Land Evaluation and Site Assessment Model

Citizens Imperial Solar, LLC Project

Imperial County, CA

June 6, 2018

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Contents

Tables

Figures

Appendices

Abbreviations and Acronyms

LCC	land capability classification
LE	land evaluation
LESA	land evaluation and site assessment
project	Citizens Imperial Solar, LLC Project
SA	site assessment

1 Land Evaluation and Site Assessment Model

1.1 Introduction

Land evaluation and site assessment (LESA) is a term used to define an approach for rating the relative quality of land resources based upon specific measurable features. The LESA system is a point-based approach composed of six different factors. Two land evaluation (LE) factors are based upon measures of soil resource quality. Four site assessment (SA) factors provide measures of a given project's size, water resource availability, surrounding agricultural lands, and surrounding protected resource lands. For a given project, each of these factors is separately rated on a 100-point scale. The factors are then weighted relative to one another and combined, resulting in a single numeric score for a given project, with a maximum attainable score of 100 points. This score becomes the basis for making a determination of a project's potential significance, based upon a range of established scoring thresholds (California Department of Conservation 1997).

Appendix G of the California Environmental Quality Act Guidelines identifies the California Agricultural LESA Model as an optional model to use in assessing impacts on agriculture and farmland. A LESA model was prepared for the proposed Citizens Imperial Solar, LLC Project (project), and the results are provided in this report.

2 Project Description

The proposed project is located approximately 6 miles northeast of the City of Calipatria and 5 miles southeast of Niland, a census-designated place, in the unincorporated area of Imperial County (Figure 1). The project site encompasses approximately 223 acres, comprised of two parcels of land identified as assessor parcel numbers 025-260-024 (northern parcel) and 025-280-003 (southern parcel) (Figure 2). The East Highline Canal is located on the project site's eastern boundary, with desert lands immediately beyond. The project site is surrounded to the north, west, and south by privately-owned agricultural lands. Adjacent roadways, which are currently developed for agricultural uses, include Merkley Road and Simpson Road.

The proposed project involves the construction of a 30 megawatt photovoltaic solar energy facility on approximately 223 acres of land. Of the 223 acres, approximately 159 acres (area within the fence line) would be developed with a ground-mounted photovoltaic solar power generating system, supporting structures, on-site substation, access driveways, and transmission structures. The project would interconnect with the Imperial Irrigation District's system at the existing Midway Substation, located on the northern parcel of the project site. Of the 223 acres, approximately 12.02 acres is currently developed with the Midway Substation. The Important Farmlands maps, prepared by the California Department of Conservation, also identifies the area containing the Midway Substation as developed land. Therefore, for the purposes of this

LESA, the project area does not include the 12.02 acres already developed with the existing Midway Substation (Figure 2).

Figure 1. Regional Location

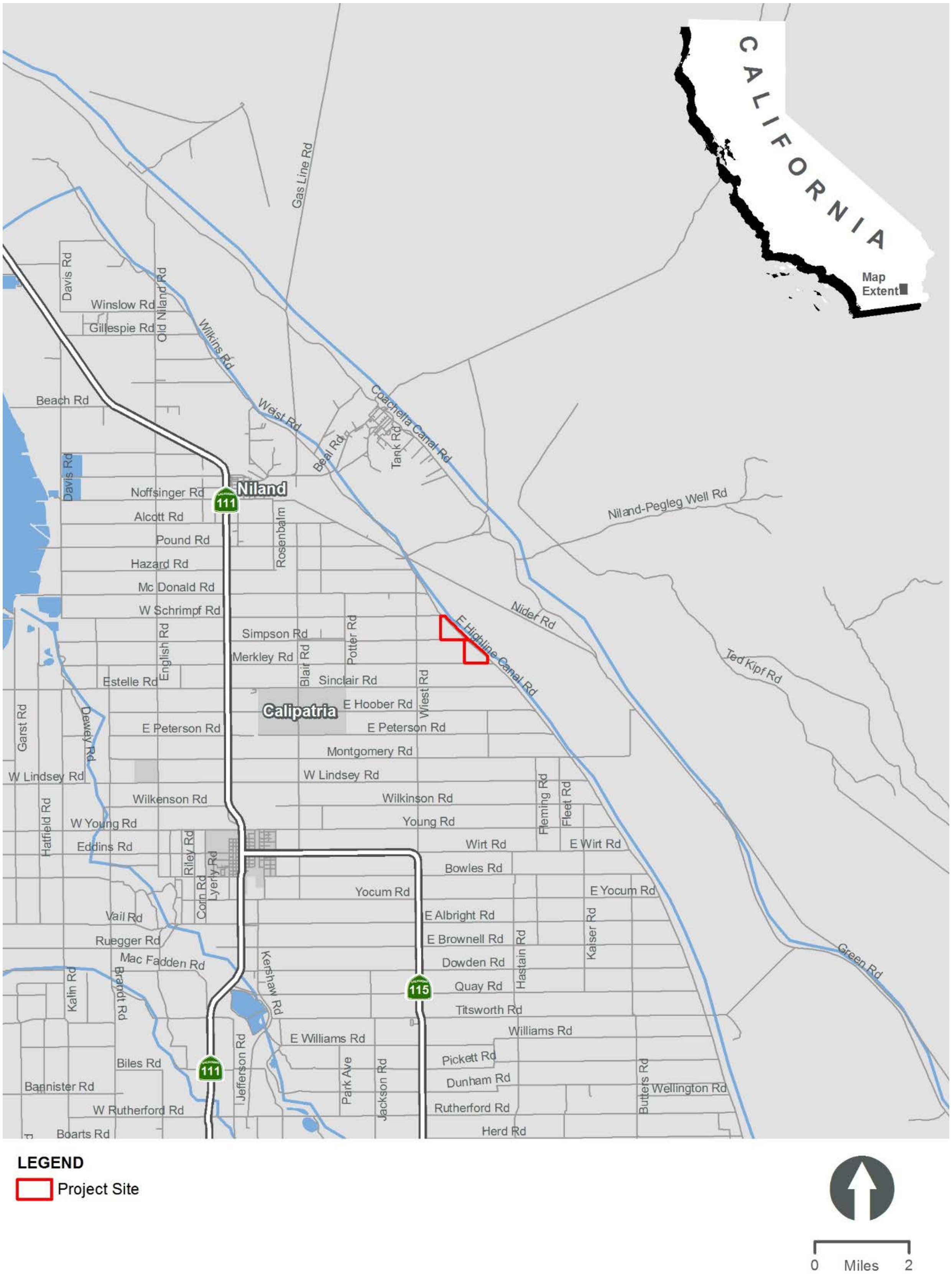
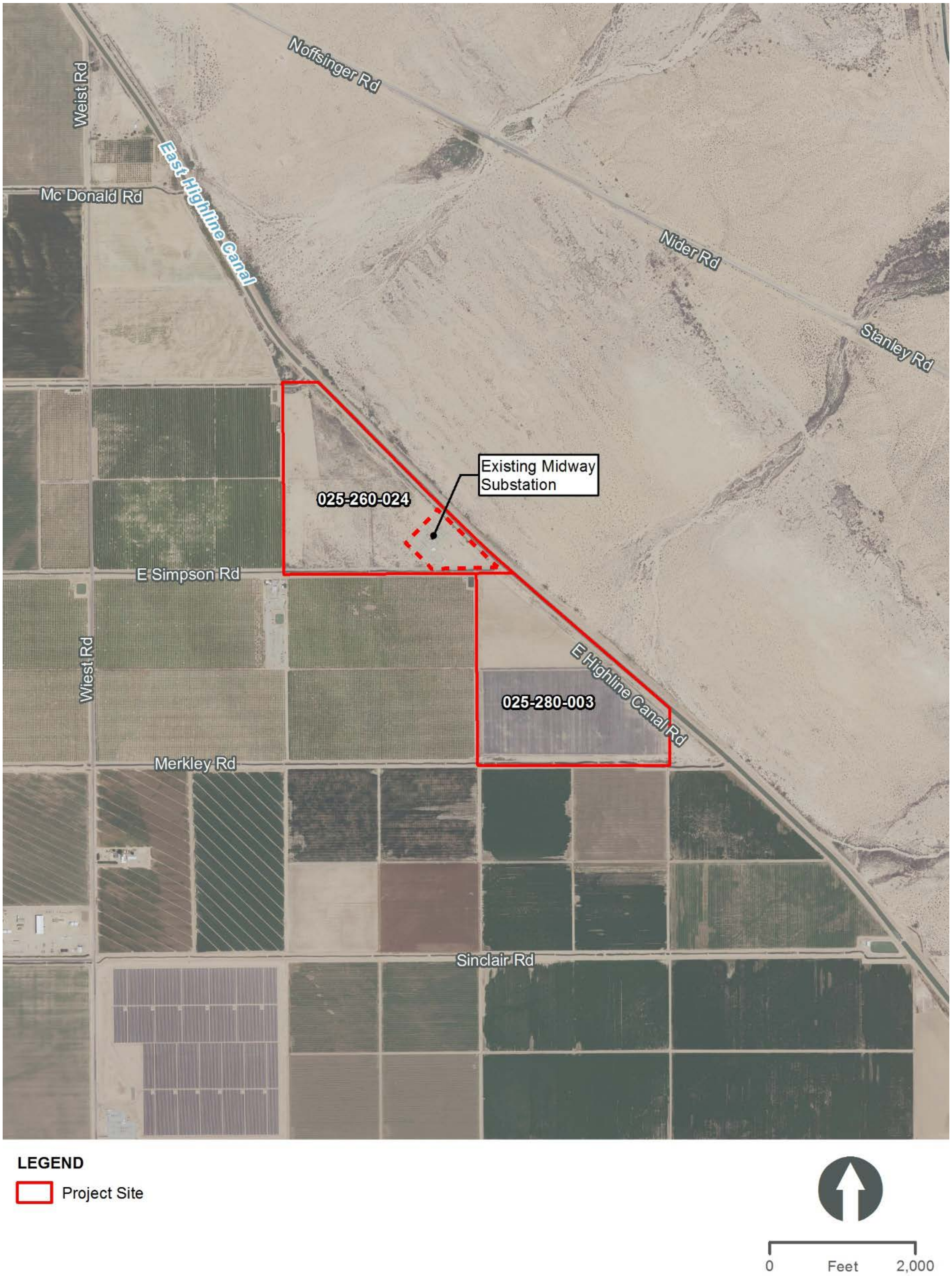


Figure 2. Project Site



3 Land Evaluation and Site Assessment

The site was evaluated using the California LESA model to rate the quality and availability of agricultural resources for the project site and identify whether the proposed project would meet the threshold criteria as a significant impact to Agricultural Resources under the California Environmental Quality Act Guidelines. The LESA evaluates LE and SA factors to identify if the project would result in a significant agricultural resources impact. The factors are evaluated in the following sections.

3.1 Land Evaluation

The LE portion of the LESA Model focuses on two main components that are separately rated:

1. **Land Capability Classification Rating:** The land capability classification (LCC) indicates the suitability of soils for most kinds of crops. Soils are rated from Class 1 to Class 8, with soils having the fewest limitations receiving the highest rating.
2. **Storie Index Rating:** The Storie Index provides a numeric rating (based upon a 100- point scale) of the relative degree of suitability or value of a given soil for intensive agriculture use. This rating is based upon soil characteristics only.

Figure 3 depicts the distribution of soil types on the project site. Table 1 details the varieties of soils found on the project site, along with their Capability Class and Storie Index rating.

Table 1. Soil Suitability

Map Symbol	Mapping Unit	Capability Class	Storie Index Rating
114	Imperial silty clay, wet	3w	36
115	Imperial-Glenbar silty clay loams, wet, 0 to 2 percent slopes	3w	68
122	Meloland very fine sandy loam, wet	3w	77
125	Niland gravelly sand, wet	4w	45
145	Water	NA	NA

Source: Appendix A

NA – not applicable

The LESA model assigns ratings to each land capability class and multiplies that number by the proportion of the project area that contains each soil class to find the LCC score. A Storie Index score is calculated by multiplying the proportion of the project within each soil type by the soil type's Storie Index rating. Table 2 provides a summary of the LE scores. The final LE and SA scores are entered into the final LESA Score Sheet, as shown in Table 6.

Figure 3. Project Soil Types

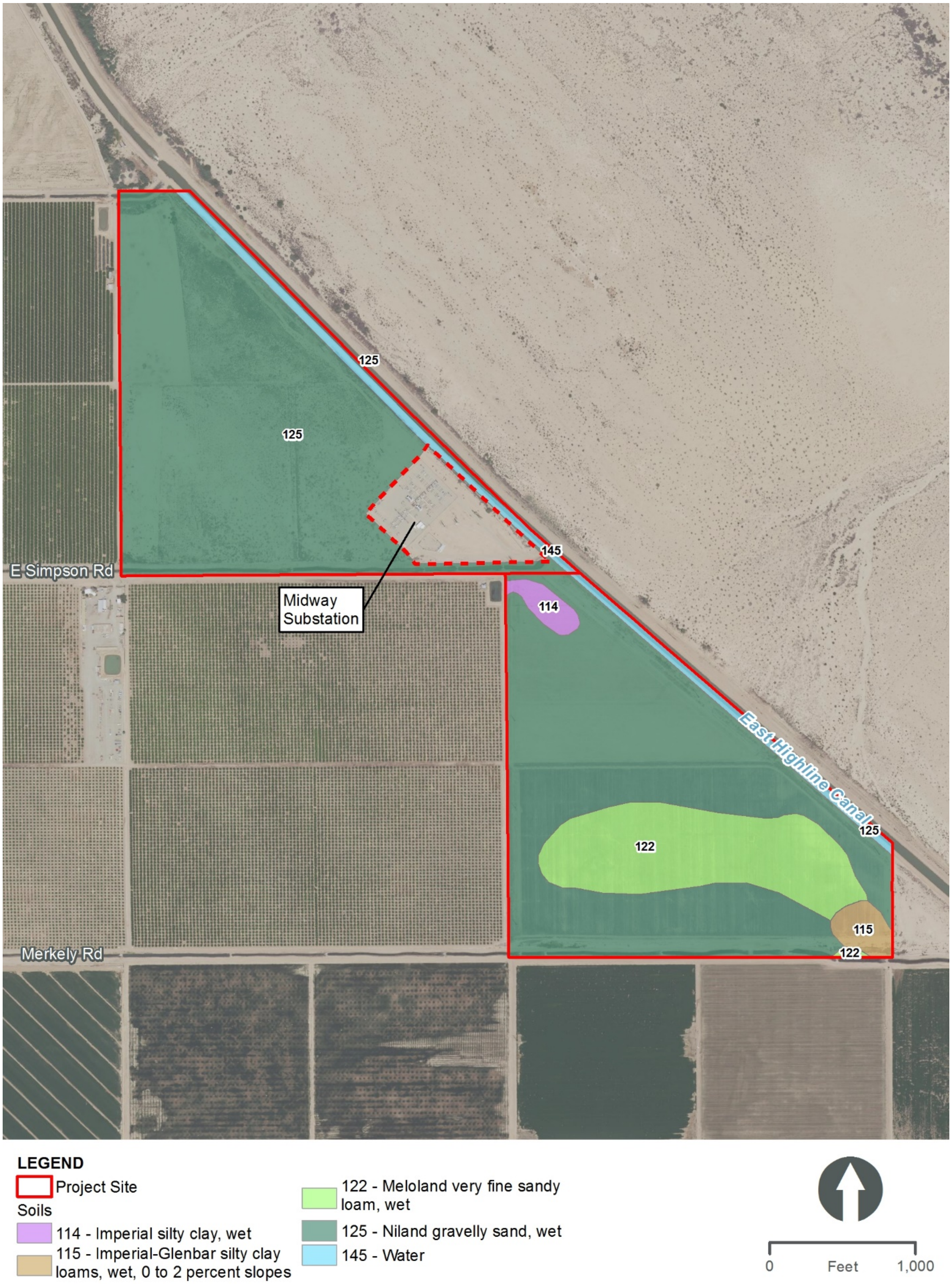


Table 2. Land Evaluation Worksheet

A	B	C	D	E	F	G	H
Soil Map Unit	**Project Acres**	**Proportion of Project Area**	**LCC (Irrigated)**	**LCC Rating (Irrigated)**	**LCC Score (C x E)**	**Storie Index**	**Storie Index Score (C x G)**
114	2.24	0.01	3w	60	0.60	36	0.36
115	2.75	0.01	3w	60	0.60	68	0.68
122	26.55	0.12	3w	60	7.20	77	9.24
125	170.48	0.81	4w	40	32.40	45	36.45
145	9.21	0.04	NA	0	0.00	0	0.00
Totals	**211.22**	**1.00**	**--**	**--**	**40.80**	**--**	**46.73**

LCC – land capability classification; NA – not applicable

3.2 Site Assessment Factors

The California LESA model includes four SA factors that are separately rated and include:

1. Project size rating
2. Water resources availability rating
3. Surrounding agricultural land rating
4. Surrounding protected resource land rating

3.2.1 Project Size Rating

The project size rating recognizes the role that farm 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, as well as impacts upon supporting industries and food processing industries (California Department of Conservation 1997).

In terms of agricultural productivity, the size of the farming operation can be considered not only from its total acreage but the acreage of different quality lands that comprise the operation. Lands with higher quality soils lend themselves to greater management and cropping flexibility and have the potential to provide greater economic return per acre unit. For a given project, instead of relying upon a single acreage figure in the project size rating, the project is divided into three acreage groupings based upon the LCC ratings previously determined in the LE analysis. Under the project size rating, relatively fewer acres of high quality soils are required to achieve a maximum project size score. Alternatively, a maximum score on lesser quality soils could also achieve a maximum project size score. Table 3 summarizes the project size score for the proposed project.

Table 3. Site Assessment Worksheet 1 – Project Size Score

	LCC Class I-II	LCC Class III	LCC Class IV-VIII
	0.0	31.54	170.48
Total Acres	0.0	31.54	170.48
Project Size Scores	0	30	60
Highest Project Size Score	**60**		

LCC – land capability classification

3.2.2 Water Resources Availability Rating

The water resources availability rating is based upon identifying the various water sources that may supply a given property, and then determining whether different restrictions in supply are likely to take place in years that are characterized as being periods of drought and non-drought.

The project site is completely served by irrigation water provided by the Imperial Irrigation District. The proposed project was given the highest water resource availability rating given the consistent water delivery provided by Imperial Irrigation District to the project site. The project has no physical or economic restrictions that may alter water resource supply during either drought or non-drought years. Table 4 summarizes the water resources availability score.

Table 4. Site Assessment Worksheet 2 – Water Resources Availability

A	B	C	D	E
Project Portion	**Water Source**	**Proportion of Project Area**	**Water Availability Score**	**Weighted Availability Score (C x D)**
1	Irrigation Water	1.0	100	100
			Total Water Resource Score	**100**

3.2.3 Surrounding Agricultural Land Rating

The surrounding agricultural land rating is designed to provide a measurement of the level of agricultural land use for lands within the zone of influence of the subject parcel. The definition of a 'zone of influence' is the amount of surrounding lands up to a minimum of 0.25 mile from the project boundary. Parcels that are intersected by the 0.25-mile buffer are included in their entirety. Based upon the percentage of agricultural land in the zone of influence, the project site is assigned a surrounding agricultural land score. The LESA model rates the potential significance of the conversion of an agricultural parcel that has a large proportion of surrounding land in agricultural production more highly than one that has a relatively small percentage of surrounding land in agricultural production (California Department of Conservation 1997).

Lands used for agricultural production are located adjacent to the project site to the south and west (Figure 4). The surrounding agricultural land score for the proposed project is provided in Table 5.

Figure 4. Zone of Influence

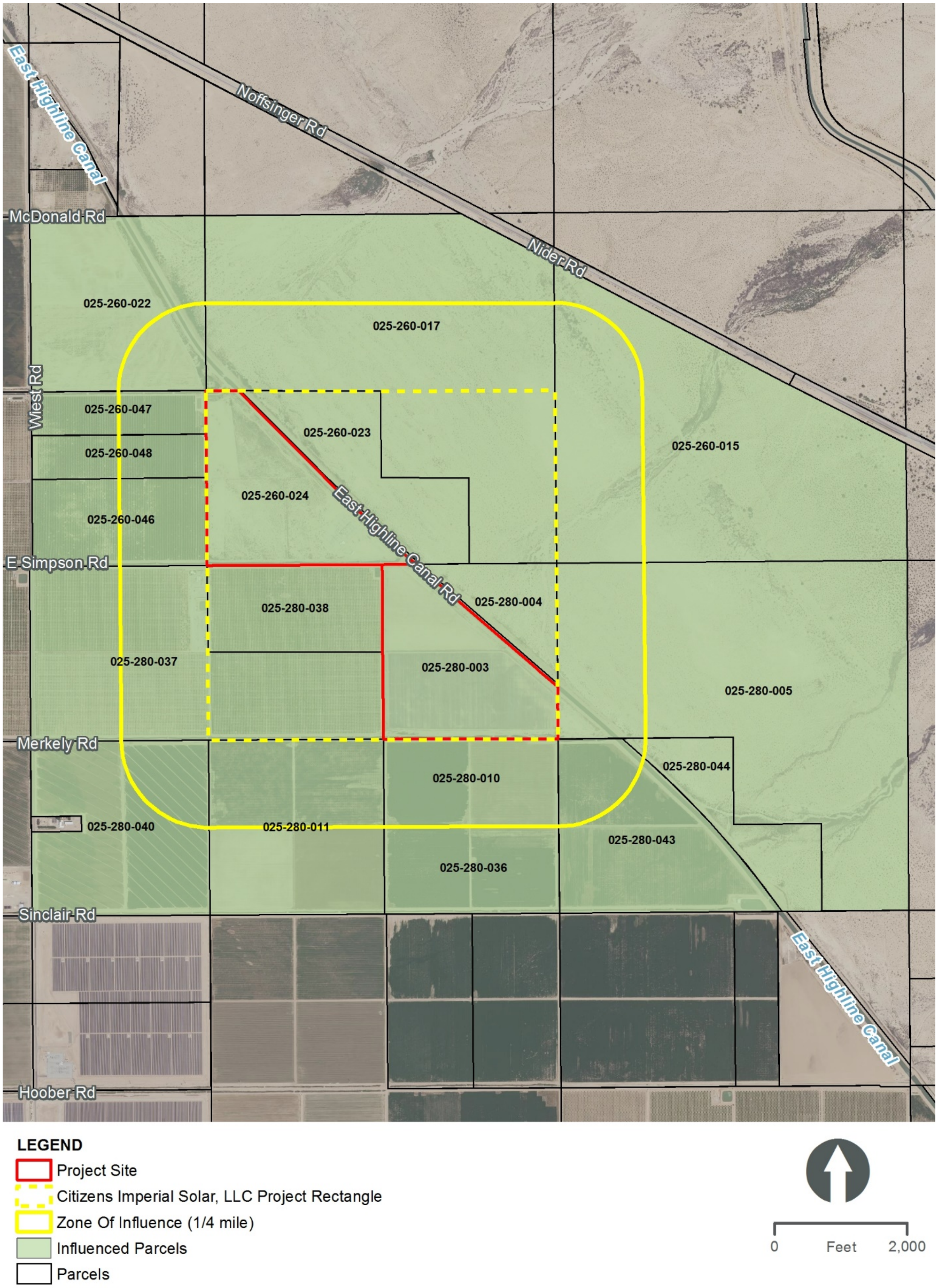


Table 5. Site Assessment Worksheet 3 – Surrounding Agricultural Land and Surrounding Protected Resource Land

Surrounding Parcels	Acres	Protected Resource Land?	Percent Protected Resource Land	Acres in Protected Land	Agricultural Land?	Percent Agricultural Land	Acres of Agriculture
025-260-015	381.83	Yes	100	381.83	No	0	0.0
025-260-017	429.78	Yes	100	429.78	Yes	0	0.00
025-260-022	160.07	Yes	16.3	26.07	Yes	83.7	134.01
025-260-023	87.05	Yes	100	87.05	No	0	0.0
025-260-046	80.17	No	0	0	Yes	100	80.17
025-260-047	39.90	No	0	0	Yes	100	39.90
025-260-048	39.95	No	0	0	Yes	100	39.95
025-280-004	43.10	Yes	100	43.10	No	0	0.0
025-280-005	442.00	Yes	97.3	430.11	Yes	2.7	11.89
025-280-010	79.97	No	0	0	Yes	100	79.97
025-280-011	160.06	No	0	0	Yes	100	160.06
025-280-036	79.78	No	0	0	Yes	100	79.78
025-280-037	242.75	No	0	0	Yes	100	242.75
025-280-038	79.70	No	0	0	Yes	100	79.70
025-280-040	158.98	No	0	0	Yes	100	158.98
025-280-043	136.98	No	0	0	Yes	100	136.98
025-280-044	62.75	Yes	100	62.75	No	0	0.0
TOTAL	**2704.82**	--	--	**1460.69**	--	--	**1244.14**

Zone of Influence*					Surrounding Agricultural Land Score (From LESA Manual Table 6)	Surrounding Protected Resource Land Score (From LESA Manual Table 7)
Total Acreage within Zone of Influence	Acres in Agricultural Production	Acres of Protected Resource Land**	Percent in Agriculture	Percent Protected Resource Land		
2704.82	**1244.14**	**1460.69**	**46.00**	**54.00**	**20**	**30**

* *In conformance with the instructions in the LESA Instruction Manual (California Department of Conservation 1997), the Zone of Influence was determined by drawing the smallest rectangle that could completely encompass the entire Project Area. A second rectangle was then drawn which extended one quarter mile on all sides beyond the first rectangle. The Zone of Influence is represented by the entire area of all parcels with any lands inside the outer rectangle, less the area of the proposed project (Figure 4).*

** *The LESA Instruction Manual (California Department of Conservation 1997) describes Protected Resource Land as those lands with long term use restrictions that are compatible with or supportive of agricultural uses of land. Included among them are the following: Williamson Act contracted lands; Publicly owned lands maintained as park, forest, or watershed resources; and Lands with agricultural, wildlife habitat, open space, or other natural resource easements that restrict the conversion of such land to urban or industrial uses.*

3.2.4 Surrounding Protected Resource Land Rating

The surrounding protected resource land rating is essentially an extension of the surrounding agricultural land rating and scored in a similar manner. Protected resource lands are those lands with long-term use restrictions compatible with or supportive of agricultural uses of land. Included among them are the following:

- Williamson Act contracted land
- Publicly owned lands maintained as park, forest, or watershed resources
- Lands with agricultural, wildlife habitat, open space, or other natural resource easements that restrict the conversion of such land to urban or industrial uses

Based on a review of the Department of Conservation's Imperial County Williamson Act FY 2016/2017 map (California Department of Conservation 2016), several parcels located within the zone of influence are located on Williamson Act contracted land (non-renewal). This is defined as enrolled lands for which non-renewal has been filed pursuant to Government Code Section 51245. On February 23, 2010, the Imperial County Board of Supervisors voted to reject any new Williamson Act contracts and not to renew existing contracts because of the elimination of the subvention funding from the state budget. Imperial County reaffirmed this decision in a vote on October 12, 2010, and notices of nonrenewal were sent to landowners with Williamson Act contracts following that vote. The applicable deadlines for challenging Imperial County's actions have expired, and, therefore, all Williamson Act contracts in Imperial County will terminate on or before December 31, 2018. For the purposes of this LESA, the parcels located within the zone of influence identified as being located on Williamson Act contracted land (non-renewal) are not considered protected resources.

Protected resources within 0.25 mile of the project site include public lands managed by the Bureau of Land Management and Imperial County lands zoned for open space and preservation. The surrounding protected resource land score for the proposed project is provided in Table 5.

4 Summary

The LESA Model is weighted so half of the total score of a given project is derived from the LE and half from the SA. As shown in Table 6, the LE subscore is 21.88, while the SA subscore is 28.50. The final LESA score is 50.38. As shown in Table 7, a final LESA score between 40 and 59 points is considered significant only if the LE and SA subscores are greater than or equal to 20 points. Therefore, with both subscores (LE and SA) above 20, the project is considered to have a significant impact on agricultural resources.

Table 6. Final Land Evaluation Site Assessment Score Sheet Summary

	Factor Rating (0-100 Points)	Factor Weighting (Total = 1.00)	Weighted Factor Rating
LE			
1. LCC Rating	40.80	0.25	10.20
2. Storie Index Rating	46.73	0.25	11.68
LE Subscore	--	--	21.88
SA			
1. Project Size Rating	60	0.15	9.0
2. Water Resource Availability Rating	100	0.15	15.00
3. Surrounding Agricultural Land Rating	20	0.15	3.00
4. Surrounding Protected Resource Lands Rating	30	0.05	1.50
SA Subscore	--	--	28.50
Total			**50.38**

LCC – land capability classification; LE – land evaluation; SA – site assessment

Table 7. California Land Evaluation Site Assessment Model Scoring Thresholds

Total LESA Score	Scoring Decision
0 to 39 points	Not considered significant
40 to 59 points	Considered significant only if LE and SA subscores are greater than or equal to 20 points
60 to 79 points	Considered significant unless either LE or SA subscore is less than 20 points
80 to 100 points	Considered significant

Source: California Department of Conservation 1997

LE – land evaluation; SA – site assessment

5 References

California Department of Conservation. 1997. California Agricultural Land Evaluation and Site Assessment Model Instruction Manual.

——— 2016. *Imperial County Williamson Act FY 2016/2017.* *ftp://ftp.consrv.ca.gov/pub/dlrp/wa/Imperial_16_17_WA.pdf*

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Appendix A. Custom Soil Report

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United States Department of Agriculture

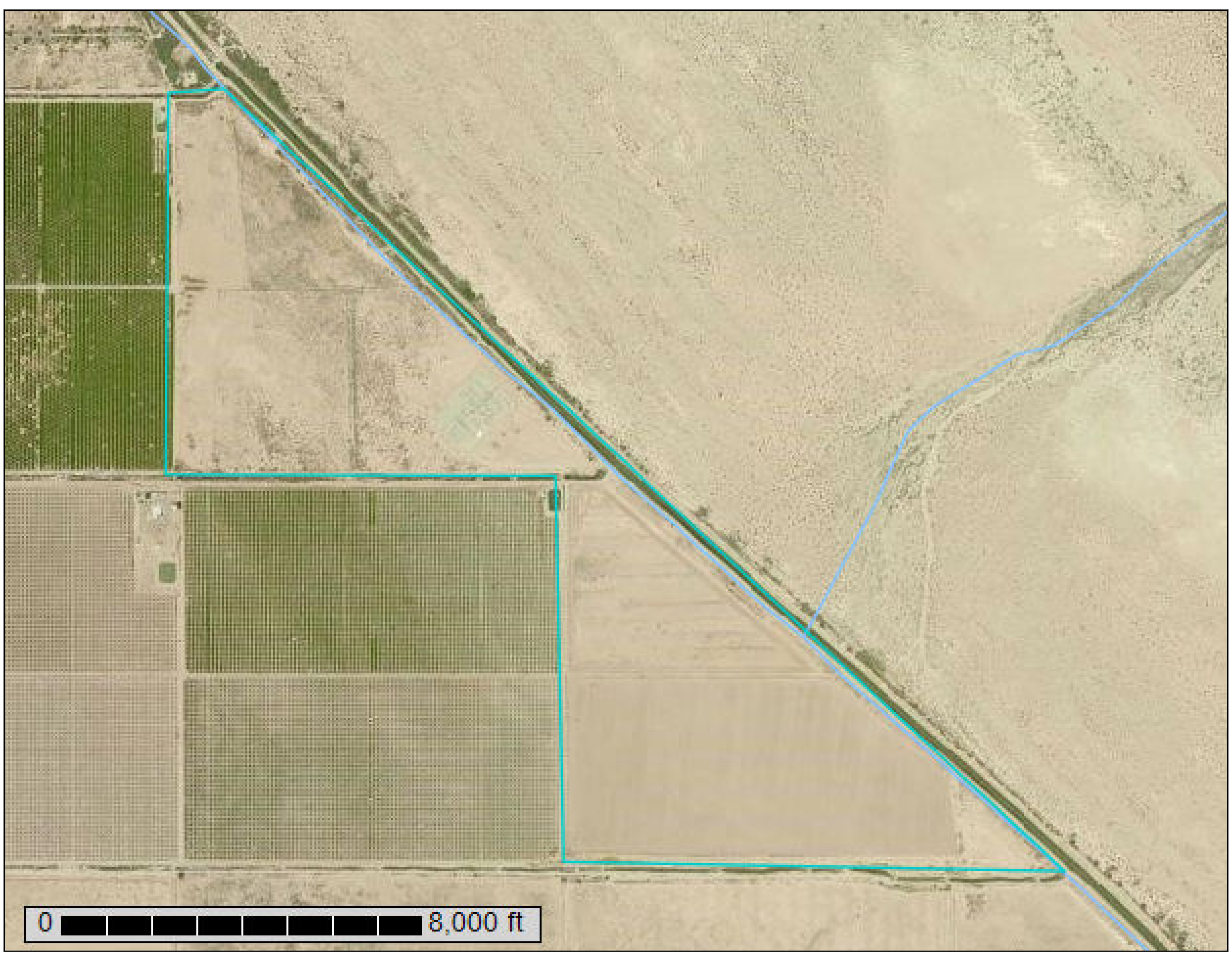
NRCS

Natural Resources Conservation Service

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

Custom Soil Resource Report for

Imperial County, California, Imperial Valley Area



May 11, 2018

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.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

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.

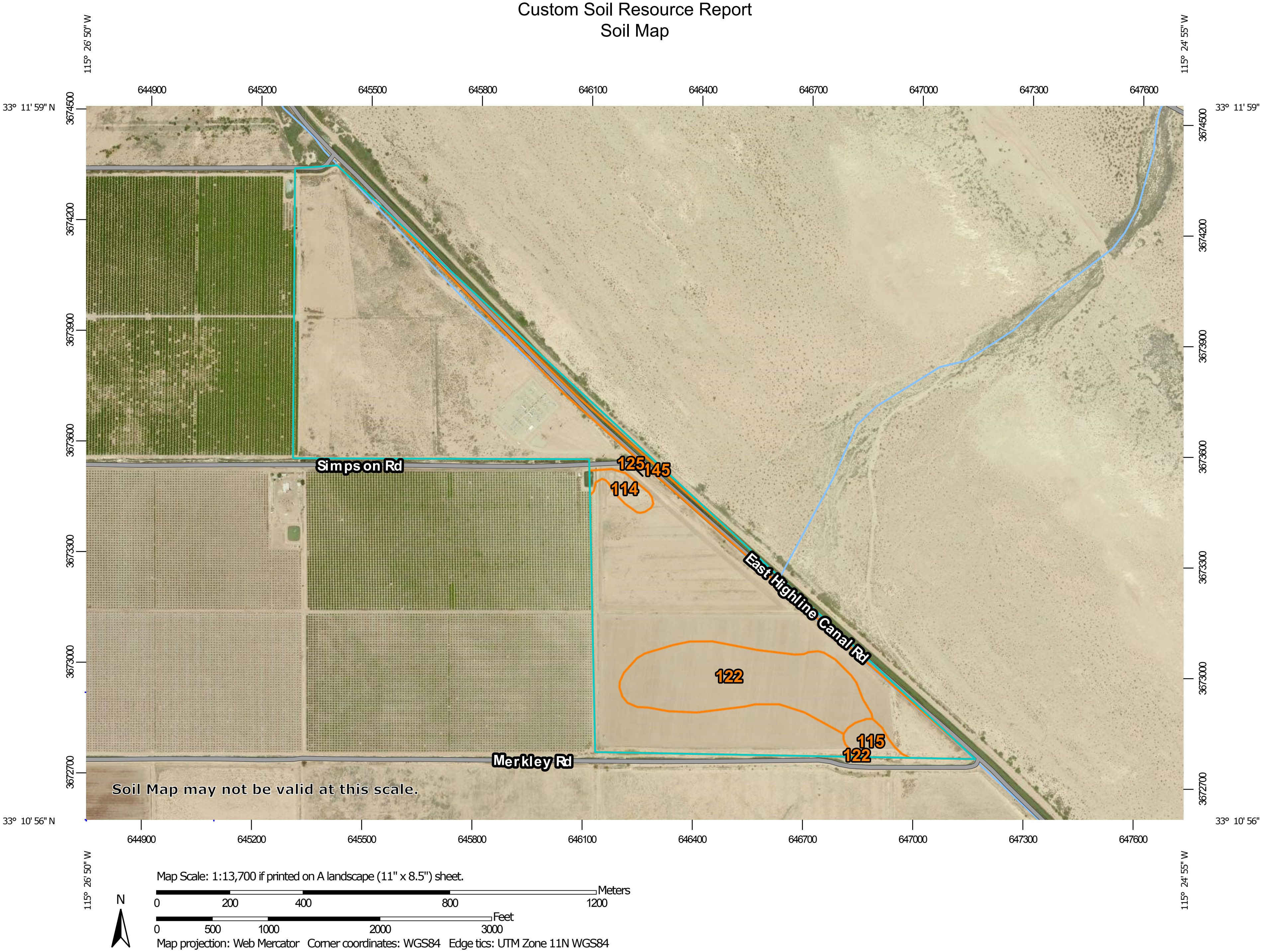
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree 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 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



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.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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: Imperial County, California, Imperial Valley Area
Survey Area Data: Version 9, Sep 11, 2017

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

Date(s) aerial images were photographed: Jun 23, 2011—Jun 25, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND	MAP INFORMATION
	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
114	Imperial silty clay, wet	2.5	1.1%
115	Imperial-Glenbar silty clay loams, wet, 0 to 2 percent slopes	2.8	1.2%
122	Meloland very fine sandy loam, wet	26.3	11.6%
125	Niland gravelly sand, wet	188.2	82.9%
145	Water	7.4	3.3%
Totals for Area of Interest		**227.2**	**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.

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.

Imperial County, California, Imperial Valley Area

114—Imperial silty clay, wet

Map Unit Setting

National map unit symbol: h8zn
Elevation: -230 to 200 feet
Mean annual precipitation: 0 to 3 inches
Mean annual air temperature: 72 to 75 degrees F
Frost-free period: 300 to 350 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Imperial, Wet

Setting

Landform: Basin floors
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey alluvium derived from mixed and/or clayey lacustrine deposits derived from mixed

Typical profile

H1 - 0 to 12 inches: silty clay
H2 - 12 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural 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 in profile: 5 percent
Salinity, maximum in profile: Slightly saline to moderately saline (4.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 20.0
Available water storage in profile: Moderate (about 8.3 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Glenbar

Percent of map unit: 4 percent

Hydric soil rating: No

Meloland

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

Holtville

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

Niland

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

115—Imperial-Glenbar silty clay loams, wet, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: h8zp
Elevation: -230 to 200 feet
Mean annual precipitation: 0 to 3 inches
Mean annual air temperature: 72 to 75 degrees F
Frost-free period: 300 to 350 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Imperial, wet, and similar soils: 40 percent
Glenbar, wet, and similar soils: 40 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Imperial, Wet

Setting

Landform: Basin floors
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey alluvium derived from mixed and/or clayey lacustrine deposits derived from mixed

Typical profile

H1 - 0 to 12 inches: silty clay loam
H2 - 12 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Low
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 in profile: 5 percent
Salinity, maximum in profile: Slightly saline to moderately saline (4.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 20.0
Available water storage in profile: Moderate (about 8.6 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: C
Hydric soil rating: No

Description of Glenbar, Wet

Setting

Landform: Basin floors
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from mixed

Typical profile

H1 - 0 to 13 inches: silty clay loam
H2 - 13 to 60 inches: clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Low
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 in profile: 5 percent
Salinity, maximum in profile: Very slightly saline to moderately saline (2.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 15.0
Available water storage in profile: High (about 10.8 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Holtville

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

Meloland

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

122—Meloland very fine sandy loam, wet

Map Unit Setting

National map unit symbol: h8zx
Elevation: -230 to 200 feet
Mean annual precipitation: 0 to 3 inches
Mean annual air temperature: 72 to 75 degrees F
Frost-free period: 300 to 350 days
Farmland classification: Prime farmland if irrigated and drained

Map Unit Composition

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

Description of Meloland, Wet

Setting

Landform: Basin floors
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from mixed and/or eolian deposits derived from mixed

Typical profile

H1 - 0 to 12 inches: very fine sandy loam
H2 - 12 to 26 inches: stratified loamy fine sand to silt loam
H3 - 26 to 71 inches: clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Moderately saline to strongly saline (8.0 to 16.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 13.0
Available water storage in profile: Moderate (about 7.8 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 7w

Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Imperial

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

Indio

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

Holtville

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

Glenbar

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

Vint

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

125—Niland gravelly sand, wet

Map Unit Setting

National map unit symbol: h900
Elevation: -230 to 200 feet
Mean annual precipitation: 0 to 3 inches
Mean annual air temperature: 72 to 75 degrees F
Frost-free period: 300 to 350 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Niland, Wet

Setting

Landform: Basin floors
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from mixed sources

Typical profile

H1 - 0 to 23 inches: gravelly sand
H2 - 23 to 60 inches: silty clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Low
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 in profile: 5 percent
Salinity, maximum in profile: Very slightly saline to strongly saline (2.0 to 16.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 10.0
Available water storage in profile: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): 4w
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Imperial

Percent of map unit: 6 percent
Hydric soil rating: No

Unnamed

Percent of map unit: 3 percent
Landform: Levees
Hydric soil rating: Yes

Carsitas

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

Meloland

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

145—Water

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

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

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)–Imperial County, California, Imperial Valley Area			
Map symbol and soil name	Pct. of map unit	California Revised Storie Index (CA)	
		Rating class	Value
114—Imperial silty clay, wet			
Imperial, WET	85	Grade 4 - Poor	36
115—Imperial-Glenbar silty clay loams, wet, 0 to 2 percent slopes			
Glenbar, WET	40	Grade 2 - Good	68
Imperial, WET	40	Grade 3 - Fair	57
122—Meloland very fine sandy loam, wet			
Meloland, WET	85	Grade 2 - Good	77
125—Niland gravelly sand, wet			
Niland, WET	85	Grade 3 - Fair	45
145—Water			
Water	100	Not Applicable for Storie Index	

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 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–Imperial County, California, Imperial Valley Area				
Map unit symbol and name	Pct. of map unit	Component name	Land Capability Subclass	
			Nonirrigated	Irrigated
114—Imperial silty clay, wet				
	85	Imperial, wet	7w	3w
115—Imperial-Glenbar silty clay loams, wet, 0 to 2 percent slopes				
	40	Imperial, wet	7w	3w
	40	Glenbar, wet	7w	3w
122—Meloland very fine sandy loam, wet				
	85	Meloland, wet	7w	3w
125—Niland gravelly sand, wet				
	85	Niland, wet	7w	4w
145—Water				
	100	Water	—	—

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