

APPENDIX 5-2 BIG-1

CALIFORNIA LESA MODEL

Barstow International Gateway California Land Evaluation Site Assessment Model

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ACRONYMS AND ABBREVIATIONS

BIG	Barstow International Gateway
California Lesa Model	California Land Evaluation and Site Assessment model
LCC	Land Capability Classification
LESA	Land Evaluation and Site Assessment
LESA Manual	California Agricultural Land Evaluation and Site Assessment Model Instruction Manual and Worksheets
SCAG	Southern California Association of Governments
SWRCB	State Water Quality Control Board
WSS	Web Soil Survey
ZOI	Zone of Influence

1.0 EXECUTIVE SUMMARY

The California Land Evaluation and Site Assessment model (“California LESA Model”) is the primary approach for rating the relative quality of agricultural land resources based upon specific measurable features. The California LESA Model was developed to provide lead agencies with a methodology to ensure that potentially significant effects of agricultural land conversions are quantitatively and consistently considered in the environmental review process, including the California Environmental Quality Act reviews. This Land Evaluation and Site Assessment (LESA) Model for Barstow International Gateway was prepared on behalf of BNSF Railway to evaluate the significance of agricultural land conversions for the BNSF Railway Barstow International Gateway (BIG) project.

The results of the assessment are briefly summarized in **Section 1.3** below.

1.1 Project Location

As depicted in **Figure 1: BIG Footprint**, BIG consists of approximately 5,000-acres in the western portion of San Bernardino County, at the eastern extent of the City of Barstow.

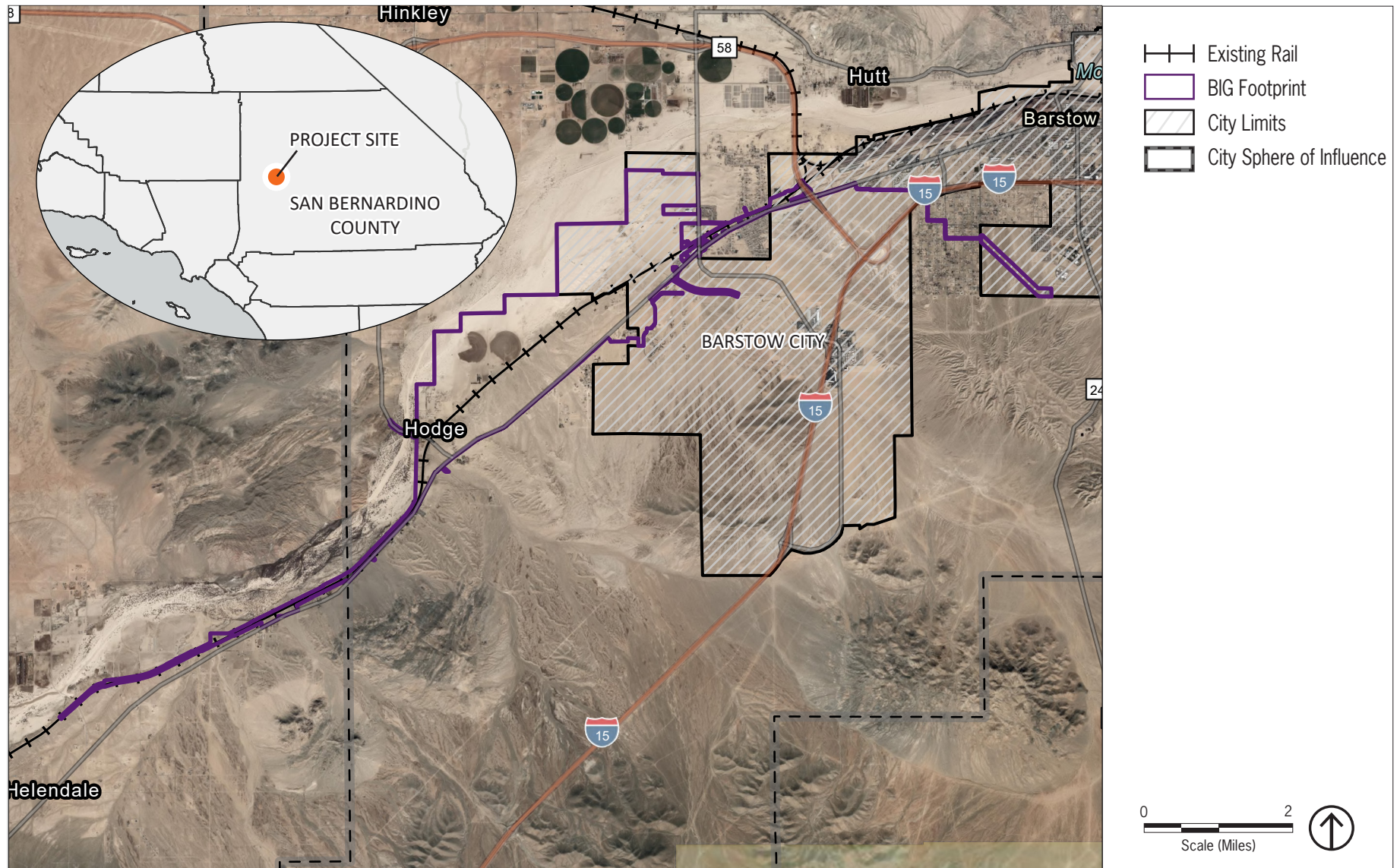
BIG is bounded by the Mojave River to the north, Main Street (also referred to as National Trails Highway or Route 66) to the south, BNSF Railway Barstow Intermodal Facility to the east, and Buckhorn Trail to the west. Regional access to BIG is provided by Main Street from the south, I-15 from the southeast, and SR-58 from the east. Local access to BIG is primarily provided by Lenwood Road and Hinkley Road from the east and west, respectively, in addition to various unpaved roads along Main Street.

1.2 California Land Evaluation and Site Assessment Model

The following sections detail the findings of the California LESA Model worksheets published by the U.S. Department of Agriculture Natural Resources Conservation Service (California Department of Transportation, ND). The scores are based on tables within the *California Agricultural Land Evaluation and Site Assessment Model Instruction Manual and Worksheets* (LESA Manual) and are combined to determine the final determination. A (LESA determines the impact of the agricultural land conversion based on various LESA factors. Each factor is weighed differently depending on its importance for agricultural production.

1.3 Conclusions

The LESA Model for Barstow International Gateway concluded that the conversion of agricultural land by BIG will not result in a significant loss of farmland.



Sources:
County of San Bernardino, Y2023_PUA_Cache [aerial imagery], 2023;
County of San Bernardino, Cities and Towns [Data set], 2021

Figure 1
BIG Footprint

2.0 LAND EVALUATION FACTORS AND SCORE

There are two Land Evaluation factors used in the LESA to determine whether a project would have a significant impact on agricultural resources:

1. Land Capability Classification (LCC) Rating
2. Storie Index Rating

Descriptions of the importance of each factor can be found in their respective sections below.

2.1 Land Capability Classification Rating

The LCC indicates the suitability of onsite soils for growing crops. Onsite soils are rated from Class I to Class VIII, with soils having the fewest limitations receiving the highest rating (identified as “Class I”) and soils being the least suitable for cropland with the lowest rating (identified as “Class VIII”). The LCC rating serves as a measure of the capacity of soil types to produce crops, and thus serves as an indicator of how productive a parcel might be as an agricultural resource. Class I through Class IV are considered suitable as cropland, while Class V through Class VIII are considered unsuitable as cropland.

Subclasses designated with a lower-case letter—identified as e, w, s, or c—are used in conjunction with the roman numerals to further describe soil limitations.

- “e” indicates that the main limitation of the soil is erosion.
- “w” indicates that the presence of water either within or on the soil causes limitation in plant growth.
- “s” indicates that the soil is shallow, droughty, or stony; and
- “c” indicates that the limitation is a climate that is generally too cold or hot for many plants.

The LCC has separate scales used for irrigated and non-irrigated lands.

Following the steps in the guidance provided in the LESA Manual, the following information was collected to get the LCC Score:

- The Project area used for the LESA analysis is the BIG footprint which totals approximately 4,998 acres.
- Soil types within the BIG footprint were obtained from National Resource Conservation Service Web Soil Survey (WSS),¹ as listed in **Table 1: Land Capability Classification and Storie Index Scores**. The Soil Map and Land Capability Classification Soil Report generated from the WSS are included in Attachment A. **Table 1** outlines the total acreage for each soil type, as well as the proportion of each soil type within the BIG footprint. These proportions were calculated based on

¹ NCRS WSS provides soil data and information produced by the National Cooperative Soil Survey. The site is updated and maintained online as the single authoritative source of soil survey information and has soil maps and data available online for more than 95 percent of the nation’s counties.

the total acreage for each soil type provided in the Soil Map divided by the total acreage of the BIG footprint.

- The LCC for each soil type, whether it was irrigated or non-irrigated, within BIG was obtained from the Land Capability Classification Soil Report within the WSS. The non-irrigated LCC were used for all soil types within the BIG footprint based on known conditions. The non-irrigated soil types within the BIG footprint received an LCC of either 6e, 7e, 7s, 8e, or 8w (see **Table 1**).
 - To determine whether to use the non-irrigated or irrigated LCC rating, several types of water management reports and a water feature report were generated for BIG from WSS (Attachment A). From these reports, the irrigation rating for the soil types varied between somewhat limited, very limited, or not rated.
 - Additionally, there are no irrigation canals in the BIG footprint. The majority of BIG is in the Centro Subarea of the Mojave River groundwater basin (Centro Basin) while a smaller portion of BIG, to the east, is within the Baja Subarea of the Mojave River groundwater basin (Baja Basin). The *Water Supply Assessment for Barstow International Gateway* (WSA) by EKI Environment & Water, Inc. (**Appendix 5.17 BIG-2**) identified BIG's main sources of water to include both irrigation district water and groundwater, with very limited other water sources. The Mojave River's surface water flows are unreliable and infrequent. The Mojave River filters into the groundwater basin, becoming the main source of recharge.
- Estimated groundwater depth is based on wells located in the vicinity of BIG. Groundwater information available from the United States Geological Survey provides current information on groundwater depths below the ground surface. The depth to groundwater generally deepens to the northeast toward the eastern end of the alignment.
- An LCC rating from 0 points to 100 points was assigned to each soil type within BIG based on the Scoring Table in the LESA Manual (shown in **Table 1**). Soil types with an LCC of 6e were assigned an LCC rating of 20 points, soil types with an LCC of 7e or 7s were assigned an LCC rating of 10 points, and soil types with an LCC of 8e, or 8w were assigned to an LCC rating of 0 points.
- The proportion of each soil type was then multiplied by the LCC rating to develop an LCC Score for each soil type (**Table 1**).
- The sum of the LCC score for all soil types within BIG resulted in an LCC Score of 11.47 out of a possible 100 points.

2.2 Storie Index Rating

The Storie Index numerically represents the relative degree of suitability of a soil for general intensive agricultural production. The Storie Index is based on a 100-point scale and uses soil characteristics such as soil depth, texture of the surface soil, density of the soil, drainage, salts and alkalinity, and relief. Other factors, such as availability of water for irrigation and climate, are not considered in the Storie Index.

Following the steps in the guidance provided in the LESA Manual, the following information was collected to get the Store Index Rating:

- The Storie Index values for the soil types within the BIG footprint were obtained from WSS, as listed in **Table 1**. In the case a soil type received two or more Storie Index values, the higher value was used. The California Revised Storie Index Soil Report generated from the WSS is included in Attachment A.
- The portion of each soil type within the BIG footprint was then multiplied by the Storie Index value to develop a Storie Index Score for each soil type (**Table 1**).
- The sum of the Storie Index Score for all soil types within BIG resulted in a Storie Index Score of 52.55 points out of a possible 100 points.

Table 1: Land Capability Classification and Storie Index Scores							
Soil Map Unit	BIG Acres	Proportion of BIG Footprint (percent)	LCC (non-irrigated)	LCC Rating (non-irrigated)	LCC Score ¹	Storie Index ²	Storie Index Score ³
106	12	0.2%	7e	10	0.02	83	0.17
112	66	1.3%	7e	10	0.13	51	0.66
113	1,042	20.8%	6e	20	4.16	47	9.78
115	150	3.0%	7e	10	0.3	34	1.02
116	16	0.3%	7e	10	0.03	61	0.18
118	9	0.2%	7e/7w	10	0.02	37	0.07
119	49	1.0%	7e	10	0.1	88	0.88
120	10	0.2%	7s	10	0.02	95	0.19
123	162	3.2%	8e	0	0	– ⁴	0.00
131	1	<0.1%	7e	10	0	80	0.00
132	27	0.5%	7e	10	0.05	74	0.37
135	6	0.1%	6e	20	0.02	37	0.04
138	<0.1	0%	7e	10	0	82	0.00
140	1	<0.1%	7e	10	0	73	0.00
141	1	<0.1%	6e	20	0	68	0.00
151	632	12.6%	7e	10	1.26	26	3.28
152	367	7.3%	7s	10	0.73	41	2.99
157	138	2.8%	8w	0	0	– ⁴	0.00
158	3	0.1%	8s/7e	10	0.01	– ⁴	0.00
169	754	15.1%	7e	10	1.51	80	12.08
171	306	6.1%	7e	10	0.61	67	4.09
172	1,248	25.0%	7e	10	2.5	67	16.75
Totals	5,000	100.0%	--	LCC Total	11.47	Storie Index Total	52.55
Notes: ¹ The LCC Score and Storie Index Score for each soil type was calculated by multiplying the proportion of each soil type by the LCC rating or Storie index. ² If a soil had two scores under the CA Revised Storie Index Report, the point allocation from the soil that had the highest percentage was used. ⁴ Not rated. ⁵ Sums may not total due to rounding.							
Sources: • U.S. Department of Agriculture Natural Resources Conservation Service • California Agricultural Land Evaluation and Site Assessment Model Instruction Manual and Worksheets							

3.0 SITE ASSESSMENT FACTORS AND SCORE

There are four Site Assessment factors used in the LESA to determine whether a project would have a significant impact on agricultural resources:

1. Project Size Rating
2. Water Resources Availability Rating
3. Surrounding Agricultural Land Rating
4. Surrounding Protected Resource Land Rating

Descriptions of the importance of each factor can be found in their respective sections below.

3.1 Project Size Rating

The Project Size Rating recognizes the role that size plays in the viability of commercial agricultural operations. In general, larger farming operations can provide greater flexibility in farm management and marketing decisions. Larger operations tend to have greater impacts upon the local economy through direct employment and impact on supporting industries (e.g., fertilizers, farm equipment, shipping, food processing industries). The farming operation's size can also result in different quality lands that comprise the operation. In terms of agricultural productivity, the size of a farming operation is also considered not just from its total acreage, but the acreage of different quality land and soils which comprise the operation. Lands with a variety of higher quality soils allow greater diversity in crop selection and potential for greater economic return per acre unit.

Following the steps in the guidance provided in the LESA Manual, the following information was collected to determine BIG's Project Size Score:

- To develop BIG's Project Size Score, each soil type was assigned to one of the following groups: LCC Class I-II, LCC Class III, or LCC Class IV-VIII. These assignments were based on the assigned LCC rating performed in the Land Evaluation scoring and are shown in **Table 2: BIG Project Size Score**. BIG did not contain any land within LCC Class I-III. The total acreage of LCC Class IV-VIII group is 5,000 acres.
- The total acreage for Class IV-VIII group is greater than 320 acres, and thus, this acreage is assigned 100 points. Since no soils were assigned in the LCC Class I-III groups, 0 points were assigned to both of those groups.
- The highest score from the three LCC categories is used for BIG Size Score. In this case, the highest score comes from LCC Class IV-VIII, which means BIG has a Project Size Score of 100 points out of a possible 100.

Table 2: BIG Project Size Score			
Soil Map Unit	LLC Class I-II	LLC Class III	LLC Class IV-VIII (acres)
106	-	-	12
112	-	-	66
113	-	-	1,042
115	-	-	150
116	-	-	16
118	-	-	9
119	-	-	49
120	-	-	10
123	-	-	162
131	-	-	1
132	-	-	27
135	-	-	6
138	-	-	<0.1
140	-	-	1
141	-	-	1
151	-	-	632
152	-	-	367
157	-	-	138
158	-	-	3
169	-	-	754
171	-	-	306
172	-	-	1,248
Total Acres	0	0	5,000
BIG Project Size Score	N/A	N/A	100 points

3.2 Water Resource Availability Rating

The Water Resource Availability Rating assessment is based upon the availability of water sources which may supply a given property. This assessment assigns a water resource score to each identified source based on whether irrigated and dryland agriculture is feasible, and if any physical or economic restrictions exist, during both drought and non-drought years. **Table 3: Water Resources Availability** summarizes BIG's Water Resource Availability Score.

Following the steps in the guidance provided in the LESA Manual, the following information was collected to get BIG's Water Resource Availability Score:

- According to the WSS and the WSA the BIG footprint is supplied by both irrigation district water and groundwater, with very limited other water sources (**Appendix 5.17 BIG-2**). This assessment determined that approximately 57 percent of the BIG footprint is currently sourced by groundwater while approximately 43 percent is serviced by an irrigation district (Golden State Water Company). The Mojave River's surface water flows are unreliable and infrequent. The Mojave River filters into the groundwater basin, becoming the main source of recharge.
- The WSA reports existing wells within the BIG footprint. Wells draw water from groundwater and therefore are not a separate water resource.

- To find the Water Availability Score, the water resource is scored against three types of restrictions under two scenarios: non-drought years and drought years. The three restriction types posed under each scenario are: if irrigated production is feasible, if physical restrictions are present, and if economic restrictions are present.
- In non-drought years, groundwater in the BIG footprint is not physically or economically restricted and irrigated production is feasible. In drought years, there are physical restrictions, no economic restrictions, and irrigated production is feasible. Physical restrictions are due to a reduction in water supply during a drought. Economic restrictions are not present since surface water is not available for purchase. Through this process, the Water Availability Score of 85 was calculated for groundwater.
- In non-drought years, irrigation district water in the BIG footprint is not physically or economically restricted and irrigated production is feasible. In drought years, there are no physical restrictions, but there are economic restrictions, and irrigated production is feasible. Economic restrictions are present since surface water is not available for purchase. Through this process, the Water Availability Score of 95 was calculated for groundwater.
- Based on the water supply information, **Table 3** shows BIG's Water Resources Availability Score.
- The groundwater portion of the BIG footprint (57 percent) was multiplied by the Water Availability Score to obtain the Weighted Availability Score. The irrigation district water portion of the BIG footprint (43 percent) was multiplied by the Water Availability Score to obtain the Weighted Availability Score. BIG received a total Water Resource Availability Score of 89.4 out a possible 100 points.

Table 3: Water Resources Availability				
BIG Portion	Water Resource	Portion of BIG Footprint	Water Availability Score	Weighted Availability Score ¹
1	Groundwater	57%	85	48.5
2	Irrigation District Water	43%	95	40.9
Totals		1.00	Total Water Resource Score	89.4
Note: 1 The Weighted Availability Score was calculated by multiplying the proportion of the Project area by the Water Availability Score. Source: California Agricultural Land Evaluation and Site Assessment Model Instruction Manual and Worksheets. Appendix 5.17 BIG-2: Water Supply Assessment.				

3.3 Surrounding Agricultural Land Use Score

The Surrounding Agricultural Land rating is designed to measure the level of agricultural land use within a project's Zone of Influence (ZOI), which consists of the land near the Project that is likely to influence, and to be influenced by, the Project site's agricultural use. The California LESA Model gives a higher rating to the conversion of an agricultural parcel that has a sizable portion of surrounding land in agricultural production than one that has a small percentage of surrounding land in agricultural production.

Following the steps in the guidance provided in the LESA Manual, the following information was collected to get the Surrounding Agricultural Land Use Score:

- The ZOI is determined by creating the smallest rectangle that would completely contain BIG, then creating a second rectangle that extends one-quarter mile beyond the first rectangle. The ZOI includes all parcels that are contained within or are intersected by the second rectangle, minus the BIG footprint. The resulting ZOI (See **Figure 2: Surrounding Agricultural Land within Zone of Influence**), which is all the parcels that are contained within or are intersected by the second rectangle minus the BIG footprint, totals approximately 86,635 acres (see **Table 4: Surrounding Agricultural Land and Protected Resource Land Scores**).
- The Farmland Mapping and Monitoring Program for San Bernardino County from the California Department of Conservation was used to determine which parcels are being used for agricultural purposes. The ZOI contains parcels mapped as Department of Conservation Prime Farmlands, Farmlands of Statewide Importance, Farmlands of Local Importance, and Unique Farmlands (see **Figure 2**). The ZOI acreage mapped as either Prime Farmlands, Farmlands of Statewide Importance, Farmlands of Local Importance, or Unique Farmlands designations totals approximately 252 acres within the ZOI, which would be included in the total acreage for surrounding agricultural land (see Table 4).
- The County of San Bernardino and City of Barstow Zoning Maps were used to determine the parcels which are zoned for agricultural use. The ZOI contains parcels within the County's Agriculture district, Agriculture 20-acre Minimum district, Floodway district, Floodway with Agricultural Preserve Overlay district, and Resource Conservation with Agricultural Preserve Overlay district (see **Figure 2**). The City of Barstow does not include any specific zoning for agricultural use. The ZOI acreage designated as County agricultural zone totals approximately 3,358 acres within the ZOI, which would be included in the total acreage for surrounding agricultural land (see **Table 4**).
- Overall, the total surrounding agricultural land within the ZOI would cover approximately 3,610 acres or 4.2 percent of the ZOI. Since the percent of the ZOI under agriculture is less than 40 percent, BIG received a Surrounding Agricultural Land Score of 0 points out of a possible 100 points (see **Table 4**).

3.4 Surrounding Protected Resource Land Rating

The Surrounding Protected Resource Land Rating uses a similar methodology and scoring process as the Surrounding Agricultural Land Rating. Protected resource lands are those lands with long-term use restrictions and are compatible with or supportive of agricultural uses of land, including publicly owned lands maintained as park, forest, or watershed resources; Williamson Act contracted lands; and lands with natural resource easements that restrict the conversion of such land to urban or industrial uses.

Following the steps in the guidance provided in the LESA Manual, the information below was collected to calculate the Surrounding Protected Resource Land Score:

- As previously determined above in **Section 3.3**, the ZOI totals approximately 86,635 acres.

- The Southern California Association of Government's (SCAG) Protected Open Space Area data was used to determine which parcels are designated as Protected Open Space by SCAG. The ZOI contains land designated by SCAG as Protected Open Space, which includes Bureau of Land Management land, California State Lands Commission land, parks, the Mojave River, and Areas of Critical Concern (see **Figure 3: Protected Resources Within Zone of Influence**). The ZOI acreage mapped by SCAG as Protected Open Space land totals approximately 35,506 acres of the total ZOI, which is included in the total acreage for protected resource lands (see Table 4).
- The City of Barstow Zoning Maps were used to determine the parcels intended for permanent open space to preserve natural resources. The ZOI contains parcels within the City's Open Space zone (see **Figure 3**). The ZOI contains approximately 2,201 acres of Open Space land, which would be included in the total acreage for protected resource land (see **Table 4**).
- The San Bernardino County Assessor Parcels Under Open Space Contract Report was used to determine which parcels are under a Williamson Act Contract (see **Figure 3**). The ZOI acreage mapped as Williamson Act Contract land totals approximately 612.5 acres or less than one percent of the total ZOI, which is included in the total acreage for protected resource land (see Table 4).
- Overall, the total surrounding protected resource lands within the ZOI would cover approximately 37,279 acres or 43 percent of the ZOI. Since the percent of the ZOI considered a protected resource is less than 45 percent, BIG received a Surrounding Protected Resource Land Score of 10 points out of a possible 100 points.

Table 4: Surrounding Agricultural Land and Protected Resource Land Scores

Total Net ZOI Acres	ZOI Acres in Agriculture	Percent in Agriculture ¹	Surrounding Agricultural Land Use Score	Acres of Protected Resource Land	Percent in Protected Resource Land ²	Surrounding Protected Resource Land Score
86,635	3,610	4.2%	0	37,279	43%	10
Notes:						
¹ The Percent in Agriculture was calculated by dividing the acres in agriculture by total acres.						
² The Percent in Protected Resource Land was calculated by dividing the acres of protected resource land by total acres.						
Source: California Agricultural Land Evaluation and Site Assessment Model Instruction Manual and Worksheets						

4.0 FINAL LESA SCORE SHEET

The California LESA Model is weighted so that 50 percent of the total LESA Score of a project is derived from the Land Evaluation factors and 50 percent from the Site Assessment factors. **Table 5: Final Land Evaluation and Site Assessment Score Sheet** outlines the final weighted scores of the various factors and determines BIG's final LESA Score to be 44.9 out of a possible 100 points.

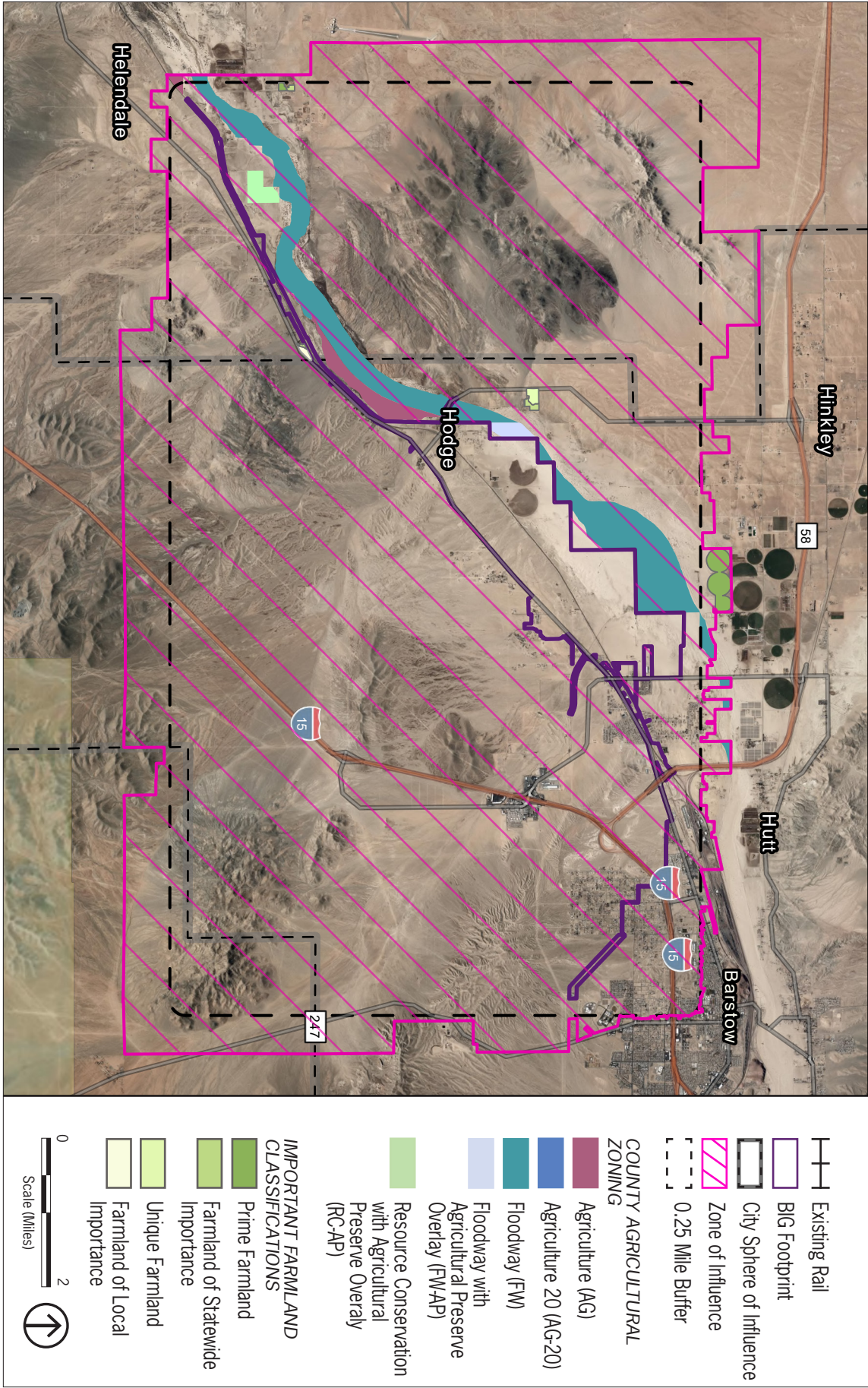
Table 5: Final Land Evaluation and Site Assessment Score Sheet			
	Factor Scores	Factor Weight	Weighted Factor Scores
LAND EVALUATION FACTORS			
Land Capability Classification	11.47	0.25	2.9
Storie Index	52.55	0.25	13.1
<i>Land Evaluation Subtotal</i>			16
SITE ASSESSMENT FACTORS			
BIG Size	100.00	0.15	15.0
Water Resource Availability	89.4	0.15	13.4
Surrounding Agricultural Land	0	0.15	0
Protected Resource Land	10.00	0.05	0.5
<i>Site Assessment Subtotal</i>			28.9
<i>Final LESA Score</i>			44.9

4.1 LESA Scoring Thresholds

The California LESA Model is designed to determine the significance of a project's conversion of agricultural lands. Scoring thresholds are based upon both the total LESA score as well as the Land Evaluation and Site Assessment factor subtotals. In this manner the scoring thresholds are dependent upon the attainment of a minimum score for all the factors so that a single threshold is not the result of heavily skewed subtotal (i.e., a site with a very high Land Evaluation score, but a very low Site Assessment score, or vice versa).

As previously mentioned, the final LESA score for BIG is 44.9. As outlined in **Table 6: Land Evaluation and Site Assessment Model Significance Determination**, a total LESA score between 40 to 59 points is considered significant if both the Land Evaluation and Site Assessment subtotals are each greater than or equal to 20 points. As determined in **Table 5**, only the Site Assessment subtotal was greater than or equal to 20 points. Therefore, BIG's conversion of agricultural land to a non-agricultural use is not considered significant.

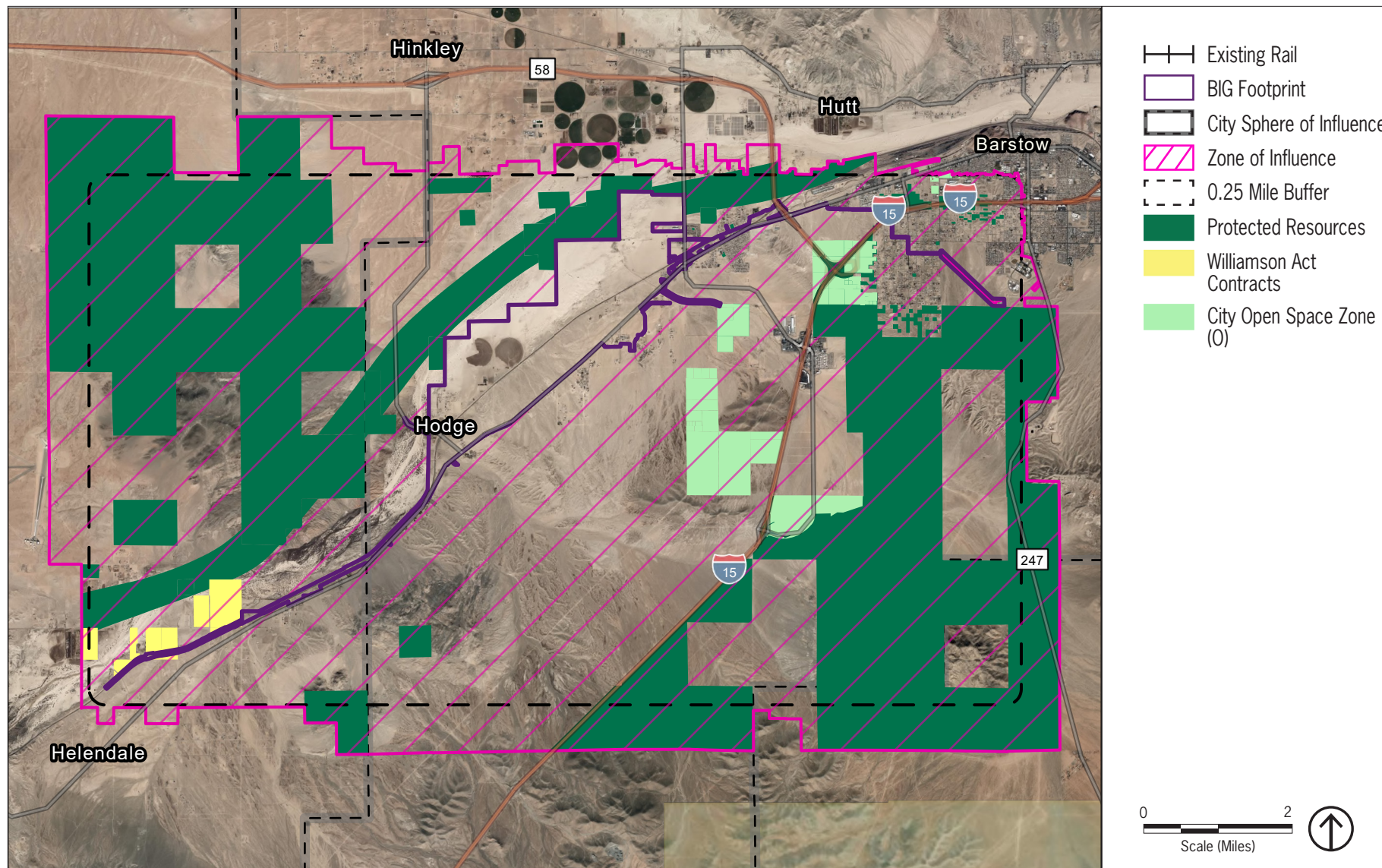
Table 6: Land Evaluation and Site Assessment Model Significance Determination	
Total LESA Score	Scoring Decision
0-39 Points	Not considered significant
40-59 Points	Considered significant only if both the Land Evaluation and Site Assessment sub scores are each greater than or equal to 20 points
60-70 Points	Considered significant unless either of the Land Evaluation and Site Assessment weighted factor sub scores is less than 20 points
80-100 Points	Considered significant



Sources:

County of San Bernardino, Y2023, PUA, Cache [aerial imagery], 2023; California Department of Conservation, California Important Farmland: 2018 [Data set], 2018; County of San Bernardino, LU-1 Land Use Map, 2020; County of San Bernardino, Cities and Towns [Data set], 2021.

Figure 2
Surrounding Agricultural Land within Zone of Influence



Sources:
County of San Bernardino, Y2023_PUA_Cache [aerial imagery], 2023; Southern California Association of Governments, Protected Open Space Areas data for the Southern California Association of Governments Region, 2020; County of San Bernardino, Cities and Towns [Data set], 2021; County of San Bernardino, San Bernardino County Assessor Parcels Under Open Space Contract Report, 2025.

Figure 3
Protected Resources Within Zone of Influence

5.0 REFERENCES CITED

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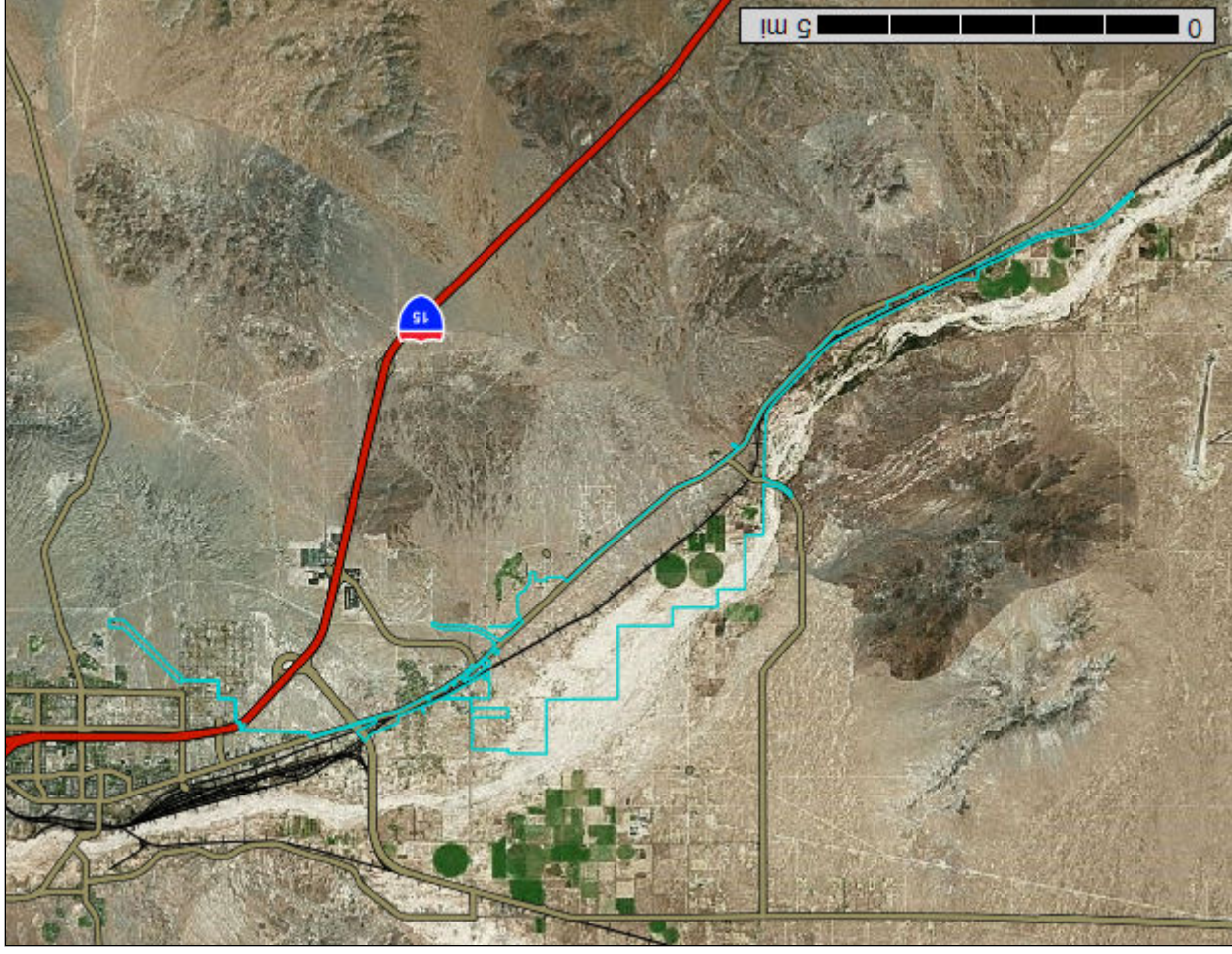
ATTACHMENT A:

WEB SOIL SURVEY SOILS REPORT

**Custom Soil Resource
Report for
San Bernardino
County, California,
Mojave River Area
BIG Footprint**

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

United States
Department of
Agriculture
NRCS
Natural
Resources
Conservation
Service



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

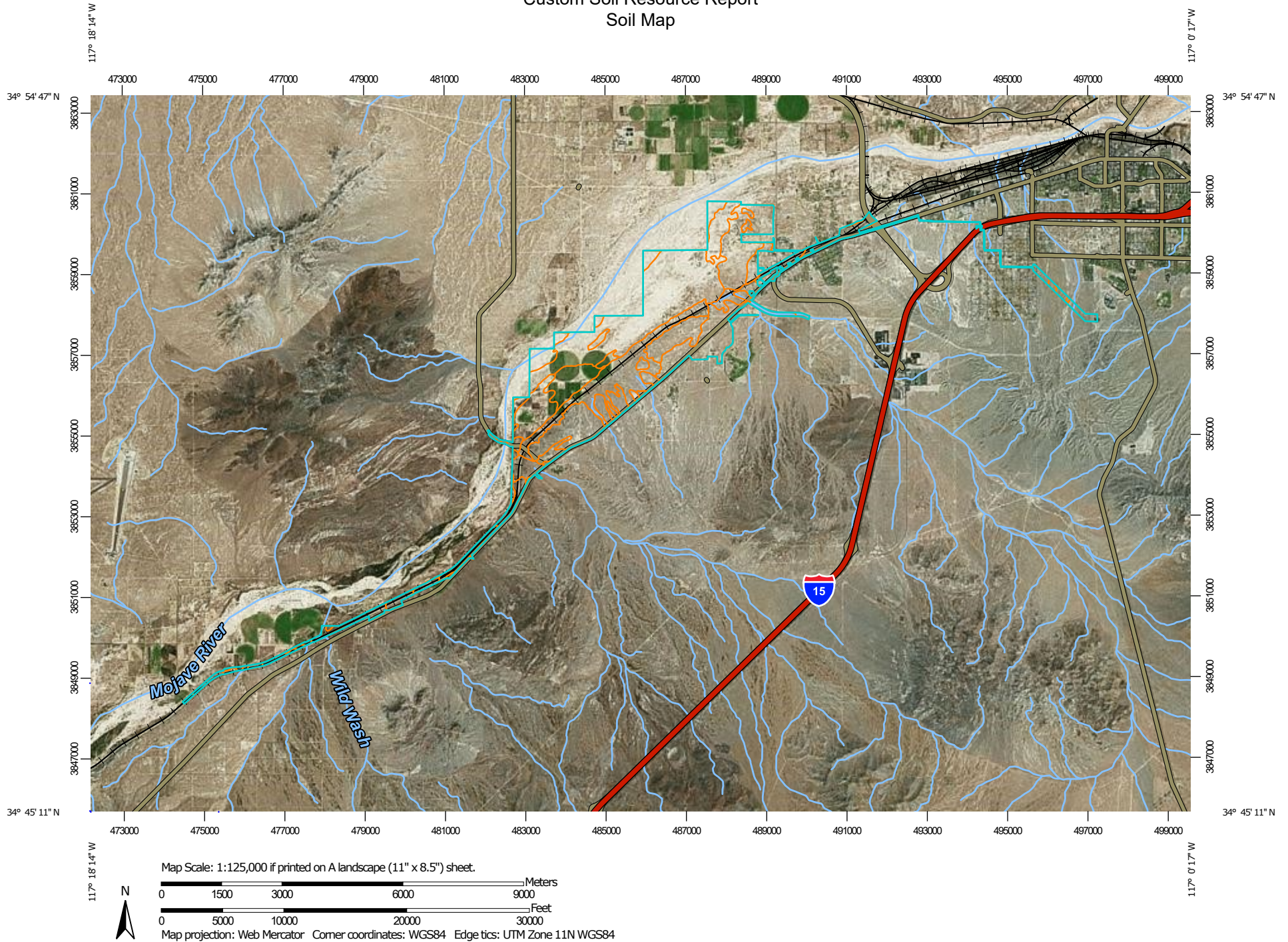
Custom Soil Resource Report

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map



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MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit

 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop

 Saline Spot

 Sandy Spot

 Severely Eroded Spot

 Sinkhole

 Slide or Slip

 Sodic Spot

 Spoil Area

 Stony Spot

 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Water Features

 Streams and Canals

Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Bernardino County, California, Mojave River Area

Survey Area Data: Version 17, Sep 8, 2025

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 17, 2022—Jun 12, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
106	BRYMAN LOAMY FINE SAND, 2 TO 5 PERCENT SLOPES	11.6	0.2%
112	CAJON SAND, 0 TO 2 PERCENT SLOPES	65.9	1.3%
113	CAJON SAND, 2 TO 9 PERCENT SLOPES	1,041.6	20.8%
115	CAJON GRAVELLY SAND, 2 TO 15 PERCENT SLOPES	149.6	3.0%
116	CAJON LOAMY SAND, 5 TO 9 PERCENT SLOPES	15.7	0.3%
118	CAJON-ARIZO COMPLEX, 2 TO 15 PERCENT SLOPES*	9.4	0.2%
119	CAJON-WASCO, COOL COMPLEX, 2 TO 9 PERCENT SLOPES*	48.6	1.0%
120	CAVE LOAM, DRY, 0 TO 2 PERCENT SLOPES	9.8	0.2%
123	DUNE LAND	162.2	3.2%
131	HELENDALE LOAMY SAND, 0 TO 2 PERCENT SLOPES	0.8	0.0%
132	HELENDALE LOAMY SAND, 2 TO 5 PERCENT SLOPES	27.4	0.5%
135	JOSHUA LOAM, 2 TO 5 PERCENT SLOPES	6.4	0.1%
138	KIMBERLINA LOAMY FINE SAND, COOL, 2 TO 5 PERCENT SLOPES	0.0	0.0%
140	LAVIC LOAMY FINE SAND	1.2	0.0%
141	LOVELACE LOAMY SAND, 5 TO 9 PERCENT SLOPES	0.8	0.0%
151	NEBONA-CUDDEBACK COMPLEX, 2 TO 9 PERCENT SLOPES*	632.1	12.6%
152	NOROB-HALLORAN COMPLEX, 0 TO 5 PERCENT SLOPES*	367.1	7.3%
157	RIVERWASH	137.8	2.8%
158	ROCK OUTCROP-LITHIC TORRIORTHENTS COMPLEX, 15 TO 50 PERCENT SLOPES*	3.1	0.1%
169	VICTORVILLE SANDY LOAM	753.9	15.1%
171	VILLA LOAMY SAND	306.2	6.1%

Custom Soil Resource Report

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
172	VILLA LOAMY SAND, HUMMOCKY	1,247.6	25.0%
Totals for Area of Interest		5,000	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

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Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

San Bernardino County, California, Mojave River Area

106—BRYMAN LOAMY FINE SAND, 2 TO 5 PERCENT SLOPES

Map Unit Setting

National map unit symbol: hkrb
Elevation: 3,000 to 3,400 feet
Mean annual precipitation: 3 to 6 inches
Mean annual air temperature: 59 to 63 degrees F
Frost-free period: 180 to 280 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Bryman and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bryman

Setting

Landform: Fan remnants
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite sources

Typical profile

H1 - 0 to 9 inches: loamy fine sand
H2 - 9 to 43 inches: sandy clay loam
H3 - 43 to 60 inches: sandy loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.3 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: R030XF012CA - Sandy
Hydric soil rating: No

Minor Components

Cajon, loamy surface

Percent of map unit: 5 percent

Hydric soil rating: No

Helendale

Percent of map unit: 5 percent

Hydric soil rating: No

Mohave variant

Percent of map unit: 5 percent

Hydric soil rating: No

Bryman, gravelly surface

Percent of map unit: 5 percent

112—CAJON SAND, 0 TO 2 PERCENT SLOPES

Map Unit Setting

National map unit symbol: hkrj

Elevation: 1,800 to 3,200 feet

Mean annual precipitation: 3 to 6 inches

Mean annual air temperature: 59 to 66 degrees F

Frost-free period: 180 to 290 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Cajon and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cajon

Setting

Landform: Alluvial fans

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium derived from granite sources

Typical profile

H1 - 0 to 7 inches: sand

H2 - 7 to 25 inches: sand

H3 - 25 to 45 inches: gravelly sand

H4 - 45 to 60 inches: stratified sand to loamy fine sand

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches

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Drainage class: Somewhat excessively drained

Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 1 percent

Available water supply, 0 to 60 inches: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): 3e

Land capability classification (nonirrigated): 7e

Hydrologic Soil Group: A

Ecological site: R030XF012CA - Sandy

Hydric soil rating: No

Minor Components

Manet

Percent of map unit: 5 percent

Landform: Playas

Hydric soil rating: Yes

Kimberlina

Percent of map unit: 5 percent

Helendale

Percent of map unit: 5 percent

113—CAJON SAND, 2 TO 9 PERCENT SLOPES

Map Unit Setting

National map unit symbol: hkrk

Elevation: 1,800 to 3,500 feet

Mean annual precipitation: 3 to 6 inches

Mean annual air temperature: 59 to 68 degrees F

Frost-free period: 180 to 290 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Cajon and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cajon

Setting

Landform: Alluvial fans

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Custom Soil Resource Report

Across-slope shape: Linear

Parent material: Alluvium derived from mixed sources

Typical profile

A - 0 to 6 inches: sand

C1 - 6 to 25 inches: sand

C2 - 25 to 60 inches: gravelly sand

Properties and qualities

Slope: 0 to 4 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat excessively drained

Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 1 percent

Available water supply, 0 to 60 inches: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): 4e

Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: A

Ecological site: R030XF012CA - Sandy

Hydric soil rating: No

Minor Components

Helendale

Percent of map unit: 5 percent

Landform: Alluvial fans

Hydric soil rating: No

Kimberlina

Percent of map unit: 5 percent

Landform: Alluvial fans

Hydric soil rating: No

Cajon, gravelly surface

Percent of map unit: 5 percent

Landform: Alluvial fans

115—CAJON GRAVELLY SAND, 2 TO 15 PERCENT SLOPES

Map Unit Setting

National map unit symbol: hkrm

Elevation: 2,300 to 3,500 feet

Mean annual precipitation: 3 to 6 inches

Mean annual air temperature: 59 to 66 degrees F

Frost-free period: 180 to 290 days

Custom Soil Resource Report

Farmland classification: Not prime farmland

Map Unit Composition

Cajon, gravelly surface, and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cajon, Gravelly Surface

Setting

Landform: Alluvial fans

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium derived from granite sources

Typical profile

H1 - 0 to 8 inches: gravelly sand

H2 - 8 to 60 inches: gravelly sand

Properties and qualities

Slope: 2 to 15 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat excessively drained

Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: Rare

Frequency of ponding: None

Calcium carbonate, maximum content: 1 percent

Available water supply, 0 to 60 inches: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): 4s

Land capability classification (nonirrigated): 7e

Hydrologic Soil Group: A

Ecological site: R030XF028CA - COBBLY SANDY

Hydric soil rating: No

Minor Components

Arizo

Percent of map unit: 3 percent

Hydric soil rating: No

Cajon

Percent of map unit: 3 percent

Hydric soil rating: No

Kimberlina

Percent of map unit: 3 percent

Hydric soil rating: No

Yermo

Percent of map unit: 3 percent

Hydric soil rating: No

Cajon, cobbly surface

Percent of map unit: 3 percent

116—CAJON LOAMY SAND, 5 TO 9 PERCENT SLOPES

Map Unit Setting

National map unit symbol: hkrn

Elevation: 2,550 to 2,800 feet

Mean annual precipitation: 3 to 6 inches

Mean annual air temperature: 59 to 66 degrees F

Frost-free period: 180 to 290 days

Farmland classification: Not prime farmland

Map Unit Composition

Cajon, loamy surface, and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cajon, Loamy Surface

Setting

Landform: Fan remnants

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium derived from granite sources

Typical profile

H1 - 0 to 6 inches: loamy sand

H2 - 6 to 30 inches: loamy sand

H3 - 30 to 60 inches: gravelly sand

Properties and qualities

Slope: 5 to 9 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat excessively drained

Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 1 percent

Available water supply, 0 to 60 inches: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): 3e

Land capability classification (nonirrigated): 7e

Hydrologic Soil Group: A

Ecological site: R030XF012CA - Sandy

Custom Soil Resource Report

Hydric soil rating: No

Minor Components

Cajon

Percent of map unit: 5 percent

Hydric soil rating: No

Helendale

Percent of map unit: 5 percent

Hydric soil rating: No

Cajon, gravelly surface

Percent of map unit: 5 percent

118—CAJON-ARIZO COMPLEX, 2 TO 15 PERCENT SLOPES*

Map Unit Setting

National map unit symbol: hkrq

Elevation: 2,800 to 3,300 feet

Mean annual precipitation: 3 to 6 inches

Mean annual air temperature: 59 to 66 degrees F

Frost-free period: 180 to 290 days

Farmland classification: Not prime farmland

Map Unit Composition

Cajon, gravelly surface, and similar soils: 55 percent

Arizo and similar soils: 30 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cajon, Gravelly Surface

Setting

Landform: Alluvial fans

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium derived from granite sources

Typical profile

H1 - 0 to 6 inches: gravelly sand

H2 - 6 to 60 inches: gravelly sand

Properties and qualities

Slope: 2 to 15 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat excessively drained

Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)

Depth to water table: More than 80 inches

Custom Soil Resource Report

Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Available water supply, 0 to 60 inches: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: R030XF028CA - COBBLY SANDY
Hydric soil rating: No

Description of Arizo

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite sources

Typical profile

H1 - 0 to 6 inches: gravelly loamy sand
H2 - 6 to 60 inches: extremely gravelly loamy coarse sand

Properties and qualities

Slope: 2 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A
Ecological site: R030XF025CA - GRAVELLY COARSE LOAMY
Hydric soil rating: No

Minor Components

Helendale

Percent of map unit: 4 percent
Hydric soil rating: No

Bryman

Percent of map unit: 4 percent
Hydric soil rating: No

Joshua

Percent of map unit: 4 percent

Hydric soil rating: No

Cajon, clayey substratum

Percent of map unit: 3 percent

119—CAJON-WASCO, COOL COMPLEX, 2 TO 9 PERCENT SLOPES*

Map Unit Setting

National map unit symbol: hkr

Elevation: 2,300 to 3,200 feet

Mean annual precipitation: 3 to 6 inches

Mean annual air temperature: 59 to 66 degrees F

Frost-free period: 180 to 290 days

Farmland classification: Not prime farmland

Map Unit Composition

Cajon and similar soils: 65 percent

Wasco, gravelly, and similar soils: 30 percent

Minor components: 5 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cajon

Setting

Landform: Alluvial fans

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium derived from granite sources

Typical profile

H1 - 0 to 8 inches: sand

H2 - 8 to 60 inches: sand

Properties and qualities

Slope: 2 to 9 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat excessively drained

Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 1 percent

Available water supply, 0 to 60 inches: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): 3e

Land capability classification (nonirrigated): 7e

Custom Soil Resource Report

Hydrologic Soil Group: A
Ecological site: R030XF012CA - Sandy
Hydric soil rating: No

Description of Wasco, Gravelly

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite sources

Typical profile

H1 - 0 to 7 inches: sandy loam
H2 - 7 to 60 inches: sandy loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: R030XF003CA - COARSE LOAMY
Hydric soil rating: No

Minor Components

Cajon, sloping

Percent of map unit: 2 percent
Hydric soil rating: No

Wasco

Percent of map unit: 2 percent
Hydric soil rating: No

Riverwash

Percent of map unit: 1 percent
Landform: Channels
Hydric soil rating: Yes

120—CAVE LOAM, DRY, 0 TO 2 PERCENT SLOPES

Map Unit Setting

National map unit symbol: hksr
Elevation: 2,200 to 2,950 feet
Mean annual precipitation: 3 to 6 inches
Mean annual air temperature: 59 to 63 degrees F
Frost-free period: 180 to 280 days
Farmland classification: Not prime farmland

Map Unit Composition

Cave, dry, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cave, Dry

Setting

Landform: Fan remnants
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite sources

Typical profile

H1 - 0 to 14 inches: loam
H2 - 14 to 21 inches: indurated
H3 - 21 to 66 inches: stratified sandy loam to loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 14 to 20 inches to petrocalcic
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Very slightly saline to slightly saline (2.0 to 4.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: R030XF003CA - COARSE LOAMY
Hydric soil rating: No

Minor Components

Cave, clayey subsoil

Percent of map unit: 5 percent

Landform: Playas

Hydric soil rating: Yes

Kimberlina

Percent of map unit: 5 percent

Lavic

Percent of map unit: 5 percent

123—DUNE LAND

Map Unit Setting

National map unit symbol: hkrw

Mean annual precipitation: 3 to 6 inches

Mean annual air temperature: 59 to 66 degrees F

Frost-free period: 180 to 290 days

Farmland classification: Not prime farmland

Map Unit Composition

Dune land: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dune Land

Setting

Landform: Dunes

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Riser

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Eolian deposits derived from mixed sources

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8e

Hydric soil rating: No

Minor Components

Riverwash

Percent of map unit: 5 percent

Cajon

Percent of map unit: 5 percent

Villa

Percent of map unit: 3 percent

Halloran

Percent of map unit: 2 percent

Landform: Fan remnants

Hydric soil rating: Yes

131—HELENDALE LOAMY SAND, 0 TO 2 PERCENT SLOPES

Map Unit Setting

National map unit symbol: hks4

Elevation: 2,500 to 3,800 feet

Mean annual precipitation: 3 to 6 inches

Mean annual air temperature: 59 to 63 degrees F

Frost-free period: 180 to 280 days

Farmland classification: Prime farmland if irrigated

Map Unit Composition

Helendale and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Helendale

Setting

Landform: Fan remnants

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium derived from granite sources

Typical profile

H1 - 0 to 4 inches: loamy sand

H2 - 4 to 30 inches: sandy loam

H3 - 30 to 66 inches: sandy loam

H4 - 66 to 70 inches: loamy sand

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 5 percent

Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Available water supply, 0 to 60 inches: Low (about 5.9 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: R030XF012CA - Sandy
Hydric soil rating: No

Minor Components

Bryman

Percent of map unit: 5 percent
Hydric soil rating: No

Kimberlina

Percent of map unit: 5 percent
Hydric soil rating: No

Cajon

Percent of map unit: 3 percent
Hydric soil rating: No

Unnamed soils

Percent of map unit: 2 percent
Hydric soil rating: No

132—HELENDALE LOAMY SAND, 2 TO 5 PERCENT SLOPES

Map Unit Setting

National map unit symbol: hks5
Elevation: 2,500 to 3,800 feet
Mean annual precipitation: 3 to 6 inches
Mean annual air temperature: 59 to 63 degrees F
Frost-free period: 180 to 280 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Helendale and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Helendale

Setting

Landform: Fan remnants
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite sources

Typical profile

H1 - 0 to 4 inches: loamy sand
H2 - 4 to 30 inches: sandy loam
H3 - 30 to 66 inches: sandy loam
H4 - 66 to 99 inches: loamy sand

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 5.9 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: R030XF012CA - Sandy
Hydric soil rating: No

Minor Components

Cajon

Percent of map unit: 5 percent
Hydric soil rating: No

Lavic

Percent of map unit: 5 percent
Hydric soil rating: No

Cave

Percent of map unit: 5 percent
Hydric soil rating: No

135—JOSHUA LOAM, 2 TO 5 PERCENT SLOPES

Map Unit Setting

National map unit symbol: hks8
Elevation: 2,600 to 3,000 feet
Mean annual precipitation: 3 to 5 inches
Mean annual air temperature: 63 to 68 degrees F
Frost-free period: 200 to 290 days
Farmland classification: Not prime farmland

Map Unit Composition

Joshua and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Joshua

Setting

Landform: Fan remnants

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Interfluvium

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium derived from mixed sources

Typical profile

A - 0 to 3 inches: loam

Bt - 3 to 20 inches: gravelly sandy clay loam

Bkq - 20 to 59 inches: very gravelly loamy coarse sand

Properties and qualities

Slope: 2 to 4 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Very low

*Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.20 to 1.98 in/hr)*

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 5 percent

Maximum salinity: Slightly saline to strongly saline (4.0 to 16.0 mmhos/cm)

Available water supply, 0 to 60 inches: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: B

Ecological site: R030XG024CA - DESERT PAVEMENT

Hydric soil rating: No

Minor Components

Cajon

Percent of map unit: 10 percent

Hydric soil rating: No

Joshua, steep

Percent of map unit: 5 percent

Hydric soil rating: No

138—KIMBERLINA LOAMY FINE SAND, COOL, 2 TO 5 PERCENT SLOPES

Map Unit Setting

National map unit symbol: hksc
Elevation: 120 to 1,000 feet
Mean annual precipitation: 3 to 6 inches
Mean annual air temperature: 59 to 63 degrees F
Frost-free period: 180 to 280 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Kimberlina and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kimberlina

Setting

Landform: Fan aprons
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from mixed sources

Typical profile

H1 - 0 to 7 inches: loamy fine sand
H2 - 7 to 60 inches: sandy loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Gypsum, maximum content: 5 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 7.0 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: R030XF012CA - Sandy
Hydric soil rating: No

Minor Components

Cajon

Percent of map unit: 5 percent

Hydric soil rating: No

Helendale

Percent of map unit: 5 percent

Hydric soil rating: No

Kimberlina

Percent of map unit: 3 percent

Hydric soil rating: No

Unnamed soils

Percent of map unit: 2 percent

Hydric soil rating: No

140—LAVIC LOAMY FINE SAND

Map Unit Setting

National map unit symbol: hksf

Elevation: 2,800 to 3,100 feet

Mean annual precipitation: 3 to 6 inches

Mean annual air temperature: 59 to 63 degrees F

Frost-free period: 180 to 280 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Lavic and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lavic

Setting

Landform: Fan skirts, fan aprons

Landform position (two-dimensional): Toeslope, footslope

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium derived from granite sources

Typical profile

H1 - 0 to 10 inches: loamy fine sand

H2 - 10 to 20 inches: loamy sand

H3 - 20 to 49 inches: loam

H4 - 49 to 60 inches: stratified sand to loamy sand

Properties and qualities

Slope: 0 to 5 percent

Custom Soil Resource Report

Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 26 percent
Maximum salinity: Slightly saline to moderately saline (4.0 to 8.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 5.5 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: R030XF012CA - Sandy
Hydric soil rating: No

Minor Components

Unnamed soils

Percent of map unit: 14 percent
Hydric soil rating: No

Unnamed

Percent of map unit: 1 percent
Landform: Playas
Hydric soil rating: Yes

141—LOVELACE LOAMY SAND, 5 TO 9 PERCENT SLOPES

Map Unit Setting

National map unit symbol: hksg
Elevation: 3,000 to 3,300 feet
Mean annual precipitation: 3 to 5 inches
Mean annual air temperature: 63 to 68 degrees F
Frost-free period: 200 to 290 days
Farmland classification: Not prime farmland

Map Unit Composition

Lovelace and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lovelace

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear

Custom Soil Resource Report

Across-slope shape: Linear

Parent material: Alluvium derived from mixed sources

Typical profile

A - 0 to 19 inches: loamy sand

Bk - 19 to 33 inches: loamy sand

C - 33 to 60 inches: loamy sand

Properties and qualities

Slope: 5 to 9 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 15 percent

Maximum salinity: Very slightly saline to slightly saline (2.0 to 4.0 mmhos/cm)

Available water supply, 0 to 60 inches: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: A

Ecological site: R030XF012CA - Sandy

Hydric soil rating: No

Minor Components

Cajon

Percent of map unit: 10 percent

Hydric soil rating: No

Lovelace, slope >5%

Percent of map unit: 5 percent

Hydric soil rating: No

151—NEBONA-CUDDEBACK COMPLEX, 2 TO 9 PERCENT SLOPES*

Map Unit Setting

National map unit symbol: hkss

Elevation: 1,800 to 3,400 feet

Mean annual precipitation: 3 to 5 inches

Mean annual air temperature: 63 to 66 degrees F

Frost-free period: 200 to 290 days

Farmland classification: Not prime farmland

Map Unit Composition

Nebona and similar soils: 60 percent

Custom Soil Resource Report

Cuddeback and similar soils: 20 percent

Minor components: 20 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nebona

Setting

Landform: Fan remnants

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Base slope

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium derived from mixed sources

Typical profile

H1 - 0 to 2 inches: sandy loam

H2 - 2 to 8 inches: fine sandy loam

H3 - 8 to 12 inches: indurated

H4 - 12 to 65 inches: stratified gravelly sand to loam

Properties and qualities

Slope: 2 to 9 percent

Depth to restrictive feature: 6 to 14 inches to duripan

Drainage class: Well drained

*Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.57 to 1.98 in/hr)*

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 5 percent

Maximum salinity: Slightly saline to strongly saline (4.0 to 16.0 mmhos/cm)

Available water supply, 0 to 60 inches: Very low (about 0.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7e

Hydrologic Soil Group: D

Ecological site: R030XF030CA - DESERT PAVEMENT

Hydric soil rating: No

Description of Cuddeback

Setting

Landform: Inset fans

Landform position (two-dimensional): Backslope

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium derived from mixed sources

Typical profile

H1 - 0 to 3 inches: sandy loam

H2 - 3 to 6 inches: sandy loam

H3 - 6 to 17 inches: gravelly sandy clay loam

H4 - 17 to 34 inches: gravelly sandy loam

H5 - 34 to 38 inches: indurated

Properties and qualities

Slope: 2 to 9 percent

Custom Soil Resource Report

Depth to restrictive feature: 20 to 40 inches to duripan
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Slightly saline to moderately saline (4.0 to 8.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: R030XG024CA - DESERT PAVEMENT
Hydric soil rating: No

Minor Components

Unnamed soils

Percent of map unit: 19 percent
Hydric soil rating: No

Unnamed

Percent of map unit: 1 percent
Landform: Playas
Hydric soil rating: Yes

152—NOROB-HALLORAN COMPLEX, 0 TO 5 PERCENT SLOPES*

Map Unit Setting

National map unit symbol: hkst
Elevation: 1,800 to 2,600 feet
Mean annual precipitation: 3 to 5 inches
Mean annual air temperature: 63 to 66 degrees F
Frost-free period: 200 to 290 days
Farmland classification: Not prime farmland

Map Unit Composition

Norob and similar soils: 60 percent
Halloran and similar soils: 20 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Norob

Setting

Landform: Fan remnants
Landform position (two-dimensional): Summit

Custom Soil Resource Report

Landform position (three-dimensional): Interfluvium

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium derived from granite sources

Typical profile

H1 - 0 to 5 inches: loamy sand

H2 - 5 to 33 inches: sandy clay loam

H3 - 33 to 60 inches: stratified gravelly loamy sand to sandy clay loam

Properties and qualities

Slope: 0 to 5 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Moderately well drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 5 percent

Maximum salinity: Slightly saline to strongly saline (4.0 to 16.0 mmhos/cm)

Available water supply, 0 to 60 inches: Moderate (about 7.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: C

Ecological site: R030XF013CA - ALKALI SANDY

Hydric soil rating: No

Description of Halloran

Setting

Landform: Fan remnants

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium derived from granite sources

Typical profile

H1 - 0 to 2 inches: sand

H2 - 2 to 21 inches: sandy loam

H3 - 21 to 33 inches: loamy sand

H4 - 33 to 60 inches: stratified sand to sandy loam

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Moderately well drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 10 percent

Gypsum, maximum content: 1 percent

Custom Soil Resource Report

Maximum salinity: Slightly saline to strongly saline (4.0 to 16.0 mmhos/cm)

Sodium adsorption ratio, maximum: 60.0

Available water supply, 0 to 60 inches: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): 4s

Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: C

Ecological site: R030XF013CA - ALKALI SANDY

Hydric soil rating: No

Minor Components

Unnamed soils

Percent of map unit: 18 percent

Hydric soil rating: No

Unnamed

Percent of map unit: 2 percent

Landform: Playas

Hydric soil rating: Yes

157—RIVERWASH

Map Unit Setting

National map unit symbol: hksz

Elevation: 650 to 4,000 feet

Mean annual precipitation: 3 to 6 inches

Mean annual air temperature: 59 to 66 degrees F

Frost-free period: 180 to 290 days

Farmland classification: Not prime farmland

Map Unit Composition

Riverwash: 90 percent

Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Riverwash

Setting

Landform: Channels

Down-slope shape: Linear

Across-slope shape: Linear

Typical profile

H1 - 0 to 60 inches: variable

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8w

Hydric soil rating: Yes

Minor Components

Villa

Percent of map unit: 5 percent

Hydric soil rating: No

Victorville

Percent of map unit: 5 percent

Hydric soil rating: No

158—ROCK OUTCROP-LITHIC TORRIORTHENTS COMPLEX, 15 TO 50 PERCENT SLOPES*

Map Unit Setting

National map unit symbol: hkt0

Elevation: 650 to 9,000 feet

Mean annual precipitation: 3 to 5 inches

Mean annual air temperature: 63 to 66 degrees F

Frost-free period: 200 to 290 days

Farmland classification: Not prime farmland

Map Unit Composition

Rock outcrop: 60 percent

Lithic torriorthents and similar soils: 30 percent

Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rock Outcrop

Setting

Landform: Mountains

Landform position (two-dimensional): Summit, backslope

Landform position (three-dimensional): Mountainflank

Down-slope shape: Concave

Across-slope shape: Concave

Typical profile

H1 - 0 to 10 inches: unweathered bedrock

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8s

Hydrologic Soil Group: D

Hydric soil rating: No

Description of Lithic Torriorthents

Setting

Landform: Mountains, hills

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Mountainflank, side slope

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Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from granite

Typical profile

H1 - 0 to 15 inches: variable
H2 - 15 to 29 inches: bedrock

Properties and qualities

Slope: 15 to 50 percent
Depth to restrictive feature: 8 to 20 inches to lithic bedrock
Drainage class: Excessively drained
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydric soil rating: No

Minor Components

Sparkhule

Percent of map unit: 4 percent
Hydric soil rating: No

Trigger

Percent of map unit: 3 percent
Hydric soil rating: No

Rock outcrop

Percent of map unit: 3 percent
Hydric soil rating: No

169—VICTORVILLE SANDY LOAM

Map Unit Setting

National map unit symbol: hktc
Elevation: 2,200 to 2,800 feet
Mean annual precipitation: 3 to 6 inches
Mean annual air temperature: 59 to 63 degrees F
Frost-free period: 180 to 280 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Victorville and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Victorville

Setting

Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 16 inches: sandy loam
H2 - 16 to 35 inches: stratified sandy loam to fine sandy loam
H3 - 35 to 49 inches: stratified sand to sandy loam
H4 - 49 to 60 inches: clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.3 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: R030XF034CA - COARSE LOAMY BOTTOM
Hydric soil rating: No

Minor Components

Unnamed soils

Percent of map unit: 10 percent
Hydric soil rating: No

Unnamed

Percent of map unit: 5 percent
Landform: Flood plains
Hydric soil rating: Yes

171—VILLA LOAMY SAND

Map Unit Setting

National map unit symbol: hktf

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Elevation: 1,700 to 2,800 feet
Mean annual precipitation: 3 to 6 inches
Mean annual air temperature: 59 to 63 degrees F
Frost-free period: 180 to 280 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Villa and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Villa

Setting

Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 7 inches: loamy sand
H2 - 7 to 60 inches: stratified sand to fine sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: About 36 to 72 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: R030XF034CA - COARSE LOAMY BOTTOM
Hydric soil rating: No

Minor Components

Unnamed soils

Percent of map unit: 10 percent
Hydric soil rating: No

Unnamed

Percent of map unit: 5 percent
Landform: Fan remnants
Hydric soil rating: Yes

172—VILLA LOAMY SAND, HUMMOCKY

Map Unit Setting

National map unit symbol: hktg
Elevation: 1,700 to 2,800 feet
Mean annual precipitation: 3 to 6 inches
Mean annual air temperature: 59 to 63 degrees F
Frost-free period: 180 to 280 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Villa and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Villa

Setting

Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 7 inches: loamy sand
H2 - 7 to 60 inches: stratified sand to fine sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: About 36 to 72 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: R030XF034CA - COARSE LOAMY BOTTOM
Hydric soil rating: No

Minor Components

Unnamed soils

Percent of map unit: 10 percent

Hydric soil rating: No

Unnamed

Percent of map unit: 5 percent

Landform: Fan remnants

Hydric soil rating: Yes

Soil Information for All Uses

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

Land Classifications

This folder contains a collection of tabular reports that present a variety of soil groupings. The reports (tables) include all selected map units and components for each map unit. Land classifications are specified land use and management groupings that are assigned to soil areas because combinations of soil have similar behavior for specified practices. Most are based on soil properties and other factors that directly influence the specific use of the soil. Example classifications include ecological site classification, farmland classification, irrigated and nonirrigated land capability classification, and hydric rating.

California Revised Storie Index (CA)

The Revised Storie Index is a rating system based on soil properties that govern the potential for soil map unit components to be used for irrigated agriculture in California.

The Revised Storie Index assesses the productivity of a soil from the following four characteristics:

- Factor A: degree of soil profile development
- Factor B: texture of the surface layer
- Factor C: steepness of slope
- Factor X: drainage class, landform, erosion class, flooding and ponding frequency and duration, soil pH, soluble salt content as measured by electrical conductivity, and sodium adsorption ratio

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Revised Storie Index numerical ratings have been combined into six classes as follows:

- Grade 1: Excellent (81 to 100)
- Grade 2: Good (61 to 80)
- Grade 3: Fair (41 to 60)
- Grade 4: Poor (21 to 40)
- Grade 5: Very poor (11 to 20)
- Grade 6: Nonagricultural (10 or less)

Reference:

O'Geen, A.T., Southard, S.B., Southard, R.J. 2008. A Revised Storie Index for Use with Digital Soils Information. University of California Division of Agriculture and Natural Resources. Publication 8355. <http://anrcatalog.ucanr.edu/pdf/8335.pdf>

Report—California Revised Storie Index (CA)

California Revised Storie Index (CA)—San Bernardino County, California, Mojave River Area			
Map symbol and soil name	Pct. of map unit	California Revised Storie Index (CA)	
		Rating class	Value
106—BRYMAN LOAMY FINE SAND, 2 TO 5 PERCENT SLOPES			
Bryman	80	Grade 1 - Excellent	83
112—CAJON SAND, 0 TO 2 PERCENT SLOPES			
Cajon	85	Grade 3 - Fair	51
113—CAJON SAND, 2 TO 9 PERCENT SLOPES			
Cajon	85	Grade 3 - Fair	47
115—CAJON GRAVELLY SAND, 2 TO 15 PERCENT SLOPES			
Cajon, GRAVELLY SURFACE	85	Grade 4 - Poor	34
116—CAJON LOAMY SAND, 5 TO 9 PERCENT SLOPES			
Cajon, LOAMY SURFACE	85	Grade 2 - Good	61
118—CAJON-ARIZO COMPLEX, 2 TO 15 PERCENT SLOPES*			
Cajon, GRAVELLY SURFACE	55	Grade 4 - Poor	34
Arizo	30	Grade 4 - Poor	37
119—CAJON-WASCO, COOL COMPLEX, 2 TO 9 PERCENT SLOPES*			
Cajon	65	Grade 3 - Fair	46
Wasco, GRAVELLY	30	Grade 1 - Excellent	88

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California Revised Storie Index (CA)–San Bernardino County, California, Mojave River Area			
Map symbol and soil name	Pct. of map unit	California Revised Storie Index (CA)	
		Rating class	Value
120—CAVE LOAM, DRY, 0 TO 2 PERCENT SLOPES			
Cave, DRY	85	Grade 1 - Excellent	95
123—DUNE LAND			
Dune land	85	Not Rated	
131—HELENDALE LOAMY SAND, 0 TO 2 PERCENT SLOPES			
Helendale	85	Grade 2 - Good	80
132—HELENDALE LOAMY SAND, 2 TO 5 PERCENT SLOPES			
Helendale	85	Grade 2 - Good	74
135—JOSHUA LOAM, 2 TO 5 PERCENT SLOPES			
Joshua	85	Grade 4 - Poor	37
138—KIMBERLINA LOAMY FINE SAND, COOL, 2 TO 5 PERCENT SLOPES			
Kimberlina	85	Grade 1 - Excellent	82
140—LAVIC LOAMY FINE SAND			
Lavic	85	Grade 2 - Good	73
141—LOVELACE LOAMY SAND, 5 TO 9 PERCENT SLOPES			
Lovelace	85	Grade 2 - Good	68
151—NEBONA-CUDDEBACK COMPLEX, 2 TO 9 PERCENT SLOPES*			
Nebona	60	Grade 6 - Nonagricultural	8
Cuddeback	20	Grade 4 - Poor	26
152—NOROB-HALLORAN COMPLEX, 0 TO 5 PERCENT SLOPES*			
Norob	60	Grade 3 - Fair	41
Halloran	20	Grade 4 - Poor	28
157—RIVERWASH			
Riverwash	90	Not Rated	
158—ROCK OUTCROP-LITHIC TORRIORTHENTS COMPLEX, 15 TO 50 PERCENT SLOPES*			
Rock outcrop	60	Not Rated	
Lithic Torriorthents	30	Not Rated	
169—VICTORVILLE SANDY LOAM			
Victorville	85	Grade 2 - Good	80
171—VILLA LOAMY SAND			
Villa	85	Grade 2 - Good	67

California Revised Storie Index (CA)–San Bernardino County, California, Mojave River Area			
Map symbol and soil name	Pct. of map unit	California Revised Storie Index (CA)	
		Rating class	Value
172—VILLA LOAMY SAND, HUMMOCKY			
Villa	85	Grade 2 - Good	67

Land Capability Classification

The land capability classification of map units in the survey area is shown in this table. This classification shows, in a general way, the suitability of soils for most kinds of field crops (United States Department of Agriculture, Soil Conservation Service, 1961). Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forestland, or for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit.

Capability classes, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

- Class 1 soils have slight limitations that restrict their use.
- Class 2 soils have moderate limitations that restrict the choice of plants or that require moderate conservation practices.
- Class 3 soils have severe limitations that restrict the choice of plants or that require special conservation practices, or both.
- Class 4 soils have very severe limitations that restrict the choice of plants or that require very careful management, or both.
- Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.
- Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.
- Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.
- Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, e, w, s, or c, to the class numeral, for example, 2e. The letter e shows that the main hazard is the risk of erosion unless close-growing plant cover is

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maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w*, *s*, or *c* because the soils in class 5 are subject to little or no erosion.

Report—Land Capability Classification

Land Capability Classification—San Bernardino County, California, Mojave River Area				
Map unit symbol and name	Pct. of map unit	Component name	Land Capability Subclass	
			Nonirrigated	Irrigated
106—BRYMAN LOAMY FINE SAND, 2 TO 5 PERCENT SLOPES				
	80	Bryman	7e	2e
112—CAJON SAND, 0 TO 2 PERCENT SLOPES				
	85	Cajon	7e	3e
113—CAJON SAND, 2 TO 9 PERCENT SLOPES				
	85	Cajon	6e	4e
115—CAJON GRAVELLY SAND, 2 TO 15 PERCENT SLOPES				
	85	Cajon, gravelly surface	7e	4s
116—CAJON LOAMY SAND, 5 TO 9 PERCENT SLOPES				
	85	Cajon, loamy surface	7e	3e
118—CAJON-ARIZO COMPLEX, 2 TO 15 PERCENT SLOPES*				
	55	Cajon, gravelly surface	7e	4s
	30	Arizo	7w	—
119—CAJON-WASCO, COOL COMPLEX, 2 TO 9 PERCENT SLOPES*				
	65	Cajon	7e	3e
	30	Wasco, gravelly	7e	2e
120—CAVE LOAM, DRY, 0 TO 2 PERCENT SLOPES				
	85	Cave, dry	7s	—
123—DUNE LAND				
	85	Dune land	8e	—

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Land Capability Classification—San Bernardino County, California, Mojave River Area				
Map unit symbol and name	Pct. of map unit	Component name	Land Capability Subclass	
			Nonirrigated	Irrigated
131—HELENDALE LOAMY SAND, 0 TO 2 PERCENT SLOPES				
	85	Helendale	7e	2e
132—HELENDALE LOAMY SAND, 2 TO 5 PERCENT SLOPES				
	85	Helendale	7e	2e
135—JOSHUA LOAM, 2 TO 5 PERCENT SLOPES				
	85	Joshua	6e	—
138—KIMBERLINA LOAMY FINE SAND, COOL, 2 TO 5 PERCENT SLOPES				
	85	Kimberlina	7e	2e
140—LAVIC LOAMY FINE SAND				
	85	Lavic	7e	3e
141—LOVELACE LOAMY SAND, 5 TO 9 PERCENT SLOPES				
	85	Lovelace	6e	—
151—NEBONA-CUDDEBACK COMPLEX, 2 TO 9 PERCENT SLOPES*				
	60	Nebona	7e	—
	20	Cuddeback	7e	—
152—NOROB-HALLORAN COMPLEX, 0 TO 5 PERCENT SLOPES*				
	60	Norob	7s	—
	20	Halloran	7s	4s
157—RIVERWASH				
	90	Riverwash	8w	—
158—ROCK OUTCROP-LITHIC TORRIORTHENTS COMPLEX, 15 TO 50 PERCENT SLOPES*				
	60	Rock outcrop	8s	—
	30	Lithic torriorthents	7e	—
169—VICTORVILLE SANDY LOAM				
	85	Victorville	7e	2e
171—VILLA LOAMY SAND				
	85	Villa	7e	3e
172—VILLA LOAMY SAND, HUMMOCKY				
	85	Villa	7e	3e

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- United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084>

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