vehicle Type**	**Running Exhaust EF (g/mile)**	**Idle EF (g/trip)**	**Start EF (g/trip)**	**Total Running Exhaust (MT/yr)**	**Total Idle (MT/yr)**	**Total Start (MT/yr)**	**Total Emissions (MT/yr)**	**Onsite Emissions (MT/yr)**	**Offsite Emissions (MT/yr)**
CO2	LDT1	260.914	0.000	53.828	111.8	0.000	23.1	135	2	133
	LHD2	571.282	16.233	0.000	5.9	0.003	0.0	6	0	6
	T7 Tractor	1111.146	337.602	0.000	9,026.1	27.36	0.0	9,053	23	9,031
CH4	LDT1	0.002	0.000	0.041	0.00	0.000	0.77	0.77	0.01	0.76
	LHD2	0.007	0.000	0.000	0.00	0.000	0.00	0.00	0.00	0.00
	T7 Tractor	0.001	0.007	0.000	0.01	0.001	0.00	0.01	0.00	0.01
N2O	LDT1	0.004	0.000	0.023	0.00	0.000	0.42	0.43	0.01	0.42
	LHD2	0.090	0.003	0.000	0.00	0.000	0.00	0.00	0.00	0.00
	T7 Tractor	0.175	0.053	0.000	1.42	0.004	0.00	1.42	0.00	1.42
CO2e	LDT1							283	4	279
	LHD2							6	0	6
	T7 Tractor							9,495	24	9,471
	Total							**9,784**	**28**	**9,757**

In EMFAC Idle EF is reported as g/vehicle/day. It is converted to g/trip by dividing by the EMFAC value for trip/vehicle/day.

Pollutant	**GWP**
CO2	1
CH4	21
N2O	310

ATTACHMENT B-3 – OFFROAD EMISSIONS CALCULATION WORKSHEETS

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Offroad Equipment - Criteria Pollutant and GHG Emissions From Composting

Criteria Pollutant Emission Factors for Equipment Used for Composting

Offroad Compost Equipment Emission Factors

Unit Count	Offroad Equipment	Typical Model (Or Equivalent)	Engine Tier and Information				NOx g/Bhp	VOC g/Bhp	CO g/Bhp	SOx g/Bhp	PM10 g/Bhp	PM2.5 g/Bhp
			Tier	Bhp	Bsfc	Load						
1	Wheeled Tractor	Massey Fergusen, 7619	4i	200	0.367	0.59	0.30	0.14	2.60	0.005	0.015	0.015
3	Wheeled Loader	Catepillar, 962K	4i	250	0.367	0.59	0.30	0.14	2.60	0.005	0.015	0.015
3	Wheeled Loader	Catepillar, 962K	4i	250	0.367	0.59	0.30	0.14	2.60	0.005	0.015	0.015
3	Wheeled Loader	Michigan 175B (Volvo Eng)	4	350	0.367	0.59	0.30	0.14	2.60	0.005	0.015	0.015
2	Water Trucks	International, 7400 6x4	2010+	350	0.367	0.59	0.20	0.15	2.60	0.005	0.015	0.015

Note:

1. Water truck emissions factors are for onroad engine with an engine newer than 2010 (per CA truck and bus regulation)

Total Criteria Pollutant Emissions from Equipment Used for Composting (640,000 Wet Tons/Year)

Unit Count	Offroad Equipment	Typical Model (Or Equivalent)	Engine Characteristics				Criteria Pollutant Exhaust Emissions (Lb/Day)					
			BHp	Op Load	Hr/Day	Hr/Year	NOx	VOC	CO	SOx	PM10	PM2.5
1	Wheeled Tractor	Massey Fergusen, 7619	200	0.59	12.00	4,380	0.94	0.44	8.12	0.02	0.05	0.05
3	Wheeled Loader	Catepillar, 962K	250	0.59	12.00	4,380	3.51	1.64	30.44	0.06	0.18	0.18
3	Wheeled Loader	Catepillar, 962K	250	0.59	12.00	4,380	3.51	1.64	30.44	0.06	0.18	0.18
3	Wheeled Loader	Michigan 175B (Volvo)	350	0.59	12.00	4,380	4.92	2.29	42.61	0.08	0.25	0.25
2	Water Trucks	International, 7400 6x4	350	0.59	12.00	4,380	2.19	1.64	28.41	0.05	0.16	0.16
Total Emissions from offroad equipment used for composting facility (Lb/Day)							15.06	7.65	140.01	0.27	0.81	0.81
Total Emissions from offroad equipment used for composting facility (Ton/Year)							2.75	1.40	25.55	0.05	0.15	0.15

Criteria Pollutant Emissions Allocated to Composting Phase

Criteria Pollutant Exhaust Emissions by Phase (Lb/Day)	Compost		Criteria Pollutant Exhaust Emissions (Lb/Day)					
	Trains	Wet Tons/Day	NOx	VOC	CO	SOx	PM10	PM2.5
Phase-1 Compost Emissions (2020)	38	555	4.77	2.42	44.34	0.09	0.26	0.26
Phase-2 Compost Emissions (2025)	17	248	2.13	1.08	19.83	0.04	0.11	0.11
Phase-3 Compost Emissions (2030)	65	950	8.16	4.14	75.84	0.15	0.44	0.44
Total Emissions from Equipment at build-out (Lb/Day)	120	1,753	15.06	7.65	140.01	0.27	0.81	0.81
Offroad Equipment Emission Factor (Lb/Wet Ton Compost)	------	------	0.008590	0.004362	0.079848	0.000153	0.000461	0.000461

Criteria Pollutant Exhaust Emissions by Phase (Ton/Year)	Compost		Criteria Pollutant Exhaust Emissions (Ton/Year)					
	Trains	Wet Tons/Year	NOx	VOC	CO	SOx	PM10	PM2.5
Phase-1 Compost Emissions (2020)	38	202,667	0.87	0.44	8.09	0.02	0.05	0.05
Phase-2 Compost Emissions (2025)	17	90,667	0.39	0.20	3.62	0.01	0.02	0.02
Phase-3 Compost Emissions (2030)	65	346,667	1.49	0.76	13.84	0.03	0.08	0.08
Total Emissions from Equipment at build-out (Ton/Year)	120	640,000	2.75	1.40	25.55	0.05	0.15	0.15
Offroad Equipment Emission Factor (Ton/Wet Ton Compost)	------	------	4.30E-06	2.18E-06	3.99E-05	7.67E-08	2.30E-07	2.30E-07

Compost Equipment - GHG Exhaust Emissions

Unit Count	Offroad Equipment	Typical Model (Or Equivalent)	Engine				Fuel	CO2	CH4	N2O	CO2e (MT/Yr)	
			Tier	Bhp	Bsfc	Load	Gal/Year	MT/Yr	Kg/Yr	Kg/Yr	SAR	AR4
1	Wheeled Tractor	Massey Fergusen, 7619	4i	200	0.367	0.59	26,905	275	15,336	6,995	2,765	2,743
3	Wheeled Loader	Catepillar, 962K	4i	250	0.367	0.59	100,894	1,030	57,509	26,232	10,370	10,285
3	Wheeled Loader	Catepillar, 962K	4i	250	0.367	0.59	100,894	1,030	57,509	26,232	10,370	10,285
3	Wheeled Loader	Michigan 175B (Volvo)	4	350	0.367	0.59	141,251	1,442	80,513	36,725	14,518	14,399
2	Water Trucks	International, 7400 6x4	2010+	350	0.367	0.59	94,168	961	53,675	24,484	9,679	9,599
Total GHG Exhaust Emissions from Equipment			----	----	----	----	464,111	4,739	264,543	120,669	47,701	47,312
Offroad Equipment GHG Exhaust Emissions (per Wet Ton)			----	----	----	----	0.725174	0.007404	0.413349	0.188545	0.074533	0.073924

ATTACHMENT B-4 – FUGITIVE EMISSIONS CALCULATION WORKSHEETS

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Lost Hills - Composting
Onroad Mobile Sources - 2030 Phase 3 (full buildout)

Onroad Paved Road Dust

Table 4-2: Paved Road PM_{10} Emission Factors

Pollutant	Freeway (Lb/VMT)	Major (Lb/VMT)	Collector (Lb/VMT)	Local (Lb/VMT)	Rural (Lb/VMT)
PM10	1.50E-04	2.50E-04	2.50E-04	1.87E-03	8.09E-03
PM2.5	3.75E-05	6.24E-05	6.24E-05	4.68E-04	2.02E-03

Compost Facility Phasing

Phase	Start-Up	Wet Tons Per Day	Fraction per Phase
Phase 1	2020	555	0.32
Phase 2	2025	248	0.14
Phase 3	2030	950	0.54
Total	–	1,753	

Table 4-3: Fraction of VMT by Functional Type of Roadway

Freeway	Major	Collector	Local	Rural[1]
0.4552	0.3611	0.1004	0.0833	–

Table 4-4: Summary of Onroad VMT by Case and Road Type

Travel Case	Freeway (VMT/Yr)	Major (VMT/Yr)	Collector (VMT/Yr)	Local (VMT/Yr)	Rural[1] (VMT/Yr)	Total Offsite (VMT/Yr)
Phase 1	1,144,419	907,842	252,416	209,425	51,308	2,565,411
Phase 2	511,380	405,667	112,791	93,581	22,927	1,146,346
Phase 3	1,958,916	1,553,964	432,063	358,475	87,825	4,391,244
Total	3,614,716	2,867,473	797,270	661,480	162,060	8,103,000

Paved Road distance	100.00	mile/trip
Trucks	111	truck/day
schedule	365	day/year
Trips	2	trips/truck (i.e., round trip)
Rural Mileage	2.0	mile/trip

Table 4-5: Emissions from Travel on Paved Roads

Phase	Freeway	Major	Collector	Local	Rural	Total
PM_{10} (Lb/Yr)						
Phase 1	171.66	226.60	63.00	391.60	415.01	1,267.88
Phase 2	76.71	101.25	28.15	174.99	185.45	566.55
Phase 3	293.84	387.87	107.84	670.31	710.38	2,170.24
Total	542.21	715.72	199.00	1236.90	1310.84	4,004.67
$PM_{2.5}$ (Lb/Yr)						
Phase 1	42.92	56.65	15.75	97.91	103.76	316.98
Phase 2	19.18	25.31	7.04	43.75	46.36	141.64
Phase 3	73.46	96.97	26.96	167.59	177.60	542.57
Total	135.55	178.93	49.75	309.24	327.72	1,001.19
PM_{10} (TPY)						
Phase 1	0.09	0.11	0.03	0.20	0.21	0.63
Phase 2	0.04	0.05	0.01	0.09	0.09	0.28
Phase 3	0.15	0.19	0.05	0.34	0.36	1.09
Total	0.27	0.36	0.10	0.62	0.66	2.00
$PM_{2.5}$ (TPY)						
Phase 1	0.02	0.03	0.01	0.05	0.05	0.16
Phase 2	0.01	0.01	0.00	0.02	0.02	0.07
Phase 3	0.04	0.05	0.01	0.08	0.09	0.27
Total	0.07	0.09	0.02	0.15	0.16	0.50

Site (Access/Egress) Fugitive Dust From Travel on Unpaved Roads

EPA Predictive Emission Factors for Fugitive Dust from Onroad Vehicles Accessing Facility

Unpaved Road Emission Factors (Applicable to All Phases)

Phase ID	EMFAC Veh. Type	Activity Use of Purpose	Road Silt %	Rain Days	Rain Cf	PM Emissions Factors (Lb/VMT)		
						PM30	PM10	PM2.5
Opr.	LDT1	Supervisor	6.4	30.0	0.9178	2.9501	0.7964	0.0796
Opr.	LDT1	Technical Staff	6.4	30.0	0.9178	2.9501	0.7964	0.0796
Opr.	LDT1	Mechanic	6.4	30.0	0.9178	2.9501	0.7964	0.0796
Opr.	LDT1	Equipment Operators	6.4	30.0	0.9178	2.9501	0.7964	0.0796
Opr.	LDT1	Personnel for facility	6.4	30.0	0.9178	2.9501	0.7964	0.0796
Opr.	LDT1	Miscellaneous Business	6.4	30.0	0.9178	2.9501	0.7964	0.0796
Opr.	LDT1	Laboratory Services	6.4	30.0	0.9178	2.9501	0.7964	0.0796
Opr.	LHD2	Delivery of Office Supplies	6.4	30.0	0.9178	3.8970	1.0520	0.1052
Opr.	T7 Tractor	Deliver to Compost Facility	6.4	30.0	0.9178	6.4844	1.7505	0.1751
Opr.	T7 Tractor	Ship from Compost Facility	6.4	30.0	0.9178	6.4844	1.7505	0.1751

Compost Facility - Onroad Vehicles and Unpaved VMT for Operational Activities

Vehicle Miles Travelled for Transport of Personnel, Supplies, Materials and Product (Total at 640,000 Tons/Year)

Phase ID	EMFAC Veh. Type	Activity Use of Purpose	Vehicle Weight (Lb)			No. of	Veh	Trips	Trips	Miles Trip	Total VMT
			Gross	Empty							
AC.1.1.01	LDT1	Supervisor	7,251	5,250	6,250.3	365	1	4	1,460	1	1,460
AC.1.1.02	LDT1	Technical Staff	7250.50	5250.00	6250.25	365	1	4	1,460	1	1,460
AC.1.1.03	LDT1	Mechanic	7250.50	5,250	6,250.3	365	1	2	730	1	730
AC.1.1.04	LDT1	Equipment Operators	7250.50	5,250	6,250.3	365	3	2	2,190	0.5	1,095
AC.1.1.05	LDT1	Personnel for facility	7250.50	5,250	6,250.3	365	3	2	2,190	0.5	1,095
AC.1.1.06	LDT1	Miscellaneous Business	7250.50	5,250	6,250.3	104	1	2	208	0.5	104
AC.1.1.07	LDT1	Laboratory Services	7,251	5,250	6,250.3	104	1	2	208	1	208
AC.2.1.01	LHD2	Delivery of Office Supplies	15,006	8,200	11,602.8	104	1	2	208	0	0
AC.3.1.01	T7 Tractor	Deliver to Compost Facility	48,948	23,000	35,973.8	365	111	1	40,515	0.25	10,129
AC.3.2.01	T7 Tractor	Ship from Compost Facility	48,948	23,000	35,973.8	365	111	1	40,515	0.25	10,129

Compost Facility - Total Onsite Unpaved Road Dust from Operational Activities (At Build-Out)

Uncontrolled, Design Reductions and Controlled Emissions from Unpaved Roads

Phase ID	EMFAC Veh. Type	Activity Use of Purpose	Uncontrolled (Lb/Year)			Design Reductions (Lb/Year)			Controlled (Lb/Year)		
			PM30	PM10	PM25	PM30	PM10	PM25	PM30	PM10	PM25
All	LDT1	Supervisor	4,307.11	1,162.73	116.27	3,445.69	930.19	93.02	861.42	232.55	23.25
All	LDT1	Technical Staff	4,307.11	1,162.73	116.27	3,445.69	930.19	93.02	861.42	232.55	23.25
All	LDT1	Mechanic	2,153.55	581.37	58.14	1,722.84	465.09	46.51	430.71	116.27	11.63
All	LDT1	Equipment Operators	3,230.33	872.05	87.21	2,584.26	697.64	69.76	646.07	174.41	17.44
All	LDT1	Personnel for facility	3,230.33	872.05	87.21	2,584.26	697.64	69.76	646.07	174.41	17.44
All	LDT1	Miscellaneous Business	306.81	82.82	8.28	245.45	66.26	6.63	61.36	16.56	1.66
All	LDT1	Laboratory Services	613.62	165.65	16.56	490.89	132.52	13.25	122.72	33.13	3.31
All	LHD2	Delivery of Office Supplies	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
All	T7 Tractor	Deliver to Compost Facility	65,679.30	17,730.60	1,773.06	52,543.44	14,184.48	1,418.45	13,135.86	3,546.12	354.61
All	T7 Tractor	Ship from Compost Facility	65,679.30	17,730.60	1,773.06	52,543.44	14,184.48	1,418.45	13,135.86	3,546.12	354.61
Unpaved Road Dust (Lb/Year)			149,507.4	40,360.6	4,036.1	119,606.0	32,288.5	3,228.8	29,901.5	8,072.1	807.2
Unpaved Road Dust (Ton/Year)			74.8	20.2	2.0	59.8	16.1	1.6	15.0	4.0	0.4

Fugitive Dust From Offroad Equipment Travel on Unpaved Areas and Haul Roads

EPA Predictive Emission Factors for Onsite Offroad Equipment

No. of Units	Equipment Description and Use		Silt Loading	Rain Days	Rain Cf	PM Emission Factors (Lb/VMT)		
						PM30	PM10	PM2.5
1	Wheeled Tractor	Massey Fergusen, 7619	6.4	30	0.9178	4.4779	1.2088	0.1209
1	Windrow Turner	Aeromaster PT170	6.4	30	0.9178	4.4265	1.1950	0.1195
3	Wheeled Loader	Catepillar, 962K	6.4	30	0.9178	7.1757	1.9371	0.1937
3	Wheeled Loader	Catepillar, 962K	6.4	30	0.9178	7.1757	1.9371	0.1937
3	Wheeled Loader	Michigan 175B (Volvo)	6.4	30	0.9178	7.1757	1.9371	0.1937
2	Water Trucks	International, 7400 6x4	6.4	30	0.9178	0.0000	0.0000	0.0000

Onsite Equipment Operating Hours and VMT

No. of Units	Equipment Description and Use		GVW Tons	Empty Tons	Average Tons	Op Hours/Day	Ave. Mph	Total VMT/Day
1	Wheeled Tractor	Massey Fergusen, 7619	7.9	7.9	7.9	12.0	1.0	12.0
1	Windrow Turner	Aeromaster PT170	7.7	7.7	7.7	12.0	0.3	3.6
3	Wheeled Loader	Catepillar, 962K	22.5	22.5	22.5	12.0	4.0	30.0
3	Wheeled Loader	Catepillar, 962K	22.5	22.5	22.5	12.0	2.0	30.0
3	Wheeled Loader	Michigan 175B (Volvo)	22.5	22.5	22.5	12.0	4.0	30.0
2	Water Trucks	International, 7400 6x4	32.4	11.5	21.9	12.0	5.0	120.0

Unpaved Road Dust Caused by Offroad Compost Processing Equipment

No. of Units	Equipment Description and Use		Uncontrolled (Lb/Day)			Controlled (Lb/Day)		
			PM30	PM10	PM25	PM30	PM10	PM25
1	Wheeled Tractor	Massey Fergusen, 7619	53.73	14.51	1.45	10.75	2.90	0.29
1	Windrow Turner	Aeromaster PT170	15.94	4.30	0.43	3.19	0.86	0.09
3	Wheeled Loader	Catepillar, 962K	215.27	58.11	5.81	43.05	11.62	1.16
3	Wheeled Loader	Catepillar, 962K	215.27	58.11	5.81	43.05	11.62	1.16
3	Wheeled Loader	Michigan 175B (Volvo)	215.27	58.11	5.81	43.05	11.62	1.16
2	Water Trucks	International, 7400 6x4	0.00	0.00	0.00	0.00	0.00	0.00
Total Dust from Equip. On Unpaved Areas (Lb/Day)			715.48	193.15	19.31	143.10	38.63	3.86
Emission Factor Equip Dust (Lb/Wet Ton Compost)			0.555640	0.149999	0.015000	0.111128	0.030000	0.003000

No. of Units	Equipment Description and Use		Uncontrolled (Lb/Year)			Controlled (Lb/Year		
			PM30	PM10	PM25	PM30	PM10	PM25
1	Wheeled Tractor	Massey Fergusen, 7619	19,613.22	5,294.73	529.47	3,922.64	1,058.95	105.89
1	Windrow Turner	Aeromaster PT170	5,816.46	1,570.20	157.02	1,163.29	314.04	31.40
3	Wheeled Loader	Catepillar, 962K	78,573.76	21,211.55	2,121.16	15,714.75	4,242.31	424.23
3	Wheeled Loader	Catepillar, 962K	78,573.76	21,211.55	2,121.16	15,714.75	4,242.31	424.23
3	Wheeled Loader	Michigan 175B (Volvo)	78,573.76	21,211.55	2,121.16	15,714.75	4,242.31	424.23
2	Water Trucks	International, 7400 6x4	0.00	0.00	0.00	0.00	0.00	0.00
Total Dust from Equip. On Unpaved Areas (Lb/Year)			261,151.0	70,499.6	7,050.0	52,230.2	14,099.9	1,410.0
Total Dust from Equip. On Unpaved Areas (Ton/Year)			130.6	35.2	3.5	26.1	7.0	0.7

Fugitive Dust Emissions from Material Handling

EPA Predictive Emission Factors for Material Handling

Predictive Emission Factors for Compost Material Handling							
	EPA AP42	Wost Case Moisture %	Ave. Wind Mph	Factor Units	Uncontrolled Factors (Lb/Ton)		
					PM30	PM10	PM2.5
Deliver Feedstock	13.2.4-3, Eq-1	40	5.6	Lb/Ton	0.000041	0.000020	0.000003
Mix Feedstock	13.2.4-3, Eq-1	40	5.6	Lb/Ton	0.000041	0.000020	0.000003
Move Feedstock	13.2.4-3, Eq-1	40	5.6	Lb/Ton	0.000041	0.000020	0.000003
Compost to Curing	13.2.4-3, Eq-1	40	5.6	Lb/Ton	0.000041	0.000020	0.000003
Curing to storage	13.2.4-3, Eq-1	40	5.6	Lb/Ton	0.000041	0.000020	0.000003
Load Compost	13.2.4-3, Eq-1	40	5.6	Lb/Ton	0.000041	0.000020	0.000003

Fugitive Dust Emissions from Material Handling

Material Handling Emissions for Composting (Lb/Day) at 640,000 Tons/Year								
Drop Points	Activity	Process Ton/Day	Uncontrolled Emissions (LbDay)			50% Control (Lb/Day)		
			PM30	PM10	PM2.5	PM30	PM10	PM2.5
1	Deliver Feedstock	1,753.425	0.07	0.034	0.005	0.04	0.017	0.003
4	Mix Feedstock	1,753.425	0.29	0.137	0.021	0.15	0.069	0.010
2	Move Feedstock	1,753.425	0.15	0.069	0.010	0.07	0.034	0.005
2	Compost to Curing	1,402.740	0.12	0.055	0.008	0.06	0.027	0.004
2	Curing to storage	1,402.740	0.12	0.055	0.008	0.06	0.027	0.004
2	Load Compost	1,402.740	0.12	0.055	0.008	0.06	0.027	0.004
Material Handling Total (Lb/Day)			0.86	0.405	0.061	0.43	0.203	0.031
Material Handling Total (Lb/Year)			312.6	147.9	22.4	156.3	73.9	11.2

Material Handling Emissions for Composting (Tons/Year) at 640,000 Tons/Year								
Drop Points	Activity	Process Ton/Year	Uncontrolled Emissions (Lb/Year)			50% Control (Lb/Year)		
			PM30	PM10	PM2.5	PM30	PM10	PM2.5
1	Deliver Feedstock	640,000	26.49	12.53	1.90	13.25	6.26	0.95
4	Mix Feedstock	640,000	105.97	50.12	7.59	52.98	25.06	3.79
2	Move Feedstock	640,000	52.98	25.06	3.79	26.49	12.53	1.90
2	Compost to Curing	512,000	42.39	20.05	3.04	21.19	10.02	1.52
2	Curing to storage	512,000	42.39	20.05	3.04	21.19	10.02	1.52
2	Load Compost	512,000	42.39	20.05	3.04	21.19	10.02	1.52
Material Handling Total (Lb/Year)			312.6	147.9	22.4	156.3	73.9	11.2
Material Handling Total (Ton/Year)			0.156	0.074	0.011	0.078	0.037	0.006

Fugitive Dust Emissions Allocation to Phases

Dust from Material Handling (Lb/Day)	Uncontrolled (Lb/Year)			Controlled (Lb/Year)		
	PM30	PM10	PM25	PM30	PM10	PM25
Phase-1 Compost Emissions (2020)	98.99	46.82	7.09	49.49	23.41	3.54
Phase-2 Compost Emissions (2025)	44.28	20.95	3.17	22.14	10.47	1.59
Phase-3 Compost Emissions (2030)	169.32	80.09	12.13	84.66	40.04	6.06
Total Dust from Equip (Lb/Day)	312.60	147.85	22.39	156.30	73.93	11.19

Dust from Material Handling (Ton/Year)	Uncontrolled (Ton/Year)			Controlled (Tons/Year)		
	PM30	PM10	PM25	PM30	PM10	PM25
Phase-1 Compost Emissions (2020)	0.049	0.023	0.004	0.025	0.012	0.002
Phase-2 Compost Emissions (2025)	0.022	0.010	0.002	0.011	0.005	0.001
Phase-3 Compost Emissions (2030)	0.085	0.040	0.006	0.042	0.020	0.003
Total Dust from Equip (Ton/Year)	0.156	0.074	0.011	0.078	0.037	0.006

ATTACHMENT B-5 – COMPOST EMISSIONS CALCULATION WORKSHEETS

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VOC and Ammonia Emissions from Composting

VOC and Ammonia - Uncontrolled (Standard) Emissions Factors for Composting

Compost Type	Combined Factor 60 Days (Lb/Wet Ton)		Composting- 22 Days (Lb/Wet Ton)		Curing - 38 Days (Lb/Wet Ton)		Feedstock (3 Days) (Lb/Wet Ton)		Product (30 Days) (Lb/Ton)	
	VOC	NH3	VOC	NH3	VOC	NH3	VOC	NH3	VOC	NH3
Co-Composting	1.7800	2.9300	1.6020	2.6370	0.1780	0.2930	0.2825	0.0231	4.25E-03	7.60E-04
Greenwaste, Food	3.7800	0.7800	3.4020	0.7020	0.3780	0.0780	0.6000	0.0062	4.25E-03	7.60E-04

Note:

1 Co-Composting with Green waste and biosolids or manure. The ARB and the SJVAPCD composting factors are the same. The term Lb/Wet ton is assumed to mean Lb/ton feedstock. The SJVAPCD compost cycle used for calculating emissions spans 60 days (22 days active composting and 38 days for curing). The SJVAPCD assumes that compost emissions are split (90%/10%) between active composting and compost curing. Daily factors may be derived by dividing the total by the appropriate number of days.

2 Green waste, food waste, grape pomace other compostable materials. The factors are from the SJVAPCD with the exception of ammonia which is the ARB factor (SJVAPCD did not report an ammonia factor).

3 Feedstock storage pile: The VOC emission factor for greenwaste is from the CARB/SJVAPCD EF Report. The VOC emission fator for co-composting storage pile VOC was calculated using the ratio of the combined factors and the green waste storage pile factor: = [0.2*1.78/3.78)]. This is multiplied by 3 because of the 3-day storag assumption. There ammonia emission factor for feedstock were calculated from the compost curing emission factors divided by 38 (number of curing days). There were no other factors avaiable for estimating ammonia emissions.

4 Product storage emission factors: The product storage emission factors are from SJVAPCD EF Report: Compost VOC Emission Factors, September 15, 2010: Appendix-C, Northern Recycling Zamora Compost Facility Air Emissions Source Test, T.R. Card and C.E. Schmidt, May 2009".

Control Efficiences for VOC and Ammonia - Composting ASP with Cured Compost Biofilter

Composting using Forced Aeration With a Cured Compost Biofilter	Combined Factor Control Eff (%)		Composting Min. Control Eff (%)		Curing Control Eff (%)		Feedstock Control Eff (%)		Product Control Eff (%)	
	VOC	NH3	VOC	NH3	VOC	NH3	VOC	NH3	VOC	NH3
	81.00	45.00	**90.00**	**50.00**	**0.00**	**0.00**	0.00	0.00	0.00	0.00

Note:

1. The VOC and Ammonia (NH3) control efficicneences are from the California Air Resources Board Methodology for Composting Facilities (3/2/2015) and;
2. CalRecycle/SJVAPCD Report: Greenwaste Compost Site Emission Reductions from Solar Powered Aeration with Biofilter Layer

VOC and Ammonia from Co-Composting with ASP and Compost Biofilter (Lb/Day)

Emission from Holloway Composting Facility (Lb/Day) at Buildout										
Buildout Process Rate Wet Tons/Day	Total Emissions		Active Composting		Compost Curing		Mix Pads		Storage (40% Shrinkage)	
	Cycle Days	60	Active Days	**22**	Cure Days	**38**	Mix Days	**3**	Store	**30**
	Emissions (Lb/Day)		Emissions (Lb/Day)		Emissions (Lb/Day)		Emissions (Lb/Day)		Emissions (Lb/Day)	
1,753.42	VOC	NH3	VOC	NH3	VOC	NH3	VOC	NH3	VOC	NH3
Uncontrolled	3,620.98	5,178.89	2,808.99	4,623.78	312.11	513.75	495.41	40.56	4.47	0.80
Reductions	2,528.09	2,311.89	2,528.09	2,311.89	0.00	0.00	0.00	0.00	0.00	0.00
Controlled	1,092.90	2,867.00	280.90	2,311.89	312.11	513.75	495.41	40.56	4.47	0.80

VOC and Ammonia Emissions from Composting Allocated to Phases (Lb/Day)

Phase-1 Emission from Composting Facility (Lb/Day)										
Phase-1 Wet Ton/Day	Total Emissions Lb/Day		Active Composting Lb/Day		Compost Curing Lb/Day		Mix Pads Lb/Day		Storage (40% Shrinkage) Lb/Day	
555.25	VOC	NH3	VOC	NH3	VOC	NH3	VOC	NH3	VOC	NH3
Uncontrolled	1,146.64	1,639.98	889.51	1,464.20	98.83	162.69	156.88	12.84	1.42	0.25
Reductions	800.56	732.10	800.56	732.10	0.00	0.00	0.00	0.00	0.00	0.00
Controlled P-1	346.08	907.88	88.95	732.10	98.83	162.69	156.88	12.84	1.42	0.25
Phase-2 Emission from Composting Facility (Lb/Day)										
Phase-2 Wet Ton/Day	Total Emissions Lb/Day		Active Composting Lb/Day		Compost Curing Lb/Day		Mix Pads Lb/Day		Storage (40% Shrink) Lb/Day	
248.40	VOC	NH3	VOC	NH3	VOC	NH3	VOC	NH3	VOC	NH3
Uncontrolled	512.97	733.68	397.94	655.04	44.22	72.78	70.18	5.75	0.63	0.11
Reductions	358.15	327.52	358.15	327.52	0.00	0.00	0.00	0.00	0.00	0.00
Controlled P-2	154.83	406.16	39.79	327.52	44.22	72.78	70.18	5.75	0.63	0.11
Phase-3 Emission from Composting Facility (Lb/Day)										
Phase-3 Wet Ton/Day	Total Emissions Lb/Day		Active Composting Lb/Day		Compost Curing Lb/Day		Mix Pads Lb/Day		Storage (40% Shrink) Lb/Day	
949.77	VOC	NH3	VOC	NH3	VOC	NH3	VOC	NH3	VOC	NH3
Uncontrolled	1,961.37	2,805.23	1,521.53	2,504.55	169.06	278.28	268.35	21.97	2.42	0.43
Reductions	1,369.38	1,252.27	1,369.38	1,252.27	0.00	0.00	0.00	0.00	0.00	0.00
Controlled P-3	591.98	1,552.96	152.15	1,252.27	169.06	278.28	268.35	21.97	2.42	0.43
Total Controlled	1,092.90	2,867.00	280.90	2,311.89	312.11	513.75	495.41	40.56	4.47	0.80

VOC and Ammonia from Co-Composting with ASP and Compost Biofilter (Ton/Year)

Emission from Holloway Composting Facility (Ton/Year) at Buildout										
Process Rate Wet Ton/Year	Total Emissions Ton/Year		Active Composting Ton/Year		Compost Curing Ton/Year		Mix Pads Ton/Year		Storage (40% Shrink) Ton/Year	
640,000.0	VOC	NH3	VOC	NH3	VOC	NH3	VOC	NH3	VOC	NH3
Uncontrolled	660.83	945.15	512.64	843.84	56.96	93.76	90.41	7.40	0.82	0.15
Reductions	461.38	421.92	461.38	421.92	0.00	0.00	0.00	0.00	0.00	0.00
Controlled	199.45	523.23	51.26	421.92	56.96	93.76	90.41	7.40	0.82	0.15

VOC and Ammonia Emissions from Composting Allocated to Phases (Ton/Year)

Phase-1 Emission from Composting Facility (Ton/Year)										
Phase-1 Wet Ton/Year	Total Emissions Ton/Year		Active Composting Ton/Year		Compost Curing Ton/Year		Mix Pads Ton/Year		Storage (40% Shrink) Ton/Year	
202,666.7	VOC	NH3	VOC	NH3	VOC	NH3	VOC	NH3	VOC	NH3
Uncontrolled	209.26	299.30	162.34	267.22	18.04	29.69	28.63	2.34	0.26	0.05
Reductions	146.10	133.61	146.10	133.61	0.00	0.00	0.00	0.00	0.00	0.00
Controlled P-1	63.16	165.69	16.23	133.61	18.04	29.69	28.63	2.34	0.26	0.05
Phase-2 Emission from Composting Facility Ton/Year)										
Phase-2 Wet Ton/Year	Total Emissions Ton/Year		Active Composting Ton/Year		Compost Curing Ton/Year		Mix Pads Ton/Year		Storage (40% Shrink) Ton/Year	
90,666.7	VOC	NH3	VOC	NH3	VOC	NH3	VOC	NH3	VOC	NH3
Uncontrolled	93.62	133.90	72.62	119.54	8.07	13.28	12.81	1.05	0.12	0.02
Reductions	65.36	59.77	65.36	59.77	0.00	0.00	0.00	0.00	0.00	0.00
Controlled P-2	28.26	74.12	7.26	59.77	8.07	13.28	12.81	1.05	0.12	0.02
Phase-3 Emission from Composting Facility (Ton/Year)										
Phase-3 Wet Ton/Year	Total Emissions Ton/Year		Active Composting Ton/Year		Compost Curing Ton/Year		Mix Pads Ton/Year		Storage (40% Shrink) Ton/Year	
346,666.7	VOC	NH3	VOC	NH3	VOC	NH3	VOC	NH3	VOC	NH3
Uncontrolled	357.95	511.96	277.68	457.08	30.85	50.79	48.97	4.01	0.44	0.08
Reductions	249.91	228.54	249.91	228.54	0.00	0.00	0.00	0.00	0.00	0.00
Controlled P-3	108.04	283.42	27.77	228.54	30.85	50.79	48.97	4.01	0.44	0.08
Total Controlled	199.45	523.23	51.26	421.92	56.96	93.76	90.41	7.40	0.82	0.15

GHG Emissions from Composting

GHG Emissions - Emissions Factors for "Standard" Composting

Compost Type	Combined Factor (Kg/Wet Ton)		Composting (Kg/Wet Ton)		Curing (Kg/Wet Ton)		Feedstock (3 Days) (Kg/Wet Ton)		Product (30 Days) (Kg/Ton)	
	CH4	N2O	CH4	N2O	CH4	N2O	CH4	N2O	CH4	N2O
Co-Composting	1.7781	0.2722	1.6003	0.0272	0.1778	0.2449	0.0679	0.0000	0.1404	0.1934
Greenwaste, Food	1.7781	0.0680	1.6003	0.0068	0.1778	0.0612	0.0679	0.0000	0.1404	0.0483

Note:

1 Combined Factors: The combined factors for CH4 are from the "Method for Estimating Greenhouse Gas Emission Reductions from Diversion of Organic Waste from Landfills to Compost Facilities", Final Draft , May 2017; California Air Resources Board. The N2O factor for green waste is from the ARB report. The N2O Factor for co-composting is from IPCC (0.3g N2O/Kg).

2 Methane emissions are split between composting and curing using the SJVAPCD recommended factor (90%/10%). However, according to the literature most (> 90%) of the N2O emissions occur late in the composting cycle or during compost curing. Consequently, the N2O emissions are split using 10% for composting and 90% for curing.

3 Feedstock Methane emission factors are from the "Inland Empire" source tests, conducted by SCAQMD and the CARB. Test Report #1 was conducted during September and October 2001; Test #2 was conducted during November and December 2001. The average CH4 emissions from feedstock were approximately 0.0226 Kg/Wet ton day. Emission factors for N2O from feedstock storage were unavailable. Given that N2O emissions typically occur late in the composting cycle after available carbon is depleted, it is assumed that the N2O emissions from short-term feedstock storage are equal to zero.

4 The GHG emissions from product storage were unavailable. Therefore the GHG emissions from product storage were assumed to be equal to the compost curing factors divided by the SJVAPCD curing days (38 days).

Control Efficiencies for GHG Emissions - Composting ASP with Cured Compost Biofilter

Composting using Forced Aeration With a Cured Compost Biofilter	Combined Factor Control Eff (%)		Composting Min. Control Eff (%)		Curing Control Eff (%)		Feedstock Control Eff (%)		Product Control Eff (%)	
	CH4	N2O	CH4	N2O	CH4	N2O	CH4	N2O	CH4	N2O
	9.00	72.00	10.00	80.00	0.00	0.00	0.00	0.00	0.00	0.00

Note:

1. The VOC and Ammonia (NH3) control efficiencies are from the California Air Resources Board: "ARB Inventory Methodology for Composting Facilities", 3/2/2015 and;
2. CalRecycle/SJVAPCD Report: Greenwaste Compost Site Emission Reductions from Solar Powered Aeration with Biofilter Layer

GHG Emissions from Composting (Kg/Day)

Emission from Holloway Composting Facility (Kg/Day) at Buildout										
Process Rate Wet Ton/Day	Total Emissions Kg/Day		Active Composting Kg/Day		Compost Curing Kg/Day		Mix Pads (3 Days) Kg/Day		Storage (40% Shrinkage) Kg/Day	
1,753.42	CH4	N2O	CH4	N2O	CH4	N2O	CH4	N2O	CH4	N2O
Uncontrolled	3,385	681	2,806	48	312	429	119	0	148	203
Reductions	281	38	281	38	0	0	0	0	0	0
Controlled	3,104	642	2,525	10	312	429	119	0	148	203

GHG Emissions from Composting Allocated to Phases (Kg/Day)

Phase-1 Emission from Composting Facility (Kg/Day)										
Phase-1 Wet Ton/Day	Total Emissions Kg/Day		Active Composting Kg/Day		Compost Curing Kg/Day		Mix Pads (Storage) Kg/Day		Storage (40% Shrinkage) Kg/Day	
555.25	CH4	N2O	CH4	N2O	CH4	N2O	CH4	N2O	CH4	N2O
Uncontrolled	1,072	216	889	15	99	136	38	0	47	64
Reductions	89	12	89	12	0	0	0	0	0	0
Controlled	983	203	800	3	99	136	38	0	47	64
Phase-2 Emission from Composting Facility (Kg/Day)										
Phase-2 Wet Ton/Day	Total Emissions Kg/Day		Active Composting Kg/Day		Compost Curing Kg/Day		Mix Pads (Storage) Kg/Day		Storage (40% Shrinkage) Kg/Day	
248.40	CH4	N2O	CH4	N2O	CH4	N2O	CH4	N2O	CH4	N2O
Uncontrolled	479	96	398	7	44	61	17	0	21	29
Reductions	40	5	40	5	0	0	0	0	0	0
Controlled	440	91	358	1	44	61	17	0	21	29
Phase-3 Emission from Composting Facility (Kg/Day)										
Phase-3 Wet Ton/Day	Total Emissions Kg/Day		Active Composting Kg/Day		Compost Curing Kg/Day		Mix Pads (Storage) Kg/Day		Storage (40% Shrinkage) Kg/Day	
949.77	CH4	N2O	CH4	N2O	CH4	N2O	CH4	N2O	CH4	N2O
Uncontrolled	1,833	369	1,520	26	169	233	64	0	80	110
Reductions	152	21	152	21	0	0	0	0	0	0
Controlled	1,681	348	1,368	5	169	233	64	0	80	110
Total Controlled	3,104	642	2,525	10	312	429	119	0	148	203

GHG Emissions from Composting (MT/Year)

Emission from Holloway Composting Facility (MT/Year) at Buildout										
Process Rate Wet Ton/Year	Total Emissions MT/Year		Active Composting MT/Year		Compost Curing MT/Year		Mix Pads (Storage) MT/Year		Storage (40% Shrinkage) MT/Year	
640,000.0	CH4	N2O	CH4	N2O	CH4	N2O	CH4	N2O	CH4	N2O
Uncontrolled	1,235.3548	248.4391	1,024.1925	17.4182	113.7992	156.7642	43.4582	0.0000	53.9049	74.2567
Reductions	102.4193	13.9346	102.4193	13.9346	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Controlled	1,132.9355	234.5045	921.7733	3.4836	113.7992	156.7642	43.4582	0.0000	53.9049	74.2567

GHG Emissions from Composting Allocated to Phases (MT/Year)

Phase-1 Emission from Composting Facility (MT/Year)										
Phase-1 Wet Ton/Year	Total Emissions MT/Year		Active Composting MT/Year		Compost Curing MT/Year		Mix Pads (Storage) MT/Year		Storage (40% Shrinkage) MT/Year	
202,666.7	CH4	N2O	CH4	N2O	CH4	N2O	CH4	N2O	CH4	N2O
Uncontrolled	391.20	78.67	324.33	5.52	36.04	49.64	13.76	0.00	17.07	23.51
Reductions	32.43	4.41	32.43	4.41	0.00	0.00	0.00	0.00	0.00	0.00
Controlled	358.76	74.26	291.89	1.10	36.04	49.64	13.76	0.00	17.07	23.51
Phase-2 Emission from Composting Facility MT/Year)										
Phase-2 Wet Ton/Day	Total Emissions MT/Year		Active Composting MT/Year		Compost Curing MT/Year		Mix Pads (Storage) MT/Year		Storage (40% Shrinkage) MT/Year	
90,666.7	CH4	N2O	CH4	N2O	CH4	N2O	CH4	N2O	CH4	N2O
Uncontrolled	175.01	35.20	145.09	2.47	16.12	22.21	6.16	0.00	7.64	10.52
Reductions	14.51	1.97	14.51	1.97	0.00	0.00	0.00	0.00	0.00	0.00
Controlled	160.50	33.22	130.58	0.49	16.12	22.21	6.16	0.00	7.64	10.52
Phase-3 Emission from Composting Facility (MT/Year)										
Phase-3 Wet Ton/Day	Total Emissions MT/Year		Active Composting MT/Year		Compost Curing MT/Year		Mix Pads (Storage) MT/Year		Storage (40% Shrinkage) MT/Year	
346,666.7	CH4	N2O	CH4	N2O	CH4	N2O	CH4	N2O	CH4	N2O
Uncontrolled	669.15	134.57	554.77	9.43	61.64	84.91	23.54	0.00	29.20	40.22
Reductions	55.48	7.55	55.48	7.55	0.00	0.00	0.00	0.00	0.00	0.00
Controlled	613.67	127.02	499.29	1.89	61.64	84.91	23.54	0.00	29.20	40.22
Total Controlled	1,132.94	234.50	921.77	3.48	113.80	156.76	43.46	0.00	53.90	74.26

GHG Emissions from Composting (CO2e MT/Year)

Emission from Holloway Composting Facility (CO2e MT/Year) at Buildout										
Process Rate Wet Ton/Year	Total Emissions MT/Year		Active Composting MT/Year		Compost Curing MT/Year		Mix Pads (Storage) MT/Year		Storage (40% Shrinkage) MT/Year	
640,000.0	CH4	N2O	CH4	N2O	CH4	N2O	CH4	N2O	CH4	N2O
Uncontrolled	25,942	77,016	21,508	5,400	2,390	48,597	913	0	1,132	23,020
Reductions	2,151	4,320	2,151	4,320	0	0	0	0	0	0
Controlled	23,792	72,696	19,357	1,080	2,390	48,597	913	0	1,132	23,020
Sub Total for CO2e	96,488		20,437		50,987		913		24,152	

GHG Emissions from Composting Allocated to Phases (CO2e MT/Year)

Phase-1 Emission from Composting Facility (CO2e MT/Year)										
Phase-1 Wet Ton/Year	Total Emissions MT/Year		Active Composting MT/Year		Compost Curing MT/Year		Mix Pads (Storage) MT/Year		Storage (40% Shrinkage) MT/Year	
202,666.7	CH4	N2O	CH4	N2O	CH4	N2O	CH4	N2O	CH4	N2O
Uncontrolled	8,215	24,388	6,811	1,710	757	15,389	289	0	358	7,290
Reductions	681	1,368	681	1,368	0	0	0	0	0	0
Controlled	7,534	23,021	6,130	342	757	15,389	289	0	358	7,290
Sub Total for CO2e	30,555		6,472		16,146		289		7,648	

Phase-2 Emission from Composting Facility CO2e MT/Year)										
Phase-2 Wet Ton/Day	Total Emissions MT/Year		Active Composting MT/Year		Compost Curing MT/Year		Mix Pads (Storage) MT/Year		Storage (40% Shrinkage) MT/Year	
90,666.7	CH4	N2O	CH4	N2O	CH4	N2O	CH4	N2O	CH4	N2O
Uncontrolled	3,675	10,911	3,047	765	339	6,885	129	0	160	3,261
Reductions	305	612	305	612	0	0	0	0	0	0
Controlled	3,370	10,299	2,742	153	339	6,885	129	0	160	3,261
Sub Total for CO2e	13,669		2,895		7,223		129		3,421	

Phase-3 Emission from Composting Facility (CO2e MT/Year)										
Phase-3 Wet Ton/Day	Total Emissions MT/Year		Active Composting MT/Year		Compost Curing MT/Year		Mix Pads (Storage) MT/Year		Storage (40% Shrinkage) MT/Year	
346,666.7	CH4	N2O	CH4	N2O	CH4	N2O	CH4	N2O	CH4	N2O
Uncontrolled	14,052	41,717	11,650	2,925	1,294	26,323	494	0	613	12,469
Reductions	1,165	2,340	1,165	2,340	0	0	0	0	0	0
Controlled	12,887	39,377	10,485	585	1,294	26,323	494	0	613	12,469
Sub Total for CO2e	52,264		11,070		27,618		494		13,082	
Grand Total CO2e	96,488									

ATTACHMENT B-6 – TOXIC AIR CONTAMINANT EMISSIONS CALCULATION WORKSHEETS

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Onroad Gasoline Vehicles

Onroad Exhaust Emissions (Gasoline)

Emissions of Volatile Organic Compounds			
Onsite	Near-site	Onsite	Near-site
VOC	VOC	VOC	VOC
Lb/Day	Lb/Day	Lb/year	Lb/year
0.0010	0.0010	0.3821	0.3821

Emissions of PM2.5			
Onsite	Near-site	Onsite	Near-site
PM2.5	PM2.5	PM2.5	PM2.5
Lb/Day	Lb/Day	Lb/year	Lb/year
0.0151	0.0151	5.5107	5.5107

Vehicle Miles Traveled	
Onsite	Near-site
Onroad	Onroad
VMT/Day	VMT/Day
17	17

Near-site encompasses 1/4 mile offsite, per SJVAPCD guidance

Speciated Emissions of From Onroad Gasoline Vehicles

Gaseous Exhaust Emissions (Onroad Gasoline Vehicles)

Speciated Emissions of Gaseous HAP						
Gaseous Compound	HAP Fraction VOC	HAP Fraction PM2.5	Onsite HAP Lb/Day	Near-site HAP Lb/Day	Onsite HAP Lb/year	Near-site HAP Lb/year
1,3-Butadiene	0.000E+00	------	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2,2,4-Trimethylpentane	1.849E-02	------	1.936E-05	1.936E-05	7.066E-03	7.066E-03
Acetaldehyde	0.000E+00	------	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Acrolein	6.280E-04	------	6.575E-07	6.575E-07	2.400E-04	2.400E-04
Benzene	0.000E+00	------	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ethanol	2.390E-02	------	2.502E-05	2.502E-05	9.133E-03	9.133E-03
Ethyl Benzene	1.932E-02	------	2.023E-05	2.023E-05	7.383E-03	7.383E-03
Formaldehyde	0.000E+00	------	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Hexane	1.593E-02	------	1.668E-05	1.668E-05	6.087E-03	6.087E-03
Propionaldehyde	8.600E-04	------	9.004E-07	9.004E-07	3.286E-04	3.286E-04
Styrene	9.700E-04	------	1.016E-06	1.016E-06	3.707E-04	3.707E-04
Toluene	8.657E-02	------	9.063E-05	9.063E-05	3.308E-02	3.308E-02
Xylene	7.032E-02	------	7.362E-05	7.362E-05	2.687E-02	2.687E-02

Speciated PAH Emissions (Gaseous + Particulate)						
PAH Compound	HAP Fraction VOC	HAP Fraction PM2.5	Onsite HAP Lb/Day	Near-site HAP Lb/Day	Onsite HAP Lb/year	Near-site HAP Lb/year
Naphthalene	2.070E-03	7.185E-05	3.252E-06	3.252E-06	1.187E-03	1.187E-03
Acenaphthylene	1.810E-04	2.133E-05	5.116E-07	5.116E-07	1.867E-04	1.867E-04
Acenapthene	3.990E-05	0.000E+00	4.177E-08	4.177E-08	1.525E-05	1.525E-05
Fluorene	8.080E-05	0.000E+00	8.459E-08	8.459E-08	3.088E-05	3.088E-05
Anthracene	3.350E-05	2.211E-05	3.689E-07	3.689E-07	1.347E-04	1.347E-04
Phenanthrene	2.140E-04	7.742E-05	1.393E-06	1.393E-06	5.084E-04	5.084E-04
Fluoranthene	5.600E-05	7.798E-05	1.236E-06	1.236E-06	4.511E-04	4.511E-04
Pyrene	6.400E-05	8.466E-05	1.345E-06	1.345E-06	4.910E-04	4.910E-04
Benz(a)anthracene	5.400E-06	2.027E-04	3.067E-06	3.067E-06	1.119E-03	1.119E-03
Chrysene	6.050E-06	1.716E-04	2.596E-06	2.596E-06	9.477E-04	9.477E-04
Benzo(a)pyrene (BAP)	2.940E-07	5.085E-04	7.678E-06	7.678E-06	2.803E-03	2.803E-03
Benzo(b)fluoranthene	4.010E-06	2.479E-04	3.746E-06	3.746E-06	1.367E-03	1.367E-03
Benzo(k)fluoranthene	4.010E-06	2.479E-04	3.746E-06	3.746E-06	1.367E-03	1.367E-03
Benzo(g,h,i)perylene	0.000E+00	1.376E-03	2.077E-05	2.077E-05	7.582E-03	7.582E-03
Indeno(1,2,3-cd)pyrene	0.000E+00	5.169E-04	7.804E-06	7.804E-06	2.848E-03	2.848E-03
Dibenzo(a,h)anthracene	0.000E+00	1.186E-05	1.791E-07	1.791E-07	6.538E-05	6.538E-05
Total PAH		3.627E-03	5.782E-05	5.782E-05	2.110E-02	2.110E-02

Speciated Emissions of From Onroad Gasoline Vehicles

Speciated Dioxin/Furan Emissions (Particulate)						
Dioxin/Furan Compound		HAP Factor mg/Mile	Onsite HAP Lb/Day	Near-site HAP Lb/Day	Onsite HAP Lb/year	Near-site HAP Lb/year
2,3,7,8-Tetrachlorodibenzo-p-Dioxin (TCDD)		8.270E-10	3.073E-14	3.073E-14	1.122E-11	1.122E-11
1,2,3,7,8-Pentachlorodibenzo-p-Dioxin		3.700E-10	1.375E-14	1.375E-14	5.018E-12	5.018E-12
1,2,3,4,7,8-Hexachlorodibenzo-p-Dioxin		3.870E-10	1.438E-14	1.438E-14	5.249E-12	5.249E-12
1,2,3,6,7,8-Hexachlorodibenzo-p-Dioxin		7.920E-10	2.943E-14	2.943E-14	1.074E-11	1.074E-11
1,2,3,7,8,9-Hexachlorodibenzo-p-Dioxin		4.930E-10	1.832E-14	1.832E-14	6.686E-12	6.686E-12
1,2,3,4,6,7,8-Heptachlorodibenzo-p-Dioxin		5.950E-09	2.211E-13	2.211E-13	8.070E-11	8.070E-11
Octachlorodibenzo-p-dioxin		4.700E-08	1.746E-12	1.746E-12	6.374E-10	6.374E-10
2,3,7,8-Tetrachlorodibenzofuran		2.760E-09	1.026E-13	1.026E-13	3.743E-11	3.743E-11
1,2,3,7,8-Pentachlorodibenzofuranj		1.320E-09	4.905E-14	4.905E-14	1.790E-11	1.790E-11
2,3,4,7,8-Pentachlorodibenzofuran		9.680E-10	3.597E-14	3.597E-14	1.313E-11	1.313E-11
1,2,3,4,7,8-Hexachlorodibenzofuran		1.090E-09	4.050E-14	4.050E-14	1.478E-11	1.478E-11
1,2,3,6,7,8-Hexachlorodibenzofuran		1.160E-09	4.310E-14	4.310E-14	1.573E-11	1.573E-11
1,2,3,7,8,9-Hexachlorodibenzofuran		3.170E-10	1.178E-14	1.178E-14	4.299E-12	4.299E-12
2,3,4,6,7,8-Hexachlorodibenzofuran		1.360E-09	5.053E-14	5.053E-14	1.845E-11	1.845E-11
1,2,3,4,6,7,8-Heptachlorodibenzofuran		1.210E-08	4.496E-13	4.496E-13	1.641E-10	1.641E-10
1,2,3,4,7,8,9-Heptachlorodibenzofuran		3.870E-10	1.438E-14	1.438E-14	5.249E-12	5.249E-12
Octachlorodibenzofuran		1.370E-08	5.091E-13	5.091E-13	1.858E-10	1.858E-10
Total Dioxins/Furans		9.098E-08	3.381E-12	3.381E-12	1.234E-09	1.234E-09

Speciated Emissions of Metals (Particulates) (lb/day)						
Metal Compound	HAP Factor g/Mile		Onsite HAP Lb/Day	Near-site HAP Lb/Day	Onsite HAP Lb/year	Near-site HAP Lb/year
Arsenic	2.30E-06		8.55E-08	8.55E-08	3.119E-05	3.119E-05
Chromium-VI	1.20E-08		4.46E-10	4.46E-10	1.628E-07	1.628E-07
Manganese	1.33E-06		4.94E-08	4.94E-08	1.804E-05	1.804E-05
Mercury	1.20E-07		4.47E-09	4.47E-09	1.632E-06	1.632E-06
Nickel	1.50E-06		5.57E-08	5.57E-08	2.034E-05	2.034E-05

TAC from Paved Roads
CARB Speciation Profile #422 (Selected Metals)

Near-site Dust

Paved Road Dust from Travel	Controlled	Lb/Day	0.0281
Other Paved Road Emissions	Controlled	Lb/Day	0.0000

Chemical Compound	CAS No	TAC, HAP T,H	Compound mg/Kg	TAC Emissions	
				Lb/Day	Lb/Year
Arsenic	7440-38-2	T,H	16.00	4.49E-07	1.64E-04
Cadmium	7440-43-9	T,H	31.00	8.70E-07	3.18E-04
Chromium VI	18540-29-9	T,H	12.45	3.49E-07	1.28E-04
Copper	7440-50-8	T	210.00	5.90E-06	2.15E-03
Lead	7439-92-1	T,H	951.00	2.67E-05	9.74E-03
Manganese	7439-96-5	T,H	795.00	2.23E-05	8.15E-03
Mercury	7439-97-6	T,H	16.00	4.49E-07	1.64E-04
Nickel	7440-02-0	T,H	68.00	1.91E-06	6.97E-04
Selenium	7782-49-2	T,H	2.00	5.61E-08	2.05E-05
Vanadium	7440-62-2	T	291.00	8.17E-06	2.98E-03

Note: Selected metals from CARB speciation profile for Paved Roads (#422)

TAC from Unpaved Roads
SJVAPCD Recommended Profile (TEIP for H.M. Holloway)

Unpaved Road Dust from Site Access	Controlled	Lb/Day	22.1154
Unpaved Road Dust Composting	Controlled	Lb/Day	38.6299
		Total PM10 (Lb/Day)	**60.74531286**

Chemical Compound	CAS No	TAC, HAP T,H	Compound mg/Kg	TAC Emissions	
				Lb/Day	Lb/Year
Arsenic	7440-38-2	T,H	3.0	1.82E-04	6.65E-02
Chromium VI	18540-29-9	T,H	1.3	7.90E-05	2.88E-02
Copper	7440-50-8	T	15.0	9.11E-04	3.33E-01
Manganese	7439-96-5	T,H	160.0	9.72E-03	3.55E+00
Nickel	7440-02-0	T,H	21.0	1.28E-03	4.66E-01
Vanadium	7440-62-2	T	30.0	1.82E-03	6.65E-01
Asbestos	1136	T	0.3	1.82E-05	6.65E-03
Crystal Silica	1175	T	2.8	1.70E-04	6.21E-02

Note: SJVAPCD approved emission profiles for dust emissions from activities related to operation of the H.M. Lost Hills Mine. Refer to the Toxic emissions inventory plam for facility S-200

TAC Emissions from Material (Compost) Handling
SJVAPCD Recommended Profile for Dust from Co-Composting

Fugitive Dust from Co-composting	Controlled	Lb/Day	0.2025
Other Sources of dust from Materials	Controlled	Lb/Day	0.0000

Chemical Compound	CAS No	TAC, HAP T,H	Compound mg/Kg	TAC Emissions	
				Lb/Day	Lb/Year
Arsenic	7440-38-2	T,H	3.8	7.70E-07	2.81E-04
Cadmium	7440-43-9	T,H	1.3	2.63E-07	9.61E-05
Chromium VI	18540-29-9	T,H	2.5	5.06E-07	1.85E-04
Copper	7440-50-8	T	180.0	3.65E-05	1.33E-02
Lead	7439-92-1	T,H	31.0	6.28E-06	2.29E-03
Manganese	7439-96-5	T,H	690.0	1.40E-04	5.10E-02
Mercury	7439-97-6	T,H	2.1	4.25E-07	1.55E-04
Nickel	7440-02-0	T,H	30.0	6.08E-06	2.22E-03
Selenium	7782-49-2	T,H	2.7	5.47E-07	2.00E-04

Note: From SJVAPCD Toxic Emission Factors for fugitive dust from Co-composting operations (September 15, 2015)

TAC Emissions from Co-composting
SJVAPCD Recommended Profile for Speciating VOC

VOC Emissions from Co-Composting	Controlled	Lb/Day	1,092.90
Other Sources of VOC to Include	Controlled	Lb/Day	0.0000

Chemical Compound	CAS No	TAC, HAP T,H	Compound Ppmw	TAC Emissions Lb/Day	TAC Emissions Lb/Year
1,1,1-Trichloroethane	71-55-6	T,H	104.0	0.114	41.5
1,1-Dichloroethane	75-34-3	T,H	137.5	0.150	54.8
Acetaldehyde	75-07-0	T,H	700.0	0.765	279.2
s-butyl alcohol	78-92-2	T	1,950.0	2.131	777.9
2-Butanone MEK	78-93-3	T	4,640.0	5.071	1,850.9
Benzene	71-43-2	T,H	23.0	0.025	9.2
Carbon disulfide	75-15-0	T,H	520.0	0.568	207.4
Carbonyl sulfide	463-58-1	T,H	570.0	0.623	227.4
Isopropyl alcohol	67-63-0	T	211,550.0	231.202	84,388.7
Methyl Chloride	74-87-3	T,H	27.4	0.030	10.9
Methanol	67-56-1	T,H	63,950.0	69.891	25,510.1
Methylene chloride	75-09-2	T,H	3,380.0	3.694	1,348.3
Naphthalene	91-20-3	T,H	2,500.0	2.732	997.3
Propylene	115-07-1	T	1,100.0	1.202	438.8
Styrene	100-42-5	T,H	119.0	0.130	47.5
Tetrachloroethene	127-18-4	T,H	230.5	0.252	91.9
Toluene	108-88-3	T,H	68.5	0.075	27.3
Vinyl acetate	108-05-4	T,H	815.0	0.891	325.1
Ammonia	7664-41-7	T	------	2,867.00	1,046,456

VOC profiles were obtaind from the SJVAPCD and are the recommended factors for calculating TAC emissions.

Concentration calculated by averaging values reported for biosolids composting and greenwaste composting assuming a 50/50 mix of greenwaste and biosolids

APPENDIX C – MODEL INPUTS

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Lost Hills
Offsite Vehicle Model Inputs

The District recommends the following for modeling vehicles

				AERMOD View input
1. Separate volume sources (separated 2W surface based)	feet	meter		(m)
2. Top of Plume Height = 1.0 x VH	13.5	4.11	PH	4.11
3. Volume Source Release Height = 0.5 x Top of Plume Height	6.75	2.06	release ht	2.06
road width	14	4.27		
4. Width of Plume = VW or lane width (Each lane should be modeled separately.)	33.7	10.27	PW	5.13
From EPA - Width of Plume = VW + 6m for single lane roadways / Road Width + 6mfor two lane roadways				
5. Initial Sigma Z - Top of Plume Height/2.15	6.28	1.91	~= initial vertical dimension calculated in AERMOD	
6. Initial Sigma Y - Width of Plume/2.15	15.67	4.78	~= initial lateral dimension calculated in AERMOD	
7. Emissions input as g/s				

SJVAPCD Guidance from Glenn T. Reed, Senior Air Quality Specialist, Thursday, August 22, 2013

Area Source Model Inputs

				AERMOD View input
Uses AREAPOLY source	feet	meter		(m)
Plume Height = estimated exhaust/dust height	6	1.83	PH	1.83
Release Height = 0.5 x Plume Height	3	0.91	release ht	0.91
Initial Sigma Z - Top of Plume Height/2.15	2.79	0.85		0.85

Flare Source Model Inputs

Max LFG to flare	384	mmscf/yr
Max LFG to flare	0.044	mmscf/hr
Heating value	630	Btu/scf
Heat input	27.6	MMBtu/hr
Operating schedule	24	hours/day
	365	days/year

Flare stack parameters

Q = Flared gas amount (scf/yr)	3.84E+08	
H = Q scf/yr * HHV Btu/scf * 0.252x10^{3}cal/Btu * yr/8760hr * hr/3600s		
H = Total Heat release rate (cal/s)	1.93E+06	
Higher Heating Vaue HHV (Btu/scf) =	630	
Fb = 1.66 x 10-5 x H		
Fb = Buoyancy flux	3.21E+01	
Q_H = sensible heat release rate	8.70E+05	
d = effective stack diameter (m)	0.922	
Hs = Stack height (m)	6.096	estimate
He = Hs + 4.56E-03 * H**0.478		
He = Effective stack height (m) as calculated in SCREEN	10.707	
v = Exit velocity (m/s) - default	20	
Ts = Exit temperature (K) - default	1273	

Based on EPA Screening Procedures for flare parameterization (1992)

APPENDIX D – HEALTH RISK ANALYSIS

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CAPCOA Risk Prioritization Score for
Lost Hills Total Landfill and Composting Facility TAC Emissions

Dispersion Adjustment	Parameter	Factor
Year and Procedure (EP or DA)	2019	DA
Dh Stack Height	0-20 m	60
Rp Sensitive Receptor	3,600	0.001
Cancer Normalization	------	128

	CAPCOA Risk Score (Business Receptor)			CAPCOA Risk Score (Sensitive Receptor)		
Results Summary	Acute	Chronic	Cancer	Acute	Chronic	Cancer
	0.12	0.19	2.28	0.06	0.09	1.14

Daily and Annual HAP/TAC Emissions					OEHHA Risk Matrix			CAPCOA Risk Score (Business Receptor)			CAPCOA Risk Score (Sensitive Receptor)		
Chemical Substance	Chemical CAS No	Include (Y/N)	Max Daily TAC Lb/Day	Annual TAC Lb/Year	Acute REL	Chronic REL	Unit Risk ug/M3	Acute Score	Chronic Score	Cancer Score	Acute Score	Chronic Score	Cancer Score
1,1,2,2-Tetrachloroethane	79345	Y					5.8E-05						
1,1,1-Trichloroethane	71556	Y	1.14E-01	4.15E+01	6.8E+04	1.0E+03		2.09E-07	1.42E-06		1.04E-07	7.10E-07	
1,1,1,2Tetrachloroethane	630206	Y											
1,1,2-Trichloroethane	79005	Y					1.6E-05						
1,1-Dichloroethane	75343	Y	1.50E-01	5.48E+01			1.6E-06			1.35E-03			6.74E-04
1,2,3-Trimethylbemzene	526738	Y											
1,2,4-Trimethylbenze	95636	Y											
1,3,5-Trimethylbenzene	108678	Y											
1,2, Dichloroethane EDCL	107062	Y				4.0E+02	2.1E-05						
1,3-Dichloropropene	542756	Y					1.1E-03						
2,2,4-Trimethylpentane	540841	Y	1.42E-02	5.17E+00									
1,3 Butadiene	106990	Y			6.6E+02	2.0E+00	1.7E-04						
2-Butanone	78933	Y	5.07E+00	1.85E+03	1.3E+04	0.0E+00	0.0E+00	4.88E-05			2.44E-05		
2-Methylchloroanthrene	56495	Y					6.3E-03						
2-Methylnaphthalene	91576	Y											
7,12-Dimethylbenz(a)anthracene	57966	Y											
Bromomethane (Methyl bromide)	74839	Y			3.9E+03	5.0E+00							
Chloroethane (Ethyl chloride)	75003	Y				3.0E+04							
1,1-Dichloroethylene	75354	Y				7.0E+01							
Benzyl Chloride	100447	Y			2.4E+02		4.9E-05						
p-Dichlorobenzene	106467	Y				8.0E+02	1.1E-05						
1,4-Dioxane (1,4-Diethylene dioxide	123911	Y			3.0E+03	3.0E+03	7.7E-06						
Tetrachloroethylene (Perchloroethyl	127184	Y	2.52E-01	9.19E+01	2.0E+04	3.5E+01	6.1E-06	1.57E-06	9.00E-05	8.62E-03	7.87E-07	4.50E-05	4.31E-03
Carbonyl sulfide (Carbon oxysulfide	463581	Y	6.23E-01	2.27E+02	6.6E+02	1.0E+01		1.18E-04	7.79E-04		5.90E-05	3.89E-04	
Acenaphthene	83329	Y											
Acenaphthylene	208968	Y											
Acetaldehyde	75070	Y	7.65E-01	2.79E+02	4.7E+02	1.4E+02	2.7E-06	2.03E-04	6.83E-05	1.16E-02	1.02E-04	3.42E-05	5.79E-03
Acrolein	107028	Y	4.81E-04	1.75E-01	2.5E+00	3.5E-01		2.40E-05	1.72E-05		1.20E-05	8.58E-06	
Anthracene	120127	Y											
Ammonia	7664417	Y	2.87E+03	1.05E+06	3.2E+03	2.0E+02		1.12E-01	1.79E-01		5.60E-02	8.96E-02	
Benzene	71432	Y	2.51E-02	9.17E+00	2.7E+01	3.0E+00	2.9E-05	1.16E-04	1.05E-04	4.09E-03	5.82E-05	5.24E-05	2.04E-03
Benz[a]anthracene	56553	Y					1.1E-04						
Benzo(a)anthracene	56556	Y											
Benzo(a)pyrene	50328	Y					1.1E-03						
Benzo(b)fluoranthene	205992	Y					1.1E-04						

Daily and Annual HAP/TAC Emissions					OEHHA Risk Matrix			CAPCOA Risk Score (Business Receptor)			CAPCOA Risk Score (Sensitive Receptor)		
Chemical Substance	Chemical CAS No	Include (Y/N)	Max Daily TAC Lb/Day	Annual TAC Lb/Year	Acute REL	Chronic REL	Unit Risk ug/M3	Acute Score	Chronic Score	Cancer Score	Acute Score	Chronic Score	Cancer Score
Benzo(g,h,i)perylene	191242	Y											
Benzo[e]pyrene	192972	Y											
Benzo(k)fluoranthene	207089	Y					1.1E-04						
Biphenyl	92524	Y											
Butane	106078	Y											
Carbon Disulfide	75150	Y	5.68E-01	2.07E+02	6.2E+03	8.0E+02		1.15E-05	8.88E-06		5.73E-06	4.44E-06	
Carbon tetrachloride	56235	Y			1.9E+03	4.0E+01	4.3E-05						
Chlorobenzene	108907	Y				1.0E+03	4.6E-06						
Chloroform	67663	Y			1.5E+02	3.0E+02	5.3E-05						
Chrysene	218019	Y					1.1E-05						
Cyclohexane	110827	Y											
Dibenzo(a,h)anthracene	53703	Y					1.2E-03						
Ethane	748400	Y											
Ethylbenzene	100414	Y	1.48E-02	5.40E+00		2.0E+03	2.5E-06		9.24E-08	2.07E-04		4.62E-08	1.04E-04
Ethylene dibromide	106934	Y				8.0E-01	7.1E-05						
Fluoranthene	206440	Y											
Fluorene	86737	Y											
Formaldehyde	50000	Y			5.5E+01	9.0E+00	6.0E-06						
Hydrogen Chloride	7647010	Y			2.1E+03	9.0E+00							
Hydrogen Sulfide (H2S)	7783064	Y			4.2E+01	1.0E+01							
Hexane	110543	Y	1.22E-02	4.45E+00		7.0E+03			2.18E-08			1.09E-08	
Indeno(1,2,3,c,d)pyrene	193395	Y					1.1E-04						
Isopropyl Alcohol	67630	Y	2.31E+02	8.44E+04	3.2E+03	7.0E+03		9.03E-03	4.13E-04		4.52E-03	2.06E-04	
Methanol	67561	Y	6.99E+01	2.55E+04	2.8E+04	4.0E+03		3.12E-04	2.18E-04		1.56E-04	1.09E-04	
Methylene chloride	75092	Y	3.69E+00	1.35E+03	1.4E+04	4.0E+02	1.0E-06	3.30E-05	1.15E-04	2.07E-02	1.65E-05	5.77E-05	1.04E-02
Naphthalene	91203	Y	2.73E+00	9.97E+02		9.0E+00	3.4E-05		3.79E-03	5.21E-01		1.90E-03	2.60E-01
Pentane	109660	Y											
Perylene	198550	Y											
Phenanthrene	85018	Y											
Phenol	108952	Y			5.8E+03								
Propylene	115071	Y	1.20E+00	4.39E+02		3.0E+03			5.01E-06			2.50E-06	
Styrene	100425	Y	1.31E-01	4.77E+01	2.1E+04	9.0E+02		7.79E-07	1.82E-06		3.89E-07	9.08E-07	
Toluene	108883	Y	1.41E-01	5.15E+01	3.7E+04	3.0E+02		4.77E-07	5.88E-06		2.38E-07	2.94E-06	
Diesel Particulate [DPM]	9901	Y	8.14E-01	2.97E+02		5.0E+00	3.0E-04		2.04E-03	1.37E+00		1.02E-03	6.85E-01
Total PAH(W/Napthalene)	1150	Y					1.1E-03						
Total PAH(W/O Napthalene)	1151	Y	4.23E-02	1.54E+01			1.1E-03			2.61E-01			1.30E-01
Vinyl Acetate	108054	Y			0.0E+00	2.0E+02							
Vinyl Chloride	75014	Y			1.8E+05		7.8E-05						
Total Xylene	1330207	Y	5.38E-02	1.96E+01	2.2E+04	7.0E+02		3.06E-07	9.61E-07		1.53E-07	4.81E-07	
Arsenic	7440382	Y	2.46E-04	8.98E-02	2.0E-01	1.5E-02	3.3E-03	1.54E-04	2.05E-04	4.55E-03	7.69E-05	1.02E-04	2.27E-03
Barium	7440393	Y											
Beryllium	7440417	Y				7.0E-03	2.4E-03						
Cadmium	7440439	Y	1.13E-06	4.14E-04		2.0E-02	4.2E-03		7.08E-07	2.67E-05		3.54E-07	1.33E-05

Daily and Annual HAP/TAC Emissions					OEHHA Risk Matrix			CAPCOA Risk Score (Business Receptor)			CAPCOA Risk Score (Sensitive Receptor)		
Chemical Substance	Chemical CAS No	Include (Y/N)	Max Daily TAC Lb/Day	Annual TAC Lb/Year	Acute REL	Chronic REL	Unit Risk ug/M3	Acute Score	Chronic Score	Cancer Score	Acute Score	Chronic Score	Cancer Score
Chromium VI	18540299	Y	8.02E-05	2.93E-02		2.0E-01	1.5E-01		5.01E-06	6.74E-02		2.50E-06	3.37E-02
Chromium, total	7440473	Y											
Cobalt	7440484	Y											
Copper	7440508	Y	9.54E-04	3.48E-01	1.0E+02			1.19E-06			5.96E-07		
Lead	7439921	Y	3.30E-05	1.20E-02			1.2E-05			2.22E-06			1.11E-06
Manganese	7439965	Y	9.92E-03	3.62E+00		9.0E-02			1.38E-03			6.89E-04	
Mercury	7439976	Y	8.28E-06	3.02E-03	6.0E-01	3.0E-02		1.73E-06	3.45E-06		8.63E-07	1.73E-06	
Molybdenum	7439987	Y											
Nickel	7440020	Y	1.32E-03	4.83E-01	2.0E-01	1.4E-02	2.6E-04	8.28E-04	1.18E-03	1.93E-03	4.14E-04	5.91E-04	9.65E-04
Silica (Crystal)	1175	Y	1.70E-04	6.21E-02	0.0E+00	3.0E+00			7.09E-07			3.54E-07	
Selenium	7782492	Y	6.03E-07	2.20E-04		2.0E+01			3.77E-10			1.88E-10	
Vanadium	7440622	Y	1.83E-03	6.68E-01	3.0E+01			7.63E-06			3.81E-06		
Zinc	7440666	Y											
Sulfates	9960	Y			1.2E+02								
Asbestos	1332214	Y	1.82E-05	6.65E-03			6.3E-02			6.44E-03			3.22E-03
Dioxins and Furans	1086	Y	2.47E-09	9.02E-07		4.0E-05	3.8E+01		7.72E-07	5.26E-04		3.86E-07	2.63E-04
CAPCOA Risk Prioritization Score for Facility								0.122886	0.189624	2.278625	0.061443	0.094812	1.139313
Note:								Acute	Chronic	Cancer	Acute	Chronic	Cancer

1. Risk is prioritized using the CAPCOA "dispersion adjustment procerdure". The stack height used for selecting the dispersion adjustment factors was selected based on a release height of less than 20 meters for an area source.

2. Emissions are presented for full buildout of landfill and composting facilities.

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APPENDIX E – ODOR ASSESSMENT

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Odor Impact Assessment
for the Proposed Modification of the
Lost Hills Solid Waste Management Facility



Lost Hills Composting and Waste to Energy Projects (PP8111)

August 2019

Odor Impact Assessment for the Proposed Modification of the Lost Hills Solid Waste Management Facility

In Support of an
Environmental Impact Report

Conditional Use Permit No. 9, Map 28
Lost Hills Solid Waste Management Facility

Prepared For
Kern County Planning Department
2700 “M” Street, Suite 100
Bakersfield, CA 93301

August 2019

By
Vector Environmental
P.O. Box 10447
Bakersfield, CA 93389

and

Yorke Engineering, LLC
31726 Rancho Viejo Road, Suite 218
San Juan Capistrano, CA 92675

Appendix E
Odor Impact Assessment

A. Introduction

Lost Hills Environmental LLC, an affiliate of H.M. Holloway, Inc. (Holloway), owns and operates the Lost Hills Solid Waste Management Facility (SWMF or Lost Hills Facility), a Class III non-hazardous industrial waste landfill facility located in Kern County near Lost Hills, CA. Lost Hills Environmental LLC is proposing to modify the permits for Lost Hills Facility to expand the list of waste types allowed for disposal and extend the hours of operation. A permit for a composting operation at this facility, using a variety of feedstocks, including Class-A and Class-B dewatered biosolids, is also being sought. This report includes an odor assessment of the proposed SWMF Project related to the landfill and new composting operations.

B. Dimensions of Odor

The sensory perception of odorants has four major dimensions: detectability, intensity, character, and hedonic tone.

1. Odorant Detectability

Odorant detectability (or threshold) refers to the minimum concentration of odorant necessary for detection in some specified percentage of the population. This is usually defined as the mean, 50% of the population.

If the quantity is expressed in parts per million (ppm) or billion (ppb) or in moles or micrograms per cubic meter of a specific chemical compound, then the value represents the physical, chemical amount of an odorant required to elicit a response. However, for complex mixtures odor is usually measured on a sensory response scale.

Odor, as measured on a sensory response scale (i.e., based on odor detection), is expressed in terms of how many dilutions (with odor free air) it takes before it is no longer detectable. This value is often expressed as dilutions to threshold (D/T) or odor units (OU). An OU is a dimensionless quantity but is frequently expressed using the pseudo dimensions of odor unit per cubic meter (OU/m^3).

Odor strength is quantified by determining the amount of dilution needed to bring the odorous air sample to its threshold of detection. Stronger odors require greater dilutions

to reduce the odor to its detection threshold. The dilution ratio (i.e., OU or D/T) is an estimate of the number of dilutions needed to make the actual odor emission just undetectable.

2. Odor Intensity[1]

Odor intensity refers to the perceived strength of the odor sensation. Intensity increases as a function of concentration. Odor intensity is evaluated by comparing the intensity of a sample odor with the intensity of a standard odorant at various concentrations. The most common reference odorant used in the U.S. is 1-butanol. The intensity is reported in terms of the corresponding butanol concentration (e.g., in ppm).

Odor intensity and concentration both indicate the strength of an odor. They are related but have different qualities. Quantitatively, intensity (I) and concentrated (C) are related by Steven's Psychophysical Law as follows:

$$I = k\,C^{n}$$

(I = Intensity, C=Concentration, k, n vary by odor)

The equation holds for either an overall odor or an individual odorant. For an overall odor the threshold concentration expressed in terms of D/T would be used. For an odorant, the actual concentration applies. The constants k and n vary with the particular odor or odorant.

The constant (n) indicates how easily the odor intensity decreases when the air is diluted (i.e., the concentration decreases). The value of the exponent (n) ranges from 0.2 to 0.8 for most compounds. A low n value means that the intensity changes little as the air is diluted. The odor is said to be "pervasive". When n is large, diluting air readily reduces the intensity and the odor is non-pervasive. For example, ammonia and aldehydes have high values of (n) they are easily diluted. Hydrogen sulfide and amines are examples of odor-causing compounds with low (n) values—their odors are pervasive and disappear slowly as they are diluted.

3. Character

The third dimension of odor is the character, in other words, what the substance smells like. Odor descriptors include such terms as fishy, hay, nutty, creosote, turpentine, rancid, sewer, and ammonia.

[1] Refer to the Integrated Waste Management Board (CIWMB) Comprehensive Odor Response Project, March 2007

4. Hedonic Tone

The fourth dimension of odor is hedonic tone. Hedonic tone represents a judgment of the relative pleasantness or unpleasantness of the odor. It is a subjective measure, but it can be averaged for a group of individuals evaluating an odor. Hedonic tone can be rated on a scale from -10 for very unpleasant to +10 for pleasant. Ratings scales can be "standardized" by relating the scale to reference odorants, such as isovaleric acid, as a model for a very unpleasant odor, and vanillin for a very pleasant odor. Hedonic tone is not an independent quality of a compound or odor. It depends on the odor intensity, concentration, duration and frequency of exposure, as well as the perceptions and associations of the individual.

C. Measuring Odors

Odorant detectability (or threshold) refers to the minimum concentration of odorant necessary for detection in some specified percentage of the population. This percentage is usually defined as the mean, 50% of the population.

If the quantity is expressed in parts per million (ppm) or billion (ppb) or in moles or micrograms per cubic meter of a specific chemical compound, then the value represents the physical, chemical amount of an odorant required to elicit a response. However, for complex mixtures odor is usually measured on a sensory response scale.

Odor, as measured on a sensory response scale (i.e., based on odor detection), is expressed in terms of how many dilutions (with odor free air) it takes before it is no longer detectable. Given that landfill gas contains hundreds of compounds with differing odor thresholds and other characteristics, odor emissions from landfills are typically expressed in terms of OU or D/T, or as a dimensionless quantity using the pseudo dimensions of OU/m^3.

Odor strength is quantified by determining the amount of dilution needed to bring the odorous air sample to its threshold of detection. Stronger odors require greater dilutions to reduce the odor to its detection threshold. The dilution ratio (i.e., OU or D/T) is an estimate of the number of dilutions needed to make the actual odor emission just detectable.

D. Odor Emission Sources

When determining odor emissions, the measurement of odor concentration alone is not sufficient. The air flow associated with the odor source must also be determined. In most instances these parameters are related to each other. The basic parameter is the Odor Emission Rate (OER), which is expressed in odor units per second (OU/sec), and is equal to product of odor concentration and the air flow rate associated with the source.

1. Point Sources

In the case of point sources, odor is emitted from a single point such as a stack and odor concentration can be determined by sampling the exhaust gas. The exhaust flowrate can be measured and the OER can be calculated as follows:

$$OER = (Qs)*OU \qquad \text{(Equation E.1)}$$

Where:

OER = Odor Emission Rate (OU/sec);
Qs = Effluent (exhaust) flow rate (m^3/sec)
OU = Odor concentration (expressed as OU/m^3)

2. Area Sources

In the case of area sources (such as the surface of a compost pile or landfill) the OER is calculated using the "surface odor emission rate" (or SOER), which may be determined using a wind tunnel or a 'flux chamber" (Figure E.1). In either case odorous air is passed through a chamber that isolates a portion of an odor emitting surface. The concentration of the odor in the effluent is determined. The total odor emissions rate (OU/sec) is determined and then divided by the area of the emitting surface to determine the SOER. The equation for calculating SOER is shown below.

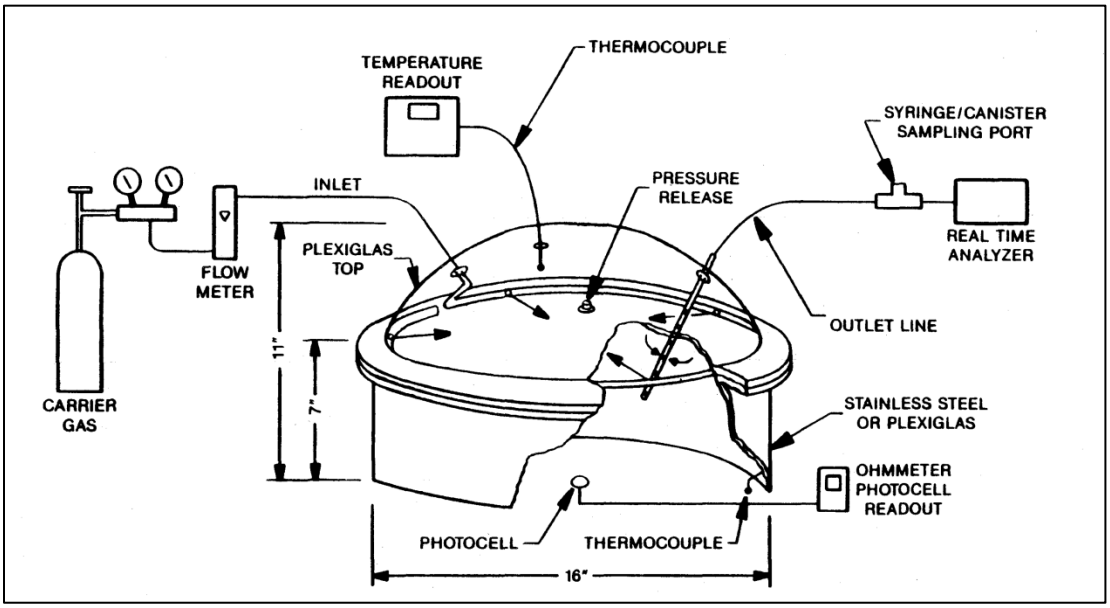
$$SOER = (Qs)*(OU)/A \qquad \text{(Equation E.2)}$$

Where:

SOER = Surface odor emission rate (OU/m^2*sec)
Qs = Volumetric flowrate of odorous air (m^3/sec).
OU = Odor concentration in the effluent (as OU/m^3)
A = Area of the emitting surface (m^2)

Although odor concentration is sometimes expressed as OU/m^3, this is not strictly correct. Odor concentration is the number of cubic meters that one cubic meters of sample will occupy when diluted to the odor threshold. The implied units are volume of sample diluted to the odor threshold, per volume of original sample (i.e., V/V). Thus, the odor unit is a dimensionless number should be correctly expressed as OU or D/T. Nevertheless, odor concentrations are frequently expressed as OU/m^3.

Figure E.1
Typical EPA Flux Chamber for Measuring Surface Emissions



E. Odors from Composting

Composting is the biological decomposition of organic matter under controlled conditions. By-products of composting include heat, carbon dioxide, methane, water vapor and sometimes odorous compounds (or odorants), produced by microorganism during the composting process. These odorants are typically constituents of the volatile organic compounds (VOCs) produced during composting.

Under aerobic conditions the metabolic pathway of the microorganisms favors production of carbon dioxide (CO_2). Consequently, fewer VOCs are generated and the odorants are typically less pungent and offensive than those produced under anaerobic conditions. In some cases, odor nuisance can be significantly reduced or eliminated by ensuring that composting is conducted under conditions that favor aerobic decomposition.

Decomposition that takes place in the absence of oxygen (i.e., anaerobic decomposition) produces a greater amount of VOC and more pungent odorants. As the air is consumed by microorganism or is mechanically compressed out of the material, it is replaced by methane gas, carbon dioxide, and other odorous compounds. These odorants include a wide range of compounds, the most notorious being the reduced sulfur compounds (i.e., hydrogen sulfide, dimethyl sulfide, dimethyl disulfide, and methyl sulfide), volatile fatty acids (VFA), aromatic compounds, and amines.

Ammonia is the most common odor that can be formed anaerobically as well as aerobically. Ammonia losses are primarily a result of low carbon to nitrogen (C:N) ratio. However, pH is also a contributing factor and a pH greater than 9 can lead to the volatilization of ammonium. Ammonia is usually more noticeable on the composting site rather than off-site. This is due in part to the fact that it is lighter than air and rapidly rises into the atmosphere where it is dispersed.

Anaerobic odors can also originate with the incoming feedstocks or bulking agents, which may have been stored under anaerobic conditions. Once those feedstocks or bulking agents are incorporated into a properly designed composting system the anaerobic odors disappear.

1. Odorants Formed During Composting

Odors are generated during the composting process. Composting is mainly a microbiological, catalytic degradation and transformation process. Within this process, distinct long-lasting phases may be identified. The conditions that exist during a given phase determine the type of odorants generated. Most of the odorants are produced early in the composting phase, as shown in Figure E.2.

The types of odors and the compounds emitted during the composting process are a function of the feedstocks used. Table E.1 shows some of the odorous compounds identified during composting of biosolids. The major odor groups include fatty acids, ammonia and nitrogen-containing compounds, ketones, aromatics, and inorganic and organic sulfur compounds.

Figure E.2
Typical Compost Temperature Profile

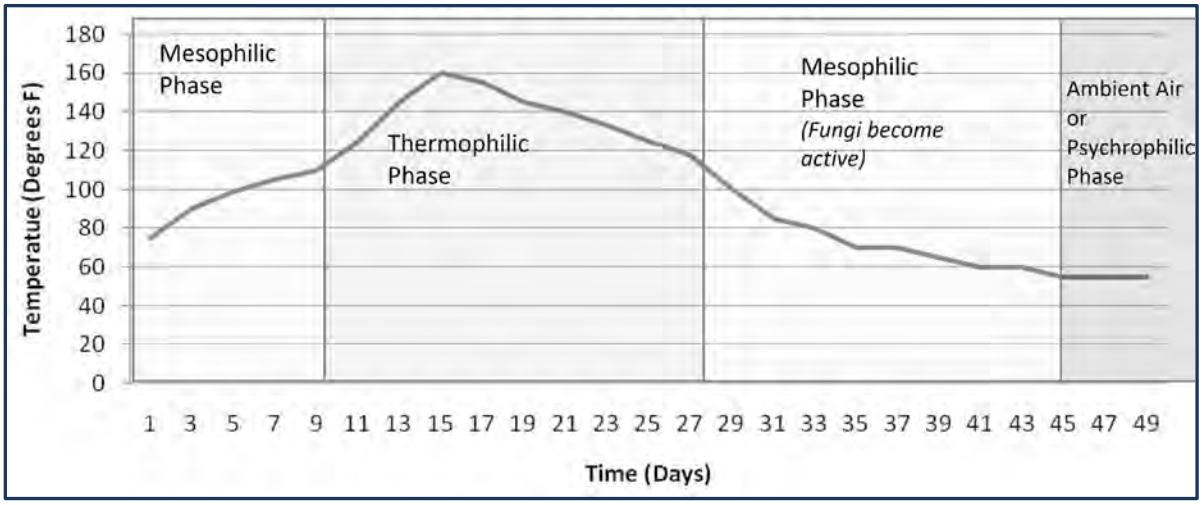


Table E.1

Odorous Compounds Identified During Biosolids Composting

Compound	Smell	Odor Detection Thresholds (µg/m³)		
		Low	High	ADL
Sulfur Compounds				
Hydrogen sulfide	Rotten egg	0.7	14	6.7
Carbon oxysulfide	Pungent			
Carbon Disulfide	Disagreeable, sweet	24.3	23,000	665
Dimethyl sulfide	Rotten cabbage	2.5	50.8	2.5
Dimethyl disulfide	Sulfide	0.1	346	—
Dimethyl trisulfide	Sulfide	6.2	6.2	—
Methamethiol	Sulfide, pungent	0.04	82	4.2
Ethanethiol	Sulfide, earthy	0.032	92	2.6
Ammonia and Nitrogen-Containing Compounds				
Ammonia	Pungent, sharp	26.6	39,600	33,100
Methylamine	Fishy, pungent	25.2	12,000	—
Dimethylamine	Fishy, amine	84.6	84.6	88.1
Trimethylamine	Fishy, pungent	0.8	0.8	0.52
3-Methylmdole (skatole)	Feces, chocolate	4.0*10–5	268	—
Volatile Fatty Acids				
Methanoic (formic)	Biting	45	37,800	—
Ethanoic (acetic)	Vinegar	2,500	250,000	2,500
Propanoic (progionic)	Rancid, pungent	84	60,000	—
Butanoic (butyric)	Rancid	1	9,000	0.7
Pentanoic (valeric)	Unpleasant	2.6	2.6	—
Isovaleric	Rancid cheese	52.8	52.8	—
Ketones				
Propanone (acetone)	Sweet, minty	47,500	1,610,000	241,000
Butamone (MEK)	Sweet, acetone	737	147,000	30,000
2-Pentamone (MPK)	Sweet	28,000	45,000	—
Other Compounds				
Benzothiozole	Penetrating	442	2,210	—
Aacetaldehyde	Green sweet	0.2	4,140	385
Phenol	Medicinal	178	2,240	184

Source: Science and Engineering of Composting: Design, Environmental, Microbial and Utilization Aspects; A.J. Hoitink, et. al. Ohio State University, Wooster 1993

2. Odor Generation During Compost Decomposition[2]

Initial Mesophilic Stage: During the starting phase of composting, substantial portions of easily degradable organic substances are decomposed. These substances are mainly decomposed by mesophilic microorganisms residing in fresh biowaste using considerable oxygen. Thus, the available oxygen in the substrate is prematurely used. The diffusion of oxygen from the ambient is not enough to reach deeper areas of the mass, so anaerobic degradation processes arise increasingly. Although the aeration of the material during decomposition improves the oxygen input; the volatile substances are more easily released into the atmosphere, which leads to a heavy odor load in the ambient air. Because of the increasing biological activity followed by an increasing temperature, the mesophilic microorganisms are gradually replaced by a thermophilic heat-loving population. A lack of oxygen during this phase preponderantly causes anaerobic processes. The aerobic–anaerobic metabolic transition products together with the metabolic products of the fermentation phases are increasingly responsible for the odor emission.

Mesophilic – Acidic Phase

Composting Phase	Characteristic Odor Active Substances	Concentration D/T or OU	Period (Days)
I. Mesophillic Phase/Self-Heating	Fatty Acids, Aldehydes, Alcohols, Ketones, Sulfide, Terpenes	6,000 – 25,000	3 - 14

Thermophilic Phase: As decomposition progresses, the easily degradable substances in the biowaste decrease and the formation of biogenic odor components declines. However, at the higher temperatures abiogenic odor substances are generated via a purely chemical means—through pyrolysis, auto-oxidation, and Maillard reaction. Their formation grows with increasing temperature.

Thermophilic Phase

Composting Phase	Characteristic Odor Active Substances	Concentration D/T or OU	Period (Days)
II. Thermophilic / High Temperature Phase	Ketones, Organic-sulfide compounds, Ammonia, Terpenes	1,000 – 9,000	4 - 14

Cooling/Maturation Phase: During the final, phase, the biowaste components that are left are more difficult to degrade. The change in the properties of the decomposed material, results in a decrease in microbiological activity and a temperature decline. The progressive decrease in oxygen consumption causes a new aerobic environment, and the malodorous emissions decrease.

[2] Compost Science and Technology; W. Bidlingmaier, et.al. Waste Management Series, Volume-8 2007

Cooling/Maturation Phase

Composting Phase	Characteristic Odor Active Substances	Concentration D/T or OU	Period (Days)
III. Cooling /Maturation Phase	Ammonia, sulfides, terpenes	150 – 3,000	To end

During composting the pathways of biochemical metabolism produce many intermediate compounds that themselves are odorous. The aerobic intermediates tend to be less obnoxious than their anaerobic counterparts, but they are not odor free. The following classes of chemicals have been found to significantly contribute to odor emissions that arise during composting: fatty acids, amines, aromatics, inorganic sulfur, organic sulfur, and terpenes[3].

- **Fatty Acids**

Fatty acids are relatively long chained, monocarboxylic acids that occur in nature as constituents of fats, oils, and waxes. The longer chained acids can be hydrolyzed to lower molecular weight, volatile acids such as acetic, propionic, and butyric acids. Acetic acid, commonly known as vinegar, has an obvious and recognizable odor. The volatile and fatty acids are readily degradable.

- **Amines**

The amines are alkyl derivatives of ammonia and are produced during the anaerobic decomposition of proteins and amino acids. Methylamine, ethylamine, dimethylamine, triethylamine, cadaverine, and putrescine are examples of very odorous amine compounds and are often described as putrid and fishy. Formation of amines may be promoted at low C:N ratios.

- **Aromatic Organics**

Aromatic organics are all based on the benzene ring and may contain one or more cyclic groups. Aromatic compounds contribute to the odor of many wood species. Aromatics can be produced during aerobic composting from the breakdown of lignin which is usually abundant. Indole and skatole are examples of heterocyclic compounds that contain a benzene ring condensed with a second five-member ring containing nitrogen. Both have a very unpleasant odor and are produced during the anaerobic decomposition of protein matter.

[3] Pöhle, H., Mietke, H., & Kliche, R. (1993). Zusammenhang zwischen mikrobieller Besiedlung und Geruchsemissionen bei der Bioabfallkompostierung. *BMFT- Statusseminar Neue Techniken zur Kompostierung@*, Umweltbundesamt Berlin, Germany.

- **Hydrogen Sulfide**

Hydrogen sulfide (H_2S) is an odorant well known to most people. It produces the characteristic rotten egg smell and can be detected at a concentration of only 1 part H_2S in 2 billion parts of air. Hydrogen sulfide is produced by two principle pathways. First, it can be produced from the anaerobic decomposition of proteins or other sulfur containing organics. Secondly, under anoxic conditions organics and sulfate can react to produce H_2S. Hydrogen sulfide can sometimes be formed during composting if anaerobic conditions exist in the interior of poorly aerated clumps of material.

- **Organic Sulfides**

Mercaptans are the sulfur analog of alcohols, having the general formula R-SH. Their distinguishing physical characteristic is their repulsive odor, which diminishes with increasing molecular weight. The nose can detect 1 part ethyl mercaptan in about 3 billion parts of air. The odor of skunks is largely due to butyl mercaptan. Alkyl sulfides with a formula R-S-R are the sulfur analog of the corresponding ethers. Such compounds occur in nature in plants of the onion and garlic family and are responsible for the odors and flavors of such species. The nose can detect 1 part dimethyl sulfide in 1 billion parts of air.

Mercaptans can be formed from sulfur containing amino acids under both aerobic and anaerobic conditions, but production under anaerobic conditions is greater. If oxygen becomes available, such as within a compost clump with some anaerobic zones, the mercaptan can be oxidized to dimethyl sulfide and dimethyl disulfide. Thus, it is likely that each of these compounds is being formed and degraded within the compost pile.

- **Terpenes**

Terpenes are cycloalkane derivatives having one or more carbon rings and are a class of naturally occurring, organic compounds. Terpenes occur widely in the plant kingdom and are a major contributor to the fragrance of plants. For centuries the perfume industry has extracted these compounds by steam distillation or solvent extraction to produce mixtures called essential oils. Oils of lemon (limonene), geranium, rose, peppermint, turpentine (α-pinene), and eucalyptus (cineol) are examples of essential oils. Terpenes can be found in concentrations ranging from 0 to 500 ppb and their odor threshold is about 6 ppb.

- **Ammonia**

Ammonia (NH_3) is produced from either aerobic or anaerobic decomposition of proteins and amino acids. Any substrate with a low C:N ratio will likely release excess ammonia into the vapor phase.

Fortunately, ammonia has a relatively high threshold odor concentration and dilutes rapidly to below detection. It is usually considered to be a relatively minor odorant away from the facility

- **Other Compounds**

There are a great number of organic compounds that could potentially contribute to odor generation during composting. Aldehydes, alcohols, ketones, alkenes, esters, acrylates, butyrates and others include odorous compounds that could be present in the starting feedstock or formed as intermediates during microbial metabolism.

3. Sources of Odor from Composting

Sources of odors at composting facilities include the delivery and handling of raw feedstocks, active composting, curing, and storage of the finished product. The type of feedstock handled determines the type of odors generated. For example, raw sewage sludge is more odorous than digested sludge or biosolids. Grass is typically a significant source of odor at yard waste facilities. Technology selection and facility design also affect the types of odors that are generated, quantity released, and how odors are released.

The amount of odor generated during the composting period depends on the composting technology employed. The percentage of odors emitted during windrow and static composting at four different facilities is shown. According to the literature, most of the odor emissions result from active composting and from compost curing. For extended aerated static pile (eASP) composting more than 90% of the odors are from the compost piles.

Table E.2
Main Sources of Odor Emissions from Composting

Type of Composting Operation		Percentage of Total Odor Emissions			
		Compost	Curing	[1]Other	[2]Reference
A.	Turned Windrow	67.6	13.0	19.4	Table 9.9
B.	Static Aerated Pile	91.2	3.9	4.9	Table 9.10
C.	Static Aerated Pile	92.3	3.3	4.4	Table 9.11
D.	Static Aerated Pile	75.1	10.3	14.6	Table 9.12
-	Overall Average	81.6	7.6	10.8	----------
Comments					
A. Over 67% of the odor emissions occurred during the first 27 days of composting.					
B. Over 84% of the odor emissions occurred during the first 21 days of composting.					
C. Over 90% of the odor emissions occurred during the first 14 days of composting.					

Notes:
1. Other sources of odor include feedstock storage, mixing, turning, pile tear-down, loading, unlading, etc.

2. Industrial Composting, Environmental Engineering and Facilities Management; E. Epstein, 1997 CRC Press

E. Composting Facility

At the Lost Hills Facility, composting will be conducted using unenclosed eASPs. Most of the odor emissions are expected to result from the active compost piles and compost curing piles. The layout of the proposed composting area is shown in Figure E.3.

The odor emissions from composting and curing were calculated from odorant concentration and the volume of gas released during composting and curing. The odor concentration (5,173 OU/m^3) used in the calculation was obtained from a report issued by CIWMB in 2002. Total gas volume was determined by converting the mass emissions of selected compounds (CO_2, CH_4, VOC and NH_3) to their volume equivalent using the ideal gas law and summing them.

The calculated volume was adjusted to “actual conditions” to account for moisture content, temperature and excess oxygen. The concentration and flow rate were combined to determine the OER (OU/sec). To account for other sources of odor, the calculated emission rates were increased by 10%.

As discussed elsewhere in the technical report, the composting facility will be built and operated in three phases. The odor emission rate (OU/sec) for each operating phase was determined by calculating the odor emissions from the sources (mix piles; compost piles; curing piles; storage piles) included in a given phase, as shown in Table E.3.

Figure E.3
Compost Facility Layout

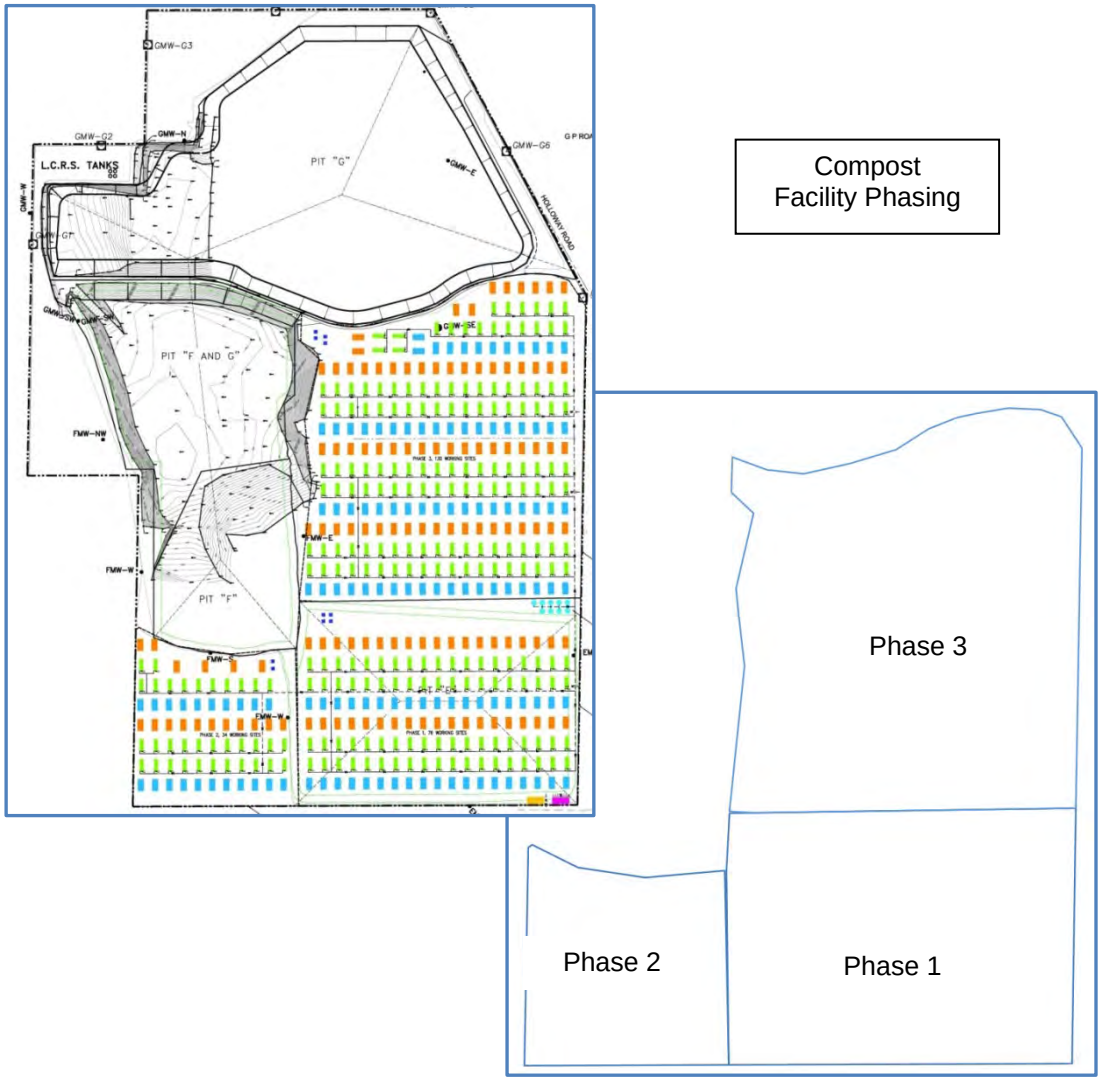


Table E.3
Lost Hills Compost Facility

Compost Facility Implementation Strategy						
Phase	Start-Up	Wet Tons Per Day	Mix Pads	Compost Pads	Curing Pads	Total Acre
Phase 1	2020	555	38	76	38	47.3
Phase 2	2025	248	17	34	17	21.2
Phase 3	2030	950	65	130	65	67.7
Total	-------	1,753	120	240	120	136.2

1. Compost Area Odor Emission Calculations

Unenclosed windrow and statically aerated composting facilities are best characterized as large passive sources. Determining emissions factors and emission rates for these types of sources is difficult. A great deal of information has been amassed on odor concentrations from the different types of sources at composting facilities. However, information on odor emissions rates (OU/sec or OU/m^2*sec) is relatively limited. In some cases, the available data are either not well documented or has been determined by different techniques, making direct comparisons of emission rates difficult.

With respect to the Lost Hills Facility, the odor emissions were calculated using the data obtained from tests conducted by the California Integrated Waste Management Board (CIWMB) on active compost piles. The CIWMB study[4] identified odorants associated with composting along with odor detection thresholds and odor concentration. The facility layout, surface area for a given type of composting pad, and other information used in the emission calculations are summarized in Tables E.4 and E.5 and Figure E.4.

Odor concentration for a given constituent was calculated from its chemical concentration (ppmv) and its odor detection threshold (ppmv). As explained previously, odor concentration is equal to the number of dilutions that must be made to a volume of gas, to dilute it to its odor detection threshold. Odor concentration is expressed in terms of a dimensionless quantity called an “odor unit” (OU). Although OU are dimensionless they are often assigned the quasi dimension of OU/m^3 and used with volumetric flow rates to calculate odor emission rates (OER = OU/sec).

[4] Compost Demonstration Project, Sacramento California; Using High-Carbon Wood Ash to Control Odor at a Green Materials Composting Facility; California Integrated Waste Management Board, April 2002

Table E.4
Calculation of Active Pads
During a Given Compost Buildout Phase

Compost "Train" Processing Schedule					
Compost Mix Days	Compost Pile Days	Curing Pile Days	Cycle Limiting Days	Storage Capacity Days	Cycles Per Year
3	22	38	38	30	9.61
	Compost Train Days in Service				
	Total Mix Days/Year	Total Compost Days/Year	Total Curing Days/Year	Total Storage Days	
	28.82	365.00	365.00	365.00	
Number of Train Components (Pads) In Service at Any Given Time					
Compost Project Phase	Total Compost Trains	Active Mix Pads	Active Compost Pads	Active Curing Pads	Active Storage Piles
Phase 1	38	3	76	38	1
Phase 2	17	2	34	17	1
Phase 3	65	6	130	65	1
Total	120	10	240	120	3

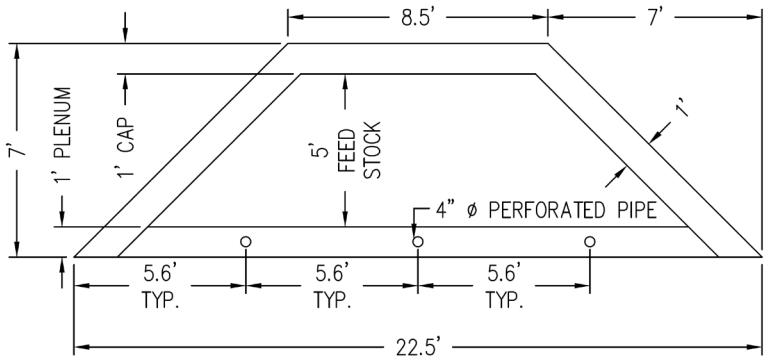
Notes:

1. Given that the mix pads are only used 3 days per composting cycle, the majority of the time the pads are unoccupied. At buildout 13 mix pads out of 120 mix pads will be in service at any one time.

2. Active Mix Pads: (Mix Days/Year) * (120 Pads) (1/ 365 Days/Year) equals the number of pads in service at buildout = 9.48 ≈ 10 pads. At full buildout the equivalent of 13 mixing pads would simultaneously be in service.

3. Cycle times based on SJVAPCD analysis of composting operations.

Figure E.4
Dimensions of Typical Compost Pile (70 Ft Long)



Note: The mixing pad and the curing pad proportions (aspect ratio) is similar to the composting pad but the width is 35 feet instead of 22 feet. The dimensions shown above should be adjusted accordingly.

Table E.5
Surface Area for Compost Processing

Compost Project Phase	Total Compost Trains	Active Pile Surface Area (m^2)			
		Mix Pads	Compost Pads	Curing Pads	Storage Area
Phase 1	38	1,027.3	15,535.5	13,012.2	13,012.2
Phase 2	17	684.9	6,950.1	5,821.2	5,821.2
Phase 3	65	2,054.6	26,573.8	22,257.7	22,257.7
Total (m^2)	120	3,766.69	49,059.36	41,091.12	41,091.1
Grand Total (m^2)					135,008.3

Compost Odor: In the CIWMB study the odor concentration for an active compost pile ranged between 3,009 OU/m^3 to 7,337 OU/m^3. For calculating the proposed Project compost area odor emissions, the average concentration was used (5,317 OU/m^3).

Volumetric Flowrate: The volumetric flowrate (m^3/sec) used in the calculation was determined by converting the mass emission of a given compound to its volumetric equivalent using the ideal gas law. The Ideal gas law and an example calculation for converting mass emissions of VOC to its equivalent volume are shown in Equation E.3.

Equation E.3

Ideal Gas Law and Gas Volume Equivalent to Mass

$$V = \frac{nRT}{P} = \left(\frac{M}{Mw}\right) * \left(\frac{RT}{P}\right)$$

Where:

R = Universal Gas Constant = 0.0820575

n = Number of moles

T = Temperature (K)

P = Pressure (Atm)

M = Mass of substance (Kg)

Mw = Molecular weight (Kg)

Example for VOC (as methane Mw = 16)

VOC (m^3) = [(18 Kg / 16 Mw)*(0.08206)*293°K)]/ 1 Atm

= 27.05 m^3 (at 20°C, 1 Atm)

2. Composting Area Odor Emission Rates

The odor concentration determined by the CIWMB study and the total gas volume calculated from the mass emissions of compounds released during composting were used to calculate the odor emission rates for the facility. The results of the emission calculations are summarized in Tables E.6, E.7, E.8 and E.9.

Table E.6

Mass Emission Rates of Selected Compounds Released During Composting

Compost Process	VOC Kg/Day	NH_3 Kg/Day	CO_2 Kg/Day	CH_4 Kg/Day	N_2O Kg/Day	Total Moles/Day
Mix Pads	224.72	18.40	593.09	119.06	0.00	36.05
Compost Pads	127.41	1,048.67	12,579.76	2,525.41	9.54	513.61
Curing Pads	141.57	233.04	1,553.06	311.78	429.49	87.10
Storage	2.03	0.36	735.66	147.68	203.44	30.72
Total	495.73	1,300.46	15,461.57	3,103.93	642.48	667.48

Note: Uncontrolled mass emissions were used to estimate uncontrolled odor emission. Reductions in odor achieved by the cured compost biofilter are accounted for below. The CO_2 emissions were calculated using the average of the values for CO_2 emissions reported in "Greenwaste Compost Site Emission Reductions from Solar-powered Aeration and Biofilter Layer, SJVAPCD 5/14/13.

Table E.7
Volumetric Flowrate from Composting Piles

Compost Process	VOC m^3/day	NH_3 m^3/day	CO_2 m^3/day	CH_4 m^3/day	N_2O m^3/day	Gas Vol. m^3/day
Mix Pads	337.80	26.03	324.20	178.98	0.00	1,500.94
Compost Pads	191.53	1,483.66	6,876.49	3,796.28	5.22	21,385.30
Curing Pads	212.82	329.70	848.95	468.68	234.77	3,626.63
Storage	3.05	0.51	402.13	222.00	111.21	1,279.17
Total	745.20	1,839.91	8,451.77	4,665.94	351.20	27,792.03

Note: Total gas volume is adjusted to reflect typical compost conditions: Temperature of 55°C, 15% moisture (saturated at T) and 5% O_2. Other gas volumes are reported at standard conditions (20°C, 1 Atm, dry, no O_2).

Table E.8
Volumetric Flowrate from Composting Piles

Compost Process	Surface Area (m^2)	Total m^3/sec	Conc. OU/m^3	OER OU/sec	Other Sources OU/sec	Controlled OU/sec
Mix Pads	3,766.69	0.017372	5,173.00	89.87	8.99	98.85
Compost Pads	49,059.36	0.247515	5,173.00	1,280.40	128.04	1,408.43
Curing Pads	41,091.12	0.041975	5,173.00	217.14	21.71	238.85
Storage	41,091.12	0.014805	5,173.00	76.59	7.66	84.25
Total (or Ave.)	135,008.29	0.321667	5,173.00	1,663.98	166.40	1,830.38

Note: Controlled emissions include 10% of uncontrolled emissions to account for other sources. Per literature for eASP composting counts for 90% of odor, other sources account for 10% of odor.

Table E.9
Odor Emission Rates by Compost Phase

Compost Operation Odor Emissions by Phase (OU/sec)						
Phase	Start-Up	Mix Pads	Compost Pads	Curing Pads	Storage Pads	Total Phase
Phase 1	2020	31.30	446.00	75.64	26.68	579.62
Phase 2	2025	14.00	199.53	33.84	11.93	259.30
Phase 3	2030	53.54	762.90	129.38	45.63	991.46
Total	-------	98.85	1,408.43	238.85	84.25	1,830.38

3. Composting Area Odor Impacts

The odor emission rate, the nature of the odorant (intensity, character and hedonic tone) and the proximity of the source to receptors are all important facts to consider when determining if a proposed project will result in an adverse impact with respect to odor. Fortunately, most odors are rapidly dispersed and ambient concentrations are greatly diminished within a short distance, typically less than a mile.

With respect to the proposed composting facility the nearest residential receptor is located approximately 2.3 miles due east and the community of Lost Hills, including schools, is located about 3.5 miles away. Given the distance to the receptor, and the dilution to odor that occurs with distance, the composting facility is not expected to result in an adverse impact at a residential or sensitive receptor.

The worst-case 1-hour odor concentrations at selected receptor distances were determined using the EPA model AERSCREEN for an OER of 100. These concentrations were converted to the odor averaging time of 3-minutes using the following equation:

$$C_{3\text{-min}} = C_{1\text{-hour}} * (60/3)^{0.28}$$

Where

$C_{1\text{-hour}}$ = 1-hour concentration (OU/m^3)

$C_{3\text{-min}}$ = 3-minute concentration (OU/m^3)

Based on the modeling, with respect to the Lost Hills Facility (with an emission rate of 1,830 OU/sec) the worst-case odor at a residential or sensitive receptor would be 1.8 D/T (or OU) or lower. Odor concentration predicted for the composting facility at various locations is summarized in Table E.10.

Table E.10
AERSCREEN Modeling for
Odor Emissions from an Area Source (135,000 m^2, 1,830 OU/sec)

Dilution to Threshold (D/T) at Specified Distance		
1 Mile (~1,600 m) Nearest Workplace	2.3 Miles (~3,700 m) Nearest Residence	3.5 Miles (~5,600 m) Lost Hills
2.7	1.8	1.3

F. Odors from Landfill Gas

Over 300 trace compounds have been identified in landfill gas (LFG). The variety of compounds found in LFG reflects the intermediate products that may be formed during anaerobic decomposition of waste, as well as other chemicals that may be introduced via industrial and commercial waste streams. However, with respect to LFG, unpleasant odor is usually associated with sulfur-containing compounds including mercaptans and sulfides.

Of the constituents contained in LFG, sulfur-based compounds typically have the lowest odor detection threshold (ODT), which makes them the most likely source of unpleasant odors. The concentrations of some odorants commonly found in LFG and their typical concentration are presented in Table E.11.

Table E.11
Malodorous Compounds Commonly Found in Landfill Gas

Odorant	Mw	EPA ppmv	
		ppmv	mg/m^3
Butanoic acid	88.11	------	------
Butyl Mercaptan	90.18	------	------
Diethyl disulfide	90.19	0.086	0.323
Dimethyl disulfide	94.20	0.137	0.537
Dimethyl sulfide	62.14	5.660	14.630
Ethyl mercaptan	62.14	0.198	0.512
Methyl mercaptan	48.11	1.370	2.742
Ethyl butanoate	116.16	6.960	33.629
Hydrogen sulfide	34.00	32.000	45.256
Methyl butanoate	102.13	7.400	31.436
Propyl mercaptan	76.16	0.125	0.396
Xylene	106.17	9.230	40.762

Odors from landfills typically originate from three sources; freshly tipped waste, covered waste, and landfill gas (LFG).

1. Tipping Area/Working Face

Even though sanitary landfill odors can be reduced by employing various control techniques, depending on the type of waste being disposed of a certain level of odor will inevitably exist at the landfill working face. At the Lost Hills Facility, odor emissions are minimized by ensuring that the working face is only as large as necessary to allow adequate truck movement and unloading space, as well as efficient operation of landfill

equipment. In general, the size of the working face is designed to accommodate the maximum number of truckloads of waste expected on a daily basis.

Inert waste and biosolids are currently accepted at the Lost Hills SWMF and Lost Hills Environmental is proposing to accept other organic waste streams. Disposal of inert material is not expected to contribute to odor emissions from the working face of the landfill or other landfill areas. Odor emissions from biosolids and other organic wastes will be controlled by covering the waste with a layer of soil, typically within a few hours of receipt but in any event no later than the end of the working day.

2. Covered Waste (Area Sources)

With respect to emissions from surface areas, the proposed addition of new waste streams will not result in an increase in disposal rate (2,000 tons/day) or an increase in the aerial extent (i.e., surface area) of the landfill. At present, about half of the landfill acreage is in active use at any given time. The remaining acreage is either covered with an intermediate layer of native soil or is inactive. The proposed new waste streams are not expected to result in a change in the method of operation of the landfill.

As cells are completed, they are covered with a layer of native soil. Lifts (a collection of contiguous cells) are covered with an intermediate layer of compacted native soil. Gas collection wells are located around the perimeter of the landfill to ensure that LFG does not migrate. Vertical gas collection wells will be located in closed/caped areas and recovered LFG which will be routed to a destruction device (flare) having a control efficiency of 98%.

Once layers of waste have been placed, they are covered with a layer of soil the same day. This soil cover serves to limit the escape of odor. In addition, the cover soil acts as a biofilter, which been shown to be effective in oxidizing LFG to carbon dioxide (CO_2) which is odorless. Intermediate and final cap soil layers also play a key role in odor control. Research has shown that bacterial/microbial communities contained in cover soil are highly effective in oxidizing methane and other LFG constituents. Applying a continuous soil cover at regular intervals can have a major benefit for odor control, especially when combined with an active LFG gas collection and emissions control system.

3. Landfill Gas Point Sources

With respect to the operation of the Lost Hills Landfill, the only point source associated with the LFG will be the discharge from the flare, used as a destruction device for collected LFG. Modern enclosed flares can burn high volumes of LFG at up to 1,000ºC

with a residence time of typically 0.3 seconds. Use of these flares effectively eliminates both the hazard and the odor associated with LFG.[5].

4. LFG Odor Concentrations

As explained previously, odor concentration is equal to the number of dilutions that must be made to a volume of gas, to dilute it to its odor detection threshold. Odor concentration is expressed in terms of an OU. The odor concentrations (OU/m^3) used for calculating the odor emissions from the landfill, are from olfactory measurements made on samples of gas obtained from emitting surfaces. The odor concentrations used in the calculations are summarized in Table E.12.

Table E.12
Results of Odor Concentration
Measurements on Different Odor Sources

Odor Source	[3]Surface Odor OU/m^3	Comments
[1]Freshly Tipped Waste	1200, 1355	Freshly tipped MSW and biosolids
Temporary Cover	240,273,142	Odor concentration after 1-day
Permanent Cover	120	Odor concentration intermediate cover
Capped Surface	43	Capped surface with active GCS
[2]Value Used	194	Average for covered waste

Notes:

1. The value was not included in the calculation of the average concentration since freshly tipped waste does not contribute to the LFG volume predicted by the EPA first order decay (FOD) rate equation. As discussed below, the contribution to odor emissions from tipping was calculated separately and included in the total.
2. The average odor used in the calculations was determined by averaging the values reported for temporarily covered waste and waste covered with an intermediate layer. The value reported for a capped surface was not used in the calculations.

[3]References:

Odour emission factors for assessment and prediction of Italian MSW landfills odour impacts, Selena Sironi (et.al.); Atmospheric Environment 39 (2005) 5387-5394; May 25, 2005.

Odour from municipal solid waste (MSW) landfills: A study on the analysis of perception Sarkar, U. and Hobbs, E.; Environmental International 27, (2002) 655-662, November 1, 2001.

[5] Landfill Operational Guidelines,2nd Ed. Working Group on Landfills, International Solid Waste Association, January 2010.

In some studies odor concentration of pure LFG is determined directly from samples obtained from gas extraction wells or collection system. The odor concentration of LFG may also be calculated from the concentration and odor threshold of the trace constituents contained in the gas. However, in both cases the odor concentration in the gas emitted at the landfill surface may be grossly overestimated. As the LFG passes through the landfill cover it undergoes partial degradation/oxidation, thereby reducing its odor concentration[6].

The use of surface odor concentration for determining the OER ensures that the calculated emissions are representative of actual environmental conditions that release odorants from the landfill surface[7].

In a multi-year pilot-study conducted on a Canadian landfill[8], the odor concentration of LFG was reduced by up to 99.99% using cover material consisting of a mixture of soil, sand and in some cases compost. Performance was evaluated based on the reduction in odor and total reduced sulfur (TRS) concentrations between the raw biogas collected from a dedicated well and the emitted gases at the surface. Odor analyses were carried out by the sensorial technique of olfactometry, whereas TRS analyses followed the pulse fluorescence technique. The large difference of 2–5 orders of magnitude between raw biogas (average odor concentration = 2,100,000 OU/m^3) and emitted gases resulted in odor removal efficiencies of close to 100% for all observations. With respect to TRS concentrations, abatement efficiencies were all greater than 95%. The results of the multi-year study are presented in Table E.13.

The soil mixtures used in the pilot-study are similar to the daily cover material used at the Lost Hills Facility. Consequently, it is reasonable to conclude that daily cover applied to waste at the Lost Hills Facility achieves significant reductions in odor concentration. This conclusion is supported by the fact that there have not been any odor complaints reported to the SJVAPCD with respect to the operation of the Lost Hills Facility.

[6] Odor Sampling on Passive Area Sources: Principles and Methods; Lucernoni F., S. Sironi; Chemical Engineering Transactions, Volume 54, 2016 ISBN 978088-95608-45-7, ISSN 2283-9216.
[7] Odor Sampling: Techniques and Strategies for the Estimation of Odor Emission Rates from Different Source Types; Capelli L., Sironi S., Delroso R.; Sensors 2013, 13, 9380955; ISSN 1424-8220 January 15, 2013.
[8] Reduction of odours in pilot-scale landfill biocovers; Capanema M., H. Cabana, A. Cabral; Waste Management 34 (2014) 770-779, February 17, 2004.

Table E.13
[1]Reductions in Odor and TRS Achieved During Landfill Pilot Study

Field Plot	Cover Mix	Parameter	[1]Average Concentration	Average % Reduction
Biocover 1B	Sand, compost, gravel	Odor	2,200	99.99
		TRS	90	99.57
Biocover 2	Sand, compost	Odor	660	100.00
		TRS	30	99.86
Field Column2	Topsoil, sand	Odor	30	100.00
		TRS	15	99.93
Field Column4	Topsoil, sand, compost	Odor	30	100.00
		TRS	50	99.76
Raw Gas	Silty clay cap	Odor	2,1000,000	------
		TRS	21,000	------

Note:
1. Average concentration in OU/m^3; or for total reduced sulfur (i.e., H_2S) in ppbv.

G. Odor Impact Conclusions

The Kern County Planning Department has not identified specific impact thresholds in terms of odor concentration (i.e., D/T or OU). In the absence of any numeric threshold, the underlying criteria used for assessing odor impact is that the odor emissions do not cause a public nuisance (i.e., cause a violation of SJVAPCD Rule 4401). An odor concentration between 5 to 7[9] D/T (or OU) at a sensitive receptor is typically considered to be the range that could elicit an odor complaint.

The odor concentration, the nature of the odorant (intensity, character and hedonic tone) and the proximity of the source to receptors are all important facts to consider when determining if a proposed project will result in an adverse impact with respect to odor. Fortunately, most odors are rapidly dispersed and ambient concentrations are greatly diminished within a short distance, typically less than a mile.

The SJVAPCD Guidelines for Assessing and Mitigating Air Quality Impacts (GAMAQI) give a list of the common types of facilities that the Air District has identified which have been known to produce odors, along with a reasonable distance from the source within which the degree of odors could possibly be significant. The SJVAPCD list of facilities and distances

[9] Comprehensive Compost Odor Response Project. San Diego State University 2007. CIWMB Publication # 442-07-001.

are summarized in Table E.14. As highlighted, both compost facilities and sanitary landfills are not expected to cause odor concerns at distances greater than one mile from the facility.

With respect to the proposed Project, the nearest residential receptor (an isolated farmhouse) is located approximately 2.3 miles from the composting area and the community of Lost Hills is located approximately 3.5 miles to the nearest point. Given the distance to the receptor, and the dilution to odor that occurs with distance, the Lost Hills Facility is not expected to result in an adverse impact at a residential or sensitive receptor.

Table E.14
SJVAPCD - Distances Beyond Which Odors from
Facilities are Not Expected to Cause a Significant Impacts

Facility Type		Nearest Sensitive Receptor	
		Miles	Kilometers
1.	Wastewater Treatment Facility	2	3.22
2.	Sanitary Landfill	1	1.61
3.	Transfer Station	1	1.61
4.	Composting Facility	1	1.61
5.	Petroleum Refinery	2	3.22
6.	Asphalt Batch Plant	2	3.22
7.	Chemical Manufacturing	1	1.61
8.	Fiberglass Manufacturing	1	1.61
9.	Painting/Coating Operation	1	1.61
10.	Food Processing	1	1.61
11.	Feedlot/Dairy	1	1.61
12.	Rendering Plant	1	1.61

For the landfill, as discussed above it is expected that the daily cover will be effective in controlling odors to a large degree. The landfill gas collection system (GCS) will also be effective in reducing odors. The landfill already is allowed to accept biosolids, and the additional types of organic wastes would not be a substantial change. Given these factors, the odor impacts from the proposed Project related to the landfill are not expected to cause odor complaints.

For the composting area, an analysis was performed to determine the potential odor impacts at various distances. The analysis determined that the odor impact at one mile would be approximately 2.7 OUs and at 2.3 miles (the location of the nearest residence) would be 1.8 OUs. The biofiltration layer employed on the eASPs will reduce odor emissions. Based on the literature reviewed, an odor concentration at approximately 5 D/Ts (OUs) at a sensitive receptor is typically considered to be the value which could to elicit an odor complaint.

Since the potential impacts are well below this level, nuisance complaints are not expected, and hence the compost area should also result in a less than significant odor impact.

The SJVAPCD has never received any odor complaints regarding the Lost Hills Facility. Given the fact that the nearest residential receptor to the Lost Hills Facility is located approximately 2.3 miles away, it is reasonable to assume that the operation of the facility will not result in a significant effect for odor.

APPENDIX F – ARIES-HOLLOWAY BIOENERGY PROJECT AIR QUALITY AND GHG TECHNICAL REPORT

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Aries–Holloway Bioenergy, LLC

13850 Holloway Road Lost Hills, CA

July 2019

Prepared by:

Yorke ENGINEERING, LLC
www.YorkeEngr.com

Office Locations:
Los Angeles, Orange County, Riverside, Ventura, San Diego, Fresno, Berkeley, Bakersfield

Tel: (949) 248-8490
Fax: (949) 248-8499

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Aries–Holloway Bioenergy Project Air Quality and GHG Emissions Technical Report

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Prepared for:

Aries–Holloway Bioenergy, LLC
13850 Holloway Road
Lost Hills, CA

July 2019

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List of Acronyms and Abbreviations

AAQA	Ambient Air Quality Analysis
AAQS	Ambient Air Quality Standards
ADMRT	Air Dispersion Modeling and Risk Tool
AP-42	EPA Compilation of Air Pollutant Emission Factors
ARM2	Ambient Ratio Method 2
ATC	Authority to Construct
BPIPPRM	Building Profile Input Program for PRIME
Btu	British Thermal Unit
CAAQS	California Ambient Air Quality Standards
C&D	Construction and Demolition
CalEEMod	California Emissions Estimator Model
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resources Board
CAS	Chemical Abstracts Service
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CH_4	Methane
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalents
DEM	Digital Elevation Model
DPM	Diesel Particulate Matter
e.g.	For Example
EIR	Environmental Impact Report
EPA	[United States] Environmental Protection Agency
FAH	Fraction of Time at Home
ft^2	Square feet
GAMAQI	[SJVAPCD] Guidance for Assessing and Mitigating Air Quality Impacts
g/s	Gram per second
GHG	Greenhouse Gas
GLC	Ground-Level Concentration
H_2S	Hydrogen Sulfide
HAP	Hazardous Air Pollutant
HARP2	Hotspots Analysis and Reporting Program, Version 2
HIA	Acute Hazard Index
HIC	Chronic Hazard Index
hr	Hour
HRA	Health Risk Assessment
ID	Induced Draft
KCPD	Kern County Planning and Natural Resources Department
kW	kilowatt
lb	Pound

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LCFS	Low Carbon Fuel Standard
LF	Large Format
m	Meter
MEIR	Maximally Exposed Individual Resident
MEIW	Maximally Exposed Individual Worker
MMBtu/hr	Million British Thermal Units per Hour
MT	Metric Ton
MW	Megawatts
N/A	Not Applicable
NAAQS	National Ambient Air Quality Standards
NAD	North American Datum
NED	National Elevation Dataset
N_2O	Nitrous Oxide
NO_x	Oxides of Nitrogen
NO_2	Nitrogen Dioxide
NWS	National Weather Service
OEHHA	[California] Office of Environmental Health Hazard Assessment
OLM	Ozone Limiting Method
ORC	Organic Rankine Cycle
PAH	Polycyclic Aromatic Hydrocarbon
PG&E	Pacific Gas & Electric Company
$PM_{2.5}$	Fine Particulate Matter (Less Than 2.5 Microns in Size)
PM_{10}	Respirable Particulate Matter (Less Than 10 Microns in Size)
PMI	Point of Maximum Impact
ppm	Parts per Million
PTO	Permit to Operate
PVMRM	Plume Volume Molar Ratio Method
ROG	Reactive Organic Gases
SCR	Selective Catalytic Reduction
SIL	Significant Impact Level
SJVAPCD	San Joaquin Valley Air Pollution Control District
SO_2	Sulfur Dioxide
SO_x	Oxides of Sulfur
TAC	Toxic Air Contaminant
TPY	Tons per Year
USGS	United States Geological Survey
UTM	Universal Transverse Mercator
VOC	Volatile Organic Compound
WAF	Worker Adjustment Factor
yr	Year
^oF	Degrees Fahrenheit
$\mu g/m^3$	Micrograms per Cubic Meter
X/Q	Average Pollutant Concentration Normalized by Source Strength

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Aries–Holloway Bioenergy Project
Air Quality and GHG Emissions Technical Report

1.0 INTRODUCTION

Aries Clean Energy (Aries) and The Holloway Group (Holloway) propose to jointly develop a renewable power project to be located in the Lost Hills, California-area. Aries and Holloway intend to create a project company (Aries–Holloway Bioenergy, LLC) to design, build, own, and operate the proposed bioenergy facility.

The Aries–Holloway Bioenergy Project (Project) involves the construction and operation of a renewable bioenergy power plant, utilizing primarily woody agricultural biomass and up to 20% of other feedstocks including urban wood waste, construction and demolition (C&D) wood waste and wastewater treatment plant (WWTP) biosolids. The Project will produce up to 3 megawatts (MW) net of electrical power for export to the grid via Pacific Gas & Electric Company (PG&E) under the BioMAT program (Category 2 – agricultural feedstocks). As a renewable energy project, the Project will support multiple San Joaquin Valley and California environmental and sustainability goals by diverting organic matter from the landfill, utilizing the Valley's surplus biomass as fuel, and producing renewable energy for export.

This air quality and greenhouse gas (GHG) technical report has been prepared by Yorke Engineering, LLC (Yorke) to be used in support of the Draft Environmental Impact Report (EIR) currently being prepared by the Kern County Planning and Natural Resources Department (KCPD), who has been identified as the Lead Agency for this project. The California Environmental Quality Act (CEQA) requires environmental impacts of a proposed project be identified, assessed, and avoided or mitigated, as feasible, if these impacts are determined to be significant or potentially significant. This technical study is based on KCPD's December 2006 *Guidelines for Preparing an Air Quality Assessment for Use in Environmental Impact Reports*[1] and the San Joaquin Valley Air Pollution Control District (SJVAPCD)'s *Guidance for Assessing and Mitigating Air Quality Impacts (GAMAQI*) for projects subject to CEQA (SJVAPCD 2015a).

This report examines the criteria pollutant, toxic air contaminant (TAC), and GHG emissions associated with the construction and operation of the Project. Based on a directive from KCPD, both a construction and an operations-related health risk assessments (HRA) were conducted for the Project.

1.1 Project Description

As noted above, the bioenergy facility would process primarily woody biomass feedstock to generate renewable electricity. The feedstock would be processed through three downdraft gasifiers to produce synthesis gas (syngas). The syngas would be oxidized in a thermal oxidizer to generate heat. The heat generated would then be used to drive an Organic Rankine Cycle (ORC) turbine generator to produce up to 3.7 MW gross (3.0 MW net) of renewable electricity. The

[1] Some items required by the KCPD guidelines such as a description of the pollutants and a cumulative analysis will be provided in a companion CEQA Air Quality and GHG Emissions Technical Report being prepared for the proposed Lost Hills Environmental landfill expansion and new compost areas.

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facility would also produce a co-product called biochar, which can be used in agricultural operations as a soil amendment. Each of these components is described further below.

Feedstocks would include orchard and vineyard prunings, cannabis waste, woody arbor waste, and chipped branches, stumps, and whole trees sourced from agricultural operations. Some almond and pistachio nut shells could be included in the feedstock mix. As the BioMAT program requires that at least 80% of the feedstock is sourced from agricultural operations, it is possible that up to 20% of the feedstock could be sourced from non-agricultural sources, including urban wood, forest biomass, urban prunings, and WWTP sludge (biosolids). Orchard removal trees are allowed to dry in the field where they are ground into 3-inch chips prior to being trucked to the Project site. Feedstocks are expected to be sourced in the San Joaquin Valley, within an approximately 100-mile radius from the bioenergy plant.

The feedstock will be delivered to the site by self-unloading tractor trailers. The trucks will unload their contents at one of two truck docking stations. From there, the feedstock will be conveyed to scalping screens and tramp metal separators prior to being sent to a feedstock storage bin for storage. The feedstock will be reclaimed and conveyed out of the storage bin and sent to one of three elevated Gasifier Feed Hoppers.

Biomass is fed from the Feed Hoppers into the three Gasifier vessels, where the addition of sub-stoichiometric air generates a low British Thermal Unit (Btu) content synthesis or producer gas, as well as residual solids consisting of biochar. The biochar is recovered from the three Gasifiers and is conveyed to a single Biochar Hopper.

The Aries down draft biomass gasifier technology will be employed for this project. Three Large Format (LF) gasifiers will be installed. The Aries LF gasifier has a demonstrated history with supporting data from performance test runs and operations at the City of Lebanon's Gasification Facility, which provides a basis for the expected gasifier performance.

Producer gas, from the gasification of the woody feedstock, is combusted in a thermal oxidizer at approximately 1,700 to 1,800 ^{o}F. The hot flue gas is used to heat a thermal oil stream, which is circulated between the thermal oxidizer's heat recovery exchangers and an ORC power generation unit. During startup, the thermal oxidizers are preheated by combusting natural gas.

The ORC utilizes an organic working fluid in a closed and sealed system. Heat transferred from the hot thermal oxidizer flue gas, via the thermal oil, is used to vaporize the organic working fluid in an evaporator, with the vaporized working fluid driving a turbine connected to a generator. The organic working fluid leaving the turbine is condensed in a bank of air coolers and pumped back to the evaporator to complete the closed loop.

Warm thermal oxidizer flue gas passes through an emission control unit, prior to additional heat recovery exchangers, an induced draft (ID) fan, and then is discharged to the atmosphere via an elevated stack. Aqueous ammonia and a sorbent are injected upstream of catalytic filter modules in the emission control unit and a solid filter cake is recovered at the base of the filter modules.

The plant will operate up to 24 hours per day, 7 days per week. Truck deliveries would be scheduled for approximately 8 hours per day, 7 days per week.

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1.2 Project Location

The proposed Project site is 6-acres, with 5-acres for the bioenergy plant and an additional 1-acre allocated for retention and evaporation basin(s), located at 13850 Holloway Road, Lost Hills, CA.

Figure 1-1 shows the location of the proposed Project site and its immediate surroundings. The site is on the east side of Holloway Road, bounded by the existing Lost Hills Environmental Solid Waste Management Facility (SWMF) landfill to the west, a Holloway office to the north, and surrounded by open or agricultural space or oil fields elsewhere.

The nearest resident is a farmhouse located approximately 2.3 miles east of the Project. The next nearest residents are in the community of Lost Hills, approximately 4 miles southeast of the Project site. The nearest schools are in Lost Hills. The closest workplace with workers regularly present is located at the AERA Energy Oil Cleaning Plant, approximately 0.9 miles to the east.

The facility is within the jurisdiction of SJVAPCD. Therefore, the calculations and analyses were performed consistent with SJVAPCD requirements.

Figure 1-1: Map of Facility and Immediate Surroundings



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2.0 EMISSION ESTIMATES

Criteria pollutant[2], TAC, and GHG emissions were estimated for Project-related construction and operational sources. The Project-related emissions are used in the CEQA significance threshold comparison and subsequent modeling analyses.

KCPD uses the SJVAPCD CEQA significance thresholds for criteria pollutants. Table 2-1 presents the current thresholds in tons per year (TPY), as outlined in the GAMAQI (SJVAPCD 2015a).

Table 2-1: SJVAPCD Criteria Pollutant Emission Significance Threshold

Pollutant/Precursor	Construction Emissions (TPY)	Operational Emissions	
		Permitted Equipment and Activities (TPY)	Non-Permitted Equipment and Activities (TPY)
Carbon Monoxide (CO)	100	100	100
Oxides of Nitrogen (NO_x)	10	10	10
Reactive Organic Gases (ROG)	10	10	10
Oxides of Sulfur (SO_x)	27	27	27
Respirable Particulate (PM_{10})	15	15	15
Fine Particulates ($PM_{2.5}$)	15	15	15

Source: SJVAPCD GAMAQI page 80

SJVAPCD guidelines also set a daily construction or operational emission threshold of 100 pounds per day of any criteria pollutant, above which the applicant is required to determine potentially significant impacts from either construction or operational emissions (SJVAPCD 2013a and 2018a).

If either the daily or annual Project emissions exceed any of these thresholds, then an Ambient Air Quality Analysis (AAQA) may be required by the SJVAPCD during permitting to show that the Project would not cause or contribute to a violation of any California Ambient Air Quality Standards (CAAQS) or National Ambient Air Quality Standards (NAAQS).

2.1 Construction Emissions

Activities associated with the construction of the Project will last for approximately 11 months. Emissions associated with construction will occur from the construction equipment associated with the ground disturbance for grading, construction of the structures, paving, trucks delivering equipment, and workers commuting.

The construction emission analysis was performed using the California Emissions Estimation Model® (CalEEMod, version 2016.3.2), the official statewide land use computer model designed to provide a uniform platform for estimating potential criteria pollutant and GHG emissions associated with both construction and operations of land use projects under CEQA. The model quantifies direct emissions from construction and operations (including vehicle use), as well as

[2] Criteria pollutants are air contaminants for which there are national and/or state ambient air quality standards. These pollutants consist of ozone, nitrogen dioxide (NO_2), CO, sulfur dioxide (SO_2), PM_{10} and $PM_{2.5}$, lead, hydrogen sulfide (H_2S), and sulfates. ROGs [also known as volatile organic compounds (VOCs)] and NO_x are regulated as precursors to ozone.

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indirect emissions, such as GHG emissions from energy use, solid waste disposal, vegetation planting and/or removal, and water use. The mobile source emission factors used in the model, which are published by the California Air Resources Board (CARB), include the Pavley standards and Low Carbon Fuel Standards (LCFS). The model also identifies project design features, regulatory measures, and mitigation measures to reduce criteria pollutant and GHG emissions, along with calculating the benefits achieved from the selected measures. CalEEMod was developed by the California Air Pollution Control Officers Association (CAPCOA) in collaboration with the SJVAPCD and other California air districts. Default land use data (e.g., emission factors, trip lengths, meteorology, source inventory, etc.) were provided by the various California air districts to account for local requirements and conditions. As the official assessment methodology for land use projects in California, CalEEMod is relied upon herein for the construction emissions quantification, which forms the basis for the impact analysis.

Based on information received from the applicant, land use data used for CalEEMod input are presented in Table 2-2. The types of vehicles included and the travel distance are presented in the CalEEMod output files in Attachment A.

Table 2-2: Land Use Data for CalEEMod Input

Project Element	Land Use Type	Land Use Subtype	Unit Amount	Size Metric (ft^2)	Lot Acreage (Footprint)	Square Feet (Est.)	Est. Pop.
Process Unit	Industrial	General Light Industry	43.560	1,000	1.00	43,560	0
Roads & Walkways	Parking	Other Non-Asphalt Surfaces	8.712	1,000	0.20	8,712	0
Feedstock Staging & Storage	Parking	Other Non-Asphalt Surfaces	209.088	1,000	4.80	209,088	0
				Aggregated Project	**6.0**	**261,360**	**0**

Source: Applicant, CalEEMod version 2016.3.2
Notes:
Utility: PG&E
Climate Zone 3; Kern – San Joaquin County
1 acre = 43,560 square feet (ft^2)

2.1.1 Criteria Pollutant Emissions

Equipment and activities during a project's construction phase may emit different air pollutants, but PM_{10} and $PM_{2.5}$ in fugitive dust and diesel engine exhaust are the pollutants of greatest concern. Fugitive dust emissions can result from a variety of construction activities, including excavation, grading, demolition, vehicle travel on paved and unpaved surfaces, and vehicle exhaust. Construction-related emissions can cause substantial increases in localized concentrations of PM_{10} and affect PM_{10} compliance with Ambient Air Quality Standards (AAQS) on a regional basis. Particulate emissions from construction activities can lead to adverse health effects and nuisance concerns, such as reduced visibility and the soiling of exposed surfaces. The use of diesel-powered construction equipment emits ozone precursors NO_x, ROG, and diesel particulate matter (DPM), the

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latter being a composite of TACs containing a variety of hazardous substances. The use of architectural coatings and other materials associated with finishing buildings and paving may also emit ROG and TACs. CEQA significance thresholds address the impacts of construction activity emissions on local and regional air quality. The SJVAPCD has significance thresholds for construction based on both daily maximum and annual emissions.

Annual and daily criteria pollutant emissions from all Project construction sources are shown in Tables 2-3 and 2-4, respectively, and are below the SJVAPCD significance thresholds. Therefore, a construction AAQA is not needed. Attachment A contains the CalEEMod output presenting the estimated construction emissions.

Table 2-3: Annual Construction Emissions

Criteria Pollutants	Mitigated Construction Emissions CalEEMod (TPY)	SJVAPCD Threshold (TPY)
ROG	0.5	10
NO_x	4.1	10
CO	3.5	100
SO_x	0.01	27
PM_{10}	4.6	15
$PM_{2.5}$	0.8	15

Sources: SJVAPCD 2015a, CalEEMod version 2016.3.2
Notes: Emissions are for the entire construction period and include offsite vehicle travel.

Table 2-4: Daily Construction Emissions

Criteria Pollutants	Mitigated Construction Emissions CalEEMod (lb/day)	SJVAPCD Threshold (lb/day)
ROG	4.6	100
NO_x	36.9	100
CO	33.6	100
SO_x	0.1	100
PM_{10}	45.7	100
$PM_{2.5}$	7.8	100

Sources: SJVAPCD 2018a, CalEEMod version 2016.3.2
Notes:
lb/day are winter or summer maxima for planned land use (working days).
Emissions include offsite vehicle travel.
Daily thresholds are based on SJVAPCD policy APR-2030 from June 2018.

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2.1.2 TAC Emissions

The primary source of TACs will be DPM from the construction equipment and delivery trucks. As DPM has a high toxicity, DPM was the only TAC examined for construction. The exhaust portion of the PM_{10} from the onsite or near-site portion of travel from the CalEEMod output can conservatively be assumed to all be DPM. Table 2-5 presents the annual (total) DPM emissions from the construction equipment and the onsite and near-site truck travel. Attachment B contains the DPM emission summary for the construction equipment and the onsite and near-site truck travel.

Table 2-5: Construction DPM Emissions

Location	Purpose	Roundtrip Distance Travelled (miles/trip)	DPM Emissions (lb/yr)
Onsite	Construction Equipment	--	322.62
	Trucks	0.12	0.058
	Total Onsite Emissions	--	322.68
Near-site	Trucks – Holloway Site	0.25	0.121
	Trucks – Holloway Road	0.25	0.121
	Total Near-site Emissions	--	0.24

2.1.3 GHG Emissions

Table 2-6 presents the GHG emissions in metric tons (MT) from the construction of the Project, as estimated in CalEEMod.

Table 2-6: Construction GHG Emissions

Greenhouse Gas	Mitigated Construction Emissions (MT)
Carbon Dioxide (CO_2)	963
Methane (CH_4)	0.13
Nitrous Oxide (N_2O)	0.00
Total Carbon Dioxide Equivalent (CO_2e)	966

Source: CalEEMod version 2016.3.2
Notes:
Total emissions for planned construction (working days)
Currently (2019), there are no SJVAPCD CEQA mass emissions thresholds for GHGs. Instead, the SJVAPCD uses Best Performance Standards (2009) in lieu of mass emissions thresholds.

2.2 Operational Emissions

The Project will use a feedstock of agricultural woody biomass, with up to 20% of C&D waste, forestry products, and/or biosolids, to generate electricity. The feedstock will be gasified to produce syngas, which will be sent to a thermal oxidizer that generates heat which in turn drives the ORC turbine generator to produce up to 3.0 MW of net renewable electricity. Operational emissions were estimated based on two feedstock scenarios. NO_x and SO_x emissions are based on a feedstock of 80% woody biomass and 20% biosolids, as this low Btu case was worst-case for

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NO_x and SO_x emissions. For all other pollutants, emissions are based on the highest design heat input rate derived from a feedstock of 100% agricultural wood.

The gasifiers are closed systems with no vents to atmosphere. The gasifiers produce syngas which is oxidized in the thermal oxidizer to generate heat. The ORC power generation unit operates on heat provided by the thermal oxidizer via the heat transfer (thermal) fluid to vaporize a working fluid which drives a turbine connected to a generator. The ORC utilizes an organic working fluid in a closed, sealed system and thus has no emissions. The gasifiers also produce biochar, which is conveyed through closed conveyers to a truck load-out station where there will be fugitive dust emissions.

2.2.1 Emissions Methodology and Source Assumptions

The calculation techniques for each emission source are described below. Attachment C presents the detailed operational emission calculations, including the parameters and emission factors used.

2.2.1.1 Material Handling

The only criteria pollutants associated with the feedstock and biochar handling are PM_{10} and $PM_{2.5}$. Emission factors for drop operations for each of the material handling drop points from the United States Environmental Protection Agency's (EPA's) Compilation of Air Pollutant Emission Factors (AP-42) Chapter 13.2.4, Aggregate Handling and Storage Piles (EPA 2006), were used to estimate the emissions for material handling.

Negligible TAC and no GHG emissions are associated with the material handling of feedstock or biochar.

2.2.1.2 Thermal Oxidizer

Emissions from the thermal oxidizer are based on the syngas composition, which is based on the feedstock. The hot flue gas from the thermal oxidizer undergoes treatment for emissions reduction prior to discharge to the atmosphere. The emission reduction unit:

- Removes PM via filtration at the ceramic filter unit - 92% removal efficiency;
- Removes SO_x and hydrogen chloride (HCl) via Sorbent injection upstream of the filter unit - 90% removal efficiency; and
- Removes NO_x via a Selective Catalytic Reduction (SCR) system, which uses aqueous ammonia injection - 95% removal efficiency.

The thermal oxidizer will oxidize the syngas from the gasifiers. Criteria pollutant emissions from the syngas oxidation are calculated based on source test results from a similar bioenergy plant times the maximum design heat input rating based on syngas derived from 100% agricultural wood feedstock.

The NO_x and SO_x source test emission factors were adjusted to more closely match the anticipated feedstock compositions. It was found that a feedstock with composition of 80% woody biomass and 20% WWTP biosolids had the highest NO_x

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and SO_x emission factors. Emissions were based on the anticipated heat input rating when using this syngas composition.

Natural gas is used to preheat the thermal oxidizer. Up to 40 MMBtu/hr can be consumed, although the average natural gas consumption is expected to be lower. Natural gas combustion will be needed for up to 20 hours per startup, and it is expected that at most there will be 10 startups per year. Uncontrolled emission factors from AP-42 for natural gas external combustion (EPA 1995), incorporating the control efficiencies listed above, were used.

TAC emissions result from syngas oxidation, natural gas combustion, and ammonia slip from operation of the SCR system. TAC emissions from each of these mechanisms vent through the flue gas stack. The methods used to calculate TAC emissions are discussed below.

TAC emissions from syngas are estimated using emission factors published by the SJVAPCD for Digester Gas External and Internal Combustion (SJVAPCD 2014). The SJVAPCD digester gas factors are assumed to be representative of low Btu gas. Natural gas combustion TAC emissions are calculated using the SJVAPCD Natural Gas Fired External Combustion Equipment emission factors (SJVAPCD 2015d).

Ammonia emissions are expected to occur as a byproduct of ammonia injection into the SCR, which is used to control NO_x emissions. Ammonia slip is assumed to be 10 parts per million (ppm) by volume.

The syngas GHG emission factor is based on the syngas analysis of 100% agricultural wood derived syngas. Natural gas GHG emission factors are from Code of Federal Regulations (CFR) Title 40 Part 98, Subpart C, Tables C-1 and C-2 (EPA 2016).

2.2.1.3 Emergency Generator

A 500-kilowatt (kW) diesel-driven emergency power generation unit will be provided to supply critical emergency power needs. Non-emergency use for testing and maintenance will be limited to 50 hours per year. The criteria pollutant emission factors are based on Tier 4 standards for nonroad engines. The DPM emissions were assumed to be the same as the PM_{10} emissions. GHG emissions are based on 40 CFR Part 98 for combustion of Distillate Fuel Oil No. 2.

2.2.1.4 Firewater Pump

A 150-kW diesel-driven firewater pump unit will be provided as part of the plant's fire protection equipment. Non-emergency use for testing and maintenance will be limited to 50 hours per year. The criteria pollutant emission factors are based on Tier 3 standards for nonroad engines, plus Tier 4 for use of a particulate filter. The DPM emissions were assumed to be the same as the PM_{10} emissions. GHG emissions are based on 40 CFR Part 98 for combustion of Distillate Fuel Oil No. 2.

2.2.1.5 Mobile Sources

Delivery truck and worker vehicle exhaust and offsite paved road dust emissions during operation were calculated using CalEEMod. Offsite travel emissions are based on approximately 160 miles round trip (e.g., to and from Bakersfield), all on

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paved roads. Onsite and near-site unpaved and paved road dust emissions were estimated based on emission factors from EPA AP-42 (EPA 1995). All truck and worker engine exhaust PM_{10} was considered to be DPM. GHG emissions were estimated in CalEEMod.

The emissions presented below include both onsite and total offsite vehicle travel associated with the facility. Per SJVAPCD guidance (2015a), the HRA and AAQA include exhaust and dust emissions associated with travel of ¼ of a mile near-site on unpaved roads (across Holloway property) and ¼ of a mile offsite on paved roads (along SR-46), plus onsite travel.

2.2.2 Criteria Pollutant Emissions

Tables 2-7 and 2-8 present the maximum annual and daily operational criteria pollutant emissions, respectively. It is expected that the feedstock may vary in composition from 100% agricultural woody biomass to some fraction (up to 20%), of biosolids, forestry wastes, and/or C&D wastes. The scenario presented in the tables of 80% agricultural biomass and 20% biosolids is worst case for NO_x. For the SJVAPCD permit application, NO_x emissions were also estimated based on 100% agricultural wood feedstock and were approximately seven TPY, therefore it is expected that Project-related criteria pollutant emissions will normally be below the SJVAPCD annual and always below the daily mass emissions significance thresholds.

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Table 2-7: Operational Criteria Pollutant Annual Emissions

Pollutant	Thermal Oxidizer	Feedstock Loading	Biochar Loadout	Emergency Generator	Firewater Pump	Total Permitted Sources	Mobile Sources	Total Unpermitted Sources	*Total Emissions*	SJVAPCD CEQA Threshold
	Annual Emissions (TPY)									
NO_x	13.10	-	-	0.121	0.030	**13.25**	3.15	**3.15**	***16.40***	10
SO_x	17.14	-	-	0.000	0.000	**17.14**	0.02	**0.02**	***17.16***	27
CO	1.77	-	-	0.121	0.029	**1.91**	1.19	**1.19**	***3.10***	100
ROG	0.17	-	-	0.007	0.003	**0.18**	0.12	**0.12**	***0.30***	10
PM_{10}	3.24	3.5E-03	2.6E-02	1.4E-03	1.0E-04	**3.27**	4.10	**4.10**	***7.37***	15
$PM_{2.5}$	3.22	5.4E-04	4.0E-03	1.4E-03	1.0E-04	**3.22**	0.75	**0.75**	***3.97***	15

Notes:
The SJVAPCD CEQA thresholds are applied separately to the permitted and unpermitted sources (GAMAQI).
Mobile source emissions include total trip travel distance.
NO_x and SO_x emissions are based on syngas from a feedstock composition of 80% agricultural biomass and 20% biosolids, CO, VOC and PM emissions based on syngas from 100% agricultural wood feedstock.

Table 2-8: Operational Criteria Pollutant Maximum Daily Emissions

Pollutant	Thermal Oxidizer	Feedstock Loading	Biochar Loadout	Emergency Generator	Firewater Pump	Total Permitted Sources	Mobile Sources	Total Unpermitted Sources	Total Emissions	SJVAPCD CEQA Threshold
	Daily Emissions (lb/day)									
NO_x	75.48	-	-	4.822	1.188	**81.49**	0.07	**0.07**	***81.57***	100
SO_x	93.96	-	-	0.009	0.002	**93.97**	0.000	**0.000**	***93.97***	100
CO	71.92	-	-	4.822	1.157	**77.90**	0.03	**0.03**	***77.93***	100
ROG	4.98	-	-	0.259	0.132	**5.37**	0.003	**0.003**	***5.38***	100
PM_{10}	18.20	0.02	0.15	0.055	0.004	**18.43**	10.72	**10.72**	***29.15***	100
$PM_{2.5}$	18.07	0.00	0.02	0.055	0.004	**18.16**	1.08	**1.08**	***19.24***	100

Notes:
The SJVAPCD CEQA thresholds are applied separately to the permitted and unpermitted sources (APR-2030).
Mobile source emissions include a travel distance of 1/4 mile offsite per SJVAPCD Policy APR-2030.
NO_x and SO_x emissions are based on syngas from a feedstock composition of 80% agricultural biomass and 20% biosolids, CO, VOC and PM emissions based on syngas from 100% agricultural wood feedstock.

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2.2.3 TAC Emissions

The TAC emissions from the Project operational sources are summarized in Table 2-9. Detailed emission calculations are provided in Attachment C.

Table 2-9: Maximum Operational Annual TAC Emissions

Pollutant	CAS No.	Thermal Oxidizer	Emergency Generator	Firewater Pump	Mobile Sources	Total Emissions
		Annual Emissions (lb/yr)				
DPM	9901	-	2.75	0.20	0.12	3.07
Acetaldehyde	75070	0.02	-	-	-	0.02
Acrolein	107028	0.02	-	-	-	0.02
Ammonia	7664417	4748.3	-	-	-	4,748.3
Benzene	71432	1.33	-	-	-	1.33
Chlorobenzene	108907	0.30	-	-	-	0.30
Ethyl Benzene	100414	25.20	-	-	-	25.20
Formaldehyde	50000	1406.9	-	-	-	1,406.9
Hexane	110543	0.04	-	-	-	0.04
Hydrogen Sulfide	7783064	438.00	-	-	-	438.00
Methyl Chloroform	71556	1127.4	-	-	-	1,127.4
Methylene Chloride	75092	4.04	-	-	-	4.04
Naphthalene	91203	83.54	-	-	-	83.54
PAHs	1151	0.00	-	-	-	0.00
Perchloroethylene	127184	0.00	-	-	-	0.00
Propylene	115071	2.34	-	-	-	2.34
Toluene	108883	4.04	-	-	-	4.0
Vinyl Chloride	75014	9.44	-	-	-	9.44
Vinylidene Chloride	75354	1.27	-	-	-	1.27
Xylenes	1330207	0.30	-	-	-	0.30
					Total HAPs (TPY)	**1.58**

Notes:
CAS No. – Chemical Abstracts Service Number
DPM, ammonia, and propylene are not a federally listed Hazardous Air Pollutant (HAP).
Mobile source emissions include onsite and offsite travel to a distance of 1/4 mile.
Emissions are based on a heat rate for a syngas from a feedstock composition of 100% agricultural wood.

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2.2.4 GHG Emissions

The GHG emissions from the Project operational sources are summarized in Table 2-11. Detailed emission calculations are provided in Attachment C.

Table 2-10: Maximum Operational Annual GHG Emissions

Greenhouse Gases	Thermal Oxidizer	Emergency Generator	Firewater Pump	Mobile Sources	Total Emissions
	Annual Emissions [Metric Tons per Year (MT/yr)]				
CO_2	-	21.7	5.2	1,429	1,456
CH_4	-	0.0009	0.0002	0.021	0.022
N_2O	-	0.0002	0.0000	0.000	0.000
CO_2e	**53,893**	**21.8**	**5.2**	**1,430**	**55,350**

Note:
The GHG emissions from the thermal oxidizer are considered biogenic.
Mobile source emissions include total trip travel distance.
Emissions are based on a heat rate for a syngas from a feedstock composition of 100% agricultural wood.

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3.0 MODELING AND HEALTH RISK ASSESSMENT METHODOLOGIES

The methodology used to develop the construction and operations HRAs and operations AAQA is described below and based on SJVAPCD guidance documents and policies. AERMOD is used to provide the dispersion model component of the HRA. The air dispersion modeling methodology is based extensively on the SJVAPCD's *Guidance for Air Dispersion Modeling* (SJVAPCD 2006).

3.1 Air Dispersion Modeling

Air dispersion models calculate the atmospheric transport and fate of pollutants from the emission source. The models calculate the concentration of selected pollutants at specific downwind ground-level points, such as residential or offsite workplace receptors. The transformation (fate) of an airborne pollutant, its movement with the prevailing winds (transport), its crosswind and vertical movement due to atmospheric turbulence (dispersion), and its removal due to dry and wet deposition are influenced by the pollutant's physical and chemical properties and meteorological and environmental conditions. Factors such as distance from the source to the receptor, meteorological conditions, intervening land use and terrain, pollutant release characteristics, and background pollutant concentrations affect the predicted air concentration of an air pollutant. Air dispersion models take all of these factors into consideration when calculating downwind ground-level pollutant concentrations.

AERMOD air dispersion modeling input files used to create the dispersion characteristics in the AAQA and HRA are presented in Attachment D and can be provided electronically.

3.1.1 Model Selection

The air dispersion model used was AERMOD Version 18081, with the Lakes Environmental Software implementation/user interface, AERMOD View™ Version 9.7.0. For each HRA, AERMOD was run with all sources emitting unit emissions [1 gram/second (g/s)] to obtain the X/Q [3] values that are necessary for input into the Hotspots Analysis and Reporting Program, version 2 (HARP2). For the AAQA, actual emissions for each criteria pollutant and source are used in AERMOD.

3.1.2 Modeling Options

Regulatory defaults, the "Rural" modeling option, and "Elevated" terrain were used for the analyses. Rural was selected because more than 50% of the area around the facility is rural. Rural dispersion parameters are conservative because the atmosphere is less turbulent in rural areas, which results in less mixing and hence, generally higher ambient concentrations downwind from a source.

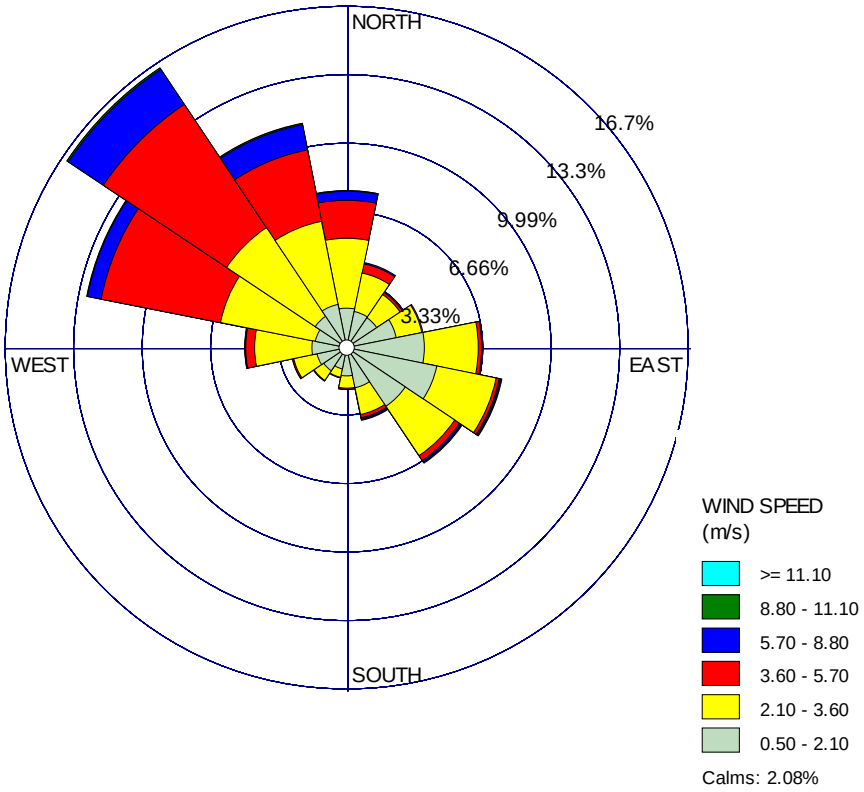
3.1.3 Meteorological Data

AERMOD-ready pre-processed meteorological data files were downloaded directly from the SJVAPCD website for the Bakersfield Municipal Airport station. This station is the nearest National Weather Service (NWS) meteorological station and most representative of the conditions at the facility. Figure 3-1 presents the windrose showing the meteorological data for the years 2013-2017. Each petal of the rose represents the frequency a wind blows from that direction and the relative strength.

[3] Chi/Q is a modeling term which denotes Average Pollutant Concentration Normalized by Source Strength

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Figure 3-1: Bakersfield Windrose 2013-2017



3.1.4 Elevation Data

Digital elevation data were imported into AERMOD and elevations were assigned to receptors, buildings, and emission sources, as necessary. Digital elevation data were obtained through the AERMOD View™ WebGIS import feature in the United States Geological Survey's (USGS) Digital Elevation Model (DEM) format, with a resolution of 7.5 minutes or approximately 30 meters. All geographical coordinates referenced in this section and appendices are in the Universal Transverse Mercator (UTM) coordinate system with the North American Datum (NAD83), Zone 11.

3.1.5 Receptors

Modeling results were obtained at various locations around the facility. These receptor locations were identified as the facility boundary, a grid network of receptors to establish the potential impact area and discrete receptors that were positioned at specific locations of concern.

The facility boundary encompasses the existing Lost Hills SWMF and this proposed Project. Per SJVAPCD guidance, a cascading grid of receptors was used to ensure that impacts were below the appropriate CEQA thresholds at all locations off site.

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These gridded receptors were located as follows:

- Fenceline receptors were placed every 25 meters apart;
- 25 meters spacing from the fenceline out to 100 meters;
- 50 meters spacing from 100 to 250 meters;
- 100 meters spacing from 250 to 500 meters;
- 250 meters spacing from 500 to 1,000 meters; and
- 500 meters spacing from 1,000 to 6,000 meters.

Any gridded receptor located within the exclusion zone for the line volume mobile sources were removed.

For the HRA, additional discrete Cartesian receptors were used to evaluate the locations of the maximally exposed residential, sensitive receptor, and offsite workplace. The nearest resident is a farmhouse located approximately 2.3 miles east of the Project. The next nearest residents are in the community of Lost Hills, approximately 4 miles southeast of the proposed Project. The nearest schools are in Lost Hills. The closest workers are located in the oil fields approximately 0.9 miles to the east. Figure 3-2 shows the locations of the discrete receptors in pink and the property line identified in red.

3.1.6 Onsite Buildings

There will not be any significant structures onsite close to the emission sources. Hence, no onsite buildings were included in the modeling for incorporation with the Building Profile Input Program for PRIME (BPIPPRM).

3.1.7 Emission Sources and Release Parameters

3.1.7.1 Construction

Emissions from construction equipment were modeled as a series of 14 volume sources covering the majority of the Project site. The onsite and near-site delivery trucks were modeled as line volume sources, the same as for the operational scenario. The release parameters for each source are shown in Attachment B and were calculated using applicable SJVAPCD methods (SJVAPCD 2013b).

3.1.7.2 Operations

The exhaust stacks from each stationary source were modeled as individual point sources, as shown in red in Figure 3-3. The onsite and near-site delivery trucks were modeled as line volume sources and are shown in blue on Figure 3-3. The fugitive emissions from the feedstock and biochar loading are modeled as volume sources and shown in blue on Figure 3-3. The release parameters for each source are shown in Attachment C and were obtained from similar equipment, SJVAPCD guidance, or calculated using applicable EPA methods (EPA 2017).

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Figure 3-2: Residential, Sensitive, and Worker Receptor Locations



Figure 3-3: Operational Source and Facility Fenceline Locations



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3.2 Health Risk Assessment

SJVAPCD and KCPD require the examination of the TAC emissions from the Project to determine the need for an HRA, which estimates the potential acute, chronic, and carcinogenic health risks from the Project. The District's risk management objectives for CEQA are to minimize health risks from new and modified sources of air pollution, and to not add significantly to the existing community risk level.

This HRA is based on the OEHHA Hotspot guidance document (OEHHA 2015), the California Air Pollution Control Officers Association (CAPCOA) facility prioritization guidelines (CAPCOA 2016), and SJVAPCD policy APR-1906 (SJVAPCD 2018b).

To assess the potential health risk from the Project, a prioritization score was calculated at the nearest receptor. The prioritization score was estimated using the Dispersion Adjustment Procedure considers the effects of dispersion by adjusting the risk score based on the height of the release point and the distance to a nearby receptor.

The prioritization score was calculated for operational activities to be 0.074 at the nearest resident, which is identified as having a low risk, thus not likely to have an adverse health risk. Although identified as low risk, a refined HRA was conducted at the request of KCPD. The prioritization score calculations are presented in Attachment E.

The construction and operational HRA followed the SJVAPCD Policy 1906 (SJVAPCD 2018) Tier 2 refined project modeling techniques, which are based on the Office of Environmental Health Hazard Assessment (OEHHA 2015) Tier 1 technique, with the exceptions noted in the following discussion.

The health risk calculations were performed using the HARP2 Air Dispersion Modeling and Risk Tool (ADMRT, version 19044). The X/Q values that were determined for each source using AERMOD were imported into HARP2 and used in conjunction with hourly and annual emissions to determine the Ground-Level Concentration (GLC) for each pollutant. The GLCs are then used to estimate the long-term cancer health risk to an individual and non-cancer chronic and acute health indices.

A description of the parameters used in the HARP2 modeling is provided below. The HARP2 summary report and results for the construction HRA are presented in Attachment F. The HARP2 summary report and results for the operational HRA are presented in Attachment G.

3.2.1 Cancer Risk

Cancer risk is the estimated probability of a maximally exposed individual potentially contracting cancer as a result of exposure to TACs over a period of time. Per SJVAPCD Policy 1906 and HRA guidance (SJVAPCD 2018b and 2015b), HRAs conducted for CEQA purposes for the Project operation examine a cancer risk over a 70-year lifetime for residential and Point of Maximum Impact (PMI) grid receptor locations, and 40 years for offsite worker receptor locations. A 1-year cancer risk exposure duration was analyzed for all receptor types for the construction HRA, because activities will last less than one year.

The exposure pathways used to estimate the cancer risk for grid, residential, sensitive, and offsite workplace receptors are listed in Table 3-2. Any exposure pathways not explicitly shown in Table 3-2 (e.g., drinking water consumption) were not included in this HRA.

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Table 3-1: Exposure Pathways

Exposure Pathway	Residential/Sensitive/Grid	Offsite Workplace
Inhalation	Yes	Yes
Homegrown Produce	Yes	No
Dermal	Yes	Yes
Soil Ingestion	Yes	Yes
Mother's Milk	Yes	No
Pig, Chicken, Egg	Yes	No

Based on SJVAPCD recommendations, the "OEHHA Derived" calculation method was used to estimate cancer risk at residential/sensitive/grid and offsite worker receptors. The "OEHHA Derived" method uses high-end exposure parameters for the top two exposure pathways and mean exposure parameters for the remaining pathways for cancer risk estimates. A deposition velocity of 0.02 meters per second was used. For residential receptors, the Fraction of Time at Home (FAH) was applied for all age bins because the nearby school receptors were identified to be outside the one in a million isopleth. The Project will operate continuously, thus for the operational HRA, no Worker Adjustment Factor (WAF) was applied in HARP2. Because construction will only occur during daytime hours, a WAF of 4.2 was applied in the construction HRA.

3.2.2 Chronic Hazard Index

Some TACs increase non-cancer health risks due to long-term (chronic) exposures. The Chronic Hazard Index (HIC) is the sum of the individual substance chronic hazard indices for all TACs affecting the same target organ system. The HIC estimates for all receptor types used the "OEHHA Derived" calculation method. The reported HIC is for the maximally affected target organ system.

3.2.3 Acute Hazard Index

Some TACs increase non-cancer health risks due to short-term (acute) exposures. The Acute Hazard Index (HIA) is the sum of the individual substance acute hazard indices for all TACs affecting the same target organ system. Acute risk is calculated from a 1-hour exposure. The reported HIA is for the maximally affected target organ system. DPM does not have an acute reference exposure level, thus no HIA was estimated for construction activities.

3.3 Ambient Air Quality Analysis

The KCPD CEQA guidance requires modeling to show compliance with the 24-hour PM_{10} and $PM_{2.5}$ NAAQS and CAAQS. The SJVAPCD GAMAQI and policy APR-2030 require modeling, if project criteria pollutant emissions exceed the mass emission significance thresholds, to show compliance with NAAQS and CAAQS for five primary criteria pollutants (ozone or VOC modeling is not required for single projects).

3.3.1 Modeling Methodology and Approach

Tables 2-7 and 2-8 present the maximum incremental Project annual and daily operational criteria pollutant emissions, respectively. Table 2-7 shows that the annual Project-related NO_x emissions are above the SJVAPCD significance thresholds for permitted sources

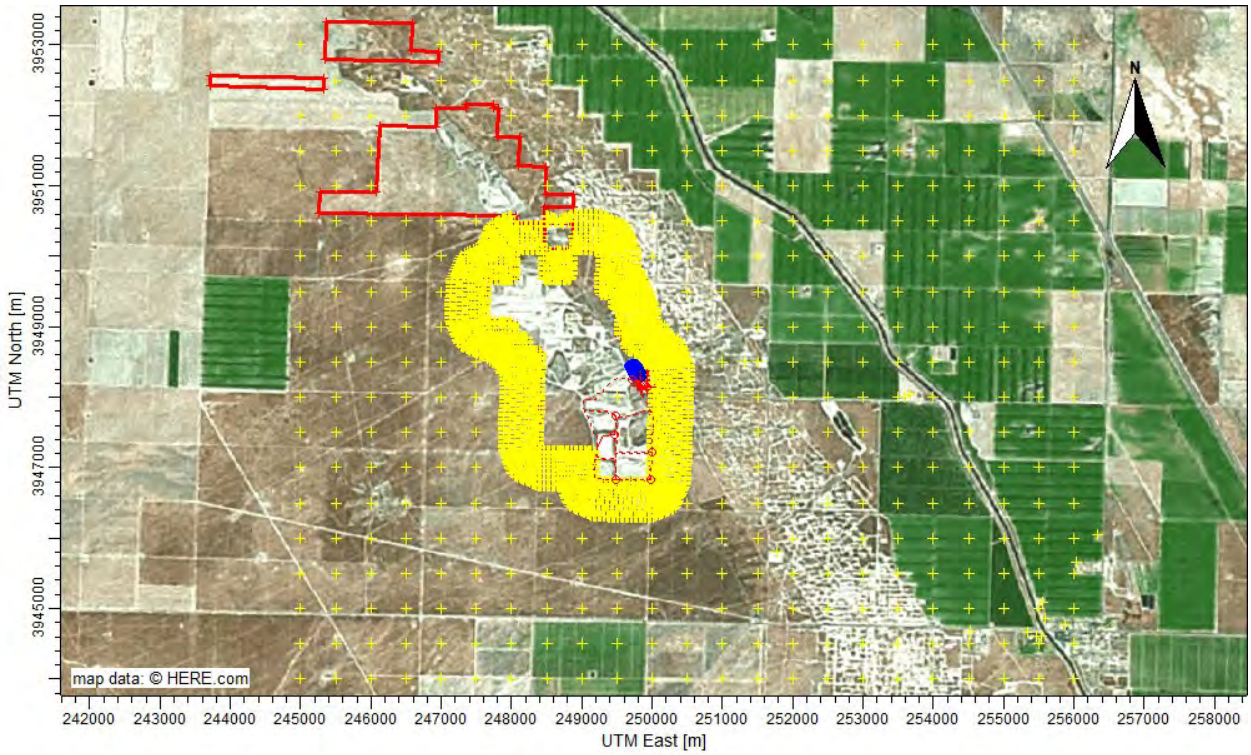
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when using a feedstock consisting of 80% agricultural biomass and 20% biosolids, and Table 2-8 shows that the daily Project-related emissions are less than the SJVAPCD significance threshold of 100 lb/day for all pollutants. Per SJVAPCD policy, because one threshold is exceeded, AAQA modeling is required for the proposed Project for all five criteria pollutants.

The purpose of the AAQA is to evaluate whether or not criteria pollutant emissions resulting from the Project will cause or contribute significantly to a violation of a CAAQS or NAAQS. The air quality modeling methodology described in this section is based on the SJVAPCD policies APR-1925 (SJVAPCD 2019) and APR-2030 (SJVAPCD 2018), and Guidance for Air Dispersion Modeling (SJVAPCD 2006).

The dispersion model, AERMOD, was used to simulate the atmospheric transport and dispersion of airborne pollutants and to quantify the maximum expected ground-level concentrations from Project emissions using the parameters described in the previous section which one exception. The Holloway property boundary was the starting location for the gridded receptors. Figure 3-4 shows the receptor grid that was used in the AAQA modeling in yellow and the property boundary in red.

Figure 3-4: Operational Sources, Fenceline and Receptor Locations for AAQA



The AAQA follows the APR-1925 Level 2 approach where each pollutant is modeled separately using maximum emission rates for the appropriate averaging time. Step 1 combines the modeled concentration with a conservative background concentration for comparison to the AAQS. If the Project plus background concentration is less than the AAQS, then Project emissions have a less than significant impact. This Step 1 technique was used for NO_2, CO, and SO_2.

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Per SJVAPCD guidance, for pollutants where the background concentration is already greater than the AAQS, Step 2 compares the maximum modeled concentration to the corresponding Significant Impact Level (SIL). If the Project concentration is less than the SIL, then Project emissions do not contribute significantly to a violation of a CAAQS or NAAQS. SIL modeling was conducted for PM_{10} and $PM_{2.5}$ as the background concentrations are greater than the AAQS as described previously. As the Aries–Holloway bioenergy facility is a minor source for $PM_{2.5}$, the modeling examined only primarily emitted $PM_{2.5}$ for comparison to the SILs.

NO_2 modeling for the 1-hour and annual NAAQS followed the EPA Tier 2 technique outlined in the EPA NO_2 clarification memo (EPA 2014) that uses of the Ambient Ratio Method 2 (ARM2), which assumes the conversion of between 20-90% of NO_x to NO_2 (Tier 2). A Tier 1 assessment conservatively assumes that all NO_x converts to NO_2. Further modeling refinements, such as use of the Ozone Limiting Method (OLM) or Plume Volume Molar Ratio Method (PVMRM) (Tier 3), were not necessary to show that Project emissions did not cause a violation of the NAAQS.

The NO_2, CO and SO_2 modeling was conducted using the highest 1-hour emission rate for all averaging times. The PM_{10} and $PM_{2.5}$ modeling used the highest 24-hour emission rate for all averaging times. This is conservative for the longer averaging times, especially the annual average.

3.3.2 Background Air Quality

Dispersion modeling to evaluate compliance with AAQS requires the use of measured air pollutant concentrations to account for the contributions of regional emissions, i.e., emission sources not explicitly included in the model simulations.

Table 3-2 presents the ambient background data for each pollutant and averaging time at the nearest representative monitoring station. The tabulated values were used to represent background levels for the indicated pollutants and averaging times in the AAQA to evaluate compliance with CAAQS or NAAQS. The monitoring data indicate that the air quality in the Project area complies with all federal NAAQS and CAAQS for NO_2, CO and SO_2. However, the CAAQS and NAAQS are periodically exceeded in the Project area for $PM_{2.5}$ and PM_{10}.

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Table 3-2: Background Concentrations Used in AAQA

Pollutant	Monitoring Station Location	Averaging Time	Standard	Ambient Background Data				AAQS	Background Exceeds Standard?	Background Concentration Notes
				2015	2016	2017	Selected Value			
NO_2 [Parts per Million (ppm)]	Shafter	1-Hour	Federal	0.0367	0.0367	0.0396	0.0377	0.100	No	Design value (= 3-year average of 98th percentile of 1-hr daily max).
			California	0.0454	0.0478	0.0476	0.0478	0.180	No	Highest of most recent 3 years.
		Annual	Federal	0.0090	0.0100	0.0090	0.0100	0.053	No	Highest of most recent 3 years.
			California	0.0090	0.0090	0.0090	0.0090	0.030	No	Highest of most recent 3 years.
CO (ppm)	Bakersfield-Municipal Airport	1-Hour	Federal	1.7	1.44	1.85	1.85	35	No	Highest of most recent 3 years.
			California	1.7	1.44	1.85	1.85	20	No	Highest of most recent 3 years.
		8-Hour	Federal	1.0	1.1	1.2	1.20	9	No	Highest of most recent 3 years.
			California	1.0	1.1	1.2	1.20	9.0	No	Highest of most recent 3 years.
SO_2 (ppm)	Fresno	1-Hour	Federal	0.0108	0.0080	0.0077	0.0108	0.075	No	Highest of most recent 3 years.
			California	0.0108	0.0080	0.0077	0.0108	0.25	No	Highest of most recent 3 years.
		3-Hour	Federal Secondary	0.0063	0.0053	0.0045	0.0063	0.5	No	Highest of most recent 3 years.
		24-Hour	California	0.0024	0.0020	0.0023	0.0024	0.04	No	Highest of most recent 3 years.
PM_{10} ($\mu g/m^3$)	Bakersfield-5558 California Avenue	24-Hour	Federal	104.7	90.6	138.0	138.0	150.0	No	Highest of most recent 3 years.
			California	103.6	92.2	143.6	143.6	50.0	Yes	Highest of most recent 3 years.
		Annual	California	44.1	40.9	42.6	44.1	20.0	Yes	Highest of most recent 3 years.
$PM_{2.5}$ ($\mu g/m^3$)	Bakersfield-5558 California Avenue	24-Hour	Federal	57.5	47.0	71.8	58.8	35.0	Yes	Design value (=3-year average of 98th percentile of daily max)
		Annual	Federal	18.3	16.5	15.7	18.3	12.0	Yes	Design value (=3-year average of annual mean)
			California	16.6	16.0	15.9	16.6	12.0	Yes	Highest of most recent 3 years.

Notes:

NO_2, PM_{10} and $PM_{2.5}$ data from CARB iADAM Air Quality Data Statistics (CARB 2019). CO and SO_2 data from EPA AirData (EPA 2019).

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4.0 HRA AND AAQA RESULTS

The results of the construction and operational HRA and the operational AAQA are presented in this Section.

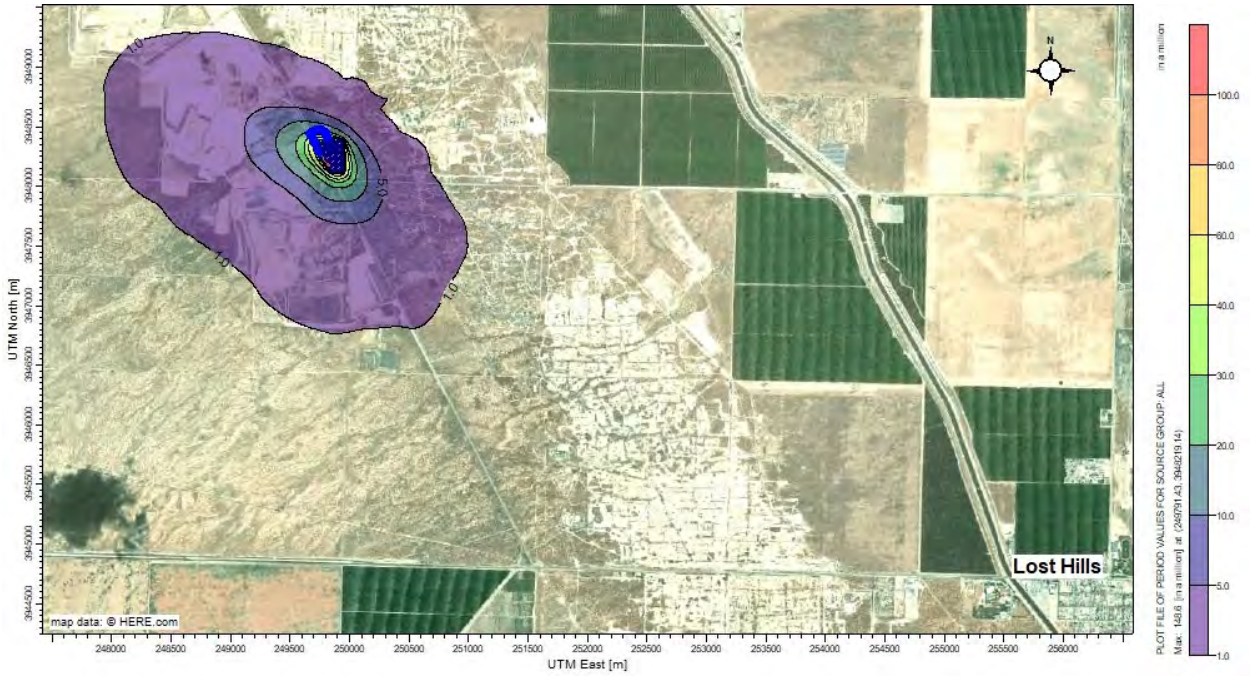
4.1 Construction HRA

The results of the HRA from the Project construction emissions are summarized in Table 4-1 and presented visually in the isopleth in Figure 4-1. Elevated cancer risk was predicted at the project fenceline and rapidly decreases with distance. The cancer risk drops below 20 in a million before crossing the Holloway property boundary, and as seen in the table is very low at the location of the closest sensitive residential or worker receptors. The DPM emissions from the onsite construction equipment contributed to the majority of the cancer risk. Construction-related HARP2 results broken down by source are presented in Attachment F.

Table 4-1: Project Construction Health Risk Assessment Results

Health Risk	Maximally Exposed Individual Resident (MEIR)	Maximum Sensitive Receptor	Maximally Exposed Individual Worker (MEIW)	SJVAPCD CEQA Threshold
Cancer Risk (In a Million)	0.088	0.083	0.023	20
HIC	0.0001	0.0001	0.0004	1

Figure 4-1: Construction 1-Year Cancer Risk Isopleth



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4.2 Operations HRA

The results of the HRA from the Project operational emissions are summarized in Table 4-2. The modeling predicted that for all receptor types and locations, the health risks are below the SJVAPCD cancer and non-cancer significance thresholds. The modeling predicted that the DPM emissions from offsite delivery trucks dominates the PMI cancer risk. The PMI cancer risk was predicted to occur on the side of Holloway Road in an unpopulated area. The predicted cancer risk, HIC, and HIA at actual receptors are well below the SJVAPCD significance thresholds. Operations-related HARP2 results by source and pollutant are presented in Attachment F.

Table 4-2: Project Operational Health Risk Assessment Results

Health Risk	PMI	MEIR	Maximum Sensitive Receptor	MEIW	SJVAPCD CEQA Threshold
Cancer Risk (In a Million)	0.66	0.013	0.017	0.005	20
HIC	0.008	0.0002	0.0002	0.0004	1
HIA	0.009	0.002	0.001	0.002	1

4.3 Operations AAQA

Air dispersion modeling was performed according to the methodology described in Sections 3.1 and 3.3. Table 4-3 presents the maximum model-predicted concentrations from the Project emissions, maximum background concentrations, and sum of these concentrations in comparison to the NAAQS and CAAQS. Table 4-3 shows that the Project will not cause an exceedance of NO_2, SO_2 or CO NAAQS or CAAQS. Since background PM_{10} concentrations are greater than the 24-hour and annual CAAQS, and background $PM_{2.5}$ concentrations are greater than the NAAQS and CAAQS, the modeled concentrations are compared to the SILs.

Table 4-4 shows that the model-predicted PM_{10} and $PM_{2.5}$ concentrations from all onsite exhaust and fugitive dust sources are less than the 24-hour and annual SILs, with the exception of the PM_{10} fugitive dust SIL, which is only exceeded at two receptors on the fenceline. Thus, at all locations where the public could access, the model-predicted PM_{10} and $PM_{2.5}$ concentrations are less than the SILs.

Therefore, the AAQA modeling predicted that the proposed Aries–Holloway Bioenergy Project will not cause a violation of the NAAQS or CAAQS, or contribute substantially to an existing air quality violation, and will have a less than significant impact on air quality.

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Table 4-3: AAQA Results for the Aries–Holloway Bioenergy Project

Pollutant	Averaging Time	Standard	Modeled Concentration (µg/m^3)	Background Concentration (µg/m^3)	Modeled + Background Concentration (µg/m^3)	AAQS (µg/m^3)	Exceed Standard?
NO_2	1-Hour	Federal	67.3	72.1	139.5	188	No
		California	67.3	91.5	158.8	339	No
	Annual	Federal	6.3	17.2	23.5	100	No
		California	6.3	17.2	23.5	57	No
CO	1-Hour	Federal	74.8	2,155	2,230	40,000	No
		California	74.8	2,155	2,230	23,000	No
	8-Hour	Federal	49.9	1,398	1,448	10,000	No
		California	49.9	1,398	1,448	10,000	No
SO_2	1-Hour	Federal	12.0	28.8	40.7	196	No
		California	12.0	28.8	40.7	655	No
	3-Hour	Federal Secondary	8.0	16.8	24.8	1,300	No
	24-Hour	California	2.9	6.4	9.3	105	No
PM_{10}	24-Hour	Federal	39.2	138.0	177.2	150	See SIL Analysis
		California	See SIL Analysis	143.6	-	50	Background Over the CAAQS and/or NAAQS, Go To Step 2 SIL Analysis
	Annual	California	See SIL Analysis	44.1	-	20	
$PM_{2.5}$	24-Hour	Federal	See SIL Analysis	58.8	-	35	
	Annual	Federal	See SIL Analysis	18.3	-	12	
		California	See SIL Analysis	16.6	-	12	

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Table 4-4: PM_{10} and $PM_{2.5}$ SIL Modeling Results for the Aries-Holloway Bioenergy Project

Pollutant	Averaging Time	Modeled Concentration ($\mu g/m^3$)	SIL ($\mu g/m^3$)	Exceed Standard?
PM_{10}	24-Hour	0.67	5.0	No
	Annual	0.21	1.0	No
$PM_{2.5}$	24-Hour	0.64	1.2	No
	Annual	0.20	0.2	No
Fugitive PM_{10}	24-Hour	11.60	10.4	Yes[1]
	Annual	0.91	2.08	No
Fugitive $PM_{2.5}$	24-Hour	1.16	2.5	No
	Annual	0.09	0.63	No

Note: 1. Only exceeds the SIL at two fenceline receptors.

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ATTACHMENT A – CALEEMOD OUTPUT

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Aries Clean Energy Lost Hills

Kern-San Joaquin County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Light Industry	43.56	1000sqft	1.00	43,560.00	0
Other Asphalt Surfaces	8.71	1000sqft	0.20	8,712.00	0
Other Non-Asphalt Surfaces	209.09	1000sqft	4.80	209,088.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.7	**Precipitation Freq (Days)**	32
Climate Zone	3			**Operational Year**	2021
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - per Applicant

Off-road Equipment - per Applicant

Off-road Equipment - per Applicant

Off-road Equipment - per Applicant

Trips and VMT - per Applicant

On-road Fugitive Dust - Last 1/2 mile as unpaved, 15 mph

Grading - per Applicant

Vehicle Trips - per Applicant

Road Dust - all paved, 15 mph, dust controls

Consumer Products - NA

Area Coating - NA

Landscape Equipment - NA

Energy Use - NA

Water And Wastewater - NA

Solid Waste - NA

Construction Off-road Equipment Mitigation - Dust controls

Area Mitigation -

Fleet Mix - per Applicant

Table Name	Column Name	Default Value	New Value
tblAreaCoating	Area_Nonresidential_Exterior	21780	0
tblAreaCoating	Area_Nonresidential_Interior	65340	0
tblAreaCoating	Area_Parking	13068	0
tblAreaCoating	ReapplicationRatePercent	10	0
tblConstDustMitigation	WaterUnpavedRoadMoistureContent	0	1.5

Aries Clean Energy Lost Hills - Kern-San Joaquin County, Annual

tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstructionPhase	NumDays	230.00	195.00
tblConstructionPhase	NumDays	20.00	30.00
tblConstructionPhase	NumDays	20.00	10.00
tblConsumerProducts	ROG_EF	2.14E-05	1E-07
tblConsumerProducts	ROG_EF_Degreaser	3.542E-07	1E-10
tblConsumerProducts	ROG_EF_PesticidesFertilizers	5.152E-08	1E-11
tblEnergyUse	LightingElect	2.70	0.00
tblEnergyUse	NT24E	4.16	0.00
tblEnergyUse	NT24NG	3.84	0.00
tblEnergyUse	T24E	1.96	0.00
tblEnergyUse	T24NG	17.03	0.00
tblFleetMix	HHD	0.15	0.52
tblFleetMix	HHD	0.15	0.52
tblFleetMix	HHD	0.15	0.52
tblFleetMix	LDA	0.48	0.24
tblFleetMix	LDA	0.48	0.24
tblFleetMix	LDA	0.48	0.24
tblFleetMix	LDT1	0.03	0.12
tblFleetMix	LDT1	0.03	0.12
tblFleetMix	LDT1	0.03	0.12
tblFleetMix	LDT2	0.17	0.12
tblFleetMix	LDT2	0.17	0.12
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tblFleetMix	OBUS	1.6260e-003	0.00
tblFleetMix	SBUS	9.5000e-004	0.00
tblFleetMix	SBUS	9.5000e-004	0.00
tblFleetMix	SBUS	9.5000e-004	0.00
tblFleetMix	UBUS	1.7240e-003	0.00
tblFleetMix	UBUS	1.7240e-003	0.00
tblFleetMix	UBUS	1.7240e-003	0.00
tblGrading	AcresOfGrading	17.44	6.00
tblLandscapeEquipment	NumberSummerDays	180	1
tblLandUse	LandUseSquareFeet	8,710.00	8,712.00

tblLandUse	LandUseSquareFeet	209,090.00	209,088.00
tblOffRoadEquipment	HorsePower	231.00	260.00
tblOffRoadEquipment	HorsePower	231.00	500.00
tblOffRoadEquipment	HorsePower	158.00	270.00
tblOffRoadEquipment	HorsePower	89.00	75.00
tblOffRoadEquipment	HorsePower	84.00	8.00
tblOffRoadEquipment	HorsePower	187.00	250.00
tblOffRoadEquipment	HorsePower	130.00	225.00
tblOffRoadEquipment	HorsePower	132.00	300.00
tblOffRoadEquipment	HorsePower	80.00	145.00
tblOffRoadEquipment	HorsePower	80.00	250.00
tblOffRoadEquipment	HorsePower	97.00	90.00
tblOffRoadEquipment	HorsePower	97.00	200.00
tblOffRoadEquipment	HorsePower	97.00	90.00
tblOffRoadEquipment	HorsePower	46.00	25.00
tblOffRoadEquipment	HorsePower	78.00	115.00
tblOffRoadEquipment	HorsePower	9.00	3.00
tblOffRoadEquipment	HorsePower	212.00	350.00
tblOffRoadEquipment	HorsePower	212.00	350.00
tblOffRoadEquipment	HorsePower	212.00	350.00
tblOffRoadEquipment	HorsePower	158.00	270.00
tblOffRoadEquipment	HorsePower	187.00	250.00
tblOffRoadEquipment	HorsePower	172.00	2.00
tblOffRoadEquipment	HorsePower	84.00	45.00
tblOffRoadEquipment	HorsePower	80.00	275.00
tblOffRoadEquipment	HorsePower	80.00	130.00
tblOffRoadEquipment	HorsePower	203.00	300.00

tblOffRoadEquipment	HorsePower	203.00	300.00
tblOffRoadEquipment	HorsePower	64.00	30.00
tblOffRoadEquipment	HorsePower	97.00	90.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	4.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	UsageHours	7.00	4.10
tblOffRoadEquipment	UsageHours	7.00	2.10
tblOffRoadEquipment	UsageHours	8.00	5.50
tblOffRoadEquipment	UsageHours	8.00	4.60
tblOffRoadEquipment	UsageHours	8.00	7.90
tblOffRoadEquipment	UsageHours	8.00	3.30
tblOffRoadEquipment	UsageHours	8.00	4.00
tblOffRoadEquipment	UsageHours	8.00	4.00
tblOffRoadEquipment	UsageHours	8.00	4.00
tblOffRoadEquipment	UsageHours	8.00	2.00
tblOffRoadEquipment	UsageHours	7.00	4.10
tblOffRoadEquipment	UsageHours	7.00	2.10

tblOffRoadEquipment	UsageHours	8.00	5.30
tblOffRoadEquipment	UsageHours	8.00	6.50
tblOnRoadDust	AverageVehicleWeight	2.40	10.00
tblOnRoadDust	AverageVehicleWeight	2.40	10.00
tblOnRoadDust	AverageVehicleWeight	2.40	10.00
tblOnRoadDust	HaulingPercentPave	100.00	99.00
tblOnRoadDust	HaulingPercentPave	100.00	99.00
tblOnRoadDust	HaulingPercentPave	100.00	99.00
tblOnRoadDust	VendorPercentPave	100.00	99.00
tblOnRoadDust	VendorPercentPave	100.00	99.00
tblOnRoadDust	VendorPercentPave	100.00	99.00
tblOnRoadDust	WorkerPercentPave	100.00	99.00
tblOnRoadDust	WorkerPercentPave	100.00	99.00
tblOnRoadDust	WorkerPercentPave	100.00	99.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblRoadDust	MaterialMoistureContent	0.5	1.5
tblRoadDust	MeanVehicleSpeed	40	15
tblRoadDust	MobileAverageVehicleWeight	2.4	10
tblSolidWaste	SolidWasteGenerationRate	54.01	0.00
tblTripsAndVMT	HaulingTripLength	20.00	100.00
tblTripsAndVMT	HaulingTripLength	20.00	100.00
tblTripsAndVMT	HaulingTripLength	20.00	100.00
tblTripsAndVMT	HaulingTripNumber	0.00	16.00
tblTripsAndVMT	HaulingTripNumber	0.00	780.00
tblTripsAndVMT	HaulingTripNumber	0.00	36.00
tblTripsAndVMT	VendorTripLength	6.60	50.00
tblTripsAndVMT	VendorTripLength	6.60	50.00

tblTripsAndVMT	VendorTripLength	6.60	50.00
tblTripsAndVMT	VendorTripNumber	0.00	13.00
tblTripsAndVMT	VendorTripNumber	43.00	9.00
tblTripsAndVMT	VendorTripNumber	0.00	5.00
tblTripsAndVMT	VendorVehicleClass	HDT_Mix	MHDT
tblTripsAndVMT	VendorVehicleClass	HDT_Mix	MHDT
tblTripsAndVMT	VendorVehicleClass	HDT_Mix	MHDT
tblTripsAndVMT	WorkerTripLength	16.80	100.00
tblTripsAndVMT	WorkerTripLength	16.80	100.00
tblTripsAndVMT	WorkerTripLength	16.80	100.00
tblTripsAndVMT	WorkerTripNumber	23.00	15.00
tblTripsAndVMT	WorkerTripNumber	110.00	35.00
tblTripsAndVMT	WorkerTripNumber	20.00	8.00
tblVehicleTrips	CC_TL	6.60	0.00
tblVehicleTrips	CC_TL	6.60	0.00
tblVehicleTrips	CC_TL	6.60	0.00
tblVehicleTrips	CC_TTP	28.00	0.00
tblVehicleTrips	CNW_TL	6.60	0.00
tblVehicleTrips	CNW_TL	6.60	0.00
tblVehicleTrips	CNW_TL	6.60	0.00
tblVehicleTrips	CNW_TTP	13.00	0.00
tblVehicleTrips	CW_TL	14.70	160.00
tblVehicleTrips	CW_TL	14.70	0.00
tblVehicleTrips	CW_TL	14.70	0.00
tblVehicleTrips	CW_TTP	59.00	100.00
tblVehicleTrips	DV_TP	5.00	0.00
tblVehicleTrips	PB_TP	3.00	0.00

tblVehicleTrips	PR_TP	92.00	100.00
tblVehicleTrips	ST_TR	1.32	0.43
tblVehicleTrips	SU_TR	0.68	0.43
tblVehicleTrips	WD_TR	6.97	0.63
tblWater	IndoorWaterUseRate	10,073,250.00	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.5085	4.3129	3.5318	0.0110	7.6629	0.1722	7.8351	1.0095	0.1627	1.1721	0.0000	974.4236	974.4236	0.1312	0.0000	977.7039
Maximum	**0.5085**	**4.3129**	**3.5318**	**0.0110**	**7.6629**	**0.1722**	**7.8351**	**1.0095**	**0.1627**	**1.1721**	**0.0000**	**974.4236**	**974.4236**	**0.1312**	**0.0000**	**977.7039**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.5085	4.3129	3.5318	0.0110	4.4359	0.1722	4.6081	0.6620	0.1627	0.8246	0.0000	974.4231	974.4231	0.1312	0.0000	977.7034
Maximum	**0.5085**	**4.3129**	**3.5318**	**0.0110**	**4.4359**	**0.1722**	**4.6081**	**0.6620**	**0.1627**	**0.8246**	**0.0000**	**974.4231**	**974.4231**	**0.1312**	**0.0000**	**977.7034**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**42.11**	**0.00**	**41.19**	**34.42**	**0.00**	**29.65**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	1-6-2020	4-5-2020	0.9980	0.9980
2	4-6-2020	7-5-2020	1.3290	1.3290
3	7-6-2020	9-30-2020	1.2706	1.2706
		Highest	1.3290	1.3290

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	8.0000e-004	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	3.0000e-005	3.0000e-005	0.0000	0.0000	3.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.1209	3.1355	1.1821	0.0151	2.1298	0.0156	2.1454	0.5375	0.0149	0.5524	0.0000	1,429.1385	1,429.1385	0.0209	0.0000	1,429.6617
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.1217**	**3.1355**	**1.1821**	**0.0151**	**2.1298**	**0.0156**	**2.1454**	**0.5375**	**0.0149**	**0.5524**	**0.0000**	**1,429.1385**	**1,429.1385**	**0.0209**	**0.0000**	**1,429.6618**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	8.0000e-004	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	3.0000e-005	3.0000e-005	0.0000	0.0000	3.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.1209	3.1355	1.1821	0.0151	2.1298	0.0156	2.1454	0.5375	0.0149	0.5524	0.0000	1,429.1385	1,429.1385	0.0209	0.0000	1,429.6617
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.1217**	**3.1355**	**1.1821**	**0.0151**	**2.1298**	**0.0156**	**2.1454**	**0.5375**	**0.0149**	**0.5524**	**0.0000**	**1,429.1385**	**1,429.1385**	**0.0209**	**0.0000**	**1,429.6618**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Grading	Grading	1/6/2020	2/14/2020	5	30	Phase 1: Grading & Undrgrounds
2	Building Construction	Building Construction	3/16/2020	12/11/2020	5	195	Phase 2: Mechanical Construction
3	Paving	Paving	12/14/2020	12/25/2020	5	10	Phase 3: Paving & Finishing

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 6

Acres of Paving: 5

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grading	Crawler Tractors	1	6.00	350	0.43
Grading	Excavators	2	5.50	270	0.38
Grading	Graders	1	3.30	250	0.41
Grading	Rollers	1	5.00	275	0.38
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Rubber Tired Loaders	2	5.70	300	0.36
Grading	Tractors/Loaders/Backhoes	1	5.30	90	0.37
Building Construction	Air Compressors	2	4.70	115	0.48
Building Construction	Cement and Mortar Mixers	1	3.40	3	0.56
Building Construction	Cranes	2	4.10	260	0.29
Building Construction	Cranes	1	2.10	500	0.29
Building Construction	Crawler Tractors	1	2.10	350	0.43
Building Construction	Excavators	1	2.70	270	0.38
Building Construction	Forklifts	2	4.60	75	0.20
Building Construction	Generator Sets	4	7.90	8	0.74
Building Construction	Other Construction Equipment	1	1.00	2	0.42
Building Construction	Pumps	1	6.20	45	0.74
Building Construction	Rollers	2	4.80	130	0.38

Building Construction	Rubber Tired Loaders	1	3.60	300	0.36
Building Construction	Sweepers/Scrubbers	1	2.60	30	0.46
Building Construction	Tractors/Loaders/Backhoes	1	4.10	90	0.37
Building Construction	Tractors/Loaders/Backhoes	1	2.10	200	0.37
Building Construction	Welders	2	6.50	25	0.45
Paving	Crawler Tractors	1	1.00	350	0.43
Paving	Graders	1	1.00	250	0.41
Paving	Pavers	1	4.00	225	0.42
Paving	Paving Equipment	1	4.00	300	0.36
Paving	Rollers	1	4.00	145	0.38
Paving	Rollers	1	2.00	250	0.38
Paving	Tractors/Loaders/Backhoes	2	6.00	90	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Grading	9	15.00	13.00	16.00	100.00	50.00	100.00	LD_Mix	MHDT	HHDT
Building Construction	24	35.00	9.00	780.00	100.00	50.00	100.00	LD_Mix	MHDT	HHDT
Paving	8	8.00	5.00	36.00	100.00	50.00	100.00	LD_Mix	MHDT	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Water Unpaved Roads

Reduce Vehicle Speed on Unpaved Roads

3.2 Grading - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0935	0.0000	0.0935	0.0500	0.0000	0.0500	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0526	0.5802	0.3044	8.2000e-004		0.0238	0.0238		0.0219	0.0219	0.0000	72.1491	72.1491	0.0233	0.0000	72.7325
Total	**0.0526**	**0.5802**	**0.3044**	**8.2000e-004**	**0.0935**	**0.0238**	**0.1173**	**0.0500**	**0.0219**	**0.0719**	**0.0000**	**72.1491**	**72.1491**	**0.0233**	**0.0000**	**72.7325**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.4000e-004	7.6100e-003	1.2500e-003	3.0000e-005	0.0131	3.0000e-005	0.0131	1.6700e-003	3.0000e-005	1.7100e-003	0.0000	2.6285	2.6285	5.0000e-005	0.0000	2.6297
Vendor	3.9100e-003	0.0647	0.0178	2.5000e-004	0.1607	1.3000e-003	0.1620	0.0209	1.2400e-003	0.0221	0.0000	23.8183	23.8183	2.5000e-004	0.0000	23.8245
Worker	6.0100e-003	4.8000e-003	0.0449	1.7000e-004	0.3661	1.1000e-004	0.3662	0.0462	1.0000e-004	0.0463	0.0000	15.0118	15.0118	3.5000e-004	0.0000	15.0207
Total	**0.0102**	**0.0771**	**0.0639**	**4.5000e-004**	**0.5399**	**1.4400e-003**	**0.5413**	**0.0688**	**1.3700e-003**	**0.0701**	**0.0000**	**41.4587**	**41.4587**	**6.5000e-004**	**0.0000**	**41.4749**

3.2 Grading - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0365	0.0000	0.0365	0.0195	0.0000	0.0195	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0526	0.5802	0.3044	8.2000e-004		0.0238	0.0238		0.0219	0.0219	0.0000	72.1490	72.1490	0.0233	0.0000	72.7324
Total	**0.0526**	**0.5802**	**0.3044**	**8.2000e-004**	**0.0365**	**0.0238**	**0.0603**	**0.0195**	**0.0219**	**0.0414**	**0.0000**	**72.1490**	**72.1490**	**0.0233**	**0.0000**	**72.7324**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.4000e-004	7.6100e-003	1.2500e-003	3.0000e-005	7.6500e-003	3.0000e-005	7.6800e-003	1.1300e-003	3.0000e-005	1.1600e-003	0.0000	2.6285	2.6285	5.0000e-005	0.0000	2.6297
Vendor	3.9100e-003	0.0647	0.0178	2.5000e-004	0.0942	1.3000e-003	0.0955	0.0142	1.2400e-003	0.0155	0.0000	23.8183	23.8183	2.5000e-004	0.0000	23.8245
Worker	6.0100e-003	4.8000e-003	0.0449	1.7000e-004	0.2124	1.1000e-004	0.2125	0.0308	1.0000e-004	0.0309	0.0000	15.0118	15.0118	3.5000e-004	0.0000	15.0207
Total	**0.0102**	**0.0771**	**0.0639**	**4.5000e-004**	**0.3142**	**1.4400e-003**	**0.3157**	**0.0462**	**1.3700e-003**	**0.0476**	**0.0000**	**41.4587**	**41.4587**	**6.5000e-004**	**0.0000**	**41.4749**

3.3 Building Construction - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.3187	2.8454	2.2941	4.5000e-003		0.1354	0.1354		0.1285	0.1285	0.0000	379.3487	379.3487	0.0960	0.0000	381.7492
Total	**0.3187**	**2.8454**	**2.2941**	**4.5000e-003**		**0.1354**	**0.1354**		**0.1285**	**0.1285**	**0.0000**	**379.3487**	**379.3487**	**0.0960**	**0.0000**	**381.7492**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0119	0.3709	0.0610	1.3500e-003	0.6390	1.6700e-003	0.6407	0.0816	1.6000e-003	0.0832	0.0000	128.1410	128.1410	2.3200e-003	0.0000	128.1989
Vendor	0.0176	0.2910	0.0802	1.1300e-003	0.7233	5.8500e-003	0.7291	0.0940	5.5900e-003	0.0996	0.0000	107.1825	107.1825	1.1100e-003	0.0000	107.2104
Worker	0.0911	0.0728	0.6803	2.5200e-003	5.5520	1.6200e-003	5.5536	0.7004	1.4900e-003	0.7019	0.0000	227.6790	227.6790	5.3700e-003	0.0000	227.8132
Total	**0.1206**	**0.7347**	**0.8215**	**5.0000e-003**	**6.9143**	**9.1400e-003**	**6.9235**	**0.8760**	**8.6800e-003**	**0.8847**	**0.0000**	**463.0025**	**463.0025**	**8.8000e-003**	**0.0000**	**463.2225**

3.3 Building Construction - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.3187	2.8454	2.2941	4.5000e-003		0.1354	0.1354		0.1285	0.1285	0.0000	379.3483	379.3483	0.0960	0.0000	381.7488
Total	**0.3187**	**2.8454**	**2.2941**	**4.5000e-003**		**0.1354**	**0.1354**		**0.1285**	**0.1285**	**0.0000**	**379.3483**	**379.3483**	**0.0960**	**0.0000**	**381.7488**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0119	0.3709	0.0610	1.3500e-003	0.3727	1.6700e-003	0.3744	0.0549	1.6000e-003	0.0565	0.0000	128.1410	128.1410	2.3200e-003	0.0000	128.1989
Vendor	0.0176	0.2910	0.0802	1.1300e-003	0.4237	5.8500e-003	0.4295	0.0641	5.5900e-003	0.0697	0.0000	107.1825	107.1825	1.1100e-003	0.0000	107.2104
Worker	0.0911	0.0728	0.6803	2.5200e-003	3.2218	1.6200e-003	3.2234	0.4674	1.4900e-003	0.4689	0.0000	227.6790	227.6790	5.3700e-003	0.0000	227.8132
Total	**0.1206**	**0.7347**	**0.8215**	**5.0000e-003**	**4.0182**	**9.1400e-003**	**4.0273**	**0.5864**	**8.6800e-003**	**0.5951**	**0.0000**	**463.0025**	**463.0025**	**8.8000e-003**	**0.0000**	**463.2225**

3.4 Paving - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	4.0500e-003	0.0492	0.0349	8.0000e-005		2.1100e-003	2.1100e-003		1.9400e-003	1.9400e-003	0.0000	6.8279	6.8279	2.2100e-003	0.0000	6.8832
Paving	2.6000e-004					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**4.3100e-003**	**0.0492**	**0.0349**	**8.0000e-005**		**2.1100e-003**	**2.1100e-003**		**1.9400e-003**	**1.9400e-003**	**0.0000**	**6.8279**	**6.8279**	**2.2100e-003**	**0.0000**	**6.8832**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	5.5000e-004	0.0171	2.8200e-003	6.0000e-005	0.0295	8.0000e-005	0.0296	3.7600e-003	7.0000e-005	3.8400e-003	0.0000	5.9142	5.9142	1.1000e-004	0.0000	5.9169
Vendor	5.0000e-004	8.2900e-003	2.2800e-003	3.0000e-005	0.0206	1.7000e-004	0.0208	2.6800e-003	1.6000e-004	2.8400e-003	0.0000	3.0536	3.0536	3.0000e-005	0.0000	3.0544
Worker	1.0700e-003	8.5000e-004	7.9700e-003	3.0000e-005	0.0651	2.0000e-005	0.0651	8.2100e-003	2.0000e-005	8.2300e-003	0.0000	2.6688	2.6688	6.0000e-005	0.0000	2.6703
Total	**2.1200e-003**	**0.0263**	**0.0131**	**1.2000e-004**	**0.1152**	**2.7000e-004**	**0.1154**	**0.0147**	**2.5000e-004**	**0.0149**	**0.0000**	**11.6366**	**11.6366**	**2.0000e-004**	**0.0000**	**11.6416**

3.4 Paving - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	4.0500e-003	0.0492	0.0349	8.0000e-005		2.1100e-003	2.1100e-003		1.9400e-003	1.9400e-003	0.0000	6.8279	6.8279	2.2100e-003	0.0000	6.8831
Paving	2.6000e-004					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**4.3100e-003**	**0.0492**	**0.0349**	**8.0000e-005**		**2.1100e-003**	**2.1100e-003**		**1.9400e-003**	**1.9400e-003**	**0.0000**	**6.8279**	**6.8279**	**2.2100e-003**	**0.0000**	**6.8831**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	5.5000e-004	0.0171	2.8200e-003	6.0000e-005	0.0172	8.0000e-005	0.0173	2.5400e-003	7.0000e-005	2.6100e-003	0.0000	5.9142	5.9142	1.1000e-004	0.0000	5.9169
Vendor	5.0000e-004	8.2900e-003	2.2800e-003	3.0000e-005	0.0121	1.7000e-004	0.0122	1.8300e-003	1.6000e-004	1.9900e-003	0.0000	3.0536	3.0536	3.0000e-005	0.0000	3.0544
Worker	1.0700e-003	8.5000e-004	7.9700e-003	3.0000e-005	0.0378	2.0000e-005	0.0378	5.4800e-003	2.0000e-005	5.5000e-003	0.0000	2.6688	2.6688	6.0000e-005	0.0000	2.6703
Total	**2.1200e-003**	**0.0263**	**0.0131**	**1.2000e-004**	**0.0670**	**2.7000e-004**	**0.0673**	**9.8500e-003**	**2.5000e-004**	**0.0101**	**0.0000**	**11.6366**	**11.6366**	**2.0000e-004**	**0.0000**	**11.6416**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.1209	3.1355	1.1821	0.0151	2.1298	0.0156	2.1454	0.5375	0.0149	0.5524	0.0000	1,429.1385	1,429.1385	0.0209	0.0000	1,429.6617
Unmitigated	0.1209	3.1355	1.1821	0.0151	2.1298	0.0156	2.1454	0.5375	0.0149	0.5524	0.0000	1,429.1385	1,429.1385	0.0209	0.0000	1,429.6617

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Light Industry	27.44	18.73	18.73	1,453,301	1,453,301
Other Asphalt Surfaces	0.00	0.00	0.00		
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Total	27.44	18.73	18.73	1,453,301	1,453,301

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Light Industry	160.00	0.00	0.00	100.00	0.00	0.00	100	0	0
Other Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0
Other Non-Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Light Industry	0.240000	0.120000	0.120000	0.000000	0.000000	0.000000	0.000000	0.520000	0.000000	0.000000	0.000000	0.000000	0.000000
Other Asphalt Surfaces	0.240000	0.120000	0.120000	0.000000	0.000000	0.000000	0.000000	0.520000	0.000000	0.000000	0.000000	0.000000	0.000000
Other Non-Asphalt Surfaces	0.240000	0.120000	0.120000	0.000000	0.000000	0.000000	0.000000	0.520000	0.000000	0.000000	0.000000	0.000000	0.000000

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Light Industry	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Light Industry	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Light Industry	0	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Light Industry	0	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

No Hearths Installed

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	8.0000e-004	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	3.0000e-005	3.0000e-005	0.0000	0.0000	3.0000e-005
Unmitigated	8.0000e-004	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	3.0000e-005	3.0000e-005	0.0000	0.0000	3.0000e-005

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	8.0000e-004					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	3.0000e-005	3.0000e-005	0.0000	0.0000	3.0000e-005
Total	**8.0000e-004**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**3.0000e-005**	**3.0000e-005**	**0.0000**	**0.0000**	**3.0000e-005**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	8.0000e-004					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	3.0000e-005	3.0000e-005	0.0000	0.0000	3.0000e-005
Total	**8.0000e-004**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**3.0000e-005**	**3.0000e-005**	**0.0000**	**0.0000**	**3.0000e-005**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Light Industry	0 / 0	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Light Industry	0 / 0	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Light Industry	0	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Light Industry	0	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

ATTACHMENT B – CONSTRUCTION EMISSION CALCULATIONS

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Table 3: Construction Emissions Summary and Impact Evaluation - Daily

Criteria Pollutants	Unmitigated	Mitigated	Threshold	Impact
	lbs/day	lbs/day	lbs/day	
VOC	4.6	4.6	100	No
NO_X	36.9	36.9	100	No
CO	33.6	33.6	100	No
SO_X	0.1	0.1	100	No
Total PM_{10}	78.3	45.7	100	No
Total $PM_{2.5}$	11.0	7.8	100	No
DPM (exh. PM_{10})	1.48	1.48	—	—

Sources: SJVAPCD 2018, 2015, CalEEMod version 2016.3.2

Notes:

lbs/day are summer or winter maxima for planned construction phases

Total PM_{10} / $PM_{2.5}$ comprises fugitive dust plus engine exhaust

Table 4: Construction Emissions Summary and Impact Evaluation - Annual

Criteria Pollutants	Unmitigated	Mitigated	Threshold	Impact
	tons/yr	tons/yr	tons/yr	
VOC	0.5	0.5	10	No
NO_X	4.1	4.1	10	No
CO	3.5	3.5	100	No
SO_X	0.01	0.01	27	No
Total PM_{10}	7.8	4.6	15	No
Total $PM_{2.5}$	1.2	0.8	15	No
DPM (exh. PM_{10})	0.16	0.16	—	—

Sources: SJVAPCD 2018, 2015, CalEEMod version 2016.3.2

Notes:

Total PM_{10} / $PM_{2.5}$ comprises fugitive dust plus engine exhaust

Table 5: Construction GHG Emissions and Impact Evaluation - Annual

Greenhouse Gases	Unmitigated	Mitigated	Threshold	Impact
	MT/yr	MT/yr	MT/yr	
CO_2	963	963	—	—
CH_4	0.13	0.13	—	—
N_2O	0.00	0.00	—	—
CO_2e	966	966	10,000	No

Sources: SCAQMD 2015, BAAQMD 2017, CalEEMod version 2016.3.2

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Aries Lost Hills
Construction Emissions for HRA

Phase	Vehicle Type	DPM Exhaust Emissions (ton/yr)	DPM Exhaust Emissions (lb/yr)
Grading	Construction Equipment	0.0238	47.60
	Trucks	2.00E-05	0.04
Building	Construction Equipment	0.1354	270.80
	Trucks	0.00013	0.26
Paving	Construction Equipment	2.11E-03	4.22
	Trucks	0	0.00
Total Construction Period	Construction Equipment	1.61E-01	322.62
	Trucks	1.50E-04	0.30

Location	Purpose	Distance travelled roundtrip (miles/trip)	DPM Emissions (lb/yr)	DPM Emissions (ton/yr)	Model Source Name
Onsite	Construction Equipment		322.62	0.16	CONSTR
	Trucks	0.12	0.058	2.90E-05	ONTRUCK
	Total Onsite Emissions		**322.68**	**0.16**	
Near Offsite	Trucks - Holloway Site	0.25	0.121	6.05E-05	OFFTRKUNP
	Trucks - Holloway Road	0.25	0.121	6.05E-05	OFFTRKPAVE
	Total Near Offsite Emissions		**0.24**	**1.21E-04**	

Notes:

Model Inputs for Trucks

The District recommends the following for modeling vehicles on paved roadways:

				AERMOD View input (m)
1. Separate volume sources	feet	meter		
2. Top of Plume Height = 1.0 x VH	13.5	4.11	PH	4.11
3. Volume Source Release Height = 0.5 x Top of Plume Height	6.75	2.06	release ht	2.06
VW = vehicle width	8.5	2.59		
4. Width of Plume = VW or lane width (Each lane should be modeled separately.)	28.2	8.59	PW	4.30
From EPA - Width of Plume = VW + 6m for single lane roadways / Road Width + 6m				
5. Initial Sigma Z - Top of Plume Height/2.15	6.28	1.91	~= initial vertical dimension calculated in AERMOD	
6. Initial Sigma Y - Width of Plume/2.15	13.11	4.00	~= initial lateral dimension calculated in AERMOD	
7. Emissions input as 1 g/s in AERMOD				

SJVAPCD Guidance from Glenn T. Reed, Senior Air Quality Specialist, Thursday, August 22, 2013

Model Inputs for Construction Equipment

				AERMOD View input (m)
Single volume source surface based	feet	meter		
Plume Height	6	1.83	PH	1.83
Release Height = 0.5 x Top of Plume Height	3	0.91	release ht	0.91
Plume Width	131.2	40.00	PW	20.00
Initial Sigma Z - Top of Plume Height/2.15	2.79	0.85	~= initial vertical dimension calculated in AERMOD	
Initial Sigma Y - Width of Plume/4.3	30.52	9.30	~= initial lateral dimension calculated in AERMOD	
Emissions input as 1 g/s				

There are 14 volume sources, so the emissions are 1/14 g/s for each source

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ATTACHMENT C – OPERATIONAL EMISSION CALCULATIONS

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Aries-Holloway Bioenergy Facility - Process Information		
Description	**Value**	**Units**
Total Feedstock Delivery Rate[1]	20.6	tons/hour (daytime)
Total Feedstock Process Rate	6.9	tons/hour (continuous)
Total Feedstock Process Rate	165	tons/day
Total Feedstock Process Rate	60,225	tons/yr
Biochar Process Rate[2]	1.0	tons/hour (continuous)
Biochar Process Rate[3]	24.8	tons/day
Biochar Process Rate	9034	tons/yr
Daytime Working Hours (staff)	8	hours/day
Daily Operation (system)	24	hours/day
Maximum Annual Operation	8760	hours/year
Maximum Annual Operation	365	days/year

Notes

1. Calculated based on transfer occurring 8 hours per day
2. Calculated based on biochar transfer occurring 24 hours per day
3. Based on 15% of mass input of woody wastes

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Aries-Holloway Bioenergy Project
Criteria Pollutant Annual Emission Summary

Pollutant	Thermal Oxidizer	Feedstock Loading	Biochar Loadout	Emergency Generator	Firewater Pump	Total Permitted Sources	Mobile Sources	Total Unpermitted Sources	*Total Emissions*	KCPD CEQA threshold	SJVAPCD CEQA threshold
	Annual Emissions (ton/yr)										
NOx	13.10	-	-	0.121	0.030	**13.25**	3.15	**3.15**	***16.40***	10	10
SOx	17.14	-	-	0.000	0.000	**17.14**	0.02	**0.02**	***17.16***	-	27
CO	1.77	-	-	0.121	0.029	**1.91**	1.19	**1.19**	***3.10***	-	100
VOC	0.17	-	-	0.007	0.003	**0.18**	0.12	**0.12**	***0.30***	10	10
PM_{10}	3.24	3.5E-03	2.6E-02	1.4E-03	1.0E-04	**3.27**	4.10	**4.10**	***7.37***	15	15
$PM_{2.5}$	3.22	5.4E-04	4.0E-03	1.4E-03	1.0E-04	**3.22**	0.75	**0.75**	***3.97***	-	15

Note: The SJVAPCD CEQA thresholds are applied separately to the permitted and unpermitted sources (GAMAQI)

Mobile source emissions include total trip travel distance.

NOx and SOx emissions based on syngas from 80% Ag Wood+20% WWTP Biosolids. CO, VOC and PM emissions based on syngas from 100% Wood.

Criteria Pollutant Daily Emission Summary

Pollutant	Thermal Oxidizer	Feedstock Loading	Biochar Loadout	Emergency Generator	Firewater Pump	Total Permitted Sources	Mobile Sources	Total Unpermitted Sources	*Total Emissions*	KCPD CEQA threshold	SJVAPCD CEQA threshold
	Daily Emissions (lb/day)										
NOx	75.48	-	-	4.822	1.188	**81.49**	0.07	**0.07**	***81.57***	-	100
SOx	93.96	-	-	0.009	0.002	**93.97**	0.000	**0.000**	***93.97***	-	100
CO	71.92	-	-	4.822	1.157	**77.90**	0.03	**0.03**	***77.93***	-	100
VOC	4.98	-	-	0.259	0.132	**5.37**	0.003	**0.003**	***5.38***	-	100
PM_{10}	18.20	0.02	0.15	0.055	0.004	**18.43**	10.72	**10.72**	***29.15***	-	100
$PM_{2.5}$	18.07	0.00	0.02	0.055	0.004	**18.16**	1.08	**1.08**	***19.24***	-	100

Note: The SJVAPCD CEQA thresholds are applied separately to the permitted and unpermitted sources (APR-2030)

Mobile source emissions include a travel distance of 1/4 mile offsite per SJVAPCD Policy APR-2030.

NOx and SOx emissions based on syngas from 80% Ag Wood+20% WWTP Biosolids. CO, VOC and PM emissions based on syngas from 100% Wood.

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Aries-Holloway Bioenergy Project
TAC Annual Emission Summary

Pollutant	CAS	Thermal Oxidizer	Emergency Generator	Firewater Pump	Mobile Sources	Total Emissions
		Annual Emissions (lb/yr)				
Diesel Particulate Matter (DPM)	9901	-	2.75	0.20	0.12	3.07
Acetaldehyde	75070	0.02	-	-	-	0.02
Acrolein	107028	0.02	-	-	-	0.02
Ammonia	7664417	4748.3	-	-	-	4,748.3
Benzene	71432	1.33	-	-	-	1.33
Chlorobenzene	108907	0.30	-	-	-	0.30
Ethyl Benzene	100414	25.20	-	-	-	25.20
Formaldehyde	50000	1406.9	-	-	-	1,406.9
Hexane	110543	0.04	-	-	-	0.04
Hydrogen chloride (HCl)	7647010	438.00	-	-	-	438.00
Hydrogen Sulfide	7783064	1127.4	-	-	-	1,127.4
Methyl Chloroform	71556	4.04	-	-	-	4.04
Methylene Chloride	75092	83.54	-	-	-	83.54
Naphthalene	91203	0.00	-	-	-	0.00
PAHs	1151	0.00	-	-	-	0.00
Perchloroethylene	127184	2.34	-	-	-	2.34
Propylene	115071	4.04	-	-	-	4.0
Toluene	108883	9.44	-	-	-	9.44
Vinyl Chloride	75014	1.27	-	-	-	1.27
Vinylidene Chloride	75354	0.30	-	-	-	0.30
Xylenes	1330207	53.82	-	-	-	53.82
					Total HAPs (ton/yr)	**1.58**

Note: DPM, Ammonia and Propylene are not a federally listed HAPs

Mobile source emissions include onsite and offsite travel to a distance of 1/4 mile.

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Aries-Holloway Bioenergy Project
GHG Annual Emission Summary

Greenhouse Gases	Thermal Oxidizer	Emergency Generator	Firewater Pump	Mobile Sources	Total Emissions
	Annual Emissions (Metric Ton/yr)				
CO_2	-	21.7	5.2	1,429	1,456
CH_4	-	0.0009	0.0002	0.021	0.022
N_2O	-	0.0002	0.0000	0.000	0.000
CO_2e	**53,893**	**21.8**	**5.2**	**1,430**	**55,350**

Note: The GHG emissions from the thermal oxidizer are considered biogenic. Emissions based on 100% wood derived syngas.

Mobile source emissions include total trip travel distance.

Emissions are based on a heat rate for a feedstock composition of 100% agricultural wood.

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Thermal Oxidizer Criteria Pollutant Emission Calculations (80% Ag Wood+20% WWTP Biosolids)

Syngas Criteria Pollutant Emissions								
Pollutant	**Estimated Emission Factor[1] (lb/MMBtu)**	**Uncontrolled Emissions (lb/hr)**	**Uncontrolled Emissions (lb/day)**	**Uncontrolled Emissions (lb/yr)**	**Control Efficiency[3]**	**Controlled Emissions (lb/hr)**	**Controlled Emissions (lb/day)**	**Controlled Emissions (lb/yr)**
NOx	1.102	59.73	1433.48	523,221	95%	2.99	71.67	26,161
SOx^2	0.722	39.13	939.18	342,800	90%	3.91	93.92	34,280
CO	0.005	0.33	7.92	2,891	0%	0.33	7.92	2,891
VOC	0.0005	0.03	0.79	289	0%	0.03	0.79	289
PM_{10}	0.140	9.24	221.76	80,942	92%	0.74	17.74	6,475
$PM_{2.5}$	0.139	9.17	220.18	80,364	92%	0.73	17.61	6,429
Biogenic CO_2e (est.)[5]	203.9	13,456	322,949	117,876,276	0%	13,456	322,949	117,876,276

Natural Gas Criteria Pollutant Emissions								
Pollutant	**Emission Factor[4] (lb/MMscf)**	**Uncontrolled Emissions (lb/hr)**	**Uncontrolled Emissions (lb/day)**	**Uncontrolled Emissions (lb/yr)**	**Control Efficiency[3]**	**Controlled Emissions (lb/hr)**	**Controlled Emissions (lb/day)**	**Controlled Emissions (lb/yr)**
NOx	100	3.81	76.2	761.9	95%	0.190	3.81	38.1
SOx	0.6	0.02	0.5	4.6	90%	0.002	0.05	0.5
CO	84	3.20	64.0	640.0	0%	3.200	64.00	640.0
VOC	5.5	0.21	4.2	41.9	0%	0.210	4.19	41.9
PM_{10}	7.6	0.29	5.8	57.9	92%	0.023	0.46	4.6
$PM_{2.5}$	7.5	0.29	5.7	57.3	92%	0.023	0.46	4.6
CO_2e [6]	122,861	4,680	93,608	936,080	0%	4,680	93,608	936,080

Thermal Oxidizer Criteria Pollutant Emissions				
Pollutant	**(lb/hr)**	**(lb/day)**	**(lb/yr)**	**(tons/yr)**
NOx	3.18	75.48	26,199	13.10
SOx	3.92	93.96	34,280	17.14
CO	3.53	71.92	3,531	1.77
VOC	0.24	4.98	331	0.17
PM_{10}	0.76	18.20	6,480	3.24
$PM_{2.5}$	0.76	18.07	6,434	3.22
CO_2e (est.) (MT/yr)	18,137	416,557	118,812,356	53,893

40 CFR 98 Table C-2 (lb/mmBTU) & IPCC 2014 GWPs				
AR5 GWP	**1**	**28**	**265**	**Default**
Fuel Type	**DF CO_2**	**CH_4**	**N_2O**	**CO_2e**
Natural Gas	116.89	0.00220	0.00022	117.01
Biogas	114.80	0.00705	0.00139	115.36
LPG	138.85	0.00661	0.00132	139.38

Data and Parameters

Process Flows - Syngas	***Heat Input***					max design heat input syngas from 100% wood
Based on feedstock blend	54.20	MMBtu/hr	375,431	Scf/hr	66	MMBtu/hr
	1,301	MMBtu/day	9,010,349	scf/day	1,584	MMBtu/day
	474,792	MMBtu/yr	3,288,777,256	scf/year	578,160	MMBtu/yr
Syngas F-factor	15,770	dscf/MMBtu	Syngas Analysis, EPA Method 19			
Molar Volume	385.3	scf/lbmol	Constant, EPA Method 19			
Syngas Heating Value	144	Btu/scf	Syngas Analysis			
Syngas Exit Temp	900	F	Project definition			
Standard Temp	68	F				
Constant	460	R				
HHV Natural Gas	1050	Btu/scf				operating schedule for natural gas preheater
Natural Gas Flow - max ho	40	MMBtu/hr	38,095	Scf/hr	10	startups/year
Natural Gas Flow - max dai	800	MMBtu/day	761,905	scf/day	20	hrs/startup
Natural Gas Flow - annual	8000	MMBtu/year	7,619,048	scf/year	200	hr/year
Natural Gas F-factor	8710	dscf/MMBtu	Method 19			
MW NOx	46	lb/lbmol				
MW SOX	64	lb/lbmol				
MW CO	28	lb/lbmol				
MW VOC	16	lb/lbmol				
Conversion	7000	gr/lb	Constant			

Calculated Stack Parameters			***Notes***
Stack Oxygen	10.9	%	Actual, per H&MB
Stack Temperature	300	F	Actual, per H&MB
Stack Temperature	760	R	Actual
Standard Temperature	528	R	EPA Method 19
Stack Moisture	11.6	%	Actual, per H&MB
Stack Flow, dry	29,688	dscf/min @ % O2	
Stack Flow, wet	33,132	wscf/min @ % O2	
Stack Flow, hot	47,691	wacf/min @ % O2 @ T	
Stack Flow, hot	1,350	wacm/min @ % O2 @ T	
Stack Diameter, ft	4.94	ft	OD minus 2xTD
Stack Height, ft	48	ft	
Stack Diameter, m	**1.50**	**m**	
Stack Height, m	**14.6**	**m**	
Stack Area, m^2	1.78	m^2	
Exit Velocity, m/sec	**12.7**	**m/sec**	
Exit Temperature, K	**422**	**K**	

Notes

1. Stack mass rates per "Investigative Air Emissions Test, PHG Gasifier/Thermal Oxidizer, City of Lebanon Gasification Facility, April 27, 2017"
2. SOx as sulfur dioxide, emission factor calculated from feedstock ultimate analysis (S content)
3. Control efficiency per manufacturer guarantee.
4. Emission factors per AP-42, Section 1.4
5. Synthetic gas GHG emission factor based on the syngas analysis
6. Natural gas GHG emission factors per 40 CFR 98 Table C-2 & IPCC AR5 (2014)

NOx and SOx emissions based on syngas from 80% Ag Wood+20% WWTP Biosolids. CO2, CO, VOC and PM emissions based on syngas from 100% Wood.

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Maximum Thermal Oxidizer TAC Emission Calculations

Syngas TAC Emissions

Pollutant	CAS No.	Emission Factor[1,2] (lb/MMscf)	Emission Factor (lb/MMBtu)	Uncontrolled Emissions (lb/hr)	Uncontrolled Emissions (lb/day)	Uncontrolled Emissions (lb/yr)	Control Efficiency	Controlled Emissions (lb/hr)	Controlled Emissions (lb/day)	Controlled Emissions (lb/yr)
Ammonia	7664417	3.72E-03	6.20E-06	4.09E-04	9.82E-03	3.58E+00	0.0%	4.09E-04	9.82E-03	3.58E+00
Benzene	71432	1.33E-03	2.22E-06	1.46E-04	3.51E-03	1.28E+00	0.0%	1.46E-04	3.51E-03	1.28E+00
Chlorobenzene	108907	3.08E-04	5.13E-07	3.39E-05	8.13E-04	2.97E-01	0.0%	3.39E-05	8.13E-04	2.97E-01
Ethyl Benzene	100414	2.61E-02	4.35E-05	2.87E-03	6.89E-02	2.51E+01	0.0%	2.87E-03	6.89E-02	2.51E+01
Formaldehyde	50000	1.46E+00	2.43E-03	1.61E-01	3.85E+00	1.41E+03	0.0%	1.61E-01	3.85E+00	1.41E+03
Hydrogen Sulfide	7783064	1.17E+00	1.95E-03	1.29E-01	3.09E+00	1.13E+03	0.0%	1.29E-01	3.09E+00	1.13E+03
Methyl Chloroform	71556	4.19E-03	6.98E-06	4.61E-04	1.11E-02	4.04E+00	0.0%	4.61E-04	1.11E-02	4.04E+00
Methylene Chloride	75092	8.67E-02	1.45E-04	9.54E-03	2.29E-01	8.35E+01	0.0%	9.54E-03	2.29E-01	8.35E+01
Perchloroethylene	127184	2.43E-03	4.05E-06	2.67E-04	6.42E-03	2.34E+00	0.0%	2.67E-04	6.42E-03	2.34E+00
Toluene	108883	9.59E-03	1.60E-05	1.05E-03	2.53E-02	9.24E+00	0.0%	1.05E-03	2.53E-02	9.24E+00
Vinyl Chloride	75014	1.32E-03	2.20E-06	1.45E-04	3.48E-03	1.27E+00	0.0%	1.45E-04	3.48E-03	1.27E+00
Vinylidene Chloride	75354	3.08E-04	5.13E-07	3.39E-05	8.13E-04	2.97E-01	0.0%	3.39E-05	8.13E-04	2.97E-01
Xylenes	1330207	5.57E-02	9.28E-05	6.13E-03	1.47E-01	5.37E+01	0.0%	6.13E-03	1.47E-01	5.37E+01

Natural Gas TAC Emissions

Pollutant	CAS No.	Emission Factor[1,3] (lb/MMscf)	Emission Factor (lb/MMBtu)	Uncontrolled Emissions (lb/hr)	Uncontrolled Emissions (lb/day)	Uncontrolled Emissions (lb/yr)	Control Efficiency	Controlled Emissions (lb/hr)	Controlled Emissions (lb/day)	Controlled Emissions (lb/yr)
Acetaldehyde	75070	3.10E-03	2.95E-06	1.18E-04	2.36E-03	2.36E-02	0.0%	1.18E-04	2.36E-03	2.36E-02
Acrolein	107028	2.70E-03	2.57E-06	1.03E-04	2.06E-03	2.06E-02	0.0%	1.03E-04	2.06E-03	2.06E-02
Benzene	71432	5.80E-03	5.52E-06	2.21E-04	4.42E-03	4.42E-02	0.0%	2.21E-04	4.42E-03	4.42E-02
Ethyl Benzene	100414	6.90E-03	6.57E-06	2.63E-04	5.26E-03	5.26E-02	0.0%	2.63E-04	5.26E-03	5.26E-02
Formaldehyde	50000	1.23E-02	1.17E-05	4.69E-04	9.37E-03	9.37E-02	0.0%	4.69E-04	9.37E-03	9.37E-02
Hexane	110543	4.60E-03	4.38E-06	1.75E-04	3.50E-03	3.50E-02	0.0%	1.75E-04	3.50E-03	3.50E-02
Naphthalene	91203	3.00E-04	2.86E-07	1.14E-05	2.29E-04	2.29E-03	0.0%	1.14E-05	2.29E-04	2.29E-03
PAH's	1151	1.00E-04	9.52E-08	3.81E-06	7.62E-05	7.62E-04	0.0%	3.81E-06	7.62E-05	7.62E-04
Propylene	115071	5.30E-01	5.05E-04	2.02E-02	4.04E-01	4.04E+00	0.0%	2.02E-02	4.04E-01	4.04E+00
Toluene	108883	2.65E-02	2.52E-05	1.01E-03	2.02E-02	2.02E-01	0.0%	1.01E-03	2.02E-02	2.02E-01
Xylenes	1330207	1.97E-02	1.88E-05	7.50E-04	1.50E-02	1.50E-01	0.0%	7.50E-04	1.50E-02	1.50E-01

Ammonia Slip and HCl Emissions										
Pollutant	**CAS No.**	**Stack Concentration (ppmv)**	**Emission Factor (lb/MMBtu)**	**Uncontrolled Emissions (lb/hr)**	**Uncontrolled Emissions (lb/day)**	**Uncontrolled Emissions (lb/yr)**	**Control Efficiency**	**Controlled Emissions (lb/hr)**	**Controlled Emissions (lb/day)**	**Controlled Emissions (lb/yr)**
Ammonia	7664417	10	8.21E-03	0.54	13.00	4745	0.0%	0.54	13.00	4,744.7
Hydrogen chloride (HCl)	7647010	-	7.58E-02	5.00	120.00	43800	99.0%	0.05	1.20	438.0

Total Thermal Oxidizer TAC Emissions				
Pollutant	**CAS No.**	**Controlled Emissions (lb/hr)**	**Controlled Emissions (lb/day)**	**Controlled Emissions (lb/yr)**
Acetaldehyde	75070	1.18E-04	2.36E-03	2.36E-02
Acrolein	107028	1.03E-04	2.06E-03	2.06E-02
Ammonia	7664417	5.42E-01	1.30E+01	4.75E+03
Benzene	71432	3.67E-04	7.93E-03	1.33E+00
Chlorobenzene	108907	3.39E-05	8.13E-04	2.97E-01
Ethyl Benzene	100414	3.13E-03	7.42E-02	2.52E+01
Formaldehyde	50000	1.61E-01	3.86E+00	1.41E+03
Hexane	110543	1.75E-04	3.50E-03	3.50E-02
Hydrogen chloride (HCl)	7647010	5.00E-02	1.20E+00	4.38E+02
Hydrogen Sulfide	7783064	1.29E-01	3.09E+00	1.13E+03
Methyl Chloroform	71556	4.61E-04	1.11E-02	4.04E+00
Methylene Chloride	75092	9.54E-03	2.29E-01	8.35E+01
Naphthalene	91203	1.14E-05	2.29E-04	2.29E-03
PAHs	1151	3.81E-06	7.62E-05	7.62E-04
Perchloroethylene	127184	2.67E-04	6.42E-03	2.34E+00
Propylene	115071	2.02E-02	4.04E-01	4.04E+00
Toluene	108883	2.06E-03	4.55E-02	9.44E+00
Vinyl Chloride	75014	1.45E-04	3.48E-03	1.27E+00
Vinylidene Chloride	75354	3.39E-05	8.13E-04	2.97E-01
Xylenes	1330207	6.88E-03	1.62E-01	5.38E+01

Data and Parameters

Process Flows - Syngas	***Heat Input***		max design heat input syngas from 100% wood	
Based on feedstock blend	54.20	MMBtu/hr	66	MMBtu/hr
	1,301	MMBtu/day	1,584	MMBtu/day
	474,792	MMBtu/yr	578,160	MMBtu/yr

Syngas F-factor	15770	dscf/MMBtu	Syngas Analysis, EPA Method 19			
Molar Volume	385.3	scf/lbmol	Constant, EPA Method 19			
Syngas Heating Value	144	Btu/scf	Project definition			
Syngas Exit Temp	900	F	Project definition			
Standard Temp	68	F				
Constant	460	R				
HHV Natural Gas	1050	Btu/scf			operating schedule for natural gas preheater	
Natural Gas Flow - max ho	40	MMBtu/hr	38,095	Scf/hr	10	startups/year
Natural Gas Flow - max da	800	MMBtu/day	761,905	scf/day	20	hrs/startup
Natural Gas Flow - annual	8000	MMBtu/year	7,619,048	scf/year	200	hr/year
Natural Gas F-factor	8710	dscf/MMBtu				
MW NOx	46	lb/lbmol				
MW SOX	64	lb/lbmol				
MW CO	28	lb/lbmol				
MW POC	16	lb/lbmol				
MW NH3	17	lb/lbmol	3.0	% Stack oxygen correction for NH3 emissions		
Conversion	7000	gr/lb	Constant			
HHV of Digester Gas[2]	600	Btu/scf	see footnote 2			

Calculated Stack Parameters			***Notes***
Stack Oxygen	10.9	%	Actual, per H&MB
Stack Temperature	300.0	F	Actual, per H&MB
Stack Temperature	760	R	Actual
Standard Temperature	528	R	EPA M19
Stack Moisture	11.6	%	Actual, per H&MB
Stack Flow, dry	36,151	dscf/min @ % O2	
Stack Flow, wet	40,346	wscf/min @ % O2	
Stack Flow, hot	58,074	wacf/min @ % O2 @ T	
Stack Flow, hot	1,644	wacm/min @ % O2 @ T	
Stack Diameter, ft	4.94	ft	minus TD
Stack Height, ft	48	ft	
Stack Diameter, m	**1.50**	**m**	
Stack Height, m	**14.6**	**m**	
Stack Area, m^2	1.78	m^2	
Exit Velocity, m/sec	**15.4**	**m/sec**	
Exit Temperature, K	**422**	**K**	

Notes

1. The Lebanon source test indicates that VOC emissions are zero. Volatile TAC are reported to ensure emissions are not underestimated.
2. Per SJVAPCD, "Digester Gas External and Internal Combustion Factors as developed by San Diego Country Air Pollution Control District" in the November 1993 memo. Emission factors converted from lb/mmscf to lb/MMBtu using the HHV for digester gas.
3. Per SJVAPCD, "Natural Gas Fired External Combustion Equipment" in the May 2001 update of VCAPCD AB 2588 Combustion Emission Factors (10-100 mmBTU/hr range for this device).
4. Ammonia emissions based on anticipated emission limit and 100% wood syngas F-factor
5. Max HCl hourly emissions from Aries. Control efficiency based on vendor specifications
6. TAC emissions estimated based on the maximum design heat input rating

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Feedstock Loading Criteria Pollutant Emissions				
Pollutant	**Emission Factor[1] (lb/ton)**	**(lb/hr)**	**(lb/day)**	**(lb/yr)**
PM_{10}	0.00004	0.002	0.019	7.08
$PM_{2.5}$	0.00001	0.000	0.003	1.07

Number of material handling drop points 3

Notes

1. USEPA AP42 Chapter 13.2.4 Aggregate Handling And Storage Piles, November 2006

Although there will be particulate controls, they are not included in the emission calculations, as the specifics are not yet known.

Drop Operations Emission Factors

EPA AP42 Chapter 13.2.4 (Aggregate Handling And Storage Piles) November 2006

$E = k * 0.0032 * (U/5)^{1.3} / (M/2)^{1.4}$

0.35	k for PM_{10}
0.053	k for $PM_{2.5}$
4.01	U = Mean Wind speed (mph) Wasco 2007-2011
	M = Moisture content of surface material (%) - biomass as received - from
17.88	Hazen Research analysis from testing on 4/27/17.
0.00004	lb of PM_{10}/ ton of material
0.00001	lb of $PM_{2.5}$/ ton of material

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Biochar Load-out PM10 Emissions				
Pollutant	**Emission Factor[1] (lb/ton)**	**(lb/hr)**	**(lb/day)**	**(lb/yr)**
PM_{10}	0.00586	0.006	0.15	52.95
$PM_{2.5}$	0.00089	0.001	0.02	8.02

Ratio of Char to Wood Wastes 15%

Notes

1. EPA AP42 Chapter 13.2.4 Aggregate Handling And Storage Piles, November 2006

Although there will be particulate controls, they are not included in the emission calculations, as the specifics are not yet known.

Drop Operations Emission Factors

USEPA AP42 Chapter 13.2.4 (Aggregate Handling And Storage Piles) November 2006

$E = k * 0.0032 * (U/5)^{1.3} / (M/2)^{1.4}$

0.35	k for PM_{10}
0.053	k for $PM_{2.5}$
4.01	U = Mean Wind speed (mph) Wasco 2007-2011
0.50	M = Moisture content of surface material (%) - biochar
0.00586	lb of PM_{10}/ ton of material
0.00089	lb of $PM_{2.5}$/ ton of material

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Diesel Emergency Generator Emissions Calculations

Operating Parameters	References/Remarks	Value	Units
Annual Throughput	ATCM	50	hrs/yr
Daily Throughput	maintenance operation	1	hrs/day
Hourly Throughput	Maximum	1.0	hrs/hr
	maintenance operation	0.5	hrs/hr
Monthly Schedule	maintenance operation	1	days/mo

Constants	References/Remarks	Value	Units
Diesel Fuel HHV	40 CFR 98 Table C-1	138000	BTU/gal
Heat Rate	AP-42 Table 3.3-1	7000	BTU/BHP-hr
Standard Molar Volume	EPA Method 19 (68°F, 20°C)	385.3	dscf/lb-mole
Dry Fd Factor	EPA Method 19 (68°F, 20°C)	9190	dscf/mmBTU
Wet Fw Factor	EPA Method 19 (68°F, 20°C)	10320	wscf/mmBTU

Release Parameters	References/Remarks	Value	Units
Generator Rating	Client specified	500	kW
Power Factor or Transfer Efficiency	Typical range is 80-100%	80%	percent
Engine Rating	Calculated from above	838	BHP
Hourly Heat Input	Calculated for heat rate	5.87	mmBTU/hr
Stack Exit Temperature	Client specified	900	°F
Stack Exit Temperature	Calculated for modeling	755	°K
Stack Height	Client specified	20.00	feet
Stack Height	Calculated for modeling	6.10	meters
Stack Diameter	Client specified	8.00	inches
Stack Diameter	Calculated for modeling	0.20	meters
Stack Velocity	Client specified	125	feet/sec
Stack Velocity	Calculated for modeling	38.10	meters/sec

Criteria Pollutants, TACs, GHGs	CAS No.	Emission Factor	Maximum Hourly	Annual Total		Annual Average	Hourly Maximum
		lb/hr	lb/hr	lb/yr	tons/yr	g/sec	g/sec
CO	630080	4.822	4.822	241.1	0.121	3.47E-03	6.08E-01
NO_x	10102440	4.822	4.822	241.1	0.121	3.47E-03	6.08E-01
PM_{10}	85101	0.055	0.055	2.8	0.001	3.96E-05	6.93E-03
$PM_{2.5}$	88101	0.055	0.055	2.8	0.001	3.96E-05	6.93E-03
VOC	43104	0.259	0.259	13.0	0.007	1.86E-04	3.26E-02
SO_x	7446095	0.009	0.009	0.5	0.000	6.47E-06	1.13E-03
Diesel Particulate Matter (DPM)	9901	0.055	0.055	2.8	0.001	—	—
CO_2	124389	956.5	956	47,824	21.7	—	—
CH_4	74828	0.039	0.039	1.95	0.001	—	—
N_2O	10024972	0.008	0.008	0.40	0.000	—	—
CO_2e	124389	959.8	960	47,988	21.8	—	—

Sources: 40 CFR 1039.101, 17 CCR 93115

Notes:

Assumes DPM = PM10

Annual GHGs in units of MT/yr

Tier 4 Factors from Nonroad Engines (CO, NO_X, PM, NMHC)			
Pollutant	g/BHP-hr for BHP	BHP	lb/hr
CO	2.610	838	4.822
NO_x	2.610	838	4.822
PM_{10}	0.030	838	0.055
$PM_{2.5}$ (99% of PM_{10})	0.0297	838	0.055
VOC (NMHC)	0.140	838	0.259
SO_x	0.005	838	0.009
DPM	0.030	838	0.055
CO_2	517.720	838	956.5
CH_4	0.021	838	0.039
N_2O	0.004	838	0.008
CO_2e	519.497	838	959.8

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Diesel Firewater Pump Emissions Calculations

Operating Parameters	References/Remarks	Value	Units
Annual Throughput	ATCM	50	hrs/yr
Daily Throughput	maintenance operation	1	hrs/day
Hourly Throughput	Maximum	1.0	hrs/hr
	maintenance operation	0.5	hrs/hr
Monthly Schedule	maintenance operation	1	days/mo

Constants	References/Remarks	Value	Units
Diesel Fuel HHV	40 CFR 98 Table C-1	138000	BTU/gal
Heat Rate	AP-42 Table 3.3-1	7000	BTU/BHP-hr
Standard Molar Volume	EPA Method 19 (68°F, 20°C)	385.3	dscf/lb-mole
Dry Fd Factor	EPA Method 19 (68°F, 20°C)	9190	dscf/mmBTU
Wet Fw Factor	EPA Method 19 (68°F, 20°C)	10320	wscf/mmBTU

Release Parameters	References/Remarks	Value	Units
Generator Rating	Client specified	150	kW
Power Factor or Transfer Efficiency	Typical range is 80-100%	100%	percent
Engine Rating	Calculated from above	201	BHP
Hourly Heat Input	Calculated for heat rate	1.41	mmBTU/hr
Stack Exit Temperature	Client specified	900	°F
Stack Exit Temperature	Calculated for modeling	755	°K
Stack Height	Client specified	16.00	feet
Stack Height	Calculated for modeling	4.88	meters
Stack Diameter	Client specified	4.00	inches
Stack Diameter	Calculated for modeling	0.10	meters
Stack Velocity	Client specified	150	feet/sec
Stack Velocity	Calculated for modeling	45.72	meters/sec

Criteria Pollutants, TACs, GHGs	CAS No.	Emission Factor	Maximum Hourly	Annual Total		Annual Average	Hourly Maximum
		lb/hr	lb/hr	lb/yr	tons/yr	g/sec	g/sec
CO	630080	1.157	1.157	57.9	0.029	8.32E-04	1.46E-01
NO_x	10102440	1.188	1.188	59.4	0.030	8.54E-04	1.50E-01
PM_{10}	85101	0.004	0.004	0.2	0.000	2.88E-06	5.04E-04
$PM_{2.5}$	88101	0.004	0.004	0.2	0.000	2.88E-06	5.04E-04
VOC	43104	0.132	0.132	6.6	0.003	9.49E-05	1.66E-02
SO_x	7446095	0.002	0.002	0.1	0.000	1.44E-06	2.52E-04
Diesel Particulate Matter (DPM)	9901	0.004	0.004	0.2	0.000	—	—
CO_2	124389	229.4	229	11,471	5.2	—	—
CH_4	74828	0.009	0.009	0.45	0.000	—	—
N_2O	10024972	0.002	0.002	0.10	0.000	—	—
CO_2e	124389	230.2	230	11,510	5.2	—	—

Sources: 40 CFR 1039.101, 17 CCR 93115

Notes:

Assumes DPM = PM10

Annual GHGs in units of MT/yr

Tier 3 Factors from Nonroad Engines (CO, NO_X, PM, NMHC)			
Pollutant	g/BHP-hr for BHP	BHP	lb/hr
CO	2.610	201	1.157
NO_x	2.682	201	1.188
PM_{10}	0.010	201	0.004
$PM_{2.5}$ (99% of PM_{10})	0.0099	201	0.004
VOC (NMHC)	0.298	201	0.132
SO_x	0.005	201	0.002
DPM	0.010	201	0.004
CO_2	517.720	201	229.4
CH_4	0.021	201	0.009
N_2O	0.004	201	0.002
CO_2e	519.497	201	230.2

Tier 4 PM10 EF used due to particulate filter

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Operational Mobile Sources Emissions Summary

Criteria Pollutants	Offsite Travel				Near Offsite Travel				Onsite Travel			
	Hourly Emissions (lb/hr)	Daily Emissions (lb/day)	Annual Emissions (lb/yr)	Annual Emissions (ton/yr)	Hourly Emissions (lb/hr)	Daily Emissions (lb/day)	Annual Emissions (lb/yr)	Annual Emissions (ton/yr)	Hourly Emissions (lb/hr)	Daily Emissions (lb/day)	Annual Emissions (lb/yr)	Annual Emissions (ton/yr)
VOC	0.031	0.7	242	0.12	9.74E-05	2.34E-03	0.76	3.78E-04	2.34E-05	5.61E-04	0.18	9.07E-05
NO_X	0.801	19.2	6,271	3.14	2.50E-03	6.00E-02	19.60	9.80E-03	6.00E-04	1.44E-02	4.70	2.35E-03
CO	0.337	8.1	2,364	1.18	1.05E-03	2.53E-02	7.39	3.69E-03	2.53E-04	6.06E-03	1.77	8.87E-04
SO_X	0.004	0.1	30	0.02	1.21E-05	2.92E-04	0.09	4.72E-05	2.92E-06	7.00E-05	0.02	1.13E-05
Fugitive PM_{10}	0.548	13.1	4,260	2.13	2.73E-01	6.55E+00	2,391.87	1.20E+00	1.74E-01	4.17E+00	1,522.46	7.61E-01
DPM (exhaust PM_{10})	0.004	0.1	31	0.02	1.23E-05	2.95E-04	0.10	4.88E-05	2.95E-06	7.08E-05	0.02	1.17E-05
Total PM_{10}	0.552	13.2	4,291	2.15	2.73E-01	6.55E+00	2,391.97	1.20E+00	1.74E-01	4.17E+00	1,522.48	7.61E-01
Fugitive $PM_{2.5}$	0.138	3.3	1,075	0.54	2.76E-02	6.61E-01	241.39	1.21E-01	1.74E-02	4.17E-01	152.25	7.61E-02
Exhaust $PM_{2.5}$	0.004	0.1	30	0.01	1.17E-05	2.81E-04	0.09	4.66E-05	2.81E-06	6.74E-05	0.02	1.12E-05
Total $PM_{2.5}$	0.142	3.4	1,105	0.55	2.76E-02	6.62E-01	241.48	1.21E-01	1.74E-02	4.17E-01	152.27	7.61E-02

Sources: CalEEMod version 2016.3.2

Notes:

lb/day are summer or winter maxima for mobile sources

Total PM_{10} / $PM_{2.5}$ comprises fugitive road dust plus engine exhaust

Offsite travel emissions are based on 160 miles round trip, all on paved roads.

Near offsite travel is based on 0.25 miles round trip on unpaved roads on the Holloway site and 0.25 miles round trip on paved roads on Holloway Road.

Onsite travel is based on 0.12 miles round trip on unpaved roads

Near offsite travel and onsite travel fugitive dust emissions are calculated using EPA AP-42 emission factors.

Operational Mobile Sources GHG

Greenhouse Gases	Annual Emissions (MT/yr)
CO_2	1,429
CH_4	0.02
N_2O	0.00
CO_2e	1,430

Sources: CalEEMod version 2016.3.2

GHG emissions are based on 160 miles round trip.

Road Dust Emissions

Purpose	Vehicle Type	Vehicles per day	Vehicles per week	Vehicles per year
Trucks	HHDT Trucks	14.31	100	5209
Workers	Passenger vehicles	12.43	87	4524

Location	Purpose	Road Surface	Vehicles per year	Distance travelled onsite roundtrip (miles/trip)	Distance travelled onsite roundtrip (miles/year)	PM10 Dust Emission factor (lb/VMT)	PM10 Dust Emissions (lb/yr)	PM10 Dust Emissions (ton/yr)	PM2.5 Dust Emission factor (lb/VMT)	PM2.5 Dust Emissions (lb/yr)	PM2.5 Dust Emissions (ton/yr)
Onsite	Trucks	Unpaved	5209	0.12	625	1.8252	1140.83	0.57	0.1825	114.08	0.06
	Workers	Unpaved	4524	0.12	542.88	0.7030	381.62	0.19	0.0703	38.16	0.02
					Total Onsite Dust Emissions		**1,522.46**	**0.76**		**152.25**	**0.08**
Near Offsite	Trucks - Holloway Site	Unpaved	5209	0.25	1302	1.8252	2376.74	1.19	0.1825	237.67	0.12
	Trucks - Holloway Road	Paved	5209	0.25	1302	0.0106	13.76	0.01	0.0026	3.38	0.002
	Workers - Holloway Road	Paved	4524	0.25	1131	0.0012	1.37	0.001	0.0003	0.34	0.000
					Total Near Offsite Dust Emissions		**2,391.87**	**1.20**		**241.39**	**0.12**

Notes:

HHDT = Heavy-heavy-duty trucks

Fugitive Road Dust Emission Factors

EPA AP-42 13.2.2 Unpaved Roads, November 2006

$E = k (s/12)^a \times (W/3)^b \times (365-P/365)$

k = particle size multiplier for particle size range and units of interest

20 W = average weight (tons) of the Trucks traveling the road

2.4 W = average weight (tons) of the passenger vehicles traveling the road

6.40 s = surface material silt content (%) - from EPA Table 13.2.2-1. for Municipal solid waste landfills

32 P = number of "wet" days with at least 0.254 mm (0.01 in) of precipitation during the averaging period (from 2007-2011 Wasco)

365 N = number of days in the averaging period = 365 for annual

	PM2.5	PM10
k	0.15	1.5
a	0.9	0.9
b	0.45	0.45

for Industrial roads

AP 42 13.2.1 Paved Roads, updated January 2011

For annual basis,

$E = k\,(sL)^{0.91} \times (W)^{1.02} \times (1-P/4N)$

k = particle size multiplier for particle size range and units of interest

20 W = average weight (tons) of the Trucks traveling the road

2.4 W = average weight (tons) of the passenger vehicles traveling the road

0.2 sL = road surface silt loading (g/m^2) from Table 13.2.1-2 for ADT < 500

32 P = number of "wet" days with at least 0.254 mm (0.01 in) of precipitation during the averaging period (from 2007-2011 Wasco)

365 N = number of days in the averaging period = 365 for annual

	k
	lb/VMT
PM2.5	0.00054
PM10	0.0022

Model Inputs

The District recommends the following for modeling vehicles on paved roadways:

				AERMOD View
1. Separate volume sources	feet	meter		input (m)
2. Top of Plume Height = 1.0 x VH	13.5	4.11	PH	4.11
3. Volume Source Release Height = 0.5 x Top of Plume Height	6.75	2.06	release ht	2.06
VW = vehicle width	8.5	2.59		
4. Width of Plume = VW or lane width (Each lane should be modeled separately.)	28.2	8.59	PW	4.30
From EPA - Width of Plume = VW + 6m for single lane roadways / Road Width + 6m				
5. Initial Sigma Z - Top of Plume Height/2.15	6.28	1.91	~= initial vertical dimension calculated in AERMOD	
6. Initial Sigma Y - Width of Plume/2.15	13.11	4.00	~= initial lateral dimension calculated in AERMOD	
7. Emissions input as g/s				

SJVAPCD Guidance from Glenn T. Reed, Senior Air Quality Specialist, Thursday, August 22, 2013

				Hourly Emissions (g/s)					Annual Emissions (g/s)			DPM (lb/yr)
truck segments	**Volume source length (m)**	**Emissions estimation distance basis (m)**	**Round trip distance (mile)**	**NOx**	**SO2**	**CO**	**PM10**	**PM2.5**	**NOx**	**PM10**	**PM2.5**	
ONTRDS	100.1	96.6	0.12				2.27E-02	2.27E-03		2.27E-02	2.27E-03	
ONTREX	100.1	96.6	0.12	7.85E-05	3.81E-07	3.30E-05	3.86E-07	3.67E-07	7.02E-05	3.49E-07	3.34E-07	2.43E-02
OFFTRUDS	195.2	201.2	0.25				3.32E-02	3.32E-03				
OFFTRUEX	195.2	201.2	0.25	1.53E-04	7.43E-07	6.44E-05	7.52E-07	7.16E-07	1.37E-04	3.32E-02	3.32E-03	4.73E-02
OFFTRPDS	201	201.2	0.25				2.18E-04	5.34E-05				
OFFTRPEX	201	201.2	0.25	1.58E-04	7.65E-07	6.63E-05	7.74E-07	7.37E-07	1.41E-04	2.18E-04	5.41E-05	4.87E-02

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Lebanon, TN Source Test Results - April 27, 2017 (80% Ag Wood+20% WWTP Biosolids)					
Parameter	**Units**	**Run 1**	**Run 2**	**Average**	**Adjusted for Feedstock Ratios[1,2]**
Check Test Report Calculations (wood Fd)					
Stack Flowrate, wet actual	wacfm	15593	13993	—	—
Stack Temp, T1	F	366.38	331.88	—	—
Standard Temp, T2	F	68	68	—	—
Gas Law Temp Correction, T2/T1	ratio	0.639	0.667	—	—
Stack Press, P1	in. Hg	29.3826	29.3826	—	—
Standard Press, P2	in. Hg	29.9213	29.9213	—	—
Gas Law Press Correction, P1/P2	ratio	0.982	0.982	—	—
Stack Flowrate, wet standard	wscfm	9783	9162	—	—
Stack Moisture	percent	8.7%	7.8%	—	—
Stack Flowrate, dry standard	dscfm	8932	8447	—	*matches rpt*
Stack Oxygen	% O2	15.79%	15.40%	—	—
Stack Flowrate, stoichiometric	dscfm	2184	2223	—	—
Average Dry Fd, wood feedstock (ultimate analysis, lab report)	dscf/mmBTU	10134	10134	—	—
Heat Input, reported	mmBTU/hr	12.93	13.16	13.05	—
Recalculate Test Report Results (syngas Fd for wood)					
Stack Flowrate, stoichiometric	dscfm	2184	2223	—	—
Dry Fd, syngas to TO (wood Fd)	dscf/mmBTU	15350	15350	—	—
Heat Input, recalculated	**mmBTU/hr**	**8.54**	**8.69**	—	—
PM10 Results [4]					
Tested PM10	gr/dscf	0.0093	0.0235		
Tested PM10	lb/hr	0.712	1.702		
Tested PM10 (wood Fd)	lb/mmBTU	0.055	0.129	0.092	*matches rpt*
Recalculated PM10 (syngas Fd)	**lb/mmBTU**	**0.083**	**0.196**	**0.140**	
CO Results					
Tested CO	ppmv	1.43	0.92		
Tested CO	lb/hr	0.056	0.034		
Tested CO (wood Fd)	lb/mmBTU	0.004	0.003	0.003	*matches rpt*
Recalculated CO (syngas Fd)	**lb/mmBTU**	**0.0065**	**0.0039**	**0.005**	
NOx Results					
Tested NO_X	ppmv	71	52	—	—
Tested NO_X	lb/hr	4.54	3.15	—	—
Tested NO_X (wood Fd)	lb/mmBTU	0.351	0.239	0.295	*matches rpt*
Recalculated NO_X (syngas Fd)	**lb/mmBTU**	**0.532**	**0.362**	**0.447**	**1.102**
SOx Results					
Tested SO_2	ppmv	6	8	—	—
Tested SO_2	lb/hr	0.53	0.67	—	—
Tested SO_2 (wood Fd)	lb/mmBTU	0.041	0.051	0.046	*matches rpt*
Recalculated SO_2 (sybgas Fd)	**lb/mmBTU**	**0.063**	**0.078**	**0.070**	**0.722**
VOC Results [5]					
Tested VOC	ppmv	0	0	—	—
Tested VOC	lb/hr	0.00	0.00	—	—
Tested VOC (wood Fd)	lb/mmBTU	0.000	0.000	0.000	*matches rpt*
Recalculated PM10 (syngas Fd)	**lb/mmBTU**	**0.000**	**0.000**	—	**0.0005**

Proposed feedstock nitrogen content fraction (dry)	*1.48%*
Average nitrogen content fraction wood tested (dry) [3]	*0.54%*
Fuel NOx conversion ratio (estimated upper-bound average)	*85%*
Aggregate nitrogen content correction factor (maximum theoretical increase in NOx formation)	*146.5%*

Notes

Ref: Investigative Air Emissions Test, PHG Gasifier/Thermal Oxidizer, City of Lebanon, TN, Gasification Facility, test date 4/27/17. Report date June 29, 2017.

1. Estimated adjusted NO_X EF scales-up the wood test data to match the proposed feedstock nitrogen content.
2. Estimated adjusted SO_2 EF calculated from feedstock ultimate analysis taking into account char residue (mass balance)
3. Nitrogen content from Hazen Research analysis from testing on 4/27/17.
4. PM 92% filter efficiency results in gas solids loading of 0.003 gr/scf vs. Tri-Mer quoted performance at ~0.0021 gr/scf
5. The detection limit for VOC using Method 25A is ~0.1 ppm or ~0.0005 lb/mmBTU

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Aries-Holloway Feedstock Basis (80% Ag Wood+20% WWTP Biosolids)			
Parameter	**Woody Ag Waste (Almond Trees)**	**WWTP Solids**	**Composite Feedstock**
Weight Fraction, %	80.0%	20%	100%
Moisture, %	20%	20%	20%
HHV, BTU/lb	8,370	6,392	7,974
Proximate Analysis, %			
Ash	1.88%	36.40%	8.78%
Volatile Matter	79.01%	63.60%	75.93%
Fixed Carbon	19.11%	0.00%	15.29%
Totals	*100.00%*	*100.00%*	*100.00%*
Ultimate Analysis, %			
Carbon	49.17%	30.36%	45.41%
Hydrogen	5.92%	4.49%	5.63%
Nitrogen	0.62%	4.92%	1.48%
Sulfur	0.01%	1.40%	0.29%
Ash	1.88%	36.40%	8.78%
Chlorine	0.04%	0.00%	0.03%
Oxygen	42.36%	22.43%	38.37%
Totals	*100.00%*	*100.00%*	*100.00%*

Calculated SO_2 Emission Factor (estimated)		
Sulfur content	0.00288	lb/lb
HHV	7,974	BTU/lb
Sulfur content	0.361	lb/mmBTU
Sulfur MW	32	lb/mole
SO_2 MW	64	lb/mole
SO_2 emission factor	**0.722**	**lb/mmBTU**

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Fuel Gas Sampling & Analysis Results (80% Ag Wood+20% WWTP Biosolids)		
Parameter	**Units**	**Value**
Analysis Results		
Hydrogen	volume % (dry)	17.70
Ammonia	volume % (dry)	0.00
Nitrogen[1]	volume % (dry)	47.60
Oxygen	volume % (dry)	0.00
Argon	volume % (dry)	0.60
Carbon Dioxide	volume % (dry)	13.20
Carbon Monoxide	volume % (dry)	18.00
Methane	volume % (dry)	2.90
Sulfur	volume % (dry)	
Total Constituents	**volume % (dry)**	**100.00**
Calculated Properties		
Molecular Weight (MW)	lb/lb-mole	25.25
Higher Heating Value (HHV)	Btu/dscf	144.4
	Btu/lb	2,170
Dry Fd Factor @ 68 °F	dscf/MMBtu	15,770
GHG Content	lb CO_2e/MMBtu	175.0
Thermal Oxidizer Rates		
Syngas Flowrate	dscf/hr	375430
Heat Input	MMBtu/hr	54.20

Notes:

375,430 scf/hr per Aries on 4/1/19

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Fuel Gas Composition Properties Calculation Tool (80% Ag Wood+20% WWTP Biosolids)																
Component Gas	Chemical Formula	nC	nH	Molecular Weight	Boiling Point (°F)	HHV (BTU/scf)	HHV (mmBTU/ mole)	Fuel Gas Composition - Dry Basis					Stack Gas CO_2 Content		
								Volume %	mole fract.	lb/mole	Weight %	BTU/scf	lb/mole	lb/mmBTU	lb/mmBTU
Hydrogen	H_2	0	2	2.016	-423.20	324	0.123	17.7	0.1770	0.357	1.413	57.36	0.00	0.00	0.00
Ammonia	NH_3	0	3	17.031	-28.01	434	0.165		0.0000	0.000	0.000	0.00	0.00	0.00	0.00
Nitrogen	N_2	0	0	28.014	-320.40	0	0.000	47.6	0.4760	13.335	52.816	0.00	0.00	0.00	0.00
Oxygen	O_2	0	0	31.998	-297.40	0	0.000		0.0000	0.000	0.000	0.00	0.00	0.00	0.00
Argon	Ar	0	0	39.948	-302.53	0	0.000	0.6	0.0060	0.240	0.949	0.00	0.00	0.00	0.00
Carbon Dioxide	CO_2	1	0	44.009	-109.30	0	0.000	13.2	0.1320	5.809	23.009	0.00	44.01	0.00	*106.03*
Carbon Monoxide	CO	1	0	28.010	-312.70	321	0.122	18.0	0.1800	5.042	19.970	57.72	44.01	361.62	65.09
Methane	CH_4	1	4	16.043	-258.69	1,010	0.383	2.9	0.0290	0.465	1.843	29.28	44.01	114.85	3.33
Ethane	C_2H_6	2	6	30.070	-127.48	1,769	0.671		0.0000	0.000	0.000	0.00	88.02	131.12	0.00
Propane	C_3H_8	3	8	44.097	-43.67	2,518	0.955		0.0000	0.000	0.000	0.00	132.03	138.19	0.00
Iso-Butane	C_4H_{10}	4	10	58.124	10.90	3,253	1.234		0.0000	0.000	0.000	0.00	176.04	142.61	0.00
N-Butane	C_4H_{10}	4	10	58.124	31.10	3,262	1.238		0.0000	0.000	0.000	0.00	176.04	142.20	0.00
Iso-Pentane	C_5H_{12}	5	12	72.151	82.12	4,000	1.518		0.0000	0.000	0.000	0.00	220.05	144.95	0.00
N-Pentane	C_5H_{12}	5	12	72.151	96.92	4,010	1.522		0.0000	0.000	0.000	0.00	220.05	144.61	0.00
Hexane (C6+)	C_6H_{14}	6	14	86.178	155.72	4,756	1.805		0.0000	0.000	0.000	0.00	264.05	146.29	0.00
Total Reduced S	S	0	0	32.064		333	0.126		0.0000	0.000	0.000	0.00	0.00	0.00	0.00
Hydrogen Sulfide	H_2S	0	2	34.080		637	0.242		0.0000	0.000	0.000	0.00	0.00	0.00	0.00
TOTALS								**100.00**	**1.000**	**25.25**	**100.00**	**144.37**			**174.45**

Ref: J.H. Gary & G.E Hendwerk, Petroleum Refining - Technology & Economics, Appendix B, 2nd Edition, Marcel Dekker, New York, 1984. (all published values at 60°F = 520 °R)

Fuel Gas Standard Molar Volume (reference)		
Standard Temperature	60	°F (choose from list)
Standard Temperature	15.56	°C
Gas Constant	0.082057338	L atm K^{-1} mol^{-1}
Standard Molar Volume	23.691	liter/g-mole
	379.5	**dscf/lb-mole**

Calculated GHG Emission Factor (CO_2e)	
Biogas	Fuel Gas Type (choose from list)
174.45	lb CO_2/mmBTU (calculated from composition)
0.00705	lb CH_4/mmBTU (40 CFR 98 Table C-2)
0.00139	lb N_2O/mmBTU (40 CFR 98 Table C-2)
175.0	**lb CO_2e/mmBTU (IPCC 2014 AR5 GWPs)**

Higher Heating Values (HHV)	
144.4	**BTU/dscf**
25.25	MW, lb/lb-mole
2,170	**BTU/lb**
0.055	mmBTU/mole

Dry Fd Factor Calculation - EPA Method 19 (68°F) - Weight Percent Basis															
Stack Gas Component	K Factor, scf/lb	H_2	NH_3	Free N_2	Free O_2	Inert Ar	Inert CO_2	CO	CH_4	C_2H_6	C_3H_8	C_4H_{10}	C_5H_{12}	C_6H_{14}	S
Carbon	1.533	–	–	–	–	–	–	13.127	2.115	0.000	0.000	0.000	0.000	0.000	–
Hydrogen (dry)	3.636	5.139	0.000	–	–	–	–	–	1.684	0.000	0.000	0.000	0.000	0.000	–
Carbon Dioxide (inert)	0.088	–	–	–	–	–	2.025	–	–	–	–	–	–	–	–
Nitrogen (free)	0.138	–	–	7.289	–	–	–	–	–	–	–	–	–	–	–
Nitrogen (bound)	0.275	–	0.000	–	–	–	–	–	–	–	–	–	–	–	–
Oxygen (free)	0.457	–	–	–	0.000	–	–	–	–	–	–	–	–	–	–
Oxygen (bound)	0.241	–	–	–	–	–	–	2.749	–	–	–	–	–	–	–
Argon (inert)	0.096	–	–	–	–	0.091	–	–	–	–	–	–	–	–	–
Sulfur	0.567	–	–	–	–	–	–	–	–	–	–	–	–	–	0.000

Dry Fd Factor Result	
∑ Components, dscf/lb	34.219
K, BTU/mmBTU	1.00E+06
GCV (HHV), BTU/lb	2,170
Fd, dscf/mmBTU @ 68 °F	**15,770**
Fd, dscf/mmBTU @ Temp	**15,530**

40 CFR 98 Table C-2 (lb/mmBTU) & IPCC 2014 GWPs				
AR5 GWP	**1**	**28**	**265**	**Default**
Fuel Type	**DF CO_2**	**CH_4**	**N_2O**	**CO_2e**
Natural Gas	116.89	0.00220	0.00022	117.01
Biogas	114.80	0.00705	0.00139	115.36
LPG	138.85	0.00661	0.00132	139.38

Method 19 K Factor Conversions	
ft^3/m^3	35.3147
lb/kg	2.2046
Conversion, m^3/kg to scf/lb	16.0185

Composition Data Source: Aries syngas analysis provided 4/1/19

ATTACHMENT D –AERMOD INPUT PARAMETERS

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```
**
**************************************
**
** AERMOD Input Produced by:
** AERMOD View Ver. 9.6.5
** Lakes Environmental Software Inc.
** Date: 4/30/2019
** File: C:\Lakes\AERMOD View\AriesLostHills\AriesLostHills.ADI
**
**************************************
**
**
**************************************
** AERMOD Control Pathway
**************************************
**
**
CO STARTING
  TITLEONE Aries Lost Hills HRA
  MODELOPT DFAULT CONC
  AVERTIME 1 PERIOD
  POLLUTID TAC
  RUNORNOT RUN
  ERRORFIL AriesLostHills.err
CO FINISHED
**
**************************************
** AERMOD Source Pathway
**************************************
**
**
SO STARTING
** Source Location **
** Source ID - Type - X Coord. - Y Coord. **
  LOCATION TO          POINT     249935.146  3948150.548     126.890
** DESCRSRC thermal oxidizer
  LOCATION WOODLOAD    VOLUME    249856.840  3948351.760     127.840
** DESCRSRC Feedstock loading
  LOCATION BIOCHAR     VOLUME    249862.948  3948291.040     127.590
** DESCRSRC biochar loadout
  LOCATION FIRE        POINT     249831.400  3948227.390     126.620
** DESCRSRC fire water pump
  LOCATION GEN         POINT     249841.580  3948165.650     126.410
** DESCRSRC emergency generator
```

```
** ----------------------------------------------------------------------
** Line Source Represented by Separated Volume Sources
** LINE VOLUME Source ID = ONTRUCK
** DESCRSRC onsite trucks
** PREFIX
** Length of Side = 4.30
** Configuration = Separated
** Emission Rate = 1.0
** Vertical Dimension = 4.11
** SZINIT = 1.91
** Nodes = 4
** 249846.951, 3948291.229, 127.40, 2.06, 3.71
** 249846.806, 3948352.777, 127.71, 2.06, 3.71
** 249827.344, 3948366.497, 127.68, 2.06, 3.71
** 249824.123, 3948380.891, 127.71, 2.06, 3.71
** ----------------------------------------------------------------------
  LOCATION L0000792    VOLUME   249846.946 3948293.379 127.45
  LOCATION L0000793    VOLUME   249846.927 3948301.364 127.53
  LOCATION L0000794    VOLUME   249846.908 3948309.348 127.61
  LOCATION L0000795    VOLUME   249846.889 3948317.332 127.69
  LOCATION L0000796    VOLUME   249846.870 3948325.316 127.69
  LOCATION L0000797    VOLUME   249846.852 3948333.300 127.69
  LOCATION L0000798    VOLUME   249846.833 3948341.284 127.69
  LOCATION L0000799    VOLUME   249846.814 3948349.268 127.71
  LOCATION L0000800    VOLUME   249843.148 3948355.356 127.73
  LOCATION L0000801    VOLUME   249836.622 3948359.956 127.71
  LOCATION L0000802    VOLUME   249830.096 3948364.556 127.69
  LOCATION L0000803    VOLUME   249826.336 3948371.001 127.72
  LOCATION L0000804    VOLUME   249824.592 3948378.793 127.77
** End of LINE VOLUME Source ID = ONTRUCK
** ----------------------------------------------------------------------
** Line Source Represented by Separated Volume Sources
** LINE VOLUME Source ID = OFFTRKUNP
** DESCRSRC Near offsite trucks unpaved road
** PREFIX
** Length of Side = 4.30
** Configuration = Separated
** Emission Rate = 1.0
** Vertical Dimension = 4.11
** SZINIT = 1.91
** Nodes = 5
** 249820.439, 3948394.603, 127.72, 2.06, 3.86
** 249794.481, 3948451.364, 127.73, 2.06, 3.86
** 249756.195, 3948479.122, 127.43, 2.06, 3.86
```

** 249724.290, 3948477.207, 127.36, 2.06, 3.86
** 249677.149, 3948451.744, 126.96, 2.06, 3.86
** ----------
LOCATION L0000853 VOLUME 249819.545 3948396.558 127.72
LOCATION L0000854 VOLUME 249816.092 3948404.108 127.69
LOCATION L0000855 VOLUME 249812.639 3948411.658 127.66
LOCATION L0000856 VOLUME 249809.187 3948419.208 127.65
LOCATION L0000857 VOLUME 249805.734 3948426.758 127.66
LOCATION L0000858 VOLUME 249802.281 3948434.308 127.69
LOCATION L0000859 VOLUME 249798.828 3948441.858 127.73
LOCATION L0000860 VOLUME 249795.376 3948449.408 127.74
LOCATION L0000861 VOLUME 249789.501 3948454.975 127.72
LOCATION L0000862 VOLUME 249782.780 3948459.848 127.65
LOCATION L0000863 VOLUME 249776.059 3948464.721 127.58
LOCATION L0000864 VOLUME 249769.337 3948469.594 127.53
LOCATION L0000865 VOLUME 249762.616 3948474.467 127.51
LOCATION L0000866 VOLUME 249755.824 3948479.100 127.52
LOCATION L0000867 VOLUME 249747.537 3948478.602 127.52
LOCATION L0000868 VOLUME 249739.250 3948478.105 127.51
LOCATION L0000869 VOLUME 249730.963 3948477.608 127.51
LOCATION L0000870 VOLUME 249722.867 3948476.439 127.44
LOCATION L0000871 VOLUME 249715.563 3948472.493 127.32
LOCATION L0000872 VOLUME 249708.258 3948468.548 127.21
LOCATION L0000873 VOLUME 249700.954 3948464.602 127.12
LOCATION L0000874 VOLUME 249693.649 3948460.657 127.09
LOCATION L0000875 VOLUME 249686.345 3948456.711 127.06
LOCATION L0000876 VOLUME 249679.040 3948452.766 127.00
** End of LINE VOLUME Source ID = OFFTRKUNP
** ----------
** Line Source Represented by Separated Volume Sources
** LINE VOLUME Source ID = OFFTRKPAVE
** DESCRSRC Near offsite trucks paved road
** PREFIX
** Length of Side = 4.30
** Configuration = Separated
** Emission Rate = 1.0
** Vertical Dimension = 4.11
** SZINIT = 1.91
** Nodes = 2
** 249665.978, 3948447.107, 126.77, 2.06, 3.98
** 249758.838, 3948268.815, 126.52, 2.06, 3.98
** ----------
LOCATION L0000829 VOLUME 249666.971 3948445.200 126.86
LOCATION L0000830 VOLUME 249670.922 3948437.614 126.82

```
  LOCATION L0000831    VOLUME   249674.873 3948430.028 126.78
  LOCATION L0000832    VOLUME   249678.824 3948422.442 126.75
  LOCATION L0000833    VOLUME   249682.775 3948414.856 126.71
  LOCATION L0000834    VOLUME   249686.726 3948407.270 126.68
  LOCATION L0000835    VOLUME   249690.677 3948399.684 126.72
  LOCATION L0000836    VOLUME   249694.628 3948392.098 126.76
  LOCATION L0000837    VOLUME   249698.579 3948384.512 126.80
  LOCATION L0000838    VOLUME   249702.531 3948376.926 126.80
  LOCATION L0000839    VOLUME   249706.482 3948369.340 126.80
  LOCATION L0000840    VOLUME   249710.433 3948361.754 126.80
  LOCATION L0000841    VOLUME   249714.384 3948354.168 126.80
  LOCATION L0000842    VOLUME   249718.335 3948346.582 126.79
  LOCATION L0000843    VOLUME   249722.286 3948338.996 126.78
  LOCATION L0000844    VOLUME   249726.237 3948331.410 126.78
  LOCATION L0000845    VOLUME   249730.188 3948323.824 126.80
  LOCATION L0000846    VOLUME   249734.139 3948316.238 126.79
  LOCATION L0000847    VOLUME   249738.090 3948308.652 126.73
  LOCATION L0000848    VOLUME   249742.041 3948301.066 126.70
  LOCATION L0000849    VOLUME   249745.992 3948293.480 126.69
  LOCATION L0000850    VOLUME   249749.943 3948285.894 126.70
  LOCATION L0000851    VOLUME   249753.894 3948278.308 126.67
  LOCATION L0000852    VOLUME   249757.845 3948270.722 126.62
** End of LINE VOLUME Source ID = OFFTRKPAVE
** Source Parameters **
  SRCPARAM TO             1.0    14.630   422.039  12.70000     1.506
  SRCPARAM WOODLOAD         1.0     2.073     2.370     1.928
  SRCPARAM BIOCHAR          1.0     2.073     1.984     1.928
  SRCPARAM FIRE             1.0     4.877   755.372  45.72000     0.102
  SRCPARAM GEN              1.0     6.096   755.372  38.10000     0.203
** LINE VOLUME Source ID = ONTRUCK
  SRCPARAM L0000792    0.0769230769     2.06     3.71     1.91
  SRCPARAM L0000793    0.0769230769     2.06     3.71     1.91
  SRCPARAM L0000794    0.0769230769     2.06     3.71     1.91
  SRCPARAM L0000795    0.0769230769     2.06     3.71     1.91
  SRCPARAM L0000796    0.0769230769     2.06     3.71     1.91
  SRCPARAM L0000797    0.0769230769     2.06     3.71     1.91
  SRCPARAM L0000798    0.0769230769     2.06     3.71     1.91
  SRCPARAM L0000799    0.0769230769     2.06     3.71     1.91
  SRCPARAM L0000800    0.0769230769     2.06     3.71     1.91
  SRCPARAM L0000801    0.0769230769     2.06     3.71     1.91
  SRCPARAM L0000802    0.0769230769     2.06     3.71     1.91
  SRCPARAM L0000803    0.0769230769     2.06     3.71     1.91
  SRCPARAM L0000804    0.0769230769     2.06     3.71     1.91
** ----------------------------------------------------------------------
```

** LINE VOLUME Source ID = OFFTRKUNP

SRCPARAM L0000853	0.0416666667	2.06	3.86	1.91
SRCPARAM L0000854	0.0416666667	2.06	3.86	1.91
SRCPARAM L0000855	0.0416666667	2.06	3.86	1.91
SRCPARAM L0000856	0.0416666667	2.06	3.86	1.91
SRCPARAM L0000857	0.0416666667	2.06	3.86	1.91
SRCPARAM L0000858	0.0416666667	2.06	3.86	1.91
SRCPARAM L0000859	0.0416666667	2.06	3.86	1.91
SRCPARAM L0000860	0.0416666667	2.06	3.86	1.91
SRCPARAM L0000861	0.0416666667	2.06	3.86	1.91
SRCPARAM L0000862	0.0416666667	2.06	3.86	1.91
SRCPARAM L0000863	0.0416666667	2.06	3.86	1.91
SRCPARAM L0000864	0.0416666667	2.06	3.86	1.91
SRCPARAM L0000865	0.0416666667	2.06	3.86	1.91
SRCPARAM L0000866	0.0416666667	2.06	3.86	1.91
SRCPARAM L0000867	0.0416666667	2.06	3.86	1.91
SRCPARAM L0000868	0.0416666667	2.06	3.86	1.91
SRCPARAM L0000869	0.0416666667	2.06	3.86	1.91
SRCPARAM L0000870	0.0416666667	2.06	3.86	1.91
SRCPARAM L0000871	0.0416666667	2.06	3.86	1.91
SRCPARAM L0000872	0.0416666667	2.06	3.86	1.91
SRCPARAM L0000873	0.0416666667	2.06	3.86	1.91
SRCPARAM L0000874	0.0416666667	2.06	3.86	1.91
SRCPARAM L0000875	0.0416666667	2.06	3.86	1.91
SRCPARAM L0000876	0.0416666667	2.06	3.86	1.91

** ----------

** LINE VOLUME Source ID = OFFTRKPAVE

SRCPARAM L0000829	0.0416666667	2.06	3.98	1.91
SRCPARAM L0000830	0.0416666667	2.06	3.98	1.91
SRCPARAM L0000831	0.0416666667	2.06	3.98	1.91
SRCPARAM L0000832	0.0416666667	2.06	3.98	1.91
SRCPARAM L0000833	0.0416666667	2.06	3.98	1.91
SRCPARAM L0000834	0.0416666667	2.06	3.98	1.91
SRCPARAM L0000835	0.0416666667	2.06	3.98	1.91
SRCPARAM L0000836	0.0416666667	2.06	3.98	1.91
SRCPARAM L0000837	0.0416666667	2.06	3.98	1.91
SRCPARAM L0000838	0.0416666667	2.06	3.98	1.91
SRCPARAM L0000839	0.0416666667	2.06	3.98	1.91
SRCPARAM L0000840	0.0416666667	2.06	3.98	1.91
SRCPARAM L0000841	0.0416666667	2.06	3.98	1.91
SRCPARAM L0000842	0.0416666667	2.06	3.98	1.91
SRCPARAM L0000843	0.0416666667	2.06	3.98	1.91
SRCPARAM L0000844	0.0416666667	2.06	3.98	1.91
SRCPARAM L0000845	0.0416666667	2.06	3.98	1.91

```
  SRCPARAM L0000846    0.0416666667     2.06     3.98     1.91
  SRCPARAM L0000847    0.0416666667     2.06     3.98     1.91
  SRCPARAM L0000848    0.0416666667     2.06     3.98     1.91
  SRCPARAM L0000849    0.0416666667     2.06     3.98     1.91
  SRCPARAM L0000850    0.0416666667     2.06     3.98     1.91
  SRCPARAM L0000851    0.0416666667     2.06     3.98     1.91
  SRCPARAM L0000852    0.0416666667     2.06     3.98     1.91
** ----------------------------------------------------------------
  SRCGROUP BIOCHAR  BIOCHAR
  SRCGROUP FIRE     FIRE
  SRCGROUP GEN      GEN
  SRCGROUP OFFTRKPA L0000829 L0000830 L0000831 L0000832 L0000833 L0000834
  SRCGROUP OFFTRKPA L0000835 L0000836 L0000837 L0000838 L0000839 L0000840
  SRCGROUP OFFTRKPA L0000841 L0000842 L0000843 L0000844 L0000845 L0000846
  SRCGROUP OFFTRKPA L0000847 L0000848 L0000849 L0000850 L0000851 L0000852
  SRCGROUP OFFTRKUN L0000853 L0000854 L0000855 L0000856 L0000857 L0000858
  SRCGROUP OFFTRKUN L0000859 L0000860 L0000861 L0000862 L0000863 L0000864
  SRCGROUP OFFTRKUN L0000865 L0000866 L0000867 L0000868 L0000869 L0000870
  SRCGROUP OFFTRKUN L0000871 L0000872 L0000873 L0000874 L0000875 L0000876
  SRCGROUP ONTRUCK  L0000792 L0000793 L0000794 L0000795 L0000796 L0000797
  SRCGROUP ONTRUCK  L0000798 L0000799 L0000800 L0000801 L0000802 L0000803
  SRCGROUP ONTRUCK  L0000804
  SRCGROUP TO       TO
  SRCGROUP WOODLOAD WOODLOAD
SO FINISHED
**
****************************************
** AERMOD Receptor Pathway
****************************************
**
**
RE STARTING
  INCLUDED AriesLostHills.rou
RE FINISHED
**
****************************************
** AERMOD Meteorology Pathway
****************************************
**
**
ME STARTING
  SURFFILE met\Bakersfield_2013-2017.SFC
  PROFFILE met\Bakersfield_2013-2017.PFL
  SURFDATA 23155 2013
```

```
  UAIRDATA 23230 2013 OAKLAND/WSO_AP
  PROFBASE 149.0 METERS
ME FINISHED
**
****************************************
** AERMOD Output Pathway
****************************************
**
**
OU STARTING
  RECTABLE ALLAVE 1ST
  RECTABLE 1 1ST
** Auto-Generated Plotfiles
  PLOTFILE 1 BIOCHAR 1ST AriesLostHills.AD\01H1G001.PLT 31
  PLOTFILE 1 FIRE 1ST AriesLostHills.AD\01H1G002.PLT 32
  PLOTFILE 1 GEN 1ST AriesLostHills.AD\01H1G003.PLT 33
  PLOTFILE 1 OFFTRKPA 1ST AriesLostHills.AD\01H1G004.PLT 34
  PLOTFILE 1 OFFTRKUN 1ST AriesLostHills.AD\01H1G005.PLT 35
  PLOTFILE 1 ONTRUCK 1ST AriesLostHills.AD\01H1G006.PLT 36
  PLOTFILE 1 TO 1ST AriesLostHills.AD\01H1G007.PLT 37
  PLOTFILE 1 WOODLOAD 1ST AriesLostHills.AD\01H1G008.PLT 38
  PLOTFILE PERIOD BIOCHAR AriesLostHills.AD\PE00G001.PLT 39
  PLOTFILE PERIOD FIRE AriesLostHills.AD\PE00G002.PLT 40
  PLOTFILE PERIOD GEN AriesLostHills.AD\PE00G003.PLT 41
  PLOTFILE PERIOD OFFTRKPA AriesLostHills.AD\PE00G004.PLT 42
  PLOTFILE PERIOD OFFTRKUN AriesLostHills.AD\PE00G005.PLT 43
  PLOTFILE PERIOD ONTRUCK AriesLostHills.AD\PE00G006.PLT 44
  PLOTFILE PERIOD TO AriesLostHills.AD\PE00G007.PLT 45
  PLOTFILE PERIOD WOODLOAD AriesLostHills.AD\PE00G008.PLT 46
  SUMMFILE AriesLostHills.sum
OU FINISHED
**
****************************************
** Project Parameters
****************************************
** PROJCTN  CoordinateSystemUTM
** DESCPTN  UTM: Universal Transverse Mercator
** DATUM    North American Datum 1983
** DTMRGN   CONUS
** UNITS    m
** ZONE     11
** ZONEINX  0
**
```

ATTACHMENT E – RISK PRIORITIZATION SCORE CALCULATION

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CAPCOA Risk Prioritization Score for
Aries-Holloway Bioenergy TAC Emissions

Dispersion Adjustment	Parameter	Factor
Year and Procedure (EP or DA)	2019	DA
Dh Stack Height	0-20 m	60
Rp Sensitive Receptor	3,600	0.001
Cancer Normalization	------	128

Results Summary	CAPCOA Risk Score (Sensitive Receptor)		
	Acute	Chronic	Cancer
	0.0093	0.0059	0.074

Daily and Annual HAP/TAC Emissions					OEHHA Risk Matrix			CAPCOA Risk Score (Sensitive Receptor)		
Chemical Substance	Chemical CAS No	Include (Y/N)	Max Hour TAC Lb/hr	Annual TAC Lb/Year	Acute REL	Chronic REL	Unit Risk ug/M3	Acute Score	Chronic Score	Cancer Score
1,1,1-Trichloroethane	71556	Y	4.61E-04	4.04E+00	6.8E+04	1.0E+03		1.02E-08	6.91E-08	
1,1-Dichloroethylene	75354	Y	3.39E-05	2.97E-01		7.0E+01			7.26E-08	
Tetrachloroethylene (Perchloroethyl	127184	Y	2.67E-04	2.34E+00	2.0E+04	3.5E+01	6.1E-06	2.00E-08	1.15E-06	1.10E-04
Acetaldehyde	75070	Y	2.70E-06	2.36E-02	4.7E+02	1.4E+02	2.7E-06	8.61E-09	2.89E-09	4.90E-07
Acrolein	107028	Y	2.35E-06	2.06E-02	2.5E+00	3.5E-01		1.41E-06	1.01E-06	
Ammonia	7664417	Y	5.42E-01	4.75E+03	3.2E+03	2.0E+02		2.54E-04	4.07E-04	
Benzene	71432	Y	1.51E-04	1.33E+00	2.7E+01	3.0E+00	2.9E-05	8.41E-06	7.57E-06	2.95E-04
Chlorobenzene	108907	Y	3.39E-05	2.97E-01		1.0E+03	4.6E-06		5.08E-09	1.05E-05
Ethylbenzene	100414	Y	2.88E-03	2.52E+01		2.0E+03	2.5E-06		2.16E-07	4.84E-04
Formaldehyde	50000	Y	1.61E-01	1.41E+03	5.5E+01	9.0E+00	6.0E-06	4.38E-03	2.68E-03	6.48E-02
Hydrogen Chloride (HCl)	7647010	Y	5.00E-02	4.38E+02	2.1E+03	9.0E+00		3.57E-05	8.33E-04	
Hydrogen Sulfide (H2S)	7783064	Y	1.29E-01	1.13E+03	4.2E+01	1.0E+01		4.60E-03	1.93E-03	
Hexane	110543	Y	4.00E-06	3.50E-02		7.0E+03			8.57E-11	
Methylene chloride	75092	Y	9.54E-03	8.35E+01	1.4E+04	4.0E+02	1.0E-06	1.02E-06	3.58E-06	6.42E-04
Naphthalene	91203	Y	2.61E-07	2.29E-03		9.0E+00	3.4E-05		4.35E-09	5.97E-07
Propylene	115071	Y	4.61E-04	4.04E+00		3.0E+03			2.30E-08	
Toluene	108883	Y	1.08E-03	9.44E+00	3.7E+04	3.0E+02		4.37E-08	5.39E-07	
Diesel Particulate [DPM]	9901	Y	3.51E-04	3.07E+00		5.0E+00	3.0E-04		1.05E-05	7.08E-03
Total PAH(W/O Napthalene)	1151	Y	8.70E-08	7.62E-04			1.1E-03			6.44E-06
Vinyl Chloride	75014	Y	1.45E-04	1.27E+00	1.8E+05		7.8E-05	1.21E-09		7.62E-04
Total Xylene	1330207	Y	6.14E-03	5.38E+01	2.2E+04	7.0E+02		4.19E-07	1.32E-06	
CAPCOA Risk Prioritization Score for Facility								0.009278	0.005873	0.074218
Note:								Acute	Chronic	Cancer

1. Risk is prioritized using the CAPCOA "dispersion adjustment procerdure". The stack height used for selecting the dispersion adjustment factors was selected based on a release height of less than 20 meters for an area source.

ATTACHMENT F – HARP2 CONSTRUCTION PROJECT SUMMARY REPORT AND RESULTS

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HARP Project Summary Report 5/14/2019 1:00:06 PM

PROJECT INFORMATION
HARP Version: 19121
Project Name: ARIESLOSTHILLS-CONSTR
Project Output Directory: C:\HARP2\ARIESLOSTHILLS-CONSTR
HARP Database: NA

FACILITY INFORMATION
Origin
X (m):0
Y (m):0
Zone:1
No. of Sources:0
No. of Buildings:0

EMISSION INVENTORY
No. of Pollutants:4
No. of Background Pollutants:0

Emissions

ScrID	StkID	ProID	PolID	PolAbbrev	Multi	Annual Ems (lbs/yr)	MaxHr Ems (lbs/hr)	MWAF
CONSTR	0	0	9901	DieselExhPM	1	322.62	0	1
OFFTRKPA	0	0	9901	DieselExhPM	1	0.121	0	1
OFFTRKUN	0	0	9901	DieselExhPM	1	0.121	0	1
ONTRUCK	0	0	9901	DieselExhPM	1	0.0581	0	1

Background

PolID	PolAbbrev	Conc (ug/m^3)	MWAF

Ground level concentration files (\glc\)

9901MAXHR.txt
9901PER.txt

POLLUTANT HEALTH INFORMATION
Health Database: C:\HARP2\Tables\HEALTH17320.mdb
Health Table Version: HEALTH18232
Official: True

PolID PolAbbrev InhCancer OralCancer AcuteREL InhChronicREL OralChronicREL InhChronic8HRREL

9901 DieselExhPM 1.1 5

AIR DISPERSION MODELING INFORMATION
Versions used in HARP. All executables were obtained from USEPA's Support Center for Regulatory Atmospheric Modeling website (http://www.epa.gov/scram001/)
AERMOD: 18081
AERMAP: 18081
BPIPPRM: 04274
AERPLOT: 13329

METEOROLOGICAL INFORMATION
Version:
Surface File:
Profile File:
Surface Station:
Upper Station:
On-Site Station:

LIST OF AIR DISPERSION FILES
AERMOD Input File:
AERMOD Output File:
AERMOD Error File:
Plotfile list

01H1G001.PLT
01H1G002.PLT
01H1G003.PLT
01H1G004.PLT
PE00G001.PLT
PE00G002.PLT
PE00G003.PLT
PE00G004.PLT

LIST OF RISK ASSESSMENT FILES
Health risk analysis files (\hra\)

AriesLH-Constr-1-yr-CancerRisk.csv
AriesLH-Constr-1-yr-CancerRiskSumByRec.csv
AriesLH-Constr-1-yr-CancerRiskSumByRecBySrc.csv

AriesLH-Constr-1-yr-GLCList.csv
AriesLH-Constr-1-yr-HRAInput.hra
AriesLH-Constr-1-yr-NCAcuteRisk.csv
AriesLH-Constr-1-yr-NCAcuteRiskSumByRec.csv
AriesLH-Constr-1-yr-NCAcuteRiskSumByRecBySrc.csv
AriesLH-Constr-1-yr-NCChronicRisk.csv
AriesLH-Constr-1-yr-NCChronicRiskSumByRec.csv
AriesLH-Constr-1-yr-NCChronicRiskSumByRecBySrc.csv
AriesLH-Constr-1-yr-Output.txt
AriesLH-Constr-1-yr-PathwayRec.csv
AriesLH-Constr-1-yr-PolDB.csv
AriesLH-Constr-1-yr-Wkr-CancerRisk.csv
AriesLH-Constr-1-yr-Wkr-CancerRiskSumByRec.csv
AriesLH-Constr-1-yr-Wkr-GLCList.csv
AriesLH-Constr-1-yr-Wkr-HRAInput.hra
AriesLH-Constr-1-yr-Wkr-NCAcuteRisk.csv
AriesLH-Constr-1-yr-Wkr-NCAcuteRiskSumByRec.csv
AriesLH-Constr-1-yr-Wkr-NCChronicRisk.csv
AriesLH-Constr-1-yr-Wkr-NCChronicRiskSumByRec.csv
AriesLH-Constr-1-yr-Wkr-Output.txt
AriesLH-Constr-1-yr-Wkr-PathwayRec.csv
AriesLH-Constr-1-yr-Wkr-PolDB.csv
CONSTR.AriesLH-Constr-1-yr-CancerRisk.csv
CONSTR.AriesLH-Constr-1-yr-CancerRiskSumByRec.csv
CONSTR.AriesLH-Constr-1-yr-GLCList.csv
CONSTR.AriesLH-Constr-1-yr-HRAInput.hra
CONSTR.AriesLH-Constr-1-yr-NCAcuteRisk.csv
CONSTR.AriesLH-Constr-1-yr-NCAcuteRiskSumByRec.csv
CONSTR.AriesLH-Constr-1-yr-NCChronicRisk.csv
CONSTR.AriesLH-Constr-1-yr-NCChronicRiskSumByRec.csv
CONSTR.AriesLH-Constr-1-yr-PathwayRec.csv
CONSTR.AriesLH-Constr-1-yr-PolDB.csv
OFFTRKPA.AriesLH-Constr-1-yr-CancerRisk.csv
OFFTRKPA.AriesLH-Constr-1-yr-CancerRiskSumByRec.csv
OFFTRKPA.AriesLH-Constr-1-yr-GLCList.csv
OFFTRKPA.AriesLH-Constr-1-yr-HRAInput.hra
OFFTRKPA.AriesLH-Constr-1-yr-NCAcuteRisk.csv
OFFTRKPA.AriesLH-Constr-1-yr-NCAcuteRiskSumByRec.csv
OFFTRKPA.AriesLH-Constr-1-yr-NCChronicRisk.csv
OFFTRKPA.AriesLH-Constr-1-yr-NCChronicRiskSumByRec.csv
OFFTRKPA.AriesLH-Constr-1-yr-PathwayRec.csv
OFFTRKPA.AriesLH-Constr-1-yr-PolDB.csv
OFFTRKUN.AriesLH-Constr-1-yr-CancerRisk.csv
OFFTRKUN.AriesLH-Constr-1-yr-CancerRiskSumByRec.csv

OFFTRKUN.AriesLH-Constr-1-yr-GLCList.csv
OFFTRKUN.AriesLH-Constr-1-yr-HRAInput.hra
OFFTRKUN.AriesLH-Constr-1-yr-NCAcuteRisk.csv
OFFTRKUN.AriesLH-Constr-1-yr-NCAcuteRiskSumByRec.csv
OFFTRKUN.AriesLH-Constr-1-yr-NCChronicRisk.csv
OFFTRKUN.AriesLH-Constr-1-yr-NCChronicRiskSumByRec.csv
OFFTRKUN.AriesLH-Constr-1-yr-PathwayRec.csv
OFFTRKUN.AriesLH-Constr-1-yr-PolDB.csv
ONTRUCK.AriesLH-Constr-1-yr-CancerRisk.csv
ONTRUCK.AriesLH-Constr-1-yr-CancerRiskSumByRec.csv
ONTRUCK.AriesLH-Constr-1-yr-GLCList.csv
ONTRUCK.AriesLH-Constr-1-yr-HRAInput.hra
ONTRUCK.AriesLH-Constr-1-yr-NCAcuteRisk.csv
ONTRUCK.AriesLH-Constr-1-yr-NCAcuteRiskSumByRec.csv
ONTRUCK.AriesLH-Constr-1-yr-NCChronicRisk.csv
ONTRUCK.AriesLH-Constr-1-yr-NCChronicRiskSumByRec.csv
ONTRUCK.AriesLH-Constr-1-yr-PathwayRec.csv
ONTRUCK.AriesLH-Constr-1-yr-PolDB.csv

Spatial averaging files (\sa\)

_____

HARP2 - HRACalc (dated 19044) 5/14/2019 12:59:38 PM - Output Log
Construction Residential Risk

GLCs loaded successfully
Pollutants loaded successfully
Pathway receptors loaded successfully
****
RISK SCENARIO SETTINGS

Receptor Type: Resident
Scenario: All
Calculation Method: Derived

****
EXPOSURE DURATION PARAMETERS FOR CANCER

Start Age: -0.25
Total Exposure Duration: 1

Exposure Duration Bin Distribution
3rd Trimester Bin: 0.25
0<2 Years Bin: 1
2<9 Years Bin: 0
2<16 Years Bin: 0
16<30 Years Bin: 0
16 to 70 Years Bin: 0

****
PATHWAYS ENABLED

NOTE: Inhalation is always enabled and used for all assessments. The remaining pathways are only used for cancer and noncancer chronic assessments.

Inhalation: True
Soil: True
Dermal: True
Mother's milk: True
Water: False
Fish: False
Homegrown crops: True
Beef: False
Dairy: False
Pig: True
Chicken: True

Egg: True

****
INHALATION

Daily breathing rate: LongTerm24HR

Worker Adjustment Factors
Worker adjustment factors enabled: NO

Fraction at time at home
3rd Trimester to 16 years: ON
16 years to 70 years: ON

****
SOIL & DERMAL PATHWAY SETTINGS

Deposition rate (m/s): 0.02
Soil mixing depth (m): 0.01
Dermal climate: Mixed

****
HOMEGROWN CROP PATHWAY SETTINGS

Household type: HouseholdsthatGarden
Fraction leafy: 0.137
Fraction exposed: 0.137
Fraction protected: 0.137
Fraction root: 0.137

****
PIG, CHICKEN, & EGG PATHWAY SETTINGS

Surface area (m^2): 0
Volume (kg): 0
Volume changes per year: 0

Pig
Fraction consumed from contaminated water source: 0
Fraction consumed of contaminated leafy crop: 0.25
Fraction consumed of contaminated exposed crop: 0.25
Fraction consumed of contaminated protected crop: 0.25
Fraction consumed of contaminated root crop: 0.25

Chicken
Fraction consumed from contaminated water source: 0
Fraction consumed of contaminated leafy crop: 0.25
Fraction consumed of contaminated exposed crop: 0.25
Fraction consumed of contaminated protected crop: 0.25
Fraction consumed of contaminated root crop: 0.25

Egg
Fraction consumed from contaminated water source: 0
Fraction consumed of contaminated leafy crop: 0.25
Fraction consumed of contaminated exposed crop: 0.25
Fraction consumed of contaminated protected crop: 0.25
Fraction consumed of contaminated root crop: 0.25

****
TIER 2 SETTINGS

Tier2 adjustments were used in this assessment. Please see the input file for details.
Tier2 - What was changed: ED or start age changed|
Calculating cancer risk
Cancer risk breakdown by pollutant and receptor saved to: C:\HARP2\ARIESLOSTHILLS-CONSTR\hra\AriesLH-Constr-1-yr-CancerRisk.csv
Cancer risk total by receptor saved to: C:\HARP2\ARIESLOSTHILLS-CONSTR\hra\AriesLH-Constr-1-yr-CancerRiskSumByRec.csv
Cancer risk total by receptor and source saved to: C:\HARP2\ARIESLOSTHILLS-CONSTR\hra\CancerRiskSumByRec.csv
Calculating chronic risk
Chronic risk breakdown by pollutant and receptor saved to: C:\HARP2\ARIESLOSTHILLS-CONSTR\hra\AriesLH-Constr-1-yr-NCChronicRisk.csv
Chronic risk total by receptor saved to: C:\HARP2\ARIESLOSTHILLS-CONSTR\hra\AriesLH-Constr-1-yr-NCChronicRiskSumByRec.csv
Chronic risk total by receptor and source saved to: C:\HARP2\ARIESLOSTHILLS-CONSTR\hra\AriesLH-Constr-1-yr-NCChronicRiskSumByRecBySrc.csv
Calculating acute risk
Acute risk breakdown by pollutant and receptor saved to: C:\HARP2\ARIESLOSTHILLS-CONSTR\hra\AriesLH-Constr-1-yr-NCAcuteRisk.csv
Acute risk total by receptor saved to: C:\HARP2\ARIESLOSTHILLS-CONSTR\hra\AriesLH-Constr-1-yr-NCAcuteRiskSumByRec.csv
Acute risk total by receptor and source saved to: C:\HARP2\ARIESLOSTHILLS-CONSTR\hra\AriesLH-Constr-1-yr-NCAcuteRiskSumByRecBySrc.csv
HRA ran successfully

HARP2 - HRACalc (dated 19044) 5/14/2019 1:04:23 PM - Output Log
Construction Worker Risk

GLCs loaded successfully
Pollutants loaded successfully
Pathway receptors loaded successfully
****
RISK SCENARIO SETTINGS

Receptor Type: Worker
Scenario: All
Calculation Method: Derived

****
EXPOSURE DURATION PARAMETERS FOR CANCER

Start Age: 16
Total Exposure Duration: 1

Exposure Duration Bin Distribution
3rd Trimester Bin: 0
0<2 Years Bin: 0
2<9 Years Bin: 0
2<16 Years Bin: 0
16<30 Years Bin: 1
16 to 70 Years Bin: 0

****
PATHWAYS ENABLED

NOTE: Inhalation is always enabled and used for all assessments. The remaining pathways are only used for cancer and noncancer chronic assessments.

Inhalation: True
Soil: True
Dermal: True
Mother's milk: False
Water: False
Fish: False
Homegrown crops: False
Beef: False
Dairy: False
Pig: False
Chicken: False

Egg: False

****
INHALATION

Daily breathing rate: Moderate8HR

Worker Adjustment Factors
NOTE: The worker adjustment factors below are only used for cancer assessments. However, the GLC adjustment factor is also applied to 8-hr noncancer chronic assessments.
Worker adjustments factors enabled: YES
GLC adjustment factor: 4.2
Exposure frequency: 250

Fraction at time at home
3rd Trimester to 16 years: OFF
16 years to 70 years: OFF

****
SOIL & DERMAL PATHWAY SETTINGS

Deposition rate (m/s): 0.02
Soil mixing depth (m): 0.01
Dermal climate: Mixed

****
TIER 2 SETTINGS

Tier2 adjustments were used in this assessment. Please see the input file for details.
Tier2 - What was changed: ED or start age changed|
Calculating cancer risk
Cancer risk breakdown by pollutant and receptor saved to: C:\HARP2\ARIESLOSTHILLS-CONSTR\hra\AriesLH-Constr-1-yr-Wkr-CancerRisk.csv
Cancer risk total by receptor saved to: C:\HARP2\ARIESLOSTHILLS-CONSTR\hra\AriesLH-Constr-1-yr-Wkr-CancerRiskSumByRec.csv
Cancer risk total by receptor and source saved to: C:\HARP2\ARIESLOSTHILLS-CONSTR\hra\CancerRiskSumByRec.csv
Calculating chronic risk
Chronic risk breakdown by pollutant and receptor saved to: C:\HARP2\ARIESLOSTHILLS-CONSTR\hra\AriesLH-Constr-1-yr-Wkr-NCChronicRisk.csv
Chronic risk total by receptor saved to: C:\HARP2\ARIESLOSTHILLS-CONSTR\hra\AriesLH-Constr-1-yr-Wkr-NCChronicRiskSumByRec.csv
Chronic risk total by receptor and source saved to: C:\HARP2\ARIESLOSTHILLS-CONSTR\hra\AriesLH-Constr-1-yr-Wkr-NCChronicRiskSumByRecBySrc.csv

Calculating acute risk
Acute risk breakdown by pollutant and receptor saved to: C:\HARP2\ARIESLOSTHILLS-CONSTR\hra\AriesLH-Constr-1-yr-Wkr-NCAcuteRisk.csv
Acute risk total by receptor saved to: C:\HARP2\ARIESLOSTHILLS-CONSTR\hra\AriesLH-Constr-1-yr-Wkr-NCAcuteRiskSumByRec.csv
Acute risk total by receptor and source saved to: C:\HARP2\ARIESLOSTHILLS-CONSTR\hra\AriesLH-Constr-1-yr-Wkr-NCAcuteRiskSumByRecBySrc.csv
HRA ran successfully

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ATTACHMENT G – HARP2 OPERATIONAL PROJECT SUMMARY REPORT AND RESULTS

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HARP Project Summary Report 7/22/2019 10:33:34 PM

PROJECT INFORMATION
HARP Version: 19121
Project Name: ARIESLOSTHILLS
Project Output Directory: C:\HARP2\ARIESLOSTHILLS
HARP Database: NA

FACILITY INFORMATION
Origin
X (m):0
Y (m):0
Zone:1
No. of Sources:0
No. of Buildings:0

EMISSION INVENTORY
No. of Pollutants:25
No. of Background Pollutants:0

Emissions

ScrID	StkID	ProID	PolID	PolAbbrev	Multi	Annual Ems (lbs/yr)	MaxHr Ems (lbs/hr)	MWAF
TO	0	0	75070	Acetaldehyde	1	0.0236	0.000118	1
TO	0	0	107028	Acrolein	1	0.0206	0.000103	1
TO	0	0	7664417	NH3	1	4750	0.542	1
TO	0	0	71432	Benzene	1	1.33	0.000367	1
TO	0	0	108907	Chlorobenzn	1	0.297	3.39E-05	1
TO	0	0	100414	Ethyl Benzene	1	25.2	0.00313	1
TO	0	0	50000	Formaldehyde	1	1410	0.161	1
TO	0	0	110543	Hexane	1	0.035	0.000175	1
TO	0	0	7647010	HCl	1	438	0.05	1
TO	0	0	7783064	H2S	1	1130	0.129	1
TO	0	0	71556	1,1,1-TCA	1	4.04	0.000461	1
TO	0	0	75092	Methylene Chlor	1	83.5	0.00954	1
TO	0	0	91203	Naphthalene	1	0.00229	1.14E-05	1
TO	0	0	1151	PAHs-w/o	1	0.000762	3.81E-06	1
TO	0	0	127184	Perc	1	2.34	0.000267	1
TO	0	0	115071	Propylene	1	4.04	0.0202	1
TO	0	0	108883	Toluene	1	9.44	0.00206	1
TO	0	0	75014	Vinyl Chloride	1	1.27	0.000145	1

TO	0	0	75354	Vinylid Chlorid	1	0.297	3.39E-05	1
TO	0	0	1330207	Xylenes	1	53.8	0.00688	1
GEN	0	0	9901	DieselExhPM	1	2.75	0	1
FIRE	0	0	9901	DieselExhPM	1	0.2	0	1
ONTRUCK	0	0	9901	DieselExhPM	1	0.0243	0	1
OFFTRKUN	0	0	9901	DieselExhPM	1	0.0473	0	1
OFFTRKPA	0	0	9901	DieselExhPM	1	0.0487	0	1

Background

PolID	PolAbbrev	Conc (ug/m^3)	MWAF

Ground level concentration files (\glc\)

100414MAXHR.txt
100414PER.txt
107028MAXHR.txt
107028PER.txt
108883MAXHR.txt
108883PER.txt
108907MAXHR.txt
108907PER.txt
110543MAXHR.txt
110543PER.txt
115071MAXHR.txt
115071PER.txt
1151MAXHR.txt
1151PER.txt
127184MAXHR.txt
127184PER.txt
1330207MAXHR.txt
1330207PER.txt
50000MAXHR.txt
50000PER.txt
71432MAXHR.txt
71432PER.txt
71556MAXHR.txt
71556PER.txt
75014MAXHR.txt
75014PER.txt
75070MAXHR.txt
75070PER.txt
75092MAXHR.txt
75092PER.txt

75354MAXHR.txt
75354PER.txt
7647010MAXHR.txt
7647010PER.txt
7664417MAXHR.txt
7664417PER.txt
7783064MAXHR.txt
7783064PER.txt
91203MAXHR.txt
91203PER.txt
9901MAXHR.txt
9901PER.txt

POLLUTANT HEALTH INFORMATION
Health Database: C:\HARP2\Tables\HEALTH17320.mdb
Health Table Version: HEALTH18232
Official: True

PolID	PolAbbrev	InhCancer	OralCancer	AcuteREL	InhChronicREL	OralChronicREL	InhChronic8HRREL
75070	Acetaldehyde	0.01		470	140		300
107028	Acrolein			2.5	0.35		0.7
7664417	NH3			3200	200		
71432	Benzene	0.1		27	3		3
108907	Chlorobenzn				1000		
100414	Ethyl Benzene	0.0087			2000		
50000	Formaldehyde	0.021		55	9		9
110543	Hexane				7000		
7647010	HCl			2100	9		
7783064	H2S			42	10		
71556	1,1,1-TCA			68000	1000		
75092	Methylene Chlor	0.0035			14000	400	
91203	Naphthalene	0.12			9		
1151	PAHs-w/o	3.9	12				
127184	Perc	0.021		20000	35		
115071	Propylene				3000		
108883	Toluene			37000	300		
75014	Vinyl Chloride	0.27			180000		
75354	Vinylid Chlorid				70		
1330207	Xylenes			22000	700		
9901	DieselExhPM	1.1			5		

AIR DISPERSION MODELING INFORMATION
Versions used in HARP. All executables were obtained from USEPA's Support Center for Regulatory Atmospheric Modeling website (http://www.epa.gov/scram001/)
AERMOD: 18081
AERMAP: 18081
BPIPPRM: 04274
AERPLOT: 13329

METEOROLOGICAL INFORMATION
Version:
Surface File:
Profile File:
Surface Station:
Upper Station:
On-Site Station:

LIST OF AIR DISPERSION FILES
AERMOD Input File:
AERMOD Output File:
AERMOD Error File:
Plotfile list

_____
01H1G002.PLT
01H1G003.PLT
01H1G004.PLT
01H1G005.PLT
01H1G006.PLT
01H1G007.PLT
PE00G002.PLT
PE00G003.PLT
PE00G004.PLT
PE00G005.PLT
PE00G006.PLT
PE00G007.PLT

LIST OF RISK ASSESSMENT FILES
Health risk analysis files (\hra\)

_____
AriesLH-CancerRisk.csv
AriesLH-CancerRiskSumByRec.csv
AriesLH-CancerRiskSumByRecBySrc.csv
AriesLH-GLCList.csv
AriesLH-HRAInput.hra
AriesLH-NCAcuteRisk.csv

AriesLH-NCAcuteRiskSumByRec.csv
AriesLH-NCAcuteRiskSumByRecBySrc.csv
AriesLH-NCChronicRisk.csv
AriesLH-NCChronicRiskSumByRec.csv
AriesLH-NCChronicRiskSumByRecBySrc.csv
AriesLH-Output.txt
AriesLH-PathwayRec.csv
AriesLH-PolDB.csv
AriesLH-Wkr-8hr-GLCList.csv
AriesLH-Wkr-8hr-HRAInput.hra
AriesLH-Wkr-8hr-NCChronic8HrRisk.csv
AriesLH-Wkr-8hr-NCChronic8HrRiskSumByRec.csv
AriesLH-Wkr-8hr-NCChronic8HrRiskSumByRecBySrc.csv
AriesLH-Wkr-8hr-Output.txt
AriesLH-Wkr-8hr-PathwayRec.csv
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AriesLH-Wkr-NCAcuteRiskSumByRec.csv
AriesLH-Wkr-NCAcuteRiskSumByRecBySrc.csv
AriesLH-Wkr-NCChronicRisk.csv
AriesLH-Wkr-NCChronicRiskSumByRec.csv
AriesLH-Wkr-NCChronicRiskSumByRecBySrc.csv
AriesLH-Wkr-Output.txt
AriesLH-Wkr-PathwayRec.csv
AriesLH-Wkr-PolDB.csv
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FIRE.AriesLH-NCChronicRisk.csv
FIRE.AriesLH-NCChronicRiskSumByRec.csv
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FIRE.AriesLH-Wkr-8hr-HRAInput.hra
FIRE.AriesLH-Wkr-8hr-NCChronic8HrRisk.csv
FIRE.AriesLH-Wkr-8hr-NCChronic8HrRiskSumByRec.csv

FIRE.AriesLH-Wkr-8hr-PathwayRec.csv
FIRE.AriesLH-Wkr-8hr-PolDB.csv
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FIRE.AriesLH-Wkr-NCChronicRiskSumByRec.csv
FIRE.AriesLH-Wkr-PathwayRec.csv
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OFFTRKUN.AriesLH-Wkr-NCChronicRiskSumByRec.csv

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ONTRUCK.AriesLH-NCAcuteRiskSumByRec.csv
ONTRUCK.AriesLH-NCChronicRisk.csv
ONTRUCK.AriesLH-NCChronicRiskSumByRec.csv
ONTRUCK.AriesLH-PathwayRec.csv
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ONTRUCK.AriesLH-Wkr-8hr-NCChronic8HrRisk.csv
ONTRUCK.AriesLH-Wkr-8hr-NCChronic8HrRiskSumByRec.csv
ONTRUCK.AriesLH-Wkr-8hr-PathwayRec.csv
ONTRUCK.AriesLH-Wkr-8hr-PolDB.csv
ONTRUCK.AriesLH-Wkr-CancerRisk.csv
ONTRUCK.AriesLH-Wkr-CancerRiskSumByRec.csv
ONTRUCK.AriesLH-Wkr-GLCList.csv
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ONTRUCK.AriesLH-Wkr-NCAcuteRiskSumByRec.csv
ONTRUCK.AriesLH-Wkr-NCChronicRisk.csv
ONTRUCK.AriesLH-Wkr-NCChronicRiskSumByRec.csv
ONTRUCK.AriesLH-Wkr-PathwayRec.csv
ONTRUCK.AriesLH-Wkr-PolDB.csv
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TO.AriesLH-CancerRiskSumByRec.csv
TO.AriesLH-GLCList.csv
TO.AriesLH-HRAInput.hra
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TO.AriesLH-NCAcuteRiskSumByRec.csv
TO.AriesLH-NCChronicRisk.csv
TO.AriesLH-NCChronicRiskSumByRec.csv
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TO.AriesLH-PolDB.csv
TO.AriesLH-Wkr-8hr-GLCList.csv
TO.AriesLH-Wkr-8hr-HRAInput.hra
TO.AriesLH-Wkr-8hr-NCChronic8HrRisk.csv
TO.AriesLH-Wkr-8hr-NCChronic8HrRiskSumByRec.csv
TO.AriesLH-Wkr-8hr-PathwayRec.csv
TO.AriesLH-Wkr-8hr-PolDB.csv

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TO.AriesLH-Wkr-NCAcuteRiskSumByRec.csv
TO.AriesLH-Wkr-NCChronicRisk.csv
TO.AriesLH-Wkr-NCChronicRiskSumByRec.csv
TO.AriesLH-Wkr-PathwayRec.csv
TO.AriesLH-Wkr-PolDB.csv

Spatial averaging files (\sa\)

_____

Operations Residential Risk
HARP2 - HRACalc (dated 19044) 7/22/2019 10:14:35 PM - Output Log

GLCs loaded successfully
Pollutants loaded successfully
Pathway receptors loaded successfully
****
RISK SCENARIO SETTINGS

Receptor Type: Resident
Scenario: All
Calculation Method: Derived

****
EXPOSURE DURATION PARAMETERS FOR CANCER

Start Age: -0.25
Total Exposure Duration: 70

Exposure Duration Bin Distribution
3rd Trimester Bin: 0.25
0<2 Years Bin: 2
2<9 Years Bin: 0
2<16 Years Bin: 14
16<30 Years Bin: 0
16 to 70 Years Bin: 54

****
PATHWAYS ENABLED

NOTE: Inhalation is always enabled and used for all assessments. The remaining pathways are only used for cancer and noncancer chronic assessments.

Inhalation: True
Soil: True
Dermal: True
Mother's milk: True
Water: False
Fish: False
Homegrown crops: True
Beef: False
Dairy: False
Pig: True
Chicken: True

Egg: True

****
INHALATION

Daily breathing rate: LongTerm24HR

Worker Adjustment Factors
Worker adjustment factors enabled: NO

Fraction at time at home
3rd Trimester to 16 years: ON
16 years to 70 years: ON

****
SOIL & DERMAL PATHWAY SETTINGS

Deposition rate (m/s): 0.02
Soil mixing depth (m): 0.01
Dermal climate: Mixed

****
HOMEGROWN CROP PATHWAY SETTINGS

Household type: HouseholdsthatGarden
Fraction leafy: 0.137
Fraction exposed: 0.137
Fraction protected: 0.137
Fraction root: 0.137

****
PIG, CHICKEN, & EGG PATHWAY SETTINGS

Surface area (m^2): 0
Volume (kg): 0
Volume changes per year: 0

Pig
Fraction consumed from contaminated water source: 0
Fraction consumed of contaminated leafy crop: 0.25
Fraction consumed of contaminated exposed crop: 0.25
Fraction consumed of contaminated protected crop: 0.25
Fraction consumed of contaminated root crop: 0.25

Chicken
Fraction consumed from contaminated water source: 0
Fraction consumed of contaminated leafy crop: 0.25
Fraction consumed of contaminated exposed crop: 0.25
Fraction consumed of contaminated protected crop: 0.25
Fraction consumed of contaminated root crop: 0.25

Egg
Fraction consumed from contaminated water source: 0
Fraction consumed of contaminated leafy crop: 0.25
Fraction consumed of contaminated exposed crop: 0.25
Fraction consumed of contaminated protected crop: 0.25
Fraction consumed of contaminated root crop: 0.25

****
TIER 2 SETTINGS
Tier2 not used.

****

Calculating cancer risk
Cancer risk breakdown by pollutant and receptor saved to: C:\HARP2\ARIESLOSTHILLS\hra\AriesLH-CancerRisk.csv
Cancer risk total by receptor saved to: C:\HARP2\ARIESLOSTHILLS\hra\AriesLH-CancerRiskSumByRec.csv
Cancer risk total by receptor and source saved to: C:\HARP2\ARIESLOSTHILLS\hra\CancerRiskSumByRec.csv
Calculating chronic risk
Chronic risk breakdown by pollutant and receptor saved to: C:\HARP2\ARIESLOSTHILLS\hra\AriesLH-NCChronicRisk.csv
Chronic risk total by receptor saved to: C:\HARP2\ARIESLOSTHILLS\hra\AriesLH-NCChronicRiskSumByRec.csv
Chronic risk total by receptor and source saved to: C:\HARP2\ARIESLOSTHILLS\hra\AriesLH-NCChronicRiskSumByRecBySrc.csv
Calculating acute risk
Acute risk breakdown by pollutant and receptor saved to: C:\HARP2\ARIESLOSTHILLS\hra\AriesLH-NCAcuteRisk.csv
Acute risk total by receptor saved to: C:\HARP2\ARIESLOSTHILLS\hra\AriesLH-NCAcuteRiskSumByRec.csv
Acute risk total by receptor and source saved to: C:\HARP2\ARIESLOSTHILLS\hra\AriesLH-NCAcuteRiskSumByRecBySrc.csv
HRA ran successfully

Operations Worker Risk
HARP2 - HRACalc (dated 19044) 7/22/2019 10:22:32 PM - Output Log

GLCs loaded successfully
Pollutants loaded successfully
Pathway receptors loaded successfully
****
RISK SCENARIO SETTINGS

Receptor Type: Worker
Scenario: All
Calculation Method: Derived

****
EXPOSURE DURATION PARAMETERS FOR CANCER

Start Age: 16
Total Exposure Duration: 40

Exposure Duration Bin Distribution
3rd Trimester Bin: 0
0<2 Years Bin: 0
2<9 Years Bin: 0
2<16 Years Bin: 0
16<30 Years Bin: 0
16 to 70 Years Bin: 40

****
PATHWAYS ENABLED

NOTE: Inhalation is always enabled and used for all assessments. The remaining pathways are only used for cancer and noncancer chronic assessments.

Inhalation: True
Soil: True
Dermal: True
Mother's milk: False
Water: False
Fish: False
Homegrown crops: False
Beef: False
Dairy: False
Pig: False
Chicken: False

Egg: False

****
INHALATION

Daily breathing rate: Moderate8HR

Worker Adjustment Factors
Worker adjustment factors enabled: NO

Fraction at time at home
3rd Trimester to 16 years: OFF
16 years to 70 years: OFF

****
SOIL & DERMAL PATHWAY SETTINGS

Deposition rate (m/s): 0.02
Soil mixing depth (m): 0.01
Dermal climate: Mixed

****
TIER 2 SETTINGS

Tier2 adjustments were used in this assessment. Please see the input file for details.
Tier2 - What was changed: ED or start age changed|
Calculating cancer risk
Cancer risk breakdown by pollutant and receptor saved to: C:\HARP2\ARIESLOSTHILLS\hra\AriesLH-Wkr-CancerRisk.csv
Cancer risk total by receptor saved to: C:\HARP2\ARIESLOSTHILLS\hra\AriesLH-Wkr-CancerRiskSumByRec.csv
Cancer risk total by receptor and source saved to: C:\HARP2\ARIESLOSTHILLS\hra\CancerRiskSumByRec.csv
Calculating chronic risk
Chronic risk breakdown by pollutant and receptor saved to: C:\HARP2\ARIESLOSTHILLS\hra\AriesLH-Wkr-NCChronicRisk.csv
Chronic risk total by receptor saved to: C:\HARP2\ARIESLOSTHILLS\hra\AriesLH-Wkr-NCChronicRiskSumByRec.csv
Chronic risk total by receptor and source saved to: C:\HARP2\ARIESLOSTHILLS\hra\AriesLH-Wkr-NCChronicRiskSumByRecBySrc.csv
Calculating acute risk
Acute risk breakdown by pollutant and receptor saved to: C:\HARP2\ARIESLOSTHILLS\hra\AriesLH-Wkr-NCAcuteRisk.csv

Acute risk total by receptor saved to: C:\HARP2\ARIESLOSTHILLS\hra\AriesLH-Wkr-NCAcuteRiskSumByRec.csv
Acute risk total by receptor and source saved to: C:\HARP2\ARIESLOSTHILLS\hra\AriesLH-Wkr-NCAcuteRiskSumByRecBySrc.csv
HRA ran successfully

Operations Worker 8-Hour Risk
HARP2 - HRACalc (dated 19044) 7/22/2019 10:25:16 PM - Output Log

GLCs loaded successfully
Pollutants loaded successfully
Pathway receptors loaded successfully
****
RISK SCENARIO SETTINGS

Receptor Type: Worker
Scenario: NCChronic8HR
Calculation Method: Derived

****
EXPOSURE DURATION PARAMETERS FOR CANCER
Exposure duration are only adjusted for cancer assessments

****
PATHWAYS ENABLED

NOTE: Inhalation is always enabled and used for all assessments. The remaining pathways are only used for cancer and noncancer chronic assessments.

Inhalation: True
Soil: False
Dermal: False
Mother's milk: False
Water: False
Fish: False
Homegrown crops: False
Beef: False
Dairy: False
Pig: False
Chicken: False
Egg: False

****
INHALATION

Daily breathing rate: Moderate8HR

Worker Adjustment Factors
Worker adjustment factors enabled: NO

Fraction at time at home
NOTE: Exposure duration (i.e., start age, end age, ED, & FAH) are only adjusted for cancer assessments.

****
TIER 2 SETTINGS

Tier2 adjustments were used in this assessment. Please see the input file for details.
Tier2 - What was changed: ED or start age changed|
Calculating chronic 8hr risk
Chronic 8-hr risk breakdown by pollutant and receptor saved to:
C:\HARP2\ARIESLOSTHILLS\hra\AriesLH-Wkr-8hr-NCChronic8HrRisk.csv
Chronic 8-hr risk total by receptor saved to: C:\HARP2\ARIESLOSTHILLS\hra\AriesLH-Wkr-8hr-NCChronic8HrRiskSumByRec.csv
Chronic 8-hr risk total by receptor and source saved to: C:\HARP2\ARIESLOSTHILLS\hra\AriesLH-Wkr-8hr-NCChronic8HrRiskSumByRecBySrc.csv
HRA ran successfully

Appendix B.2

Air Quality and GHG Technical Report Addendum

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Yorke
ENGINEERING, LLC
www.YorkeEngr.com

May 6, 2021

Mr. Jeremy Bowman
Project Director
The Holloway Group
2019 Westwind Drive, Suite B
Bakersfield, CA 93301
Office: (661) 758-1451
E-mail: JBowman@HMHolloway.com

Subject: Addendum – CEQA Air Quality and Greenhouse Gas Analyses Report for the Proposed Landfill Modification and Composting Project near Lost Hills, CA

Dear Mr. Bowman:

We understand that Lost Hills Environmental LLC (LHE) has recently made some operational changes at the Lost Hills Solid Waste Management Facility (the landfill) that may potentially impact the analysis and conclusions reported in Yorke Engineering, LLC's (Yorke's) *Lost Hills Composting and Waste to Energy Projects -- Air Quality and Greenhouse Gas (GHG) Technical Report* that was developed for the proposed projects in April 2020. Specifically, we understand that the landfill's gas collection system (GCS) has been removed. At your request, Yorke is providing this summary that explains how the removal of the GCS affects the analyses and conclusions of Yorke's Technical Report.

BACKGROUND

In April 2020, Yorke submitted an Air Quality and Greenhouse Gas (GHG) Technical Report for the proposed projects. This Technical Report contained the details of the air quality and GHG impact analyses related to the modifications proposed for the existing Lost Hills SWMF to allow for additional waste streams to be disposed of within the landfill and to add a composting operation on 136.2 acres within the existing landfill boundaries. The Technical Report also addressed impacts related to the development of a waste to energy biomass gasification ("bioenergy") facility across the highway from the landfill. The Technical Report is being used by the Kern County Planning Department to develop an Environmental Impact Report (EIR) for the proposed projects. This Addendum to Yorke's Technical Report is related to only the proposed landfill waste-types modification and not the composting area or bioenergy facility.

When developing the Technical Report, Yorke assumed continued operation of the landfill's GCS and availability of an existing flare if needed when analyzing the air quality and GHG impacts of both the existing (i.e., the baseline) landfill operations and future operations based on maximum disposal of proposed wastes. We understand that the GCS was recently removed from the landfill because it wasn't collecting enough landfill gas to light (i.e., to maintain combustion in) the flare. We further understand that the gas monitoring wells have recorded low methane levels since their installation, and that the flare remains onsite but is not hooked up to the GCS system anymore. The removal of the GCS was approved by the San Joaquin Valley Air Pollution Control District (SJVAPCD) and the Kern County Health Department, which is the Local Enforcement Agency (LEA) for CalRecycle for solid waste management facilities.

DISCUSSION

The implications of the removal of the GCS on the analysis previously documented in Yorke's Technical Report are discussed below.

Criteria Pollutant Emissions

Decomposition of organic wastes in a landfill produces landfill gas (LFG), which consists predominately of methane and carbon dioxide, but which also contain volatile organic compounds (VOC). Of these gases, VOC is regulated as a criteria pollutant because it contributes to the formation of ozone. For the Technical Report, VOC emissions associated with LFG during the baseline were assumed to be emitted at the permit limit of 9.8 tons per year (TPY) as allowed by the current SJVAPCD permit to operate. The GCS and flare were assumed to be non-operational during the baseline period, so removal of the GCS has no impact on the baseline VOC emissions or impacts presented in the Technical Report.

VOC emissions estimated for the proposed future landfill operations were predicted using the LandGEM software, a program developed by the U.S. Environmental Protection Agency (EPA). Because LFG emissions continue to increase as the organic wastes are accumulated in the landfill, the maximum VOC emissions are expected to occur a few years after facility closure, as that would be the period at which the maximum quantity of organic waste would be present in the landfill and when the maximum decomposition would occur. Maximum uncontrolled VOC emissions were estimated using LandGem to be about 95 TPY at that time (a few years after closure). Maximum controlled VOC emissions were calculated based on uncontrolled emissions, a gas collection efficiency of 75% and a flare destruction efficiency of 98%. During this period of maximum LFG production with the GCS and flare in place, controlled VOC emissions were estimated to be about 25 TPY. LHE would be required by the SJVAPCD to provide emission reduction credits (ERC) to offset all VOC emissions in excess of 10 TPY. Thus, the net increase in VOC emissions due to the proposed landfill modification would be 0.2 TPY (i.e., the difference between the current SJVAPCD permitted emission limit of 9.8 TPY and the offset threshold of 10 TPY).

Federal regulations (40 CFR 60, Subpart WWW) mandate the installation of a GCS and flare once the VOC emissions exceed 50 megagrams per year (about 55 TPY). Based on the assumed rate of organic waste disposal, operation of the GCS and flare was projected to be mandatory per the federal regulations near the end of the permitted life of the landfill, i.e., at "full buildout". Thus, removal of the GCS has no impact on the analysis or conclusions of the Technical Report because operation of the GCS and flare will be mandatory after this level of VOC emissions is reached.

However, if LHE continues to operate without the GCS and flare, there would be an intermediate period during which uncontrolled VOC emissions would be greater than the baseline VOC emissions, but before the GCS and flare are required by 40 CFR 60, Subpart WWW (which would also be true for the project as analyzed). This period would exist when uncontrolled VOC emissions exceed the current permit limit of 9.8 TPY up until the VOC emissions are greater than 50 megagrams per year when the emission control is required. The maximum uncontrolled VOC emissions during this period would be 55 TPY. As noted above, under SJVAPCD rules, ERC are required for any permitted stationary source with VOC emissions exceeding 10 TPY. Once the LFG VOC emissions exceed the current permit limit, LHE would be required to seek a permit modification. All modification requests seeking a VOC emission limit over 10 TPY, and up to 55 TPY, would trigger the requirement for LHE to provide ERC to offset the VOC emission increase,

which would be offset to zero. Thus, the net increase in VOC emissions during this intermediate period would also be at most 0.2 TPY.

The Technical Report estimated emissions of nitrogen oxides (NOx), carbon monoxide (CO), sulfur oxides (SOx) and particulate matter (PM_{10}) from the combustion of LFG in the flare. With the removal of the GCS and flaring not being employed, the emission of these criteria pollutants from LFG combustion would no longer occur. This would apply up until the re-installation of the GCS and flare are required by 40 CFR 60, Subpart WWW.

In summary, removal of the GCS and non-operation of the flare has no impact on the baseline emissions. Because operation of the GCS and flare are required once uncontrolled VOC emissions exceed about 55 TPY, the analysis and conclusions of the Technical Report for the proposed project at the end of the landfill operation continue to accurately reflect the impacts analyzed in the Technical Report. At full build-out of the landfill, the net VOC increase from landfill operations would be 0.2 TPY, as any increase above 10 TPY would be offset per SJVAPCD rules.

For any project operational period during which uncontrolled VOC emissions exceed 10 TPY, but prior to the re-installation of the GCS and flare to meet 40 CFR 60, Subpart WWW requirements, LHE would be required to provide ERC to offset any emission increase above 10 TPY to zero. Thus, SJVAPCD rules limit the VOC emission increase to 0.2 TPY during the intermediate period. Because the flare would not operate during this intermediate period, NOx, CO, PM_{10}, and SOx emissions would not occur.

Based on this analysis, Yorke concludes that removal of the GCS and non-operation of the flare has no impact on the analysis or conclusions related to criteria pollutants, as presented in the Technical Report.

Toxic Air Contaminant Emissions

Toxic Air Contaminant (TAC) emissions from the landfill were also predicted using the EPA LandGEM software for both the baseline and maximum landfill build-out case. For the baseline case, TAC emissions were assumed to be uncontrolled, i.e., the GCS and flare were not in operation. Thus, the removal of the GCS and non-operation of the flare has no impact on the analysis of baseline TAC emissions.

At full build-out, the proposed TAC emissions were estimated based on uncontrolled emissions, a GCS collection efficiency of 75% and a flare destruction efficiency of 98%. As discussed in relation to VOC emissions, at maximum build-out, the GCS and flare would have to be installed and operated to comply with 40 CFR 60, Subpart WWW. Thus, removal of the GCS now has no impact on the analysis or conclusions of the Technical Report because at full build-out, operation of the GCS and flare are mandatory after the VOC emissions exceed 50 megagrams per year (about 55 TPY), which would ensure that TAC emissions are also controlled by the flare.

An intermediate period after the uncontrolled TAC baseline but before the time when the GCS and flare become mandatory would continue to be possible but is the same as the situation in effect for the Technical Report. The low LFG/VOC (including TAC) emissions monitored from the wells, the low level of health risk determined for the proposed projects as discussed in the Technical Report, and the large distance to the nearest receptors, would mean that a significant health risk from TAC emissions is unlikely to occur and the conclusions in the Technical Report related to TAC emissions would be unchanged.

Greenhouse Gas Emissions

LFG GHG emissions for the baseline (pre-project) condition and proposed landfill build-out case were also predicted using the EPA LandGEM software. For the baseline case, GHG emissions are assumed to be uncontrolled, i.e., the GCS and flare were not in operation. Thus, the removal of the GCS and non-operation of the flare has no impact on baseline GHG emissions that were analyzed in the Technical Report.

The proposed maximum GHG emissions for the landfill at full build-out were estimated based on the predicted uncontrolled methane emissions of 9,673 metric tons (MT) per year[1], a GCS collection efficiency of 75% and a flare destruction efficiency for methane of 98%, giving total methane emissions of 2,563 MT per year. As discussed in relation to VOC emissions, at maximum build-out, the GCS and flare would have to be installed and operated to comply with 40 CFR 60, Subpart WWW. Thus, removal of the GCS now has no impact on the analysis or conclusions of the Technical Report because at full build-out, operation of the GCS and flare are mandatory after the VOC emissions exceed 50 megagrams per year (about 55 TPY), which would ensure that methane emissions are also controlled by the GCS and flare once emissions reach those levels.

Up until the GCS and flare are re-installed, it would be possible to have landfill GHG emissions that are greater than the GHG emissions that were analyzed at full build-out. As discussed for the VOC emissions, this maximum GHG emissions would occur just before VOC emission exceeded 50 megagrams per year, which is when the GCS and flare emissions controls become mandatory. At this point in time, the methane emissions would be higher than the uncontrolled baseline emissions (from the increase and decomposition of organic wastes over time) and could also be greater than the GHG emissions from the landfill that were analyzed at full build-out with the GCS and flare operational. The methane emissions would be approximately 60% of the uncontrolled emissions at full build-out, or about 5,800 MT per year. Subtracting baseline methane emissions of 2,783, yields a net increase of 3,020 MT per year. Applying the global warming potential of 21, this intermediate period, operating without the GCS or flare, would result in GHG emissions of 63,400 MT of carbon dioxide equivalents (CO_2e) per year.

The proposed projects include the operation of a 600,000 TPY composting facility that provides a management option for diverting organic waste from the landfill. The net GHG benefit due to landfill diversion and use of the compost in agriculture was estimated to be approximately 246,000 MT CO_2e per year. This net benefit would be reduced to 182,500 MT CO_2e per year during this intermediate period without the operation of the GCS and flare. So, while the benefit is reduced, there is still a substantial benefit due to operation of the proposed landfill modifications and compost area.

In summary, the removal of the GCS and flare has no impact on baseline GHG emission estimates. The GCS and flare would be required at full build-out to comply with 40 CFR 60 Subpart WWW, so the GHG emission estimates presented in the Technical Report continue to represent the landfill at full build-out. Although GHG emissions are predicted to increase prior to the re-installation of

[1] GHG includes carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). Because the CO_2 emissions are biogenic, CO_2 emissions are excluded from the analysis. For this discussion, we are also excluding N_2O because the N_2O emissions are small (<< 1%) relative to the methane emissions.

the GCS and flare, the proposed projects would continue to provide a substantial reduction in GHG emissions due to landfill diversion and compost application in agriculture.

CONCLUSION

The GCS was removed from the active area due to the low LFG volumes and the low concentrations of methane in the LFG. This removal was approved by the SJVAPCD and the Kern County Environmental Health Department/LEA. The Air Quality and GHG analysis prepared by Yorke in April 2020 included the GCS and flare as a project feature. However, the removal of the GCS is not expected to substantively change the conclusions of that analysis relative to the impacts associated with criteria pollutants, TACs, or GHG emissions from the proposed projects as discussed above.

If you have any questions, please email or call me at Shead@YorkeEngr.com or (805) 293-7085.

Sincerely,



Sara J. Head, QEP
Principal Scientist
Yorke Engineering, LLC

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Appendix B.3

Sierra Club SJVAPCD and SCAQMD Amicus Briefs

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S219783

IN THE SUPREME COURT OF C ALIFORNIA

SIERRA CLUB, REVIVE THE SAN JOAQUIN, and
LEAGUE OF WOMEN VOTERS OF FRESNO,

Plaintiffs and Appellants,

v.

COUNTY OF FRESNO,

Defendant and Respondent,

and,

FRIANT RANCH, L.P.,

Real Party in Interest and Respondent.

SUPREME COURT
FILED
APR 13 2015
Frank A. McGuire Clerk
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After a Published Decision by the Court of Appeal, filed May 27, 2014
Fifth Appellate District Case No. F066798

Appeal from the Superior Court of California, County of Fresno
Case No. 11CECG00726
Honorable Rosendo A. Pena, Jr.

APPLICATION OF THE SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT FOR LEAVE TO FILE BRIEF OF *AMICUS CURIAE* IN SUPPORT OF NEITHER PARTY AND *[PROPOSED]* BRIEF OF *AMICUS CURIAE*

Kurt R. Wiese, General Counsel (SBN 127251)
*Barbara Baird, Chief Deputy Counsel (SBN 81507)
SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
21865 Copley Drive, Diamond Bar, CA 91765
Telephone: 909-396-2302; Facsimile: 909-396-2961
Email: bbaird@aqmd.gov
Counsel for [Proposed] Amicus Curiae,
SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

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TO THE HONORABLE CHIEF JUSTICE AND JUSTICES OF THE SUPREME COURT:

APPLICATION FOR LEAVE TO FILE *AMICUS CURIAE* BRIEF

Pursuant to Rule 8.520(f) of the California Rules of Court, the South Coast Air Quality Management District (SCAQMD) respectfully requests leave to file the attached *amicus curiae* brief. Because SCAQMD's position differs from that of either party, we request leave to submit this amicus brief in support of neither party.

HOW THIS BRIEF WILL ASSIST THE COURT

SCAQMD's proposed amicus brief takes a position on two of the issues in this case. In both instances, its position differs from that of either party. The issues are:

1) Does the California Environmental Quality Act (CEQA) require an environmental impact report (EIR) to correlate a project's air pollution emissions with specific levels of health impacts?
2) What is the proper standard of review for determining whether an EIR provides sufficient information on the health impacts caused by a project's emission of air pollutants?

This brief will assist the Court by discussing the practical realities of correlating identified air quality impacts with specific health outcomes. In short, CEQA requires agencies to provide detailed information about a project's air quality impacts that is sufficient for the public and decisionmakers to adequately evaluate the project and meaningfully understand its impacts. However, the level of analysis is governed by a rule of reason; CEQA only requires agencies to conduct analysis if it is reasonably feasible to do so.

With regard to health-related air quality impacts, an analysis that correlates a project's air pollution emissions with specific levels of health impacts will be feasible in some cases but not others. Whether it is feasible depends on a variety of factors, including the nature of the project and the nature of the analysis under consideration. The feasibility of analysis may also change over time as air districts and others develop new tools for measuring projects' air quality related health impacts. Because SCAQMD has among the most sophisticated air quality modeling and health impact evaluation capability of any of the air districts in the State, it is uniquely situated to express an opinion on the extent to which the Court should hold that CEQA requires lead agencies to correlate air quality impacts with specific health outcomes.

SCAQMD can also offer a unique perspective on the question of the appropriate standard of review. SCAQMD submits that the proper standard of review for determining whether an EIR is sufficient as an informational document is more nuanced than argued by either party. In our view, this is a mixed question of fact and law. It includes determining whether additional analysis is feasible, which is primarily a factual question that should be reviewed under the substantial evidence standard. However, it also involves determining whether the omission of a particular analysis renders an EIR insufficient to serve CEQA's purpose as a meaningful, informational document. If a lead agency has not determined that a requested analysis is infeasible, it is the court's role to determine whether the EIR nevertheless meets CEQA's purposes, and courts should not defer to the lead agency's conclusions regarding the legal sufficiency of an EIR's analysis. The ultimate question of whether an EIR's analysis is "sufficient" to serve CEQA's informational purposes is predominately a question of law that courts should review de novo.

This brief will explain the rationale for these arguments and may assist the Court in reaching a conclusion that accords proper respect to a lead agency's factual conclusions while maintaining judicial authority over the ultimate question of what level of analysis CEQA requires.

STATEMENT OF INTEREST OF *AMICUS CURIAE*

The SCAQMD is the regional agency primarily responsible for air pollution control in the South Coast Air Basin, which consists of all of Orange County and the non-desert portions of the Los Angeles, Riverside, and San Bernardino Counties. (Health & Saf. Code § 40410; Cal. Code Regs., tit. 17, § 60104.) The SCAQMD participates in the CEQA process in several ways. Sometimes it acts as a lead agency that prepares CEQA documents for projects. Other times it acts as a responsible agency when it has permit authority over some part of a project that is undergoing CEQA review by a different lead agency. Finally, SCAQMD also acts as a commenting agency for CEQA documents that it receives because it is a public agency with jurisdiction by law over natural resources affected by the project.

In all of these capacities, SCAQMD will be affected by the decision in this case. SCAQMD sometimes submits comments requesting that a lead agency perform an additional type of air quality or health impacts analysis. On the other hand, SCAQMD sometimes determines that a particular type of health impact analysis is not feasible or would not produce reliable and informative results. Thus, SCAQMD will be affected by the Court's resolution of the extent to which CEQA requires EIRs to correlate emissions and health impacts, and its resolution of the proper standard of review.

CERTIFICATION REGARDING AUTHORSHIP AND FUNDING

No party or counsel in the pending case authored the proposed amicus curiae brief in whole or in part, or made any monetary contribution intended to fund the preparation or submission of the brief. No person or entity other than the proposed *Amicus Curiae* made any monetary contribution intended to fund the preparation or submission of the brief.

Respectfully submitted,

DATED: April 3, 2015

SOUTH COAST AIR QUALITY
MANAGEMENT DISTRICT
KURT R. WIESE, GENERAL COUNSEL
BARBARA BAIRD, CHIEF DEPUTY COUNSEL

By: Barbara Baird
Barbara Baird
Attorneys for [proposed] Amicus Curiae
SOUTH COAST AIR QUALITY
MANAGEMENT DISTICT

BRIEF OF AMICUS CURIAE

SUMMARY OF ARGUMENT

The South Coast Air Quality Management District (SCAQMD) submits that this Court should not try to establish a hard-and-fast rule concerning whether lead agencies are required to correlate emissions of air pollutants with specific health consequences in their environmental impact reports (EIR). The level of detail required in EIRs is governed by a few, core CEQA (California Environmental Quality Act) principles. As this Court has stated, "[a]n EIR must include detail sufficient to enable those who did not participate in its preparation to understand and to consider meaningfully the issues raised by the proposed project." (*Laurel Heights Improvement Assn. v. Regents of the Univ of Cal.* (1988) 47 Cal.3d 376, 405 ["*Laurel Heights I*"]) Accordingly, "an agency must use its best efforts to find out and disclose all that it reasonably can." (*Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova* (2007) 40 Cal.4th 412, 428 (quoting CEQA Guidelines § 15144)[1].). However, "[a]nalysis of environmental effects need not be exhaustive, but will be judged in light of what is reasonably feasible." (*Association of Irritated Residents v. County of Madera* (2003) 107 Cal.App.4th 1383, 1390; CEQA Guidelines §§ 15151, 15204(a).)

With regard to analysis of air quality related health impacts, EIRs must generally quantify a project's pollutant emissions, but in some cases it is not feasible to correlate these emissions to specific, quantifiable health impacts (e.g., premature mortality; hospital admissions). In such cases, a general description of the adverse health impacts resulting from the pollutants at issue may be sufficient. In other cases, due to the magnitude

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[1] The CEQA Guidelines are found at Cal. Code Regs., tit. 14 §§ 15000, *et seq*.

or nature of the pollution emissions, as well as the specificity of the project involved, it may be feasible to quantify health impacts. Or there may be a less exacting, but still meaningful analysis of health impacts that can feasibly be performed. In these instances, agencies should disclose those impacts.

SCAQMD also submits that whether or not an EIR complies with CEQA's informational mandates by providing sufficient, feasible analysis is a mixed question of fact and law. Pertinent here, the question of whether an EIR's discussion of health impacts from air pollution is sufficient to allow the public to understand and consider meaningfully the issues involves two inquiries: (1) Is it feasible to provide the information or analysis that a commenter is requesting or a petitioner is arguing should be required?; and (2) Even if it is feasible, is the agency relying on other policy or legal considerations to justify not preparing the requested analysis? The first question of whether an analysis is feasible is primarily a question of fact that should be judged by the substantial evidence standard. The second inquiry involves evaluating CEQA's information disclosure purposes against the asserted reasons to not perform the requested analysis. For example, an agency might believe that its EIR meets CEQA's informational disclosure standards even without a particular analysis, and therefore choose not to conduct that analysis. SCAQMD submits that this is more of a legal question, which should be reviewed de novo as a question of law.

ARGUMENT

I. RELEVANT FACTUAL AND LEGAL FRAMEWORK.

A. Air Quality Regulatory Background

The South Coast Air Quality Management District (SCAQMD) is one of the local and regional air pollution control districts and air quality

management districts in California. The SCAQMD is the regional air pollution agency for the South Coast Air Basin, which consists of all of Orange County and the non-desert portions of Los Angeles, Riverside, and San Bernardino Counties. (Health & Saf. Code § 40410, 17 Cal. Code Reg. § 60104.) The SCAQMD also includes the Coachella Valley in Riverside County (Palm Springs area to the Salton Sea). (SCAQMD, *Final 2012 AQMP (Feb. 2013)*, http://www.aqmd.gov/home/library/clean-air-plans/air-quality-mgt-plan/final-2012-air-quality-management-plan; then follow "chapter 7" hyperlink; pp 7-1, 7-3 (last visited Apr. 1, 2015).) The SCAQMD's jurisdiction includes over 16 million residents and has the worst or nearly the worst air pollution levels in the country for ozone and fine particulate matter. (SCAQMD, *Final 2012 AQMP (Feb. 2013)*, http://www.aqmd.gov/home/library/clean-air-plans/air-quality-mgt-plan/final-2012-air-quality-management-plan; then follow "Executive Summary" hyperlink p. ES-1 (last visited Apr. 1, 2015).)

Under California law, the local and regional districts are primarily responsible for controlling air pollution from all sources except motor vehicles. (Health & Saf. Code § 40000.) The California Air Resources Board (CARB), part of the California Environmental Protection Agency, is primarily responsible for controlling pollution from motor vehicles. (*Id.*) The air districts must adopt rules to achieve and maintain the state and federal ambient air quality standards within their jurisdictions. (Health & Saf. Code § 40001.)

The federal Clean Air Act (CAA) requires the United States Environmental Protection Agency (EPA) to identify pollutants that are widely distributed and pose a threat to human health, developing a so-called "criteria" document. (42 U.S.C. § 7408; CAA § 108.) These pollutants are frequently called "criteria pollutants." EPA must then establish "national ambient air quality standards" at levels "requisite to protect public health",

allowing "an adequate margin of safety." (42 U.S.C. § 7409; CAA § 109.) EPA has set standards for six identified pollutants: ozone, nitrogen dioxide, sulfur dioxide, carbon monoxide, particulate matter (PM), and lead. (U.S. EPA, National Ambient Air Quality Standards (NAAQS), http://www.epa.gov/air/criteria.html (last updated Oct. 21, 2014).)[2]

Under the Clean Air Act, EPA sets emission standards for motor vehicles and "nonroad engines" (mobile farm and construction equipment, marine vessels, locomotives, aircraft, etc.). (42 U.S.C. §§ 7521, 7547; CAA §§ 202, 213.) California is the only state allowed to establish emission standards for motor vehicles and most nonroad sources; however, it may only do so with EPA's approval. (42 U.S.C. §§ 7543(b), 7543(e); CAA §§ 209(b), 209(c).) Sources such as manufacturing facilities, power plants and refineries that are not mobile are often referred to as "stationary sources." The Clean Air Act charges state and local agencies with the primary responsibility to attain the national ambient air quality standards. (42 U.S.C. § 7401(a)(3); CAA § 101(a)(3).) Each state must adopt and implement a plan including enforceable measures to achieve and maintain the national ambient air quality standards. (42 U.S.C. § 7410; CAA § 110.) The SCAQMD and CARB jointly prepare portion of the plan for the South Coast Air Basin and submit it for approval by EPA. (Health & Saf. Code §§ 40460, et seq.)

The Clean Air Act also requires state and local agencies to adopt a permit program requiring, among other things, that new or modified "major" stationary sources use technology to achieve the "lowest achievable emission rate," and to control minor stationary sources as

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[2] Particulate matter (PM) is further divided into two categories: fine particulate or $PM_{2.5}$ (particles with a diameter of less than or equal to 2.5 microns) and coarse particulate (PM_{10}) (particles with a diameter of 10 microns or less). (U.S. EPA, Particulate Matter (PM), http://www.epa.gov/airquality/particlepollution/ (last visited Apr. 1, 2015).)

needed to help attain the standards. (42 U.S.C. §§ 7502(c)(5), 7503(a)(2), 7410(a)(2)(C); CAA §§ 172(c)(5), 173(a)(2), 110(a)(2)(C).) The air districts implement these permit programs in California. (Health & Saf. Code §§ 42300, et seq.)

The Clean Air Act also sets out a regulatory structure for over 100 so-called "hazardous air pollutants" calling for EPA to establish "maximum achievable control technology" (MACT) for sources of these pollutants. (42 U.S.C. § 7412(d)(2); CAA § 112(d)(2).) California refers to these pollutants as "toxic air contaminants" (TACs) which are subject to two state-required programs. The first program requires "air toxics control measures" for specific categories of sources. (Health & Saf. Code § 39666.) The other program requires larger stationary sources and sources identified by air districts to prepare "health risk assessments" for impacts of toxic air contaminants. (Health & Saf. Code §§ 44320(b), 44322, 44360.) If the health risk exceeds levels identified by the district as "significant," the facility must implement a "risk reduction plan" to bring its risk levels below "significant" levels. Air districts may adopt additional more stringent requirements than those required by state law, including requirements for toxic air contaminants. (Health & Saf. Code § 41508; *Western Oil & Gas Assn. v. Monterey Bay Unified APCD* (1989) 49 Cal.3d 408, 414.) For example, SCAQMD has adopted a rule requiring new or modified sources to keep their risks below specified levels and use best available control technology (BACT) for toxics. (SCAQMD, *Rule 1401-New Source Review of Toxic Air Contaminants*, http://www.aqmd.gov/home/regulations/rules/scaqmd-rule-book/regulation-xiv; then follow "Rule 1401" hyperlink (last visited Apr. 1, 2015).)

B. The SCAQMD's Role Under CEQA

The California Environmental Quality Act (CEQA) requires public agencies to perform an environmental review and appropriate analysis for projects that they implement or approve. (Pub. Resources Code § 21080(a).) The agency with primary approval authority for a particular project is generally the "lead agency" that prepares the appropriate CEQA document. (CEQA Guidelines §§ 15050, 15051.) Other agencies having a subsequent approval authority over all or part of a project are called "responsible" agencies that must determine whether the CEQA document is adequate for their use. (CEQA Guidelines §§ 15096(c), 15381.) Lead agencies must also consult with and circulate their environmental impact reports to "trustee agencies" and agencies "with jurisdiction by law" including "authority over resources which may be affected by the project." (Pub. Resources Code §§ 21104(a), 21153; CEQA Guidelines §§ 15086(a)(3), 15073(c).) The SCAQMD has a role in all these aspects of CEQA.

Fulfilling its responsibilities to implement its air quality plan and adopt rules to attain the national ambient air quality standards, SCAQMD adopts a dozen or more rules each year to require pollution reductions from a wide variety of sources. The SCAQMD staff evaluates each rule for any adverse environmental impact and prepares the appropriate CEQA document. Although most rules reduce air emissions, they may have secondary environmental impacts such as use of water or energy or disposal of waste—e.g., spent catalyst from control equipment.[3]

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[3] The SCAQMD's CEQA program for its rules is a "Certified Regulatory Program" under which it prepares a "functionally equivalent" document in lieu of a negative declaration or EIR. (Pub. Resources Code § 21080.5, CEQA Guidelines § 15251(l).)

The SCAQMD also approves a large number of permits every year to construct new, modified, or replacement facilities that emit regulated air pollutants. The majority of these air pollutant sources have already been included in an earlier CEQA evaluation for a larger project, are currently being evaluated by a local government as lead agency, or qualify for an exemption. However, the SCAQMD sometimes acts as lead agency for major projects where the local government does not have a discretionary approval. In such cases, SCAQMD prepares and certifies a negative declaration or environmental impact report (EIR) as appropriate.[4] SCAQMD evaluates perhaps a dozen such permit projects under CEQA each year. SCAQMD is often also a "responsible agency" for many projects since it must issue a permit for part of the projects (e.g., a boiler used to provide heat in a commercial building). For permit projects evaluated by another lead agency under CEQA, SCAQMD has the right to determine that the CEQA document is inadequate for its purposes as a responsible agency, but it may not do so because its permit program already requires all permitted sources to use the best available air pollution control technology. (SCAQMD, *Rule 1303(a)(1) – Requirements*, http://www.aqmd.gov/home/regulations/rules/scaqmd-rule-book/regulation-xiii; then follow "Rule 1303" hyperlink (last visited Apr. 1, 2015).)

Finally, SCAQMD receives as many as 60 or more CEQA documents each month (around 500 per year) in its role as commenting agency or an agency with "jurisdiction by law" over air quality—a natural resource affected by the project. (Pub. Resources Code §§ 21104(a), 21153; CEQA Guidelines § 15366(a)(3).) The SCAQMD staff provides comments on as many as 25 or 30 such documents each month.

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[4] The SCAQMD's permit projects are not included in its Certified Regulatory Program, and are evaluated under the traditional local government CEQA analysis. (Pub. Resources Code §§ 21150-21154.)

(SCAQMD Governing Board Agenda, Apr. 3, 2015, Agenda Item 16, Attachment A, http://www.aqmd.gov/home/library/meeting-agendas-minutes/agenda?title=governing-board-meeting-agenda-april-3-2015; then follow "16. Lead Agency Projects and Environmental Documents Received by SCAQMD" hyperlink (last visited Apr. 1, 2015).) Of course, SCAQMD focuses its commenting efforts on the more significant projects.

Typically, SCAQMD comments on the adequacy of air quality analysis, appropriateness of assumptions and methodology, and completeness of the recommended air quality mitigation measures. Staff may comment on the need to prepare a health risk assessment detailing the projected cancer and noncancer risks from toxic air contaminants resulting from the project, particularly the impacts of diesel particulate matter, which CARB has identified as a toxic air contaminant based on its carcinogenic effects. (California Air Resources Board, Resolution 98-35, Aug. 27, 1998, http://www.arb.ca.gov/regact/diesltac/diesltac.htm; then follow Resolution 98-35 hyperlink (last visited Apr. 1, 2015).) Because SCAQMD already requires new or modified stationary sources of toxic air contaminants to use the best available control technology for toxics and to keep their risks below specified levels, (SCAQMD Rule 1401, supra, note 15), the greatest opportunity to further mitigate toxic impacts through the CEQA process is by reducing emissions—particularly diesel emissions—from vehicles.

II. THIS COURT SHOULD NOT SET A HARD-AND-FAST RULE CONCERNING THE EXTENT TO WHICH AN EIR MUST CORRELATE A PROJECT'S EMISSION OF POLLUTANTS WITH RESULTING HEALTH IMPACTS.

Numerous cases hold that courts do not review the correctness of an EIR's conclusions but rather its sufficiency as an informative document. (*Laurel Heights 1, supra*, 47 Cal.3d at p. 392; *Citizens of Goleta Valley v.*

Bd. of Supervisors (1990) 52 Cal.3d 553, 569; *Bakersfield Citizens for Local Control v. City of Bakersfield* (2004) 124 Cal.App.4th 1184, 1197.)

As stated by the Court of Appeal in this case, where an EIR has addressed a topic, but the petitioner claims that the information provided about that topic is insufficient, courts must "draw[] a line that divides *sufficient* discussions from those that are *insufficient*." (*Sierra Club v. County of Fresno* (2014) 226 Cal.App.4th 704 (superseded by grant of review) 172 Cal.Rptr.3d 271, 290.) The Court of Appeal readily admitted that "[t]he terms themselves – sufficient and insufficient – provide little, if any, guidance as to where the line should be drawn. They are simply labels applied once the court has completed its analysis." (*Id.*)

The CEQA Guidelines, however, provide guidance regarding what constitutes a sufficient discussion of impacts. Section 15151 states that "the sufficiency of an EIR is to be reviewed in light of what is reasonably feasible." Case law reflects this: "Analysis of environmental effects need not be exhaustive, but will be judged in light of what was reasonably feasible." (*Association of Irritated Residents v. County of Madera, supra,* 107 Cal.App.4th at p. 1390; see also CEQA Guidelines § 15204(a).)

Applying this test, this Court cannot realistically establish a hard-and-fast rule that an analysis correlating air pollution impacts of a project to quantified resulting health impacts is always required, or indeed that it is never required. Simply put, in some cases such an analysis will be "feasible"; in some cases it will not.

For example, air pollution control districts often require a proposed new source of toxic air contaminants to prepare a "health risk assessment" before issuing a permit to construct. District rules often limit the allowable cancer risk the new source may cause to the "maximally exposed individual" (worker and residence exposures). (*See, e.g.*, SCAQMD Rule 1401(c)(8); 1401(d)(1), *supra* note 15.) In order to perform this analysis, it

is necessary to have data regarding the sources and types of air toxic contaminants, location of emission points, velocity of emissions, the meteorology and topography of the area, and the location of receptors (worker and residence). (SCAQMD, *Supplemental Guidelines for Preparing Risk Assessments for the Air Toxics "Hot Spots" Information and Assessment Act (AB2588), pp. 11-16*; (last visited Apr. 1, 2015) http://www.aqmd.gov/home/library/documents-support-material; "Guidelines" hyperlink; AB2588; then follow AB2588 Risk Assessment Guidelines hyperlink.)

Thus, it is feasible to determine the health risk posed by a new gas station locating at an intersection in a mixed use area, where receptor locations are known. On the other hand, it may not be feasible to perform a health risk assessment for airborne toxics that will be emitted by a generic industrial building that was built on "speculation" (i.e., without knowing the future tenant(s)). Even where a health risk assessment can be prepared, however, the resulting maximum health risk value is only a calculation of risk—it does not necessarily mean anyone will contract cancer as a result of the project.

In order to find the "cancer burden" or expected additional cases of cancer resulting from the project, it is also necessary to know the numbers and location of individuals living within the "zone of impact" of the project: i.e., those living in areas where the projected cancer risk from the project exceeds one in a million. (SCAQMD, Health Risk Assessment Summary form, http://www.aqmd.gov/home/forms ; filter by "AB2588" category; then "Health Risk Assessment" hyperlink (last visited Apr. 1, 2015).) The affected population is divided into bands of those exposed to at least 1 in a million risk, those exposed to at least 10 in a million risk, etc. up to those exposed at the highest levels. (*Id.*) This data allows agencies to calculate an approximate number of additional cancer cases expected from

the project. However, it is not possible to predict which particular individuals will be affected.

For the so-called criteria pollutants[5], such as ozone, it may be more difficult to quantify health impacts. Ozone is formed in the atmosphere from the chemical reaction of the nitrogen oxides (NO_x) and volatile organic compounds (VOC) in the presence of sunlight. (U.S. EPA, Ground Level Ozone, http://www.epa.gov/airquality/ozonepollution/ (last updated Mar. 25, 2015).) It takes time and the influence of meteorological conditions for these reactions to occur, so ozone may be formed at a distance downwind from the sources. (U.S. EPA, *Guideline on Ozone Monitoring Site Selection* (Aug. 1998) EPA-454/R-98-002 § 5.1.2, http://www.epa.gov/ttnamti1/archive/cpreldoc.html (last visited Apr. 1, 2015).) NO_x and VOC are known as "precursors" of ozone.

Scientifically, health effects from ozone are correlated with increases in the ambient level of ozone in the air a person breathes. (U.S. EPA, *Health Effects of Ozone in the General Population,* Figure 9, http://www.epa.gov/apti/ozonehealth/population.html#levels (last visited Apr. 1, 2015).) However, it takes a large amount of additional precursor emissions to cause a modeled increase in ambient ozone levels over an entire region. For example, the SCAQMD's 2012 AQMP showed that reducing NO_x by 432 tons per day (157,680 tons/year) and reducing VOC by 187 tons per day (68,255 tons/year) would reduce ozone levels at the SCAQMD's monitor site with the highest levels by only 9 parts per billion. (South Coast Air Quality Management District, *Final 2012 AQMP (February 2013)*, http://www.aqmd.gov/home/library/clean-air-plans/air-quality-mgt-plan/final-2012-air-quality-management-plan; then follow "Appendix V: Modeling & Attainment Demonstrations" hyperlink,

[5] See discussion of types of pollutants, supra, Part I.A.

pp. v-4-2, v-7-4, v-7-24.) SCAQMD staff does not currently know of a way to accurately quantify ozone-related health impacts caused by NO_x or VOC emissions from relatively small projects.

On the other hand, this type of analysis may be feasible for projects on a regional scale with very high emissions of NO_x and VOCs, where impacts are regional. For example, in 2011 the SCAQMD performed a health impact analysis in its CEQA document for proposed Rule 1315, which authorized various newly-permitted sources to use offsets from the districts "internal bank" of emission reductions. This CEQA analysis accounted for essentially *all* the increases in emissions due to new or modified sources in the District between 2010 and 2030.[6] The SCAQMD was able to correlate this very large emissions increase (e.g., 6,620 pounds per day NO_x (1,208 tons per year), 89,180 pounds per day VOC (16,275 tons per year)) to expected health outcomes from ozone and particulate matter (e.g., 20 premature deaths per year and 89,947 school absences in the year 2030 due to ozone).[7] (SCAQMD Governing Board Agenda, February 4, 2011, Agenda Item 26, *Assessment for: Re-adoption of Proposed Rule 1315 – Federal New Source Review Tracking System* (see hyperlink in fn 6*)* at p. 4.1-35, Table 4.1-29.)

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[6] (SCAQMD Governing Board Agenda, February 4, 2011, Agenda Item 26, Attachment G, *Assessment for: Re-adoption of Proposed Rule 1315 – Federal New Source Review Tracking System, Vol. 1, p.4.0-6,* http://www.aqmd.gov/home/library/meeting-agendas-minutes/agenda?title=governing-board-meeting-agenda-february-4-2011; the follow "26. Adopt Proposed Rule 1315 – Federal New Source Review Tracking System" (last visited April 1, 2015).)

[7] The SCAQMD was able to establish the location of future NO_x and VOC emissions by assuming that new projects would be built in the same locations and proportions as existing stationary sources. This CEQA document was upheld by the Los Angeles County Superior Court in *Natural Res. Def. Council v SCAQMD*, Los Angeles Superior Court No. BS110792).

However, a project emitting only 10 tons per year of NO_x or VOC is small enough that its regional impact on ambient ozone levels may not be detected in the regional air quality models that are currently used to determine ozone levels. Thus, in this case it would not be feasible to directly correlate project emissions of VOC or NO_x with specific health impacts from ozone. This is in part because ozone formation is not linearly related to emissions. Ozone impacts vary depending on the location of the emissions, the location of other precursor emissions, meteorology and seasonal impacts, and because ozone is formed some time later and downwind from the actual emission. (EPA Guideline on Ozone Monitoring Site Selection (Aug. 1998) EPA-454/R-98-002, § 5.1.2; https://www.epa.gov/ttnamti1/archive/cpreldoc.html; then search "Guideline on Ozone Monitoring Site Selection" click on pdf) (last viewed Apr. 1, 2015).)

SCAQMD has set its CEQA "significance" threshold for NO_x and VOC at 10 tons per year (expressed as 55 lb/day). (SCAQMD, *Air Quality Analysis Handbook*, http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook; then follow "SCAQMD Air Quality Significance Thresholds" hyperlink (last visited Apr. 1, 2015).) This is because the federal Clean Air Act defines a "major" stationary source for "extreme" ozone nonattainment areas such as SCAQMD as one emitting 10 tons/year. (42 U.S.C. §§ 7511a(e), 7511a(f); CAA §§ 182(e), 182(f).) Under the Clean Air Act, such sources are subject to enhanced control requirements (42 U.S.C. §§ 7502(c)(5), 7503; CAA §§ 172(c)(5), 173), so SCAQMD decided this was an appropriate threshold for making a CEQA "significance" finding and requiring feasible mitigation. Essentially, SCAQMD takes the position that a source that emits 10 tons/year of NO_x or VOC would contribute cumulatively to ozone formation. Therefore, lead agencies that use SCAQMD's thresholds of significance may determine

that many projects have "significant" air quality impacts and must apply all feasible mitigation measures, yet will not be able to precisely correlate the project to quantifiable health impacts, unless the emissions are sufficiently high to use a regional modeling program.

In the case of particulate matter ($PM_{2.5}$)[8], another "criteria" pollutant, SCAQMD staff is aware of two possible methods of analysis. SCAQMD used regional modeling to predict expected health impacts from its proposed Rule 1315, as mentioned above. Also, the California Air Resources Board (CARB) has developed a methodology that can predict expected mortality (premature deaths) from large amounts of $PM_{2.5}$. (California Air Resources Board, *Health Impacts Analysis: PM Premature Death Relationship*, http://www.arb.ca.gov/research/health/pm-mort/pm-mort_arch.htm (last reviewed Jan. 19, 2012).) SCAQMD used the CARB methodology to predict impacts from three very large power plants (e.g., 731-1837 lbs/day). (Final Environmental Assessment for Rule 1315, *supra*, pp 4.0-12, 4.1-13, 4.1-37 (e.g., 125 premature deaths in the entire SCAQMD in 2030), 4.1-39 (0.05 to 1.77 annual premature deaths from power plants.) Again, this project involved large amounts of additional $PM_{2.5}$ in the District, up to 2.82 tons/day (5,650 lbs/day of $PM_{2.5}$, or, or 1029 tons/year. (*Id.* at table 4.1-4, p. 4.1-10.)

However, the primary author of the CARB methodology has reported that this $PM_{2.5}$ health impact methodology is not suited for small projects and may yield unreliable results due to various uncertainties.[9] (SCAQMD, *Final Subsequent Mitigated Negative Declaration for: Warren*

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[8] SCAQMD has not attained the latest annual or 24-hour national ambient air quality standards for "$PM_{2.5}$" or particulate matter less than 2.5 microns in diameter.

[9] Among these uncertainties are the representativeness of the population used in the methodology, and the specific source of PM and the corresponding health impacts. (*Id.* at p. 2-24.)

E&P, Inc. WTU Central Facility, New Equipment Project (certified July 19, 2011), http://www.aqmd.gov/home/library/documents-support-material/lead-agency-permit-projects/permit-project-documents---year-2011; then follow "Final Subsequent Mitigated Negative Declaration for Warren E&P Inc. WTU Central Facility, New Equipment Project" hyperlink, pp. 2-22, 2-23 (last visited Apr. 1, 2015).) Therefore, when SCAQMD prepared a CEQA document for the expansion of an existing oil production facility, with very small $PM_{2.5}$ increases (3.8 lb/day) and a very small affected population, staff elected not to use the CARB methodology for using estimated $PM_{2.5}$ emissions to derive a projected premature mortality number and explained why it would be inappropriate to do so. (*Id.* at pp 2-22 to 2-24.) SCAQMD staff concluded that use of this methodology for such a small source could result in unreliable findings and would not provide meaningful information. (*Id.* at pp. 2-23, 2-25.) This CEQA document was not challenged in court.

In the above case, while it may have been technically possible to plug the data into the methodology, the results would not have been reliable or meaningful. SCAQMD believes that an agency should not be required to perform analyses that do not produce reliable or meaningful results. This Court has already held that an agency may decline to use even the "normal" "existing conditions" CEQA baseline where to do so would be misleading or without informational value. (*Neighbors for Smart Rail v. Exposition Metro Line* (2013) 57 Cal.4th 439, 448, 457.) The same should be true for a decision that a particular study or analysis would not provide reliable or meaningful results.[10]

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[10] Whether a particular study would result in "informational value" is a part of deciding whether it is "feasible." CEQA defines "feasible" as "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, and

Therefore, it is not possible to set a hard-and-fast rule on whether a correlation of air quality impacts with specific quantifiable health impacts is required in all cases. Instead, the result turns on whether such an analysis is reasonably feasible in the particular case.[11] Moreover, what is reasonably feasible may change over time as scientists and regulatory agencies continually seek to improve their ability to predict health impacts. For example, CARB staff has been directed by its Governing Board to reassess and improve the methodology for estimating premature deaths. (California Air Resources Board, *Health Impacts Analysis: PM Mortality Relationship*, http://www.arb.ca.gov/research/health/pm-mort/pm-mort.htm (last reviewed Dec. 29, 2010).) This factor also counsels against setting any hard-and-fast rule in this case.

III. THE QUESTION OF WHETHER AN EIR CONTAINS SUFFICIENT ANALYSIS TO MEET CEQA'S REQUIREMENTS IS A MIXED QUESTION OF FACT AND LAW GOVERNED BY TWO DIFFERENT STANDARDS OF REVIEW.

A. Standard of Review for Feasibility Determination and Sufficiency as an Informative Document

A second issue in this case is whether courts should review an EIR's informational sufficiency under the "substantial evidence" test as argued by Friant Ranch or the "independent judgment" test as argued by Sierra Club.

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technological factors." (Pub. Resources Code § 21061.1.) A study cannot be "accomplished in a *successful* manner" if it produces unreliable or misleading results.

[11] In this case, the lead agency did not have an opportunity to determine whether the requested analysis was feasible because the comment was non-specific. Therefore, SCAQMD suggests that this Court, after resolving the legal issues in the case, direct the Court of Appeal to remand the case to the lead agency for a determination of whether the requested analysis is feasible. Because Fresno County, the lead agency, did not seek review in this Court, it seems likely that the County has concluded that at least some level of correlation of air pollution with health impacts is feasible.

As this Court has explained, "a reviewing court must adjust its scrutiny to the nature of the alleged defect, depending on whether the claim is predominantly one of improper procedure or a dispute over the facts." (*Vineyard Area Citizens v. City of Rancho Cordova, supra,* 40 Cal.4th at 435.) For questions regarding compliance with proper procedure or other legal questions, courts review an agency's action de novo under the "independent judgment" test. (*Id.*) On the other hand, courts review factual disputes only for substantial evidence, thereby "accord[ing] greater deference to the agency's substantive factual conclusions." (*Id.*)

Here, Friant Ranch and Sierra Club agree that the case involves the question of whether an EIR includes sufficient information regarding a project's impacts. However, they disagree on the proper standard of review for answering this question: Sierra Club contends that courts use the independent judgment standard to determine whether an EIR's analysis is sufficient to meet CEQA's informational purposes,[12] while Friant Ranch contends that the substantial evidence standard applies to this question.

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[12] Sierra Club acknowledges that courts use the substantial evidence standard when reviewing predicate factual issues, but argues that courts ultimately decide as a matter of law what CEQA requires. (Answering Brief, pp. 14, 23.)

SCAQMD submits that the issue is more nuanced than either party contends. We submit that, whether a CEQA document includes sufficient analysis to satisfy CEQA's informational mandates is a mixed question of fact and law,[13] containing two levels of inquiry that should be judged by different standards.[14]

The state CEQA Guidelines set forth standards for the adequacy of environmental analysis. Guidelines Section 15151 states:

> An EIR should be prepared with a sufficient degree of analysis to provide decision makers with information which enables them to make a decision which intelligently takes account of environmental consequences. An evaluation of the environmental effects of a proposed project need not be exhaustive, but the sufficiency of an EIR is to be reviewed in light of what is reasonably feasible. Disagreement among experts does not make an EIR inadequate, but the EIR should summarize the main points of disagreement among the experts. The courts have looked not for perfection, but for adequacy, completeness, and a good-faith effort at full disclosure.

In this case, the basic question is whether the underlying analysis of air quality impacts made the EIR "sufficient" as an informative document. However, whether the EIR's analysis was sufficient is judged in light of what was reasonably feasible. This represents a mixed question of fact and law that is governed by two different standards of review.

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[13] Friant Ranch actually states that the claim that an EIR lacks sufficient relevant information is, "most properly thought of as raising mixed questions of fact and law." (Opening Brief, p. 27.) However, the remainder of its argument claims that the court should apply the substantial evidence standard of review to all aspects of the issue.

[14] Mixed questions of fact and law issues may implicate predominantly factual subordinate questions that are reviewed under the substantial evidence test even though the ultimate question may be reviewed by the independent judgment test. *Crocker National Bank v. City and County of San Francisco* (1989) 49 Cal.3d 881, 888-889.

SCAQMD submits that an EIR's sufficiency as an informational document is ultimately a legal question that courts should determine using their independent judgment. This Court's language in *Laurel Heights I* supports this position. As this Court explained: "The court does not pass upon the correctness of the EIR's environmental conclusions, but only upon its *sufficiency as an informative document.*" (*Laurel Heights I, supra,* 47 Cal.3d at 392-393) (emphasis added.) As described above, the Court in *Vineyard Area Citizens v. City of Rancho Cordova, supra,* 40 Cal.4th at 431, also used its independent judgment to determine what level of analysis CEQA requires for water supply impacts. The Court did not defer to the lead agency's opinion regarding the law's requirements; rather, it determined for itself what level of analysis was necessary to meet "[t]he law's informational demands." (*Id.* at p. 432.) Further, existing case law also holds that where an agency fails to comply with CEQA's information disclosure requirements, the agency has "failed to proceed in the manner required by law." (*Save Our Peninsula Comm. v. Monterey County Bd. of Supervisors* (2001) 87 Cal.App.4th 99, 118.)

However, whether an EIR satisfies CEQA's requirements depends in part on whether it was reasonably feasible for an agency to conduct additional or more thorough analysis. EIRs must contain "a detailed statement" of a project's impacts (Pub. Res. Code § 21061), and an agency must "use its best efforts to find out and disclose all that it reasonably can." (CEQA Guidelines § 15144.) Nevertheless, "the sufficiency of an EIR is to be reviewed in light of what is reasonably feasible." (CEQA Guidelines § 15151.)

SCAQMD submits that the question of whether additional analysis or a particular study suggested by a commenter is "feasible" is generally a question of fact. Courts have already held that whether a particular alternative is "feasible" is reviewed by the substantial evidence test.

(*Uphold Our Heritage v. Town of Woodside* (2007) 147 Cal.App.4th 587, 598-99; *Center for Biological Diversity v. County of San Bernardino* (2010) 185 Cal.App.4th 866, 883.) Thus, if a lead agency determines that a particular study or analysis is infeasible, that decision should generally be judged by the substantial evidence standard. However, SCAQMD urges this Court to hold that lead agencies must explain the basis of any determination that a particular analysis is infeasible in the EIR itself. An EIR must discuss information, including issues related to the feasibility of particular analyses "in sufficient detail to enable meaningful participation and criticism by the public. '[W]hatever is required to be considered in an EIR must be in that formal report; what any official might have known from other writings or oral presentations cannot supply what is lacking in the report.'" (*Laurel Heights I, supra*, 47 Cal.3d at p. 405 (quoting *Santiago County Water District v. County of Orange* (1981) 118 Cal.App.3d 818, 831) (discussing analysis of alternatives).) The evidence on which the determination is based should also be summarized in the EIR itself, with appropriate citations to reference materials if necessary. Otherwise commenting agencies such as SCAQMD would be forced to guess where the lead agency's evidence might be located, thus thwarting effective public participation.

Moreover, if a lead agency determines that a particular study or analysis would not result in reliable or useful information and for that reason is not feasible, that determination should be judged by the substantial evidence test. (See *Neighbors for Smart Rail v. Exposition Metro Line Construction Authority, supra*, 57 Cal.4th 439, 448, 457:

whether "existing conditions" baseline would be misleading or uninformative judged by substantial evidence standard.[15])

If the lead agency's determination that a particular analysis or study is not feasible is supported by substantial evidence, then the agency has not violated CEQA's information disclosure provisions, since it would be infeasible to provide additional information. This Court's decisions provide precedent for such a result. For example, this Court determined that the issue of whether the EIR should have included a more detailed discussion of future herbicide use was resolved because substantial evidence supported the agency's finding that "the precise parameters of future herbicide use could not be predicted." *Ebbetts Pass Forest Watch v. California Dept. of Forestry & Fire Protection* (2008) 43 Cal.4th 936, 955.

Of course, SCAQMD expects that courts will continue to hold lead agencies to their obligations to consult with, and not to ignore or misrepresent, the views of sister agencies having special expertise in the area of air quality. (*Berkeley Keep Jets Over the Bay v. Board of Port Commissioners* (2007) 91 Cal.App.4th 1344, 1364 n.11.) In some cases, information provided by such expert agencies may establish that the purported evidence relied on by the lead agency is not in fact "substantial". (*Id.* at pp. 1369-1371.)

In sum, courts retain ultimate responsibility to determine what CEQA requires. However, the law does not require exhaustive analysis, but only what is reasonably feasible. Agencies deserve deference for their factual determinations regarding what type of analysis is reasonably feasible. On the other hand, if a commenter requests more information, and the lead agency declines to provide it but does *not* determine that the

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[15] The substantial evidence standard recognizes that the courts "have neither the resources nor the scientific expertise" to weigh conflicting evidence on technical issues. (*Laurel Heights I, supra,* 47 Cal.3d 376, 393.)

requested study or analysis would be infeasible, misleading or uninformative, the question becomes whether the omission of that analysis renders the EIR inadequate to satisfy CEQA's informational purposes. (*Id.* at pp. 1370-71.) Again, this is predominantly a question of law and should be judged by the de novo or independent judgment standard of review. Of course, this Court has recognized that a "project opponent or reviewing court can always imagine some additional study or analysis that might provide helpful information. It is not for them to design the EIR. That further study...might be helpful does not make it necessary." (*Laurel Heights I, supra,* 47 Cal.3d 376, 415 – see also CEQA Guidelines § 15204(a) [CEQA "does not require a lead agency to conduct every test. . . recommended or demanded by commenters."].) Courts, then, must adjudicate whether an omission of particular information renders an EIR inadequate to serve CEQA's informational purposes.[16]

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[16] We recognize that there is case law stating that the substantial evidence standard applies to "challenges to the scope of an EIR's analysis of a topic" as well as the methodology used and the accuracy of the data relied on in the document "because these types of challenges involve factual questions." (*Bakersfield Citizens for Local Control v. City of Bakersfield*, *supra*, 124 Cal.App.4th 1184, 1198, and cases relied on therein.) However, we interpret this language to refer to situations where the question of the scope of the analysis really is factual—that is, where it involves whether further analysis is feasible, as discussed above. This interpretation is supported by the fact that the *Bakersfield* court expressly rejected an argument that a claimed "omission of information from the EIR should be treated as inquiries whether there is substantial evidence supporting the decision approving the project. " *Bakersfield, supra,* 124 Cal.App.4th at p. 1208. And the *Bakersfield* court ultimately decided that the lead agency must analyze the connection between the identified air pollution impacts and resulting health impacts, even though the EIR already included some discussion of air-pollution-related respiratory illnesses. *Bakersfield, supra,* 124 Cal.App.4th at p. 1220. Therefore, the court must not have interpreted this question as one of the "scope of the analysis" to be judged by the substantial evidence standard.

B. Friant Ranch's Rationale for Rejecting the Independent Judgment Standard of Review is Unsupported by Case Law.

In its brief, Friant Ranch makes a distinction between cases where a required CEQA topic is not discussed at all (to be reviewed by independent judgment as a failure to proceed in the manner required by law) and cases where a topic is discussed, but the commenter claims the information provided is insufficient (to be judged by the substantial evidence test). (Opening Brief, pp. 13-17.) The Court of Appeal recognized these two types of cases, but concluded that both raised questions of law. (*Sierra Club v. County of Fresno* (2014) 226 Cal.App.4th 704 (superseded by grant of review) 172 Cal.Rptr.3d 271, 290.) We believe the distinction drawn by Friant Ranch is unduly narrow, and inconsistent with cases which have concluded that CEQA documents are insufficient. In many instances, CEQA's requirements are stated broadly, and the courts must interpret the law to determine what level of analysis satisfies CEQA's mandate for providing meaningful information, even though the EIR discusses the issue to some extent.

For example, the CEQA Guidelines require discussion of the existing environmental baseline. In *County of Amador v. El Dorado County Water Agency* (1999) 76 Cal.App.4th 931, 954-955, the lead agency had discussed the environmental baseline by describing historic month-end water levels in the affected lakes. However, the court held that this was not an adequate baseline discussion because it failed to discuss the timing and amounts of past actual water releases, to allow comparison with the proposed project. The court evidently applied the independent judgment test to its decision, even though the agency discussed the issue to some extent.

Likewise, in *Vineyard Area Citizens* (2007) 40 Cal.4th 412, this Court addressed the question of whether an EIR's analysis of water supply impacts complied with CEQA. The parties agreed that the EIR was required to analyze the effects of providing water to the development project, "and that in order to do so the EIR had, in some manner, to identify the planned sources of that water." (*Vineyard Area Citizens, supra,* at p. 428.) However, the parties disagreed as to the level of detail required for this analysis and "what level of uncertainty regarding the availability of water supplies can be tolerated in an EIR . . . ." (*Id.*) In other words, the EIR had analyzed water supply impacts for the project, but the petitioner claimed that the analysis was insufficient.

This Court noted that neither CEQA's statutory language or the CEQA Guidelines specifically addressed the question of how precisely an EIR must discuss water supply impacts. (*Id.*) However, it explained that CEQA "states that '[w]hile foreseeing the unforeseeable is not possible, an agency must use its best efforts to find out and disclose all that it reasonably can.'" (*Id.*, [Guidelines § 15144].) The Court used this general principle, along with prior precedent, to elucidate four "principles for analytical adequacy" that are necessary in order to satisfy "CEQA's informational purposes." (*Vineyard Area Citizens, supra,* at p. 430.) The Court did not defer to the agency's determination that the EIR's analysis of water supply impacts was sufficient. Rather, this Court used its independent judgment to determine for itself the level of analysis required to satisfy CEQA's fundamental purposes. (*Vineyard Area Citizens, supra*, at p. 441: an EIR does not serve its purposes where it neglects to explain likely sources of water and "... leaves long term water supply considerations to later stages of the project.")

Similarly, the CEQA Guidelines require an analysis of noise impacts of the project. (Appendix G, "Environmental Checklist Form."[17]) In *Gray v. County of Madera* (2008) 167 Cal.App.4th 1099, 1123, the court held that the lead agency's noise impact analysis was inadequate even though it had addressed the issue and concluded that the increase would not be noticeable. If the court had been using the substantial evidence standard, it likely would have upheld this discussion.

Therefore, we do not agree that the issue can be resolved on the basis suggested by Friant Ranch, which would apply the substantial evidence standard to *every* challenge to an analysis that addresses a required CEQA topic. This interpretation would subvert the courts' proper role in interpreting CEQA and determining what the law requires.

Nor do we agree that the Court of Appeal in this case violated CEQA's prohibition on courts interpreting its provisions "in a manner which imposes procedural or substantive requirements beyond those explicitly stated in this division or in the state guidelines." (Pub. Resources Code § 21083.1.) CEQA requires an EIR to describe *all* significant impacts of the project on the environment. (Pub. Resources Code § 21100(b)(2); *Vineyard Area Citizens, supra,* at p. 428.) Human beings are part of the environment, so CEQA requires EIRs to discuss a project's significant impacts on human health. However, except in certain particular circumstances,[18] neither the CEQA statute nor Guidelines specify the precise level of analysis that agencies must undertake to satisfy the law's requirements. (see, e.g., CEQA Guidelines § 15126.2(a) [EIRs must describe "health and safety problems caused by {a project's} physical changes"].) Accordingly, courts must interpret CEQA as a whole to

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[17] Association of Environmental Professionals, 2015 CEQA Statute and Guidelines (2015) p.287.

[18] E.g., Pub. Resources Code § 21151.8(C)(3)(B)(iii) (requiring specific type of health risk analysis for siting schools).

determine whether a particular EIR is sufficient as an informational document. A court determining whether an EIR's discussion of human health impacts is legally sufficient does not constitute imposing a new substantive requirement.[19] Under Friant Ranch's theory, the above-referenced cases holding a CEQA analysis inadequate would have violated the law. This is not a reasonable interpretation.

IV. COURTS MUST SCRUPULOUSLY ENFORCE THE REQUIREMENTS THAT LEAD AGENCIES CONSULT WITH AND OBTAIN COMMENTS FROM AIR DISTRICTS

Courts must "scrupulously enforce" CEQA's legislatively mandated requirements. (*Vineyard Area Citizens, supra*, 40 Cal.4th 412, 435.) Case law has firmly established that lead agencies must consult with the relevant air pollution control district before conducting an initial study, and must provide the districts with notice of the intention to adopt a negative declaration (or EIR). (*Schenck v. County of Sonoma* (2011) 198 Cal.App.4th 949, 958.) As *Schenck* held, neither publishing the notice nor providing it to the State Clearinghouse was a sufficient substitute for sending notice directly to the air district. (*Id.*) Rather, courts "must be satisfied that [administrative] agencies have fully complied with the procedural requirements of CEQA, since only in this way can the important public purposes of CEQA be protected from subversion." *Schenck,* 198 Cal.App.4th at p. 959 (citations omitted).[20]

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[19] We submit that Public Resources Code Section 21083.1 was intended to prevent courts from, for example, holding that an agency must analyze economic impacts of a project where there are no resulting environmental impacts (see CEQA Guidelines § 15131) , or imposing new procedural requirements, such as imposing additional public notice requirements not set forth in CEQA or the Guidelines.

[20] Lead agencies must consult air districts, as public agencies with jurisdiction by law over resources affected by the project, *before* releasing an EIR. (Pub. Resources Code §§ 21104(a); 21153.) Moreover, air

Lead agencies should be aware, therefore, that failure to properly seek and consider input from the relevant air district constitutes legal error which may jeopardize their project approvals. For example, the court in *Fall River Wild Trout Foundation v. County of Shasta,* (1999) 70 Cal.App.4th 482, 492 held that the failure to give notice to a trustee agency (Department of Fish and Game) was prejudicial error requiring reversal. The court explained that the lack of notice prevented the Department from providing any response to the CEQA document. (*Id.* at p. 492.) It therefore prevented relevant information from being presented to the lead agency, which was prejudicial error because it precluded informed decision-making. (*Id.*)[21]

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districts should be considered "state agencies" for purposes of the requirement to consult with "trustee agencies" as set forth in Public Resources Code § 20180.3(a). This Court has long ago held that the districts are not mere "local agencies" whose regulations are superseded by those of a state agency regarding matters of statewide concern, but rather have concurrent jurisdiction over such issues. (*Orange County Air Pollution Control District v. Public Util. Com.* (1971) 4 Cal.3d 945, 951, 954.) Since air pollution is a matter of statewide concern, *Id* at 952, air districts should be entitled to trustee agency status in order to ensure that this vital concern is adequately protected during the CEQA process.

[21] In *Schenck,* the court concluded that failure to give notice to the air district was not prejudicial, but this was partly because the trial court had already corrected the error before the case arrived at the Court of Appeal. The trial court issued a writ of mandate requiring the lead agency to give notice to the air district. The air district responded by concurring with the lead agency that air impacts were not significant. (*Schenck,* 198 Cal.App.4th 949, 960.) We disagree with the *Schenck* court that the failure to give notice to the air district would not have been prejudicial (even in the absence of the trial court writ) merely because the lead agency purported to follow the air district's published CEQA guidelines for significance. (*Id.*, 198 Cal.App.4th at p. 960.) In the first place, absent notice to the air district, it is uncertain whether the lead agency properly followed those guidelines. Moreover, it is not realistic to expect that an air district's published guidelines would necessarily fully address all possible air-quality related issues that can arise with a CEQA project, or that those

Similarly, lead agencies must obtain additional information requested by expert agencies, including those with jurisdiction by law, if that information is necessary to determine a project's impacts. (*Sierra Club v. State Bd. Of Forestry* (1994) 7 Cal.4th 1215, 1236-37.) Approving a project without obtaining that information constitutes a failure to proceed in the manner prescribed by CEQA. (*Id.* at p. 1236.)

Moreover, a lead agency can save significant time and money by consulting with the air district early in the process. For example, the lead agency can learn what the air district recommends as an appropriate analysis on the facts of its case, including what kinds of health impacts analysis may be available, and what models are appropriate for use. This saves the lead agency from the need to do its analysis all over again and possibly needing to recirculate the document after errors are corrected, if new significant impacts are identified. (CEQA Guidelines § 15088.5(a).) At the same time, the air district's expert input can help the lead agency properly determine whether another commenter's request for additional analysis or studies is reasonable or feasible. Finally, the air district can provide input on what mitigation measures would be feasible and effective.

Therefore, we suggest that this Court provide guidance to lead agencies reminding them of the importance of consulting with the relevant air districts regarding these issues. Otherwise, their feasibility decisions may be vulnerable to air district evidence that establishes that there is no substantial evidence to support the lead agency decision not to provide specific analysis. (*See Berkeley Keep Jets Over the Bay, supra,* 91 Cal.App.4th 1344, 1369-1371.)

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guidelines would necessarily be continually modified to reflect new developments. Therefore we believe that, had the trial court not already ordered the lead agency to obtain the air district's views, the failure to give notice would have been prejudicial, as in *Fall River, supra,* 70 Cal.App.4th 482, 492.

CONCLUSION

The SCAQMD respectfully requests this Court *not* to establish a hard-and-fast rule concerning whether CEQA requires a lead agency to correlate identified air quality impacts of a project with resulting health outcomes. Moreover, the question of whether an EIR is "sufficient as an informational document" is a mixed question of fact and law containing two levels of inquiry. Whether a particular proposed analysis is feasible is predominantly a question of fact to be judged by the substantial evidence standard of review. Where the requested analysis is feasible, but the lead agency relies on legal or policy reasons not to provide it, the question of whether the EIR is nevertheless sufficient as an informational document is predominantly a question of law to be judged by the independent judgment standard of review.

Respectfully submitted,

DATED: April 3, 2015

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
KURT R. WIESE, GENERAL COUNSEL
BARBARA BAIRD, CHIEF DEPUTY COUNSEL

By: Barbara Baird
Barbara Baird
Attorneys for Amicus Curiae
SOUTH COAST AIR QUALITY MANAGEMENT DISTICT

CERTIFICATE OF WORD COUNT

Pursuant to Rule 8.520(c)(1) of the California Rules of Court, I hereby certify that this brief contains 8,476 words, including footnotes, but excluding the Application, Table of Contents, Table of Authorities, Certificate of Service, this Certificate of Word Count, and signature blocks. I have relied on the word count of the Microsoft Word Vista program used to prepare this Certificate.

DATED: April 3, 2015 Respectfully submitted,

Barbara Baird

Barbara Baird

PROOF OF SERVICE

I am employed in the County of Los Angeles, California. I am over the age of 18 years and not a party to the within action. My business address is 21865 Copley Drive, Diamond Bar, California 91765.

On April 3, 2015 I served true copies of the following document(s) described as **APPLICATION OF THE SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT FOR LEAVE TO FILE BRIEF OF *AMICUS CURIAE* IN SUPPORT OF NEITHER PARTY AND *[PROPOSED]* BRIEF OF *AMICUS CURIAE*** by placing a true copy of the foregoing document(s) in a sealed envelope addressed as set forth on the attached service list as follows:

BY MAIL: I enclosed the document(s) in a sealed envelope or package addressed to the persons at the addresses listed in the Service List and placed the envelope for collection and mailing following our ordinary business practices. I am readily familiar with this District's practice for collection and processing of correspondence for mailing. Under that practice, the correspondence would be deposited with the United States Postal Service, with postage thereon fully prepaid at Diamond Bar, California, in the ordinary course of business. I am aware that on motion of the party served, service is presumed invalid if postal cancellation date or postage meter date is more than one day after date of deposit for mailing in affidavit.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Executed on April 3, 2015 at Diamond Bar, California.

Patricia Anderson

SERVICE LIST

James G. Moose, Tiffany K. Wright, Laura M. Harris REMY MOOSE MANLEY, LLP 555 Capitol Mall, Suite 800 Sacramento, CA 95814	Attorneys for Real Party in Interest and Respondent *Friant Ranch, L.P.*
Bryan N. Wagner WAGNER & WAGNER 7110 N. Fresno St, Suite 340 Fresno, CA 93720	Attorney for Real Party in Interest and Respondent *Friant Ranch, L.P.*
Sara Hedgpeth-Harris LAW OFFICE OF SARA HEDGPETH-HARRIS 5445 E. Lane Avenue Fresno, CA 93727	Attorney for Plaintiffs and Appellants *Sierra Club, et al*
Daniel C. Cederborg Bruce B. Johnson, Jr. Zachary Stephen Redmond OFFICE OF THE FRESNO COUNTY COUNSEL 2220 Tulare Street, Suite 500 Fresno, CA 93721	Attorneys for Respondents *County of Fresno*
Clerk of the Court California Court of Appeal Fifth Appellate District 2424 Ventura Street Fresno, CA 93721 *(via U.S. Mail & Electronic Transmission)*	
Clerk of the Court Superior Court of California County of Fresno 1130 O Street Fresno, CA 93721	

Appendix C

Biological Resources Technical Studies

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Appendix C.1

Reconnaissance-Level Biological Evaluation

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Reconnaissance Level Biological Evaluation for Lost Hills Composting and Waste to Energy Project Kern County, California

Revised
August 2020

Prepared for:
Lost Hills Environmental
2019 Westwind Drive, Suite B
Bakersfield, CA 93301

Prepared by:
McCormick Biological, Inc.
P.O. Box 80983
Bakersfield, California 93380

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EXECUTIVE SUMMARY

This report documents the biological resources found during reconnaissance-level biological surveys conducted in 2018 (April 5), 2019 (April 11), and 2020 (January 30, February 5, and March 13, June 22) in regard to a proposed Conditional Use Permit (CUP) for the Lost Hills Environmental Composting and Waste to Energy Project. The CUP is proposed for a portion of the H.M. Holloway facility measuring approximately measuring approximately 340 acres (Project Site). The Project Site is located both east and west of Holloway Road and North of Route 46/Paso Robles Highway, in Kern County, California in Sections 24 and 25, Township 26 South, Range 20 East M.D.B.&M., approximately 9.5 miles (15.3 kilometers) west of the community of Lost Hills, California.

The purpose of this report is to document biological resources identified during site visits at the Project Site, and includes an evaluation of the potential for special-status biological resources that may occur based on the habitat conditions present. This report combines two previous reports that were prepared by McCormick Biological, Inc. and submitted to Kern County previously: *Reconnaissance Level Biological Evaluation for Lost Hills Environmental H.M. Holloway Waste Facility CUP Renewal* (May 2018) and *Reconnaissance Level Biological Evaluation for Lost Hills Environmental H.M. Holloway Aries Project* (April 2019). In addition, comments received via memorandum (*Re: Lost Hills Composting and Waste to Energy Project: Peer Review of the Biological Evaluation Reports*; December 20, 2019) that were prepared by SWCA Environmental Consultants are incorporate herein.

The Project Site is located within the geographic range of several federal- and/or state-listed threatened and/or endangered wildlife taxa including: San Joaquin antelope squirrel (*Ammospermophilus nelsoni*, SJAS), Swainson's hawk (*Buteo swainsoni*, BUSW), western snowy plover (*Charadrius alexandrines nivosus*), giant kangaroo rat (*Dipodomys ingens*; GKR), Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*, TKR), blunt-nosed leopard lizard (*Gambelia sila*; BNLL), Buena Vista Lake ornate shrew (*Sorex ornatus relictus*), and San Joaquin kit fox (*Vulpes macrotis mutica*; SJKF). In addition, the site is in the range of listed plant taxa, including California jewelflower (*Caulanthus californicus*), Kern mallow (*Eremalche parryi* ssp. *kernensis*), San Joaquin woolly-threads (*Monolopia congdonii*). All of the potentially occurring listed plant species are annuals.

Several non-listed special-status plants wildlife species were identified that may occur on the Project Site and vicinity. Some of the special-status plants recorded in the region on similar habitats to those present on the Project Site include crownscale (*Atriplex coronata* var. *coronata*), Lost Hills crownscale (*Atriplex coronata* var. *vallicola*), lesser saltscale (*Atriplex minuscula*), recurved larkspur (*Delphinium recurvatum*), Temblor buckwheat (*Eriogonum temblorense*), Coulter's goldfields (*Lasthenia glabrata*), and Munz's tidy tips (*Layia munzii*). Special-status wildlife of the region include western spadefoot (*Spea hammondii*), California glossy snake (*Arizona elegans occidentalis*), San Joaquin coachwhip (*Masticophis flagellum ruddocki*), Blainville's horned lizard (*Phrynosoma blainvilli*), burrowing owl (*Athene cunicularia*), LeConte's thrasher (*Toxostoma lecontei*), short-nosed kangaroo rat (*Dipodomy nitratoides brevinasus*), Tulare grasshopper mouse (*Onychomys torridus tularensis*), and American badger (*Taxidea taxus*).

Listed plant and animal species are protected primarily through the *Federal Endangered Species*

Act (FESA) *of 1973* (2015), and/or the *California Endangered Species Act* (CESA) *of 1970 1973* (2017). Each of these laws, among other provisions, prohibits *take* of listed threatened and endangered species. Although the definition of *take* under each law varies somewhat, in general, injuring, killing, or possessing listed species without a permit issued from the United States Fish and Wildlife Service (USFWS) and/or the California Department of Fish and Wildlife (CDFW) is unlawful. Under FESA, harassment and harm may also be considered *take* for which the USFWS recommends a permit. One of the potentially occurring species, BNLL is a California *fully protected* species. Under this designation, no *take* of this species is allowed, even under endangered species act permitting unless it is authorized for scientific purposes.

Based upon field survey results, the project will not result in significant impacts to wetlands, riparian habitat or other special-status habitats, or wildlife corridors. The project will not conflict with existing or adopted Habitat Conservation Plans, Natural Community Conservation Plans, local or regional conservation plans, or local ordinances protecting biological resources.

Information gathered during the reconnaissance-level surveys conducted for this project was used to evaluate the potential for impacts to special-status species identified from the literature review. Special-status species observations recorded during site visits and surveys include San Joaquin kit fox, loggerhead shrike, and crownscale. The project has the potential to result in impacts to many of the special-status species identified during literature review either based on direct observations or habitat suitability. A series of general recommendations and species-specific recommendations are included that, when implemented, are expected to mitigate project impacts to a level of “less than significant”.

1.0 INTRODUCTION

1.1 Purpose and Background

The purpose of this report is to document biological resources identified during the literature review and reconnaissance-level survey conducted within the survey area, identify the potential for special-status resources to be present, identify potential impacts to those resources due to the proposed project, and recommend avoidance and minimization measures for implementation prior to and during project activities. The objective of avoidance and minimization measures is to reduce potential impacts to biological resources to a level of "less than significant", if possible.

This report is intended to support CEQA review of the proposed Project for modification of an existing Conditional Use Permit (CUP) to establish the location for the proposed Waste to Energy Biomass Gasification Facility and issue a new CUP for construction of the facility. Additionally, the existing landfill CUP would be modified to make changes in the waste stream and increase the permitted hours of operation, tonnage, and traffic volume. For the purposes of this report, potential impacts to the biological resources of the proposed Project were evaluated in accordance with the biological resources section in Appendix G of the *CEQA Guidelines* (2019).

1.2 Project Description and Surrounding Area

The Project Site is located approximately 9.5 miles (15.3 kilometers) northwest of the community of Lost Hills, California, in portions of Sections 24 and 25, Township 26 South, Range 20 East M.D.B.&M. The project consists of a Conditional Use Permit (CUP) application for composting and waste facility with a power plant component. Proposed project activities consist of continued operation of the landfill, future construction and operation of a composting facility, and expanded and continued use of a Class III Non-Hazardous Industrial Waste Landfill facility with the establishment of a new Waste to Energy Biomass Gasification Facility. The proposed composting activities will be initiated in three phases (Phase 1, 2, and 3). After project start with Phase 1, each subsequent phase is planned at five-year intervals.

The entire Project site is located on an approximately 340-acre site at 14045 Holloway Road Lost Hills, California (Figure 1-1 and 1-2). The general topography of the area is relatively flat and ranges from 370 feet to 500 feet (113–152 meters) above mean sea-level.

The Project is located near the middle of the southern portion of the San Joaquin Valley; a broad, treeless plain in the rain shadow of the Coast Ranges. The region's climate can be characterized as Mediterranean; with hot, dry summers and cool, moist winters. Summer high temperatures typically exceed 100 degrees Fahrenheit (°F; 38 °Celsius [°C]). Winter temperatures in the San Joaquin Valley are mild, with most areas experiencing very few frost days. Rainfall varies, increasing from west to east. Approximately 90% of the rainfall in the region occurs between November 1, and April 1. Drought cycles occur periodically, becoming severe enough that plant and animal populations can experience large fluctuations (Twisselman 1967).

1.3 Regulatory Background

The following section identifies the regulatory compliance framework that has been considered during both the field work and development of this biological evaluation. The regulatory

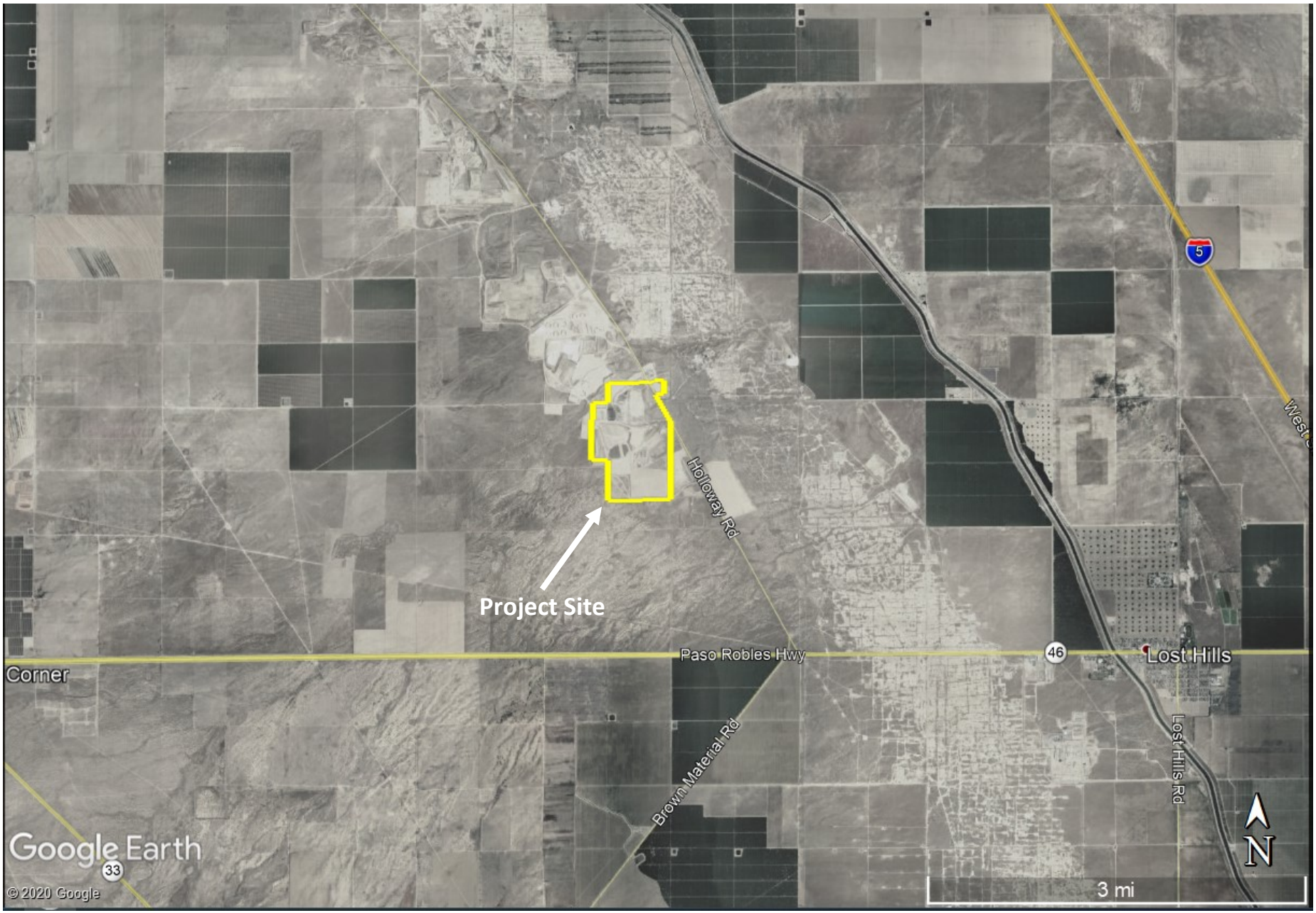


Figure 1-1: Project Vicinity Map – Kern County, California (Google Earth Pro 2020)

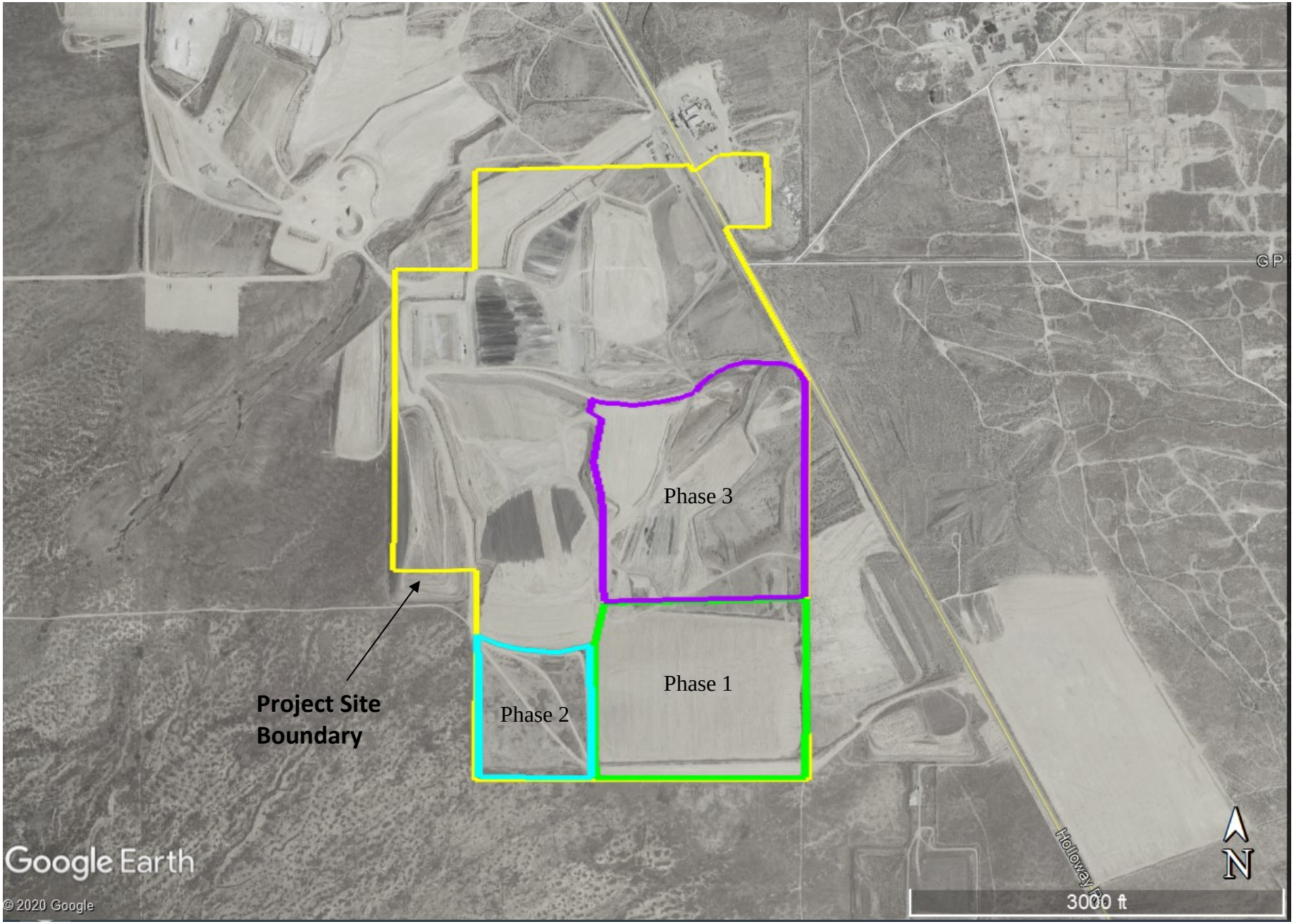


Figure 1-2: Project Site Map – Kern County, California (Google Earth Pro 2020)

framework establishes criteria in which significance is determined and whether a project will have a significant impact on species, biological resources, or the environment.

1.3.1 Federal and State Endangered Species Acts

The project site is within the range of several state- and federal-listed species which are protected through various statutes. Listed plant and animal species are protected primarily through FESA and/or CESA, depending on listing status. Each of these laws, among other provisions, prohibits *take* of listed threatened and endangered species. Although the definition of *take* under each law varies, in general, possessing, injuring or killing a listed species without a permit issued from the USFWS and/or the CDFW [Formerly the California Department of Fish and Game (CDFG)] is unlawful. Under FESA, harassment and harm could also be considered take, which requires a permit.

1.3.2 Migratory Bird Treaty Act

Among other provisions, the *Migratory Bird Treaty Act* (MBTA) *of 1918* (2018) prohibits the possession of migratory birds or their parts, and destruction of nests, eggs, and/or young of all designated migratory bird species. With very limited exceptions, all birds native to California are included in this prohibition.

1.3.3 California Fish and Game Code (C.F.G.C. § 1580 et seq.)

Several sections of the CFGC are applicable to analysis of biological resource impacts that may be associated with the Project. The following paragraphs summarize these sections.

Section 1580

This section declares the policy of the state is to protect threatened or endangered native plants; wildlife; aquatic organisms or specialized habitat types; both terrestrial and non-marine aquatic, or large, heterogeneous natural gene pools for the future use of mankind through the establishment of ecological reserves.

Sections 1600–1616

This portion of the CFGC requires notification of the CDFW if any of the following may occur within a river, stream, or lake in the state of California:

- Substantial diversion or obstruction of the natural flow,
- Substantially changing or using any material from the bed, channel, or bank,
- Depositing or disposing of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake.

This notification may result in a Streambed Alteration Agreement between the project applicant and the CDFW. Activities in intermittent streams and canals may require Streambed Alteration Agreements.

Section 1900, et seq.

This portion of the CFGC is known as the *California Native Plant Protection Act of 1977* (2015). The purpose of this chapter is to preserve, protect and enhance endangered or rare native plants of California. Many species and subspecies of native plants are endangered because their habitats are threatened with destruction, drastic modification, or severe curtailment. Commercial exploitation, disease, and other factors also represent threats to species and subspecies of native plants. This portion of the code designates rare, threatened, and endangered plant taxa of California.

Section 1930–1933

These sections established the Significant Natural Areas Program and declared it to be administered by the CDFW, because areas containing diverse ecological and geological characteristics are vital to the continual health and well-being of the state's citizens and natural resources. The CDFW is responsible for obtaining access to the most recent information with respect to natural resources by maintaining, expanding, and keeping a current data management system (California Natural Diversity Database [CNDDB]), designed to document information on these resources. This data is required to be made available to interested parties on request, and costs are to be shared by all who use the data management system.

The state's most significant natural areas are to be designated and, after consultation with federal, state, and local agencies, educational institutions, civic and public interest organizations, private organizations, landowners, and other private individuals, periodic reports regarding the most significant natural areas are to be prepared. The CDFW is required to maintain and perpetuate these significant natural areas for present and future generations in the most feasible manner. The code also requires that the CDFW coordinate services to federal, state, local and private interests wishing to aid in the maintenance and perpetuation of significant natural areas.

Section 3503

This section prohibits taking, possessing, or needlessly destroying the nest or eggs or any bird. Birds of prey are specifically included in Section 3503.5.

Section 3513

California's migratory birds are protected under this section by making it unlawful to take or possess any migratory, non-game bird (or any part of such bird) as designated in the MBTA.

Section 3511, 4700, 5050, and 5515

These sections prohibit take of animals that are classified as fully protected (FP) in California. Take of FP species is specifically prohibited, even if other sections of the CFGC provide for incidental take of the species, with very narrow exceptions.

Title 14 California Code of Regulations (CCR) Section 15000 et seq.

This portion of the CCR prescribes the regulations to be followed by all local and state agencies in implementing CEQA.

Porter-Cologne Water Quality Control Act (Clean Water Act Section 401 Certification or Waiver)

The state of California regulates water quality related to discharge of fill material into waters of the state pursuant to Section 401 of the *Clean Water Act of 1972* (2002). Section 401 compliance is a federal mandate implemented by the state. The local Regional Water Quality Control Board (RWQCB) has jurisdiction over all those areas defined as jurisdictional under Section 404 of the CWA and regulates water quality for all waters of the State. These waters may include isolated wetlands as defined under the *Porter-Cologne Water Quality Control Act* (2015). Regulated discharges include those that can affect water quality, even if there is no significant nexus to a traditional navigable water body required for the U.S. Army Corps of Engineers (ACOE) determination of jurisdiction over waters of the U.S. A Waste Discharge Permit may be required to comply with the Porter-Cologne Water Quality Control Act even if the CWA (including Section 401 water quality certifications or Section 404 permits) would not apply.

1.3.4 Clean Water Act

The ACOE, under Section 404 of the CWA, regulates discharges of dredged or fill material in waters of the U.S. Per the U.S. Environmental Protection Agency (2020), waters of the United States include:

- All waters which are currently used, or 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;
- All interstate waters including interstate wetlands;
- 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 could affect interstate or foreign commerce including any such waters:
    - Which are or could be used by interstate or foreign travelers for recreational or other purposes; or
    - (From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
    - Which are used or could be used for industrial purposes by industries in interstate commerce;
- All impoundments of waters otherwise defined as waters of the United States under this definition;
- Tributaries of waters identified above;
- The territorial sea;
- Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in bullets above.

Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR 423.11(m) which also meet the criteria of this definition) are not waters of the U.S.

Waters of the U.S. do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with EPA.

Both wetlands and non-wetland areas can be included within the regulated area. Within non-wetlands that are classified as waters of the U.S., the ACOE maintains jurisdiction up to the ordinary high water mark. If wetlands are present that meet the criteria established by the ACOE, the limit of jurisdiction is the ordinary high water mark or the limit of the adjacent or associated wetland, whichever is greater. If waters are determined to be under the jurisdiction of the ACOE, the RWQCB would be the state-permitting authority. At the discretion of the ACOE, impacts to these areas could require a permit, depending on the type and size of the activity within ACOE jurisdiction.

2.0 METHODS

"Special-status" or "sensitive" species considered in this evaluation include those that may occur in the project vicinity that have statutory protections, such as federal- and state-listed (rare, threatened, or endangered; fully protected) species and candidates for listing under the respective endangered species acts. In addition, species that are of "concern" to either USFWS or CDFW have been included in the evaluation if the project site or vicinity (generally, 10-mile radius) includes habitat that may be occupied by such species. Bird species that are not listed as threatened or endangered have been included if the project site or observed vicinity includes potential nesting habitat or the species was observed during biological survey activities. In addition, potential impacts to special-status bird species have been considered if habitat that may be important to the species outside of breeding season was observed. Species may meet the criteria for inclusion on the lists consulted during the literature review if a special interest group, such as the California Native Plant Society (CNPS), has concluded through published data that the species is declining and warrants concern and, potential habitat is present on the project site or vicinity. Species evaluated in this biological resource assessment have been collectively referred to as "special-status species."

For the purposes of this document, special status plants include all plant species that meet one or more of the following criteria:

- Listed or proposed for listing as threatened or endangered under ESA or candidates for possible future listing as threatened or endangered under the ESA (50 CFR §17.12).
- Listed or candidates for listing by the State of California as threatened or endangered under CESA (Fish and Game Code §2050 et seq.). A species, subspecies, or variety of plant is endangered when the prospects of its survival and reproduction in the wild are in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, over-exploitation, predation, competition, disease, or other factors (Fish and Game Code §2062). A plant is threatened when it is likely to become endangered in the foreseeable future in the absence of special protection and management measures (Fish and Game Code §2067).
- Listed as rare under the California Native Plant Protection Act (Fish and Game Code §1900 et seq.). A plant is rare when, although not presently threatened with extinction, the species, subspecies, or variety is found in such small numbers throughout its range that it may be endangered if its environment worsens (Fish and Game Code §1901).
- Meet the definition of rare or endangered under CEQA §15380(b) and (d). Species that may meet the definition of rare or endangered include the following:
    - Species considered by the California Native Plant Society (CNPS) to be "rare, threatened or endangered in California" (Lists 1A, 1B and 2);
    - Species that may warrant consideration on the basis of local significance or recent biological information.
    - Some species included on the California Natural Diversity Database's (CNDDB) Special Plants, Bryophytes, and Lichens List (California Department of Fish and Game 2008)6.
- Considered a locally significant species, that is, a species that is not rare from a statewide perspective but is rare or uncommon in a local context such as within a county or region (CEQA §15125 (c)) or is so designated in local or regional plans, policies, or ordinances (CEQA Guidelines, Appendix G). Examples include a species at the outer limits of its

known range or a species occurring on an uncommon soil type.Special-status species considered in this evaluation include those that may occur in the project vicinity that have statutory protections, and include federal- and state-listed (rare, threatened, or endangered; fully protected) species and candidates for listing under the respective endangered species acts.

The list of special-status species that was evaluated was additionally compiled by consulting pertinent literature, obtaining the USFWS *List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project*, and accessing the CNDDB (USFWS 2020; CNDDB 2020). The CNDDB contains records for special-status species, as well as special-status natural communities that have been reported to the CDFW. Updates to the database are provided monthly for subscribers (CNDDB 2020). A standard 10-mile (16-kilometer) report was generated for the project location (i.e., USGS 7.5-minute topographic quadrangle in which the project site is found as well as the quadrangles located within a 10-mile (16-kilometer) radius of the project footprint). For clarity, a map was generated illustrating those species reported in close proximity to the project area by the CNDDB. Species that are recorded by the CNDDB that have no official status (e.g., *Watch List*) were not further considered in the impact evaluation unless observed during the reconnaissance site visits.

MBI staff reviewed these lists and other pertinent information to complete the list of special-status species evaluated. The list was then reviewed based on site characteristics, the project description, and observations, to assess the potential for occurrence. Potential impacts were determined in relation to the special-status species that may occur on the proposed project site and the aspects of the Project that could result in impacts to those species. Species whose occurrence in the vicinity and life history makes them vulnerable to impacts even if they are not known to occur directly on the project site were also evaluated.

Site visits in 2018 and 2019 included walking belt transect within potential habitat within the proposed waste facility project footprint and the energy facility project footprint, respectively. A 250-foot buffer was walked if accessible. Field notes included observations of all identified plant and wildlife species observed. Supporting documentation regarding species findings included direct observations and/or significant species *sign* (e.g., scat, tracks, feather/fur, prey remains, nests/burrows or any other indication of wildlife presence) deemed necessary to document potential occupation and habitat suitability. Species identification was aided through the use of binoculars and field guides, and locations of significant findings were recorded using handheld, global positioning system (GPS) units. During the 2020 site visit, meandering transects were walked within habitat and the accessible portion of the 250-foot buffer on the Project, with the exception of the annual grassland area to the west of the primary existing landfill. Conditions in this portion of the Project were evaluated based on a reconnaissance level site visit conducted on January 30, 2020.

If encountered, coordinates for important biological resource elements and direct observations of special-status species were recorded using a handheld geographic positioning system unit (accuracy ±20 feet, ±6 meters). If observed, SJKF dens were classified as potential, known, natal, or atypical as defined by the *USFWS Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox Prior to or During Ground Disturbance* (2011). Remote sensing cameras were placed at selected dens to assess status and potential canid use. Cameras were monitored between February 3 and February 14, 2020.

All plant taxa encountered during the site visits were identified to the extent possible. Identifications were made using keys contained in *The Jepson Manual: Vascular Plants of California* and online updates containing revisions to taxonomic treatments (Baldwin et al. 2012; Jepson Flora Project 2020). Plant identifications were made using a 10X or greater magnification field hand lens and/or were collected and identified using a dissecting microscope. Locations of special-status plant species or tentatively identified special-status plant species were recorded using a handheld GPS unit. A transect survey of the Phase 1 composting area was conducted on June 22, 2020. Transects spaced at 50-foot intervals were walked over the entire Phase 1 area by two qualified botanists.

General habitat and site conditions were photographed to visually depict conditions during the site visits. In addition, special-status species or habitat features, such as vegetation communities or ephemeral channels, were also photographically documented if present.

3.0 RESULTS and DISCUSSION

The literature review resulted in identification of 19 special-status plant species and 60 special-status wildlife species that could occur in the vicinity of the proposed project (Appendix A; Tables A-1 through A-4). Appendix B provides the results of the CNDDB records query within a 10-mile [16-kilometer] radius. Appendix C includes results of the query of the CNPS database and Appendix D includes the USFWS *List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project* information from Planning and Conservation (IPaC) Trust Resources Report (2020) generated for the project. The general site conditions combined with the habitat requirements and known ranges of these species were evaluated to determine potential for occurrence of these species on the proposed project site. The remainder of this section discusses the 2018 and 2019 reconnaissance field survey results, 2020 site visit to update conditions, 2020 late season plant survey on Phase 1 of the composting facility, and evaluation of those results based on the literature review and professional judgment of MBI personnel. Special-status species that are discussed in the following sections are those that were identified as potentially being affected by the proposed project or are discussed due to sensitivity in the region.

3.1 General Conditions

The majority of the Project site consists of ongoing operations of the permitted landfill facility, with annual grassland (*Bromus rubens—Schismus* [*arabicus, barbatus*]) semi-natural stand that has recovered from past disturbance in portions of the Project site that are not currently active and some recovering habitat consisting of *Atriplex polycarpa* alliance (Allscale Scrub) with an understory of annual grasses and forbs along Holloway Road (Appendix E; Figure 3-1, Table 3-1). None of the vegetated areas are historical natural lands, but rather are recovering due to variable lengths of inactivity, ranging from one to a few years. Some vegetation recovery is present on overburden, while other areas have been subjected to surface disturbance from landfill operations. While the actively working portion of the landfill is highly disturbed and unlikely to support special-status wildlife or plant species, the margins and recovering vegetated areas may support these species. Ruderal vegetation is present in along roadways and between cells; however, these areas were not mapped due to ongoing landfill activity, very small footprint, and negligible value for special-status species.

The United States Geological Survey (USGS) Natural Resources Conservation Service (NRCS) soil survey identifies three soil map units as occurring within the Project Site boundary. These include Soil Map Units 196 (Milham sandy loam, 0 to 2 percent slopes) and 239 (Typic Gypsiorthids-Kimberlina association, 0 to 5 percent slopes). Also included on the map are Soil Map Units 217 (pits) and 257 (water). Figure 3-2 provides the location of soils within the Project boundary. Although these soils are identified as occurring on the Project Site, most of the site consists of either areas of excavated gypsum mine or overburden from previous excavation. As such, soils are no longer present in the same configuration as they were prior to mining disturbance. Therefore, soils depicted in Figure 3-2 are representative of extremely disturbed conditions.

Two areas identified by the USGS within the Project Site are identified as “water”. Neither of these areas appears to have contained water recently, nor did they contain water during the site visits conducted for this report.

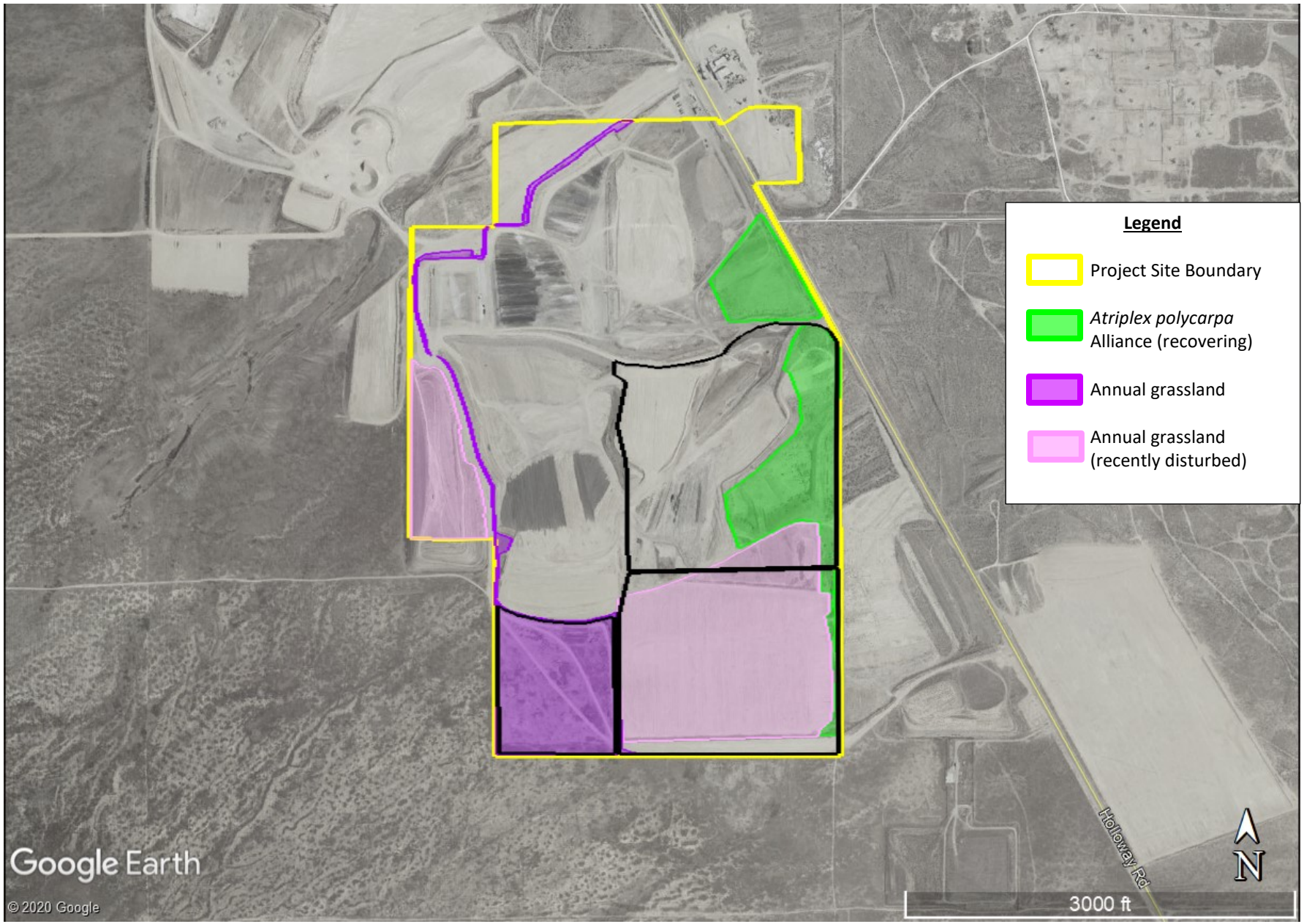


Figure 3-1: Project Site Vegetation

Table 3-1. Vegetation on the Lost Hills Environmental Composting and Waste to Energy Project Site

Vegetation Classification	Area
(*Bromus rubens—Schismus* [*arabicus, barbatus*]) semi-natural stand (annual grassland)	91.27 ac
Atriplex polycarpa Alliance	29.46 ac
TOTAL	120.73 ac

Table 3-2: Soil Map Units within the Project Site

Soil Map Unit	Name	Brief Description Project Site Distribution[1]
196	Milham sandy loam, 0 to 2 percent slopes	This soil is alluvium derived from igneous and sedimentary rock. Generally found on alluvial fans, terraces, fan remnants, and plains with a typical profile 0 to 4 inches (0–10 centimeters) sandy loam (Ap), 4 to 10 inches (10–25 centimeters) sandy loam (Bk), 10 to 22 inches (25-55 centimeters) loam (Btk1), 22 to 49 inches (55-124 centimeters) clay loam (Btk2), and 49 to 60 inches (124-152 centimeters) sandy loam (2Ck). The soil is classified as well drained with medium runoff, and is not considered hydric. It is non-saline to moderately saline.
217	Pits	Supports little to no vegetation
239	Typic Gypsiorthids-Kimberlina association, 0 to 5 percent slopes	Gypsiorthids soil is alluvium derived from sedimentary rock, and found on alluvial fans. It is classified as somewhat poorly drained and is not considered hydric. Kimberlina soil is alluvium derived from igneous and sedimentary rock, and found on alluvial fans. It has a typical profile of 0 to 9 inches (0-22 centimeters) sandy loam (A), 9 to 45 inches (22-114 centimeters) fine sandy loam (C), and 45-71 inches (114-180 centimeters) stratified silt loam and sandy clay loam (2C). This soil is classified as well drained with very high runoff, and is not considered hydric. It is non-saline to slightly saline.
257	Water	Water (*comment: no water is currently present at these locations*)

[1]United States Department of Agriculture- Natural Resource Conservation Service Web Soil Survey 2019

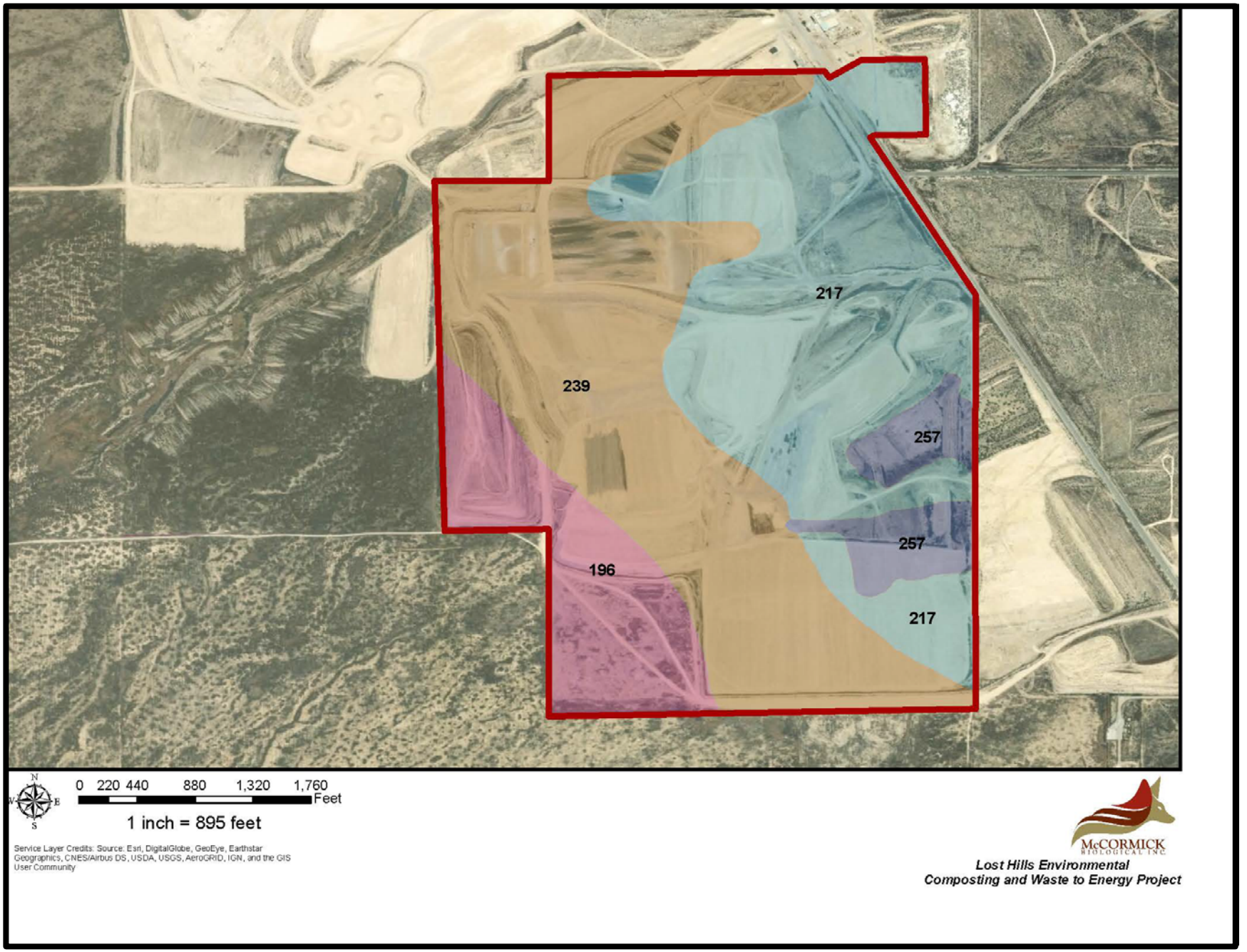


Figure 3-2: Soils Map

All plant and wildlife species observed during the surveys were recorded (Appendix F; Tables F-1 and F-2). Direct and indirect evidence of several special-status wildlife species was noted during the site visits. The literature review and field survey results for all relevant special-status species are described in the following sections.

3.2 Special-status Biological Resources

As a result of the literature review and based on general habitat conditions, seven special-status plant species were determined to warrant further discussion (Appendix A, Table A-1 and A-2). Of the 60 special-status wildlife species identified as potentially occurring in the region, 12 species were determined to warrant further consideration and have the potential for significant impacts from the project (Appendix A, Table A-3). These species are further discussed in Sections 3.2.1 and 3.2.2. The initial evaluations of each special-status species that was identified during the literature review with potential to occur in the region are included in Appendix B. Those that the initial evaluation found unlikely to be impacted by the proposed project are not discussed beyond the evaluation contained in Appendix A.

3.2.1 Special-status Plant Species

California jewelflower (*Caulanthus californicus*)

California jewelflower, a member of the mustard family (Brassicaceae), is an herbaceous annual that branches from the base, with upper leaves clasping the succulent stems. Plants reach a height of 6 to 15 inches (15–38 centimeters). Foliage is gray green, with heart shaped clasping stem leaves and wavy margined strap shaped basal leaves. Unopened flowers appear deep maroon in color. Open flowers are white to greenish yellow. Habitat for this species is non alkaline to slightly alkaline sandy loam soils of relatively undisturbed grassland communities below 3,000 feet (914 meters) in elevation (Al-Shehbaz 2016).

Seeds begin to germinate in the fall, and seedlings may continue to emerge for several months. The seedlings develop into rosettes of leaves during winter months, after which stems elongate and flower buds appear in February or March. Translucent white flowers with purple to green tips may continue blooming as late as May if rainfall and temperatures are favorable (USFWS 1998).

It is thought that this species forms a persistent seed bank, but seeds appear to germinate only when exposed to conditions simulating prolonged weathering (Taylor & Davilla 1986). Seed dispersal agents are unknown, but may include gravity, seed-eating animals such as giant kangaroo rat, wind and water.

Historically, the range of the species included the upper San Joaquin and adjacent valleys from Coalinga in the northwest to the Cuyama Valley in the southwest. Of 55 historical locations, approximately 20 extant populations remain (USFWS 1998). Recently, extant populations have been found on the Carrizo Plain in San Luis Obispo County, and in the Kreyenhagen Hills of Fresno County. An attempt has been made to establish an artificial population at the Paine Wildflower Preserve, Kern County; however, this population has not been successful (USFWS

1998). Both of the populations of this species that were identified as a result of the literature review as occurring within a 10-mile radius of this site are thought to be extirpated. This species is not generally tolerant of high levels of disturbance.

Although some site visits were conducted at an appropriate time to detect this species, they were reconnaissance level and complete coverage of the site was not completed. Based on current conditions, it is not expected to occur within the active landfill footprint and is very unlikely on the overburden areas that have revegetated. Based on a high level of historic disturbance and manipulation of soils, these revegetated overburden areas outside of the active landfill footprint have a low potential to support this species.

Kern mallow (*Eremalche parryi* ssp. *kernensis*)

Kern mallow is an erect annual of the mallow family (Malvaceae), and is a federal-listed endangered species. Plants have either bisexual or pistillate flowers. The fruit consists of 7 to 19 indehiscent, unwinged, one-seeded segments. The leaves are deeply 3–5 palmately-lobed or parted. Habitat includes eroded hillsides and alkali flats with non-native grassland, saltbush scrub, juniper woodland, or ephedra scrub between 230 and 500 feet (70–152 meters) in elevation. It typically occurs on dry, open sandy to clay soils (CNPS 2020).

The taxonomic characters that separate Kern mallow from Parry's mallow (*Eremalche parryi*) (Bates, 1993) are complicated. This taxon was classified as a subspecies of *E. parryi* by Hickman (1993). Others have kept Kern mallow as *E. kernensis* (USFWS 1998). A complex breeding system and diverse morphology have made definitive classification difficult. Another closely related species occurring in some areas with both Kern mallow and Parry's mallow is desert mallow (*E. exilis*). Using the historic strict definition of *E. kernensis* (USFWS 1998), Kern mallow was considered white-flowered plants known only from the Lokern area, located in western Kern County, plus populations of pink-flowered plants in the Buena Vista Valley, Elk Hills, Lost Hills, McKittrick Hills, Stockdale, and the Temblor Range in Kern County. Subsequently, many herbarium specimens previously identified as *E. kernensis* were found to have been misidentified and were actually *E. exilis*. Upon annotation of approximately 15 years of records for the taxon, Cypher (2002) truncated the range to a narrow band along Lokern Road in Kern County. The USFWS currently accepts a definition of the species that includes all populations that exhibit both perfect and pistillate flowers (known as gynodioecy), regardless of flower color. *E. kernensis* is the only member of the genus to exhibit gynodioecy (USFWS 2013).

Historically, populations of this species were thought to be restricted to a small area within the Lokern area. However, based on recent studies the range is now considered to include populations from the Lokern area, several additional western Kern County locations, and populations that have been verified based on herbarium collections in San Luis Obispo, Santa Barbara, Ventura, and Tulare Counties (USFWS 2013).

Although some site visits were conducted at an appropriate time to detect this species, they were reconnaissance level and complete coverage of the site was not completed. Based on current conditions, it is not expected to occur within the active landfill footprint and is very unlikely on

the overburden areas that have revegetated. Based on a high level of historic disturbance and manipulation of soils, these revegetated overburden areas outside of the active landfill footprint have a low potential to support this species.

San Joaquin wooly-threads (*Monolopia congdonii*)

San Joaquin wooly-threads, a member of the Asteraceae family, is a small, inconspicuous annual which may be 1 to 10 inches (2.5–25 centimeters) in height at maturity. Stems are multiple, decumbent and often somewhat succulent. Leaves and stems are typically loosely floccose to woolly-haired. Leaves are 1.5 inches (4 centimeters) long by about 0.25 inch (0.64 centimeters) wide with wavy margins. Individual flowers are arranged in heads that are clustered towards the ends of branches. Each head has four to seven phyllaries that are commonly black tipped. Tiny yellow ray and disk flowers appear in late February or March. Ray flowers and their achenes are clearly distinguished from those of the disk (Johnson 2016).

Insect pollinators are not required for seed-set of this species. However, animals may be important to this plant species in other ways. For example, GKR activity contributes to greater plant size and flower head production in San Joaquin woolly-threads where the two species co-occur, probably by increasing available soil nutrients and reducing competition from other plants. The microhabitat offered by GKR precincts (burrow systems) also contributes to earlier seed germination and maturation of San Joaquin woolly-threads, possibly because precinct surfaces are warmer than the surrounding area during the winter months (USFWS 1998).

San Joaquin wooly threads are found in valley grassland habitat types with silty sand or sandy loam soils at elevations ranging from 400 to 1,200 feet (122–366 meters). Valley saltbush is often the dominant shrub in these habitat types. The preferred microhabitat for this species consists of areas with reduced annual grass competition. It is generally not found where annual grasses are extremely dense and tall (Taylor 1989). This species is somewhat prostrate, allowing it to persist under grazing pressure. Known extant populations in Kern County occur along the Kern River near I-5, near Lost Hills, and on the Belridge Plain (USFWS 1998).

Although some site visits were conducted at an appropriate time to detect this species, they were reconnaissance level and complete coverage of the site was not completed. Based on current conditions, it is not expected to occur within the active landfill footprint and is very unlikely on the overburden areas that have revegetated. Based on a high level of historic disturbance and manipulation of soils, these revegetated overburden areas outside of the active landfill footprint have a low potential to support this species.

Lost Hills Crownscale (*Atriplex coronata* var. *vallicola*)
Crownscale (*Atriplex coronata* var. *coronata*)

Two varieties of crownscale (*Atriplex coronata*) were identified during the literature review: "Lost Hills crownscale" (*Atriplex coronata* var. *vallicola*; CNPS Rank 1B.2) and "crownscale" (*Atriplex coronata* var. *coronata*; CNPS Rank 4.2). Lost Hills crownscale has few branches and alternate, ovate leaves with entire margins on a few, short stems. Flowers are inconspicuous because they are extremely small and lack petals. Male and female flowers are mixed in small

clusters in the upper leaf axils. The fruiting bracts are broadly triangular, irregularly toothed, and may or may not have tubercles. Each pair of bracts encloses a dark brown seed.

Crownscale is very similar in appearance to Lost Hills crownscale, with the key difference being the size of the fruiting bracts. The fruiting bracts of Lost Hills crownscale are 2.5-4 mm long by 2.5-4 mm wide, while the fruiting bracts of crownscale are larger at 4.5-6 mm long by 3-5 mm wide (Zacharias 2020).

Lost Hills crownscale may flower any time from April to September, while crownscale has a slightly broader flowering period from March to October. Typical habitat of Lost Hills crownscale is dried beds of alkaline pools in *Atriplex* scrub or annual grassland communities. Crownscale grows in similar habitat, but may occur on clay soils. Both varieties occur throughout San Joaquin Valley, west side foothills, and on the Carrizo Plain, while crownscale may be found at more locations in the Coast Ranges and south to Riverside County (CNPS 2020; CCH 2020).

A survey was conducted on Phase 1 of the composting facility for late flowering plant species on June 22, 2020. While Lost Hills crownscale was not detected during the survey, approximately 50 individuals of crownscale were detected at a very low density. The surface in Phase 1 of the proposed composting facility has experienced disturbance because it is part of the permitted landfill. The surface is comprised of displaced soils deposited from other areas onsite. Given that this situation is repeated throughout the Project site areas outside of the active landfill are periodically left to regrow vegetation, it is likely that additional individuals of this species are present on other portions of the site.

Crownscale has a CNPS California Plant Rank of 4.2. Although it is of limited distribution, this plant has been collected in 11 counties ranging in the south from Riverside County, through the San Joaquin Valley, adjacent Coast Ranges, and north to Colusa County. Specimens from at least 35 locations have been deposited at various herbaria in California with reported populations ranging from a few individuals to an estimated 104,000 on the Carrizo Plain, San Luis Obispo County (CCH 2020).

Recurved Larkspur (*Delphinium recurvatum*)

Recurved larkspur is a member of the buttercup family (Ranunculaceae). The stem of this perennial herb is 18 to 85 cm in length (usually <60cm). The base of the stem is usually narrower than, but firmly attached to the root. Leaves of the recurved larkspur have 3 to 11 lobes and are generally cauline and glabrous. Sepals of the plant are light blue and generally reflexed, with white lower petals. The fruit of recurved larkspur is generally less than three times as long as it is wide, and the seeds are winged with wavy coat cell margins.

The recurved larkspur flowers from March to May and is generally found on poorly drained, fine, alkaline soils in grasslands (Koontz and Warnock 2020).

This plant is very conspicuous when ground in grassland, as it is typically taller than the surrounding grasses. The senescent stalks are persistent well after the flowering period is

completed. No individuals of recurved larkspur have been detected during any of the site visits conducted to date.

Hoover's Eriastrum (*Eriastrum hooveri*)

Hoover's eriastrum is an inconspicuous member of the phlox family (Polemoniaceae). This plant is a small annual that reaches a height to 6 inches. Stems typically support erect branches, and leaves are entire, linear, and three-cleft with two lateral lobes. The inconspicuous flowers are organized into small heads. Corollas range in color from pale bluish to white or cream yellow. Capsules are oblong to ellipsoid with two to four seeds each. Seeds of Hoover's eriastrum germinate later in the growing season than those of many of the associated annual plants (USFWS 1998). Seedlings may emerge from January or February until mid-April (Taylor and Davilla 1986). Flowers usually appear in mid to late spring (April to May) with the flowering period continuing through July. Plants in the genus *Eriastrum* are distinctive even when dry, and can be identified well past the flowering period.

Hoover's eriastrum typically occurs in valley grassland, saltbush scrub (*Atriplex polycarpa* or *A. spinifera*), and pinyon/juniper woodland (CNPS 2020). The plants are often found in openings in *Atriplex* scrub where cryptogamic crusts have developed on the soil surface. Associated species include red brome, annual fescue, and goldfields (*Lasthenia californica*) (Sandoval and Cypher 1998). In addition, it is frequently found on disturbed surfaces under the right soil conditions such as unpaved roads, abandoned well pads, and pipeline rights-of-way.

Hoover's eriastrum is known to occur in Fresno County, Kern County, on the Carrizo Plain (San Luis Obispo County) and in the Cuyama Valley (Santa Barbara County). After it was listed as a federally threatened species, numerous populations and thousands of individuals were subsequently found at many sites throughout its range and beyond, including lands bordering the Elk Hills in Kern County. Hoover's eriastrum was officially delisted in 2003, but is retained by CNPS on the list of plants with limited distribution (Rank 4.2) (CNPS 2020).

The survey of the Phase 1 portion of the composting facility was conducted during the published flowering period for this plant. No individuals were observed during that survey.

3.2.2 Special-status Wildlife Species

No special-status invertebrates, fish, or amphibians are expected to be present or impacted by proposed project activities. Two special-status reptile species, three special-status bird species, and six special-status mammal species have the potential to be present. Three special-status species have been documented on the Project site to date: Loggerhead shrike (*Lanius ludovicianus*), San Joaquin coachwhip (*Masticophis flagellum ruddockii*) and San Joaquin kit fox (*Vulpes macrotis mutica*). All of the species for which potentially significant impacts have been identified are discussed in the following paragraphs.

Reptiles

Blunt-nosed leopard lizard

The blunt-nosed leopard lizard (BNLL) is a relatively large lizard in the Iguanidae family. It is currently federal- and state-listed as endangered, and is fully protected by the state of California. It has a long, regenerative tail, long and powerful hind limbs; and a broad, triangular head with a short, blunt snout (USFWS 1998). Adult total length including tail may reach up to 13 inches (33 centimeters) and adult weight up to 1.5 ounces. Coloration consists of a light grayish, tan, or brown background with a conspicuous pattern of dark overlaying spots and/or pale crossbars. During the spring courtship season both sexes may develop reddish markings on the sides, tail, and ventral surfaces. Juveniles usually show a similar, but more yellowish pattern (CDFW 2018; Native fish and wildlife 1967; Stebbins 1985).

BNLL were historically distributed over the San Joaquin Valley and in adjacent lower foothills, plains, and valleys. Currently, this species is found only in the San Joaquin Valley in sparsely vegetated desert scrub, lower canyon slopes, valley floors, arroyos, and washes. Associated vegetation may include a variety of grasses, saltbush, goldenbush, iodine bush, and seep weed (USFWS 2010). Population behavior and stability are sensitive to temperature and precipitation changes, and population numbers will substantially decline if there are many years of drought or too frequent above average precipitation levels. Larger habitat patches of 350 hectares or more have a greater chance of BNLL occurrence (Bailey and Germano 2015). Males are territorial and will not procreate until they are large enough to attain a mate. Mating season is April-May and this taxon is mostly polygynous, but sometimes may maintain the same mate for several years (Ahlborn 2000).

BNLL feed primarily on insects (particularly grasshoppers, crickets and moths), other lizards, and occasionally plant material (USFWS 1998). BNLL are active during the day, primarily from April to October, and peak daily activity usually occurs when air temperatures are between 75 and 95 °F (24–35 °C). During the winter months, and to seek shade during the summer months, animals can be found in underground rodent small mammal burrows.

BNLL have been recorded in habitat adjacent to the project site. Small mammal burrows suitable for occupation by BNLL were observed within most of the recovering vegetated areas surrounding the active landfill at low to moderate density (see Figure 3-1). Protocol-level surveys were not completed for this project. Based on the literature review and suitability of habitat that is present in the vegetated areas, BNLL could be present on the Project site.

San Joaquin coachwhip

The San Joaquin coachwhip is a large, smooth-scaled, slender snake that is 35 to 61 inches (90–155 centimeters) in length, and may be light yellow, olive brown or occasionally reddish in dorsal coloration. Neck bands are very faint or entirely absent. The ventral color is straw yellow becoming pinkish to orange beneath the tail. The scalation on the tail suggests a braided whip.

This diurnal snake emerges from rodent burrows typically during the warmest part of the day,

except in the hottest period during the summer. The San Joaquin coachwhip is active from late spring (April–May) through early fall (September). It primarily feeds upon lizards, and small mammals including bats but will also feed on birds and eggs, snakes, amphibians, and carrion, and is known to climb bushes and trees for viewing prey and potential predators.

Endemic to California, the San Joaquin Coachwhip is known to occur in valley grassland and saltbush scrub associations and ranges from Arbuckle in Colusa County southward to the Grapevine in the Kern County portion of the San Joaquin Valley and westward into the inner South Coast Ranges. An isolated population occurs in the Sutter Buttes. Land-use conversion, for agriculture and urban development, combined with consecutive years of drought, has significantly contributed to population fragmentation. The species is considered a California species of special concern (CDFW 2019; Jennings et al., 1994; Stebbins 2003).

San Joaquin coachwhip was observed during one of the site visits in 2019 and the areas outside of the active landfill footprint represent suitable habitat for this species.

Coast horned lizard

The coast horned lizard is a flat-bodied lizard up to 6 inches (15 centimeters) in length, with a large crown of spines on the posterior portion of its head. The cranial spines of the California horned lizard are similar in size, whereas the central two spines tend to be longer in the other subspecies. There are large, dark spots on the side of its neck and two rows of pointed scales at the fringe of its trunk. Coloration is variable, possibly dependent on soil coloration, and can be reddish, brown, yellow, or gray with dark blotches on the back.

This lizard is diurnal and will inflate with air when frightened to avoid predation. Other defensive strategies include threatening would-be enemies with an open mouth and hissing noises, tilting its head to expose the cranial spines, biting, and spraying blood from the corner of its eyes. This lizard lays a clutch of 6 to 12 eggs in May or June, and hatchlings emerge in July or September. The main food source of this species is native ants, but they will also consume spiders, beetles, termites, flies, honeybees, moth larvae, and grasshoppers.

The California horned lizard is a California species of special concern. It occurs along the coast, north of San Francisco Bay to Los Angeles, and inland into the Sacramento and San Joaquin Valleys. It inhabits open areas of sandy soil with low, sparse vegetation (CDFW 2019; Jennings et al., 1994).

Although no coast horned lizards were observed during the site visits, the areas outside of the active landfill footprint represent suitable habitat for this species.

Birds

Grasshopper sparrow

The grasshopper sparrow is a California species of special concern that is also protected under the Migratory Bird Treaty Act (MBTA) and California Fish and Game Code (CDFW 2019).This

species is a small brown sparrow with a short tail and flat head. The dark crown has a pale center stripe. A white eye-ring with a yellow-orange spot in front of the eye is present on most birds (Dunn & Alderfer 2008). The typical diet consists of grasshoppers and seeds. Seeds the grasshopper sparrow is known to eat come from knotweed (*Polygonum* spp.), campion (*Lychnis* spp.), oats (*Avena* spp.), and pigweed (*Amaranthus* spp.)

The grasshopper sparrow is considered a rare summer resident of California from March to September, and little is known of its wintering status. The species is found in a variety of habitats within its known range, but its preference within California seems to include moderately open grasslands with short to moderate vegetation height and scattered shrubs such as California sagebrush (*Artemisia californica*). This species' naturally patchy range in California has become even more fragmented due to agricultural and urban development (Shuford & Gardali 2008).

Marginal annual grassland and shrub habitats are present on the Project site that could support this species.

Burrowing owl

The burrowing owl is a California species of special concern, and documented population declines have occurred in the state since at least the 1970s. This species is a small, ground-dwelling owl with a round head that lacks ear tufts. Adults are sandy brown overall with bold spotting and barring, have white eyebrows above yellow eyes, and can be distinguished from all other small owls by their long legs. Adult burrowing owls have an average weight of 6 ounces (170 grams), a full body length of 8.5 to 11 inches (22–28 centimeters), and average wingspan of 20- to 24-inches (51- to 61-centimeters) wingspan (Brown 2006).

Within California, this species is found throughout the Central Valley, in the San Francisco Bay Area, Carrizo Plain, and Imperial Valley. Typical habitat includes open grasslands, agricultural or range lands, and desert lands with short, sparse vegetation at elevations from 200 feet (61 meters) below sea level to 9,000 feet (2,743 meters) above sea level (Brown 2006). The Central Valley population resides in the area year-round in the annual and perennial grasslands or other vegetation communities that support little to no tree or shrub cover. The state of California is also considered an important wintering ground for migrants; thus, California's burrowing owl population increases during the winter season (CDFG 2012; Dunn & Alderfer 2008; Shuford & Gardali 2008). Nesting season begins late March and breeding pairs exhibit biparental care in which the female incubates the eggs and the male cares for the young.

Burrowing owls are active daytime and nighttime but are mostly active during dawn and dusk. In California, the species is typically found in close association with California ground squirrels that create burrows that are used by burrowing owls as year-round shelter and seasonal nesting habitat; however, burrowing owls may also use human-made structures such as culverts, corrugated metal pipes, debris piles, or openings beneath pavement as shelter and nesting habitat. During active periods of the year they may be observed above ground in the vicinity of their burrows, or roosting on the ground or nearby high spots such as berms, fence posts, or shrubs. They have a varied diet that includes insects, small rodents, birds, amphibians, reptiles, and carrion, and there is some evidence that population sizes of California vole (*Microtus*

californicus) influence their survival and reproductive success (Poulin et al., 1998). Pellets including animal bones and exoskeletons may be found near burrow entrances, along with white wash and foot tracks.

Although no burrowing owls were observed during the site visits, the areas outside of the active landfill represent suitable habitat for this species, especially the annual grassland areas.

Loggerhead shrike

The loggerhead shrike is considered a species of special concern in California (CDFW 2019). It is a robin-sized bird about 9 inches (23 centimeters) in length with a raptor-like, hooked bill. Dorsal coloration of adults is bluish-gray, and ventral coloration is whitish with very faint barring. Juveniles tend to be more brownish. Most distinctive is the black eye mask, and in flight, the white wing patches on the contrasting dark wings. It is distinguished from the northern mockingbird (*Mimus polyglottos*), which it resembles in flight, by darker wings and smaller white wing patches. The mockingbird also lacks the conspicuous eye patch and hooked bill, and has slower wing beats (Dunn & Alderfer 2008).

Lacking talons, the shrike impales its prey to facilitate feeding, or to store it for future consumption. Its diet includes a variety of insects and spiders, small reptiles, rodents, and small birds. Nests are built on stable branches in densely-foliaged shrubs or trees, usually well-concealed (Ehrlich et al. 1988).

This species prefers open habitats such as savannas and deserts, with scattered shrubs, trees, posts, fences, utility lines, or other perches. In California, the loggerhead shrike occurs as a resident over most of the state, being absent from high mountain regions (Zeiner et al., 1990).

The entire site represents suitable foraging habitat for this species. Shrub areas are suitable for nesting; however, lack of mature shrubs reduces the likelihood of nesting somewhat. A loggerhead shrike was observed during one of the site visits in 2020.

Mammals

San Joaquin antelope squirrel

The San Joaquin antelope squirrel (SJAS) is a small, yellow-brown squirrel with two distinguishing white stripes along the dorsal side of the body. In contrast to other listed mammals in their range, these squirrels are diurnal and active year-round. Young are born in March and appear above ground in early April (Kakiba-Russell et al. 1991). SJASs are most often found in grasslands or open shrublands. Associated shrubs include saltbush (*Atriplex* spp.), bladder pod (*Isomeris arborea*), goldenbush (*Isocoma acradenius=Haplopappus a.*), snakeweed (*Gutierrezia bracteata*) and others. SJASs are omnivorous, with a diet consisting primarily of grass and herb seeds, and insects (USFWS 1998). It appears that SJASs rarely occupy burrows they have dug; instead, they tend to use burrows dug by kangaroo rats. In grassy, shrubless areas, Harris and Stearns (1991) found SJASs only in areas which also had high kangaroo rat densities.

SJAS originally occurred on the western side of the San Joaquin Valley from southern Merced

County south to Kern County, the Carrizo Plain in San Luis Obispo County, and the Cuyama Valley in San Luis Obispo and Santa Barbara Counties. Prior to cultivation of the San Joaquin Valley, SJAS occupied approximately 3,456,000 acres (13,986 square kilometers). More than 80 percent of this estimated original geographic range is now under cultivation, with this species having been nearly extirpated on the eastern side of the San Joaquin Valley. No large tracts of prime habitat remain, and only about 15 percent of the remaining habitat is considered to be good to fair in quality. SJAS now occur only in the southwestern portion of the San Joaquin Valley and in adjacent valleys to the west. The species is currently state-listed as threatened (CDFW 2019; USFWS 1998).

Habitat for SJAS is present within the areas outside of the active landfill, and small mammal burrows were found in low density during the site visits. The closest recorded CNDDB polygon for this species is 0.79 miles (1.3 kilometers) to the northwest of the project. SJAS may be present based on suitable habitat outside of the active landfill and proximity of known records for the species.

Giant kangaroo rat

This species occupies annual grasslands and sparse shrublands with well-drained, usually loamy or sandy loam soils. Giant kangaroo rats (GKR) favor flat to gently sloping terrain with low annual precipitation, typically 5 inches (13 centimeters) or less in the southwestern San Joaquin Valley, and adjacent plateaus and valleys in the Inner Coast Ranges. The species is found from elevations of about 300 to 2,900 feet (91–884 meters). Little extant habitat remains at elevations below 650 feet (198 meters) and few colonies are located above 2,500 feet (762 meters).

GKR *burrow systems* (precincts) are distinctive due to the size and orientation of individual entrances, and the presence of cleared vegetation in the vicinity of the system. Precincts may include one to several burrow openings and a colony may consist of two to thousands of precincts. Burrows of two types may be observed within GKR precincts: those with horizontal burrow openings, and those with vertical burrow openings. Horizontal burrow openings are similar in appearance compared to other kangaroo rats; however, these openings are usually quite large in comparison to other species. Other characteristics of GKR precincts include tracks from their distinctively large feet and tail drags, haystacks of seeds drying near burrows, and large scat near burrow entrances. Individual precincts are usually connected to other precincts by well-worn paths and are relatively easy to detect, even from a distance. This species is nocturnal and detection of characteristic burrow systems is used as a method of determining potential presence. When sign of presence is detected, small mammal trapping is needed to verify the species is actually present.

GKR originally occurred throughout the San Joaquin Valley from southern Merced County to southwestern Kern County and northern Santa Barbara County. By 1980, conversion of native valley grassland habitats to agricultural uses had reduced extant GKR distribution to approximately 2 to 3 percent of its historic range. The remaining habitat has been broken into six major geographic units, including Lokern. The Cuyama Valley is the farthest south of the identified extant populations of this species. Due to high vulnerability of these small, widely scattered colonies, GKR are currently federal- and state-listed as endangered (CDFW 2018; ETWP 1987; USFWS 1998; Williams 1980).

Habitat for GKR is present outside of the active landfill areas, but characteristic burrow and precinct sign were not observed during the site visits. There were no recorded CNDDB polygons within 10 miles of the project site. Although it is unlikely that this species is present based on the evidence gathered to date, a comprehensive survey would be necessary to determine status on the Project site.

Short-nosed kangaroo rat

Within the family Heteromyidae, of the mammalian order: Rodentia (rodents), kangaroo rat represents the common name for every member of the genus *Dipodomys*. A species of particular interest is the San Joaquin kangaroo rat (*D. nitratoides*). This species can only be found in the San Joaquin and adjacent valleys of California (Reid 2006). The species consists of three recognized subspecies: Fresno kangaroo rat (*D. n. exilis*), short-nosed kangaroo rat (*D. n. brevinasus*; SNKR), and Tipton kangaroo rat (*D. n. nitratoides*). The SNKR is a California Species of Special Concern (CSC) due to the loss and fragmentation of its habitat, which has limited its range and most likely led to population declines (Brylski 1998; CDFW 2019; USFWS 2010b).

The historical range of SNKR extended along the western half of the San Joaquin Valley from about the western edge near Los Banos, Merced County at its northernmost limits, to the foothills of the Tehachapi Mountains at its southernmost limits. The range continued eastward along the foothills and most likely reached just northeast of Bakersfield, California. The SNKR also is known to have occurred in the Panoche Valley, the Carrizo Plain, and the Cuyama Valley (Brylski 1998; USFWS 1998). Though populations are known to occur throughout patches of its historical range, knowledge of where current populations occur is incomplete due to a lack of comprehensive surveys. It is estimated that current occupied habitat represents 1.2–1.5% of its historical habitat at best (Patton et al., 2019).

Distinguishing morphological differences between the three subspecies of San Joaquin kangaroo rat is based on statistical measurements of a series of individuals within a population. Today, however, a population's location almost always allows for knowledge of subspecies status (Brylski 1998; Patton et al., 2019). Some populations may present taxonomic uncertainty if found within the known or potential historical range overlap with the Fresno kangaroo rat. For now, currently known SNKR populations can be identified on the basis of location alone (Patton et al., 2019). The Tipton kangaroo rat and the SNKR had small zones of overlap in their historical ranges; however, the California Aqueduct is now a point of separation for the two subspecies. San Joaquin kangaroo rats that are found west of the California Aqueduct are considered SNKR (USFWS 1998).

The SNKR is generally on flat or gently sloping terrain containing friable soils that are often associated with grassland (largely non-native) and/or desert-shrub vegetation. Saltbush (*Atriplex* sp.) and California ephedra (*Ephedra californica*) are the primary species associated with this type of vegetation. Throughout the range in which SNKR populations are known to exist; topography, vegetation density, and soil salinity can vary quite a bit. In the Elkhorn Plain and western slopes of the Temblor Range, SNKR populations are known to occur on steep, rocky

hillsides amongst mixed shrubs (e.g., chaparral yucca [*Hesperoyucca whipplei*], ephedra [*Ephedra* sp.], etc.) where they can be found at elevations up to about 2,750 feet (840 meters).

Like all other Heteromyids, kangaroo rats are active year-round and are considered nocturnal. Individuals of SNKR may be observed above ground during the day, an odd behavior that has been reported in many kangaroo rat species. It is also likely that they will stay below ground in exceptionally cold weather (Reid 2006; USFWS 1998). Above-ground activities consist principally of foraging. The diet of SNKR mostly consists of seeds, with small amounts of green, herbaceous vegetation and insects. They seem to consume seeds opportunistically from the surrounding grasses and forbs, both native and non-native, depending on availability. The seeds of woody shrubs, especially saltbushes, seem to be diligently sought out by SNKR. Like most kangaroo rats, the SNKR will cache seeds for later consumption (USFWS 1998).

The nature of small, isolated SNKR populations and their boom and bust growth cycle allows for typically insignificant threats to push SNKR closer to extinction (Germano & Saslaw 2017; Pimm et al., 1988). These threats may take the form of competition, mortality due to vehicle strikes (both traffic and off-road vehicles), predation, certain diseases, and other various factors that may not yet be identified (USFWS 2010a; USFWS 2010b).

Small mammal burrows that could be occupied by SNKR were observed throughout the vegetated areas outside of the active landfill at varying densities. This species may be present on the Project site.

Tulare grasshopper mouse

The Tulare grasshopper mouse is considered a California species of special concern (CDFW 2019). It is a stout-bodied rodent with a club-like, bi-colored tail. The body is also bi-colored, being pale brown to gray or pinkish-cinnamon above with white underparts. Though the Tulare grasshopper mouse prefers to feed on small mammals and insects, its diet also includes other invertebrates and seeds. It may be confused with the white-footed mouse (*Peromyscus* spp.); however, the grasshopper mouse has a shorter, thicker tail, and larger forefeet

Historically, the species ranged from western Merced and eastern San Benito Counties east to Madera County and south to the Tehachapi Mountains. Currently, they are known to occur along the western margin of the Tulare Basin including western Kern County; within the Carrizo Plain Natural Area; along the Cuyama Valley side of the Caliente Mountains in San Luis Obispo County; and the Ciervo-Panoche Region in Fresno and San Benito Counties (Brown & Williams 2006).

Tulare grasshopper mice may occur outside of the active landfill footprint. Vegetated areas with small mammal burrows represent suitable habitat for this species.

American badger

This species is a low, squat animal with conspicuous silver-tipped, dorsal fur and a short, black-tipped tail. The most striking visual feature of this species is its striped face, consisting of a

median white stripe proceeding from the tip of its nose to the back of its head. This stripe is flanked by alternating white and dark stripes giving way to bright, white-outlined ears. The American badger has short but powerful legs, and the front feet are fitted with long claws that are well suited for digging out the burrows of the rodents on which it feeds. In addition to rodents, their diet includes other small mammals, invertebrates, birds, snakes and carrion. Mating occurs in late summer or early autumn, and litters of two to five offspring are born in early spring.

The historic range of American badgers in California was throughout the state with the exception of the humid coastal forests in Del Norte and Humboldt Counties. Their modern distribution in the lower San Joaquin Valley is restricted to the limited, often isolated tracts of grassland and shrubland habitats. Cultivated lands have been reported to provide little usable habitat for this species. In the 1980s, badgers were believed to be declining throughout California, and their status has not changed. American badgers remain a California species of special concern.

Badgers are primarily nocturnal animals and infrequently observed directly during daytime surveys; however, they have a fairly distinctive digging style and burrow shape, which is easily detected in the field. Combined with tracks, it is typically the method used to determine presence on a site (CDFW 2014; Reid 2006; Williams 1986; Zeiner et al., 1990).

Although no burrows typical of American badger have been detected during site visits conducted to date, vegetated areas outside of the active landfill are suitable for this species. Given the extensive annual grassland adjacent to the Project site, it is likely that this species is present in the vicinity.

San Joaquin kit fox

This species, currently federal-listed as endangered and state-listed as threatened, resembles a small, lanky dog in appearance, with disproportionately large ears containing an abundance of large white, inner guard hairs. The San Joaquin kit fox (SJKF) is the largest subspecies of kit fox, with adults weighing 4.5 to 5 pounds (2–2.3 kilograms). Total length is about 32 inches (81 centimeters), including a bushy black-tipped tail up to 12 inches (30 centimeters) long, and total height is about 12 inches (30 centimeters) tall. Coloration ranges from light buff to grayish along the back and tail; gray, rust, or yellowish along the sides; and white on the belly.

SJKF occur in a variety of open grassland, oak savannah, and shrub vegetation types/habitats as well as oil-producing and urban areas in Kern County. Predation is an appreciable cause of SJKF mortality, with urban kit foxes yielding higher survival rates due to lack of competition with large carnivores such as coyotes (USFWS 2010). In the southern San Joaquin Valley portion of the range, SJKF are generally found in sparse, annual grassland and scrub communities (e.g., valley sink scrub, saltbush scrub) with low annual precipitation. Home ranges for the taxon have been reported by several authors to range from 1 to 12 square miles (1.6–19 square kilometers) with large overlap in home ranges among individuals, though dens are restricted to a single family. They change dens on a regular basis, likely due to prey depletion; in one study, a single kit fox was tracked to 70 dens during a 2-year period (Native fish and wildlife 1967; USFWS 1998). Dens are used for temperature regulation, shelter, reproduction, and safety from potential predators, but characteristics such as number of entrances varies across the taxon’s range. In the

southern portion of its range the taxon often creates dens with two entrances, and natal dens generally have multiple entrances. Entrances are usually 8 to 10 inches (20–25 centimeters) in diameter and are normally greater in height than width, but kit foxes can utilize dens with entrances as small as 4 inches (10 centimeters) in diameter. Kit foxes do not typically excavate their own dens, but rather enlarge the burrows of other species, such as California ground squirrels and American badgers, or utilize human-made structures such as culverts and pipelines.

The diet of this taxon consists largely of nocturnal kangaroo rats and other small mammals, though they may also eat ground-nesting birds or insects (USFWS 2010). Similar to many desert species, kit fox do not need drinking water and obtain hydration from their diet. Breeding season is December-March with pups typically born between February and March. Adult breeding pairs remain monogamous within the same year, but pairs may change between years (Morrell, 1972; USFWS 1998).

SJKF are primarily nocturnal, but can be seen during the day when activities on the surface get their attention or when pups are present and play outside of the den in late afternoon. Potential site occupation is determined based on observation of canid scat and/or tracks within a size range appropriate for this species, and presence of dens that meet the criteria for classification as known or natal/pupping per the USFWS guidelines (USFWS 2011).

One potential den and six known den entrances were detected during the site visits conducted in 2020 (Figure 3-3). Remote-sensing cameras were used to assess status of SJKF dens identified during the 2020 site visits. SJKF were observed emerging from one of the dens, and were observed investigating all of the known and potential dens during the monitoring period. Additional wildlife species detected during the monitoring included savannah sparrow (*Passerculus sandwichensis*), horned lark (*Eremophila alpestris*), common raven (*Corvus corax*), black-tailed jackrabbit (*Lepus californicus*), coyote (*Canis latrans*), and side blotched lizard (*Uta stansburiana*).

3.2.3 Riparian Habitat, Wetlands, and Other Waters

A search of the USFWS National Wetlands Inventory resulted in no wetlands mapped on the project site (USFWS, 2020; Figure 3-4). No features were identified within the Project site that would be classified as riparian habitat, wetlands, or other waters.

3.2.4 Critical Habitat

No critical habitat for any federal listed species has been designated within the Project site or vicinity.

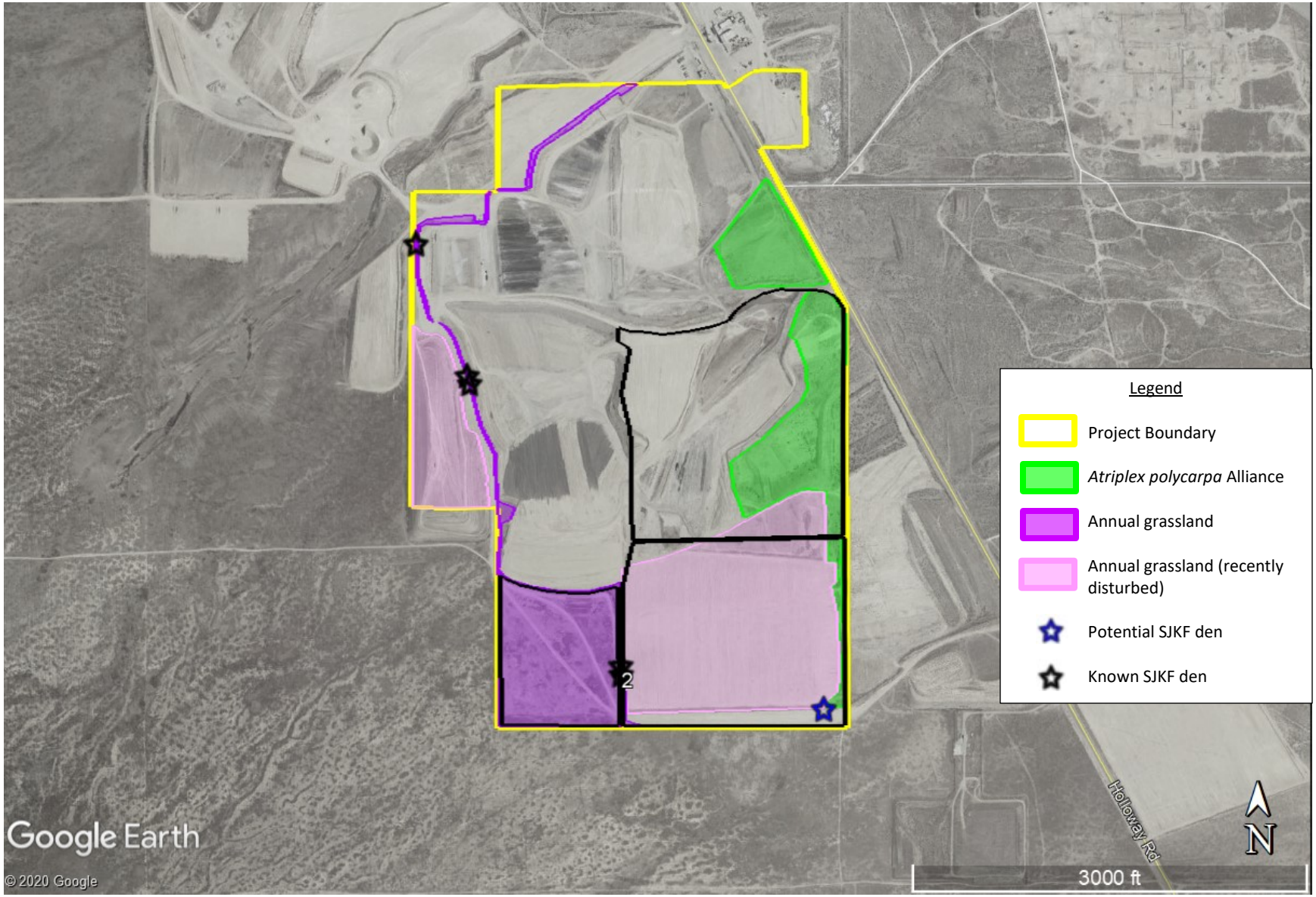


Figure 3-3: San Joaquin Kit Fox Dens Observed During Site Visits in 2020

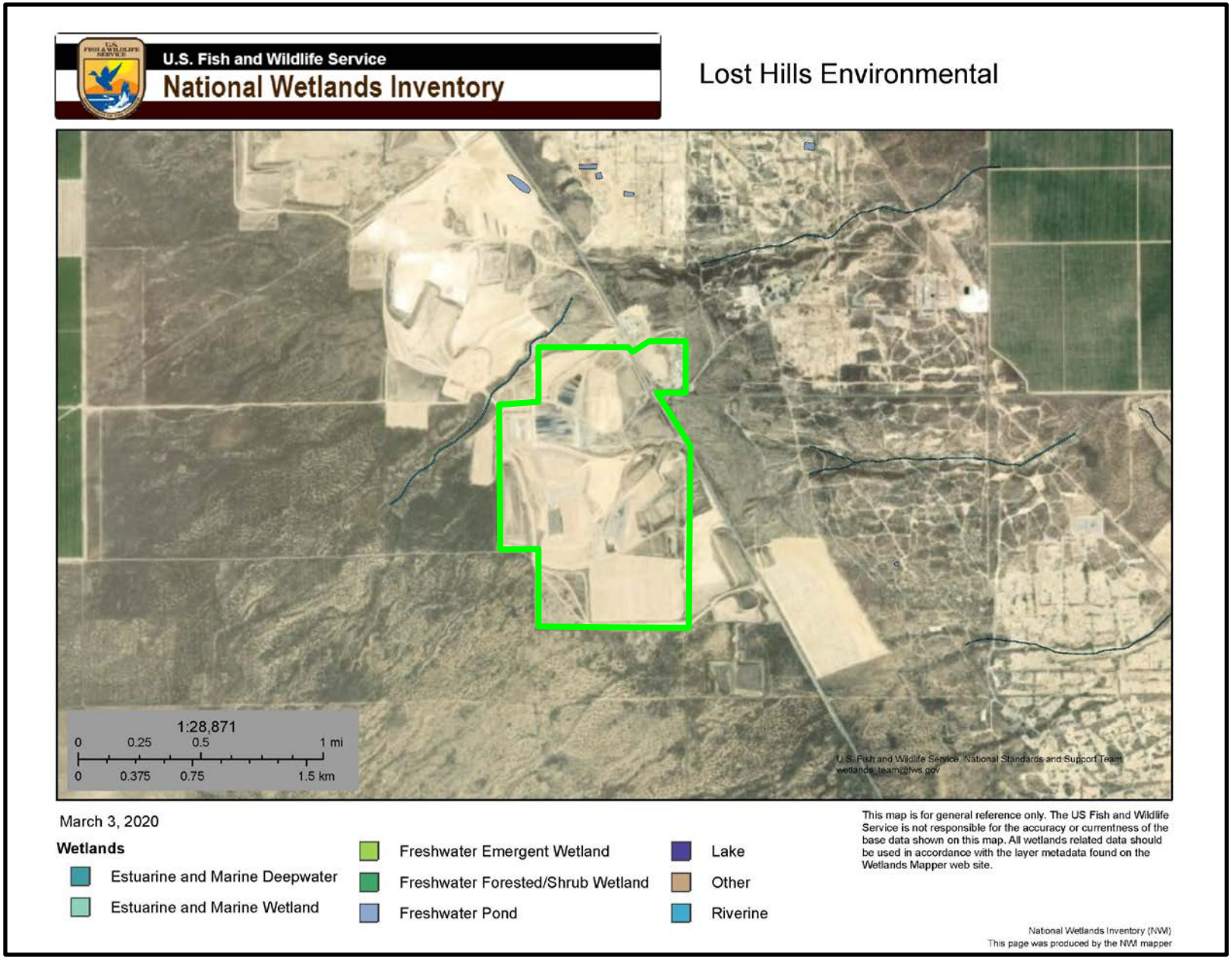


Figure 3-4: National Wetlands Inventory Map (USFWS 2020)

4.0 IMPACT ANALYSIS AND RECOMMENDATIONS

4.1 Effects of the Proposed Project

This section provides an analysis of the potential impacts of the Project following the standards of CEQA and CEQA Guidelines. CEQA Appendix G thresholds have been used to evaluate potential impacts to the biological resources from the proposed Project. The Project would create a significant impact to biological resources, based on the specifications in the biological resources section in Appendix G of the CEQA Guidelines, if the following were to occur:

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 CDFW or the USFWS;

2. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations; or by the CDFW or the USFWS;

3. Have a substantial adverse effect on federally protected wetlands as defined by section 404 of the CWA (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means;

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;

5. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance;

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.

The following analysis discusses potential impacts associated with the development of the Project and provides recommendations where appropriate to further reduce potential impacts.

1. Would the project 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 the USFWS?

In general, continuing work in the existing active landfill, disturbance to annual grassland or *Atriplex polycarpa* alliance (common saltbush) vegetation and construction activities associated with Project activities have the potential to result in injury or mortality to special-status species. Up to 90.1 acres of annual grassland and 29.46 acres of *Atriplex polycarpa* alliance could be disturbed. These impacts could occur within the Project footprint and may result in crushing of occupied burrows or dens, vehicle strikes, entrapment in open trenches or equipment, and other

effects associated with construction and ongoing project activities. Indirect impacts, in the form of loss of foraging habitat associated with a threatened, endangered, or otherwise protected species, may also occur as a result of the completion of this Project. In addition, noise and the increase in human activities in the vicinity may indirectly affect special-status species that could be present in the vicinity.

Wildlife are known to commonly enter open pipes, materials stockpiles and storage containers as well as get on, under, or in vehicles and equipment. In addition, terrestrial wildlife may fall into open excavations. Closing or moving pipes with wildlife inside could lead to direct mortality of individuals. If present under pallets, wildlife could be killed or injured by equipment when moving materials. If present in, on, or under equipment or vehicles when started or moving, wildlife could be crushed by tires, injured or killed by moving parts, or threatened through harassment by workers needing to access the vehicles. If deep enough in comparison to the animal size, wildlife falling into open excavations could be injured by the fall, or could otherwise become entrapped, thereby increasing risks to the individual.

Effects to Special-status Plants:

Although some of the site visits were conducted at appropriate times to evaluate for the possible presence of special-status plant species, floristic surveys throughout the seasons of occurrence for those species were not completed and plants identified on site were limited. Habitat that could support special status plant species was observed within the Project site, in areas outside of the existing active facility footprint (see Figure 3-1 and 3-3). A late season survey (June 22, 2020) was conducted on the Phase 1 portion of the proposed composting facility.

Of the listed species evaluated, California jewelflower (*Caulanthus californicus*), Kern mallow (*Eremalche parryi* ssp. *kernensis*), San Joaquin wooly threads (*Monolopia congdonii*), have been recorded in the in similar habitats to those found outside of the active landfill area. In addition, non-listed special-status plant species, including crownscale (*Atriplex coronata* var. *coronata*), Lost Hills crownscale (*Atriplex coronata* var. *vallicola*), recurved larkspur (*Delphinium recurvatum*), and Hoover's eriastrum (*Eriastrum hooveri*) have the potential to occur. Given the history of disturbance, including in the areas found to be vegetated, these species have a low potential to occur on the Project site, primarily outside of the active landfill. If present, special-status plant species could be disturbed by ground disturbance, especially in areas of recovering habitat or relatively intact habitat outside of the active landfill areas.

A small population of a plant of limited distribution (CNPS Rank 4.2), crownscale, was observed within the Phase 1 portion of the proposed composting facility. The surface in this area is frequently disturbed because it is a permitted landfill, and the surface is comprised of displaced soils deposited from other areas onsite. Given that this situation is repeated throughout the Project site, it is likely that additional individuals of this species are present on other portions of the site. Given the widespread nature of its occurrence in California and at least one known population of over 100,000 individuals that has some protection (CCH 2020), impacts to the relatively small number of plants present on the site are not considered significant.

Effects to Special-status Wildlife:

The status of BNLL on the Project footprint is unknown at this time. While the species is not expected in the active landfill due to the frequent and intense nature of disturbance on that portion of the site, the presence of small mammal burrows and records of BNLL in the surrounding area indicates a possibility that BNLL could occupy these features. BNLL are underground in burrows much of the year, and are only active during the warmer spring and summer months. The site visits conducted for this reconnaissance evaluation are not sufficient to determine absence from this location. Given those factors, there is potential that BNLL could be impacted by Project activities. Recommendations are included below to reduce potential impacts.

Although no burrowing owls or sign of species presence was observed during the site visit, California ground squirrel burrows, which are frequently used by burrowing owls for nesting and shelter, were observed. The site is likely to support small mammals that are typical prey items in the diet of burrowing owl. Therefore, a foraging and potential nesting habitat will be removed as a result of the Project. Absent additional measures, burrowing owl burrows could be crushed or destroyed by vehicles during construction activities. Provided that measures below are implemented, impacts can be reduced to "less than significant".

During the field survey, SJKF were observed, but no other special-status wildlife species. A low to moderate density of small mammal burrows are present in the vegetated areas shown in Figure 3-1 and 3-3. These burrows could harbor short-nosed kangaroo rat or Tulare grasshopper mouse.

SJKF have the potential to forage on or over the entire Project and occupied dens were detected during the 2020 site visits. If known or natal SJKF dens, badger burrows, small mammal burrows, or bird nests are present during construction, individual animals, shelter sites, eggs, nests, and/or juveniles could be crushed or otherwise be killed by earthmoving activities, large equipment working the site as well as delivery vehicles and personal worker vehicles. Wildlife moving through the construction work area could be subject to vehicular mortality, if present during work activities.

Additionally, birds nesting on or in the immediate vicinity of the route could be disturbed if the project is conducted during nesting season when active nests are present. If these nests are disturbed to the extent that eggs are destroyed, young are injured or killed, or adults abandon the nests, a violation of the MBTA and California Fish and Game Code could results.

Wildlife are known to commonly enter open pipes, materials stockpiles and storage containers as well as get on, under, or in vehicles and equipment. In addition, terrestrial wildlife may fall into open excavations. Closing or moving pipes with wildlife inside could lead to direct mortality of individuals. If present under pallets, wildlife could be killed or injured by equipment when moving materials. If present in, on, or under equipment or vehicles when started or moving, wildlife could be crushed by tires, injured or killed by moving parts, or threatened through harassment by workers needing to access the vehicles. If deep enough in comparison to the animal size, wildlife falling into open excavations could be injured by the fall or otherwise become entrapped thereby increasing risks to the individual.

The following measures are intended to avoid, minimize, and reduce the potential for these effects to occur as a result of work activities. The following measures are also intended to result in compliance with applicable state and federal statutes and regulations protecting biological resources. In some cases, if effects cannot be definitively determined based on the reconnaissance-level survey, additional surveys are recommended. In addition, if it is determined that the effects to these species cannot be avoided, state and/or federal permits may be warranted to obtain the appropriate authorization for such project effects.

2. Would the project 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 the USFWS?

No riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations; or by the CDFW or the USFWS will be disturbed by the proposed Project; therefore, no further measures are recommended. The Allscale series (common saltbush) vegetation present on the Project is naturalized vegetation that has recovered on fill material that has been deposited as a result of past landfill activities. This vegetation is not natural intact habitat and the sensitivity of this vegetation is not equivalent to new habitat disturbance.

3. Would the project 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?

The proposed Project does not propose any disturbance to wetland vegetation. An ephemeral drainage that appears on the USFWS National Wetlands Inventory mapping for the Project site crosses the western annual grassland area (USFWS 2020) within the proposed Project. However, it is not connected to any other features that would indicate ACOE jurisdiction or Clean Water Act regulation. No wetland features or vegetation indicative of wetland conditions were observed during the field survey. Consequently, no substantial adverse effect will occur as a result of the development of the Project.

4. Would the project 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?

Wildlife corridors can be defined as connections between wildlife blocks that meet specific habitat needs for species movement generally during migratory periods, but seasonally as well. Wildlife corridors generally contain habitat dissimilar to the surrounding vicinity and include examples such as riparian areas along rivers and streams, washes, canyons, or otherwise undisturbed areas within urbanization. Corridor width requirements can vary based on the needs of the species utilizing them. No impacts are expected; consequently, no additional measures are included.

5. Would the project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

There are no biological resources on the site which are specifically protected by local policies. Therefore, conflicts with local policies will not occur.

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.

The Project is not known to conflict with any Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

4.2 Recommendations

The following measures are intended to reduce identified potential effects to special-status species as a result of the Project; and are intended to result in compliance with applicable state and/or federal statutes and regulations protecting biological resources.

BIO-1: Biologists conducting activities in measures BIO-2 through BIO-11 shall submit resumes to Kern County for approval prior to implementation of these measures. Resumes shall document sufficient experience with each species to show that each biologist is qualified to determine species presence. At a minimum, approved biologists shall have obtained a Bachelor's degree in biological or environmental sciences or show equivalent experience, have 2 years of experience detecting the target species, and have experience in construction monitoring sufficient to understand potential effects on the species for which they are approved.

BIO-2: Project activities should avoid the vegetated portions of the Project site as shown in Figure 3-1 and Figure 3-3 unless focused surveys for the detection of BNLL, SJAS, SJKF, giant kangaroo rat, and other special-status species identified as potentially occurring in Section 3.2, above, are conducted. Focused surveys should follow current agency-accepted protocols or, if agency protocols are not available, industry accepted methods for the detection of each of the potentially occurring special-status species. Survey timing should be determined that optimizes detection of each species, follows protocols, and allows the applicant to coordinate with agencies as necessary depending on species detected.

BIO-3: Prior to disturbance to any of the vegetated areas that are not currently permitted landfill cells shown in Figure 3-1 and Figure 3-3, a qualified botanist should conduct floristic surveys in potential habitat for special-status plant species following agency recommendations (CDFW 2018; USFWS 1996) to document plant species of the Project site outside of the active landfill. With the exception of California jewelflower, if any special-status plant species are identified during the surveys, the population should be avoided if practicable. If avoidance is not possible, a Salvage and Revegetation Plan should be submitted to Kern County for review and approval that includes, at a minimum, recovery of seed or topsoil, defines conditions under which seed or topsoil will be applied after construction or onto a revegetation site, and thresholds to determine

success of re-establishment of special-status plants. The revegetation site should be within the Project boundary unless a suitable alternative is proposed and approved by Kern County. If California jewelflower is detected, the population should be avoided by a buffer distance of at least 50 feet, unless CDFW and USFWS are consulted.

BIO-4: If new ground disturbance in the areas identified as annual grassland and/or *Atriplex polycarpa* alliance cannot avoid small mammal burrows that may be occupied by BNLL by a buffer distance of 50 feet, focused surveys following current CDFW protocols for detection of BNLL should be conducted no more than one year prior to construction or project activities within 50 feet of any burrows or dens that could be occupied by BNLL. The current survey protocol (CDFW 2019) requires that a set pattern of surveys be completed over two sessions: adult (April 15-July 15) and hatchling (August 15 to September 30).

- If BNLL are observed at any time, at a minimum, construction and other project activities should avoid all occupied areas by a buffer distance of 250 feet, speed limits on the Project site should be reduced to 10 miles per hour and USFWS and CDFW should be contacted. A "Blunt-nosed Leopard Lizard Avoidance Plan" should be prepared and submitted to CDFW and USFWS for review and concurrence unless "incidental take" is authorized through a Natural Communities Conservation Plan and federal Section 10 endangered species authorization.

BIO-5: If construction activities can avoid small mammal burrows that may be occupied by BNLL by a buffer distance of 50-feet, USFWS and CDFW shall be contacted if a BNLL is observed within the Project site at any time during Project activities. If BNLL are observed, BIO-4 should be implemented.

BIO-6: Surveys to detect burrowing owls should be conducted no more than 30 days prior to any project activities that will affect vegetated areas identified in Figure 3-1 and Figure 3-3. If burrowing owl burrows are detected, recommendations for occupied burrow avoidance and mitigation for foraging habitat loss contained in CDFG (2012), *Staff report on burrowing owl mitigation*, shall be implemented.

BIO-7: Survey protocols and den definitions should be consistent with the USFWS *Standardized recommendations for the protection of the San Joaquin kit fox prior to or during ground disturbance* (USFWS 2011; Guidelines) or current agency protocols and requirements. Den buffer zones and excavation procedures should be consistent with the Guidelines. Should SJKF dens be found, protection measures should include the following:

- Potential and known SJKF dens (as defined in the Guidelines) should be avoided by 50-foot (15-meter) and 100-foot (30-meter) buffers, respectively, if possible. If it is not possible to avoid potential or known SJKF dens, then the procedures specified below that pertain to SJKF should be followed.

- Potential dens with no sign of SJFK presence should be monitored for 4 nights using tracking material and/or an infrared camera. Potential dens may be excavated once it is confirmed that no SJKF is present. If SJKF or sign of SJKF is observed at any time

during the monitoring or excavation of a potential den, its status becomes *known* and procedures described below for treatment of *known* dens must be implemented.

- If a known den cannot be avoided by Project activities, USFWS and CDFW should be contacted regarding FESA and CESA compliance, respectively. Should it be determined that FESA and CESA authorization is not required, unavoidable known SJKF dens may be excavated under the supervision of a County-approved qualified biologist provided that each are shown through standard monitoring methods (see below) to be unoccupied. USFWS and/or CDFW should be contacted no less than 30 days prior to implementation of these measures to provide each agency the opportunity to provide guidance regarding the potential destruction of known SJKF dens.

    - Known SJKF dens should be monitored by placing tracking material, or other means of detecting activity (e.g., camera stations, etc.), at each den entrance and checking each morning until no SJKF activity is recorded for 4 consecutive days;

    - A qualified biologist should be present during all SJKF den monitoring and excavations.

    - At a minimum, the Guidelines should be implemented if FESA and CESA take permits are issued for the Project.

- If a SJKF natal/pupping den cannot be avoided by 500 feet (152 meters), the CDFW and the USFWS should be contacted for further guidance.

- Other avoidance and minimization measures, not described above, may be employed to preserve denning opportunities and protect wildlife as needed. For example, SJKF potential dens within the recommended buffer may be temporarily blocked after appropriate monitoring and documentation of vacancy, to discourage SJKF from denning during construction or other activities. Once construction activities are completed, blocked dens should be reopened.

- All trenches or holes greater than 2-feet (0.6-meters) deep left open overnight (e.g., not backfilled prior to the end of the work day) should be inspected for entrapped wildlife and then covered so as to preclude entry by wildlife and escape ramps should be provided at no greater than 500-foot (152-meter) intervals to ensure no entrapment of animals. Escape ramps should be installed at an angle of no greater than 45 degrees.

- All pipes over 4 inches (10 centimeters) in diameter should be covered in such a way as to exclude wildlife from entry. If this is not possible, straight pipes should be inspected for wildlife before moving or capping. Any pipes of this size that cannot be seen through completely must be covered if left overnight.

    - If any such pipes are left overnight without being covered, they should be treated as potential SJKF dens and the monitoring procedures described above

should be implemented by a qualified biologist before the pipe is moved or capped.

BIO-8: If any small mammal burrows are detected that could be occupied by GKR, short-nosed kangaroo rat, or Tulare grasshopper mouse, nocturnal trapping following *Survey Protocol for Determining Presence of San Joaquin Kangaroo Rats* (USFWS 2013) should be conducted by an appropriately authorized biologist holding a California Endangered Species Act Memorandum of Understanding and Federal Endangered Species Act authorization for species that may be captured.

- If GKR are detected, all burrows potentially occupied by this species will be avoided by a buffer distance of at least 50 feet unless the appropriate FESA and CESA authorizations are obtained to allow Project activities that have the potential to result in "take" of GKR.
- If any non-listed special-status species are detected, they should be released to an offsite adjacent area at least 50 feet from planned activities. Release should be accomplished using modified "soft release" methods, including creation of artificial burrows using hand auger or other method to create cover for the released individuals.

BIO-9: If any SJAS are detected during BNLL surveys or other biological surveys conducted for detection of special-status plants or wildlife, burrows known or suspected to be occupied by SJAS should be avoided by a buffer distance of 50 feet, and connected to intact habitat that represents potential habitat for SJAS. "Take" of SJAS must be avoided unless appropriate authorization is obtained from CDFW.

BIO-10: If project activities occur during nesting season (March 1 to August 31) in any of the vegetated areas identified in Figure 3-1 and Figure 3-3, a qualified biologist shall conduct a nesting bird survey to identify any active nests present within the proposed work area and a 250-foot buffer no more than 14 days prior to the onset of project activities. If active nests are observed, they shall be avoided by an appropriate buffer distance as determined by a qualified biologist to avoid abandonment of the nest during incubation and chick rearing. The nest will not be disturbed until the young have fledged or the nest has been abandoned as determined by the qualified biologist.

BIO-11: If any federal or state listed species cannot be avoided by project activities, appropriate FESA and CESA authorizations for the subject species should be obtained. At a minimum, these authorizations should include avoidance and minimization measures including the following:

- Avoidance and minimization measures intended to minimize the impacts to listed species;
- Capture and relocation of individual listed small mammals through implementation of a Mortality Reduction and Relocation Plan to be approved by either USFWS, CDFW, or both in the case of a dually listed species;
- Compensation for habitat disturbance at ratio of no less than 3:1 for permanent impacts and 1.1:1 for temporary impacts to listed species habitat; and,
- Provision of funding for preservation and management of compensation lands in perpetuity.

BIO-12: Once focused surveys conducted per BIO-1 through BIO-11 are completed, a pre-construction survey should be conducted no more than 30 days prior to the onset of Project activities outside of the existing active landfill footprint. The purpose of the preconstruction survey will be to provide current biological information in order to implement all avoidance and minimization measures that are required based on any previous observations of special-status species and to update observations should any new site occupation by special-status species occur.

BIO-13: A qualified biologist should monitor all ground disturbing activities that occur within 100 feet of any of the vegetated areas identified in Figure 3-1. The purpose of the biological monitor will be to assist with avoiding special-status species and to document compliance with these recommendations and any subsequent plans. A report of biological monitoring activity will be submitted quarterly during any quarter that ground disturbance occurs to Kern County Planning and Natural Resources Department to document compliance with these measures.

BIO-14: The following additional general measures should be implemented that represent *best management practices* for reducing the potential for impacts on biological resources:

A) Traffic restraints and signs should be established to minimize temporary disturbances during construction. All construction traffic should be restricted to designated access roads and routes, Project site, storage areas, and staging and parking areas. Off-road traffic outside designated Project boundaries should be prohibited. A 15 mile-per-hour (24 kilometer-per-hour) speed limit should be observed in all Project construction areas, except as otherwise posted on county roads and state and federal highways.

B) All equipment storage and parking during construction activities should be confined to the designated construction area or to previously disturbed offsite areas that are not habitat for listed species.

C) All Project construction activities involving excavation or surface disturbance should be limited to daylight hours.

D) Trenches should be inspected for entrapped wildlife each morning prior to the onset of construction. Before such holes or trenches are filled, they should be thoroughly inspected for entrapped animals. Any wildlife so discovered should be allowed to escape voluntarily, without harassment, before construction activities resume. A qualified biologist may remove wildlife from a trench, hole or other entrapment out of harm's way if the immediate welfare of the individual is in jeopardy. State or federal listed species may not be handled. Should any state or federal listed species become entrapped, CDFW and USFWS should be contacted as appropriate.

E) All food-related trash items such as wrappers, cans, bottles and food scraps generated by Project activities should be disposed of in closed containers and removed at least once each week from the site. Deliberate feeding of wildlife should be prohibited.

F) To prevent harassment of special-status species, construction personnel should not be allowed to have firearms or pets on the Project.

G) All equipment and work-related materials should be contained in closed containers either in the work area or on vehicles. Loose items (e.g. rags, hose, etc.) should be stored within closed containers or enclosed in vehicles when on the work site.

H) All liquids should be in closed, covered containers. Any spills of hazardous liquids should not be left unattended until clean-up has been completed.

I) Use of rodenticides and herbicides on the Project should be prohibited unless approved by the USFWS and the CDFW. This is necessary to prevent primary or secondary poisoning of special-status species using adjacent habitats, and to avoid the depletion of prey upon which they depend. Label restrictions and other restrictions imposed by the United States Environmental Protection Agency, the California Department of Food and Agricultural, and other state and federal legislation should be implemented. If rodent control must be conducted, zinc phosphide should be used because of its proven lower risk to SJKF.

J) Any employee who inadvertently kills or injures a listed species, or who finds any such wildlife dead, injured, or entrapped, should be required to report the incident immediately to a designated site representative (e.g., foreman, project manager, environmental inspector, etc.), except animals killed on state and county roads when such mortality is not associated with Project traffic.

K) In the case of entrapped wildlife that are listed species, escape ramps or structures should be installed immediately if possible, to allow the subject wildlife to escape unimpeded.

L) In the case of injured special-status wildlife, the CDFW should be notified immediately. During business hours Monday through Friday, the phone number is (559) 243-4017. For non-business hours, report to (800) 952-5400. Notification should include the date, time, location, and circumstances of the incident. Instructions provided by the CDFW for the care of the injured animal should be followed by the contractor onsite.

M) In the case of dead wildlife that are listed as threatened or endangered, the USFWS and the CDFW should be immediately (within 24 hours) notified by phone or in person, and should document the initial notification in writing within 2 working days of the findings of any such wildlife. Notification should include the date, time, location, and circumstances of the incident.

N) Prior to commencement of construction on any phase of work, work areas should be clearly marked with fencing, stakes with rope or cord, or other means of delineating the work area boundaries.

O) All personnel entering the Project location should attend a worker orientation program. The worker orientation program should present measures required to avoid, minimize,

and mitigate impacts to biological resources and should include, at a minimum, the following subjects: A summary of FESA, CESA, and the MBTA; biological survey results for the current construction area; life history information for the species of concern; biological resource avoidance, minimization, and mitigation requirements; consequences for failure to successfully implement requirements; and procedures to be followed if dead or injured wildlife area located during Project activities. Upon completion of the orientation, employees should sign a form stating that they attended the program and understand all biological resource mitigation measures and receive a hardhat sticker or other means of identifying that they have attended the worker orientation. Forms verifying worker attendance should be filed at the applicant's office and be accessible to County, USFWS and CDFW staff. No untrained personnel should be allowed to work onsite with the exception of delivery trucks that are only onsite for 1 day or less and are under the supervision of a trained employee.

5.0 SUMMARY OF FINDINGS

The existing landfill is subject to heavy and ongoing intense physical disturbance. Habitat for special-status species is present outside of the active landfill. Best management practices included as BIO-14 should reduce potential impacts in the existing landfill to less than significant. If potential habitat and resources identified in Figures 3-1 and 3-3 cannot be avoided, recommendations contained in measures BIO-1 through BIO-13 should be implemented to reduce impacts to special-status species and biological resources.

Although no special-status plant species were identified, full floristic surveys following agency guidelines were not conducted. Therefore, these species may be present in the vegetated portions of the Project site. The implementation of the recommendations provided in Section 4.0 addresses impacts to listed wildlife species that may traverse the project area or occupy portions of the project. Project related impacts (e.g., work activities) could possibly impact annual grassland (*Bromus rubens—Schismus* [*arabicus, barbatus*]) semi-natural stand (annual grassland) and recovering *Atriplex polycarpa* alliance (Allscale Scrub). The habitat present in the immediate area could support the federal- and state-listed wildlife species identified in Appendix A and discussed in Section 3.

6.0 CONCLUSION

With the implementation of recommendations, impacts to biological resources can be reduced to "less than significant."

7.0 LIST OF PREPARERS

Report Preparation

Randi McCormick, McCormick Biological, Inc. (MBI), Principal Biologist	Primary Author
Craig O'Neill, MBI, Staff Biologist II	Maps and Figures

Reconnaissance Field Survey and Follow-up Site Visits

Yancey Bissonnette, MBI, On-call Senior Biologist

Waring Laurendine, MBI, Senior Biologist

Randi McCormick, MBI, Principal Biologist

Eugene "Woody" Moise, MBI, On-call Senior Biologist

Craig O'Neill, MBI, Staff Biologist

Colin Guthrie, MBI, Staff Biologist

Megan Means, MBI, Staff Biologist

Korissa Troxel, MBI, Staff Biologist/GIS Specialist

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Appendix A
Special-Status Plants and Wildlife Evaluation

Table A-1: Special-status Plants That May Occur in the Vicinity of the Project Site.

Scientific Name Common Name	Status Fed/State/CRPR	Brief Description	Blooming Period	Survey Results
Astragalus hornii var. *hornii* Horn's milk-vetch	S/-/1B.1	Annual herb in the Fabaceae found in meadows and seeps and on playas and lake margins on alkaline soils between 197 and 2,789 feet (60–850 meters) in elevation. Known from occurrences in the Southern San Joaquin Valley, the Tehachapi Mountains and the Western Transverse Ranges in Kern, Los Angeles, and San Bernardino Counties.	May to October	Species not observed. No potential habitat. No impacts are anticipated.
Atriplex coronata var. *notatior* San Jacinto Valley crownscale	E/-/1B.1	Herbaceous annual in the Chenopodiaceae found in valley and foothill grasslands, playas, and vernal pools on alkaline soils between 456 and 1,640 feet (139–500 meters) in elevation.	April to August	Species not observed. No potential habitat No impacts are anticipated.
Atriplex coronata* var. *vallicola **Lost Hills crownscale**	S/-/1B.2	Annual herb in the Chenopodiaceae that occurs between 164 and 2,083 feet (50–635 meters) in elevation in chenopod scrub, valley and foothill grasslands, and vernal pools on alkaline soils. Known from occurrences in Southeastern San Joaquin Valley from Kern County north to Fresno County and on the Carrizo Plain.	April to August	Species not observed. Soils are marginal. Low potential for this species in recovering vegetated areas. See discussion in Section 3.2.1.
Caulanthus californicus **California jewelflower**	E/E/1B.1	Herbaceous annual in the Brassicaceae that occurs between 200 and 3,281 feet (61–1,000 meters) elevation on sandy soils in chenopod scrub, pinyon and juniper woodland, and valley and foothill grasslands. Although many populations are thought to have been extirpated from the San Joaquin Valley, occurrences are known from Kern, Kings, Tulare, San Luis Obispo, Santa Barbara, and Fresno Counties.	February to May	Species not observed. Soils are marginal. Low potential for this species in recovering vegetated areas. See discussion in Section 3.2.1.
Cirsium crassicaule Slough thistle	S/-/1B.1	Herbaceous annual or perennial in the Asteraceae occurring between 10 and 328 feet (3–100 meters) in elevation in chenopod scrub, marshes and swamps (sloughs), and riparian scrub. Known to occur in the Southern San Joaquin Valley in Kern and Southern Kings Counties, and in the Northern San Joaquin Valley in San Joaquin County.	May to August	Species not observed and no potential habitat is present. No impacts are anticipated.
Delphinium recurvatum **Recurved larkspur**	S/-/1B.2	Perennial herb in the Ranunculaceae occurring between 10 and 2,461 feet (3–750 meters) in elevation in chenopod scrub, cismontane woodland, and valley and foothill grasslands on alkaline soils. Known to occur in the Mojave Desert and Southern San Joaquin Valley in Kern County north to Solano County; the South Inner Coastal Ranges from San Luis Obispo County north to Stanislaus County, and the Sacramento Valley from San Joaquin County north to Butte County.	March to June	Marginal conditions based on historic disturbance. Low potential for this species in recovering vegetated areas. See discussion in Section 3.2.1.
Eremalche parryi* ssp. *kernensis **Kern mallow**	E/-/1B.2	Annual herb in the Malvaceae that occurs between 230 and 4,232 feet (70–1,290 meters) in elevation in chenopod scrub, and valley and foothill grasslands. Distribution includes Kern and Tulare Counties and the Inner South Coast Ranges in San Luis Obispo and Santa Barbara Counties.	March to May	Suitable soils but low potential based on historic disturbance in recovering vegetated areas. See discussion in Section 3.2.1.

Scientific Name **Common Name**	**Status** **Fed/State/CRPR**	**Brief Description**	**Blooming Period**	**Survey Results**
Eriastrum hooveri **Hoover's eriastrum**	D/-/4.2	Annual herb in the Polemoniaceae that occurs between 164 and 3,002 feet (50–915 meters) in elevation in pinyon-juniper woodland, and valley and foothill grasslands, occasionally on gravelly soils. Known to occur in the Southern San Joaquin Valley in Kern and Fresno Counties and on the Carrizo Plain in San Luis Obispo County.	March to July	Marginally suitable soils not typical for the species. This species is tolerant of disturbance and could occur in recovering vegetated areas. See discussion in Section 3.2.1.
Eriogonum temblorense Temblor buckwheat	-/-/1B.2	Annual herb in the Polygonaceae that occurs between 984 and 3,281 feet (300–1,000 meters) in elevation, in valley and foothill grasslands on clay soils or sandstone. Known to occur in the South Inner Coastal Ranges from Kern County north to Monterey County.	May to September (occasionally April)	This species is not anticipated to occur on the Project site based on historic disturbance, lack of typical soils, and the site is outside of the known elevational range. No impacts anticipated.
Lasthenia glabrata ssp. coulteri Coulter's goldfields	-/-/1B.1	Annual herb in the Asteraceae found between 3 and 4,003 feet (1–1,220 meters) in elevation in marshes, swamps, playas, and vernal pools. Known from occurrences in the Transverse Ranges in Santa Barbara, Ventura, and San Bernardino Counties, the Peninsular Ranges in San Diego, Orange and Riverside Counties, the South Coast in Los Angeles County, the Northern Channel Islands, the South Coast Ranges in San Luis Obispo County, the Tehachapi Mountains in Kern County, and the Southern San Joaquin Valley in Kern, Tulare, and Merced Counties.	February to June	Species not observed and no potential habitat is present. No impacts are anticipated.
Layia munzii Munz's tidy-tips	-/-/1B.2	Annual herb in the Asteraceae found between 492 and 2,297 feet (150–700 meters) in elevation in chenopod scrub, and valley and foothill grasslands in alkaline clay soils. Known to occur in the San Joaquin Valley from Kern County north to Madera County, and the South Inner Coastal Ranges from San Luis Obispo County north to San Benito County.	March to April	Species not observed and no suitable soils are present. No impacts are anticipated.
Madia radiata Showy golden madia	-/-/1B.1	Annual herb in the Asteraceae found between 82 and 3,986 feet (25–1,215 meters) in elevation in cismontane woodland and valley and foothill grasslands on vertic clay, rarely serpentine. Known to occur in Western San Joaquin Valley from Kern County north to San Benito County, the Inner South Coast Ranges from San Luis Obispo County north to Monterey County, and the Northern San Joaquin Valley in Contra Costa and San Joaquin Counties.	March to May	Species not observed and no suitable soils are present. No impacts are anticipated.
Monolopia congdonii **San Joaquin woolly-threads**	E/-/1B.2	Annual herb in the Asteraceae found between 197 and 2,625 feet (60–800 meters) in elevation in chenopod scrub, and valley and foothill grasslands, on sandy soils. Known to occur in the San Joaquin Valley from Kern County north to San Benito County, and the Carrizo Plain in San Luis Obispo and Santa Barbara Counties.	February to May	This species is known in the region from fine sandy loam soils, which are not present. Marginal soil conditions and historic disturbance reduce habitat potential. However, marginal habitat is present. See discussion in Section 3.2.1.

Scientific Name **Common Name**	**Status** **Fed/State/CRPR**	**Brief Description**	**Blooming Period**	**Survey Results**
Puccinellia simplex California alkali grass	-/-/1B.2	Annual herb in the Poaceae found in chenopod scrub, meadows and seeps, valley and foothill grassland, and vernal pools; in alkaline, vernally-mesic sinks, flats, and lake margins between 6 to 3,051 feet (2–930 meters) in elevation. Known from locations in Alamadea, Butte, Contra Costa, Colusa, Fresno, Glenn, Kern, Lake, Los Angeles, Madera, Merced, Napa, San Bernardino, Santa Clara, Santa Cruz, San Luis Obispo, Solano, Stanislau, Tulare, and Yolo Counties. This species is presumed extirpated in Kings County.	March to May	Species not observed and no potential habitat is present. No impacts are anticipated.
Tropidocarpum californicum Kings gold	-/-/1B.1	Herbaceous annual in the Brassicaceae found in chenopod scrub at 213 feet (65 meters) in elevation on alkaline, sandy clay soil. Known to occur in Kern and Kings Counties.	March	Species not observed and no potential habitat is present. No impacts are anticipated.

* Species shown in **BOLD** are discussed further in section 3.2

STATUS:
Federal and State Listing Code
D Delisted
E Federal- or State-listed Endangered
- No listing status

CRPR
1B.1 Plants considered rare, threatened, or endangered in California and elsewhere; seriously threatened in California
1B.2 Plants considered rare, threatened, or endangered in California and elsewhere; fairly threatened in California
4.2 Plants of Limited Distribution Moderately Threatened in California
- No listing status

Table A-2: Plant Species of Limited Distribution* That Were Considered, Not Expected, or For Which Significant Impacts Are Not Anticipated

Scientific Name **Common Name**	**Notes**
Allium howellii var. *howellii* Howell's onion	No clay or serpentine soils present
Antirrhinum ovatum Oval-leaved snapdragon	Project site is below the known elevational range for the species; although gypsum soils are present, alkaline conditions typically present were not observed
Atriplex coronata var. *coronata* Crownscale	Fine sandy, saline or alkaline soils typical of this species were not observed on Project site. Although the site does not represent typical habitat for this species, it was detected on the Phase 1 portion of the composting facility. See discussion in Section 3.2.1.
Trichostema ovatum San Joaquin bluecurls	Although suitable habitat is present for this species and it was not observed, surveys were not conducted at an appropriate time for detection. Even if present, San Joaquin blue curls is relatively widespread and populations are quite large in Kern County under good conditions. In addition, it tends to occur in disturbed locations. If found during floristic surveys, it should be reported to the CNDDB. Additionally, it would be likely to persist on project edges over time.

*California Rare Plant Rank 4.2 or 4.3.

Table A-3: Special-status Wildlife That May Occur in the Vicinity of the Project Site.

Scientific Name Common Name	Status Federal/State	General Habitat	Survey Results
Invertebrates			
Branchinecta lynchi Vernal pool fairy shrimp	T/-	Widespread but not abundant; known from Shasta County south to Tulare County; occupies a variety of different vernal pool habitats, from small, clear, sandstone rock pools to large, turbid, alkaline, grassland valley floor pools; most frequently found in pools measuring less than 0.05 acres (0.02 hectares). Kern County has no documented occurrences.	No vernal pools or other ephemeral pool or swale habitats present that would support this species. Project is outside designated critical habitat and this species is not expected.
Lytta moesta Moestan blister beetle	-/-	Not much information exists on the Hopping's blister beetle. Known to occur in the Central Valley. Collections described from Blackwell's Corners, Kern County and Brentwood, Contra Costa County. Lytta are nest parasites of solitary bees as the beetle larvae feed on the pollen stores that the bee provides her own larvae.	No suitable forage habitat for this species exists on the project site. Historic disturbance suggests that habitat may no longer be suitable for this species. No impacts are anticipated.
Fish			
Hypomesus transpacificus Delta smelt	T/T	Found only in the Sacramento-San Joaquin Estuary in the interface between salt and freshwater.	This Project will not impact any waters that could support or connect to waters that support this species. No impacts expected.
Amphibians			
Rana draytonii California red-legged frog	T/-	Found in dense, shrubby riparian vegetation associated with deep (0.6 meters, 2 feet), still or slow-moving water; arroyo willow (*Salix lasiolepis*) seems to be most suitable, but cattails (*Typha* sp.) and bulrushes (*Scirpus* sp.) also provide good habitat.	No suitable riparian or aquatic resources are present on the Project site. Project is outside designated critical habitat.
Spea hammondii Western spadefoot toad	-/CSC	Central valley and adjacent foothills, Coast Ranges from Point Conception south to the Mexico border; valley-foothill grasslands and valley-foothill hardwood, shallow temporary pools used for breeding, below 4,472 feet (1,363 meters).	No suitable ephemeral pools or other aquatic resources were observed on the project site. No impacts expected
Reptiles			
Anniella pulchra Northern California legless lizard	-/CSC	Legless lizards distributed within suitable habitats in the Coast Ranges south to the Mexican border, the floor of the San Joaquin Valley from San Joaquin County south, the west slope of the southern Sierra, the Tehachapi Mountains west of the desert, and the mountains of southern California. Elevation ranges from near sea level to about 6000 ft (1800 m); habitats include coastal dune, valley-foothill, chaparral, and coastal scrub types; prefers warm, loose soil that is somewhat moist; can often be found under leaf litter, rocks, boards, driftwood, and logs. The Project is in the range of the northern legless lizard.	Soils are not typical of the loose, sandy soils preferred by this species. Occurrence is highly unlikely based on lack of soils, lack of moisture, and historic disturbance. No impacts are anticipated.
Arizona elegans occidentalis California glossy snake	-/CSC	Inhabits arid scrub, rocky washes, grasslands, and chaparral. Appears to prefer microhabitats of open areas and areas with soil loose enough for easy burrowing. Occurs from the eastern part of the San Francisco Bay Area south to northwestern Baja California. It is absent along the central coast.	Soils within the recovering vegetation on the Project site are fairly compact, and not conducive to this species. It is considered unlikely and impacts are not anticipated.

Scientific Name **Common Name**	**Status** **Federal/State**	**General Habitat**	**Survey Results**
Emys marmorata Western pond turtle	-/CSC	Completely aquatic requiring calm waters such as pools or streams with vegetation banks or logs for basking. Will utilize upland habitat up to about 0.3 miles (0.5 kilometers) from water.	No aquatic resources are present on the Project site. This species is not expected to occur and no impacts are anticipated.
Gambelia sila **Blunt-nosed leopard lizard**	E/E,SFP	Found in the San Joaquin Valley, adjacent Carrizo Plain, Elkhorn Plain, Cuyama Valley, and Panoche Valley; inhabits sparsely vegetated plains, lower canyon slopes, valley floors, and washes; open grassland, saltbush scrub, and alkali sink are more common habitat types.	Suitable habitat is present for this species. See discussion in Section 3.2.2.
Masticophis flagellum ruddocki **San Joaquin coachwhip**	-/CSC	Found in the San Joaquin Valley in open, dry habitats. Associated with valley grassland and saltbush scrub habitats containing small mammal burrows which are used for refugia and oviposition sites.	Species was observed. Suitable habitat is present. See discussion in Section 3.2.2.
Phrynosoma blainvillii **Coast horned lizard**	-/CSC	Inhabits valley-foothill hardwood, coniferous and riparian, as well as pine-cypress, juniper, and annual grasslands, in Sierra Nevada below 3,937 feet (1,200 meters) and in mountains of Southern California and into the adjacent valleys.	Species not observed. Suitable habitat is present. See discussion in Section 3.2.2.
Thamnophis gigas Giant garter snake	T/T	Highly aquatic; usually found in areas of freshwater marsh low-gradient streams, drainage canals and irrigation ditches, especially those associated with rice farming; historically occurred in the San Joaquin Valley from the vicinity of Sacramento southward to Buena Vista and the Tulare Lake Basin; currently known from near Chico, Butte County, to the vicinity of Burrel, Fresno County.	No aquatic resources are present on the Project site. This species has most likely been extirpated from this portion of its range. No impacts are anticipated.
Birds			
Agelaius tricolor Tricolored blackbird	-/CSC	Forages in grasslands, wetlands, rice fields, croplands, and weedy uplands dominated by mustards and thistles, etc.; breeds in marshes containing heavy growth of bulrushes, cattails, and blackberries; found throughout the Central Valley.	Suitable foraging habitat is present. No suitable nesting habitat is present. Species not observed. No impacts are anticipated.
Ammodramus savannarum **Grasshopper sparrow**	-/CSC	Occurs in dry, dense grassland with a variety of grasses and tall forbs. Scattered shrubs are preferred. Feeds on insects and other invertebrates, grass and forb seeds. Preferred cover consists of thick grasses and forbs.	Marginal nesting and foraging habitat present given that most of the vegetation on the Project site is fairly open. See Section 3.2.2 for further discussion.
Aquila chrysaetos Golden eagle	BEPA, BCC/FP, WL	Uncommon permanent resident and migrant throughout California except center of the Central Valley; forages in rolling foothills, mountain areas, sage-juniper flans and desert areas, below 12,575 feet (3,833 meters), nests on cliffs and in large trees in open areas, very susceptible to human disturbance.	Suitable foraging habitat but potential nesting habitat greater than 10 miles to the west in the Temblor Range. Marginal impacts to potential foraging habitat.
Athene cunicularia **Burrowing owl**	-/CSC	Inhabit dry, open grasslands, rolling hills, desert floors, prairies, savannas, agricultural land, and other areas of open, bare ground. These owls will also inhabit open areas near human habitation, such as airports, golf courses, shoulders of roads, railroad embankments, and the banks of irrigation ditches and reservoirs.	Suitable foraging and nesting habitat are present in the recovering vegetation areas of the Project Site. See Section 3.2.2 for further discussion.
Buteo swainsoni Swainson's hawk	-/T	Riparian and sometimes large isolated trees used for nesting; grasslands and agricultural lands used for foraging; in California, breeds primarily in the Sacramento Valley, with occasional nesting to the south through Kern County; migrate through the Central and San Joaquin Valleys to their wintering grounds in South America.	For the region, marginal foraging habitat is present but no nesting substrate available on the Project site. Nearest reported nest approximately 3.5 miles southeast. No impacts are anticipated given the distance to likely nesting.

Scientific Name **Common Name**	**Status** **Federal/State**	**General Habitat**	**Survey Results**
Charadrius alexandrines nivosus Western snowy plover	T/-	Nests, feeds, and takes cover on sandy or gravelly beaches along the coast, on estuarine salt ponds, alkali lakes, and at the Salton Sea. On the Pacific coast, it nests on 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, and river bars.	No suitable nesting or foraging habitat. Species is not expected and impacts are not anticipated.
Charadrius montanus Mountain plover	-/CSC	Forages in short grasslands and plowed fields Winter resident from September through March in the Central Valley from Sutter and Yuba Counties southward also Los Angeles County, eastern San Bernardino County and along the Colorado River Valley, does not breed in California.	Marginal wintering habitat present in grassland portion of Project site. Disturbance to grassland would not result in significant impacts given the marginal suitability and that the site use would be limited to potential winter foraging.
Dendrocygna bicolor Fulvous whistling-duck	-/CSC	Historical records from the San Joaquin Valley; however, rare and irregular occurrence. Feeds on rice, grains, seeds, and green shoots; habitats include dense emergent wetland and wooded habitats. Known from the Imperial Valley and the Salton Sea.	No suitable nesting or foraging habitat. Species is not expected and impacts are not anticipated.
Lanius ludovicianus **Loggerhead shrike**	-/CSC	Common resident and winter visitor in lowlands and foothills of California; species prefers open habitats with scattered shrubs, trees, posts, fences, utility lines, or other perches; nests on stable branches in densely-foliaged shrubs or trees, usually well-concealed.	Species was observed during site visit. Potential nesting habitat is present in the recovering saltbush and shrubs of the Project site. See Section 3.2.2 for further discussion.
Toxostoma lecontei LeConte's thrasher	-/CSC	Inhabit arid, sparsely vegetated deserts of southern Nevada, western Arizona, extreme northwestern Mexico, and southeastern California. It is also found in six isolated pockets of the San Joaquin Valley: McKittrick to Maricopa, Lost Hills, Kettleman Hills, Carrizo-Elkhorn Plain, Cuyama Valley, and the Panoche Hills.	Marginal nesting and foraging habitat. Site lacks mature stands of common saltbush typical of this species. No impacts anticipated.
Xanthocephalus xanthocephalus Yellow-headed blackbird	-/CSC	Species found in freshwater marshes during the summer. They prefer cattails, tule, and bulrush. During migration and over winter months, the Yellow-headed Blackbird is found in open, cultivated lands, in fields, and in pastures.	Marginally suitable winter foraging habitat is present. No suitable nesting habitat is present. No impacts are anticipated.
Mammals			
Ammospermophilus nelsoni **San Joaquin antelope squirrel**	-/T	Found in grasslands or open shrublands; formerly more extensive, current range includes southwestern portion of the San Joaquin Valley and in adjacent valleys to the west.	Suitable habitat is present. See discussion Section 3.2.2.
Antrozous pallidus *Pallid bat*	-/CSC	Throughout Californian except high Sierra Nevada from Shasta County south to Kern County and the northwestern corner of the state; grasslands, shrub lands, woodlands, and forest habitats; roosts in caves, crevices, mines and hollow trees.	Marginal foraging habitat present but no roosting habitat. Impacts not anticipated.
Corynorhinus townsendii Townsend's big-eared bat	-/CSC	Occurs throughout California except at the highest elevations; requires caves, mines, tunnels, or other structures for roosting; prefers moist habitats, feeding from brush or trees along habitat edges.	Marginal foraging and no roosting habitat present. Impacts not anticipated.
Dipodomys ingens **Giant kangaroo rat**	E/E	Western side of the San Joaquin Valley, including the Carrizo Plain and the Panoche Valley; grassland and shrub-land habitats with sparse vegetative cover and soils that are well-drained, fine sandy loams with gentle slopes.	Suitable habitat is present. Characteristic burrow and precinct sign were not observed during the site visits. See discussion Section 3.2.2.

Scientific Name **Common Name**	**Status** **Federal/State**	**General Habitat**	**Survey Results**
Dipodomys nitratoides brevinasus **Short-nosed kangaroo rat**	-/CSC	Gently sloping terrain and on hilltops in scrub vegetation (primarily saltbush); sometimes alkaline soils; populations are small and fragmented, occurring in Fresno, San Benito, Kings, and western Kern counties, Carrizo Plain Natural Area, and Cuyama Valley.	Suitable habitat is present and small mammal burrows that could be occupied by this species were observed. See discussion Section 3.2.2.
Dipodomys nitratoides nitratoides Tipton kangaroo rat	E/E	Found in arid communities on the valley floor portions of Kern, Tulare, and Kings counties in scrub and grassland communities in level to near-level terrain with alluvial fan-floodplain soil (fine sands and sandy loams) with sparse grasses and woody vegetation such as iodine bush, saltbush, seep weed, and mesquite.	Project is west of the accepted range for this species, which is considered to be the San Joaquin Valley east of the California Aqueduct. No impacts anticipated.
Eumops perotic californicus Western mastiff bat	-/CSC	Open, semi-arid to arid habitats, including conifer and deciduous woodlands, annual and perennial grasslands, chaparral, desert scrub, and urban areas; roosts in cliff faces, as well as high buildings, trees, and tunnels; uncommon resident in southwestern San Joaquin Valley.	No suitable roosting habitat on Project site or in nearby area; low potential for foraging. Impacts not anticipated.
Lasiurus blossevillii Western red bat	- / CSC	Occurs throughout western California from Shasta County south; roosts primarily in trees and occasionally in shrubs, prefers habitat edges or mosaics with trees for roosting and open areas for foraging.	No suitable roosting habitat on Project site or in nearby areas; foraging unlikely
Onychomys torridus tularensis **Tulare grasshopper mouse**	-/CSC	Found in valley grasslands habitats, blue oak savanna, desert associations dominated by annual grasses and California ephedra, alkali sink scrub, saltbush scrub, and upper Sonoran shrub associations, dominated by ephedra.	Suitable habitat is present. Suitable small mammal burrows present in recovering vegetated areas, but density was low. See discussion Sections 3.2.2.
Sorex ornatus relictus Buena Vista Lake shrew	E/CSC	Formerly occupied marshlands of the San Joaquin Valley and the Tulare Basin. Its range has become much restricted due to the loss of lakes and sloughs in the area. It has been recorded from the Kern Lake Preserve area and the Kern National Wildlife Refuge. Current distribution is unknown but likely to be very restricted due to the loss of habitat.	No suitable habitat is present for this species and it is not expected to occur on the Project site. No impacts anticipated.
Taxidea taxus **American badger**	-/CSC	Uncommon resident found through California; in less disturbed grassland and shrubland habitats in San Joaquin Valley.	Suitable habitat is present in the recovering vegetated areas. See discussion Section 3.2.2.
Vulpes macrotis mutica **San Joaquin kit fox**	E/T	Found in valley saltbush scrub, valley sink scrub, Interior Coast Range saltbush scrub, upper Sonoran sub-shrub scrub, non-native grassland, and valley sacaton grassland in the Central Valley and adjacent foothills and valleys, infrequently to the outer Coast Ranges; generally not found in densely wooded areas, wetland areas, or areas subject to frequent periodic flooding.	Suitable habitat present and this species was observed during site visits. See discussion Section 3.2.2.

*Species shown in **BOLD** are discussed further in section 3.2

STATUS: Federal

E	Listed as Endangered
T	Listed as Threatened
BEPA	Bald Eagle Protection Act
BCC	Bird Species of Special Concern
-	No Listing Status

State

CSC	California Department of Fish and Wildlife Designated Species of Special Concern
E	Listed as Endangered
SFP	California Department of Fish and Wildlife Designated Fully Protected
T	Listed as Threatened
WL	Watch List
-	No Listing Status

Table A-4: Non-listed Special-status* Wildlife Species That Were Considered, Not Expected, and Significant Impacts Are Not Anticipated

Scientific Name **Common Name**	**Notes**
Birds	
Accipiter cooperi Cooper's hawk	Nests considered sensitive by CDFW; no nesting habitat present
Accipiter striatus Sharp-shinned hawk	Nests considered sensitive by CDFW; Project is outside of known breeding range
Ardea alba Great egret	Nesting colonies considered sensitive by CDFW; no nesting habitat present
Ardea herodeas Great blue heron	Nesting colonies considered sensitive by CDFW; no nesting habitat present
Asio flammeus Short-eared owl	Nesting considered sensitive by CDFW; Project is outside of known breeding range
Asio otus *Long-eared owl*	Nests considered sensitive by CDFW; no nesting habitat present
Botaurus lentiginosus American bittern	Wetland species for which no foraging or nesting habitat is present
Buteo regalis Ferruginous hawk	Not observed during any of the site visits; expected to winter in the general vicinity; minor amount of potential wintering habitat could be disturbed by Project Activities and foraging not likely to be precluded by project over time
Calypte costae Costa's hummingbird	Nests considered sensitive by CDFW; no nesting habitat present
Circus hudsonius Northern harrier	Nests considered sensitive by CDFW; no nesting habitat present
Egretta thula *Snowy egret*	Nesting colonies considered sensitive by CDFW; no nesting habitat present
Elanus leucurus White-tailed kit	Nests considered sensitive by CDFW; no nesting habitat present
Eremophila alpestris actia California horned lark	Project is near the edge of the published range of this species. Horned larks are common throughout this portion of Kern County in open grasslands. Nesting bird surveys for new ground disturbance (Measure BIO-8) would result in avoiding nesting individuals. Grassland habitat disturbance would not result in significant impacts to the species and nesting in non-disturbed portions of Project site likely to persist over time.
Falco columbarius Merlin	Not observed during any of the site visits; expected to winter in the general vicinity; minor amount of potential wintering habitat could be disturbed by Project Activities and foraging not likely to be precluded by project over time
Falco mexicanus Prairie falcon	Nests considered sensitive by CDFW; no nesting habitat present
Falco peregrinus anatum American peregrine falcon	Nests considered sensitive by CDFW; no nesting habitat present (also CFGC FP species)
Ixobrychus exilis Least bittern	Wetland species for which no foraging or nesting habitat is present
Melospiza melodia Song sparrow	Several subspecies tracked by CNDDB; however, the Project is not within the known range of any of these subspecies. Song sparrow may occasionally occur
Numenius americanus Long-billed curlew	Nesting considered sensitive by CDFW; Project is outside of known breeding range
Nycticorax nycticorax Black-crowned night heron	Nesting colonies considered sensitive by CDFW; no nesting habitat present
Palacrocorax auritus Double-crested cormorant	Nesting colonies considered sensitive by CDFW; no nesting habitat present
Pelecanus erythrorhynchos American white pelican	Nesting colonies considered sensitive by CDFW; no nesting habitat present

Scientific Name **Common Name**	**Notes**
Plegadis chihi White-faced ibis	Nesting colonies considered sensitive by CDFW; no nesting habitat present
Selasphorus rufous Rufous hummingbird	Nesting considered sensitive by CDFW; Project is outside of known breeding range
Spinus lawrencei Lawrence's goldfinch	Project is outside of the expected breeding range of this species; habitat is suitable foraging

* USFWS *Bird Species of Species Concern*, CDFW *Watch List* or otherwise no status but tracked by CNDDB

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Appendix B
California Natural Diversity Database 10-mile Radius Maps and Summary Table Report

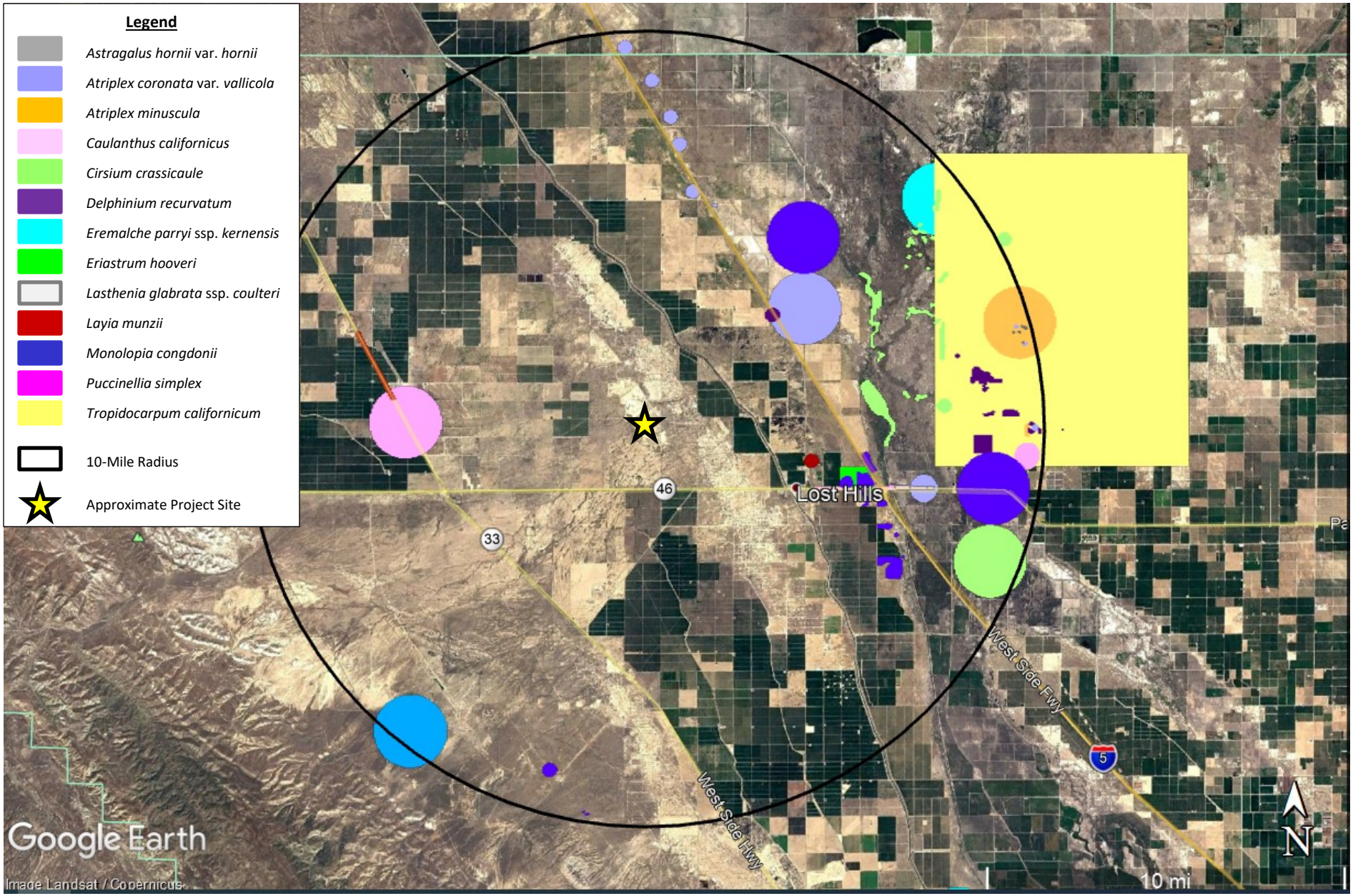


Figure B-1: California Natural Diversity Database – Recorded Plant Species Observations Map [10-mile radius].

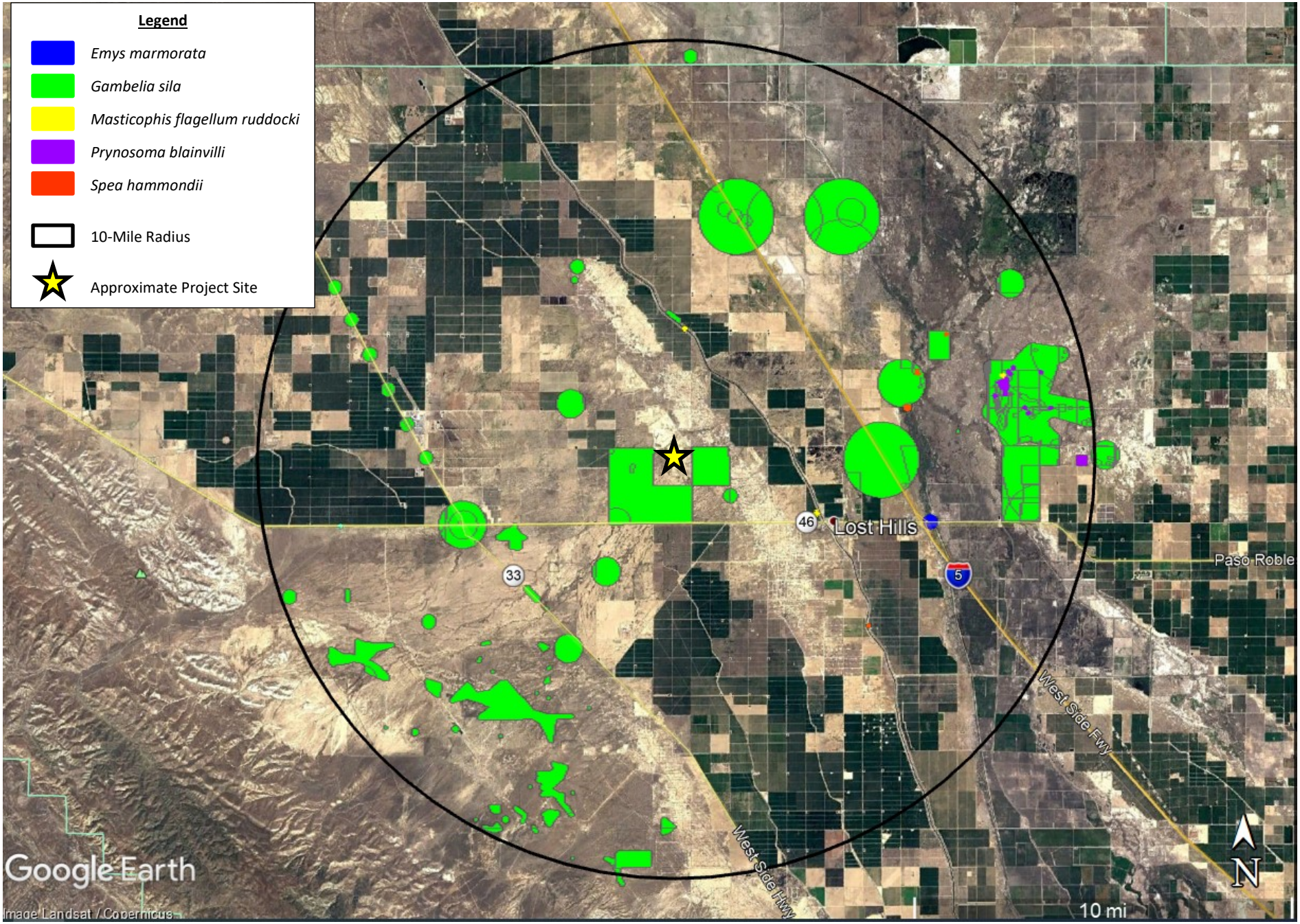


Figure B-2: California Natural Diversity Database – Recorded Reptile and Amphibian Species Observations Map [10-mile radius].

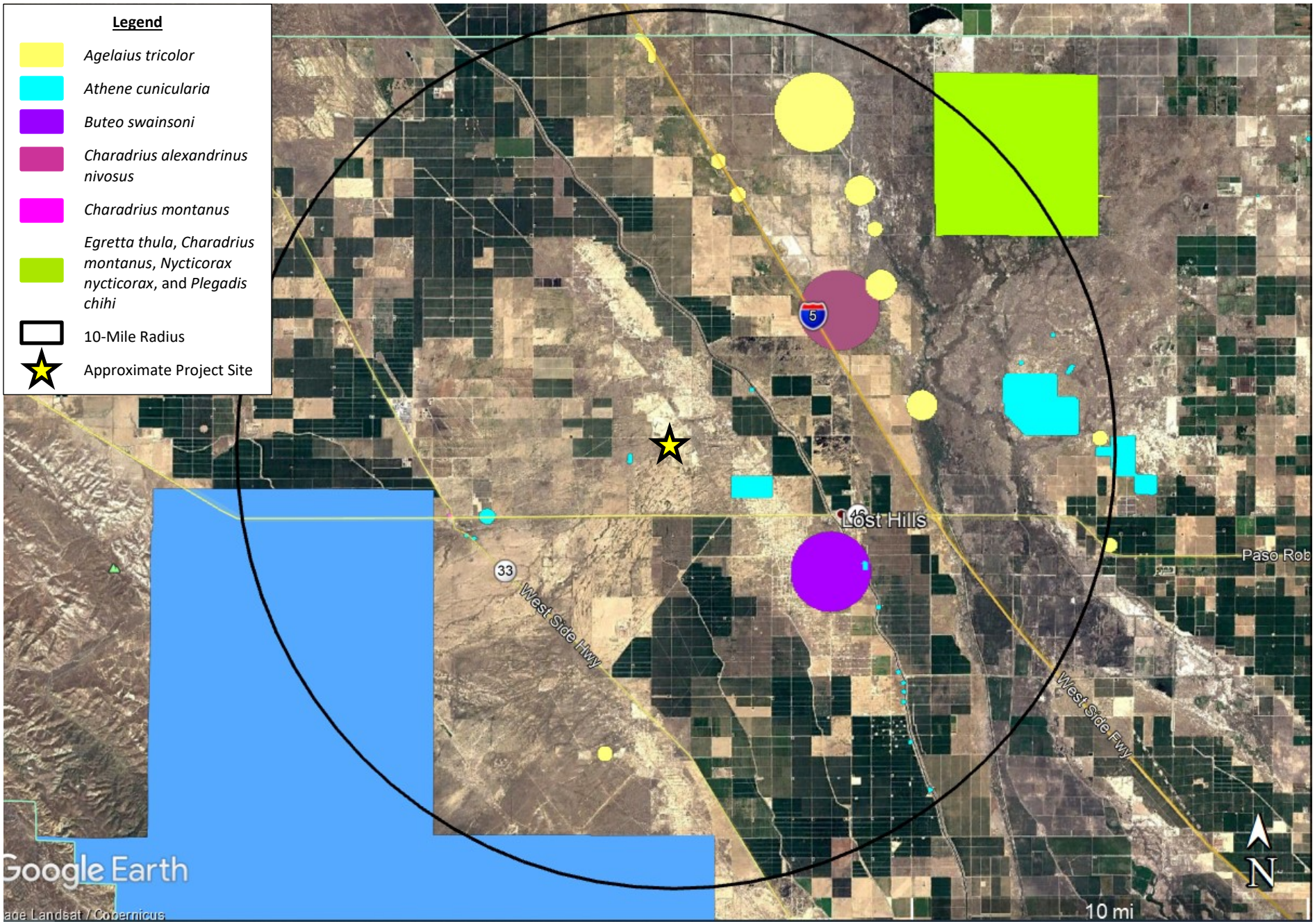


Figure B-3: California Natural Diversity Database – Recorded Bird Species Observations Map [10-mile radius].

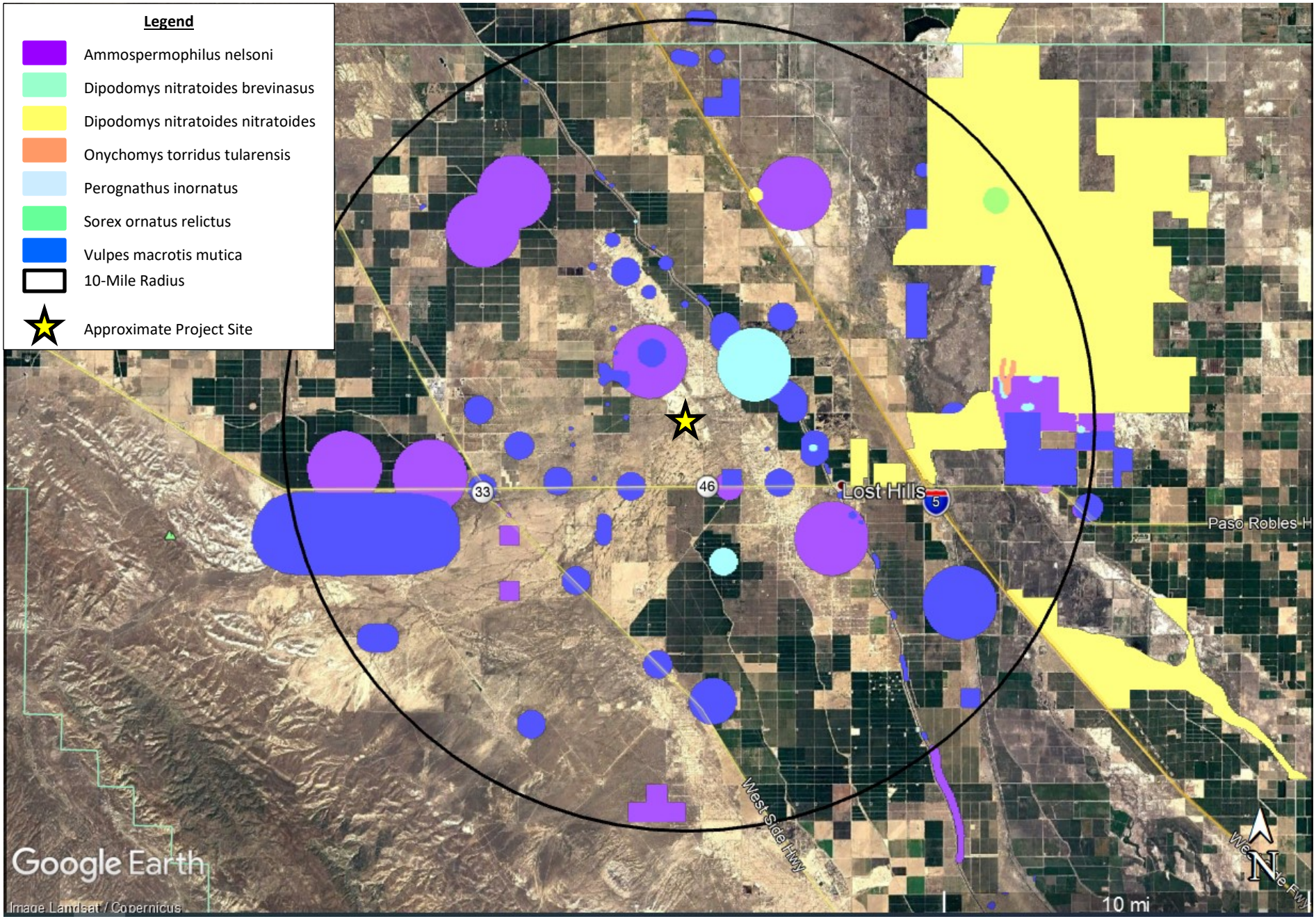


Figure B-4: California Natural Diversity Database – Recorded Mammal Species Observations Map [10-mile radius].

Summary Table Report

California Department of Fish and Wildlife

California Natural Diversity Database

Query Criteria: Quad IS (West Camp (3511977) OR Avenal Gap (3511978) OR Lone Tree Well (3511976) OR Emigrant Hill (3511968) OR Antelope Plain (3511967) OR Lost Hills NW (3511966) OR Shale Point (3511958) OR Lost Hills (3511956) OR Blackwells Corner (3511957))

Name (Scientific/Common)	CNDDB Ranks	Listing Status (Fed/State)	Other Lists	Elev. Range (ft.)	Total EO's	Element Occ. Ranks						Population Status		Presence		
						A	B	C	D	X	U	Historic > 20 yr	Recent <= 20 yr	Extant	Poss. Extirp.	Extirp.
Agelaius tricolor tricolored blackbird	G2G3 S1S2	None Threatened	BLM_S-Sensitive CDFW_SSC-Species of Special Concern IUCN_EN-Endangered NABCI_RWL-Red Watch List USFWS_BCC-Birds of Conservation Concern	210 725	955 S:13	0	0	0	0	0	13	9	4	13	0	0
Ammospermophilus nelsoni Nelson's antelope squirrel	G2 S2S3	None Threatened	BLM_S-Sensitive IUCN_EN-Endangered	200 1,150	285 S:22	0	4	4	0	0	14	20	2	22	0	0
Antirrhinum ovatum oval-leaved snapdragon	G3 S3	None None	Rare Plant Rank - 4.2	950 950	16 S:1	0	0	0	0	0	1	1	0	1	0	0
Arizona elegans occidentalis California glossy snake	G5T2 S2	None None	CDFW_SSC-Species of Special Concern	800 800	260 S:1	0	0	0	0	0	1	0	1	1	0	0
Astragalus hornii var. hornii Horn's milk-vetch	GUT1 S1	None None	Rare Plant Rank - 1B.1 BLM_S-Sensitive	190 215	28 S:2	0	0	0	0	1	1	2	0	1	0	1
Athene cunicularia burrowing owl	G4 S3	None None	BLM_S-Sensitive CDFW_SSC-Species of Special Concern IUCN_LC-Least Concern USFWS_BCC-Birds of Conservation Concern	300 634	1989 S:24	4	2	16	1	0	1	10	14	24	0	0
Atriplex coronata var. vallicola Lost Hills crownscale	G4T2 S2	None None	Rare Plant Rank - 1B.2 BLM_S-Sensitive SB_SBBG-Santa Barbara Botanic Garden	220 340	106 S:10	1	3	1	1	0	4	7	3	10	0	0
Buteo swainsoni Swainson's hawk	G5 S3	None Threatened	BLM_S-Sensitive IUCN_LC-Least Concern USFWS_BCC-Birds of Conservation Concern	220 513	2518 S:3	0	0	0	0	1	2	1	2	2	1	0

Summary Table Report

California Department of Fish and Wildlife

California Natural Diversity Database

Name (Scientific/Common)	CNDDB Ranks	Listing Status (Fed/State)	Other Lists	Elev. Range (ft.)	Total EO's	Element Occ. Ranks						Population Status		Presence		
						A	B	C	D	X	U	Historic > 20 yr	Recent <= 20 yr	Extant	Poss. Extirp.	Extirp.
Caulanthus californicus California jewelflower	G1 S1	Endangered Endangered	Rare Plant Rank - 1B.1 SB_RSABG-Rancho Santa Ana Botanic Garden SB_SBBG-Santa Barbara Botanic Garden SB_UCBG-UC Botanical Garden at Berkeley	265 650	67 S:2	0	0	0	0	2	0	2	0	0	1	1
Charadrius alexandrinus nivosus western snowy plover	G3T3 S2S3	Threatened None	CDFW_SSC-Species of Special Concern NABCI_RWL-Red Watch List USFWS_BCC-Birds of Conservation Concern	200 230	138 S:3	0	0	0	0	0	3	3	0	3	0	0
Charadrius montanus mountain plover	G3 S2S3	None None	BLM_S-Sensitive CDFW_SSC-Species of Special Concern IUCN_NT-Near Threatened NABCI_RWL-Red Watch List USFWS_BCC-Birds of Conservation Concern	225 640	90 S:2	0	0	0	0	0	2	2	0	2	0	0
Cirsium crassicaule slough thistle	G1 S1	None None	Rare Plant Rank - 1B.1 BLM_S-Sensitive	205 230	18 S:8	0	5	0	0	1	2	8	0	7	1	0
Delphinium recurvatum recurved larkspur	G2? S2?	None None	Rare Plant Rank - 1B.2 BLM_S-Sensitive SB_SBBG-Santa Barbara Botanic Garden	220 350	120 S:2	0	0	1	0	0	1	1	1	2	0	0
Dendrocygna bicolor fulvous whistling-duck	G5 S1	None None	CDFW_SSC-Species of Special Concern IUCN_LC-Least Concern	210 210	3 S:1	0	0	0	0	0	1	1	0	1	0	0
Dipodomys ingens giant kangaroo rat	G1G2 S1S2	Endangered Endangered	IUCN_EN-Endangered	350 400	137 S:2	0	0	0	0	0	2	2	0	2	0	0
Dipodomys nitratoides brevinasus short-nosed kangaroo rat	G3T1T2 S1S2	None None	BLM_S-Sensitive CDFW_SSC-Species of Special Concern IUCN_VU-Vulnerable	305 530	64 S:7	0	0	5	2	0	0	2	5	7	0	0

Summary Table Report

California Department of Fish and Wildlife

California Natural Diversity Database

Name (Scientific/Common)	CNDDB Ranks	Listing Status (Fed/State)	Other Lists	Elev. Range (ft.)	Total EO's	Element Occ. Ranks						Population Status		Presence		
						A	B	C	D	X	U	Historic > 20 yr	Recent <= 20 yr	Extant	Poss. Extirp.	Extirp.
Dipodomys nitratoides nitratoides Tipton kangaroo rat	G3T1T2 S1S2	Endangered Endangered	IUCN_VU-Vulnerable	220 270	79 S:4	0	1	0	0	0	3	3	1	4	0	0
Egretta thula snowy egret	G5 S4	None None	IUCN_LC-Least Concern	220 220	20 S:1	0	0	0	0	0	1	1	0	1	0	0
Emys marmorata western pond turtle	G3G4 S3	None None	BLM_S-Sensitive CDFW_SSC-Species of Special Concern IUCN_VU-Vulnerable USFS_S-Sensitive	240 240	1385 S:1	0	0	0	0	0	1	1	0	1	0	0
Eremalche parryi ssp. kernensis Kern mallow	G3G4T3 S3	Endangered None	Rare Plant Rank - 1B.2 SB_RSABG-Rancho Santa Ana Botanic Garden SB_SBBG-Santa Barbara Botanic Garden	225 230	184 S:2	0	0	0	0	1	1	2	0	1	0	1
Eriastrum hooveri Hoover's eriastrum	G3 S3	Delisted None	Rare Plant Rank - 4.2 SB_RSABG-Rancho Santa Ana Botanic Garden	250 2,200	47 S:3	1	0	0	0	0	2	3	0	3	0	0
Eriogonum temblorense Temblor buckwheat	G2 S2	None None	Rare Plant Rank - 1B.2 BLM_S-Sensitive	1,150 1,150	16 S:1	0	0	0	0	0	1	1	0	1	0	0
Falco mexicanus prairie falcon	G5 S4	None None	CDFW_WL-Watch List IUCN_LC-Least Concern USFWS_BCC-Birds of Conservation Concern	1,525 1,525	460 S:1	0	0	0	0	0	1	1	0	1	0	0
Gambelia sila blunt-nosed leopard lizard	G1 S1	Endangered Endangered	CDFW_FP-Fully Protected IUCN_EN-Endangered	200 1,151	380 S:71	2	34	16	8	1	10	37	34	70	1	0
Lasthenia glabrata ssp. coulteri Coulter's goldfields	G4T2 S2	None None	Rare Plant Rank - 1B.1 BLM_S-Sensitive SB_RSABG-Rancho Santa Ana Botanic Garden SB_SBBG-Santa Barbara Botanic Garden	215 225	111 S:3	0	0	0	0	0	3	1	2	3	0	0
Layia munzii Munz's tidy-tips	G2 S2	None None	Rare Plant Rank - 1B.2 BLM_S-Sensitive	270 270	68 S:2	0	0	0	0	0	2	2	0	2	0	0

Summary Table Report

California Department of Fish and Wildlife

California Natural Diversity Database

Name (Scientific/Common)	CNDDB Ranks	Listing Status (Fed/State)	Other Lists	Elev. Range (ft.)	Total EO's	Element Occ. Ranks						Population Status		Presence		
						A	B	C	D	X	U	Historic > 20 yr	Recent <= 20 yr	Extant	Poss. Extirp.	Extirp.
Lytta molesta molestan blister beetle	G2 S2	None None		360 360	17 S:1	0	0	0	0	0	1	1	0	1	0	0
Madia radiata showy golden madia	G3 S3	None None	Rare Plant Rank - 1B.1 BLM_S-Sensitive SB_RSABG-Rancho Santa Ana Botanic Garden SB_SBBG-Santa Barbara Botanic Garden	2,300 2,300	100 S:1	0	0	0	0	0	1	1	0	1	0	0
Masticophis flagellum ruddocki San Joaquin coachwhip	G5T2T3 S2?	None None	CDFW_SSC-Species of Special Concern	310 320	96 S:2	0	1	0	1	0	0	1	1	2	0	0
Monolopia congdonii San Joaquin woollythreads	G2 S2	Endangered None	Rare Plant Rank - 1B.2 SB_UCBG-UC Botanical Garden at Berkeley	225 800	111 S:7	0	3	1	0	2	1	4	3	5	2	0
Nycticorax nycticorax black-crowned night heron	G5 S4	None None	IUCN_LC-Least Concern	220 220	37 S:1	0	0	0	0	0	1	1	0	1	0	0
Onychomys torridus tularensis Tulare grasshopper mouse	G5T1T2 S1S2	None None	BLM_S-Sensitive CDFW_SSC-Species of Special Concern	200 200	53 S:1	0	0	0	0	0	1	1	0	1	0	0
Perognathus inornatus San Joaquin Pocket Mouse	G2G3 S2S3	None None	BLM_S-Sensitive IUCN_LC-Least Concern	310 540	127 S:11	0	5	3	1	0	2	3	8	11	0	0
Plegadis chihi white-faced ibis	G5 S3S4	None None	CDFW_WL-Watch List IUCN_LC-Least Concern	190 220	20 S:2	0	0	0	0	0	2	2	0	2	0	0
Puccinellia simplex California alkali grass	G3 S2	None None	Rare Plant Rank - 1B.2	240 240	80 S:1	0	0	0	0	0	1	1	0	1	0	0
Sorex ornatus relictus Buena Vista Lake ornate shrew	G5T1 S1	Endangered None	CDFW_SSC-Species of Special Concern	220 220	7 S:1	1	0	0	0	0	0	1	0	1	0	0
Spea hammondii western spadefoot	G3 S3	None None	BLM_S-Sensitive CDFW_SSC-Species of Special Concern IUCN_NT-Near Threatened	226 463	1247 S:5	0	3	2	0	0	0	1	4	5	0	0

Summary Table Report

California Department of Fish and Wildlife

California Natural Diversity Database

Name (Scientific/Common)	CNDDB Ranks	Listing Status (Fed/State)	Other Lists	Elev. Range (ft.)	Total EO's	Element Occ. Ranks						Population Status		Presence		
						A	B	C	D	X	U	Historic > 20 yr	Recent <= 20 yr	Extant	Poss. Extirp.	Extirp.
Taxidea taxus	G5	None	CDFW_SSC-Species of Special Concern IUCN_LC-Least Concern	240	592 S:1	0	0	0	0	0	1	1	0	1	0	0
American badger	S3	None		240												
Tropidocarpum californicum	G1	None	Rare Plant Rank - 1B.1	217	8 S:3	0	0	0	1	0	2	1	2	3	0	0
Kings gold	S1	None		255												
Valley Saltbush Scrub	G2	None		215	19 S:2	0	1	1	0	0	0	2	0	2	0	0
Valley Saltbush Scrub	S2.1	None		250												
Valley Sink Scrub	G1	None		220	29 S:1	0	1	0	0	0	0	1	0	1	0	0
Valley Sink Scrub	S1.1	None		220												
Vulpes macrotis mutica	G4T2	Endangered		200	1018 S:73	9	1	17	3	0	43	53	20	73	0	0
San Joaquin kit fox	S2	Threatened		1,070												

Appendix C
Results of CNPS Special-Status Plant Data Query for Project

CNPS California Native Plant Society

*The database used to provide updates to the Online Inventory is under construction. View updates and changes made since May 2019 here.

Plant List

18 matches found. *Click on scientific name for details*

Search Criteria

Found in Quads 3511978, 3511977, 3511976, 3511968, 3511967, 3511966, 3511958 3511957 and 3511956;

Modify Search Criteria | Export to Excel | Modify Columns | Modify Sort | Display Photos

Scientific Name	Common Name	Family	Lifeform	Blooming Period	CA Rare Plant Rank	State Rank	Global Rank
Allium howellii var. howellii	Howell's onion	Alliaceae	perennial bulbiferous herb	Mar-Apr	4.3	S3	G3G4T3
Antirrhinum ovatum	oval-leaved snapdragon	Plantaginaceae	annual herb	May-Nov	4.2	S3	G3
Astragalus hornii var. hornii	Horn's milk-vetch	Fabaceae	annual herb	May-Oct	1B.1	S1	G4G5T1T2
Atriplex coronata var. coronata	crownscale	Chenopodiaceae	annual herb	Mar-Oct	4.2	S3	G4T3
Atriplex coronata var. notatior	San Jacinto Valley crownscale	Chenopodiaceae	annual herb	Apr-Aug	1B.1	S1	G4T1
Atriplex coronata var. vallicola	Lost Hills crownscale	Chenopodiaceae	annual herb	Apr-Sep	1B.2	S2	G4T2
Caulanthus californicus	California jewelflower	Brassicaceae	annual herb	Feb-May	1B.1	S1	G1
Cirsium crassicaule	slough thistle	Asteraceae	annual / perennial herb	May-Aug	1B.1	S1	G1
Delphinium recurvatum	recurved larkspur	Ranunculaceae	perennial herb	Mar-Jun	1B.2	S2?	G2?
Eremalche parryi ssp. kernensis	Kern mallow	Malvaceae	annual herb	Jan,Mar,Apr,May(Feb)	1B.2	S3	G3G4T3
Eriastrum hooveri	Hoover's eriastrum	Polemoniaceae	annual herb	(Feb)Mar-Jul	4.2	S3	G3
Eriogonum temblorense	Temblor buckwheat	Polygonaceae	annual herb	(Apr)May-Sep	1B.2	S2	G2
Lasthenia glabrata ssp. coulteri	Coulter's goldfields	Asteraceae	annual herb	Feb-Jun	1B.1	S2	G4T2
Layia munzii	Munz's tidy-tips	Asteraceae	annual herb	Mar-Apr	1B.2	S2	G2
Monolopia congdonii	San Joaquin woollythreads	Asteraceae	annual herb	(Jan)Feb-May	1B.2	S2	G2

Puccinellia simplex	California alkali grass	Poaceae	annual herb	Mar-May	1B.2	S2	G3
Trichostema ovatum	San Joaquin bluecurls	Lamiaceae	annual herb	Jul-Oct	4.2	S3	G3
Tropidocarpum californicum	Kings gold	Brassicaceae	annual herb	Feb-Mar	1B.1	S1	G1

Suggested Citation

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Appendix D
USFWS Information for Planning and Conservation (IPaC)
Trust Resources Report (2020)

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

NOT FOR CONSULTATION

Location

Kern County, California



Local office

Sacramento Fish And Wildlife Office

(916) 414-6600
(916) 414-6713

Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS

NOT FOR CONSULTATION

Giant Kangaroo Rat Dipodomys ingens — Endangered
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/6051

San Joaquin Kit Fox Vulpes macrotis mutica — Endangered
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/2873

Reptiles

NAME	STATUS
Blunt-nosed Leopard Lizard Gambelia silus No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/625	Endangered
Giant Garter Snake Thamnophis gigas No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/4482	Threatened

Amphibians

NAME	STATUS
California Red-legged Frog Rana draytonii There is final critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/2891	Threatened

Fishes

NAME	STATUS
Delta Smelt Hypomesus transpacificus There is final critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/321	Threatened

Crustaceans

NAME	STATUS
Vernal Pool Fairy Shrimp Branchinecta lynchi There is final critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/498	Threatened

Flowering Plants

NAME	STATUS

NOT FOR CONSULTATION

California Jewelflower Caulanthus californicus Endangered
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/4599

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

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For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)
Golden Eagle Aquila chrysaetos This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1680	Breeds Jan 1 to Aug 31
Lawrence's Goldfinch Carduelis lawrencei This is a Bird of Conservation Concern (BCC) throughout its range in the conterminous USA and Alaska. https://ecos.fws.gov/ecp/species/9464	Breeds Mar 20 to Sep 20
Long-billed Curlew Numenius americanus This is a Bird of Conservation Concern (BCC) throughout its range in the conterminous USA and Alaska. https://ecos.fws.gov/ecp/species/5511	Breeds elsewhere
Song Sparrow Melospiza melodia This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the conterminous USA	Breeds Feb 20 to Sep 5

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Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

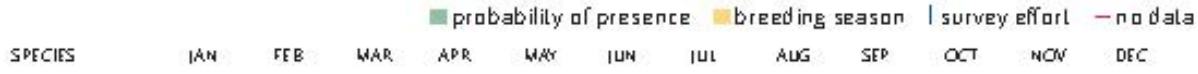
Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

NOT FOR CONSULTATION





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Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

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What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

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Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

RIVERINE

R5UBF

A full description for each wetland code can be found at the National Wetlands Inventory website

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

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Appendix E
Photographs of the Project Site



Photo E-1: Representative Landfill Disturbance.



Photo E-2: Representative Landfill Disturbance.



Photo E-3: Representative Recovering Vegetation/Annual Grassland Habitat in Western Portion of Project Site



Photo A-4: Representative Recovering Vegetation/Allscale Series (common saltbush) Habitat in Eastern Portion of Project Site

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Appendix F
Plants and Wildlife Observed During the Site Visits Conducted April 11, 2019, January 30, February 5, and June 22, 2020

Table F-1: Plant Species Observed During the Survey Conducted on April 11, 2019 and June 22, 2020.

Scientific Name	**Common Name**
Asteraceae	
Ambrosia acanthicarpa	Burweed
Centaurea melitensis	Tocalote
Deinandra kelloggii	Tarweed
Gutierrezia californica	Matchweed
Lactuca serriola	Prickly lettuce
Layia glandulosa	White layia
Malacothrix coulteri	Snake's Head
Boraginaceae	
Amsinckia sp.	Fiddleneck
Plagiobothrys canescens	Valley popcorn flower
Brassicaceae	
Hirschfeldia incana	Mediterranean hoary mustard
Lepidium nitidum	Peppergrass
Sisymbrium altissimum	Tumble mustard
Sisymbrium irio	London rocket
Sisymbrium orientale	Oriental mustard
Chenopodiaceae	
Atriplex argentea	Silverscale
Atriplex coronata var. *coronata*	Crownscale*
Atriplex polycarpa	Cattle spinach
Atriplex spinifera	Spiny saltbush
Bassia hyssopifolia	Bassia
Salsola tragus	Russian thistle
Euphorbiaceae	
Croton setiger	Dove weed
Euphorbia ocellate subsp. *ocellata*	Valley spurge
Fabaceae	
Melilotus indicus	Sourclover
Geraniaceae	
Erodium cicutarium	Red-stemmed filaree

Scientific Name	**Common Name**
Poaceae	
Bromus diandrus	Rip-gut brome
Bromus madritensis subsp. *rubens*	Red brome
Hordeum marinum subsp. *gussoneanum*	Mediterranean barley
Schismus arabicus	Mediterranean grass
Polygonaceae	
Eriogonum viridescens	Two-toothed wild buckwheat
Tamaricaceae	
Tamarix sp.	Tamarisk

*Special-status species

Table F-2: Wildlife Species Observed during the Survey Conducted on April 11, 2019, January 30, 2020, and February 5, 2020.

Scientific Name	**Common Name**
Reptiles	
Uta stansburiana	Common side-blotched lizard
Birds	
Buteo jamaicensis	Red-tailed hawk
Charadrius vociferus	Killdeer
Corvus corax	Common raven
Eremophila alpestris	Horned lark
Haemorhous mexicanus	House finch
Lanius ludovicianus	Loggerhead shrike*
Passerculus sandwichensis	Savannah sparrow
Sayornis nigricans	Black phoebe
Sayornis saya	Say's phoebe
Sturnella neglecta	Western meadowlark
Zenaida macroura	Mourning dove
Zonotrichia leucophrys	White-crowned sparrow
Mammals	
Canis latrans	Coyote (scat observed)
Lepus californicus	Black-tailed jackrabbit
Sylvilagus audubonii	Cottontail
Vulpes macrotis mutica	San Joaquin kit fox*

*Special-status species

Appendix C.2

Biological Assessment

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June 12, 2020

Jeremy Bowman
HM Holloway
2019 Westwind Drive, Suite B
Bakersfield, CA 93301
Via email: jbowman@hmholloway.com

Re: RESULTS OF BIOLOGICAL ASSESSMENT OF CURRENT SITE CONDITIONS FOR PHASE 1 OF THE LOST HILLS COMPOSTING AND WASTE TO ENERGY PROJECT, LOST HILLS, CALIFORNIA.

Dear Mr. Bowman:

West Kern Environmental Consulting, LLC (WKEC) conducted a reconnaissance-level site assessment for Phase 1 of the Lost Hills Composting and Waste to Energy Project by Lost Hills Environmental, LLC. The project site is located west of Holloway Road, approximately 1.5 miles north of Highway 46, approximately 3.5 miles northwest of Lost Hills, California. The Phase 1 project site occurs within an existing class III non-hazardous industrial waste landfill facility that was historically operated as an open pit gypsum mine for over 70 years. Phase 1 of the project is composed of 47.3 acres and would include the conversion of existing landfill Pit "E" to an extended aerated static pile composting operation. The Phase 1 site occurs within the boundaries of a larger proposed project within Sections 24 and 25, Township 26 South, Range 20 East, (MDB&M) **(Figures 1 and 2)**.

While two other phases are proposed for this project to be completed by 2030, this survey was restricted to the Phase 1 project boundary. Prior to the site visit, the following supporting documents were reviewed, *Reconnaissance Level Biological Evaluation for Lost Hills Composting Facility and Waste to Energy Project* (Revised 2020) and *Kern County Planning and Natural Resources Department Notice of Preparation (NOP) of a Draft Environmental Impact Report (EIR) for the Lost Hills Composting and Waste to Energy Project* (2019).

To comply with the recommendations made in the *Biological Evaluation* (Revised 2020), HM Holloway Company contacted WKEC to perform protocol level blunt-nosed leopard lizard (BNLL, *Gambelia sila*) surveys over the entire Project area, which included the multiple phases. With the other Phases planned in 5-year intervals, Phase 1 is the only phase planned for the 2020/2021 season. Upon further consultation with the Kern County Planning Department, it was determined that only Phase 1 of the Project needed to be assessed. WKEC conducted a reconnaissance-level field survey to assess current site conditions and habitat suitability for State and Federally Endangered and State fully protected blunt-nosed leopard lizard and State Threatened San Joaquin antelope squirrel (SJAS, *Ammospermophilus nelsoni*) on Phase 1 and surrounding buffer (where feasible).

On June 8, 2020, Principal Biologist Maria Myers and Senior Biologist Kim Fiehler conducted pedestrian transect surveys over the entire Phase 1 site and 50-foot buffer area, such to achieve 100% visual coverage. Weather conditions at the time of the survey were appropriate to detect the targeted wildlife species. The field survey focused on assessing current site conditions and identifying suitable habitat for the BNLL and SJAS within the Phase 1 project area. The planned

project area of Phase 1 is a heavily disturbed and currently developed active landfill pit. As described in the *Kern County Planning and Natural Resources Department Notice of Preparation (NOP) of a Draft Environmental Impact Report (EIR) for the Lost Hills Composting and Waste to Energy Project*, Pit E is "at grade and is approved to receive treated auto shredder waste, fly ash, and lime filter cake". Periodic grading of the surface of the pit occurs as part of ongoing landfill operations. Residual patches of ruderal vegetation (*Salsola tragus*, *Bromus* ssp.) were observed on site during the survey. No small mammal burrows were observed within the Phase 1 project area or within the 50-foot buffer. An approximate 10-foot high earthen berm exists along the southern and western boundary of the Phase 1 project site. A barbed wire fence separates the project site from the surrounding non-native grassland habitat to the south and west. Wire mesh is attached to the lower portion of that barbed wire fence and buried below surface. Land use to the north and east is part of the ongoing landfill operations. Representative photographs that illustrate the current conditions of the Phase 1 project area are provided in the Photo Exhibit. One side-blotched lizard (*Uta stansburiana*) and one black tailed jack rabbit *(Lepus californicus*) were observed during the field visit.

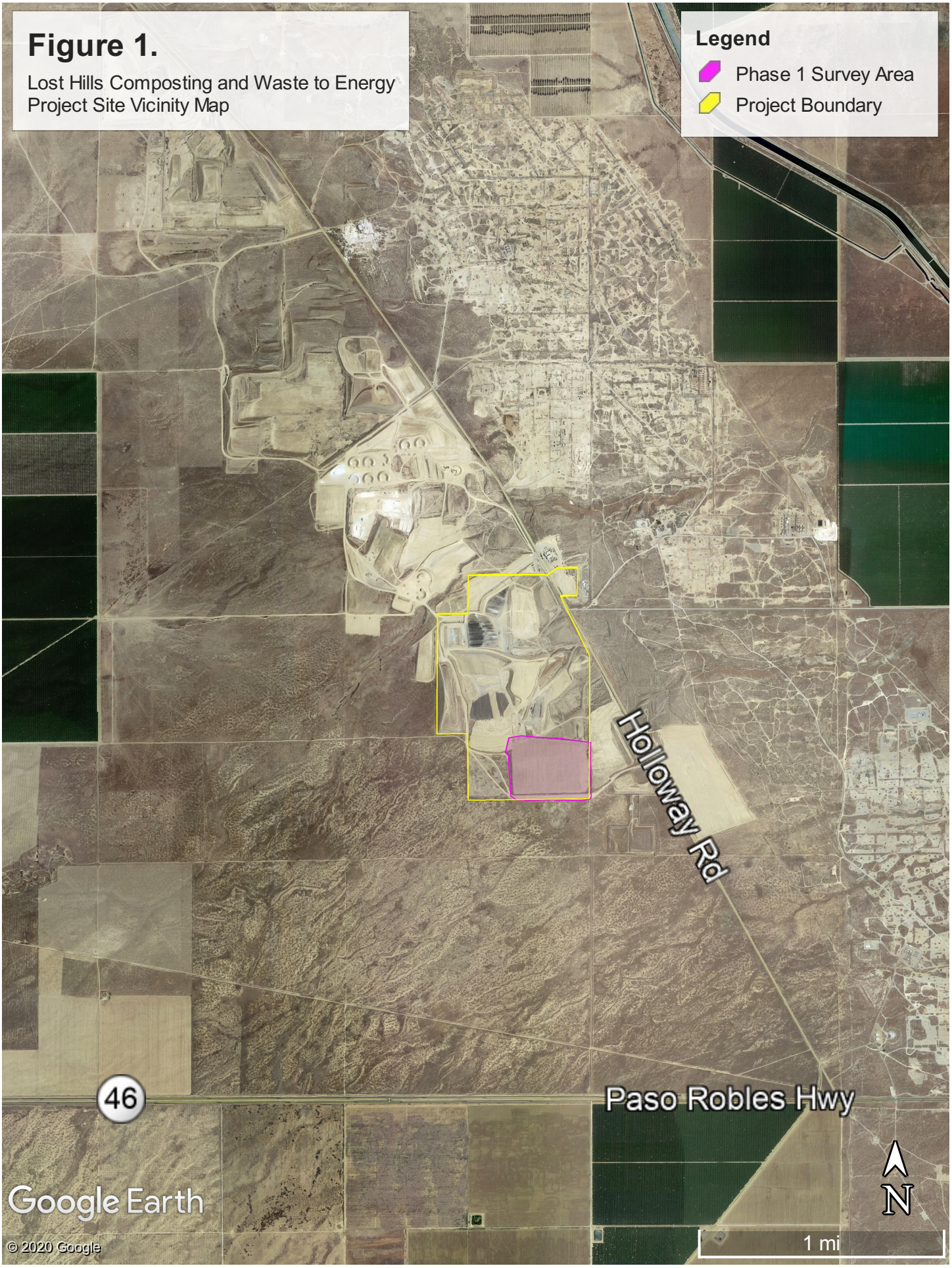
In summary, the field survey was conducted to assess current habitat conditions for BNLL and SJAS for Phase 1 project area. The project area is predominantly devoid of suitable habitat that could support BNLL or SJAS. There was no sign or indication of these species within the proposed Phase 1 Project area or within the 50-foot wide buffer. No small mammal burrows that could support BNLL or SJAS were identified within the survey area. As such, planned project activities for Phase 1 are not expected to result in take to BNLL and SJAS. Although the Phase 1 Project area is within range of BNLL and SJAS, the project site does not support suitable habitat at this time and is unlikely to return to habitat before the planned construction start date in fall 2020. Based on our survey results and current site conditions, protocol level BNLL and SJAS surveys are not needed for Phase 1. Additionally, WKEC supports the recommended mitigation measures detailed in the *Reconnaissance Level Biological Evaluation for Lost Hills Composting Facility and Waste to Energy Project* intended to reduce potential effects to special-status species as a result of the Project.

If you have any questions regarding this report or require additional information, please do not hesitate to call our office (661) 805-6991.

Sincerely,

Maria Myers

Maria Myers
Principal Biologist


Figure 1.
Lost Hills Composting and Waste to Energy
Project Site Vicinity Map
Legend
Phase 1 Survey Area
Project Boundary
Holloway Rd
46
Paso Robles Hwy
Google Earth
© 2020 Google
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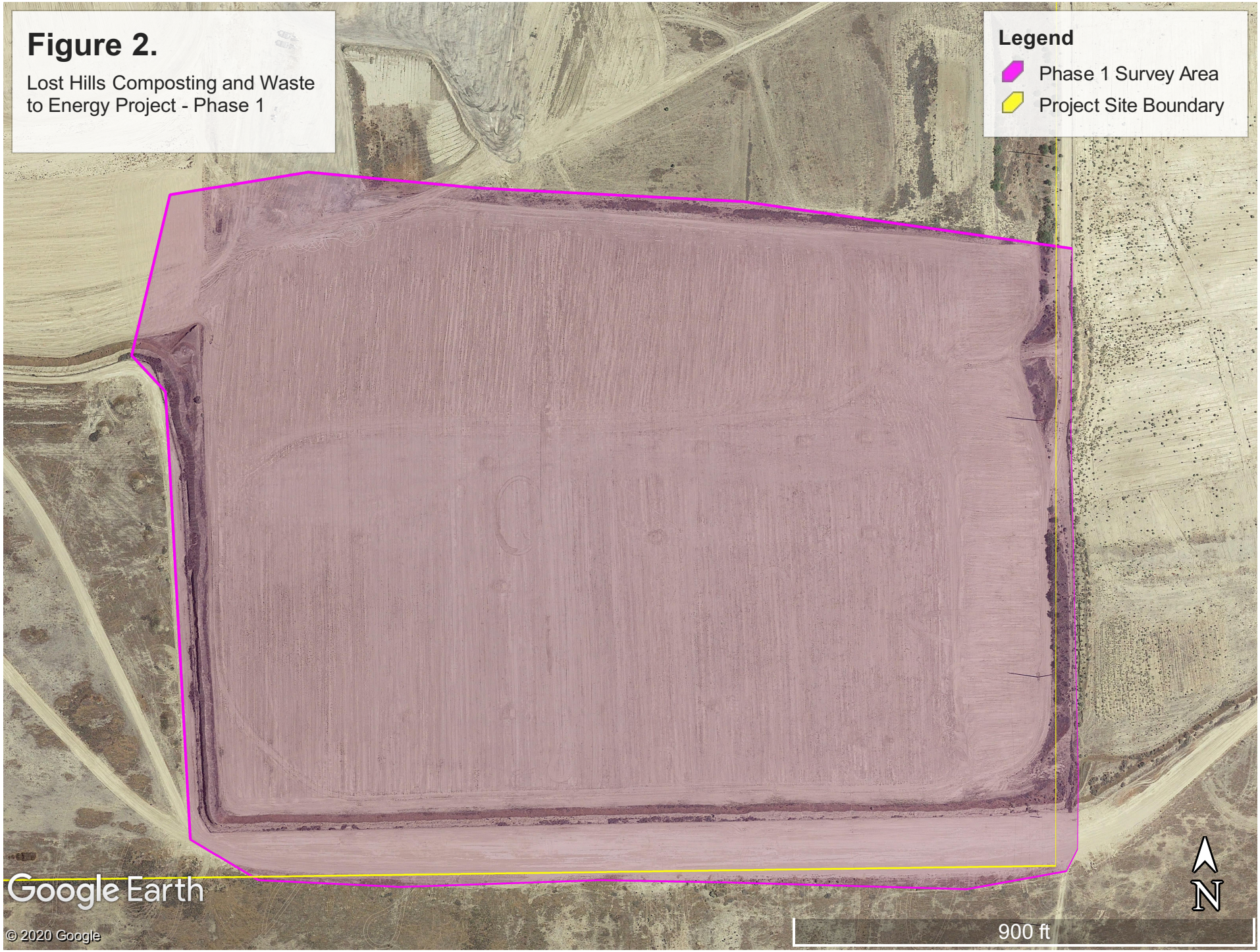

Figure 2.
Lost Hills Composting and Waste to Energy Project - Phase 1
Legend
Phase 1 Survey Area
Project Site Boundary
Google Earth
© 2020 Google
900 ft
N

Photo Exhibit



Photo 1. Representative photo of existing site conditions on Phase 1 of the project area. (06/08/2020)



Photo 2. Looking southwest at existing waste materials within Phase 1 of the proposed project area. (06/08/2020)



Photo 3. Representative photo of existing site conditions on Phase 1 of the project area, looking northeast. (06/08/2020)



Photo 4. Representative photo of Phase 1 project area, earthen berm and barbed wire perimeter fence, looking east. (06/08/2020)

Appendix D

Cultural Resources Records Search

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California Historical Resources Information System

Fresno
Kern
Kings
Madera
Tulare

Southern San Joaquin Valley Information Center
California State University, Bakersfield
Mail Stop: 72 DOB
9001 Stockdale Highway
Bakersfield, California 93311-1022
(661) 654-2289
E-mail: ssjvic@csub.edu
Website: www.csub.edu/ssjvic

To: Gregory O. Black
Palmetto Engineering and Land Surveying, Inc.
4300 Ashe Road, Suite 103
Bakersfield, CA 93313

Record Search 19-307

Date: August 6, 2019

Re: Lost Hills Environmental, Inc.

County: Kern

Map(s): Antelope Plain 7.5'

CULTURAL RESOURCES RECORDS SEARCH

The California Office of Historic Preservation (OHP) contracts with the California Historical Resources Information System's (CHRIS) regional Information Centers (ICs) to maintain information in the CHRIS inventory and make it available to local, state, and federal agencies, cultural resource professionals, Native American tribes, researchers, and the public. Recommendations made by IC coordinators or their staff regarding the interpretation and application of this information are advisory only. Such recommendations do not necessarily represent the evaluation or opinion of the State Historic Preservation Officer in carrying out the OHP's regulatory authority under federal and state law.

The following are the results of a search of the cultural resource files at the Southern San Joaquin Valley Information Center. These files include known and recorded cultural resources sites, inventory and excavation reports filed with this office, and resources listed on the National Register of Historic Places, Historic Property Directory, California State Historical Landmarks, California Register of Historical Resources, California Inventory of Historic Resources, and California Points of Historical Interest. Due to processing delays and other factors, not all of the historical resource reports and resource records that have been submitted to the Office of Historic Preservation are available via this records search. Additional information may be available through the federal, state, and local agencies that produced or paid for historical resource management work in the search area.

PRIOR CULTURAL RESOURCE STUDIES CONDUCTED WITHIN THE PROJECT AREA AND THE ONE-HALF MILE RADIUS

According to the information in our files, there has been one previous cultural resource study conducted within the project area, KE-04733. There have been three additional studies within the one-half mile radius, KE-00537, KE-00667, and KE-03940.

KNOWN/RECORDED CULTURAL RESOURCES WITHIN THE PROJECT AREA AND THE ONE-HALF MILE RADIUS

There are no recorded cultural resources within the project area or within the one-half mile radius, and it is not known if any exist there.

There are no recorded cultural resources within the project area that are listed in the National Register of Historic Places, the California Register of Historical Resources, the California Points of Historical Interest, California Inventory of Historic Resources, or the California State Historic Landmarks.

COMMENTS AND RECOMMENDATIONS

We understand this project consists construction of composting facilities and a renewable power project to a current Class B landfill. Additionally, we understand the project area was previously used to for surface mining of gypsum. It is unlikely that any surface cultural resources would still be present where gypsum mining took place. In any area the property is still vacant and undisturbed, it is unknown if any cultural resources are present because a cultural resources study has not been previously conducted on this property. If project activities will take place on any vacant and undisturbed land, we recommend a qualified, professional consultant first conduct a field survey of those areas to determine if cultural resources are present. If project activities will exclusively take place in areas that have already been disturbed by the mining activities, then no further cultural resource investigation is recommended at this time. However, if cultural resources are unearthed during any ground disturbance activities, all work must halt in the area of the find and a qualified, professional consultant should be called out to assess the findings and make the appropriate mitigation recommendations. A list of qualified consultants can be found at www.chrisinfo.org.

We also recommend that you contact the Native American Heritage Commission in Sacramento. They will provide you with a current list of Native American individuals/organizations that can assist you with information regarding cultural resources that may not be included in the CHRIS Inventory and that may be of concern to the Native groups in the area. The Commission can consult their "Sacred Lands Inventory" file in order to determine what sacred resources, if any, exist within this project area and the way in which these resources might be managed. Finally, please consult with the lead agency on this project to determine if any other cultural resource investigation is required. If you need any additional information or have any questions or concerns, please contact our office at (661) 654-2289.

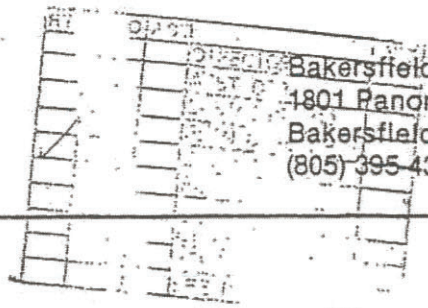
By:

Celeste M. Thomson, Coordinator **Date:** August 6, 2019

Please note that invoices for Information Center services will be sent under separate cover from the California State University, Bakersfield Accounting Office.

California Archaeological Inventory
Information Center
Fresno
Kern
Kings
Madera
Tulare





Bakersfield College
1801 Panorama Driv
Bakersfield, CA 933(
(805) 395-4391

02 JUN 3: 17

RE: Records Search for Gypsum Mining - Philip E. Persons

An examination of our files and USGS Quad(s) Antelope Plain 7.5'
for the subject property reveals: Kern Co. Lost Hills NW 7.5'

xx 1. recorded archaeological site(s) numbered: nearest recorded site is approx. ½ mile outside project area

none 2. previous archaeological investigations:

____ 3. no recorded site(s) or investigations but archaeological sensitivity for the presence of prehistoric cultural resources ____exists ____does not exist for the following reasons:

The following actions are recommended:

xx 1. no further action unless archaeological resources are discovered during future planning, development or construction.

____ 2. whether or not an EIR is required, a field survey should be conducted to determine if any archaeological resources are present.

____ 3. a qualified historian should be contacted to evaluate the potential existence of significant historic sites, structures or features.

Additional comments: This area is considered to be of low archaeological sensitivity. Though there are two recorded sites approx. ½ mile away, these sites are in a foothill area and not down on the flat area where the gypsum mining is to take place. A survey is not required at this time, but work should halt if cultural resources are located during any earth moving activities.
Let us know if we may be of further assistance.

Robert A. Schiffman
Coordinator

by _____

Catherine Lewis
Assistant Coordinator

date May 26, 1982

Fee $30.00

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Appendix E

Energy Study

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Energy Assessment

LOST HILLS ENVIRONMENTAL LLC –
COMPOSTING AND WASTE TO ENERGY PROJECT (PP18111)

Prepared by Jeremy Bowman and Mark Robertson
January 22, 2020

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I. Introduction

The County of Kern is the lead agency for CEQA for the proposed Lost Hills Environmental (Holloway) – Composting and Waste to Energy project (Aries Bioenergy Facility). This Energy Assessment has been prepared as part of the California Environmental Quality Act (CEQA) and Public Resources Code 21100 (b)(3).

The project involves several components including a new composting operation, additional waste streams to an existing landfill, and a new waste to energy facility that will provide renewable energy. This assessment will examine the amount of energy expected to be consumed during the construction and operation of the proposed project, along with the amount of energy that will be generated. Also included is analysis on if the project will result in significant environmental impacts due to wasteful, inefficient, or unnecessary consumption of energy resources. Overall the project is designed to reduce greenhouse gasses and will provide a net increase in energy to the electrical grid due to the power generated from the Aries Bioenergy Facility.

II. Project Overview

Lost Hills Environmental LLC, an affiliate of H.M. Holloway, Inc., owns and operates the Lost Hills Solid Waste Management Facility (SWMF or Lost Hills Facility), a Class III nonhazardous industrial waste landfill facility located in Kern County near Lost Hills, CA. The Lost Hills Facility is sited on approximately 331 acres that was formerly used for surface mining operations by Holloway. Reclaiming the open-pit gypsum mine for waste processing and disposal is an ecologically responsible solution that helps avoid the need to construct new landfills, see Figure 1 for a Vicinity Map and Figure 2 for a Site Map of the project area.

Figure 1 - Vicinity Map

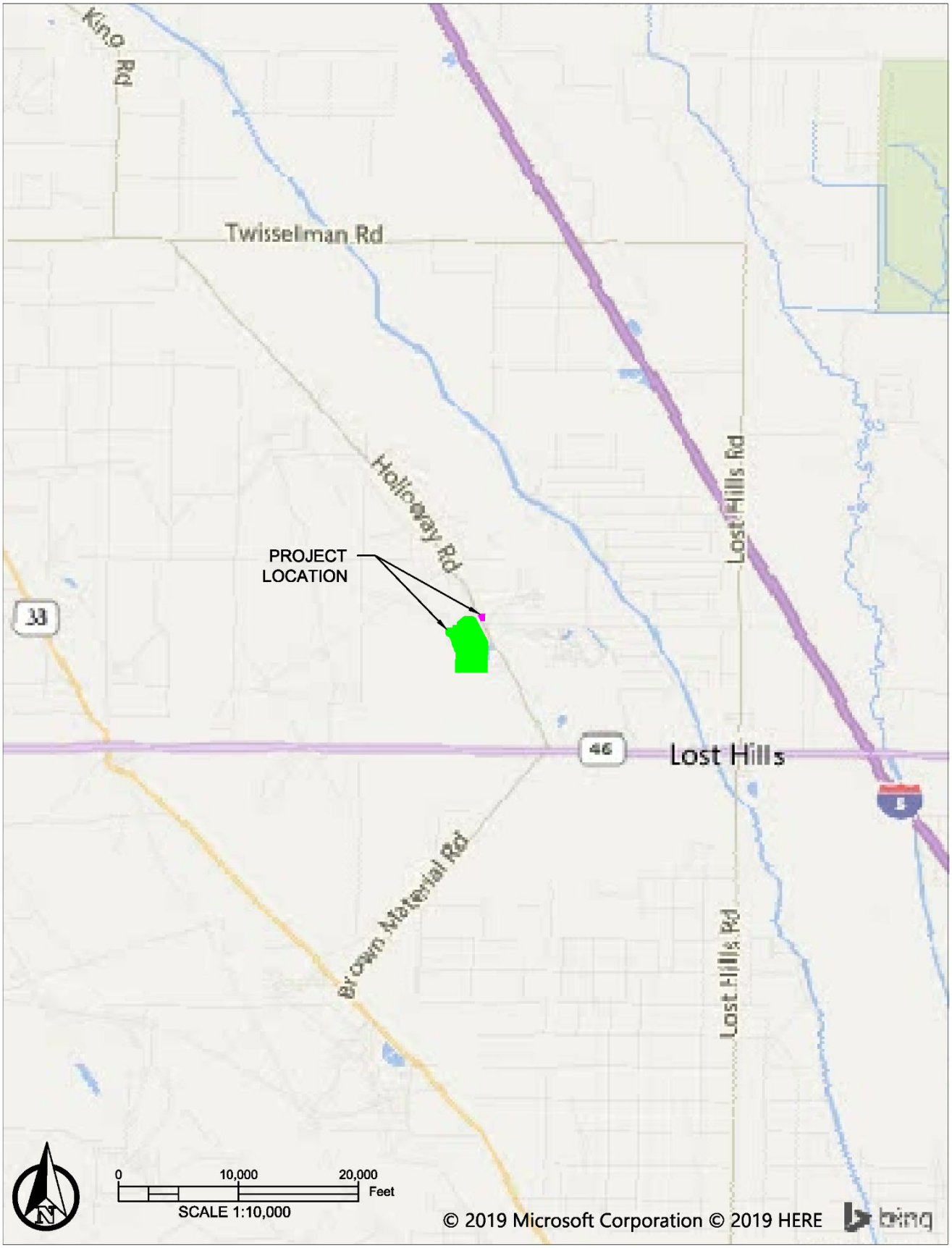
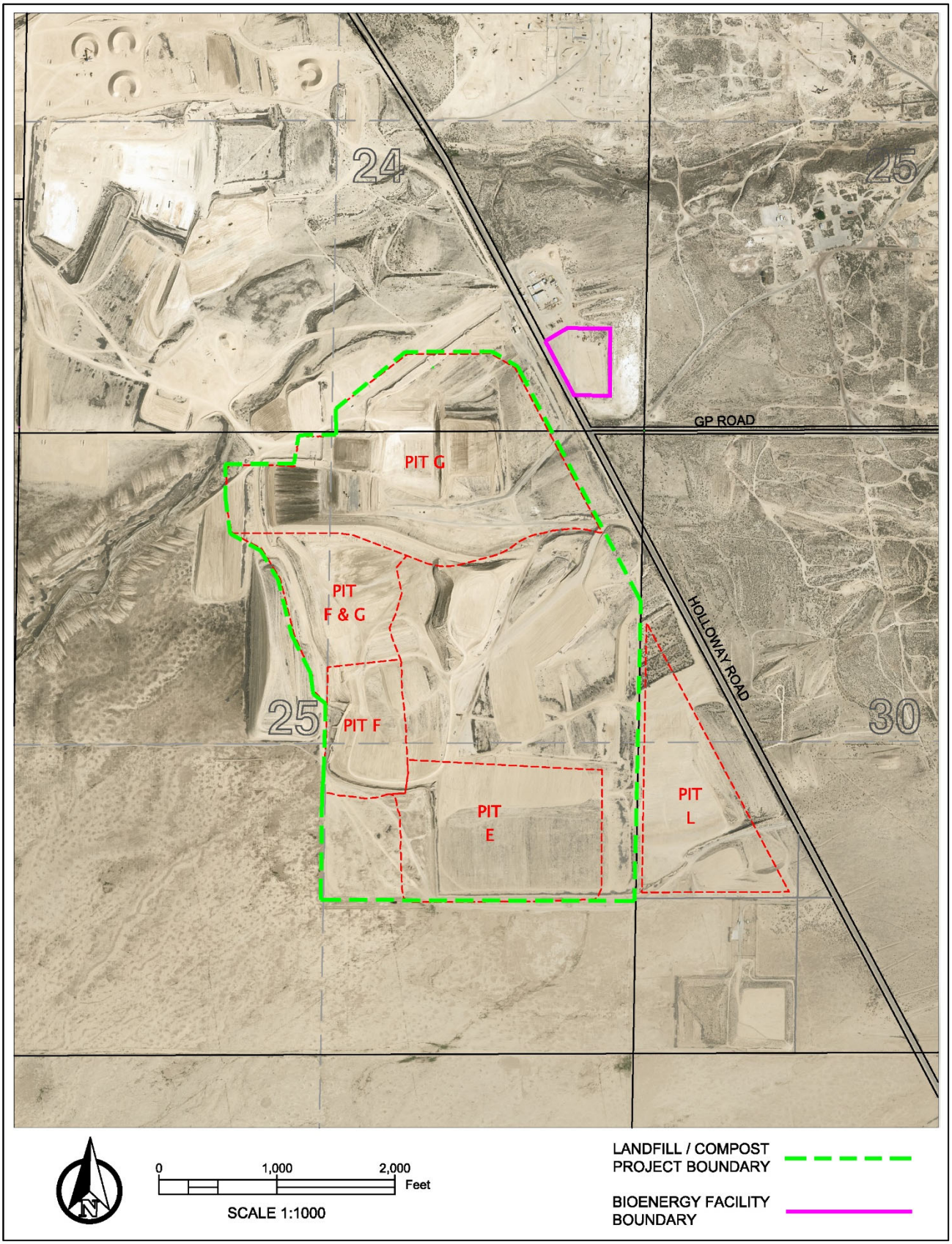


Figure 2 - Site Map



Holloway has submitted an application to Kern County to amend the Conditional Use Permits (CUP) for the Lost Hills Facilities. Modifications to the CUP proposed for the existing landfill include an allowance for additional waste streams to be disposed of within the landfill, an extension of the daily hours of operation, and the addition of a new composting area on 136.2 acres within the existing SWMF boundaries. Modification to the CUP proposed for Aries Bioenergy Facility will allow for its construction just south of the existing Holloway shop facility on Holloway Rd.

The Lost Hills Facility currently accepts Class A and B biosolids and inert wastes, including treated auto shredder residual, fly-ash, sandblast media, and lime cake. It is proposed that the landfill be allowed to accept additional inert wastes, such as drywall, cardboard, dirt, and concrete, and organic matter streams, such as biosolids from Wastewater Treatment Plants (WWTPs), shredded wood and cellulose waste, biological waste from local farms including poultry agricultural waste(droppings and processing waste), and food waste.

The Aries Bioenergy Facility will process primarily agricultural woody biomass feedstock supplemented with urban wood waste and/or WWTP biosolids. The woody biomass or other feedstock is fed into the three Gasifier vessels, where syngas is produced and sent to the thermal oxidizer to generate heat which will then be used to drive an Organic Rankine Cycle (ORC) turbine generator to produce up to 3.9 MW gross of renewable electricity of which it is expected that 3.0 MW will put be put back into the PG&E power grid. To support the facility operations, an emergency generator and firewater pump will also be installed at the proposed facility.

The proposed Project would support the State of California's goal in complying with California's Mandatory Commercial Recycling Law, approved by the Office of Administrative Law on May 7, 2012, under Assembly Bill (AB) 341, which directs the California Department of Resources Recycling and Recovery (CalRecycle) to increase statewide diversion of solid waste to 75% by 2020. The project would also support AB 1826, which requires public agencies and businesses that generate designated quantities of food, poultry, biosolids, and green waste to segregate and arrange for appropriate processing (e.g., composting) of such discarded materials to further reduce landfilling. Furthermore, the Project will help to support CalRecycle's Senate Bill (SB) 1383, which establishes targets to achieve a 50 percent reduction in the level of the statewide disposal of organic waste from the 2014 level by 2020, and a 75 percent reduction by 2025.

III. Composting and Landfill Facility - Energy Consumption

The expansion of waste streams to the landfill is not anticipated to have an impact to amount of energy needed to continue this operation. The landfill will continue to accept a maximum of 2,000 tons per day, and the radius from which waste is hauled to the landfill is not expected to change significantly. The operations to dispose of the new waste streams at the landfill will remain largely unchanged as well, requiring the same equipment and methods to dispose of the material as is currently the case. Energy usage for the composting operation generally comes from the hauling of the material on and offsite and the use of equipment to create and manage the piles.

The composting operation will not require any permanent facilities to be constructed. Overall facility will not require much in the way of construction activities, the area consists of mining pits that have will have already been backfilled and leveled.

Once up and running, organic materials (feedstock) will be trucked in from areas generally within a 150-mile radius. The organic material will then be laid out into windrow shaped piles, requiring equipment to load and pile the material accordingly. The loader creating the piles will use a rake attachment to achieve the desired shape of the pile. The compost piles, known as extended aerated static piles (eASP) will be aerated with blowers. The blowers for aerating the piles are expected to run for two minutes ever twenty minutes. Once the materials have been turned into usable compost over about a four-week period, the compost will then be delivered to agricultural operations generally within a 150-mile radius.

On-Road and Off-Road Fuel Consumption

On-road mobile energy usage is the result of fuel usage for employee travel, routine business travel, the transport of compostable feedstock material to the facility, and the transport of finished product from the facility. Table 1 represents a conservative view of expected annual fuel consumption for on-road vehicles at full build out of the three phases of the composting facility. The anticipated annual vehicle fuel consumption for On-Road use is 942,222 gallons (gas and diesel). It should be noted that logistics aims to maximize efficiency by avoiding empty loads going either when delivering or picking up materials. Since the majority of energy use involves transporting feedstock to the facility and delivering compost material to end users, the overall energy used by on-road vehicles is expected to be greatly reduced by ensuring non-empty loads both to and from the site.

Off-Road equipment required for the operation of the compost facility consists of one windrow turner to be used for mixing feedstock and wheeled loaders that will be used for moving feedstock and compost between processing pads and loading finished compost product into delivery trucks. The term Off-Road is intended to encompass the onsite fleet of heavy-duty construction equipment (graders, scrapers, bulldozers, loaders, etc.) used for operation of the

composting facility. Water trucks used for applying water on the facility haul roads for dust suppression are included, see Table 2 for proposed equipment to be used and Table 3 for the anticipated fuel consumption for Off-Road vehicles at full build out of the composting facility.

The additional landfill hours will require additional portable lighting to support operations, usage will vary depending on time of year. Up to 4 mobile lighting towers may be needed to support low-light operations in areas of work. The proposed light towers are run on diesel fuel and have an estimated 60 hour run time for lighting on a full tank of fuel (30-gallon capacity). See table 4 for estimated fuel consumption/energy usage.

The anticipated annual fuel diesel consumption from Off-road use is 492,604 gallons. Overall the anticipated annual fuel consumption for both On and Off-road sources at full build out is 1,434,826 gallons of fuel (one gallon fuel = 0.13176 Gigajoules (GJ). This equates to an annual anticipated energy usage of 189,052 GJ for the composting and landfill facility.

IV. Composting and Landfill Facility - Energy Conservation

Any additional minor grading and compaction to construct the composting site is already part of the regular landfill operations and maintenance. This will minimize fuel costs by not having to haul in additional equipment and having the equipment perform combining tasks. Holloway operates newer equipment and Tier 4 equipment to maximize efficiency and reduce fuel consumption.

The transportation of organic waste to landfills contributes to greenhouse production in the Central Valley. There is a beneficial purpose of transporting organic waste to the Holloway composting facility because the intent of the composting facility is to recover nutrients and embodied energy from composting. Therefore, the composting of organic waste has beneficial reuse and reduces energy loss from landfilling. This project would not hinder nor conflict with any local renewable energy efforts or impact energy efficiency in Kern county.

Motors for the blower are expected to be 1.5 horsepower each that will be operated by four batteries that are charged by photovoltaic solar panels, see Photo 1. It is expected that the aerating operation will consume virtually zero non-renewable energy due to the solar power.

The system will also be tied into the PG&E power grid from power lines that run adjacent to the project site, however this will just be for backup purposes should there be issues with the local solar powered system.

Increasing landfill capacity can benefit energy conservation for Kern county by having viable options for disposal. Additional capacity can in reducing vehicles mile traveled for waste leaving Kern county that could not be delivered to other local landfills.

Photo 1



Photo Credit: Greenwaste Compost Site Emissions Reductions from Solar-powered Aeration and Biofilter Layer- May 2013

Table 1

On-Road Fuel Consumption for Composting Facility

Vehicle Type	Vehicle Use	Days	Trips per Day	Trips per Year	Offsite (Mi)	Onsite (Mi)	Annual Travel (VMT/Yr.)	Fuel Consumption (gal/VMT)	Fuel Consumption (gal/yr)
Light Duty Truck	Supervisor	365	4	1,460	50	1.0	74,460	0.031	2,308
Light Duty Truck	Technical Staff	365	4	1,460	50	1.0	74,460	0.031	2,308
Light Duty Truck	Mechanic	365	2	730	50	1.0	373,320	0.031	11,573
Light Duty Truck	Equipment Operators	365	6	2,190	50	0.5	110,595	0.031	3,428
Light Duty Truck	Personnel for Facility	365	6	2,190	50	0.6	110,595	0.031	3,428
Light Duty Truck	Miscellaneous Business	104	2	208	50	0.5	10,504	0.031	326
Light Duty Truck	Lab Services	104	2	208	50	1.0	10,608	0.031	329
Light - Heavy Duty	Delivery of Office Supplies	104	2	208	50	0.0	10,400	0.057	593
T7 Tractor (Diesel)	Deliver to Compost Facility	365	111	40,515	100	0.25	4,061,629	0.113	458,964
T7 Tractor (Diesel)	Ship from Compost Facility	365	111	40,515	100	0.25	4,061,629	0.113	458,964
								Total:	**942,222 gal/yr.**

Table 2

Off-Road Equipment Description

Unit Count	Equipment Description	Typical Model (or Equivalent)	Equipment Use
1	Windrow Turner	Aeromaster PT1170	Pull type windrow turner
1	Wheeled Tractor	Massey Ferguson, 7619	Tractor to pull windrow turner
3	Wheeled Loader	Caterpillar 962K	Apply cover to eASP
3	Wheeled Loader	Caterpillar 962K	Move cured compost
3	Wheeled Loader	Michigan 175B	Move and mix immature compost
2	Water Truck	International, 7400 6x4	Water Site for Dust Suppression
4	Portable Light Tower	Magnum Light Tower 3060	Lighting for night operations at landfill

Table 3

Off-Road Equipment Fuel Consumption for Composting Facility

No. of Units[1]	Equipment Description	EPA Tier[2]	Use	BSFC[3]	Eng. Load[3]	Hr/ Day[3]	No. of Days	Total Op.[4] (Hr/Yr)	Fuel Consumption (gal/hr/unit)	Fuel Consumption (gal/yr)
1	Windrow Turner	-	-	-	-	12	365	4,380	-	-
1	Wheeled Tractor	4i	Tractor to pull windrow turner	200	0.59	12	365	4,380	6.1	26,718
3	Wheeled Loader	4i	Apply cover to eASP	250	0.59	12	365	4,380	7.7	101,178
3	Wheeled Loader	4i	Move cured compost	250	0.59	12	365	4,380	7.7	101,178
3	Wheeled Loader	4	Move and mix immature compost	350	0.59	12	365	4,380	10.7	140,598
2	Water Truck	2010+	Water Site for Dust Suppression	350	0.59	12	365	4,380	10.7	93,732

Total: 463,404 gal/yr.

Notes:

1. Number of units required to provide necessary level of service.
2. EPA Tier of equipment readily available over life of project.
3. Brake-specific fuel consumption (lb Fuel/hp-hr): obtained from EPA nonroad study.
4. Total hours of operation required for equipment (worst-case assumption).
5. The Windrow Turner is a towed device; it does not have an engine.

Density of diesel 7.05 lb/gal

Table 4

Additional Off-Road Fuel Consumption for Lighting Landfill

No. of Units	Equipment Description	EPA Tier	Use	Hr/ Day[1]	No. of Days	Total Op. (Hr/Yr)	Fuel Consumption (gal/hr/unit)	Total Fuel Consumption (gal/yr)
4	Lighting Towers	4	Lighting for night operations	10	365	3,650	2	29,200

Notes:

1. Landfill currently operates lights for approximately 2 hours each night

V. Aries Bioenergy Facility – Energy Consumption

Activities associated with the construction of the bioenergy facility are expected to last for approximately 11 months. The energy consumption associated with plant construction will occur primarily from the construction equipment associated with the ground disturbance for grading, construction of the structures, paving, trucks delivering equipment, and workers commuting to the site. The energy consumption associated with all of these construction activities is conservatively estimated to be approximately 13,750 GJ, see Appendix A for calculations. Construction will be performed in a manner to maximize efficiency with equipment, materials, and labor being sourced as close possible to the project site.

Total onsite and offsite vehicle travel associated with the facility, including for feedstock deliveries and worker passenger vehicle roundtrips, were estimated for the project's Health Risk Assessment (HRA) Report. The energy consumption associated with all of the vehicle travel associated with the facility is conservatively estimated to be approximately 20,400 GJ/year, see Appendix A for calculations.

Note that it is anticipated that feedstock supply logistic cost considerations will minimize round trip distances for feedstock trucking, which is expected to significantly reduce the actual vehicle travel energy consumption below the conservative assumptions made for the HRA vehicle travel energy consumption estimate.

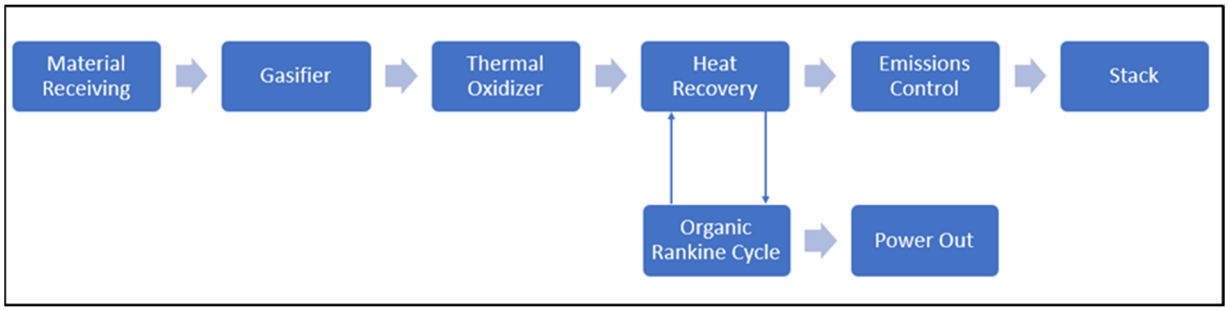
VI. Aries Bioenergy Facility – Energy Generation & Conservation

The Aries Bioenergy Facility utilizes a combination of best demonstrated available technologies to produce renewable electricity that is exported to the PG&E electrical grid. The process generates producer gas from the gasification of woody feedstock, that is combusted in a Thermal Oxidizer at approximately 1700 - 1800° F. The resulting hot flue gas is used to heat a heating oil stream, which is circulated between the Thermal Oxidizer's heat recovery exchangers and an ORC power generation unit. In addition, the hot flue gas is used to preheat combustion air to the Gasifiers.

The Organic Rankine Cycle utilizes an organic working fluid in a closed and sealed system. Heat transferred from the hot Thermal Oxidizer flue gas, via the heating oil, is used to vaporize the organic working fluid, which drives a turbine connected to a generator, see Figure 3.

Figure 3

Bioenergy Facility – Energy Production Cycle



The Lost Hills Bioenergy Project (LHBP) is planned to operate 24 hours per day, 7 days per week. The overall plant availability is predicted to be 90% (7884 operating hrs per year), including planned and forced outages. Planned outages will be scheduled during months with lower PPA Payment Allocation Factors (i.e. March thru June).

The LHBP maximum feedstock rate is 165 tons per day. The expected maximum turbine power output is 3.91 MW. The expected plant parasitic power load is 910 kW, resulting in a maximum net power export to the PG&E grid of 3.0 MW and an annual expected net energy export of 85,150 GJ/yr, see Appendix A for calculations.

Although there will be some variability in the net power export to the PG&E grid, due to feedstock composition and ambient conditions, the plant will aim to operate at close to a net power export of 3.0 MW around the clock and during the entire year, so it will provide a net increase in power to the PG&E grid, of approximately 3.0 MW, during both peak and base periods.

The by-product of the energy recovery process is a beneficial biochar. The locally produced biochar can be utilized in local agricultural operations as a soil amendment to improve soil health and agricultural productivity.

Conservation Measures

The following energy conservation design features are included in the plant's design:

Air Preheaters (3) are installed in the Gasification Unit. These units heat air to the Gasifiers (3), using low temperature heat recovered from the Thermal Oxidizer flue gas, that would otherwise be released to the atmosphere. These Gasifier Air Preheat units will be installed instead of an Air Preheater for the Thermal Oxidizer combustion air, as there is limited heat available in the flue gas, after heat is recovered for the Organic Rankine Cycle. The Gasifier Air preheaters provide additional benefits by improving the Gasifier's conversion and thermal efficiency.

The ORC Unit design includes a Regenerator heat exchanger which recovers heat from the turbine exhaust to preheat working fluid and hence improves the cycle's overall efficiency. The recovered heat would otherwise be lost to the working fluid air cooled condenser installed downstream of the Regenerator. A feedstock dryer was not included in the plant flowsheet due to the relatively low as-delivered feedstock moisture content.

Photo-voltaic solar panels to supply some portion of the Bioenergy Facility's parasitic power demand were considered, but not included in the final design, due to the limited available plot space for the Bioenergy Facility and PPA restrictions under PG&E's BioMAT program.

The use of a more energy efficient water-cooled condenser for the Organic Rankine Cycle (ORC) and various forms of "misting" or chilling of the air flow to the proposed ORC air coolers were considered in the design. However, water conservation is also an important consideration in this area and it was ultimately decided that conserving water outweighs conserving energy since the net output of the system is an increase in energy supply.

VII. Conclusion

Overall the project's goal is to provide renewable energy and to conserve resources through recycling organic material and to enhance both state and local plans for renewable energy.

The design and operation of the energy generation plant will help meet California meet its SB 100 goal of fifty percent (50 %) renewable energy by 2030. The project helps the state of California meet organic waste diversion goals (SB 1383) by using agricultural waste as the primary feedstock. This energy system is engineered to recover embodied energy from the feedstock in order to generate renewable electricity. Additionally, this project falls under the California Public Utility Commission's BioMat program (SB 1122) for renewable energy. The composting operation takes advantage of an existing site adjacent to the landfill, thereby minimizing construction activities necessary to prepare the site.

Finally, the project aims to provide efficient means in all aspects. Measures are in place to maximize efficiency in both the type of vehicles / equipment that are used and the way that they will be operated. Overall the energy resources needed for this project are minimal given the net benefit that it provides in terms of renewable resources including energy.

Appendix – A
Aries BioEnergy Facility Energy Calculations

1. CONVERSION FACTORS

Diesel combustion CO_2 emissions: 73.96 kg CO_2/MMBtu

Unit Conversion: 1.055 GJ/MMBtu

2. PLANT PARASITIC LOAD

Equipment Number	Name	No. Installed	No. Operating	Intermittent/ Continuous	Installed kW	Operating kW	Continuous Operating kW	Emergency kW	VFD / SERVO
FN-5102	ID Fan	1	1	Continuous	130	118	118	118	VFD
BL-3101/3201/3202	Gasifier Air Blowers	3	3	Continuous	90	72	72		VFD
BL-4201	Combustion Air Blower	1	1	Continuous	45	39	39	39	VFD
AC-4101	Sootblower Air Compressor	1	1	Intermittent	15	12	0		
SC-5102	Waste Screw Conveyor 1	1	1	Continuous	5	4	4		
SC-5103	Waste Screw Conveyor 2	1	1	Continuous	5	4	4		
BL-5101	SCR Air Blower	1	1	Continuous	35	30	30		
BL-5102	Flue Gas Recirculation Blower	1	1	Continuous	60	52	52		
BL-5103	Sorbent Blower	1	1	Continuous	0.5	0.4	0		
SC-5101	Sorbent Screw Feeder	1	1	Continuous	0.5	0.4	0		
P-5101	Ammonia Pump	1	1	Continuous	0.5	0.4	0		
EC-5101	Emissions (Controls & Unspecified)	1	1	Continuous	25	22	22		
AC-9301	IA/PA Compressor	1	1	Continuous	37	32	32	32	VFD
ACC-6101	ORC Air Coolers	1	1	Continuous	50	45	45	45	VFD
P-4201 A/B	Hot Oil Pumps	2	1	Continuous	160	73	73	73	VFD
P-4202 A/B	LT Hot Oil Pumps	2	1	Continuous	7.5	3	3	3	VFD
P-4203	Oil Transfer Pump	1	1	Intermittent	2	2	0		
P-6101	ORC Refrigerant Pump	1	1	Continuous	240	218	218		VFD
SC-1101	Chain Reclaimer	1	1	Intermittent	11	8.8	0		VFD
CO-1101	Receiving Conveyor	1	1	Intermittent	11	8.8	0		
DS-1101	Disc Screen	1	1	Intermittent	7.5	6	0		
MS-1101	Magnetic Head Pulley	1	1	Intermittent	1	0.8	0		
CO-1102	Storage Bin Feed Conveyor	1	1	Intermittent	11	8.8	0		
CO-1103	Feed Bin Loading/Unloading Conveyor	1	1	Intermittent	11	8.8	0		
CO-1103	Feed Bin Conveyor Hoisting Gear	1	1	Intermittent	7.5	6	0		
SC-1102 A/B/C	Feed Storage Bin Reclaimers	3	3	Continuous	17	13.6	14		VFD
CO-1104/1105/1106	Gasifier Feed Conveyors	3	3	Continuous	17	13.6	14		
SC-3101/3201/3202	Gasifier Feed Augers	3	3	Continuous	30	24	24		VFD
MO-3301/3304, 3401/3404, 3501/3504	Gasifier Grates	6	6	Continuous	4.5	3.6	4		SERVO
SC-3301 A/B, SC-3401 A/B, SC-3501 A/B	Residue Ash Augers	6	6	Continuous	4.5	3.6	4		
SC-3302/3402/3502	Gasifier Discharge Augers	3	3	Continuous	2.2	1.76	2		VFD
SC-3303/3403/3503	Cyclone Discharge Augers	3	3	Continuous	3.3	2.64	3		VFD
SC-7101	Main Biochar Auger	1	1	Continuous	3.7	2.96	3		
MX-7102	Biochar Mixer/Conditioner	1	1	Continuous	3.7	2.96	3		
P-9701	Wastewater Pump	1	1	Intermittent	0.5	0.4	0		
P-9101 A/B	Cooling Water Pumps	2	1	Continuous	1.5	0.6	1	0.6	
HX-9101	Water Cooler	1	1	Continuous	2.5	2	2	2	
P-9303 A/B	Plant Water Pumps	2	1	Continuous	4	1.6	2	1.6	
PKG-9305	Demin Water Treatment	1	1	Intermittent	0.2	0.16	0		
PKG-9304	Potable Water (UV) Treatment	1	1	Continuous	0.2	0.16	0	0.16	
P-9304 A/B	Potable Water Pumps	2	1	Continuous	5	2	2	2	
PKG-9302	Firewater jockey pump	1	1	Continuous	3.5	2.8	3	2.8	
HX-4203	Oil Cooler	1	1	Continuous	30	24	24	24	VFD
TK-4203	Oil Tank (Heat Tracing)	1	1	Continuous	15	7.5	8	7.5	
MISC	Lighting, controls & miscellaneous	1	1	Continuous	25	20	20	20	
	Totals	72	67		1141	906	844	371	

3. EXPECTED NET ENERGY EXPORT

Annual net power export = 3,000 KJ/s x 3,600 s/hr x 7,884 hr/yr x 10^{-6} GJ/KJ

= 85,147 GJ/yr

4. ENERGY USED DURING PLANT CONSTRUCTION

CO_2 emissions from Table 2-6, "Construction GHG Emissions" of Report, "Air Quality and GHG Emissions Technical Report" = 963 MT/yr, as estimated in CalEEMod

Construction energy consumption = 963 MT CO_2 x 1,000 kg CO_2/MT CO_2

x (1/73.96) MMBtu/kg CO_2 x 1.055 GJ/MMBtu = 13,736 GJ

5. VEHICLE DAILY TRIPS FOR FEEDSTOCK AND ASSOCIATED FUEL CONSUMPTION.

Mobile source CO_2 emissions from Table 2-10, "Maximum Operational Annual GHG Emissions" of Report, "Air Quality and GHG Emissions Technical Report" = 1,429 MT/yr,.

Vehicle annual energy consumption = 1,429 MT CO_2/yr x 1,000 kg CO_2/MT CO_2

x (1/73.96) MMBtu/kg CO_2 x 1.055 GJ/MMBtu = 20,383 GJ/yr

6. ENERGY USED BY FACILITY

Natural Gas annual consumption from Attachment C "Operational Emission Calculations", page 7 of 57 = 8,000 MMBtu/yr

Annual Natural Gas energy consumption = 8,000 MMBtu/yr x 1.055 GJ/MMBtu

= 8,440 GJ/yr

Diesel Emergency Generator usage from Attachment C "Operational Emission Calculations", page 14 of 57 = 50 hrs/yr

Diesel Emergency Generator engine rating from Attachment C "Operational Emission Calculations", page 14 of 57 = 838 BHP

Diesel Emergency Generator engine heat rate from Attachment C "Operational Emission Calculations", page 14 of 57 = 7,000 BTU/BHP-hr

Diesel Firewater Pump usage from Attachment C “Operational Emission Calculations”, page 16 of 57 = 50 hrs/yr

Diesel Firewater Pump engine rating from Attachment C “Operational Emission Calculations”, page 16 of 57 = 201 BHP

Diesel Firewater Pump engine heat rate from Attachment C “Operational Emission Calculations”, page 16 of 57 = 7,000 BTU/BHP-hr

Annual diesel fuel energy consumption = (838 + 201) BHP x 50 hrs/yr x

7,000 BTU/BHP-hr x 10^{-6} MMBtu/Btu x 1.055 GJ/MMBtu

= 383 GJ/yr

See summation of the operating kW from plant parasitic load (above) = 906 kW

Parasitic power load when plant shutdown = 125 kW

Annual parasitic power energy consumption = 906 KJ/s x 3,600 s/hr x 7,884 hr/yr

x 10^{-6} GJ/KJ + 125 KJ/s x 3,600 s/hr x 876 hr/yr x 10^{-6} GJ/KJ

= 26,108 GJ/yr

Appendix F

Geotechnical Engineering and Soils Technical Studies

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Appendix F.1

Geotechnical Evaluation

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LANDFILL CAP ELEVATION AND DESIGN AND GEOTECHNICAL EVALUATION OF PROPOSED VERTICAL EXPANSION

For the:

H.M. HOLLOWAY SOLID WASTE FACILITY
HOLLWAY GYPSUM PITS
14045 HOLLOWAY ROAD
LOST HILLS, CALIFORNIA 93239

Prepared for:

Holloway Environmental, LLC
2019 Westwind Drive, Suite B
Bakersfield, California 93301

Prepared by:

ES ENGINEERING SERVICES

1 Park Plaza, Suite 1000
Irvine, California 92614
Telephone: (714) 919-6500

Project #029-RCS-168734

Preparation Date:
May 11, 2017

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Figure 1: Vicinity Map

Figure 2: Site Map

Figure 3: Final Cover and Existing Topography

Attachment

Attachment 1: BSK Report – Slope Stability Analysis

Attachment 2: Deformation Analysis

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1.0 INTRODUCTION

ES Engineering Services, LLC (ES) performed a design and geotechnical evaluation at the request of Holloway Environmental, LLC (Client) to address slope stability and liquid retention considerations related to the proposed vertical expansion of the H.M. Holloway Solid Waste Landfill (Landfill), located at 14045 Holloway Road, Lost Hills, California (**Figure 1—Vicinity Map**). The vertical expansion is proposed to allow for additional airspace within the Landfill's existing waste disposal footprint.

1.1 Site Location

The Landfill is located at 14045 Holloway Road, Lost Hills, California 93239. Access to the Landfill is from Holloway Road. This area is connected by a State and federal highway system as well as local rural roads. Interstate Route 5, State Route (SR) 46, and SR 33 are located in the general area. Interstate 5 is a four-lane freeway, and SR 46 and SR 33 are 2 lane highways. All of these state routes are used to access the site (**Figure 1**).

Approved Landfill:

The approved Landfill facility is located in Sections 24 and 25- Township 26 South, Range 20 East (MDB&M). As noted in **Table 1—Pit Capacity**, the Landfill area includes the following Kern County Assessor's Parcel Numbers (APNs):

TABLE 1: PIT CAPACITY

APN	ACRES
057-220-16	31.69
057-240-29	30.14
057-240-60	159.31
057-240-50	80.00

1.2 Background

H.M. Holloway open pit gypsum mine located at Lost Hills, California (operational for over seventy (70) years). Currently the Landfill is owned and operated by H. M. Holloway, Inc., located at 2019 Westwind Drive Suite B, Bakersfield, California 93301. The mining facility is located at 14045 Holloway Road, Lost Hills, California, 93249. As of December 1, 2006, approximately 22,913,000 tons of processed gypsum ore for agricultural use has been removed from the mine's open pits. Mining activities have created several large depressions or natural receptacles between forty-five (45) and fifty-five (55) feet deep, each comprising an area of several acres. The Landfill is located at a surface elevation of approximately 410 to 425 feet above mean sea level (amsl).

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1.3 Surrounding Land Use

The H. M. Holloway Gypsum Mine is an adjacent land use north of the Landfill. Other adjacent or nearby land uses include row-crop farming, a biosolids/green waste composting operation, an inactive County-operated sanitary Landfill, oilfields, and two State Highways (S.R. 46, S.R. 33) and Interstate 5.

The composting operation (Liberty Composting, Inc.) is located approximately 4.5 miles north of Holloway Landfill on Holloway Road. The inactive Lost Hills Landfill is located immediately south of the Holloway Landfill. The community of Lost Hills is approximately 4.3 miles southeast of the Holloway Landfill. The corresponding zone classifications and General Plan land use designations for the area surrounding the Landfill are:

- North - General Plan: 8.4 Mineral and Petroleum (Min. 5 acre parcel size), 8.4/2.5 Mineral and Petroleum (Min. 5 acre parcel size)/Flood Hazard), Zone District: A (Exclusive Agriculture).
- East - General Plan: 1.1 Nonjurisdictional land (State or Federal Land), 8.4, 8.4/2.10 Mineral and Petroleum (Min. 5 acre parcel size)/Nearby Waste Facility, Zone District: A (Exclusive Agriculture).
- South - General Plan: 8.3 Extensive Agriculture (Min. 20-acre parcel size), 8.3/2.10, and 3.4 Public Facilities (Solid waste facilities), Zone District: A (Exclusive Agriculture).
- West- General Plan: 8.3, 8.3/2.10, 8.4/2.5 and 8.4/2.10 , Zone District: A (Exclusive Agriculture)

1.4 Project Understanding

ES understands that the proposed vertical expansion will include revisions to the Solid Waste Facility Permit (SWFP) and Waste Discharge Requirements (WDRs) for the Landfill. ES understands the dimensions of the cap will be as follows: From natural grade, a 3:1 (H:V) slope to a height of 25'-0", followed by a shallower slope of approximately 11.6:1 (4.2°). The existing site conditions within and surrounding the Landfill's waste footprint are shown on **Figure 2—Site Map**.

1.5 Scope of Current Study

ES scope of work for the current study consists of the following primary tasks:

- *Develop final cap configuration;*
- *Review and analyze existing waste data (for example: moisture content) previously collected at the Landfill;*
- *Evaluate if the existing waste mass will be able to retain liquids after placement of additional waste for the proposed vertical expansion; and*
- *Perform static and dynamic slope stability analyses to support the proposed vertical expansion.*

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The remainder of this report presents the results of ES's above described Scope of Work.

2.0 DATA REVIEW

ES reviewed the following documents for background and additional information for the Geotechnical Evaluation of the Vertical Expansion of the Landfill:

Palmetto Engineering and Land Surveying (Palmetto), 2015, H.M. Holloway Solid Waste Facility Pit "G" – Cell 2 and 3 Construction Specifications; dated October 2015, 262p.

BSK Associates, Geotechnical Consultants, Inc. (BSK), 2007, Final Report, Slope Stability Analysis, Holloway Gypsum Pits, Lost Hills, California; BSK Project Number G07-116-10B, 101p.

_____, 2017, Report – Slope Stability Analysis, Holloway Landfill—Final Cover/Cap, Los Hills, California; BSK Project Number G17-065-10B, 2p.

Quad Knopf, Inc., 2014, Joint Technical Document (JTD) Report of Disposal Site Information Report of Waste Discharge Preliminary Closure/Post-Closure Maintenance Plan Financial Assurance; completed December 2014: Revised by Palmetto Engineering and Land Surveying, Inc., April 2016, 980p.

United States Environmental Protection Agency (EPA), 2002, Final Report: Issues Involving the Vertical Expansion of Landfills; EPA Grant # R825427C002; webpage location: https://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.highlight/abstract/5407/report/F.

3.0 GEOLOGY AND SUBSURFACE CONDITIONS

3.1 General Geologic Conditions

The Landfill lies along the southwestern edge of California's San Joaquin Valley. The San Joaquin Valley is the southern two-thirds of the Great Valley geomorphic province. The Great Valley province consists of a thick sequence of predominantly marine strata deformed into a northwest oriented, asymmetrical syncline with its axis nearest the western limits of the Valley (Norris and Webb, 1976). In general, the Valley's stratigraphic section overlaps the basement rocks exposed along its eastern edge, while these sediments slope gently westward into the basin. By contrast, the western sediments are generally characterized by steeper dips and local surface exposure along the extreme western edge of the basin. The nearest exposures of

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bedrock crop out approximately 10 to 12 miles to the west-southwest of the Landfill area (Kern County Water Agency (KCWA), 1992).

The rocks found in the adjacent Lost Hills Oil Field range from late Cretaceous to Pleistocene in age. The major units noted by the California Department of Conservation Division of Oil, Gas, and Geothermal Resources (DOGGR) include the Upper Cretaceous Moreno Formation, the Eocene Lodi and Kreyenhagen Formations, the uppermost Eocene through middle Miocene Temblor Formation, the Miocene Monterey and Reef Ridge Formations, the Pliocene Etchegoin Formation and the Plio-Pleistocene Tulare Formation (DOGGR, 1992). With the exception of the Tulare Formation these units are marine in origin. These sediments were derived from erosion of the uplifting mountains surrounding the valley including the Sierra Nevada, Tehachapi, San Emigdio, and the eastern Coast Ranges (KCPD, 1982.)

Many of the Lost Hills formations produce oil with the major contributors from the Miocene. In addition, many sands from the Pliocene Etchegoin Formation are productive as are the fluvial sands from the Plio-Pleistocene Tulare Formation. The predominantly marine sediments are overlain by continental deposits of the Plio-Pleistocene Tulare Formation and in turn by late Pleistocene to Recent alluvium. The Tulare Formation crops out along the ridge of the adjacent Lost Hills Anticline to the east of the site. The Tulare is the oldest formation that crops out locally (ICG Hydrotech, 1991). Most of the Landfill area is covered with alluvium.

3.2 Site Geology

The area of the Landfill is relatively flat and slopes gently to the south-southeast; with elevations on the project site being generally within the 410- to 425-foot contour (United States Geological Survey (USGS) (1954). Two topographic features are present:

1. The northwest-southeast trending Lost Hills Anticline, whose westerly dipping flank borders the eastern limits of the Landfill/mine; and
2. The easterly sloping Antelope Plain, which lies between the mine's western limits and the eastern flank of the Central Coastal Range. The Landfill is located in the relatively flat low spot (swale) along the intersection of these two reverse dipping or sloping regional features.

Because of the Landfill's position on the distal end of the Antelope Fan, the Landfill consists entirely of near-surface or shallow Recent alluvial fan deposits of considerable thickness; these originated from streams emerging from the Coastal Ranges to the west. Other deposits included are older Recent unconsolidated sand, clay, and gravel stream terraces and natural levee deposits. The alluvial deposits are estimated to be approximately 250 to 350 feet thick in the Landfill area. Extensive site characterization drilling, sampling and testing of each approved

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pit generally encountered clay and clay-rich silt profiles to at least 125 feet below ground surface (bgs).

Calcite-flocculated or cemented, very low permeable clays and clay-rich silts ($1x10^{-7}$ to $1x10^{-10}$ cm/sec). In general terms, the native soil section that is very dense and very dry or desiccated are present from 25 to 60 feet bgs (BSK, 2007).

3.3 Landfill Waste Characterization

The Landfill is a Class III Non-Hazardous Industrial Waste Landfill facility sited on approximately 331 acres that was formerly used for the surface mining operations. The Landfill operates under the approved Conditional Use Permit (CUP) 9, Map 28, a California Regional Water Quality Control Board, Central Valley Region Waste Discharge Requirements (WDRs) Order No. 97-078, and a Solid Waste Facility Permit (SWIS 15-AA-0308-01 0-A) issued by the Lead Enforcement Agency (LEA) (Kern County Environmental Health Services Division), which allows for a Class III Non-Hazardous waste landfill at the Landfill. The backfilling of the first pits created from the mining of gypsum began in 1993 with the limited disposal of inert waste streams.

The Landfill is currently allowed to conduct disposal activities on four (4) contiguous "pit areas" known as Pits E, F, G and the Pit F/G Connection Area, by backfilling them with alternating equal lifts or a blend of approved imported non-hazardous waste streams and native soils, for a maximum daily import rate of 2,000 tons. This operation is presently a non-classified disposal site for a limited number of approved nonhazardous industrial waste streams. Municipal Solid Waste (MSW) is not disposed at the Landfill. This is not a public Landfill facility. H.M. Holloway, Inc., is the sole operator of all operations within the limits of the ±3,200 acres it controls at Lost Hills. The area permitted by the approved modified CUP and Solid Waste Facility Permit covers approximately 331 ± acres of Landfill's area.

3.4 Groundwater

The mine and the Landfill site are underlain by a portion of the Kern County Groundwater Basin and are within the San Joaquin Hydrologic Study Area defined by the California Department of Water Resources and the Kern County Water Agency (KCWA, 1992). Most of the usable groundwater in the basin occurs in the unconsolidated deposits of late Tertiary and Quaternary age (ICG Hydrotech, 1991).

These confined and unconfined resources in the region are generally limited to the eastern flank of the Lost Hills anticline or oil field (KCWA, 1992), some three miles east of the Landfill site. The groundwater produced immediately to the east of the Lost Hills Anticline contains total dissolved solids (TDS) concentrations above 2,000 milligrams per liter (mg/L) in the

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confined aquifer and above 3,000 mg/L in the overlying unconfined aquifer (KCWA, 1992). Even the uppermost non-marine Tulare sands found in the adjacent Lost Hills Oil Field have TDS concentrations in the range of 15,500 mg/L (DOGGR, 1992). The groundwater conditions at the site are best described in a staff memo by an Associate Engineering Geologist, to Dane S. Johnson, Senior Engineering Geologist of the California Regional Water Quality Control Board (August 30, 2002):

> "The Holloway facility is located in an area of unique geologic and hydrogeologic conditions that are conducive to waste discharge. First encountered groundwater occurs in thin, laterally discontinuous and vertically stratified, sand lenses found at a depth of approximately 30 feet below the waste management units. This groundwater is of poor quality with an average Total Dissolved Solids (TDS) concentration of 6,016 mg/l and concentrations of selenium and nitrate that exceed the respective primary MCLs for drinking water. Selenium ranges from 57 to 219 µg/l and nitrate ranges from 14 to 598 mg/l. Secondary drinking water standards are also exceeded for manganese, chloride, and sulfate. First encountered groundwater also exceeds Agricultural Water Quality Goals for chloride, molybdenum, selenium, specific conductance and TDS."

> "The same geologic conditions that made it possible for gypsum to form (extremely low permeability) also provide for excellent waste containment. Additionally, the waste streams contain very little moisture and the geologic materials at the bottom of the waste management units are essentially moisture deficient. The average precipitation is approximately five (5) inches per year and the average evaporation rate is approximately 80 inches per year."

Collectively, the very limited local groundwater data suggests that an unconfined or semi-unconfined aquifer may exist locally at approximately 150 to 350 feet bgs, along with the very localized or limited areas of very shallow and thin perched zones that have been encountered on the Landfill's property. However, none of these local groundwater resources seem to be adequate or self-sustaining. All available data on groundwater quality also indicates (1) a very neutral pH, and (2) water of a very poor quality, with TDS concentrations generally in the range of 3,000 to 9,000 mg/kg (or parts per million (ppm)).

Holloway monitors the first occurrence of groundwater beneath the disposal pits and has been doing so since 1993. A majority of the disposal site overlies an area of exempt aquifer located in deeper confined zones and formations. These aquifer exemptions underlie the designated boundaries of the adjacent Lost Hills Oil Field, which extend into most of the disposal site.

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3.5 Regional Faulting and Seismicity

In general, the western side of the San Joaquin Valley is characterized by compressional features generally created or influenced by the regional strike slip movement of the San Andreas Fault, which trends northwest-southeast approximately 30 miles west of the Landfill area (Bakun, et.al., 1996). The Lost Hills anticline is one of the many producing folds that parallel the Coast Range-Great Valley boundary (Norris and Webb, 1976).

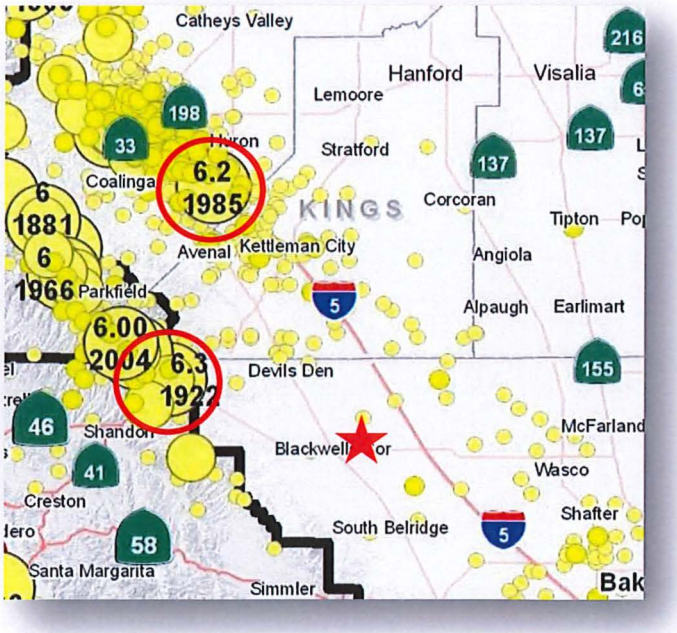
The Landfill property lies on a distal portion of the easterly/northeasterly dipping monoclinic Antelope Plain; this regional trend has been interrupted or reversed by the opposing westerly dipping flank of the Lost Hills anticline. The resulting low relief localized saddle or flattening has been created by the intersection of the opposing slopes of these two regional features.

3.6 Site Faulting and Seismicity

Faulting in the immediate area of the Landfill area includes several faults delineated by stratigraphic correlations of wells in the Lost Hills Oil Field (DOGGR, 1991). These faults appear to trend normal to the structural contours of the anticline. They are normal faults with minor displacements. It appears that these faults are generally inactive, and that no active faults cross the project site. Faulting in the adjacent oil field cuts into the Tulare Formation but appears to die out before reaching the surface. The only notable epicenter was approximately 3 miles to the north of the Pits "F" and "G" with a maximum Richter magnitude of 2.9 (KCPD, 1982). A study conducted immediately to the southeast of the project site revealed no signs of active faulting (ICG Hydrotech, 1991).

The two largest earthquakes (*red circles*) with 50 miles of the Landfill (*red star*) are:

- **1922 Parkfield Earthquake,** dated March 10, 1922, Magnitude 6.3Mw, located 27 miles west-northwest (*San Andreas fault zone*)[1].
- **1985 Kettleman Hills Earthquake,** dated August 4, 1985, Magnitude 6.2Mw, located 40 miles northwest (*Coalinga Anticline*)[2].



[1] Bakun, 1988
[2] Ekström, et.al., 1992

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3.7 Hydrology

The Landfill is identified within the Federal Emergency Management Agency (FEMA) FIRM Flood Panel # 060075 0375B (9/29/86), and no portions of the project area are within Flood Zone A (areas of 100-year flood); therefore, no portions of the project area are within a Special Flood Hazard area. No housing exists in the project area.

Due to the sparse rainfall in this arid region, the existence of naturally occurring surface water is very rare. According to the California Department of Water Resources (DWR, 2006), the Landfill area is within the Tulare Lake Hydrologic Region, San Joaquin Valley Groundwater Basin, Kern County Subbasin. The Landfill area naturally drains to the north, and then along and under Holloway road, and to the northeast-east via channels through the Lost Hills structure (through Sections 24 T.26S., R.20E., and 30 T.26S., R.21E., MDB&M.

Prior to the present preparation of Pits "E", "F", and "G" for disposal operations, surface runoff water usually caught in the depleted pits escaped only by a combination of evaporation and/or was reused for dust control on mine roads. Rainfall at the Landfill area has been established at 5 to 6 inches on a mean annual basis, by the Kern County Water Agency (KCWA, 1992).

Because of the region's relatively flat topographic relief, short term 100-year storm water sheet flow runoff conditions can occur. Based on the Kern County Hydrology Manual (Hromadka, 1993), the 100-year, 24-hour storm in the vicinity of the Landfill area is predicted to yield 2.5 inches of precipitation. Based on the Kern County Hydrology Manual (Hromadka, 1993), the 100-year, 1-hour precipitation event in the vicinity of the Landfill area is predicted to yield 0.63 inches of precipitation.

Laboratory analysis of the local rainwater indicated a pH of 7.6. However, to minimize the chances of any surface runoff entering, flooding, filling, or eroding the pits during the course of backfilling operations, a 6 to 7 foot high continuous earthen berm system has been constructed immediately around their perimeters, preventing any possible surface drainage from entering these pits.

4.0 POTENTIAL FOR RELEASE OF LIQUIDS

The potential for release of liquids from the existing unlined waste mass as a result of the proposed vertical expansion of the landfill was evaluated by comparing the average waste moisture content profile to estimate values of the field capacity of the existing waste under the current conditions and the proposed expansion. The field capacity is defined as the moisture content that a porous material (typically municipal solid waste (MSW)) will store within its

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pores by capillary stress. In theory, any moisture within the porous material that is in excess of the field capacity would drain out of the porous material via gravity.

The Landfill does not accept MSW; therefore, the potential for liquid's release must be evaluated in light of the accepted waste characteristics.

In a typical MSW landfill, as waste is added to the landfill, the loading from newer waste will cause older waste to consolidate and lose void space, thereby decreasing its field capacity. A concern associated with vertical expansions of unlined landfills is that adding waste over the existing waste will result in a reduction of the field capacity of the existing waste, thereby lowering its liquid holding potential. If the moisture content in the waste exceeds its field capacity, leachate could be released and these liquids could come into contact with the native soils underlying the unlined waste mass.

Field capacity of the waste at a given MSW landfill can be calculated based on a relationship developed by Tchobanoglous et al. (1993). The field capacity calculation of the existing waste stream is evaluated using the recommendations for "typical waste" given in Zekkos et al. (2006).

The Landfill does not accept MSW. Currently, the Landfill accepts dewatered biosolids and fly ash. Pore-space in the current material is very low. The water content of the waste stream and the surrounding soil is dry. Therefore, the potential for water generation is very low and cannot be modeled by Tchabanoglus et al (1993) or Zekkos, et al (2006).

Proposed future waste streams include chipped construction lumber, concrete and construction demolition rubble, rip rap and clean construction dry wall demolition material (Quad Knopf, Inc., 2014: see p.359). In addition, the Landfill does not accept high liquid content wastes (Quad Knopf, Inc., 2014: see p. 356). Even if the additional material is accepted, this material is dry sand would not generate significant water.

Therefore, the potential for liquid generation is very low.

5.0 SLOPE STABILITY ANALYSIS

5.1 General

In association with this study, BSK performed slope stability analyses of the waste mass and final cover system for the proposed final (ultimate) configuration of the Landfill. This section describes the analytical methods used, material properties assigned, cross-sections developed,

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and results and interpretations of the stability analyses performed for the proposed final cover grading.

The analyses included assessing overall (i.e., global) waste slope stability under static and dynamic conditions as well as assessing the static and dynamic stability of the final cover system. For the purposes of this study, the final cover system was assumed to be a 4-foot thick evapotranspirative (ET) monolithic soil cover (**Figure 3—Final Cover and Existing Topography**).

5.2 Slope Stability Criteria

Under static conditions, Title 27 of the California Code of Regulations (CCR) requires that final landfill slopes possess a factor of safety (FS) against sliding of at least 1.5. For seismic loading conditions, Title 27 of the CCR requires that final landfill slopes possess a pseudostatic FS against sliding of at least 1.5 under the design earthquake event.

ES has designed landfill slopes at a 3:1 ratio to a maximum height of 25'-0", followed by a shallower slope of approximately 11.6:1 (4.2°). The figure showing this is attached as **Figure 3**. However, due to the difficulty of satisfying the pseudostatic FS requirement in many areas of California, a seismic displacement analysis was conducted to demonstrate adequate slope performance under seismic loading. This is further discussed in Section 5.8 of this report.

In California, it is common to require that calculated seismic displacements of the slopes not exceed 12 inches for both final waste slopes and final cover systems of unlined facilities under the design earthquake event. This seismic displacement threshold criterion has been adopted for the current study.

5.3 Cross-Sections Analyzed

In order to evaluate the global stability of the final waste slopes, BSK (2017) evaluated an idealized cross-section.

One (1) typical cross section was selected to model the slope. For each condition, a minimum of 10,000 randomly generated slip circles were analyzed for the critical factor of safety.

Limit Equilibrium Slope Stability Analysis

BSK (2017) completed a slope stability analysis dated May 3, 2017 (BSK, 2017). The scope of work included producing the slope stability analysis and preparation of this report.

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Seismic Displacement Analysis

BSK performed a slope stability analysis on a representative section of the landfill and future cap. The landfill was modelled with a depth of 25 feet above adjacent grade at a 3:1 (horizontal / vertical) slope ratio, followed by a shallower slope of approximately 11.6:1 (4.2°). This model was analyzed for stability in the static and pseudostatic condition using Janbu's Simplified Method of Slices and modeled in the computer program, SLIDE v6.0.

The soil parameters were determined through estimations based on BSK field exploration and laboratory testing from a prior investigation of on-site materials (BSK, 2007). For the native material which contains the landfill waste material, an internal strength friction angle of 30.0 degrees, cohesion of 1,000 pounds per square foot (psf), and unit weight of 125 pounds per cubic foot (pcf) were used in the analysis.

- For the landfill waste material and clay cap, an internal strength friction angle of 20.0 degrees, cohesion of 500 psf, and unit weight of 120 pcf were used in the analysis.
- Variables for the pseudo-static slope stability analysis were acquired through the United States Geological Society's Unified Hazard Tool, located at:

earthquake.usgs.gov/hazards/interactive/.

5.4 Material Properties

The soil parameters were determined through estimations based on BSK's field exploration and laboratory testing from the prior on-site materials assessment (BSK, 2007). The strength type for both static and pueudo-static slope stability is Mohr-Coulomb.

TABLE 2 MATERIAL PROPERTIES: STATIC AND PSEUDO-STATIC STABILITY ANALYSIS

Materials	Unit Weight (pounds per cubic foot (pcf))	Cohesion Intercept (pounds per square foot (psf))	Friction Angle (degrees)
Native Subgrade	125	1,000	30
Landfill Waste	120	500	20
Final Clay Cap	120	500	20

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5.5 Earthquake Loading Parameters

The horizontal ground motion site coefficient was found to be 0.285, based on a 2,495-year maximum earthquake return period. Vertical ground motions and groundwater conditions were not considered in the analysis.

5.6 Liquefaction

The liquefaction susceptibility of the existing native alluvial soils underlying the site is considered low. The depth to groundwater is approximately 150 to 300 feet bgs. as discussed in Section 3.4.

There are laterally discontinuous perched zones at depths of about 30 feet below ground surface (bgs). These shallow perched zones do not appear to contain sufficient volume to generate a liquefaction concern.

Based on the underlying soil and depth to groundwater, groundwater and liquefaction conditions were not considered in the analysis by BSK (2017).

5.7 Settlement:

As per Title 27, §21142, Holloway will grade and maintain each individual Landfill/pit area within the Landfill to prevent ponding. Final grades will be sloped at a minimum 3 percent on top and a maximum of three to one (3:1) on side slopes. A final vegetative cover will minimize erosion. Final vegetation will reduce run off velocities and limit rill and gully soil erosion. At least two permanent surveying monuments will be maintained at each backfilled/capped pit area within the Landfill.

Every five years the site monuments will be surveyed to determine the degree of Landfill settlement. Holloway will repair any differential settlement per the Post-Closure Maintenance Plan (PCMP), Grading and Drainage. No analytical methods exist to accurately estimate potential landfill settlement. Ultimate compression generally ranges from 10 to 20 percent of the overall MSW Landfill thickness. However, this may be difficult to estimate for this Landfill since the waste is characterized as fly ash and dehydrated biosolids.

Holloway will implement an Operations and Maintenance Plan (O&M Plan) at the Landfill to maintain the integrity and effectiveness of the final cover. Semi-annually, Holloway will monitor the site by a visual inspection of the cover system for cracks, eroded areas, and localized depressions. Maintenance will consist of filling and compacting cracks and eroded areas with materials compatible to the original cover system. Holloway staff will fill localized depressions with the appropriate type of final cover material and grade to drain.

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Said O&M Plan should be sufficient to limit problems. Leachate and landfill gas (LFG) generation is not a significant concern due to the dry nature of the waste and the lack of significant volumes of organic waste (Quad Knopf, Inc., 2014).

5.8 Results of Slope Stability and Seismic Displacement Analyses

As stated before, one (1) typical cross section was selected to model the slope. For each condition, a minimum of 10,000 randomly generated slip circles were analyzed for the critical factor of safety. A summary of the critical factors of safety is provided in the table below:

TABLE 3 – STATIC AND PSEUDO-STATIC ANALYSIS RESULTS

STATIC FS,cr	PSEUDO-STATIC FS,cr
2.696	1.244

Because the seismic factor of safety was below the minimum required of 1.5, a Deformation Analysis was completed as part of this study. The following table outlines the results of that calculation:

TABLE 4- SUMMARY OF SLOPE STABILITY AND SEISMIC DISPLACEMENT ANALYSES

Description	Limit Acceleration (K_y)	Potential Ground Acceleration (g)	Calculated Seismic Displacement (inches)[3]
Global waste slope stability	0.3941	0.430	**0.8 to 4.0**

The final calculation is included as **Attachment B – Deformation Analysis**.

6.0 CONCLUSIONS

Based on our engineering analysis, it is our opinion that the slopes as designed at a 3:1 (horizontal:vertical) slope ratio to a maximum height of 25'-0", followed by a shallower slope of approximately 11.6:1 (4.2°), should be grossly stable. The result of our deformation analysis also indicates that the slope deformation will be within tolerable limits and should be stable under the seismic conditions modeled.

[3] Using Makdisi and Seed (1978) using the area for a M=8¼ earthquake.

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7.0 CLOSING

The opportunity to be of service to you on this project is sincerely appreciated.

Respectfully submitted,
ES Engineering Services, LLC

Richard J. Frizzell, PG, QSP/QSD
Senior Geologist

Dean Stanphill, PE, GE
Senior Engineer

5.9.17

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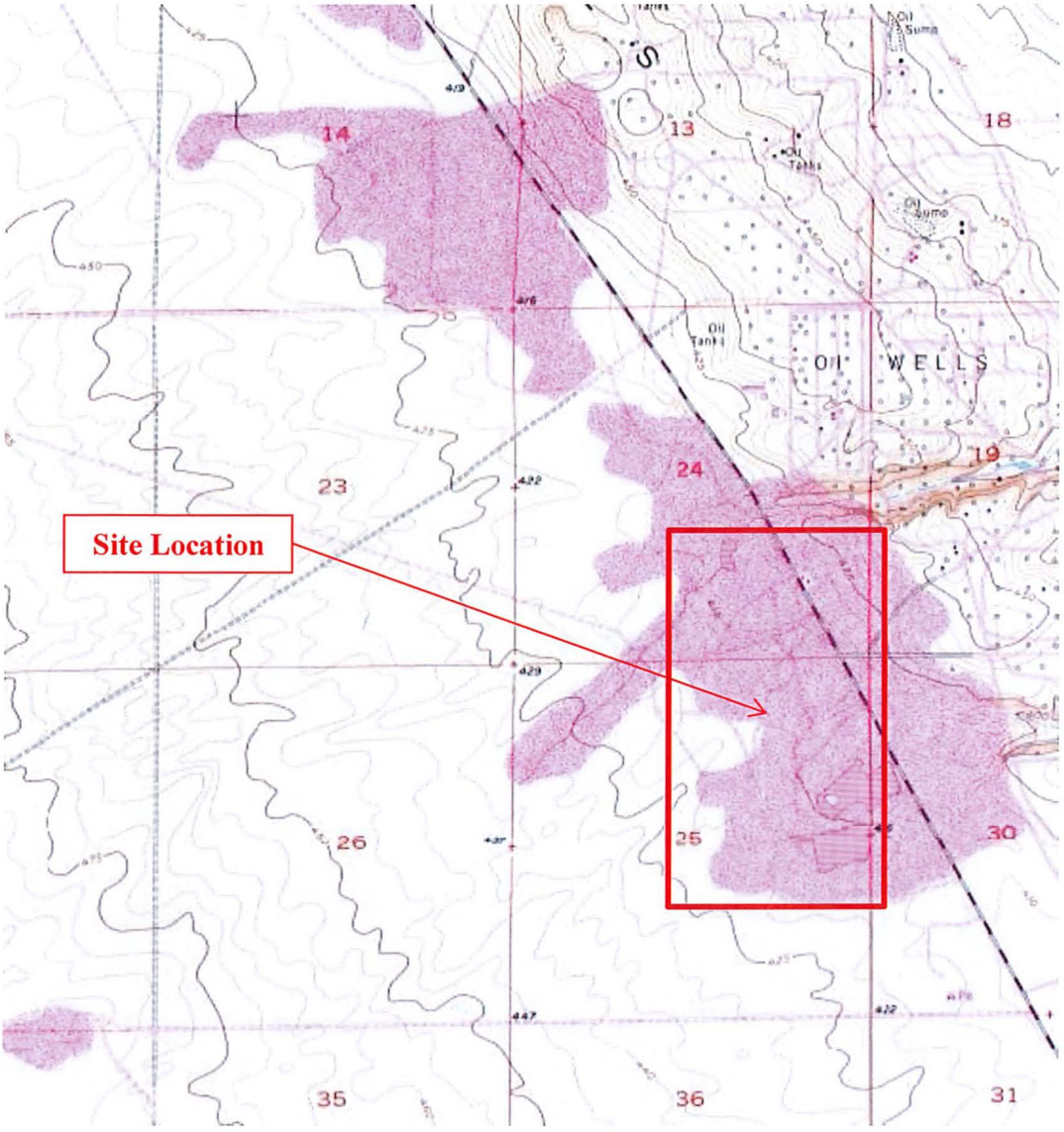
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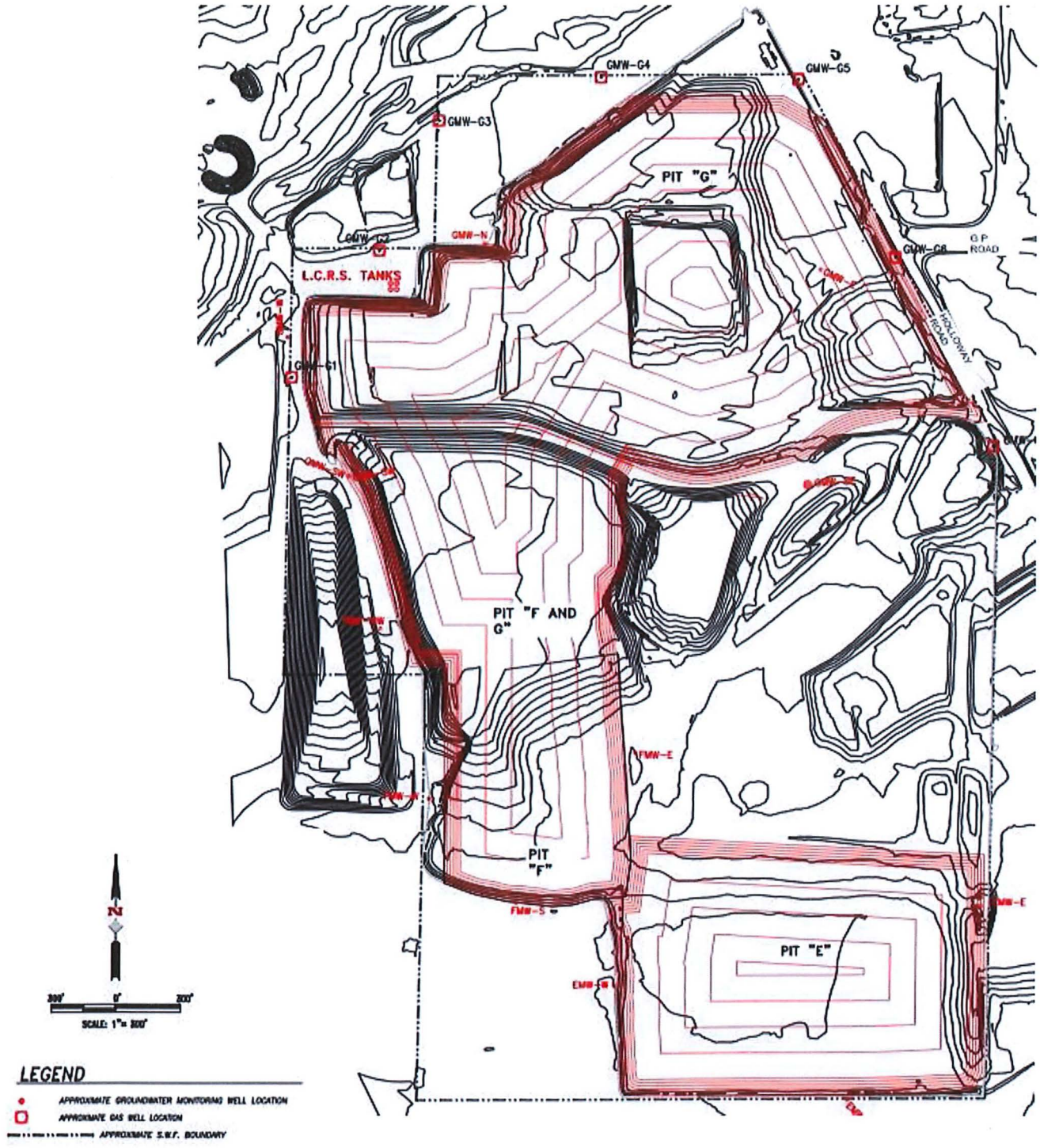
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FIGURES

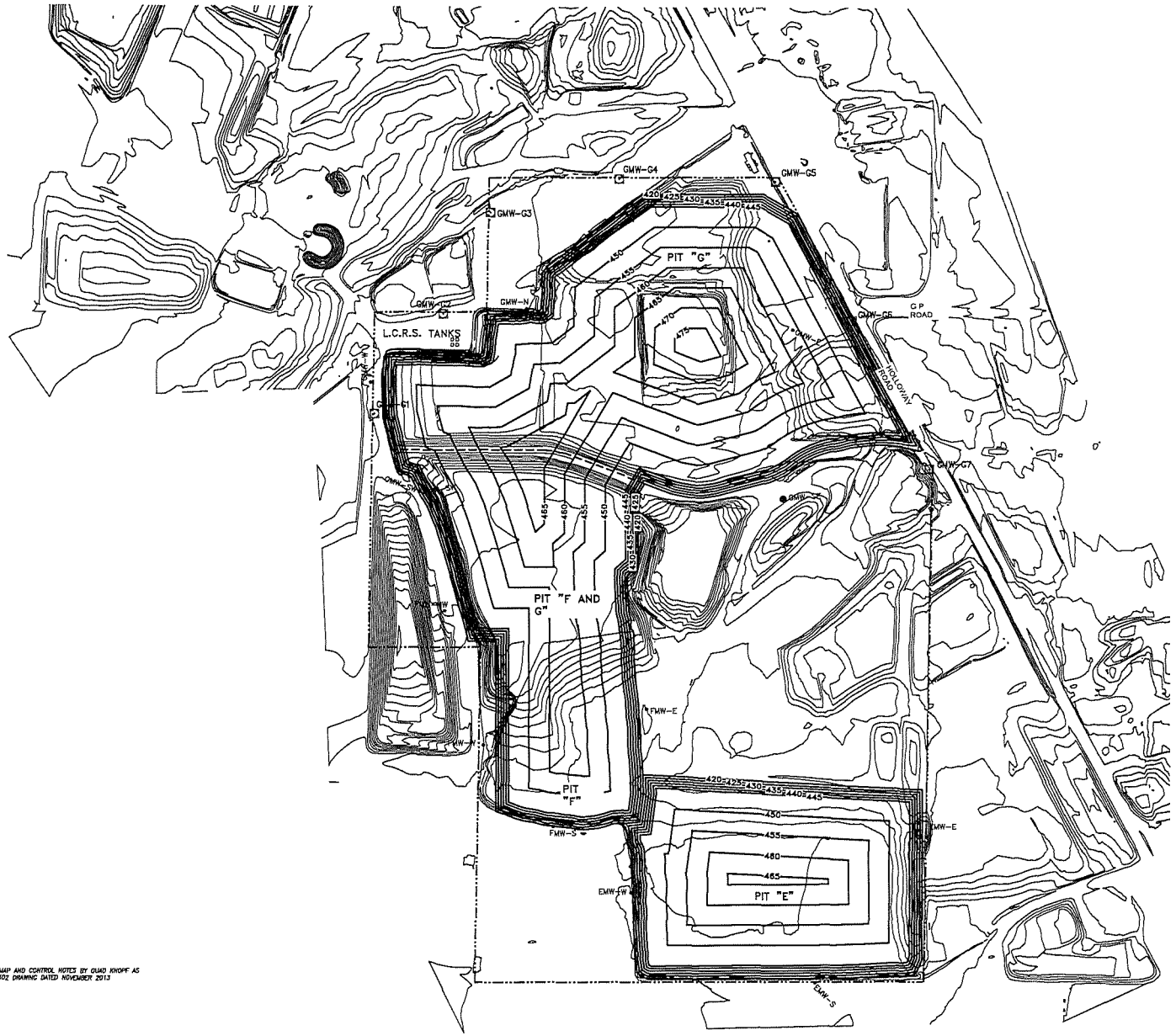
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ES ENGINEERING SERVICES ES ENGINEERING SERVICES, LLC. 1 PARK PLAZA, SUITE 1000 IRVINE, CALIFORNIA 92614 (714) 919-6500	CLIENT: **HALLOWAY ENVIRONMENTAL, LLC**	PROJECT NUMBER: **168734**	FIGURE 1: VICINITY MAP
	PROJECT LOCATION: **14045 Holloway Road, Lost Hills, California**	DATE: 5/2017	



ES ENGINEERING SERVICES ES ENGINEERING SERVICES, LLC. 1 PARK PLAZA, SUITE 1000 IRVINE, CALIFORNIA 92614 (714) 919-6500	CLIENT: **HALLOWAY ENVIRONMENTAL, LLC**	PROJECT NUMBER: **168734**	FIGURE 2: SITE MAP
	PROJECT LOCATION: **14045 Holloway Road, Lost Hills, California**	DATE: 5/2017	



N

300' 0' 300'

SCALE: 1"= 300'

LEGEND

- APPROXIMATE GROUNDWATER MONITORING WELL LOCATION
- APPROXIMATE GAS WELL LOCATION
- APPROXIMATE S.W.F. BOUNDARY

HORIZONTAL CONTROL

THE HORIZONTAL DATUM FOR THIS SURVEY WAS ESTABLISHED USING THE CALIFORNIA COORDINATE SYSTEM, ZONE 5, NAD83 (EPOCH 2002.00) AND DETERMINED LOCALLY BY THE GEODETIC VALUES PUBLISHED BY THE NATIONAL GEODETIC SURVEY FOR THE FOLLOWING CONTINUOUS OPERATING REFERENCE STATIONS:

DELANO AIRCS2005	PID DM6183
VOGELRANCHCS2004	PID DH4506
BUTTONWILLCS2005	PID DM7566
STONCORRALCN2004	PID DH3885

VERTICAL CONTROL

THE VERTICAL CONTROL FOR THIS SURVEY WAS BASED ON THE BENCHMARK SHOWN ON THE TOPOGRAPHIC SURVEY BY OTHERS NAMED "DK POINTS" LOCATED ON THE SOUTH SIDE OF HIGHWAY 46, 3 MILES EAST OF HIGHWAY 33. ELEV=819.583 (1973)

NOTE: BASE MAP AND CONTROL NOTES BY GUAD KNOPF AS PART OF C-502 DRAWING DATED NOVEMBER 2013

engineering services

ES ENGINEERING SERVICES, LLC
1 PARK PLAZA #1000
IRVINE, CA 92614
WWW.ES-ONLINE.COM

REV	DATE	DESCRIPTION

STATUS:

PLOT DATE:

CLIENT: H.M. HOLLOWAY, INC.
2019 WESTWIND DRIVE, SUITE B
BAKERSFIELD, CA 93301

PROJECT LOCATION: VERTICAL LANDFILL EXPANSION
13650 HOLLOWAY ROAD
LOST HILLS, CA 93249

DESCRIPTION: FINAL COVER AND EXISTING TOPOGRAPHY

PROJECT NO. 168734

SHEET: FIG-3

FILE: S:\HOLLOWAY ENV\LC_C502\VERTICAL LANDFILL EXPANSION\ACAD DOCS\C-C502 CLOSURE.DWG

ATTACHMENT A
BSK REPORT – SLOPE STABILITY ANALYSIS

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BSK ASSOCIATES
50th 1966-2016 ANNIVERSARY

700 22nd Street
Bakersfield CA 93301
P 661.327.0671
F 661.324.4218
www.bskassociates.com

Sent via email: dan.allen@hmhgypsum.com

BSK Project G17-065-10B

May 3, 2017

Mr. Dan Allen, SVP
Holloway Environmental
2019 Westwind Drive, Suite B
Bakersfield, California 93301

SUBJECT: **Report – Slope Stability Analysis**
Holloway Landfill – Final Cover/Cap
Lost Hills, California

Dear Mr. Allen,

BSK Associates (BSK) has conducted a slope stability analysis for the Holloway Landfill in Lost Hills, California. Our scope of services included producing the slope stability analysis and preparation of this report.

1.0 BACKGROUND

BSK understands that the site is located on Holloway Road in Lost Hills, California. BSK understands that in the future, Holloway Landfill will be required to have a final cap over the landfill. BSK understands the dimensions of the cap will be as follows: From natural grade, a 3:1 (H:V) slope to a height of 25'-0", followed by a shallower slope of approximately 11.6:1 (4.2°).

2.0 SLOPE STABILITY ANALYSIS

Based on preliminary drawings provided by ES Engineering Services, we performed a slope stability analysis on a representative section of the landfill and future cap. The landfill was modelled with a depth of 40'-0" and a slope gradient of 1.5:1. This model was analyzed for stability in the static and pseudo-static condition using Janbu's Simplified Method of Slices and modeled in the computer program, SLIDE v6.0. The model was analyzed for stability using circular slip surfaces originating and terminating at critical points along the cross sections analyzed. The inputs required for the site include slope geometry, subsurface profile data, horizontal and vertical ground acceleration, as well as constraints on the upper and lower limits of the search region for the critical slip circle, numbers and locations of initiation and termination points of trial surfaces, and number of trial surfaces for each initiation point.

The soil parameters were determined through estimations based on our field exploration and laboratory testing from a prior investigation of on-site materials (BSK Report *Slope Stability Analysis – Holloway*

Gypsum Pits – Lost Hills, California; June 28, 2007). For the native material which contains the landfill waste material, an internal strengh friction angle of 30.0 degrees, cohesion of 1,000 pounds per square foot, and unit weight of 125 pounds per cubit foot were used in the analysis. For the landfill waste material and clay cap, an internal strengh friction angle of 20.0 degrees, cohesion of 500 pounds per square foot, and unit weight of 120 pounds per cubit foot were used in the analysis.

Variables for the pseudo-static slope stability analysis were acquired through the United States Geological Society's Unified Hazard Tool, located at *earthquake.usgs.gov/hazards/interactive/*. The horizontal ground motion site coefficient was found to be 0.285, based on a maximum considered earthquake return period of 2495-years. Vertical ground motions and groundwater conditions were not considered in the analysis. One (1) typical cross section was selected to model the slope. For each condition, a minimum of 10,000 randomly generated slip circles were analyzed for the critical factor of safety. A summary of the critical factors of safety is provided in the table below:

STATIC FS,cr	PSEUDO-STATIC FS,cr
2.696	1.244

3.0 CLOSING

BSK appreciates the opportunity to be of service to you on this project. If you have any questions, or would like additional information, please call us at (661) 327-0671.

Respectfully submitted,
BSK ASSOCIATES



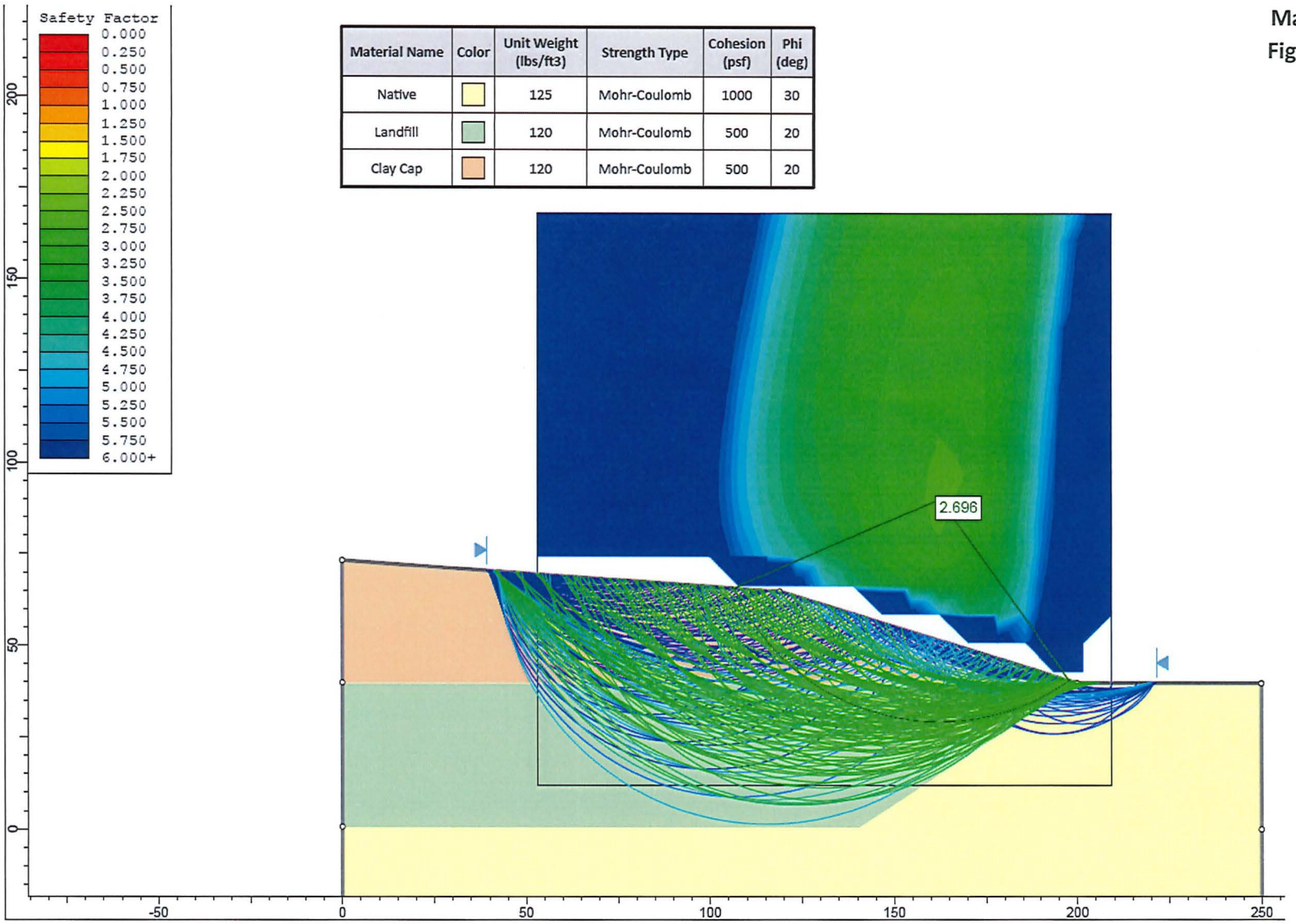
Logan Prosser
Staff Geologist

On Man Lau, P.E., G.E.
South Valley Regional Manager

Attachments: Figure 1: Static Slope Stability Analysis
Figure 2: Pseudo-Static Slope Stability Analysis

BSK Job No. G17-065-10B
May 2017
Figure A-1

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Native		125	Mohr-Coulomb	1000	30
Landfill		120	Mohr-Coulomb	500	20
Clay Cap		120	Mohr-Coulomb	500	20



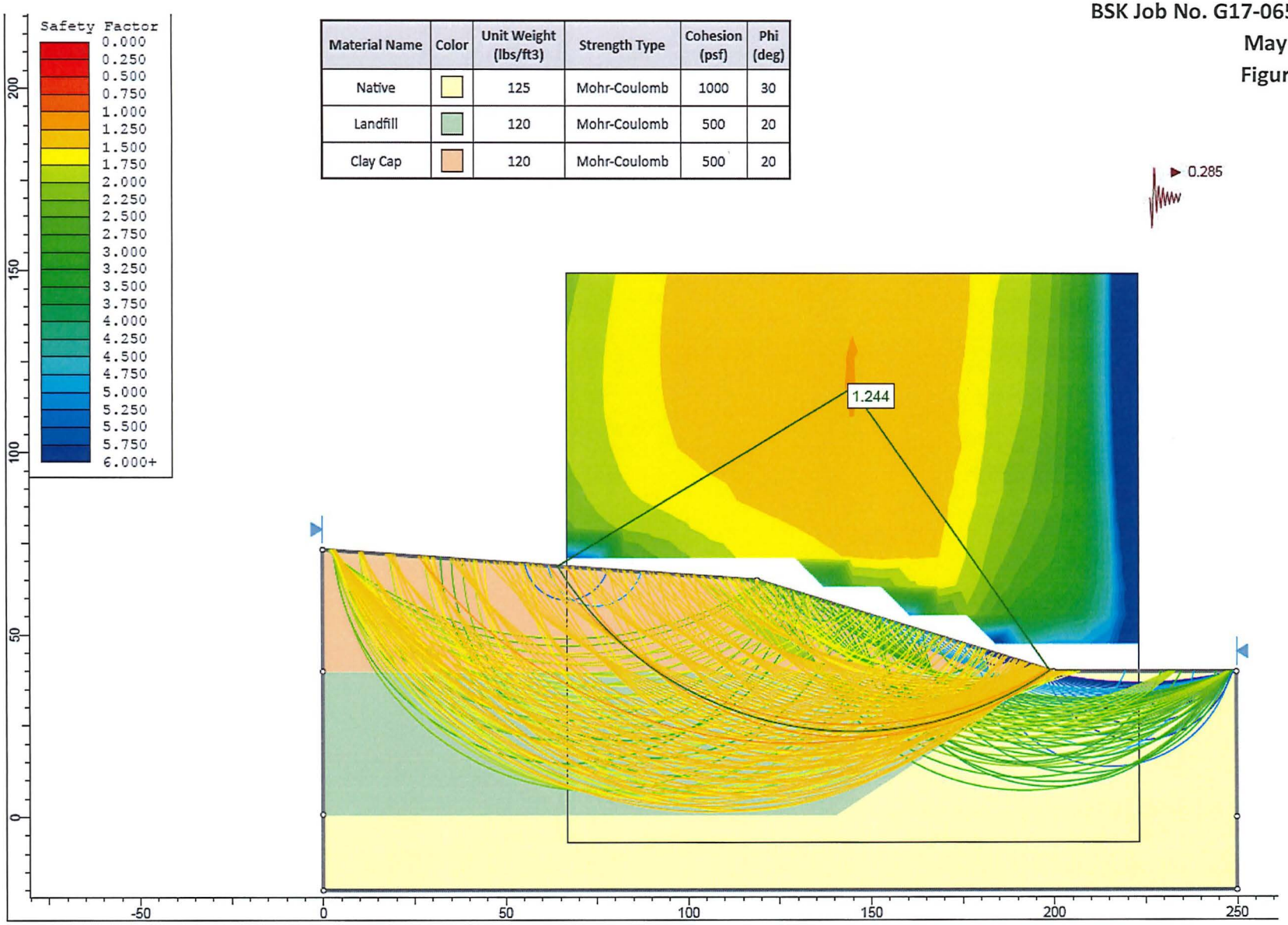
STATIC SLOPE STABILITY ANALYSIS
HOLLOWAY LANDFILL - FINAL CAP

HOLLOWAY ENVIRONMENTAL
LOST HILLS, CALIFORNIA

BSK ASSOCIATES

BSK Job No. G17-065-10B
May 2017
Figure A-2

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Native		125	Mohr-Coulomb	1000	30
Landfill		120	Mohr-Coulomb	500	20
Clay Cap		120	Mohr-Coulomb	500	20



PSEUDO-STATIC SLOPE STABILITY ANALYSIS
HOLLOWAY LANDFILL - FINAL CAP

HOLLOWAY ENVIRONMENTAL
LOST HILLS, CALIFORNIA

BSK ASSOCIATES

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ATTACHMENT B
DEFORMATION ANALYSIS

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RE: Deformation Analysis

Logan Prosser <lprosser@bskassociates.com>

Fri 5/5/2017 4:40 PM

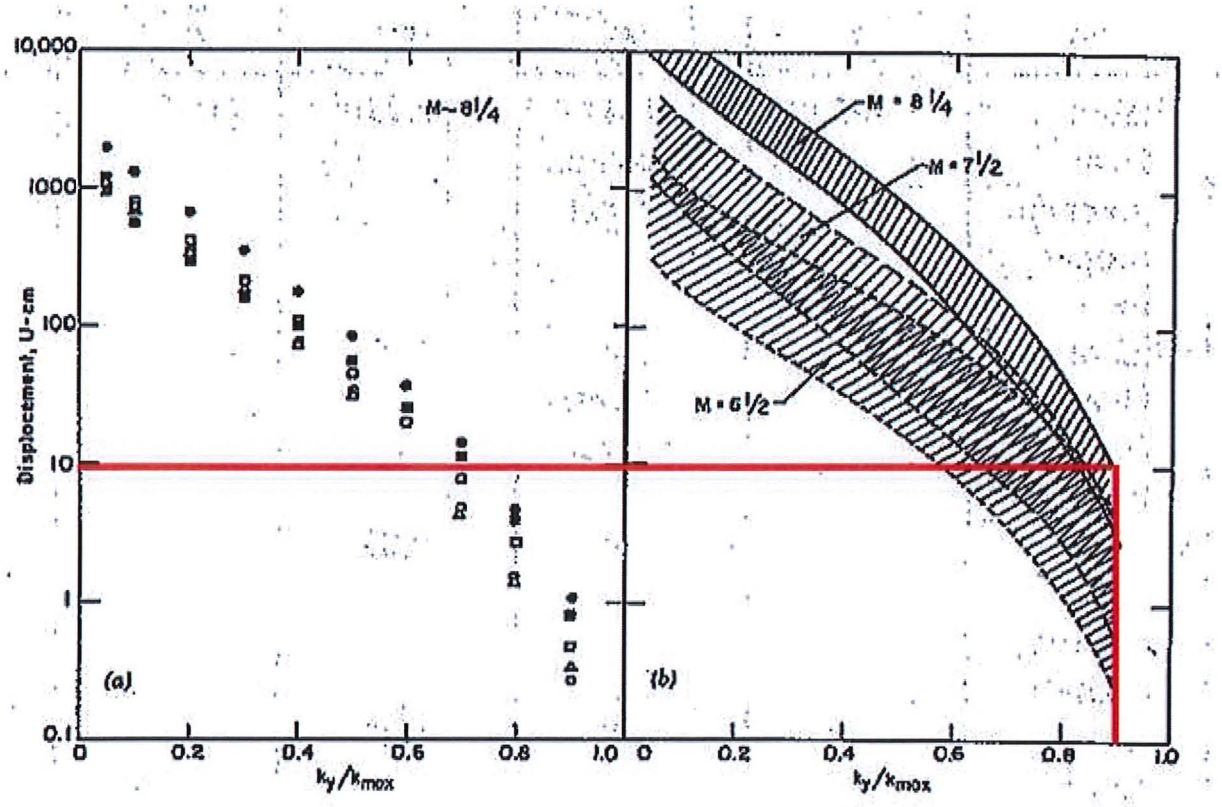
To: Dean Stanphill <dstanphill@es-online.com>;

Cc: On Man Lau <olau@bskassociates.com>; Richard Frizzell <rfrizzell@es-online.com>; Dan Allen <dan.allen@hmhgypsum.com>; Adam Terronez <aterronez@bskassociates.com>;

After running the analysis to figure out with horizontal force (Ky) gave a FS,cr = 1.000;

Ky = 0.3941
PGA according to the USGS Seismic Design tool = 0.430

Consulting the Makdisi and Seed (1978) chart, below, I chose the area for a M=8-1/4 earthquake.



The results shown here indicate a displacement, U, of 10-cm.

From: Dean Stanphill [mailto:dstanphill@es-online.com]
Sent: Friday, May 05, 2017 3:02 PM
To: Logan Prosser
Cc: On Man Lau; Richard Frizzell; Dan Allen
Subject: Deformation Analysis

Hello Mr. Prosser,

Since the psuedostatic factor of safety is less than the prescriptive 1.5, I have to do a deformation analysis. Can you crank out for me. The way I have always done it is to determine the yield acceleration at a Factor of Safety of 1 and compare against the PGA and then use Figure 14 from Makdisi and Seed (1977).

I know it will likely be only a couple of inches, but I need to verify and add in the calculations.

Thanks

Solid Waste & Recycling

Dean Stanphill, PE, GE

Senior Manager

ES ENGINEERING

ES Engineering Services, LLC.

www.es-online.com

775-560-3911 mobile

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BSK REPORT
FEBRUARY 8, 2019

BSK ASSOCIATES

GEOLOGY AND SOILS REVIEW
IN SUPPORT OF COMPOST FACILITY PERMITTING
LOST HILLS ENVIRONMENTAL, LLC COMPOST SITE
13850 HOLLOWAY ROAD
LOST HILLS, CALIFORNIA

BSK PROJECT E19-004-01B

PREPARED FOR:

LOST HILLS ENVIRONMENTAL, LLC
2019 WESTWIND DRIVE, SUITE B
BAKERSFIELD, CALIFORNIA 93301

FEBRUARY 8, 2019

GEOLOGY AND SOILS REVIEW
IN SUPPORT OF COMPOST FACILITY PERMITTING
LOST HILLS ENVIRONMENTAL, LLC COMPOST SITE
13850 HOLLOWAY ROAD
LOST HILLS, CALIFORNIA

Prepared for:

Mr. Dan Allen
Chief Operating Officer
Lost Hills Environmental, LLC
2019 Westwind Dr., Suite B
Bakersfield, California 93301

BSK Project: E19-004-01B

February 8, 2019

Prepared by:

FOR Kyle Wright
Staff Geologist

Lynne Baumgras, PhD, PG, CHG, CEG, PMP
Environmental Group Manager



On Man Lau, PE, GE
South Valley Regional Manager

BSK Associates
550 West Locust Avenue
Fresno, California 93650
(559) 497-2880
(559) 497-2886 Fax
www.bskassociates.com

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EXECUTIVE SUMMARY

BSK Associates (BSK) completed a review of geology and soils characteristics for Lost Hills Environmental, LLC in support of permitting for a planned compost facility (Site) in Lost Hills, California. Information compiled in this geology and soils review was compared to permit requirements for soil permeability as established in the State Water Resource Control Board Order WQ 2015-0121-DWQ General Waste Discharge Requirements for Composting Operations (Composting General Order).

A Draft Environmental Impact Report (DEIR) to evaluate potential environmental impacts of the Holloway Landfill was prepared in October 2007 by H.M. Holloway and was submitted to the Kern County Planning Department (KCPD). The proposed compost facility lies within the 2007 DEIR study area. This Report describes BSK's findings and conclusions developed from review of the soils and geology information presented in the DEIR. and compares the soil characteristics to permeability values set forth in the Composting General Order. As part of this review, BSK also conducted a Site visit to visually inspect site and soil conditions.

Based on published soil survey data, it appears that native surficial soils at the proposed compost Site will not meet the Composting General Order requirement of 1.0×10^{-5} cm/s or less for working surfaces without engineering measures such as compaction. However, geotechnical boreholes at Pits F and G indicated that thick sequences of silty clays, clayey silts, and silty clays may be present at depth beneath the proposed Site area. Should these clays be present in the Site area, the working surfaces permeability criteria may be met.

BSK recommends that that the surface of the composting areas will be graded and compacted prior to commencement of composting operations to provide a minimum 1-foot thickness and a permeability value that meets the Composting General Order requirement of 1.0×10^{-5} cm/s or less for working surfaces. Prior to construction, BSK will compact the selected soil sample to a predetermined compaction based on ASTM D1557 in the laboratory in order to achieve the permeability requirement of 1.0×10^{-5} cm/s or less. During construction, BSK recommends that one (1) compaction test be performed per each 1,000 cubic yards of soil placed. The compaction requirement should be at a degree of compaction as determined in the laboratory.

1.0 INTRODUCTION

BSK Associates (BSK) completed a review of geology and soils characteristics for the Lost Hills Environmental, LLC compost facility (Site) in Lost Hills, California. Lost Hills Environmental, LLC is planning to build a composting facility at the landfill site and has applied for a proposed Modification to Kern County Conditional Use Permit (CUP) No. 9, Map No. 28 for the Holloway Landfill.

In 2007, a Draft Environmental Impact Report (DEIR) for the Holloway Landfill was prepared by the Kern County Planning Department (KCPD) in accordance with the California Environmental Quality Act (CEQA) in order to analyze the potential environmental impacts of the Holloway Landfill. The scope of work performed in this geology and soils review consisted primarily of reviewing soils and geology information presented in the DEIR and comparing the geology and soil characteristics to the Composting General Order requirements. BSK also conducted a Site visit to visually inspect site and soil conditions. Information compiled in this geology and soils review has been compared to permitting requirements of the Composting General Order.

This assessment was initiated per the authorization of Mr. Dan Allen, of Lost Hills Environmental, LLC.

2.0 SITE DESCRIPTION

The Site is owned and operated by Lost Hills Environmental, LLC. **Figure 1** is a Site Location Map. The Landfill is located approximately 3.5 miles west-northwest of the community of Lost Hills, California. The approximately 850-acre Landfill is bound on the east by Holloway Road and on the south by State Highway 46. The proposed compost area (Site) is located within the southern 1/3 of Kern County Assessor's Parcel (APN) 057-240-60. **Figure 2** is a Site Plan which shows the boundaries of the proposed compost area. The proposed compost area has an area of approximately 40 acres.

The terrain of the Site and vicinity is generally flat and gently slopes southeast. The Lost Hills Anticline western facing slope borders the east side of the Site and the Antelope Plain rises gently southwest from the west boundary of the Site to the east flank of the Coastal Range. As indicated on the United States Geological Survey (USGS), 7.5-minute Antelope Plain Topographic Quadrangle Map, the site is located in a topographic trough between the Antelope Plain and the Temblor Mountain Range on the west and southwest and the Lost Hills to the east and northeast. The Site elevation is approximately 415 feet above mean sea level (USGS, 2015).

The Antelope Plain and the western slope of the San Joaquin Valley east of Lost Hills include the greater part of the valley lands in the Avenal-McKittrick area. Despite the large size of the area, little information is available regarding groundwater conditions. This area is characterized by low rainfall, groundwater of inferior quality, and high concentrations of salts in the soil and subsoil. Accordingly, there has been little agricultural development in this area. For the most part, the land is used only for grazing.

3.0 GEOLOGY

Figure 3 is a map of regional geology. Surficial deposits in the vicinity of the proposed Compost Site are mapped as Quaternary Alluvium. The Site lies within an area of thin, near surface or shallow Recent alluvial fan deposits and older Recent unconsolidated sand, clay, terrace and natural levee deposits, all of which are dominated by very large sections of very dense clays and clay-rich silts. These Recent deposits originated from streams emerging from the Coastal ranges to the west and are estimated to be approximately 250 to 350 feet thick in the project area.

The rocks of the adjacent Lost Hills Oil Field range from Late Cretaceous to Pleistocene in age. The major units include the Upper Cretaceous Moreno Formation, the Eocene Lodi and Kreyenhagen Formations, the late Eocene through middle Miocene Temblor Formation, the Miocene Monterey and Reef Ridge Formations, the Pliocene Etchegoin Formation, and the Plio-Pleistocene Tulare Formation. Except for the Tulare Formation, these units are Marine in origin. The sediments associated with these formations were derived from the uplifting mountains surrounding the valley including the Sierra Nevada, Tehachapi, San Emidio, and the Coastal Ranges.

Many of the Lost Hills formations produce oil with the major contributors from the Miocene Epoch. Sands from the Pliocene Etchegoin Formation and the Plio-Pleistocene Tulare Formation are productive as well. The predominantly marine sediments are overlain by continental deposits of the Plio-Pleistocene Tulare Formation, which are overlain by Recent alluvium. The Tulare Formation outcrops along the ridge of the adjacent Lost Hills Anticline east of the site. Most of the site is covered with Recent alluvium.

Geotechnical drilling was conducted in the areas of Pits "F/G Connection Area," "E," "F," and "G" in 1993. The geotechnical boreholes were advance to depths of 25 to 50 feet below the pit floor surface grades. Thick sequences of silty clays, clayey silts, and silty clays were encountered at depths to 50 feet below the pit floor at some locations. Permeability test values indicated that permeability values for samples collected in twelve boreholes of Pits F and G are comparable to or are less than the 1 x 10-7 cm/s permeability value for landfill liner material. It is unknown, but likely, that the thick clay sequences observed at Pits F and G are also present in the proposed compost Site area.

4.0 SOILS AND PERMEABILITY

Quaternary alluvial fan deposits consisting of clay, silt, sand, and gravels originating from the mountain complexes to the west are common in the southwestern portion of the San Joaquin Valley. The Antelope Valley Flood Plain provides the route for the sediment deposits. The recently deposited soils lack stratigraphic development and soil horizons and are commonly found in active environments such as the toe of a mountain slope or the distal end of a flood plain. The bulk of the soil is of low fertility and consists of sand and rock fragments of unaltered parent material that is susceptible to erosion.

According to the United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) Web Soil Survey, native soils at the proposed compost Site belong to the Typic Gypsiorthids-Kimberlina Association (0 to 5 percent slopes). **Figure 4** shows the mapped soil types at the Site. A soil association is defined by NRCS as two or more geographically associated soils or miscellaneous areas in such an intricate pattern that they cannot be shown separately on the soil maps. Soils of the Typic Gypsiorthids-Kimberlina Association, 0 to 5 percent slopes, occur at an elevation range of 425 to 490 feet above mean sea level (msl) and form at the footslopes of alluvial fans derived from sedimentary rock. The Typic Gypsiorthids-Kimberlina Association has an average annual precipitation of 5 inches. The average annual air temperature is 65 degrees Fahrenheit (°F) and it has a frost-free season of 250 to 300 days. The Typic Gypsiorthids-Kimberlina Association, 0 to 5 Percent Slopes soils, is classified as having a moderately high capacity of the most limiting layer to transmit water with values of 0.57 to 1.98 in/hr (4.2×10^{-4} cm/s to 1.4×10^{-3} cm/s). Permeability of the Typic Gypsiorthids is classified as moderate or moderately rapid.

This soil type is interlaminated with the Kimberlina fine sandy loam. Kimberlina soils are deep, level to moderately sloped, well-drained, fine sandy loams that are found on recent alluvial fans and alluvial plains. The alluvium is derived from sedimentary or granitic rock. Typically, the surface layer is brown, fine sandy loam approximately 9 inches thick. The upper 36 inches of the underlying material is pale brown, fine sandy loam, and the lower part to a depth of 71 inches is pale brown, silt loam. In some areas the surface layer is sandy loam or coarse sandy loam. Permeability of the Kimberlina soil is classified as moderate.

5.0 COMPARISON TO COMPOSTING GENERAL ORDER REQUIREMENTS

The Composting General Order was adopted to ensure that composting facilities implement measures to protect water quality. Composting operations may generate leachate if water percolates into compost material or excess moisture flows through the compost material. Leachate can deplete oxygen in waterways and can contain levels of nitrogen, phosphorus, metals, pathogens, and other pollutants that can impact waters of the state.

The Composting General Order applies to facilities that compost green wastes, manure, biosolids, food scraps, and scrap paper projects and is applicable to both existing and new composting operations. The Composting General Order sets forth requirements for siting, construction, operation, and maintenance of facilities in order to protect surface water and groundwater quality. One of the Composting General Order requirements is a maximum permeability of the ground beneath composting piles of no more than 1.0×10^{-5} cm/s or less for working surfaces. Working surfaces must consist of one of the following: compacted soils, with a minimum thickness of one foot; asphaltic concrete or Portland cement concrete; or an equivalent engineered alternative that is approved by the Regional Water Board.

Soils of the Typic Gypsiorthids-Kimberlina Association, 0 to 5 percent slopes are characterized as having permeability ranges of 4.2×10^{-4} cm/s to 1.4×10^{-3} cm/s, which is an order of magnitude greater than the Composting General Order requirement of 1.0×10^{-5} cm/s or less for working surfaces.

Geotechnical drilling was conducted in the areas of Pits "F/G Connection Area," "E," "F," and "G" in 1993. The geotechnical boreholes were advanced to depths of 25 to 50 feet below the pit floor surface grades. Thick sequences of silty clays, clayey silts, and silty clays were encountered at depths to 50 feet below the pit floor at some locations. Permeability test values indicated that permeability values for samples collected in twelve boreholes of Pits F and G are comparable to or are less than the 1 x 10-7 cm/s permeability value for landfill liner material. It is unknown, but likely, that the thick clay sequences observed at Pits F and G are also present in the proposed compost Site area. Should these clays be present in the Site area, the working surfaces permeability criteria may be met.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on published soil survey data, it appears that native surficial soils at the proposed compost Site will not meet the Composting General Order requirement of 1.0×10^{-5} cm/s or less for working surfaces without engineering measures such as compaction. However, geotechnical boreholes at Pits F and G indicated that thick sequences of silty clays, clayey silts, and silty clays may be present at depth beneath the proposed Site area. Should these clays be present in the Site area, the working surfaces permeability criteria may be met.

BSK recommends that that the surface of the composting areas will be graded and compacted prior to commencement of composting operations to provide a minimum 1-foot thickness and a permeability value that meets the Composting General Order requirement of 1.0×10^{-5} cm/s or less for working surfaces. Prior to construction, BSK will compact the selected soil sample to a predetermined compaction based on ASTM D1557 in the laboratory in order to achieve the permeability requirement of 1.0×10^{-5} cm/s or less. During construction, BSK recommends that one (1) compaction test be performed per each 1,000 cubic yards of soil placed. The compaction requirement should be at a degree of compaction as determined in the laboratory.

7.0 LIMITATIONS

This Report has been prepared for the exclusive use of Lost Hills Environmental, LLC in accordance with generally accepted environmental engineering practices in Kern County at the time the services were performed. BSK's services were performed solely for the purpose of evaluating environmental conditions at the site.

No other warranties either express or implied are made to the professional advice provided under the terms of BSK's agreement with Lost Hills Environmental, LLC. The passage of time, natural processes, or human intervention on the facility or adjacent properties and changes in the regulations can cause changed conditions, which can invalidate the findings and conclusions presented in this report.

8.0 REFERENCES

California Department of Water Resources, Groundwater Information Center Interactive Map Application, https://gis.water.ca.gov/app/gicima/, Accessed January 30, 2019.

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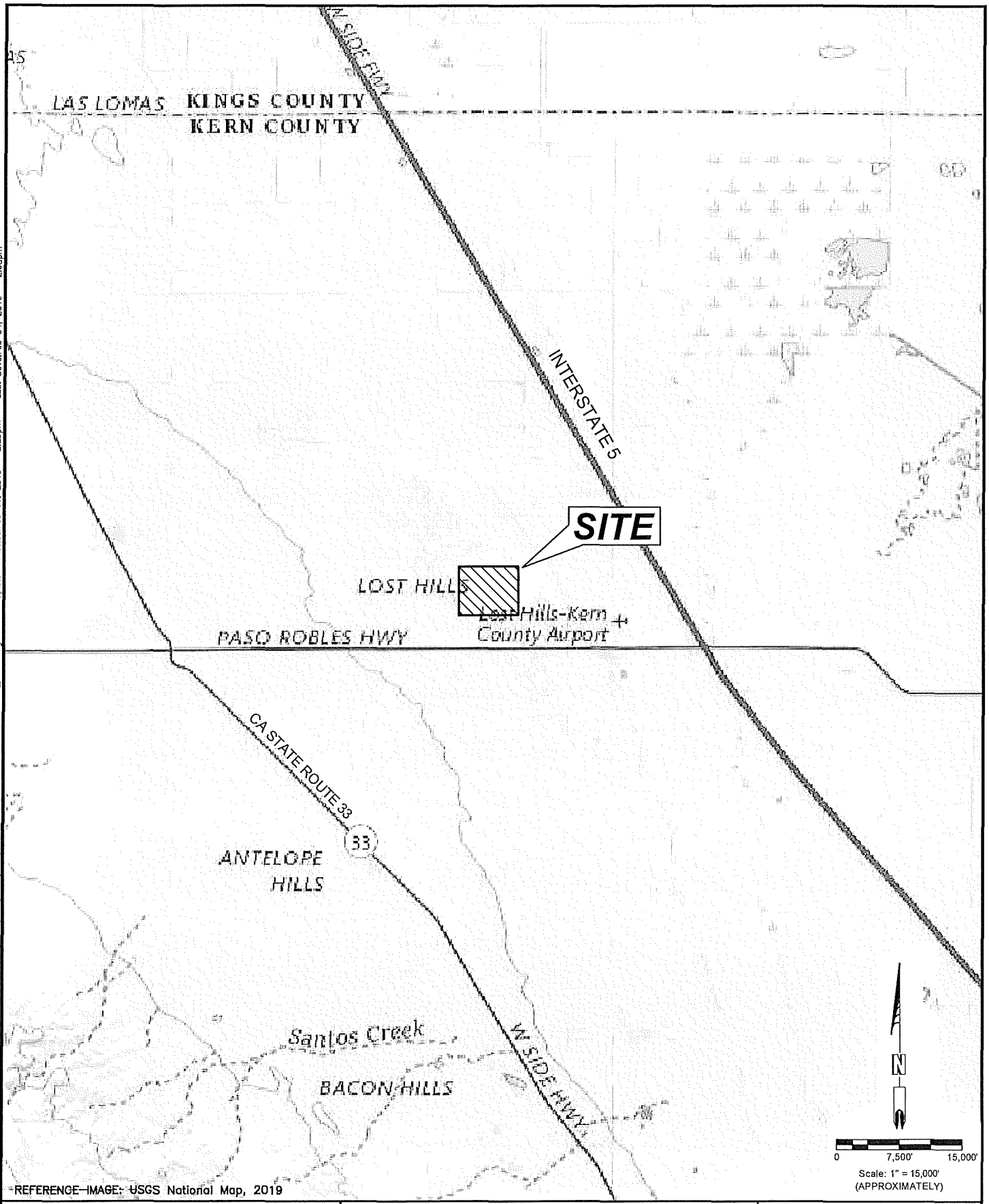
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United States Geological Survey (USGS), 7.5-minute Antelope Plain Topographic Quadrangle Map. 2015.

FIGURES



REFERENCE IMAGE: USGS National Map, 2019

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BSK ASSOCIATES
550 West Locust Avenue
Fresno, California 93650
Tel. (559) 497-2880

VICINITY MAP

Geology and Soils Review - Compost Facility Permitting
Lost Hills Environmental, LLC
14045 Holloway Road, Lost Hills
Kern County, California

FIGURE 1

JOB NO. E19-004-01B
DATE February 6, 2019
DR. BY KTW
CH. BY LMB
SCALE AS SHOWN
SHEET NO. 1
OF 1 SHEETS



LEGEND:

Proposed Composting Area

REFERENCE IMAGE: Google Earth Pro, 2019

BSK ASSOCIATES
550 West Locust Avenue
Fresno, California 93650
Tel. (559) 497-2880

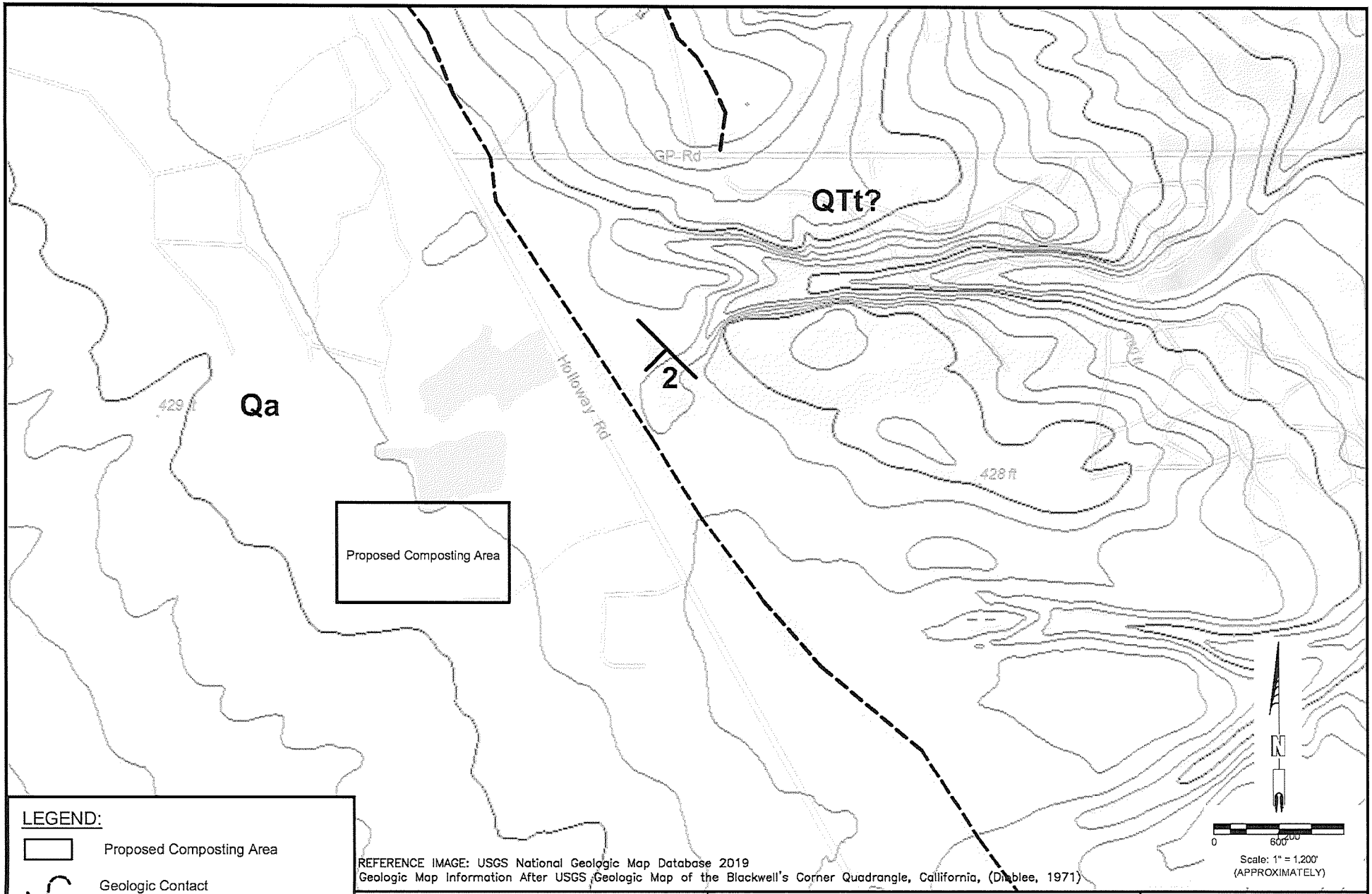
SITE PLAN

Geology and Soils Review - Compost Facility Permitting
Lost Hills Environmental, LLC
14045 Holloway Road, Lost Hills
Kern County, California

FIGURE 2

JOB NO. E19-004-01B
DATE February 6, 2019
DR. BY KTW
CH. BY LMB
SCALE AS SHOWN
SHEET NO. 1
OF 1 SHEETS

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LEGEND:

- Proposed Composting Area
- Geologic Contact
- 2 Strike and Dip Orientation
- QTt Tulare Formation (Terrestrial gravel and sand)
- Qa Alluvium

REFERENCE IMAGE: USGS National Geologic Map Database 2019
Geologic Map Information After USGS Geologic Map of the Blackwell's Corner Quadrangle, California, (Dibblee, 1971)

BSK ASSOCIATES
550 West Locust Avenue
Fresno, California 93650
Tel. (559) 497-2880

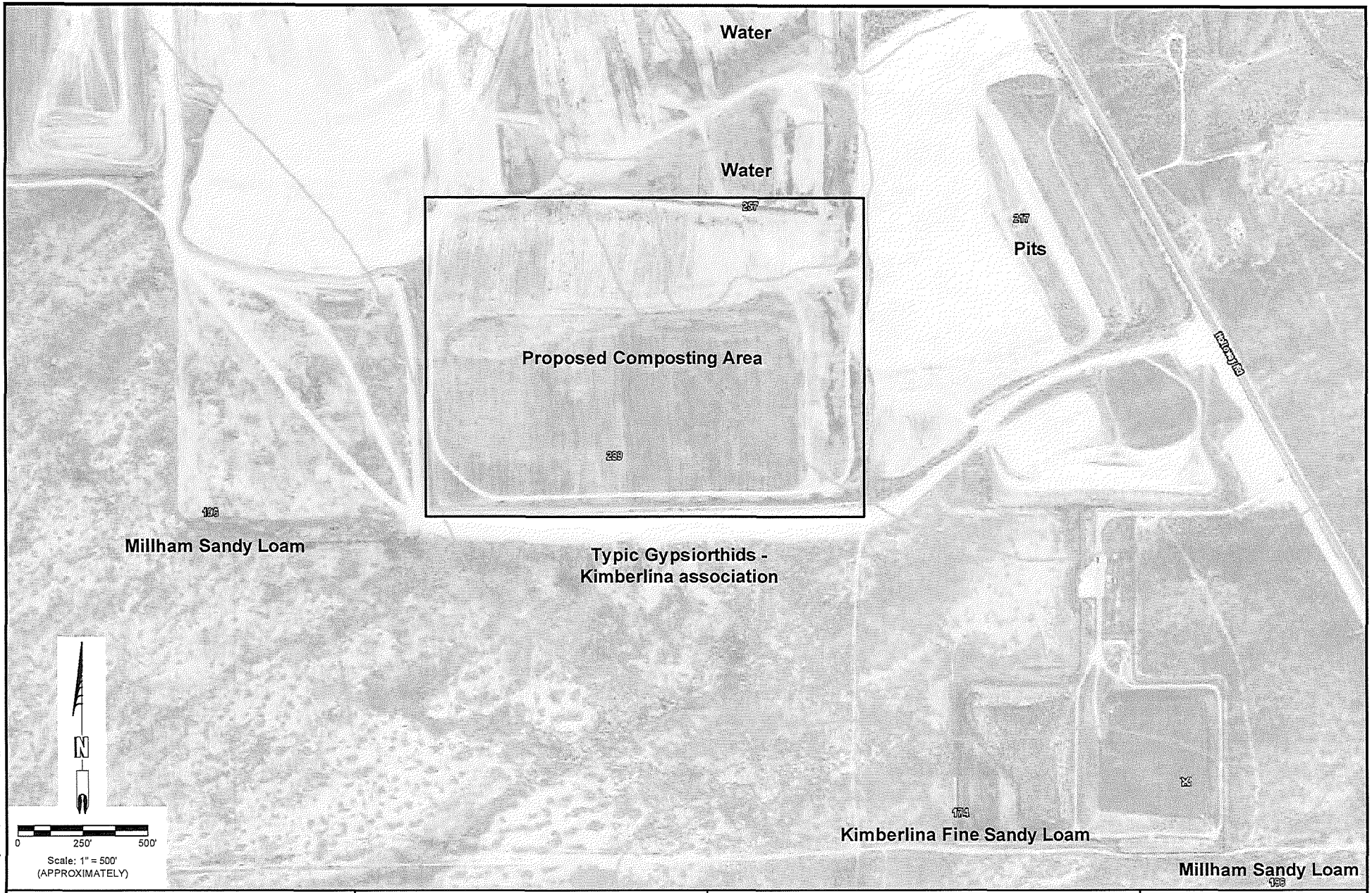
REGIONAL GEOLOGY

Geology and Soils Review - Compost Facility Permitting
Lost Hills Environmental, LLC
14045 Holloway Road, Lost Hills
Kern County, California

FIGURE 3

JOB NO. E19-004-01B
DATE February 6, 2019
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LEGEND:

- Proposed Composting Area
- Soil Formation Boundary

REFERENCE IMAGE: USDA WEB SOIL SURVEY, 2019

BSK ASSOCIATES
550 West Locust Avenue
Fresno, California 93650
Tel. (559) 497-2880

SITE SOILS

Geology and Soils Review - Compost Facility Permitting
Lost Hills Environmental, LLC
14045 Holloway Road, Lost Hills
Kern County, California

FIGURE 4

JOB NO. E19-004-01B
DATE February 6, 2019
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Appendix F.2

Addendum to the Geotechnical Evaluation

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NOVA GEOTECHNICAL & inspection services

March 18, 2020

Mr. Jeremy Bowman
Projects Director
Holloway Environmental
2019 Westwind Drive, Suite B
Bakersfield, California 93301

Subject: Addendum to Report
Geotechnical Evaluation of Proposed Composting Facility
Lost Hills Composting Project
Lost Hills, California
Job No. RE-20-005

References: "Landfill Cap Evaluation and Design and Geotechnical Evaluation of Proposed Vertical Expansion", report dated May 11, 2017, by ES Engineering (authored by Dean Stanphill).

"Geology and Soils Review in Support of Composting Facility Permitting, Lost Hills Environmental, LLC Compost Site, 13850 Holloway Road, Lost Hills, California", report dated February 8, 2019, by BSK Associates.

Dear Mr. Bowman,

As requested, presented herein is an update to the referenced report by ES Engineering. Specifically, this report addresses the comments presented in the SWCA Environmental Consultants Memorandum of January 17, 2020.

1. SWCA Peer Review Comments

The following is a summary of the referenced SWCA Memorandum. The memorandum concluded that the descriptions of site geology, subsurface conditions (both soils and landfill waste), and seismic conditions presented in the report are acceptable for the purposes of the Draft and Final EIR. However, the following additional information was requested:

1. The referenced report should be updated to reflect the current proposed project components, which no longer includes a vertical expansion.

2. The referenced report does not include descriptions and recommendations relative to:
   - Grading operations needed for the proposed project
   - Borrow sources to be used for the earthen berms, Extended Static Pile working surfaces, liners for wastewater ponds, and conveyance structures, etc.
   - Potential settlement of the existing landfill due to the construction and operation of the new composting facility.

2. Summary of Referenced BSK Report

A copy of the referenced BSK report is attached to this letter. The primary focus of this report is to provide an evaluation of the alluvial fan materials at the site with regards to soil permeability. The anticipated soil permeability values for the on-site soils are then compared to the State of California Composting General Order requirements. The opinion presented in the final report indicates that native near surface soils at the site would likely not meet the Composting General Order requirements of 1.0×10^{-5} cm/s without engineering measures, such as compaction. Moreover, the report indicates that there may exist some areas of silty clays and clayey silts that may be present in the site area that may meet this permeability requirement.

3. New Proposed Project

It is our understanding that the compost facility may accept biosolids from various wastewater treatment plants from, green and food waste from local municipalities, as well as organic waste from local farms. The composting facility will be 136.2 acres at full build out (three phases) and is shown on the attached "Overall Site Plan".

The composting facility will utilize an extended static pile (eASP) composting system. At project build-out, there will be 240 individual composting piles, each equipped with a 1.5 horsepower blow motor powered by solar cells. The blower will be connected to a manifold that leads to three, four-inch perforated pipes that will run through each compost pile. The piles will be covered in a one-foot deep layer of cured compost and a sprinkler system. It is expected that the system will not generate any run-off or wastewater. Rainfall will be collected on-site and diverted into nearby pits. There are no buildings or major structures planned for the composting facility.

4. Specific Response to SWCA Peer Review Comments

<u>The Referenced Report Should Be Updated to Reflect the Current Project.</u>

The current project is as described herein. The data contained with respect to site geology and seismicity as well as geologic and seismic hazards such as liquefaction and faulting. Conclusions related to the new proposed construction are presented in the next section of this report.

<u>Grading Operations</u>

Based on our previous site visit, the location of the initial two phase of the proposed composting operation is currently level and is in an area of native alluvial soils. Phase 3 is also in native alluvial soils but has more topographic relief. Our previous observations also indicated that the site was covered in relatively light to moderate growths of native vegetation.

Grading operations in the area will grade the property to direct surface drainage to sheet flow to conveyance swales and/or sheet flow into the aforementioned adjacent pits. Cuts and/or fills are anticipated to be minimal, likely less than one foot in the initial two phases. Cuts and fills may be somewhat more in Phase 3; however, Phase 3 will be graded to in such a manner as to minimize required earthwork. Prior to fill placement, the existing vegetation will be removed and the exposed soils moisture conditioned and rolled to a relatively firm and unyielding condition. There will be no building pads, berms, or pavements constructed at the site.

The working surfaces of the composting facility will be graded in such a way as to meet the specific requirements of the Composting General Order. These soils will be brought to above optimum moisture conditions and then compacted to provide a surface with a minimum permeability of 1×10^{-5} cm/s. It is anticipated that 95 percent relative compaction based on the maximum dry density determined by ASTM D 1557 will be required to achieve the minimum permeability requirements. This degree of compaction will be determined based on laboratory testing of actual soils anticipated to be used for the soil subgrade. The finish working surface will consist of compacted soil (not paved).

Quality assurance testing will be a critical component of project performance. Continuous and full-time observations supplemented by periodic compaction and permeability testing should be performed. As part of the work, the soil subgrade must always be kept in a moist condition so that desiccation cracking of the surface soils does not occur. Moreover, regular maintenance of the soil surface will be required.

Borrow Sources

It is anticipated that all soils required for site construction will be derived from sources within the overall Holloway property. As presented in the BSK report, the on-site soils in their current condition would not meet the minimum permeability requirements without compaction or other engineering measures (such as bentonite treatment). However, with proper compaction there is a possibility that the on-site soils might meet the minimum requirements. Moreover, there may be sources for clay-rich soils on the Holloway property that would meet the minimum requirements with minimal processing. The final determination of which soils would be used would be based on the import/export requirements for the site and the availability of the clay-rich soils.

Potential Settlements

Soil settlement can occur under loads imposed by structures or large fills. Wheel ruts can develop under repeated loadings from dozers or large trucks. Settlement is many times facilitated by the saturation of subsurface soils.

Because no large fills or structures are planned for the site, soil settlement under these loading conditions would not be considered a concern. The nominal amount of fill to be placed at the site to achieve finish site grades is not expected to surcharge the underlying soils as to cause excessive settlement. The potential for soil settlement will also be reduced by the proper conditioning and compaction of both the existing and fill soils. Moreover, the surfacing of the site with low permeability soils will help in preventing water from saturating any underlying settlement prone subsurface soils.

It is important however that regular maintenance be performed for all working areas. This includes keeping the final working surface moistened at all times and making sure truck traffic areas are maintained and surface drainage is not interrupted.

The opportunity to be of service to you is sincerely appreciated. If you have any questions, please call the undersigned at 775-560-3911.

Respectfully submitted,

NOVA GEOTECHNICAL AND INSPECTION

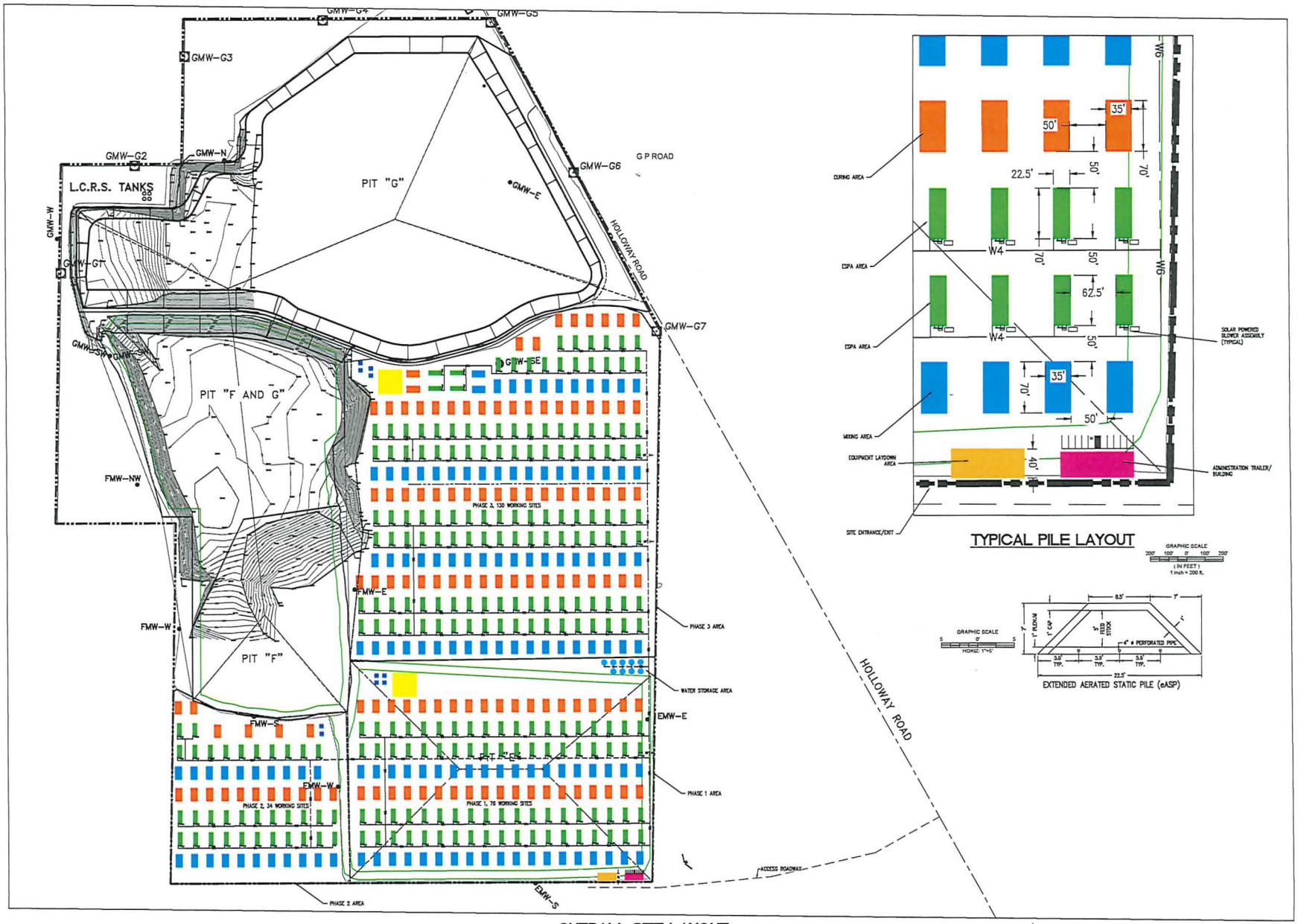


3-18-20

Dean R. Stanphill, PE, CEM
Principal

Attachments: Overall Site Plan
ES Engineering Report
BSK Report

OVERALL SITE PLAN



OVERALL SITE LAYOUT

TYPICAL PILE LAYOUT

GRAPHIC SCALE
200' 100' 0' 100' 200'
(IN FEET)
1 inch = 200 ft.

EXTENDED AERATED STATIC PILE (eASP)

PROJECT PHASING	
PHASE	AREA (ACRES)
1	47.3
2	21.2
3	67.7
TOTAL	136.2

GRAPHIC SCALE
200' 100' 0' 100' 200'
(IN FEET)
1 inch = 200 ft.

LEGEND
- RETURN STOCKPILE
- EQUIPMENT LAYDOWN
- TRAILER/MAINTENANCE
- CURING PILES
- eASP
- MIXING AREA
- WATER STORAGE
- MATERIAL PROCESSING AREA

REVISION: | NO. | DATE | BY:

CORNERSTONE ENGINEERING, INC.
5080 CALIFORNIA AVE. SUITE 220
BAKERSFIELD, CA 93309
PH. (661) 322-4028
FAX (661) 322-4029
CONSULTING CIVIL ENGINEERING AND LAND SURVEYING
www.cornerstoneeng.com

DEVELOPMENT BY:
HOLLOWAY ENVIRONMENTAL LLC
2019 WESTWIND DR. SUITE B
BAKERSFIELD, CA 93301
661-755-6484

H.M. HOLLOWAY, INC.
SITE PLAN
PROPOSED COMPOST FACILITY
BERMS OVEREXCAVATION

DESIGNER:	CAW
CHECKED BY:	DCW
DATE:	07/10/17
DRAFTER	CAW
SCALE:	AS SHOWN
COMP. NO: 502-01 SITE PLAN	
JOB NO.:	502-01-00
C-1.0	SHEET 1 OF 1

ES ENGINEERING REPORT

MAY 11, 2017

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LANDFILL CAP ELEVATION AND DESIGN AND GEOTECHNICAL EVALUATION OF PROPOSED VERTICAL EXPANSION

For the:

H.M. HOLLOWAY SOLID WASTE FACILITY
HOLLWAY GYPSUM PITS
14045 HOLLOWAY ROAD
LOST HILLS, CALIFORNIA 93239

Prepared for:

Holloway Environmental, LLC
2019 Westwind Drive, Suite B
Bakersfield, California 93301

Prepared by:

ES ENGINEERING SERVICES

1 Park Plaza, Suite 1000
Irvine, California 92614
Telephone: (714) 919-6500

Project #029-RCS-168734

Preparation Date:
May 11, 2017

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Figures

Figure 1: Vicinity Map

Figure 2: Site Map

Figure 3: Final Cover and Existing Topography

Attachment

Attachment 1: BSK Report – Slope Stability Analysis

Attachment 2: Deformation Analysis

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1.0 INTRODUCTION

ES Engineering Services, LLC (ES) performed a design and geotechnical evaluation at the request of Holloway Environmental, LLC (Client) to address slope stability and liquid retention considerations related to the proposed vertical expansion of the H.M. Holloway Solid Waste Landfill (Landfill), located at 14045 Holloway Road, Lost Hills, California (**Figure 1—Vicinity Map**). The vertical expansion is proposed to allow for additional airspace within the Landfill's existing waste disposal footprint.

1.1 Site Location

The Landfill is located at 14045 Holloway Road, Lost Hills, California 93239. Access to the Landfill is from Holloway Road. This area is connected by a State and federal highway system as well as local rural roads. Interstate Route 5, State Route (SR) 46, and SR 33 are located in the general area. Interstate 5 is a four-lane freeway, and SR 46 and SR 33 are 2 lane highways. All of these state routes are used to access the site (**Figure 1**).

Approved Landfill:

The approved Landfill facility is located in Sections 24 and 25- Township 26 South, Range 20 East (MDB&M). As noted in **Table 1—Pit Capacity**, the Landfill area includes the following Kern County Assessor's Parcel Numbers (APNs):

TABLE 1: PIT CAPACITY

APN	ACRES
057-220-16	31.69
057-240-29	30.14
057-240-60	159.31
057-240-50	80.00

1.2 Background

H.M. Holloway open pit gypsum mine located at Lost Hills, California (operational for over seventy (70) years). Currently the Landfill is owned and operated by H. M. Holloway, Inc., located at 2019 Westwind Drive Suite B, Bakersfield, California 93301. The mining facility is located at 14045 Holloway Road, Lost Hills, California, 93249. As of December 1, 2006, approximately 22,913,000 tons of processed gypsum ore for agricultural use has been removed from the mine's open pits. Mining activities have created several large depressions or natural receptacles between forty-five (45) and fifty-five (55) feet deep, each comprising an area of several acres. The Landfill is located at a surface elevation of approximately 410 to 425 feet above mean sea level (amsl).

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1.3 Surrounding Land Use

The H. M. Holloway Gypsum Mine is an adjacent land use north of the Landfill. Other adjacent or nearby land uses include row-crop farming, a biosolids/green waste composting operation, an inactive County-operated sanitary Landfill, oilfields, and two State Highways (S.R. 46, S.R. 33) and Interstate 5.

The composting operation (Liberty Composting, Inc.) is located approximately 4.5 miles north of Holloway Landfill on Holloway Road. The inactive Lost Hills Landfill is located immediately south of the Holloway Landfill. The community of Lost Hills is approximately 4.3 miles southeast of the Holloway Landfill. The corresponding zone classifications and General Plan land use designations for the area surrounding the Landfill are:

- North - General Plan: 8.4 Mineral and Petroleum (Min. 5 acre parcel size), 8.4/2.5 Mineral and Petroleum (Min. 5 acre parcel size)/Flood Hazard), Zone District: A (Exclusive Agriculture).
- East - General Plan: 1.1 Nonjurisdictional land (State or Federal Land), 8.4, 8.4/2.10 Mineral and Petroleum (Min. 5 acre parcel size)/Nearby Waste Facility, Zone District: A (Exclusive Agriculture).
- South - General Plan: 8.3 Extensive Agriculture (Min. 20-acre parcel size), 8.3/2.10, and 3.4 Public Facilities (Solid waste facilities), Zone District: A (Exclusive Agriculture).
- West- General Plan: 8.3, 8.3/2.10, 8.4/2.5 and 8.4/2.10 , Zone District: A (Exclusive Agriculture)

1.4 Project Understanding

ES understands that the proposed vertical expansion will include revisions to the Solid Waste Facility Permit (SWFP) and Waste Discharge Requirements (WDRs) for the Landfill. ES understands the dimensions of the cap will be as follows: From natural grade, a 3:1 (H:V) slope to a height of 25'-0", followed by a shallower slope of approximately 11.6:1 (4.2°). The existing site conditions within and surrounding the Landfill's waste footprint are shown on **Figure 2—Site Map**.

1.5 Scope of Current Study

ES scope of work for the current study consists of the following primary tasks:

- *Develop final cap configuration;*
- *Review and analyze existing waste data (for example: moisture content) previously collected at the Landfill;*
- *Evaluate if the existing waste mass will be able to retain liquids after placement of additional waste for the proposed vertical expansion; and*
- *Perform static and dynamic slope stability analyses to support the proposed vertical expansion.*

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The remainder of this report presents the results of ES's above described Scope of Work.

2.0 DATA REVIEW

ES reviewed the following documents for background and additional information for the Geotechnical Evaluation of the Vertical Expansion of the Landfill:

Palmetto Engineering and Land Surveying (Palmetto), 2015, H.M. Holloway Solid Waste Facility Pit "G" – Cell 2 and 3 Construction Specifications; dated October 2015, 262p.

BSK Associates, Geotechnical Consultants, Inc. (BSK), 2007, Final Report, Slope Stability Analysis, Holloway Gypsum Pits, Lost Hills, California; BSK Project Number G07-116-10B, 101p.

_____, 2017, Report – Slope Stability Analysis, Holloway Landfill—Final Cover/Cap, Los Hills, California; BSK Project Number G17-065-10B, 2p.

Quad Knopf, Inc., 2014, Joint Technical Document (JTD) Report of Disposal Site Information Report of Waste Discharge Preliminary Closure/Post-Closure Maintenance Plan Financial Assurance; completed December 2014: Revised by Palmetto Engineering and Land Surveying, Inc., April 2016, 980p.

United States Environmental Protection Agency (EPA), 2002, Final Report: Issues Involving the Vertical Expansion of Landfills; EPA Grant # R825427C002; webpage location: https://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.highlight/abstract/5407/report/F.

3.0 GEOLOGY AND SUBSURFACE CONDITIONS

3.1 General Geologic Conditions

The Landfill lies along the southwestern edge of California's San Joaquin Valley. The San Joaquin Valley is the southern two-thirds of the Great Valley geomorphic province. The Great Valley province consists of a thick sequence of predominantly marine strata deformed into a northwest oriented, asymmetrical syncline with its axis nearest the western limits of the Valley (Norris and Webb, 1976). In general, the Valley's stratigraphic section overlaps the basement rocks exposed along its eastern edge, while these sediments slope gently westward into the basin. By contrast, the western sediments are generally characterized by steeper dips and local surface exposure along the extreme western edge of the basin. The nearest exposures of

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bedrock crop out approximately 10 to 12 miles to the west-southwest of the Landfill area (Kern County Water Agency (KCWA), 1992).

The rocks found in the adjacent Lost Hills Oil Field range from late Cretaceous to Pleistocene in age. The major units noted by the California Department of Conservation Division of Oil, Gas, and Geothermal Resources (DOGGR) include the Upper Cretaceous Moreno Formation, the Eocene Lodi and Kreyenhagen Formations, the uppermost Eocene through middle Miocene Temblor Formation, the Miocene Monterey and Reef Ridge Formations, the Pliocene Etchegoin Formation and the Plio-Pleistocene Tulare Formation (DOGGR, 1992). With the exception of the Tulare Formation these units are marine in origin. These sediments were derived from erosion of the uplifting mountains surrounding the valley including the Sierra Nevada, Tehachapi, San Emigdio, and the eastern Coast Ranges (KCPD, 1982.)

Many of the Lost Hills formations produce oil with the major contributors from the Miocene. In addition, many sands from the Pliocene Etchegoin Formation are productive as are the fluvial sands from the Plio-Pleistocene Tulare Formation. The predominantly marine sediments are overlain by continental deposits of the Plio-Pleistocene Tulare Formation and in turn by late Pleistocene to Recent alluvium. The Tulare Formation crops out along the ridge of the adjacent Lost Hills Anticline to the east of the site. The Tulare is the oldest formation that crops out locally (ICG Hydrotech, 1991). Most of the Landfill area is covered with alluvium.

3.2 Site Geology

The area of the Landfill is relatively flat and slopes gently to the south-southeast; with elevations on the project site being generally within the 410- to 425-foot contour (United States Geological Survey (USGS) (1954). Two topographic features are present:

1. The northwest-southeast trending Lost Hills Anticline, whose westerly dipping flank borders the eastern limits of the Landfill/mine; and
2. The easterly sloping Antelope Plain, which lies between the mine's western limits and the eastern flank of the Central Coastal Range. The Landfill is located in the relatively flat low spot (swale) along the intersection of these two reverse dipping or sloping regional features.

Because of the Landfill's position on the distal end of the Antelope Fan, the Landfill consists entirely of near-surface or shallow Recent alluvial fan deposits of considerable thickness; these originated from streams emerging from the Coastal Ranges to the west. Other deposits included are older Recent unconsolidated sand, clay, and gravel stream terraces and natural levee deposits. The alluvial deposits are estimated to be approximately 250 to 350 feet thick in the Landfill area. Extensive site characterization drilling, sampling and testing of each approved

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pit generally encountered clay and clay-rich silt profiles to at least 125 feet below ground surface (bgs).

Calcite-flocculated or cemented, very low permeable clays and clay-rich silts ($1x10^{-7}$ to $1x10^{-10}$ cm/sec). In general terms, the native soil section that is very dense and very dry or desiccated are present from 25 to 60 feet bgs (BSK, 2007).

3.3 Landfill Waste Characterization

The Landfill is a Class III Non-Hazardous Industrial Waste Landfill facility sited on approximately 331 acres that was formerly used for the surface mining operations. The Landfill operates under the approved Conditional Use Permit (CUP) 9, Map 28, a California Regional Water Quality Control Board, Central Valley Region Waste Discharge Requirements (WDRs) Order No. 97-078, and a Solid Waste Facility Permit (SWIS 15-AA-0308-01 0-A) issued by the Lead Enforcement Agency (LEA) (Kern County Environmental Health Services Division), which allows for a Class III Non-Hazardous waste landfill at the Landfill. The backfilling of the first pits created from the mining of gypsum began in 1993 with the limited disposal of inert waste streams.

The Landfill is currently allowed to conduct disposal activities on four (4) contiguous "pit areas" known as Pits E, F, G and the Pit F/G Connection Area, by backfilling them with alternating equal lifts or a blend of approved imported non-hazardous waste streams and native soils, for a maximum daily import rate of 2,000 tons. This operation is presently a non-classified disposal site for a limited number of approved nonhazardous industrial waste streams. Municipal Solid Waste (MSW) is not disposed at the Landfill. This is not a public Landfill facility. H.M. Holloway, Inc., is the sole operator of all operations within the limits of the ±3,200 acres it controls at Lost Hills. The area permitted by the approved modified CUP and Solid Waste Facility Permit covers approximately 331 ± acres of Landfill's area.

3.4 Groundwater

The mine and the Landfill site are underlain by a portion of the Kern County Groundwater Basin and are within the San Joaquin Hydrologic Study Area defined by the California Department of Water Resources and the Kern County Water Agency (KCWA, 1992). Most of the usable groundwater in the basin occurs in the unconsolidated deposits of late Tertiary and Quaternary age (ICG Hydrotech, 1991).

These confined and unconfined resources in the region are generally limited to the eastern flank of the Lost Hills anticline or oil field (KCWA, 1992), some three miles east of the Landfill site. The groundwater produced immediately to the east of the Lost Hills Anticline contains total dissolved solids (TDS) concentrations above 2,000 milligrams per liter (mg/L) in the

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confined aquifer and above 3,000 mg/L in the overlying unconfined aquifer (KCWA, 1992). Even the uppermost non-marine Tulare sands found in the adjacent Lost Hills Oil Field have TDS concentrations in the range of 15,500 mg/L (DOGGR, 1992). The groundwater conditions at the site are best described in a staff memo by an Associate Engineering Geologist, to Dane S. Johnson, Senior Engineering Geologist of the California Regional Water Quality Control Board (August 30, 2002):

> "The Holloway facility is located in an area of unique geologic and hydrogeologic conditions that are conducive to waste discharge. First encountered groundwater occurs in thin, laterally discontinuous and vertically stratified, sand lenses found at a depth of approximately 30 feet below the waste management units. This groundwater is of poor quality with an average Total Dissolved Solids (TDS) concentration of 6,016 mg/l and concentrations of selenium and nitrate that exceed the respective primary MCLs for drinking water. Selenium ranges from 57 to 219 µg/l and nitrate ranges from 14 to 598 mg/l. Secondary drinking water standards are also exceeded for manganese, chloride, and sulfate. First encountered groundwater also exceeds Agricultural Water Quality Goals for chloride, molybdenum, selenium, specific conductance and TDS."

> "The same geologic conditions that made it possible for gypsum to form (extremely low permeability) also provide for excellent waste containment. Additionally, the waste streams contain very little moisture and the geologic materials at the bottom of the waste management units are essentially moisture deficient. The average precipitation is approximately five (5) inches per year and the average evaporation rate is approximately 80 inches per year."

Collectively, the very limited local groundwater data suggests that an unconfined or semi-unconfined aquifer may exist locally at approximately 150 to 350 feet bgs, along with the very localized or limited areas of very shallow and thin perched zones that have been encountered on the Landfill's property. However, none of these local groundwater resources seem to be adequate or self-sustaining. All available data on groundwater quality also indicates (1) a very neutral pH, and (2) water of a very poor quality, with TDS concentrations generally in the range of 3,000 to 9,000 mg/kg (or parts per million (ppm)).

Holloway monitors the first occurrence of groundwater beneath the disposal pits and has been doing so since 1993. A majority of the disposal site overlies an area of exempt aquifer located in deeper confined zones and formations. These aquifer exemptions underlie the designated boundaries of the adjacent Lost Hills Oil Field, which extend into most of the disposal site.

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3.5 Regional Faulting and Seismicity

In general, the western side of the San Joaquin Valley is characterized by compressional features generally created or influenced by the regional strike slip movement of the San Andreas Fault, which trends northwest-southeast approximately 30 miles west of the Landfill area (Bakun, et.al., 1996). The Lost Hills anticline is one of the many producing folds that parallel the Coast Range-Great Valley boundary (Norris and Webb, 1976).

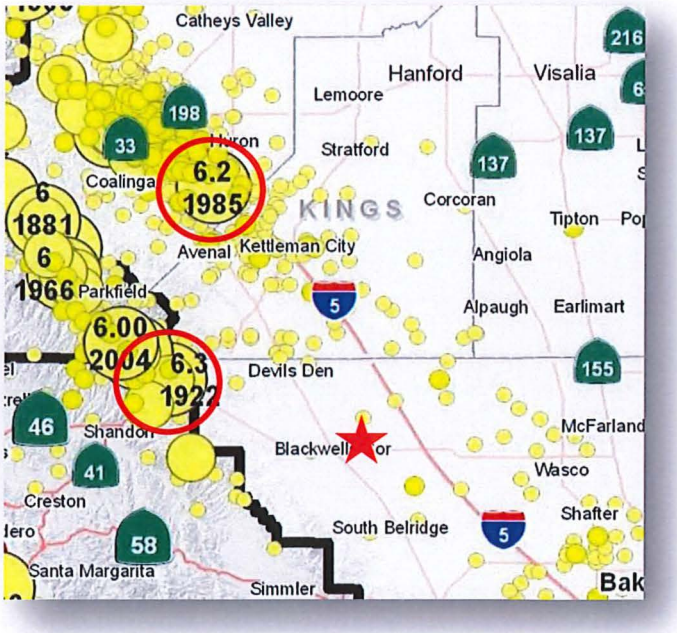
The Landfill property lies on a distal portion of the easterly/northeasterly dipping monoclinic Antelope Plain; this regional trend has been interrupted or reversed by the opposing westerly dipping flank of the Lost Hills anticline. The resulting low relief localized saddle or flattening has been created by the intersection of the opposing slopes of these two regional features.

3.6 Site Faulting and Seismicity

Faulting in the immediate area of the Landfill area includes several faults delineated by stratigraphic correlations of wells in the Lost Hills Oil Field (DOGGR, 1991). These faults appear to trend normal to the structural contours of the anticline. They are normal faults with minor displacements. It appears that these faults are generally inactive, and that no active faults cross the project site. Faulting in the adjacent oil field cuts into the Tulare Formation but appears to die out before reaching the surface. The only notable epicenter was approximately 3 miles to the north of the Pits "F" and "G" with a maximum Richter magnitude of 2.9 (KCPD, 1982). A study conducted immediately to the southeast of the project site revealed no signs of active faulting (ICG Hydrotech, 1991).

The two largest earthquakes (*red circles*) with 50 miles of the Landfill (*red star*) are:

- **1922 Parkfield Earthquake,** dated March 10, 1922, Magnitude 6.3Mw, located 27 miles west-northwest (*San Andreas fault zone*)[1].
- **1985 Kettleman Hills Earthquake,** dated August 4, 1985, Magnitude 6.2Mw, located 40 miles northwest (*Coalinga Anticline*)[2].



[1] Bakun, 1988
[2] Ekström, et.al., 1992

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3.7 Hydrology

The Landfill is identified within the Federal Emergency Management Agency (FEMA) FIRM Flood Panel # 060075 0375B (9/29/86), and no portions of the project area are within Flood Zone A (areas of 100-year flood); therefore, no portions of the project area are within a Special Flood Hazard area. No housing exists in the project area.

Due to the sparse rainfall in this arid region, the existence of naturally occurring surface water is very rare. According to the California Department of Water Resources (DWR, 2006), the Landfill area is within the Tulare Lake Hydrologic Region, San Joaquin Valley Groundwater Basin, Kern County Subbasin. The Landfill area naturally drains to the north, and then along and under Holloway road, and to the northeast-east via channels through the Lost Hills structure (through Sections 24 T.26S., R.20E., and 30 T.26S., R.21E., MDB&M.

Prior to the present preparation of Pits "E", "F", and "G" for disposal operations, surface runoff water usually caught in the depleted pits escaped only by a combination of evaporation and/or was reused for dust control on mine roads. Rainfall at the Landfill area has been established at 5 to 6 inches on a mean annual basis, by the Kern County Water Agency (KCWA, 1992).

Because of the region's relatively flat topographic relief, short term 100-year storm water sheet flow runoff conditions can occur. Based on the Kern County Hydrology Manual (Hromadka, 1993), the 100-year, 24-hour storm in the vicinity of the Landfill area is predicted to yield 2.5 inches of precipitation. Based on the Kern County Hydrology Manual (Hromadka, 1993), the 100-year, 1-hour precipitation event in the vicinity of the Landfill area is predicted to yield 0.63 inches of precipitation.

Laboratory analysis of the local rainwater indicated a pH of 7.6. However, to minimize the chances of any surface runoff entering, flooding, filling, or eroding the pits during the course of backfilling operations, a 6 to 7 foot high continuous earthen berm system has been constructed immediately around their perimeters, preventing any possible surface drainage from entering these pits.

4.0 POTENTIAL FOR RELEASE OF LIQUIDS

The potential for release of liquids from the existing unlined waste mass as a result of the proposed vertical expansion of the landfill was evaluated by comparing the average waste moisture content profile to estimate values of the field capacity of the existing waste under the current conditions and the proposed expansion. The field capacity is defined as the moisture content that a porous material (typically municipal solid waste (MSW)) will store within its

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pores by capillary stress. In theory, any moisture within the porous material that is in excess of the field capacity would drain out of the porous material via gravity.

The Landfill does not accept MSW; therefore, the potential for liquid's release must be evaluated in light of the accepted waste characteristics.

In a typical MSW landfill, as waste is added to the landfill, the loading from newer waste will cause older waste to consolidate and lose void space, thereby decreasing its field capacity. A concern associated with vertical expansions of unlined landfills is that adding waste over the existing waste will result in a reduction of the field capacity of the existing waste, thereby lowering its liquid holding potential. If the moisture content in the waste exceeds its field capacity, leachate could be released and these liquids could come into contact with the native soils underlying the unlined waste mass.

Field capacity of the waste at a given MSW landfill can be calculated based on a relationship developed by Tchobanoglous et al. (1993). The field capacity calculation of the existing waste stream is evaluated using the recommendations for "typical waste" given in Zekkos et al. (2006).

The Landfill does not accept MSW. Currently, the Landfill accepts dewatered biosolids and fly ash. Pore-space in the current material is very low. The water content of the waste stream and the surrounding soil is dry. Therefore, the potential for water generation is very low and cannot be modeled by Tchabanoglus et al (1993) or Zekkos, et al (2006).

Proposed future waste streams include chipped construction lumber, concrete and construction demolition rubble, rip rap and clean construction dry wall demolition material (Quad Knopf, Inc., 2014: see p.359). In addition, the Landfill does not accept high liquid content wastes (Quad Knopf, Inc., 2014: see p. 356). Even if the additional material is accepted, this material is dry sand would not generate significant water.

Therefore, the potential for liquid generation is very low.

5.0 SLOPE STABILITY ANALYSIS

5.1 General

In association with this study, BSK performed slope stability analyses of the waste mass and final cover system for the proposed final (ultimate) configuration of the Landfill. This section describes the analytical methods used, material properties assigned, cross-sections developed,

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and results and interpretations of the stability analyses performed for the proposed final cover grading.

The analyses included assessing overall (i.e., global) waste slope stability under static and dynamic conditions as well as assessing the static and dynamic stability of the final cover system. For the purposes of this study, the final cover system was assumed to be a 4-foot thick evapotranspirative (ET) monolithic soil cover (**Figure 3—Final Cover and Existing Topography**).

5.2 Slope Stability Criteria

Under static conditions, Title 27 of the California Code of Regulations (CCR) requires that final landfill slopes possess a factor of safety (FS) against sliding of at least 1.5. For seismic loading conditions, Title 27 of the CCR requires that final landfill slopes possess a pseudostatic FS against sliding of at least 1.5 under the design earthquake event.

ES has designed landfill slopes at a 3:1 ratio to a maximum height of 25'-0", followed by a shallower slope of approximately 11.6:1 (4.2°). The figure showing this is attached as **Figure 3**. However, due to the difficulty of satisfying the pseudostatic FS requirement in many areas of California, a seismic displacement analysis was conducted to demonstrate adequate slope performance under seismic loading. This is further discussed in Section 5.8 of this report.

In California, it is common to require that calculated seismic displacements of the slopes not exceed 12 inches for both final waste slopes and final cover systems of unlined facilities under the design earthquake event. This seismic displacement threshold criterion has been adopted for the current study.

5.3 Cross-Sections Analyzed

In order to evaluate the global stability of the final waste slopes, BSK (2017) evaluated an idealized cross-section.

One (1) typical cross section was selected to model the slope. For each condition, a minimum of 10,000 randomly generated slip circles were analyzed for the critical factor of safety.

Limit Equilibrium Slope Stability Analysis

BSK (2017) completed a slope stability analysis dated May 3, 2017 (BSK, 2017). The scope of work included producing the slope stability analysis and preparation of this report.

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Seismic Displacement Analysis

BSK performed a slope stability analysis on a representative section of the landfill and future cap. The landfill was modelled with a depth of 25 feet above adjacent grade at a 3:1 (horizontal / vertical) slope ratio, followed by a shallower slope of approximately 11.6:1 (4.2°). This model was analyzed for stability in the static and pseudostatic condition using Janbu's Simplified Method of Slices and modeled in the computer program, SLIDE v6.0.

The soil parameters were determined through estimations based on BSK field exploration and laboratory testing from a prior investigation of on-site materials (BSK, 2007). For the native material which contains the landfill waste material, an internal strength friction angle of 30.0 degrees, cohesion of 1,000 pounds per square foot (psf), and unit weight of 125 pounds per cubic foot (pcf) were used in the analysis.

- For the landfill waste material and clay cap, an internal strength friction angle of 20.0 degrees, cohesion of 500 psf, and unit weight of 120 pcf were used in the analysis.
- Variables for the pseudo-static slope stability analysis were acquired through the United States Geological Society's Unified Hazard Tool, located at:

earthquake.usgs.gov/hazards/interactive/.

5.4 Material Properties

The soil parameters were determined through estimations based on BSK's field exploration and laboratory testing from the prior on-site materials assessment (BSK, 2007). The strength type for both static and pueudo-static slope stability is Mohr-Coulomb.

TABLE 2 MATERIAL PROPERTIES: STATIC AND PSEUDO-STATIC STABILITY ANALYSIS

Materials	Unit Weight (pounds per cubic foot (pcf))	Cohesion Intercept (pounds per square foot (psf))	Friction Angle (degrees)
Native Subgrade	125	1,000	30
Landfill Waste	120	500	20
Final Clay Cap	120	500	20

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5.5 Earthquake Loading Parameters

The horizontal ground motion site coefficient was found to be 0.285, based on a 2,495-year maximum earthquake return period. Vertical ground motions and groundwater conditions were not considered in the analysis.

5.6 Liquefaction

The liquefaction susceptibility of the existing native alluvial soils underlying the site is considered low. The depth to groundwater is approximately 150 to 300 feet bgs. as discussed in Section 3.4.

There are laterally discontinuous perched zones at depths of about 30 feet below ground surface (bgs). These shallow perched zones do not appear to contain sufficient volume to generate a liquefaction concern.

Based on the underlying soil and depth to groundwater, groundwater and liquefaction conditions were not considered in the analysis by BSK (2017).

5.7 Settlement:

As per Title 27, §21142, Holloway will grade and maintain each individual Landfill/pit area within the Landfill to prevent ponding. Final grades will be sloped at a minimum 3 percent on top and a maximum of three to one (3:1) on side slopes. A final vegetative cover will minimize erosion. Final vegetation will reduce run off velocities and limit rill and gully soil erosion. At least two permanent surveying monuments will be maintained at each backfilled/capped pit area within the Landfill.

Every five years the site monuments will be surveyed to determine the degree of Landfill settlement. Holloway will repair any differential settlement per the Post-Closure Maintenance Plan (PCMP), Grading and Drainage. No analytical methods exist to accurately estimate potential landfill settlement. Ultimate compression generally ranges from 10 to 20 percent of the overall MSW Landfill thickness. However, this may be difficult to estimate for this Landfill since the waste is characterized as fly ash and dehydrated biosolids.

Holloway will implement an Operations and Maintenance Plan (O&M Plan) at the Landfill to maintain the integrity and effectiveness of the final cover. Semi-annually, Holloway will monitor the site by a visual inspection of the cover system for cracks, eroded areas, and localized depressions. Maintenance will consist of filling and compacting cracks and eroded areas with materials compatible to the original cover system. Holloway staff will fill localized depressions with the appropriate type of final cover material and grade to drain.

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Said O&M Plan should be sufficient to limit problems. Leachate and landfill gas (LFG) generation is not a significant concern due to the dry nature of the waste and the lack of significant volumes of organic waste (Quad Knopf, Inc., 2014).

5.8 Results of Slope Stability and Seismic Displacement Analyses

As stated before, one (1) typical cross section was selected to model the slope. For each condition, a minimum of 10,000 randomly generated slip circles were analyzed for the critical factor of safety. A summary of the critical factors of safety is provided in the table below:

TABLE 3 – STATIC AND PSEUDO-STATIC ANALYSIS RESULTS

STATIC FS,cr	PSEUDO-STATIC FS,cr
2.696	1.244

Because the seismic factor of safety was below the minimum required of 1.5, a Deformation Analysis was completed as part of this study. The following table outlines the results of that calculation:

TABLE 4- SUMMARY OF SLOPE STABILITY AND SEISMIC DISPLACEMENT ANALYSES

Description	Limit Acceleration (K_y)	Potential Ground Acceleration (g)	Calculated Seismic Displacement (inches)[3]
Global waste slope stability	0.3941	0.430	**0.8 to 4.0**

The final calculation is included as **Attachment B – Deformation Analysis**.

6.0 CONCLUSIONS

Based on our engineering analysis, it is our opinion that the slopes as designed at a 3:1 (horizontal:vertical) slope ratio to a maximum height of 25'-0", followed by a shallower slope of approximately 11.6:1 (4.2°), should be grossly stable. The result of our deformation analysis also indicates that the slope deformation will be within tolerable limits and should be stable under the seismic conditions modeled.

[3] Using Makdisi and Seed (1978) using the area for a M=8¼ earthquake.

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7.0 CLOSING

The opportunity to be of service to you on this project is sincerely appreciated.

Respectfully submitted,
ES Engineering Services, LLC

Richard J. Frizzell, PG, QSP/QSD
Senior Geologist

Dean Stanphill, PE, GE
Senior Engineer

5.9.17

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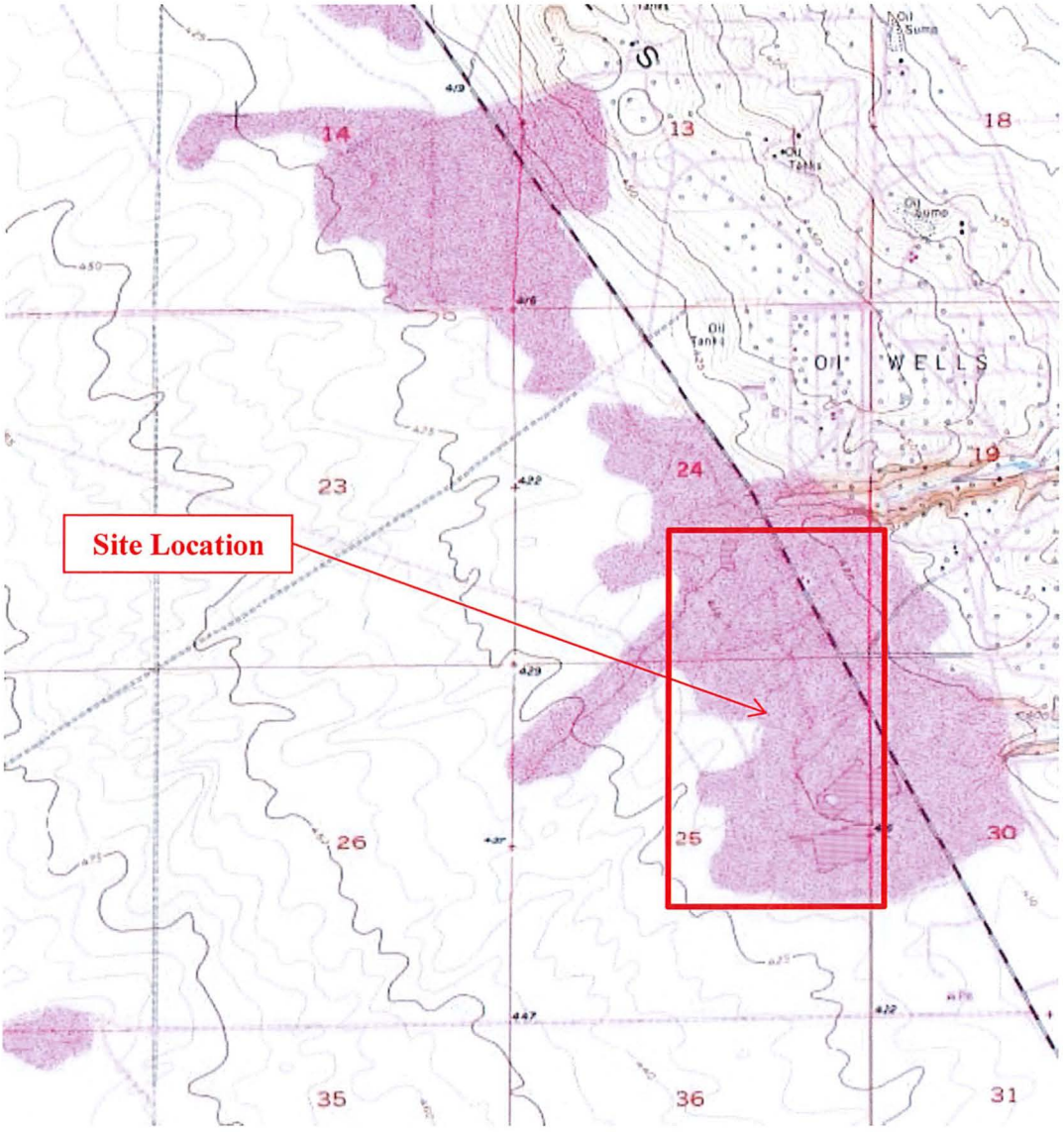
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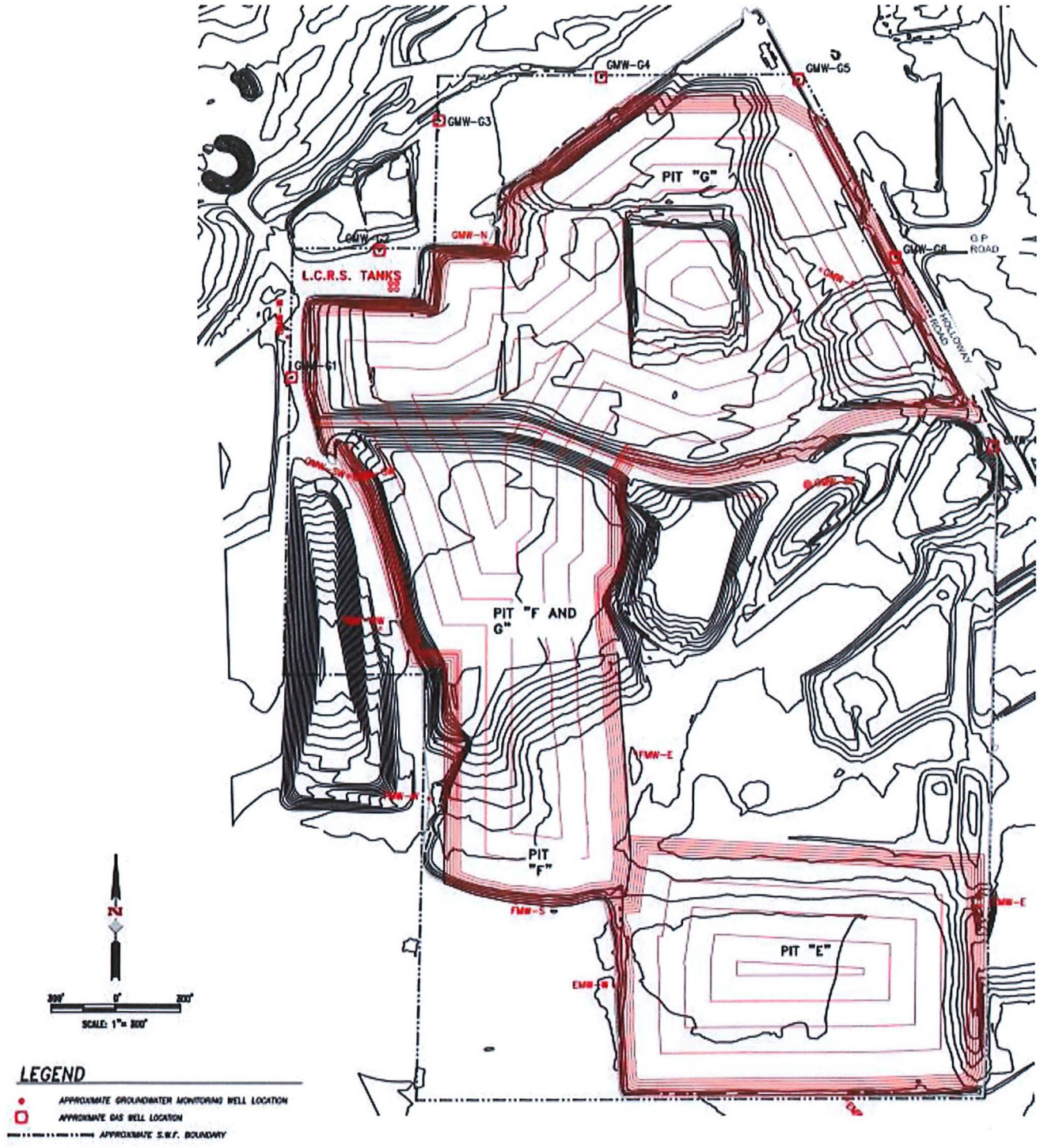
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FIGURES

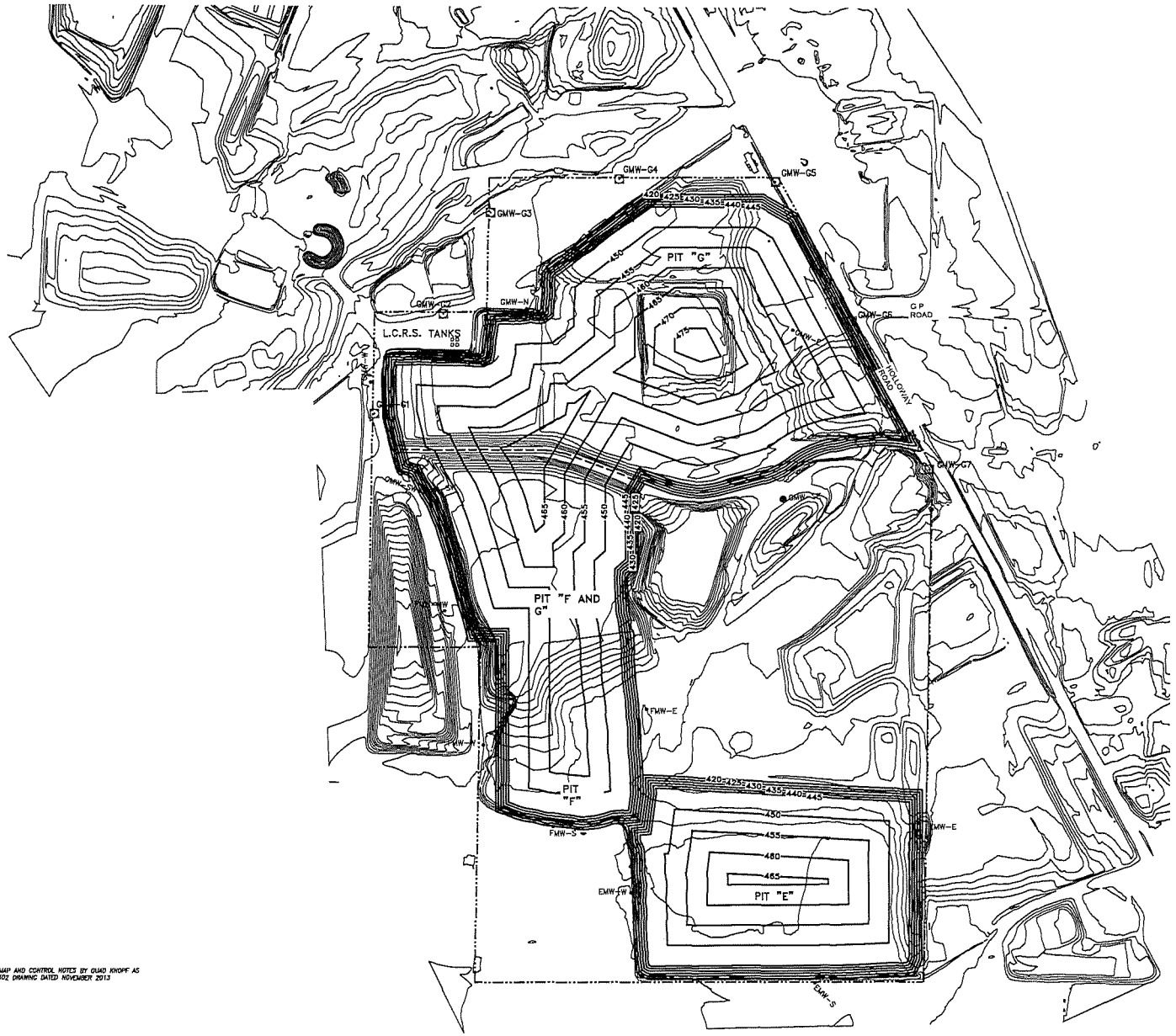
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ES ENGINEERING SERVICES ES ENGINEERING SERVICES, LLC. 1 PARK PLAZA, SUITE 1000 IRVINE, CALIFORNIA 92614 (714) 919-6500	CLIENT: **HALLOWAY ENVIRONMENTAL, LLC**	PROJECT NUMBER: **168734**	FIGURE 1: VICINITY MAP
	PROJECT LOCATION: **14045 Holloway Road, Lost Hills, California**	DATE: 5/2017	



ES ENGINEERING SERVICES ES ENGINEERING SERVICES, LLC. 1 PARK PLAZA, SUITE 1000 IRVINE, CALIFORNIA 92614 (714) 919-6500	CLIENT: **HALLOWAY ENVIRONMENTAL, LLC**	PROJECT NUMBER: **168734**	FIGURE 2: SITE MAP
	PROJECT LOCATION: **14045 Holloway Road, Lost Hills, California**	DATE: 5/2017	



N

300' 0' 300'

SCALE: 1"= 300'

LEGEND

- APPROXIMATE GROUNDWATER MONITORING WELL LOCATION
- APPROXIMATE GAS WELL LOCATION
- APPROXIMATE S.W.F. BOUNDARY

HORIZONTAL CONTROL

THE HORIZONTAL DATUM FOR THIS SURVEY WAS ESTABLISHED USING THE CALIFORNIA COORDINATE SYSTEM, ZONE 5, NAD83 (EPOCH 2002.00) AND DETERMINED LOCALLY BY THE GEODETIC VALUES PUBLISHED BY THE NATIONAL GEODETIC SURVEY FOR THE FOLLOWING CONTINUOUS OPERATING REFERENCE STATIONS:

DELANO AIRCS2005	PID DM6183
VOGELRANCHCS2004	PID DH4506
BUTTONWILLCS2005	PID DM7566
STONCORRALCN2004	PID DH3885

VERTICAL CONTROL

THE VERTICAL CONTROL FOR THIS SURVEY WAS BASED ON THE BENCHMARK SHOWN ON THE TOPOGRAPHIC SURVEY BY OTHERS NAMED "DK POINTS" LOCATED ON THE SOUTH SIDE OF HIGHWAY 46, 3 MILES EAST OF HIGHWAY 33. ELEV=819.583 (1973)

NOTE: BASE MAP AND CONTROL NOTES BY GUAD KNOPF AS PART OF C-502 DRAWING DATED NOVEMBER 2013

engineering services

ES ENGINEERING SERVICES, LLC
1 PARK PLAZA #1000
IRVINE, CA 92614
WWW.ES-ONLINE.COM

REV	DATE	DESCRIPTION

STATUS:

PLOT DATE:

CLIENT: H.M. HOLLOWAY, INC.
2019 WESTWIND DRIVE, SUITE B
BAKERSFIELD, CA 93301

PROJECT LOCATION: VERTICAL LANDFILL EXPANSION
13650 HOLLOWAY ROAD
LOST HILLS, CA 93249

DESCRIPTION: FINAL COVER AND EXISTING TOPOGRAPHY

PROJECT NO. 168734

SHEET: FIG-3

FILE: S:\HOLLOWAY ENV\LC_C502\VERTICAL LANDFILL EXPANSION\ACAD DOCS\C-C502 CLOSURE.DWG

ATTACHMENT A
BSK REPORT – SLOPE STABILITY ANALYSIS

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BSK ASSOCIATES
50th 1966-2016 ANNIVERSARY

700 22nd Street
Bakersfield CA 93301
P 661.327.0671
F 661.324.4218
www.bskassociates.com

Sent via email: dan.allen@hmhgypsum.com

BSK Project G17-065-10B

May 3, 2017

Mr. Dan Allen, SVP
Holloway Environmental
2019 Westwind Drive, Suite B
Bakersfield, California 93301

SUBJECT: **Report – Slope Stability Analysis**
Holloway Landfill – Final Cover/Cap
Lost Hills, California

Dear Mr. Allen,

BSK Associates (BSK) has conducted a slope stability analysis for the Holloway Landfill in Lost Hills, California. Our scope of services included producing the slope stability analysis and preparation of this report.

1.0 BACKGROUND

BSK understands that the site is located on Holloway Road in Lost Hills, California. BSK understands that in the future, Holloway Landfill will be required to have a final cap over the landfill. BSK understands the dimensions of the cap will be as follows: From natural grade, a 3:1 (H:V) slope to a height of 25'-0", followed by a shallower slope of approximately 11.6:1 (4.2°).

2.0 SLOPE STABILITY ANALYSIS

Based on preliminary drawings provided by ES Engineering Services, we performed a slope stability analysis on a representative section of the landfill and future cap. The landfill was modelled with a depth of 40'-0" and a slope gradient of 1.5:1. This model was analyzed for stability in the static and pseudo-static condition using Janbu's Simplified Method of Slices and modeled in the computer program, SLIDE v6.0. The model was analyzed for stability using circular slip surfaces originating and terminating at critical points along the cross sections analyzed. The inputs required for the site include slope geometry, subsurface profile data, horizontal and vertical ground acceleration, as well as constraints on the upper and lower limits of the search region for the critical slip circle, numbers and locations of initiation and termination points of trial surfaces, and number of trial surfaces for each initiation point.

The soil parameters were determined through estimations based on our field exploration and laboratory testing from a prior investigation of on-site materials (BSK Report *Slope Stability Analysis – Holloway*

Gypsum Pits – Lost Hills, California; June 28, 2007). For the native material which contains the landfill waste material, an internal strengh friction angle of 30.0 degrees, cohesion of 1,000 pounds per square foot, and unit weight of 125 pounds per cubit foot were used in the analysis. For the landfill waste material and clay cap, an internal strengh friction angle of 20.0 degrees, cohesion of 500 pounds per square foot, and unit weight of 120 pounds per cubit foot were used in the analysis.

Variables for the pseudo-static slope stability analysis were acquired through the United States Geological Society's Unified Hazard Tool, located at *earthquake.usgs.gov/hazards/interactive/*. The horizontal ground motion site coefficient was found to be 0.285, based on a maximum considered earthquake return period of 2495-years. Vertical ground motions and groundwater conditions were not considered in the analysis. One (1) typical cross section was selected to model the slope. For each condition, a minimum of 10,000 randomly generated slip circles were analyzed for the critical factor of safety. A summary of the critical factors of safety is provided in the table below:

STATIC FS,cr	PSEUDO-STATIC FS,cr
2.696	1.244

3.0 CLOSING

BSK appreciates the opportunity to be of service to you on this project. If you have any questions, or would like additional information, please call us at (661) 327-0671.

Respectfully submitted,
BSK ASSOCIATES



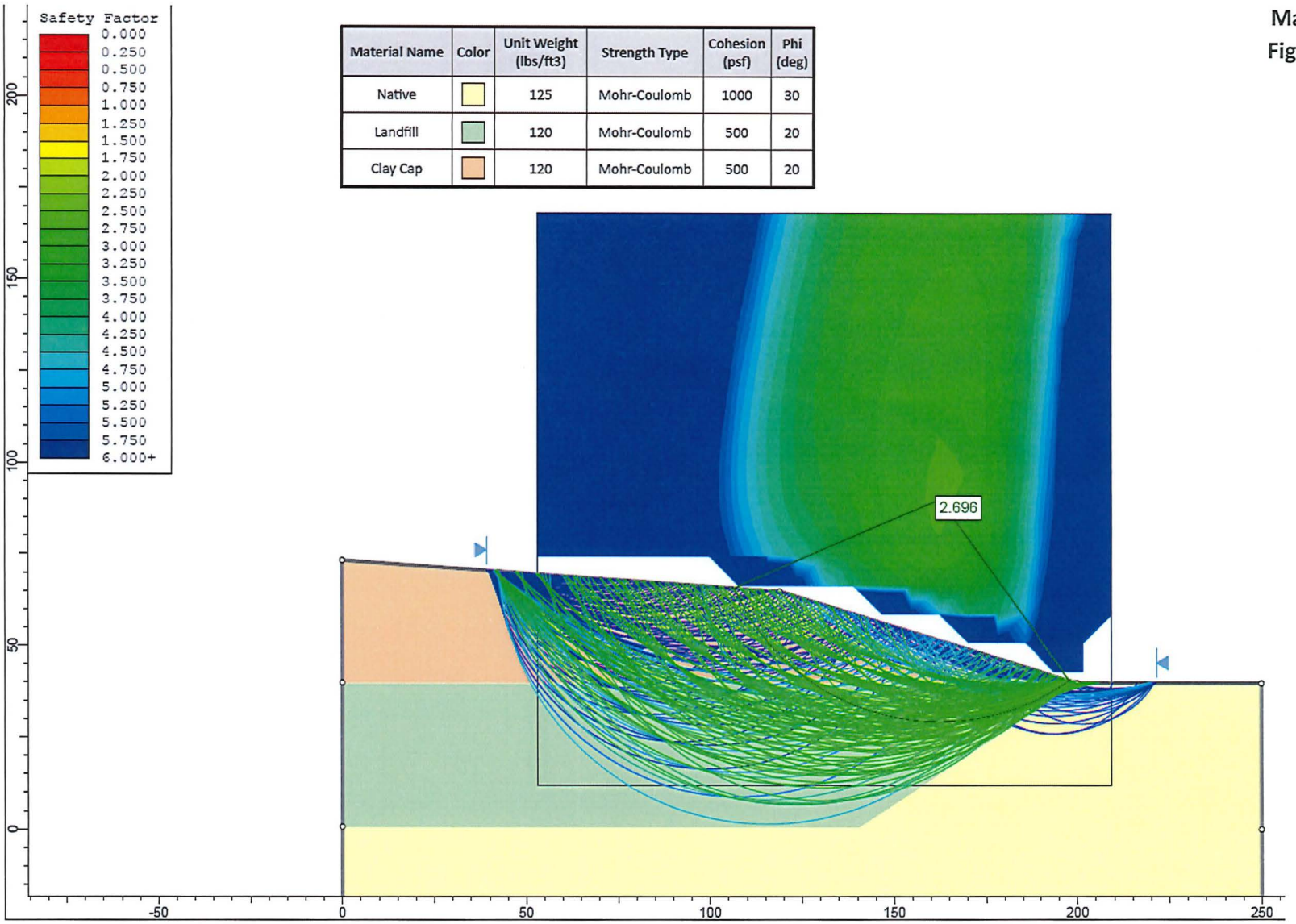
Logan Prosser
Staff Geologist

On Man Lau, P.E., G.E.
South Valley Regional Manager

Attachments: Figure 1: Static Slope Stability Analysis
Figure 2: Pseudo-Static Slope Stability Analysis

BSK Job No. G17-065-10B
May 2017
Figure A-1

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Native		125	Mohr-Coulomb	1000	30
Landfill		120	Mohr-Coulomb	500	20
Clay Cap		120	Mohr-Coulomb	500	20



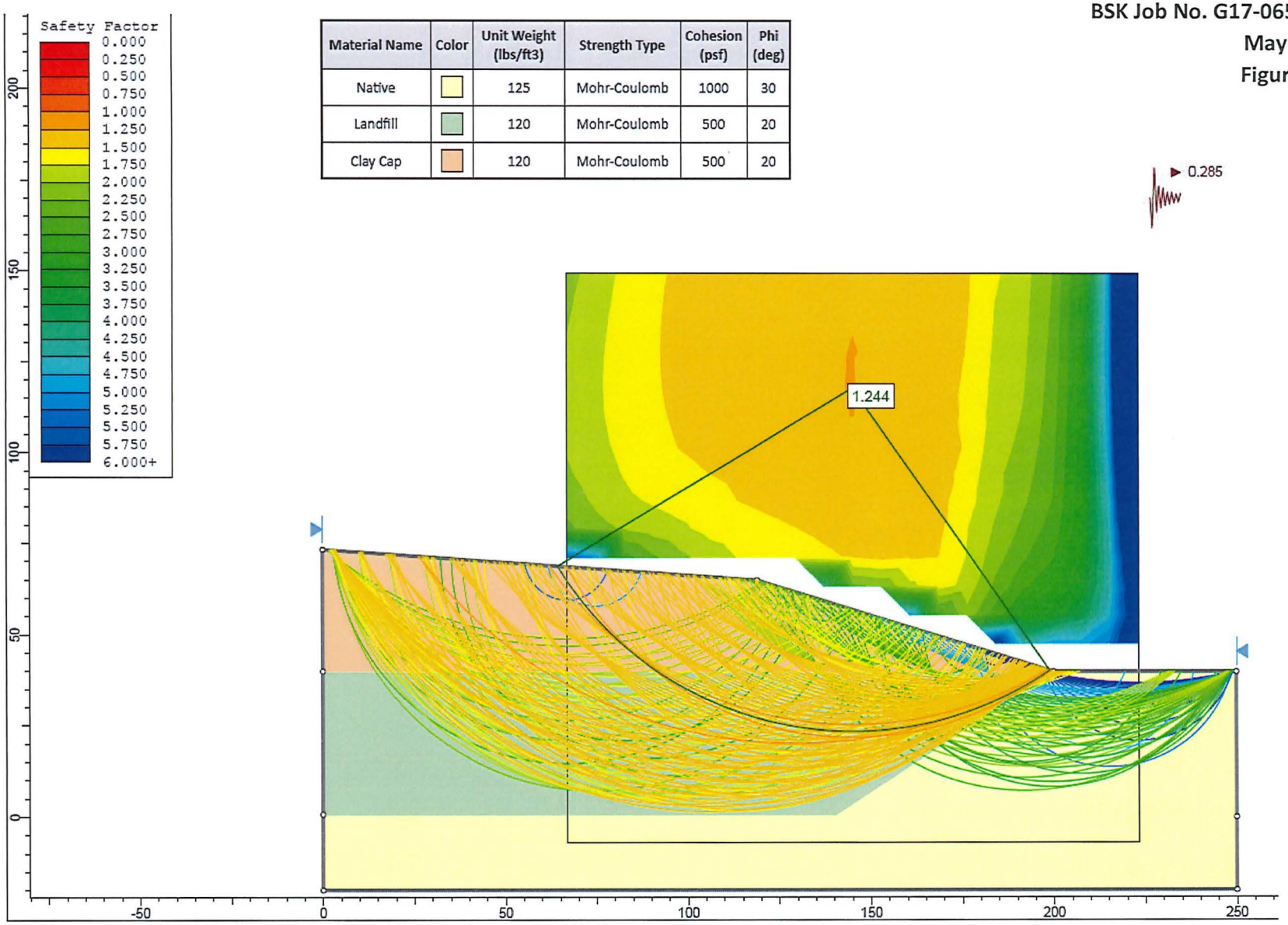
STATIC SLOPE STABILITY ANALYSIS
HOLLOWAY LANDFILL - FINAL CAP

HOLLOWAY ENVIRONMENTAL
LOST HILLS, CALIFORNIA

BSK ASSOCIATES

BSK Job No. G17-065-10B
May 2017
Figure A-2

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Native		125	Mohr-Coulomb	1000	30
Landfill		120	Mohr-Coulomb	500	20
Clay Cap		120	Mohr-Coulomb	500	20



PSEUDO-STATIC SLOPE STABILITY ANALYSIS
HOLLOWAY LANDFILL - FINAL CAP

HOLLOWAY ENVIRONMENTAL
LOST HILLS, CALIFORNIA

BSK ASSOCIATES

ATTACHMENT B
DEFORMATION ANALYSIS

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RE: Deformation Analysis

Logan Prosser <lprosser@bskassociates.com>

Fri 5/5/2017 4:40 PM

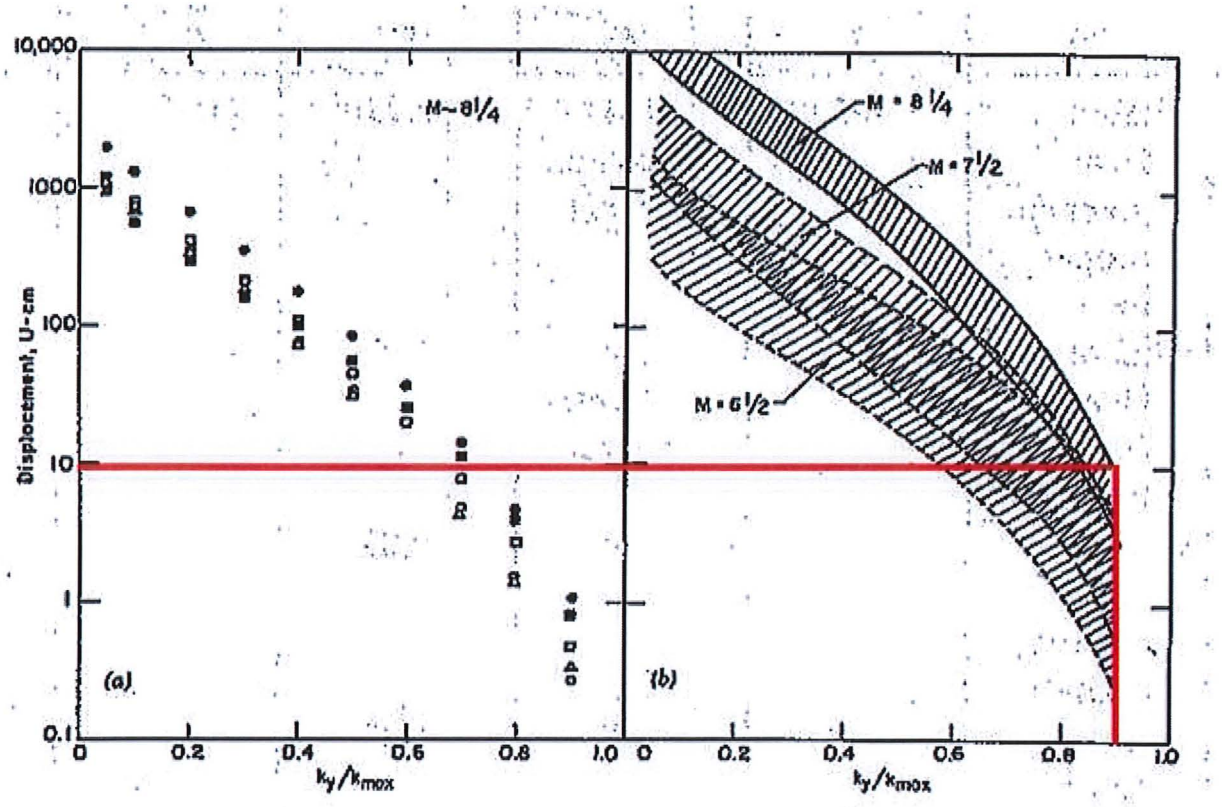
To: Dean Stanphill <dstanphill@es-online.com>;

Cc: On Man Lau <olau@bskassociates.com>; Richard Frizzell <rfrizzell@es-online.com>; Dan Allen <dan.allen@hmhgypsum.com>; Adam Terronez <aterronez@bskassociates.com>;

After running the analysis to figure out with horizontal force (Ky) gave a FS,cr = 1.000;

Ky = 0.3941
PGA according to the USGS Seismic Design tool = 0.430

Consulting the Makdisi and Seed (1978) chart, below, I chose the area for a M=8-1/4 earthquake.



The results shown here indicate a displacement, U, of 10-cm.

From: Dean Stanphill [mailto:dstanphill@es-online.com]
Sent: Friday, May 05, 2017 3:02 PM
To: Logan Prosser
Cc: On Man Lau; Richard Frizzell; Dan Allen
Subject: Deformation Analysis

Hello Mr. Prosser,

Since the psuedostatic factor of safety is less than the prescriptive 1.5, I have to do a deformation analysis. Can you crank out for me. The way I have always done it is to determine the yield acceleration at a Factor of Safety of 1 and compare against the PGA and then use Figure 14 from Makdisi and Seed (1977).

I know it will likely be only a couple of inches, but I need to verify and add in the calculations.

Thanks

Solid Waste & Recycling

Dean Stanphill, PE, GE

Senior Manager

ES ENGINEERING

ES Engineering Services, LLC.

www.es-online.com

775-560-3911 mobile

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BSK REPORT
FEBRUARY 8, 2019

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BSK ASSOCIATES

GEOLOGY AND SOILS REVIEW
IN SUPPORT OF COMPOST FACILITY PERMITTING
LOST HILLS ENVIRONMENTAL, LLC COMPOST SITE
13850 HOLLOWAY ROAD
LOST HILLS, CALIFORNIA

BSK PROJECT E19-004-01B

PREPARED FOR:

LOST HILLS ENVIRONMENTAL, LLC
2019 WESTWIND DRIVE, SUITE B
BAKERSFIELD, CALIFORNIA 93301

FEBRUARY 8, 2019

GEOLOGY AND SOILS REVIEW
IN SUPPORT OF COMPOST FACILITY PERMITTING
LOST HILLS ENVIRONMENTAL, LLC COMPOST SITE
13850 HOLLOWAY ROAD
LOST HILLS, CALIFORNIA

Prepared for:

Mr. Dan Allen
Chief Operating Officer
Lost Hills Environmental, LLC
2019 Westwind Dr., Suite B
Bakersfield, California 93301

BSK Project: E19-004-01B

February 8, 2019

Prepared by:

FOR Kyle Wright
Staff Geologist

Lynne Baumgras, PhD, PG, CHG, CEG, PMP
Environmental Group Manager



On Man Lau, PE, GE
South Valley Regional Manager

BSK Associates
550 West Locust Avenue
Fresno, California 93650
(559) 497-2880
(559) 497-2886 Fax
www.bskassociates.com

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3.0 GEOLOGY 3

4.0 SOILS AND PERMEABILITY 3

5.0 COMPARISON TO COMPOSTING GENERAL ORDER REQUIREMENTS 4

6.0 CONCLUSIONS AND RECOMMENDATIONS 5

7.0 LIMITATIONS 5

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Figure 1: Site Vicinity Map
Figure 2: Site Plan
Figure 3: Regional Geologic Map
Figure 4: Soil Map

EXECUTIVE SUMMARY

BSK Associates (BSK) completed a review of geology and soils characteristics for Lost Hills Environmental, LLC in support of permitting for a planned compost facility (Site) in Lost Hills, California. Information compiled in this geology and soils review was compared to permit requirements for soil permeability as established in the State Water Resource Control Board Order WQ 2015-0121-DWQ General Waste Discharge Requirements for Composting Operations (Composting General Order).

A Draft Environmental Impact Report (DEIR) to evaluate potential environmental impacts of the Holloway Landfill was prepared in October 2007 by H.M. Holloway and was submitted to the Kern County Planning Department (KCPD). The proposed compost facility lies within the 2007 DEIR study area. This Report describes BSK's findings and conclusions developed from review of the soils and geology information presented in the DEIR. and compares the soil characteristics to permeability values set forth in the Composting General Order. As part of this review, BSK also conducted a Site visit to visually inspect site and soil conditions.

Based on published soil survey data, it appears that native surficial soils at the proposed compost Site will not meet the Composting General Order requirement of 1.0×10^{-5} cm/s or less for working surfaces without engineering measures such as compaction. However, geotechnical boreholes at Pits F and G indicated that thick sequences of silty clays, clayey silts, and silty clays may be present at depth beneath the proposed Site area. Should these clays be present in the Site area, the working surfaces permeability criteria may be met.

BSK recommends that that the surface of the composting areas will be graded and compacted prior to commencement of composting operations to provide a minimum 1-foot thickness and a permeability value that meets the Composting General Order requirement of 1.0×10^{-5} cm/s or less for working surfaces. Prior to construction, BSK will compact the selected soil sample to a predetermined compaction based on ASTM D1557 in the laboratory in order to achieve the permeability requirement of 1.0×10^{-5} cm/s or less. During construction, BSK recommends that one (1) compaction test be performed per each 1,000 cubic yards of soil placed. The compaction requirement should be at a degree of compaction as determined in the laboratory.

1.0 INTRODUCTION

BSK Associates (BSK) completed a review of geology and soils characteristics for the Lost Hills Environmental, LLC compost facility (Site) in Lost Hills, California. Lost Hills Environmental, LLC is planning to build a composting facility at the landfill site and has applied for a proposed Modification to Kern County Conditional Use Permit (CUP) No. 9, Map No. 28 for the Holloway Landfill.

In 2007, a Draft Environmental Impact Report (DEIR) for the Holloway Landfill was prepared by the Kern County Planning Department (KCPD) in accordance with the California Environmental Quality Act (CEQA) in order to analyze the potential environmental impacts of the Holloway Landfill. The scope of work performed in this geology and soils review consisted primarily of reviewing soils and geology information presented in the DEIR and comparing the geology and soil characteristics to the Composting General Order requirements. BSK also conducted a Site visit to visually inspect site and soil conditions. Information compiled in this geology and soils review has been compared to permitting requirements of the Composting General Order.

This assessment was initiated per the authorization of Mr. Dan Allen, of Lost Hills Environmental, LLC.

2.0 SITE DESCRIPTION

The Site is owned and operated by Lost Hills Environmental, LLC. **Figure 1** is a Site Location Map. The Landfill is located approximately 3.5 miles west-northwest of the community of Lost Hills, California. The approximately 850-acre Landfill is bound on the east by Holloway Road and on the south by State Highway 46. The proposed compost area (Site) is located within the southern 1/3 of Kern County Assessor's Parcel (APN) 057-240-60. **Figure 2** is a Site Plan which shows the boundaries of the proposed compost area. The proposed compost area has an area of approximately 40 acres.

The terrain of the Site and vicinity is generally flat and gently slopes southeast. The Lost Hills Anticline western facing slope borders the east side of the Site and the Antelope Plain rises gently southwest from the west boundary of the Site to the east flank of the Coastal Range. As indicated on the United States Geological Survey (USGS), 7.5-minute Antelope Plain Topographic Quadrangle Map, the site is located in a topographic trough between the Antelope Plain and the Temblor Mountain Range on the west and southwest and the Lost Hills to the east and northeast. The Site elevation is approximately 415 feet above mean sea level (USGS, 2015).

The Antelope Plain and the western slope of the San Joaquin Valley east of Lost Hills include the greater part of the valley lands in the Avenal-McKittrick area. Despite the large size of the area, little information is available regarding groundwater conditions. This area is characterized by low rainfall, groundwater of inferior quality, and high concentrations of salts in the soil and subsoil. Accordingly, there has been little agricultural development in this area. For the most part, the land is used only for grazing.

3.0 GEOLOGY

Figure 3 is a map of regional geology. Surficial deposits in the vicinity of the proposed Compost Site are mapped as Quaternary Alluvium. The Site lies within an area of thin, near surface or shallow Recent alluvial fan deposits and older Recent unconsolidated sand, clay, terrace and natural levee deposits, all of which are dominated by very large sections of very dense clays and clay-rich silts. These Recent deposits originated from streams emerging from the Coastal ranges to the west and are estimated to be approximately 250 to 350 feet thick in the project area.

The rocks of the adjacent Lost Hills Oil Field range from Late Cretaceous to Pleistocene in age. The major units include the Upper Cretaceous Moreno Formation, the Eocene Lodi and Kreyenhagen Formations, the late Eocene through middle Miocene Temblor Formation, the Miocene Monterey and Reef Ridge Formations, the Pliocene Etchegoin Formation, and the Plio-Pleistocene Tulare Formation. Except for the Tulare Formation, these units are Marine in origin. The sediments associated with these formations were derived from the uplifting mountains surrounding the valley including the Sierra Nevada, Tehachapi, San Emidio, and the Coastal Ranges.

Many of the Lost Hills formations produce oil with the major contributors from the Miocene Epoch. Sands from the Pliocene Etchegoin Formation and the Plio-Pleistocene Tulare Formation are productive as well. The predominantly marine sediments are overlain by continental deposits of the Plio-Pleistocene Tulare Formation, which are overlain by Recent alluvium. The Tulare Formation outcrops along the ridge of the adjacent Lost Hills Anticline east of the site. Most of the site is covered with Recent alluvium.

Geotechnical drilling was conducted in the areas of Pits "F/G Connection Area," "E," "F," and "G" in 1993. The geotechnical boreholes were advance to depths of 25 to 50 feet below the pit floor surface grades. Thick sequences of silty clays, clayey silts, and silty clays were encountered at depths to 50 feet below the pit floor at some locations. Permeability test values indicated that permeability values for samples collected in twelve boreholes of Pits F and G are comparable to or are less than the 1 x 10-7 cm/s permeability value for landfill liner material. It is unknown, but likely, that the thick clay sequences observed at Pits F and G are also present in the proposed compost Site area.

4.0 SOILS AND PERMEABILITY

Quaternary alluvial fan deposits consisting of clay, silt, sand, and gravels originating from the mountain complexes to the west are common in the southwestern portion of the San Joaquin Valley. The Antelope Valley Flood Plain provides the route for the sediment deposits. The recently deposited soils lack stratigraphic development and soil horizons and are commonly found in active environments such as the toe of a mountain slope or the distal end of a flood plain. The bulk of the soil is of low fertility and consists of sand and rock fragments of unaltered parent material that is susceptible to erosion.

According to the United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) Web Soil Survey, native soils at the proposed compost Site belong to the Typic Gypsiorthids-Kimberlina Association (0 to 5 percent slopes). **Figure 4** shows the mapped soil types at the Site. A soil association is defined by NRCS as two or more geographically associated soils or miscellaneous areas in such an intricate pattern that they cannot be shown separately on the soil maps. Soils of the Typic Gypsiorthids-Kimberlina Association, 0 to 5 percent slopes, occur at an elevation range of 425 to 490 feet above mean sea level (msl) and form at the footslopes of alluvial fans derived from sedimentary rock. The Typic Gypsiorthids-Kimberlina Association has an average annual precipitation of 5 inches. The average annual air temperature is 65 degrees Fahrenheit (°F) and it has a frost-free season of 250 to 300 days. The Typic Gypsiorthids-Kimberlina Association, 0 to 5 Percent Slopes soils, is classified as having a moderately high capacity of the most limiting layer to transmit water with values of 0.57 to 1.98 in/hr (4.2×10^{-4} cm/s to 1.4×10^{-3} cm/s). Permeability of the Typic Gypsiorthids is classified as moderate or moderately rapid.

This soil type is interlaminated with the Kimberlina fine sandy loam. Kimberlina soils are deep, level to moderately sloped, well-drained, fine sandy loams that are found on recent alluvial fans and alluvial plains. The alluvium is derived from sedimentary or granitic rock. Typically, the surface layer is brown, fine sandy loam approximately 9 inches thick. The upper 36 inches of the underlying material is pale brown, fine sandy loam, and the lower part to a depth of 71 inches is pale brown, silt loam. In some areas the surface layer is sandy loam or coarse sandy loam. Permeability of the Kimberlina soil is classified as moderate.

5.0 COMPARISON TO COMPOSTING GENERAL ORDER REQUIREMENTS

The Composting General Order was adopted to ensure that composting facilities implement measures to protect water quality. Composting operations may generate leachate if water percolates into compost material or excess moisture flows through the compost material. Leachate can deplete oxygen in waterways and can contain levels of nitrogen, phosphorus, metals, pathogens, and other pollutants that can impact waters of the state.

The Composting General Order applies to facilities that compost green wastes, manure, biosolids, food scraps, and scrap paper projects and is applicable to both existing and new composting operations. The Composting General Order sets forth requirements for siting, construction, operation, and maintenance of facilities in order to protect surface water and groundwater quality. One of the Composting General Order requirements is a maximum permeability of the ground beneath composting piles of no more than 1.0×10^{-5} cm/s or less for working surfaces. Working surfaces must consist of one of the following: compacted soils, with a minimum thickness of one foot; asphaltic concrete or Portland cement concrete; or an equivalent engineered alternative that is approved by the Regional Water Board.

Soils of the Typic Gypsiorthids-Kimberlina Association, 0 to 5 percent slopes are characterized as having permeability ranges of 4.2×10^{-4} cm/s to 1.4×10^{-3} cm/s, which is an order of magnitude greater than the Composting General Order requirement of 1.0×10^{-5} cm/s or less for working surfaces.

Geotechnical drilling was conducted in the areas of Pits "F/G Connection Area," "E," "F," and "G" in 1993. The geotechnical boreholes were advanced to depths of 25 to 50 feet below the pit floor surface grades. Thick sequences of silty clays, clayey silts, and silty clays were encountered at depths to 50 feet below the pit floor at some locations. Permeability test values indicated that permeability values for samples collected in twelve boreholes of Pits F and G are comparable to or are less than the 1 x 10-7 cm/s permeability value for landfill liner material. It is unknown, but likely, that the thick clay sequences observed at Pits F and G are also present in the proposed compost Site area. Should these clays be present in the Site area, the working surfaces permeability criteria may be met.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on published soil survey data, it appears that native surficial soils at the proposed compost Site will not meet the Composting General Order requirement of 1.0×10^{-5} cm/s or less for working surfaces without engineering measures such as compaction. However, geotechnical boreholes at Pits F and G indicated that thick sequences of silty clays, clayey silts, and silty clays may be present at depth beneath the proposed Site area. Should these clays be present in the Site area, the working surfaces permeability criteria may be met.

BSK recommends that that the surface of the composting areas will be graded and compacted prior to commencement of composting operations to provide a minimum 1-foot thickness and a permeability value that meets the Composting General Order requirement of 1.0×10^{-5} cm/s or less for working surfaces. Prior to construction, BSK will compact the selected soil sample to a predetermined compaction based on ASTM D1557 in the laboratory in order to achieve the permeability requirement of 1.0×10^{-5} cm/s or less. During construction, BSK recommends that one (1) compaction test be performed per each 1,000 cubic yards of soil placed. The compaction requirement should be at a degree of compaction as determined in the laboratory.

7.0 LIMITATIONS

This Report has been prepared for the exclusive use of Lost Hills Environmental, LLC in accordance with generally accepted environmental engineering practices in Kern County at the time the services were performed. BSK's services were performed solely for the purpose of evaluating environmental conditions at the site.

No other warranties either express or implied are made to the professional advice provided under the terms of BSK's agreement with Lost Hills Environmental, LLC. The passage of time, natural processes, or human intervention on the facility or adjacent properties and changes in the regulations can cause changed conditions, which can invalidate the findings and conclusions presented in this report.

8.0 REFERENCES

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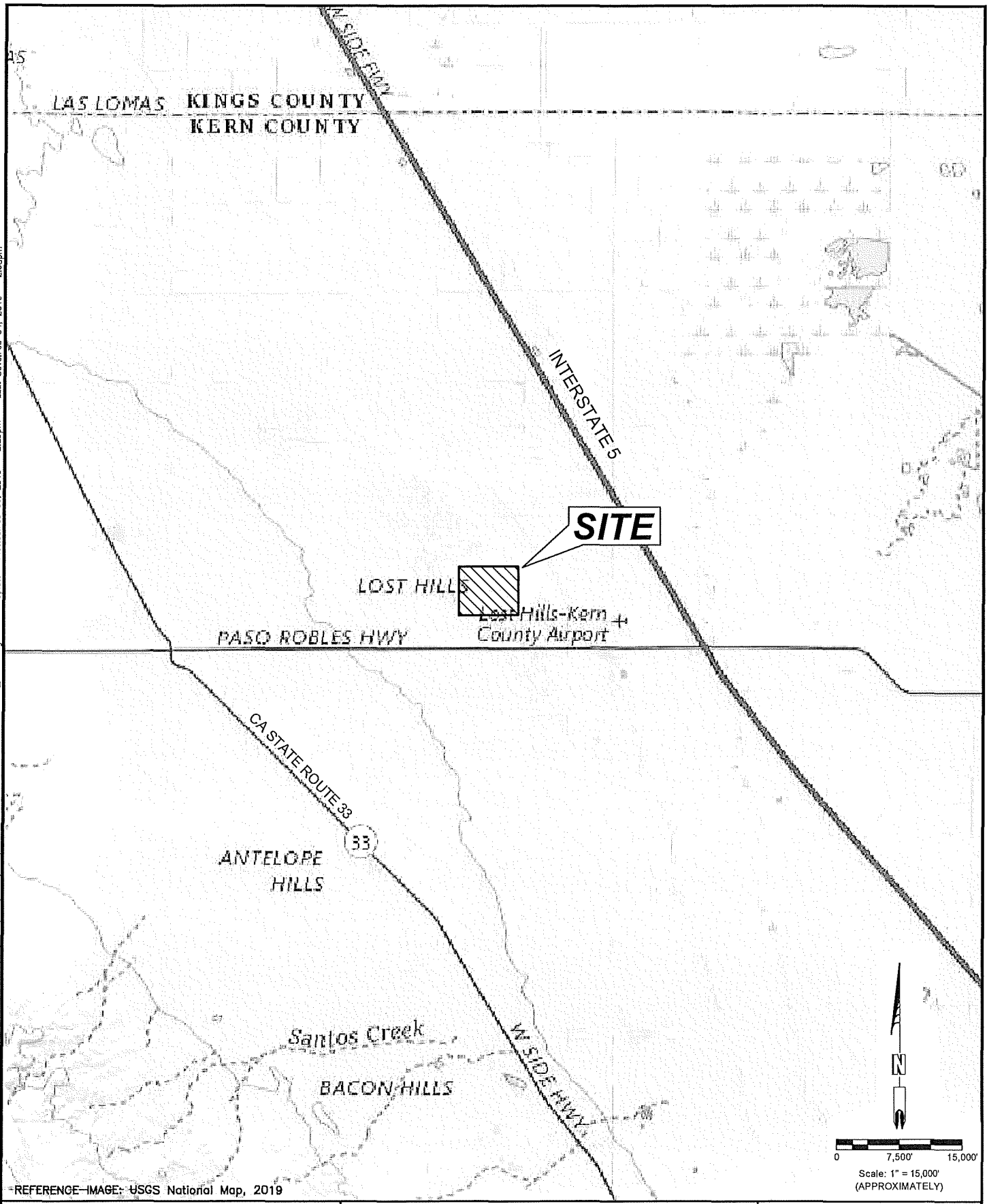
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United States Geological Survey (USGS), 7.5-minute Antelope Plain Topographic Quadrangle Map. 2015.

FIGURES



REFERENCE IMAGE: USGS National Map, 2019

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BSK ASSOCIATES
550 West Locust Avenue
Fresno, California 93650
Tel. (559) 497-2880

VICINITY MAP

Geology and Soils Review - Compost Facility Permitting
Lost Hills Environmental, LLC
14045 Holloway Road, Lost Hills
Kern County, California

FIGURE 1

JOB NO. E19-004-01B
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LEGEND:

Proposed Composting Area

REFERENCE IMAGE: Google Earth Pro, 2019

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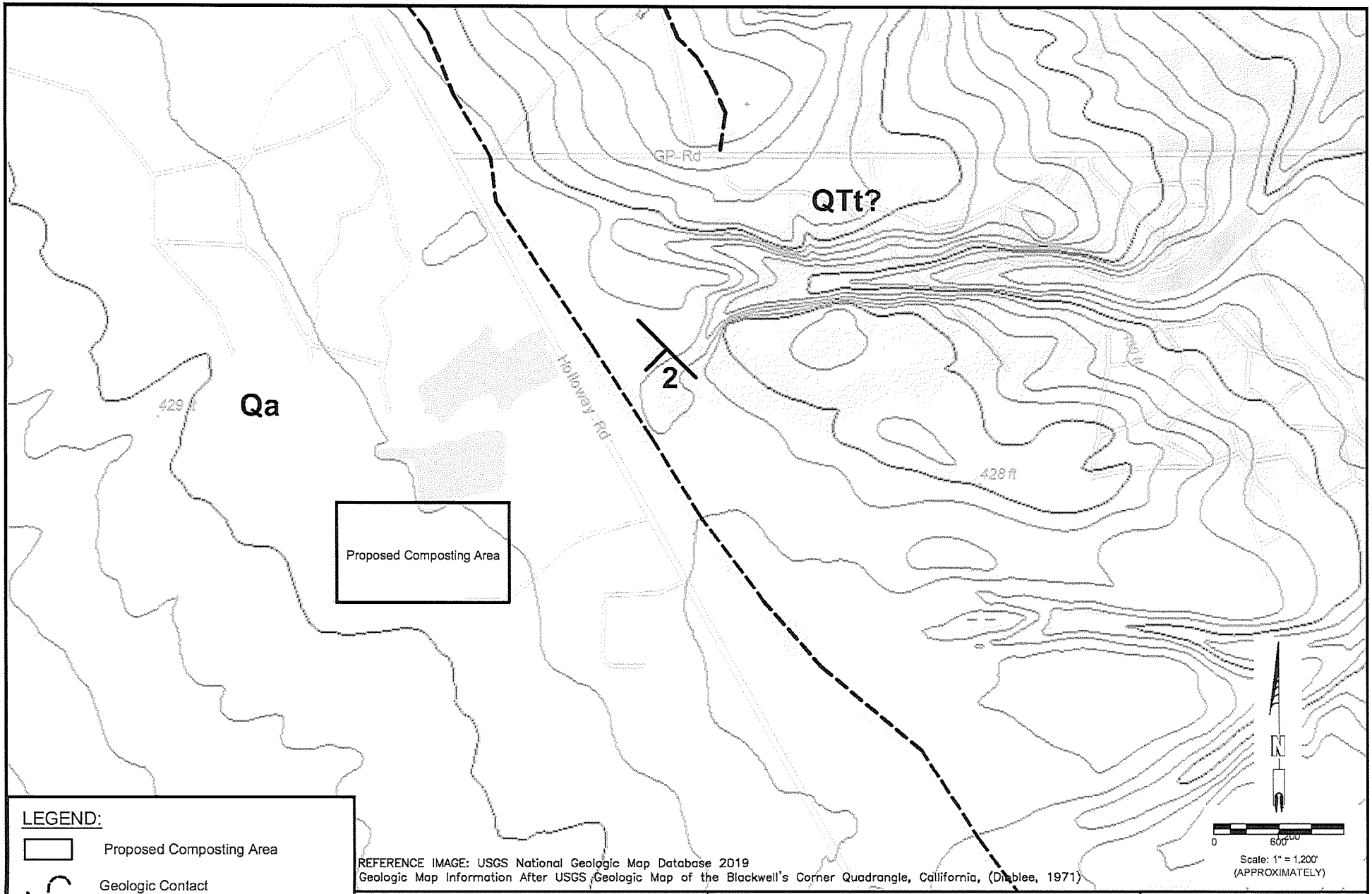
SITE PLAN

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Lost Hills Environmental, LLC
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Kern County, California

FIGURE 2

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DATE February 6, 2019
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LEGEND:

- Proposed Composting Area
- Geologic Contact
- 2 Strike and Dip Orientation
- QTt Tulare Formation (Terrestrial gravel and sand)
- Qa Alluvium

REFERENCE IMAGE: USGS National Geologic Map Database 2019
Geologic Map Information After USGS Geologic Map of the Blackwell's Corner Quadrangle, California, (Dibblee, 1971)

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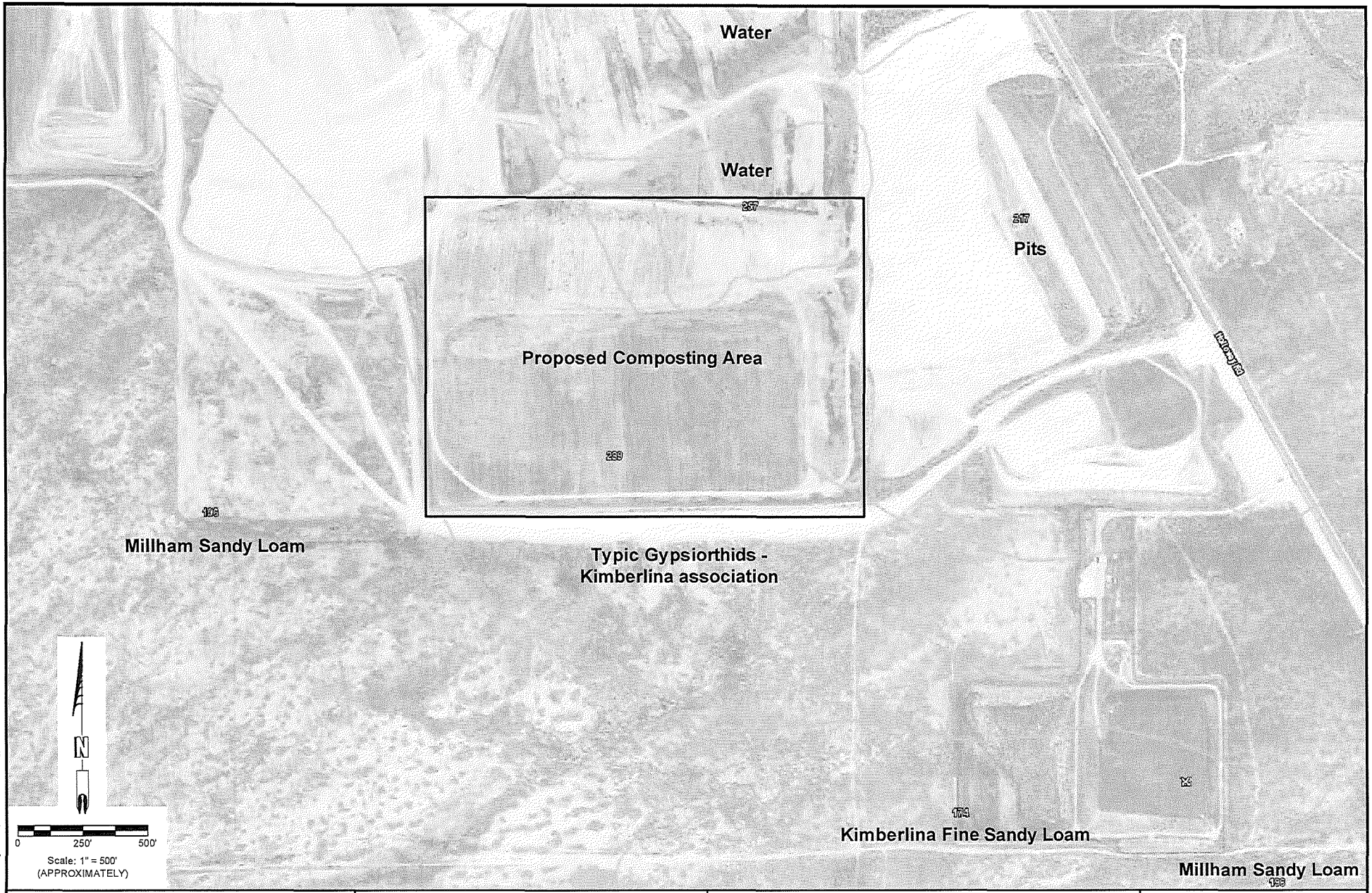
REGIONAL GEOLOGY

Geology and Soils Review - Compost Facility Permitting
Lost Hills Environmental, LLC
14045 Holloway Road, Lost Hills
Kern County, California

FIGURE 3

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LEGEND:

- Proposed Composting Area
- Soil Formation Boundary

REFERENCE IMAGE: USDA WEB SOIL SURVEY, 2019

BSK ASSOCIATES
550 West Locust Avenue
Fresno, California 93650
Tel. (559) 497-2880

SITE SOILS

Geology and Soils Review - Compost Facility Permitting
Lost Hills Environmental, LLC
14045 Holloway Road, Lost Hills
Kern County, California

FIGURE 4

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Appendix F.3

Geology and Soils Review

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GEOLOGY AND SOILS REVIEW
FOR PROPOSED RENEWABLE POWER PLANT
13850 HOLLOWAY ROAD
LOST HILLS, CALIFORNIA

BSK PROJECT E19-025-01F

PREPARED FOR:

LOST HILLS ENVIRONMENTAL, LLC
2019 WESTWIND DRIVE, SUITE B
BAKERSFIELD, CALIFORNIA 93301

MAY 20, 2019

GEOLOGY AND SOILS REVIEW
FOR PROPOSED RENEWABLE POWER PLANT
13850 HOLLOWAY ROAD
LOST HILLS, CALIFORNIA

Prepared for:

Mr. Dan Allen
Chief Operating Officer
Lost Hills Environmental, LLC
2019 Westwind Dr., Suite B
Bakersfield, California 93301

BSK Project: E19-025-01F

May 20, 2019

Prepared by:

Kyle T. Wright
Staff Geologist II

Lynne Baumgras, Ph.D., PG, CHG, CEG
Environmental Group Manager

On Man Lau, PE, GE
South Valley Regional Manager

BSK Associates
550 West Locust Avenue
Fresno, California 93650
(559) 497-2880
(559) 497-2886 Fax
www.bskassociates.com







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3.0 GEOLOGY **1**

4.0 SOILS AND PERMEABILITY **3**

6.0 CONCLUSIONS AND RECOMMENDATIONS **3**

7.0 LIMITATIONS **3**

8.0 REFERENCES **4**

Figures

Figure 1: Site Vicinity Map
Figure 2: Site Plan
Figure 3: Regional Geologic Map
Figure 4: Soil Map

EXECUTIVE SUMMARY

BSK Associates (BSK) completed a review of geology and soils characteristics for Lost Hills Environmental, LLC in support of permitting for a proposed renewable power plant (Site) in Lost Hills, California. Based upon the data collected during our study and from a geology and geotechnical engineering standpoint, it is our opinion that there are no soil conditions that would preclude the construction of the proposed improvements provided that a site-specific investigation be performed during the design phase.

1.0 INTRODUCTION

BSK Associates (BSK) completed a review of geology and soils characteristics for a proposed renewable power plant (Site) in Lost Hills, California. Aries Clean Energy (Aries) and The Holloway Group (Holloway) intend to jointly develop a renewable power project to be located at the subject Site. This assessment was initiated per the authorization of Mr. Dan Allen, of Lost Hills Environmental, LLC.

In 2007, a Draft Environmental Impact Report (DEIR) for the Holloway Landfill was prepared by the Kern County Planning Department (KCPD) in accordance with the California Environmental Quality Act (CEQA) to analyze the potential environmental impacts of the Holloway Landfill. The scope of work performed in this geology and soils review consisted of reviewing publicly available soils and geology information and conducting a Site visit to visually evaluate site and soil conditions.

2.0 SITE DESCRIPTION

The Site is owned and operated by Lost Hills Environmental, LLC. **Figure 1** is a Site Location Map. The proposed renewable power plant area (Site) is located within the southern 1/4 of Kern County Assessor's Parcel (APN) 057-220-16. **Figure 2** is a Site Plan which shows the boundaries of the proposed renewable power plant. The Site area is approximately 5 acres. The Site elevation is approximately 415 feet above mean sea level (USGS, 2015). The terrain of the Site and vicinity is generally flat and gently slopes southeast. The site lies approximately 4 miles west-northwest of the unincorporated community of Lost Hills, California.

3.0 GEOLOGY

The Lost Hills Anticline western facing slope borders the east side of the Site and the Antelope Plain rises gently southwest from the west boundary of the Site to the east flank of the Coastal Range. As indicated on the United States Geological Survey (USGS), 7.5-minute Antelope Plain Topographic Quadrangle Map, the site is located in a topographic trough between the Antelope Plain and the Temblor Mountain Range on the west and southwest and the Lost Hills to the east and northeast.

The Antelope Plain and the western slope of the San Joaquin Valley east of Lost Hills include the greater part of the valley lands in the Avenal-McKittrick area. Despite the large size of the area, little information is available regarding groundwater conditions. This area is characterized by low rainfall, groundwater of

inferior quality, and high concentrations of salts in the soil and subsoil. Accordingly, there has been little agricultural development in this area. For the most part, the land is used only for grazing.

Figure 3 is a map of regional geology. Surficial deposits in the vicinity of the Site are mapped as Quaternary Alluvium. The Site lies within an area of thin, near surface or shallow Recent alluvial fan deposits and older Recent unconsolidated sand, clay, terrace and natural levee deposits, all of which are dominated by very large sections of very dense clays and clay-rich silts. These Recent deposits originated from streams emerging from the Coastal ranges to the west and are estimated to be approximately 250 to 350 feet thick in the project area.

The rocks of the adjacent Lost Hills Oil Field range from Late Cretaceous to Pleistocene in age. The major units include the Upper Cretaceous Moreno Formation, the Eocene Lodi and Kreyenhagen Formations, the late Eocene through middle Miocene Temblor Formation, the Miocene Monterey and Reef Ridge Formations, the Pliocene Etchegoin Formation, and the Plio-Pleistocene Tulare Formation. Except for the Tulare Formation, these units are Marine in origin. The sediments associated with these formations were derived from the uplifting mountains surrounding the valley including the Sierra Nevada, Tehachapi, San Emidio, and the Coastal Ranges.

Many of the Lost Hills formations produce oil with the major contributors from the Miocene Epoch. Sands from the Pliocene Etchegoin Formation and the Plio-Pleistocene Tulare Formation are productive as well. The predominantly marine sediments are overlain by continental deposits of the Plio-Pleistocene Tulare Formation, which are overlain by Recent alluvium. The Tulare Formation outcrops along the ridge of the adjacent Lost Hills Anticline east of the site. Most of the site is covered with Recent alluvium.

Quaternary alluvial fan deposits consisting of clay, silt, sand, and gravels originating from the mountain complexes to the west are common in the southwestern portion of the San Joaquin Valley. The Antelope Valley Flood Plain provides the route for the sediment deposits. The recently deposited soils lack stratigraphic development and soil horizons and are commonly found in active environments such as the toe of a mountain slope or the distal end of a flood plain. The bulk of the soil is of low fertility and consists of sand and rock fragments of unaltered parent material that is susceptible to erosion.

Geotechnical drilling at the nearby Holloway Landfill was conducted in 1993 in the areas of Pits “F/G Connection Area,” “E,” “F,” and “G”. The geotechnical boreholes were advance to depths of 25 to 50 feet below the pit floor surface grades. Thick sequences of silty clays, clayey silts, and silty clays were encountered at depths to 50 feet below the pit floor at some locations. Permeability test values indicated that permeability values for samples collected in twelve boreholes of Pits F and G are comparable to or are less than the 1 x 10-7 cm/s permeability value for landfill liner material. It is unknown, but probable, that the thick clay sequences observed at Pits F and G may be present in the Site area.

4.0 SOILS AND PERMEABILITY

According to the United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) Web Soil Survey, native soils at the Site belong to the Typic Gypsiorthids-Kimberlina Association (0 to 5 percent slopes). **Figure 4** shows the mapped soil types at the Site. A soil association is defined by NRCS as two or more geographically associated soils or miscellaneous areas in such an intricate pattern that they cannot be shown separately on the soil maps. Soils of the Typic Gypsiorthids-Kimberlina Association, 0 to 5 percent slopes, occur at an elevation range of 425 to 490 feet above mean sea level (msl) and form at the footslopes of alluvial fans derived from sedimentary rock. The Typic Gypsiorthids-Kimberlina Association has an average annual precipitation of 5 inches. The average annual air temperature is 65 degrees Fahrenheit (°F) and it has a frost-free season of 250 to 300 days. The Typic Gypsiorthids-Kimberlina Association, 0 to 5 Percent Slopes soils, is classified as having a moderately high capacity of the most limiting layer to transmit water with values of 0.57 to 1.98 in/hr (4.2×10^{-4} cm/s to 1.4×10^{-3} cm/s). Permeability of the Typic Gypsiorthids is classified as moderate or moderately rapid.

This soil type is interlaminated with the Kimberlina fine sandy loam. Kimberlina soils are deep, level to moderately sloped, well-drained, fine sandy loams that are found on recent alluvial fans and alluvial plains. The alluvium is derived from sedimentary or granitic rock. Typically, the surface layer is brown, fine sandy loam approximately 9 inches thick. The upper 36 inches of the underlying material is pale brown, fine sandy loam, and the lower part to a depth of 71 inches is pale brown, silt loam. In some areas the surface layer is sandy loam or coarse sandy loam. Permeability of the Kimberlina soil is classified as moderate. Soils of the Typic Gypsiorthids-Kimberlina Association, 0 to 5 percent slopes are characterized as having permeability ranges of 4.2×10^{-4} cm/s to 1.4×10^{-3} cm/s.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the geological and soils data reviewed and from a geology and geotechnical engineering standpoint, it is our opinion that there are no soil conditions that would preclude the construction of the proposed improvements provided that a site-specific investigation be performed during the design phase.

7.0 LIMITATIONS

This Report has been prepared for the exclusive use of Lost Hills Environmental, LLC in accordance with generally accepted environmental engineering practices in Kern County at the time the services were performed. BSK's services were performed solely for the purpose of evaluating environmental conditions at the site. No other warranties either express or implied are made to the professional advice provided under the terms of BSK's agreement with Lost Hills Environmental, LLC. The passage of time, natural processes, or human intervention on the facility or adjacent properties and changes in the regulations can cause changed conditions, which can invalidate the findings and conclusions presented in this report.

8.0 REFERENCES

California Department of Water Resources, Groundwater Information Center Interactive Map Application, https://gis.water.ca.gov/app/gicima/, Accessed January 30, 2019.

H.M. Holloway, 2007. Draft Environmental Impact Report, Volume 1, Chapters 1through 10, SCH#2002111102, H.M. Holloway Landfill. October 2007.

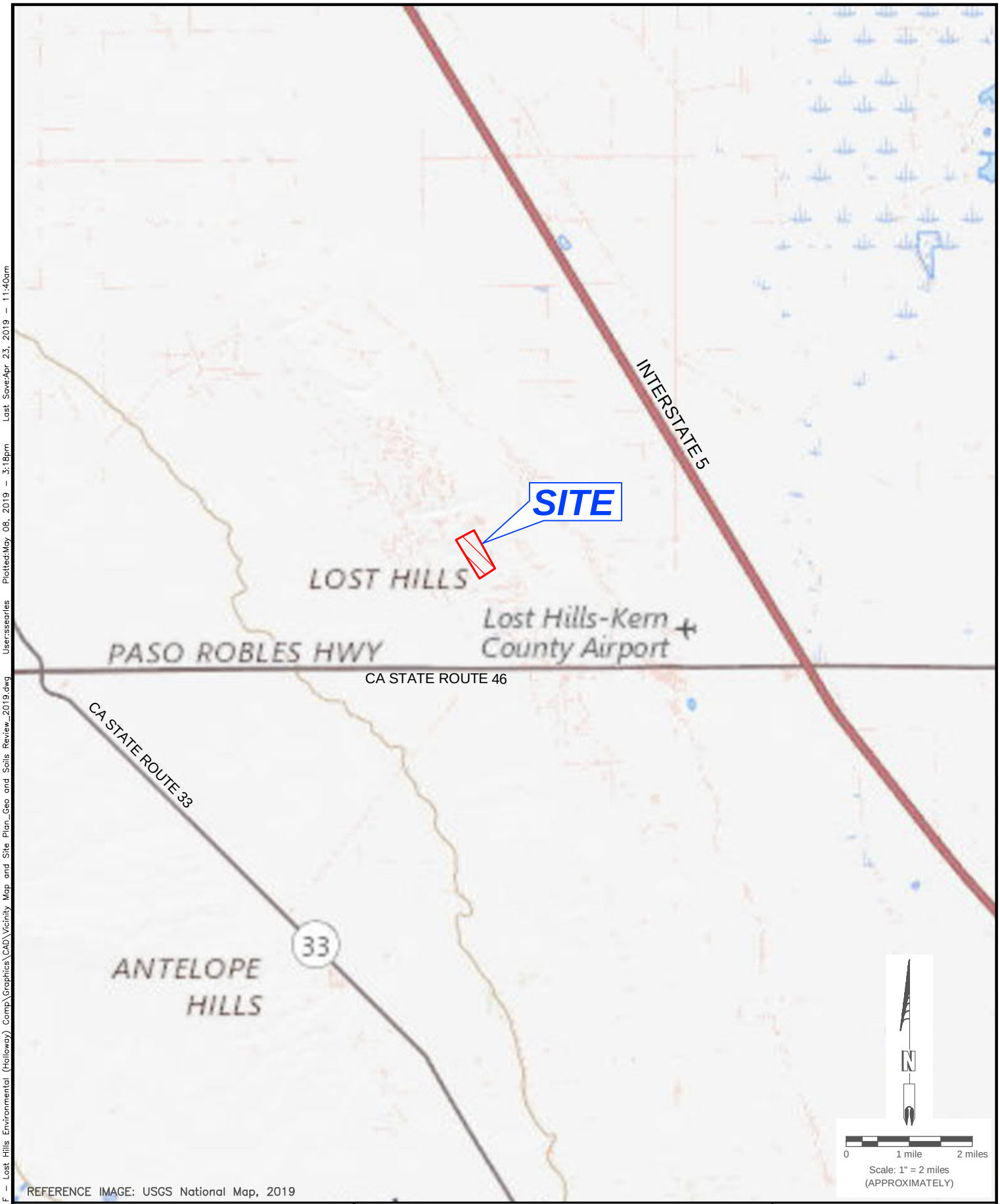
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United States Department of Agriculture, Natural Resources Conservation Service. 1988. Soil Survey of Kern County, California, Northwester Part. Accessible online at: https://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/california/CA666/0/kern.pdf.

United States Geological Survey (USGS), 7.5-minute Antelope Plain Topographic Quadrangle Map. 2015.

FIGURES



REFERENCE IMAGE: USGS National Map, 2019

ESK ASSOCIATES
550 West Locust Avenue
Fresno, California 93650
Tel. (559) 497-2880

VICINITY MAP

Geology and Soils Review for
Proposed Renewable Power Plant
Lost Hills Environmental, LLC
13850 Holloway Road, Lost Hills
Kern County, California

FIGURE 1

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LEGEND:

Proposed Composting Area

REFERENCE IMAGE: Google Earth Pro, 2019

ESK ASSOCIATES
550 West Locust Avenue
Fresno, California 93650
Tel. (559) 497-2880

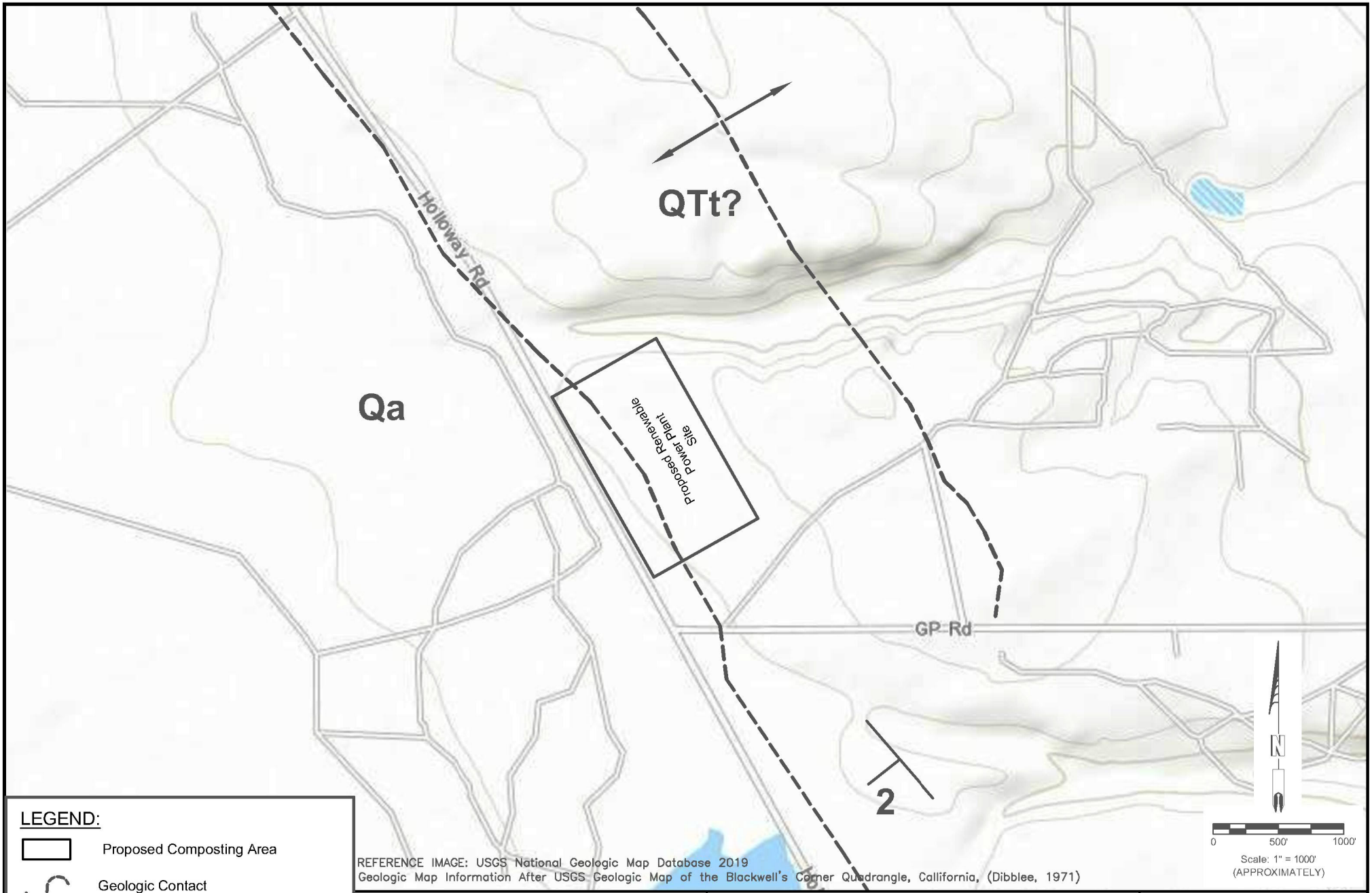
SITE PLAN

Geology and Soils Review for
Proposed Renewable Power Plant
Lost Hills Environmental, LLC
13850 Holloway Road, Lost Hills
Kern County, California

FIGURE 2

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REFERENCE IMAGE: USGS National Geologic Map Database 2019
Geologic Map Information After USGS Geologic Map of the Blackwell's Corner Quadrangle, California, (Dibblee, 1971)

LEGEND:

- Proposed Composting Area
- Geologic Contact
- 2 — Strike and Dip Orientation
- QTt — Tulare Formation (Terrestrial gravel and sand)
- Qa — Alluvium

ESK ASSOCIATES
550 West Locust Avenue
Fresno, California 93650
Tel. (559) 497-2880

REGIONAL GEOLOGY

Geology and Soils Review for
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Lost Hills Environmental, LLC
13850 Holloway Road, Lost Hills
Kern County, California

FIGURE 3

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LEGEND:

Proposed Composting Area

Soil Formation Boundary

REFERENCE IMAGE: USDA WEB SOIL SURVEY, 2019

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550 West Locust Avenue
Fresno, California 93650
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SITE SOILS

Geology and Soils Review for
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Lost Hills Environmental, LLC
13850 Holloway Road, Lost Hills
Kern County, California

FIGURE 4

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