SUNPOWER RANCH PROPERTY SOLAR PROJECT

Wetland Delineation

Prepared for
SunPower

October 2015

ESA

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CHAPTER 1.0
Introduction

On behalf of SunPower, ESA has prepared this report to delineate and document wetland and channel boundaries for the SunPower Ranch Property Solar Project (project). ESA investigated the extent of potentially jurisdictional wetlands and other waters of the U.S. occurring at the project site (**Figure 1-1**), hereafter referred to as the "study area." The study area consists of approximately 11.70 acres of land approximately 1.8 miles west of the City of Nevada City in Nevada County (**Figure 1-2**). The site investigation was conducted in October 2015. The study concludes that there are 0.457 acres of potentially jurisdictional waters of the U.S. in the study area. These include:

- 0.396 acres of seasonal wetland; and
- 0.061 acres of ephemeral channel.

This report documents wetland and channel boundary delineation using the best professional judgment of qualified biologists. All conclusions presented should be considered preliminary and subject to change pending official review and verification in writing by the U.S. Army Corps of Engineers (USACE).

1.1 Responsible Parties

The applicant's contact information is:

Sevi Gultes, Sr. Development Engineer
SunPower
1414 Harbour Way South
Richmond, CA 94804

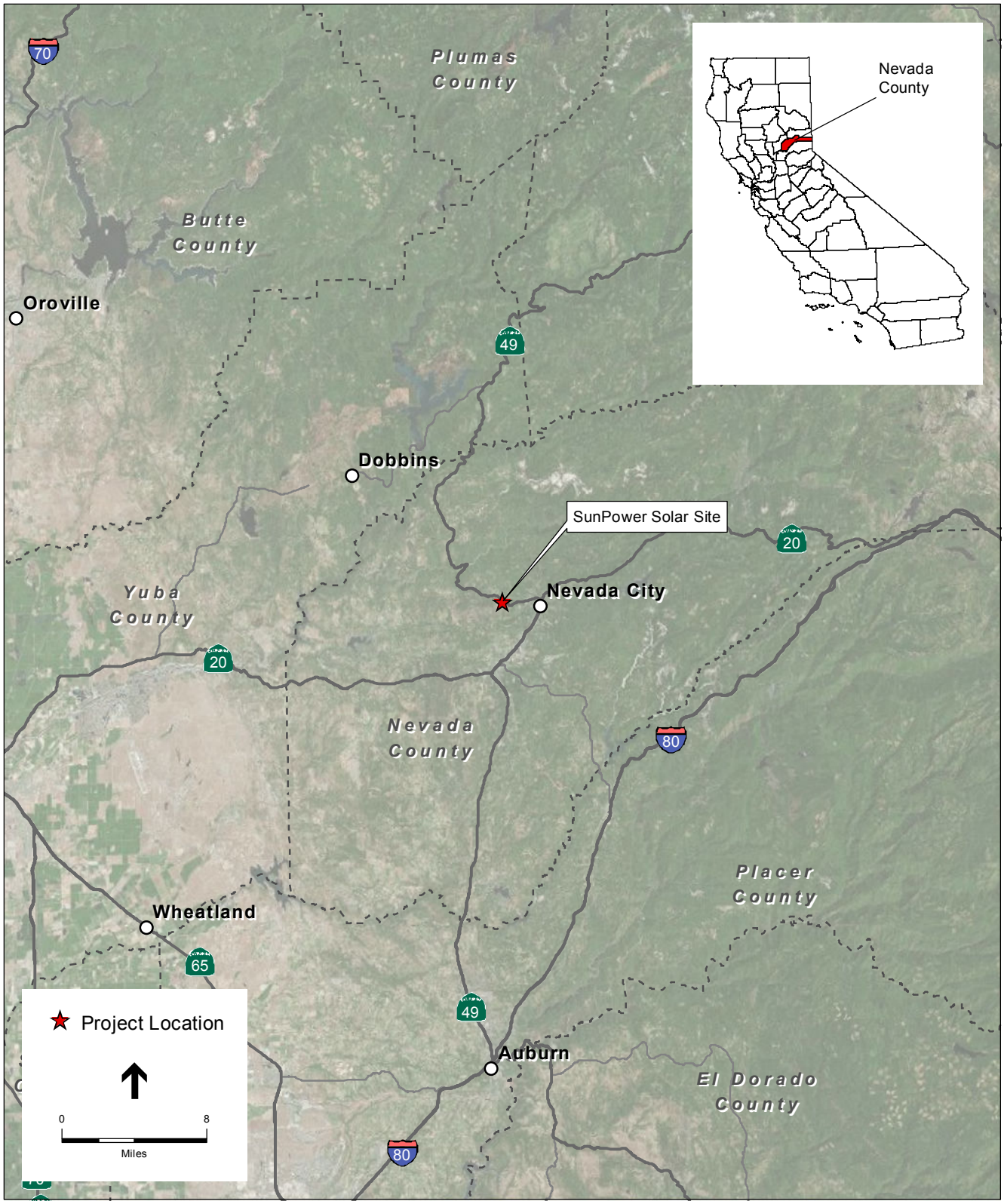
1.2 Directions to Site

Directions to the site:

- From Sacramento, take I-80 East;
- Take exit 119B for CA-49 north toward Grass Valley;
- Follow CA-49 to destination at 16782 Highway 49.

1.3 Purpose of Assessment

The purpose of this investigation is to describe and delineate all wetlands and waters of the U.S. within the study area that may be subject to Section 404 of the Clean Water Act. If necessary, information from this report may be used in preparing permit applications for future actions proposed in the study area. This report will be reviewed by the USACE to verify their jurisdiction over wetlands and other waters of the U.S. in the study area.



SOURCE: i-cubed, 1999; ESRI, 2012; ESA, 2015

SunPower Nevada County Solar Ranch Property. 150518

Figure 1-1
Regional Locator

SunPower Nevada County Solar Ranch Property. 150518

SOURCE: Microsoft, 2011; SunPower, 2015; ESA, 2015

Figure 1-2
Study Area

SECTION 2.0
Setting

2.1 Study Area

The study area is located in an unincorporated part of Nevada County approximately 1.8 miles west of the City of Nevada City, CA at 16782 Highway 49. This location corresponds to Township 16 North, Range 8 East, Section 11 of the Nevada City, CA U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle map. The site includes an adjacent County-owned residence, driveway and existing transmission lines along Highway 49. It is bounded by Highway 49 to the east and residential areas to the north, south and west. Surrounding land uses include rural residential and open space.

The study area is located in the heart of the northern Sierra Nevada foothills. The Sierra Nevada foothills lie between the western edge of the Sierra Nevada and the eastern border of the Central Valley. The foothills form a belt 10 to 30 miles wide that ranges from 500 to 5,000 feet in elevation in a series of northwest to north-northwest aligned ridges that decline in elevation from northeast to southwest. Many rapidly flowing rivers and streams run westerly in deeply incised canyons with bedrock channels to the Central Valley and eventually to the Pacific Ocean. Alluvial fans, floodplains, and terraces are not extensive; and all but the largest streams are generally dry during the summer. Dominant vegetation communities include grasslands, oak/pine woodlands, and chaparral. The climate is temperate with mean annual precipitation of 54.31 inches and mean annual temperatures ranging from a high of 67.7 to a low of 40.1 degrees Fahrenheit (Western Regional Climate Center, 2015). Within the study area, the topography gently slopes from south to north. Elevations in the study area range from approximately 2,450 to 2,500 feet above mean sea level (msl).

Representative photographs were taken throughout the project area; select photographs are included in **Appendix B**.

2.2 Soils

The *Custom Soil Resource Report for Nevada County Area, California – Ranch Property* (NRCS, 2015 – **Appendix A**) (**Table 2-1** and **Figure 2-1**) indicates two soil units within the study area. Neither of the soil units is listed by the Natural Resource Conservation Service (NRCS) on the national hydric soils list for Nevada County, California (NRCS, 2014).

TABLE 2-1
STUDY AREA SOIL UNITS

Soil Map Unit Name	Hydric Status	Percentage of Study Area
BoC: Boomer loam 5 to 15 percent slopes	Non-hydric	84.2%
SID: Sites loam, 15 to 30 percent slopes	Non-hydric	15.8%

SOURCE: NRCS, 2015; NRCS, 2014

- **Boomer loam, 5 to 15 percent slopes**, is not listed as hydric by the NRCS (NRCS, 2014). Included in this map unit are small inclusions of Josephine, Rescue, Sites, Sobrante, and Rock outcrop soils. The map unit composition is 85 percent Boomer and similar soils, and 15 percent minor components. This soil consists of well drained loam and clay loam soils derived from residuum weathered from metavolcanics. Mapped areas are on mountains.
- **Sites loam, 15 to 30 percent slopes**, is not listed as hydric by the NRCS (NRCS, 2014). Included in this map unit are small inclusions of Cohasset, Mariposa, Aiken, Josephine, Aiken, and Rock outcrop soils. The map unit composition is 85 percent Sites and similar soils, and 15 percent minor components. This soil consists of well drained loam and clay loam soils derived from metabasic residuum weathered from metasedimentary rock. Mapped areas are on hills.

2.3 Hydrology

The Ranch Property site is located within the Yuba River Watershed, which encompasses 1,340 square miles from the west slope of the Sierra Nevada at Donner Pass to the Feather River near Yuba City. Most of the Yuba River's flow comes from its three main tributaries: North Yuba, Middle Yuba, and South Yuba Rivers. The South Yuba River is located approximately 2.7 miles north of the Ranch Property and Deer Creek is located 1 mile south of the Ranch Property site.

The study area has relatively flat to moderately sloped terrain, consisting of hillsides draining to the center of the site. Surface water drains to two small ephemeral channels, which meet near the center of the site, then collectively flow northwest off the site, eventually draining to Rush Creek approximately 2,200 feet northwest of the study area. Rush Creek is a perennial channel which flows northwest to the South Yuba River. The South Yuba River joins the Yuba River and eventually drains to the Feather River just south of Marysville. The Feather River is considered a "traditional navigable water" (TNW) under Section 404 of the Clean Water Act from Marysville to its confluence with the Sacramento River.

2.4 Vegetation

Plant communities are assemblages of plant species that occur together in the same area, and are defined by species composition and relative abundance. Plant communities and habitats within the study area include annual grassland, perennial grassland, seasonal wetlands, and riverine; plant communities surrounding the study area include montane hardwood-conifer forest and montane riparian woodland.

SOURCE: Microsoft, 2011; SSURGO, 2014; SunPower, 2015; ESA, 2015

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Figure 2-1
Soils

Annual Grassland

Annual grassland is present throughout the study area and also forms the understory in the montane hardwood-conifer forest communities surrounding the site. This community is situated along the upper slopes of the hillsides in the study area, and transitions to perennial grassland and seasonal wetlands as the site elevation descends. This plant community is dominated by nonnative Mediterranean annual grasses such as Mediterranean barley (*Hordeum marinum* subsp. *gussoneanum,* FAC), perennial rye grass (*Festuca perennis,* FAC), wild oats (*Avena sativa,* UPL), and soft chess (*Bromus hordeaceus,* FACU). An assemblage of native and nonnative forbs was noted in the grasslands including clovers (*Trifolium* spp.), lupine (*Lupinus* sp.), spikeweed (*Centromadia* sp.), geranium (*Geranium* sp.), filaree (*Erodium* sp.), thistle (*Cirsium* sp.), and bird's-foot trefoil (*Lotus corniculatus,* FAC). Occasional thickets of Himalayan blackberry (*Rubus armeniacus,* FACU) and coyote brush (*Baccharis pilularis,* NL) occur sporadically within the annual grassland community, typically along the upper reaches of the ephemeral channels.

Perennial Grassland

This vegetation community forms a transitional habitat type between the annual grassland and seasonal wetlands in the study area. Dominant grass species include a mix of native perennial grasses such as needle grass (*Stipa* sp.), bluegrass (*Poa* sp.), and annual hairgrass (*Deschampsia danthonioides,* FACW) and introduced nonnative Mediterranean annual grasses. Scattered pockets of sedge (*Carex* sp.), spikerush (*Eleocharis macrostachya,* FACW), and rush (*Juncus* sp.) were noted within this community. These species were dominant in the seasonal wetlands in the study area but were only a minor component of the perennial grassland community. This community also includes native and nonnative forbs as well. Examples noted in the study area include lupines, clovers, California buttercup (*Ranunculus californicus,* FAC), chickweed (*Stellaria media,* FACU), and vetch (*Vicia* sp.).

Seasonal Wetland

Seasonal wetlands are freshwater wetlands that support ponded or saturated soil conditions during winter and spring and are dry through the summer and fall. Vegetation is characterized by annual and perennial species of native and non-native grasses and forbs that begin their growth as aquatic or semi-aquatic plants and make a transition to a dry-land environment as the wetlands dries. Plant species that are either low-growing, tenacious perennials that tolerate disturbance or annuals that tolerate seasonal wetness often colonize seasonal wetlands. Upland grasses and forbs can become established while wetland species desiccate.

Within the project site, seasonal wetlands are distributed in topographic depressions along the ephemeral drainages within the annual and perennial grasslands. Plant species found within seasonal wetlands are adapted to withstand short periods of inundation. Herbaceous plant species present in seasonal wetlands within the project site include spikerush, soft rush (*Juncus effuses,* FACW), slender rush (*Juncus tenuis,* FAC), perennial rye grass, annual hairgrass, scratch grass (*Muhlenbergia asperifolia,* FACW), pennyroyal (*Mentha pulegium,* OBL), fiddle dock (*Rumex pulcher,* FAC), rabbitsfoot grass (*Polypogon monspeliensis,* FACW), and Mediterranean barley.

Occasional arroyo willow shrubs (*Salix lasiolepis,* FACW) occur along the borders of seasonal wetlands in the study area.

Riverine

Stream habitats are distinguished by intermittent or continually running water, and occur in association with a variety of terrestrial habitats. The study area supports two ephemeral channels that traverse the upland annual and perennial grasslands as well as the seasonal wetlands. The channels both originate as upland vegetated swales, which eventually become channelized. The northernmost channel is fed from a culvert flowing under Highway 49. The stream channels are a mix of unvegetated areas and annual grassland species in their upper reaches, while in the lower reaches the channels support seasonal wetland species.

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SECTION 3
Methodology

3.1 Definition of "Waters of the U.S."

The federal government defines "Waters of the United States" in 33 CFR (Code of Federal Regulations) 328.3 as:

i. All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;

ii. All interstate waters including interstate wetlands;

iii. All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters:

   a. Which are or could be used by interstate or foreign travelers for recreational or other purposes; or

   b. From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or

   c. Which are used or could be used for industrial purpose by industries in interstate commerce;

iv. All impoundments of waters otherwise defined as waters of the United States under the definition;

v. Tributaries of the above waters;

vi. The territorial seas;

vii. Wetlands adjacent to the above waters (other than waters that are themselves wetlands). Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR 123.11(m) which also meet the criteria of this definition) are not waters of the United States.

viii. Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the CWA, the final authority regarding CWA jurisdiction remains with the EPA.

The term "wetlands" means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Under normal circumstances, the definition of wetlands requires three wetland identification parameters be present: wetland hydrology, hydric soils, and hydrophytic vegetation. Examples of wetlands may include freshwater marsh, seasonal wetlands, and vernal pool complexes that are adjacent to perennial waters of the U.S.

"Other waters of the U.S." refers to those hydric features that are regulated by the CWA but are not wetlands (33 CFR 328.4). To be considered jurisdictional, these features must exhibit a defined bed and bank and an ordinary high water mark. The term "ordinary high water mark" refers to that line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas. Examples of other waters of the U.S. may include rivers, creeks, ponds, and lakes.

In January 2001, the U.S. Supreme Court issued a decision in the case of the *Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers* that altered the Corps' regulatory authority over wetlands that are isolated from navigable waters[1]. On June 5, 2007, the EPA and the USACE released guidance on the definitions of jurisdictional waters of the U.S. in response to *Rapanos v. United States* and *Carabell v. United States*. According to this guidance the USACE and the EPA will take jurisdiction over the following waters:

1. Traditional navigable waters, which is defined as all waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
2. Wetlands adjacent to traditional navigable waters; including adjacent wetlands that do not have a continuous surface connection to traditional navigable waters;
3. Non-navigable tributaries of traditional navigable waters that are relatively permanent where the tributaries typically flow year-round or have continuous flow at least seasonally (e.g., typically three months);
4. Wetlands adjacent to non-navigable tributaries as defined above; that have a continuous surface connection to such tributaries (e.g. they are not separated by uplands, a berm, dike, or similar feature).

[1] Since the SWANCC decision, waters covered solely by this definition by virtue of their use as habitat by migratory birds are no longer considered "waters of the United States." The Supreme Court's opinion did not specifically address what other connections with interstate commerce might support the assertion of CWA jurisdiction over "nonnavigable, isolated, intrastate waters" under this definition, and the Corps is recommending case by case consideration. A factor that may be relevant to this consideration includes, but is not limited to, the following: Jurisdiction of isolated, intrastate, and nonnavigable waters may be possible if their use, degradation, or destruction could affect other "waters of the United States," thus establishing a significant nexus between the water in question and other "waters of the United States" (Corps, undated memorandum).

The EPA and the USACE decide jurisdiction over the following waters, based on a fact-specific analysis to determine if there is a significant nexus, as defined below, to a traditional navigable water (TNW):

1. Non-navigable tributaries that are not relatively permanent;
2. Wetlands adjacent to non-navigable tributaries that are not relatively permanent;
3. Wetlands adjacent to but that do not directly abut a relatively permanent non-navigable tributary.

The EPA and the USACE generally do not assert jurisdiction over the following features:

1. Swales or erosional features (e.g., gullies, small washes characterized by low volume, infrequent, or short duration flow);
2. Ditches (including roadside ditches) excavated wholly in and draining only uplands and that do not carry a relatively permanent flow of water.

The EPA and the USACE have defined the significant nexus standard as follows:

1. A significant nexus analysis assesses the flow characteristics and functions of the tributary itself and the functions performed by all wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical and biological integrity of downstream traditional navigable waters;
2. Significant nexus includes consideration of hydrologic and ecologic factors including:
    a. Volume, duration, and frequency of flow, including consideration of certain physical characteristics of the tributary,
    b. Proximity to the traditional navigable water,
    c. Size of the watershed,
    d. Average annual rainfall,
    e. Average annual winter snow pack,
    f. Potential of tributaries to carry pollutants and flood waters to traditional navigable waters,
    g. Provision of aquatic habitat that supports a traditional navigable water,
    h. Potential of wetlands to trap and filter pollutants or store flood waters, and
    i. Maintenance of water quality in traditional navigable waters.

The EPA and USACE published a Clean Water Rule on June 29, 2015 defining the term "Waters of the United States" ("Clean Water Rule: Definition of "Waters of the United States" 80 Federal Register 124 (29 June 2015), pp. 37054 – 37127). The final rule became effective on August 28, 2015. The rule is intended to resolve jurisdictional uncertainty surrounding what constitutes "Waters of the United States" following the U.S. Supreme Court decisions in the *Solid Waste Agency of Northern Cook County (SWANCC) v. U.S. Army Corps of Engineers* case and the *Rapanos v. United States (Rapanos)* case. However, the U.S. Court of Appeals for the 6th Circuit granted a nationwide stay against the new Clean Water Rule on October 9, 2015. Due to the

nationwide stay against the new rule, the EPA and USACE are currently using the existing definition of "Waters of the U.S." as well as existing case guidance to determine CWA jurisdiction.

3.2 Pre-field Review

Prior to conducting the field investigation, ESA conducted a review of the following background documents:

- USGS 7.5 minute topographic quadrangle for Nevada City, CA;
- Color aerial photography for vegetative, topographic, and hydrologic signatures;
- The *Custom Soil Resource Report for Nevada County Area, California – Ranch Property* (NRCS, 2015), for information about soils and geomorphology;
- The National Hydric Soils List for California, Nevada County (NRCS, 2014) to determine if any soils mapped within the study area are considered hydric at the level of soil series;
- The National Wetlands Inventory (U.S. Department of the Interior, 2015).

3.3 Field Investigation

A delineation of wetlands and other waters of the U.S. was conducted within the study area by ESA biologist Joshua Boldt on October 13, 2015. The delineation used the "Routine Determination Method" as described in the *1987 U.S. Army Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory, 1987), hereafter called the "1987 Manual." The 1987 Manual was used in conjunction with the *Regional Supplement to the U.S. Army Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0)* (USACE, 2010), hereafter called the "Western Mountains, Valleys, and Coast Supplement." For areas where the 1987 Manual and the Western Mountains, Valleys, and Coast Supplement differ, the Supplement was followed.

Three positive wetland parameters must normally be present for an area to be wetland: 1) a dominance of wetland vegetation, 2) presence of hydric soils, and 3) presence of wetland hydrology. Presence or absence of positive indicators for wetland vegetation, soils, and hydrology was assessed per the 1987 Manual and Western Mountains, Valleys, and Coast Supplement guidelines. Data points were recorded on Western Mountains, Valleys, and Coast wetland delineation forms, which are provided as **Appendix C**

At each data point, a visual assessment of the dominant plant species within a 6-foot radius was made. Dominant species were assessed using the recommended "50/20" rule per the Arid West Supplement. Plants were identified to species using the *The Jepson manual: Vascular plants of California, second edition* (Baldwin et al., 2012). The *Western Mountains, Valleys, and Coast 2015 Final Regional Wetland Plant List* (Lichvar et al, 2015) was used to determine the wetland indicator status of all plants. Soils at each data point were characterized by color, texture, organic matter

accumulation, and the presence or absence of hydric soil indicators. Color was described using Munsell soil color charts (Kollmorgen Instruments Corporation, 1990). Presence of wetland hydrology was determined at each data point by presence of one or more of the primary and/or secondary indicators, per guidance of the Western Mountains, Valleys, and Coast Supplement.

For "other waters of the U.S." to be considered jurisdictional, these features must exhibit a defined bed and bank and an ordinary high water mark (OHWM). Drainages with obvious bed and banks and OHWM were characterized by noting vegetation, geomorphology (e.g., incision) and hydrologic characteristics, and by measuring representative channel bank cross-sections to obtain average bankfull width (i.e., OHWM). Representative channel cross-section average bankfull width was recorded in the field and used to map stream channels in GIS, along with high-resolution aerial photographs and detailed topographic data.

3.4 Mapping and Acreage Calculations

All features, including sample points, wetland boundaries, and channel courses were recorded using a Global Positioning System (GPS) unit (Trimble GeoXT) with real-time differential correction and an instrument-rated mapping accuracy of +/- 1 meter, or were delineated on aerial photography using Geographic Information System (GIS) software (ArcGIS 10.1) and site-specific topography data.

In the office, data from sample points and wetland boundaries were downloaded from the GPS unit and mapped using GIS software on an overlay of both topography and geo-referenced aerial photography. GPS-determined wetland boundaries and data points were visually confirmed. Acreage of wetland and waters of the U.S. polygons, and the length of linear features were determined using ArcGIS.

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SECTION 4.0
Results

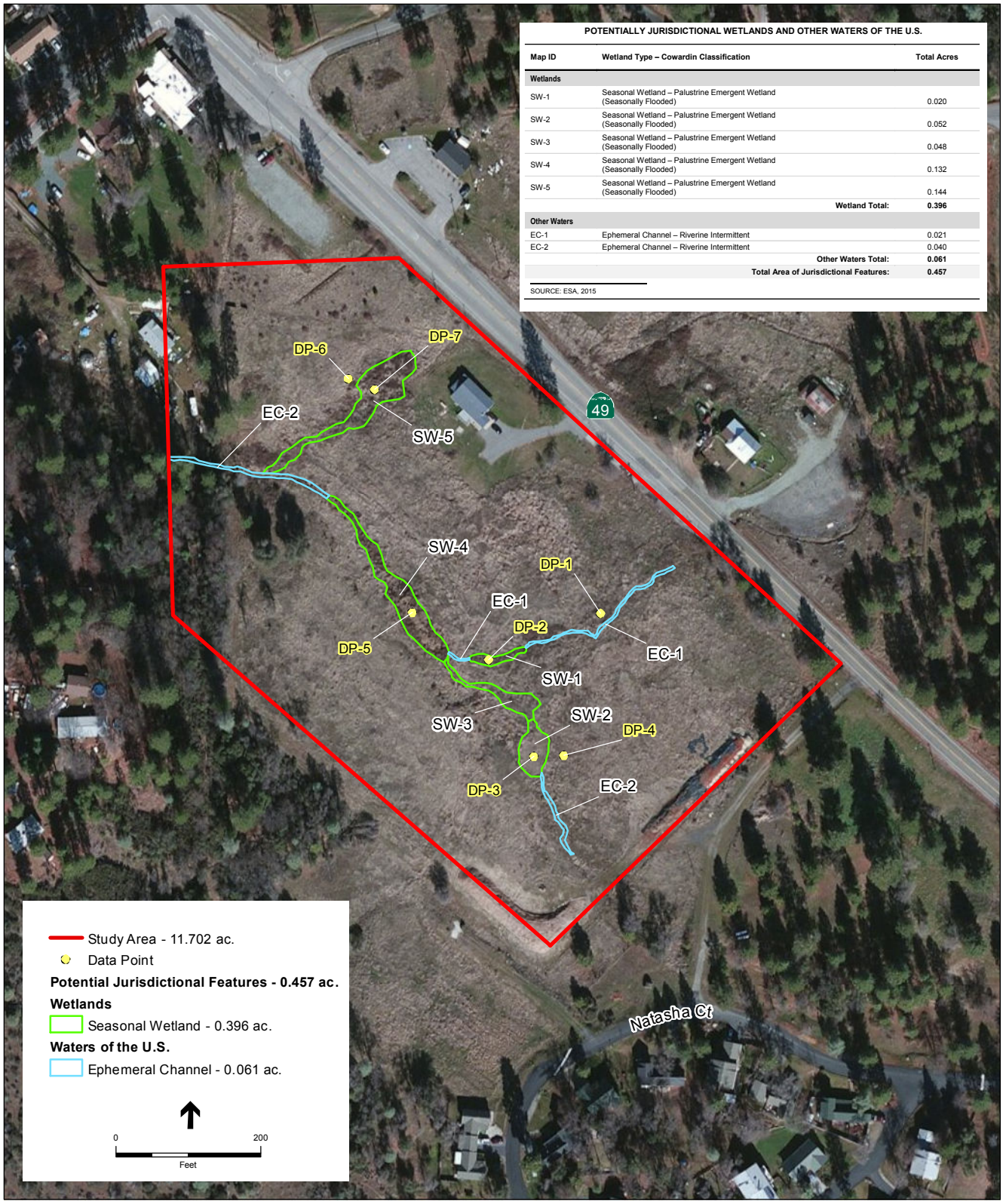
4.1 Results

This wetland delineation identified approximately 0.457 acres of potentially jurisdictional features within the study area. Potentially jurisdictional features include 0.396 acres of wetlands and 0.457 acres of other waters of the U.S. Potentially jurisdictional features within the study area include freshwater emergent wetlands, seasonal wetlands, riparian wetlands, perennial channels, canals, and drainage ditches. Aquatic communities and habitats were classified using the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979). **Table 4-1** and **Figure 4-1** provide the total extent of potentially jurisdictional wetlands and other waters of the U.S. within the study area. Each type of wetland and other waters is described in greater detail in Section 4.1.1 below.

TABLE 4-1
POTENTIALLY JURISDICTIONAL WETLANDS AND OTHER WATERS OF THE U.S.

Map ID	Wetland Type – Cowardin Classification	Total Acres
Wetlands		
SW-1	Seasonal Wetland – Palustrine Emergent Wetland (Seasonally Flooded)	0.020
SW-2	Seasonal Wetland – Palustrine Emergent Wetland (Seasonally Flooded)	0.052
SW-3	Seasonal Wetland – Palustrine Emergent Wetland (Seasonally Flooded)	0.048
SW-4	Seasonal Wetland – Palustrine Emergent Wetland (Seasonally Flooded)	0.132
SW-5	Seasonal Wetland – Palustrine Emergent Wetland (Seasonally Flooded)	0.144
	Wetland Total:	**0.396**
Other Waters		
EC-1	Ephemeral Channel – Riverine Intermittent	0.021
EC-2	Ephemeral Channel – Riverine Intermittent	0.040
	Other Waters Total:	**0.061**
	Total Area of Jurisdictional Features:	**0.457**

SOURCE: ESA, 2015



SOURCE: Microsoft, 2011; SunPower, 2015; ESA, 2015

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Figure 4-1

Potentially Jurisdictional Features

4.1.1 Potentially Jurisdictional Waters of the U.S.

Seasonal Wetland

Seasonal wetlands are ephemeral wetlands that pond water or remain saturated for extended periods during a portion of the year, often throughout the wet season, then dry up in spring or early summer. Seasonal wetlands in the study area are classified as palustrine emergent wetlands (seasonally flooded) using the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et. al, 1979). Within the project site, seasonal wetlands are distributed in topographic depressions along the ephemeral drainages within the annual and perennial grasslands. Common plant species include the following: spikerush, soft rush, slender rush, perennial rye grass, annual hairgrass, scratch grass, pennyroyal, fiddle dock, rabbitsfoot grass, and Mediterranean barley.

Five seasonal wetlands (0.396 acres) were identified in the study area as being potentially jurisdictional (SW-1 through SW-5). Seasonal wetlands are represented by datapoints 2, 3, 5 and 7 and adjacent upland areas are represented by datapoints 1, 4, and 6 (Photos 1 and 2, Appendix B). These wetland areas were mapped based on aerial photo signatures, topography, and the presence of hydrophytic vegetation. There was no surface water present at the time of the delineation, likely due to the seasonal timing of the surveys. However, saturation, high water table, and oxidized rhizospheres along living roots were the primary indicators of wetland hydrology, and sites exhibited soils with a depleted matrix and substantial redoximorphic concentrations starting within the upper 12 inches of the soil.

Ephemeral Channel

Ephemeral channels are classified as "riverine intermittent" using the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et. al, 1979). An ephemeral channel has flowing water only during, and for a short duration after, precipitation events in a typical year. Ephemeral stream beds are located above the water table year-round. Groundwater is not a source of water for the stream. Runoff from rainfall is the primary source of water for stream flow.

The study area contains two ephemeral channels, totaling approximately 0.061 acres (EC-1 and EC-2) (Photo 3, Appendix B). The channels eventually drain to Rush Creek northwest of the study area. The ephemeral channels in the study area are low gradient with clearly incised banks, indicating consistent seasonal flows. Bed material consists of soil, silt and gravel and is largely vegetated with seasonal wetland species. The boundaries of the ephemeral channels were determined using the OHWM. The channels link together the seasonal wetlands, forming an interconnected channel/wetlands system.

4.1.2 Jurisdictional Analysis

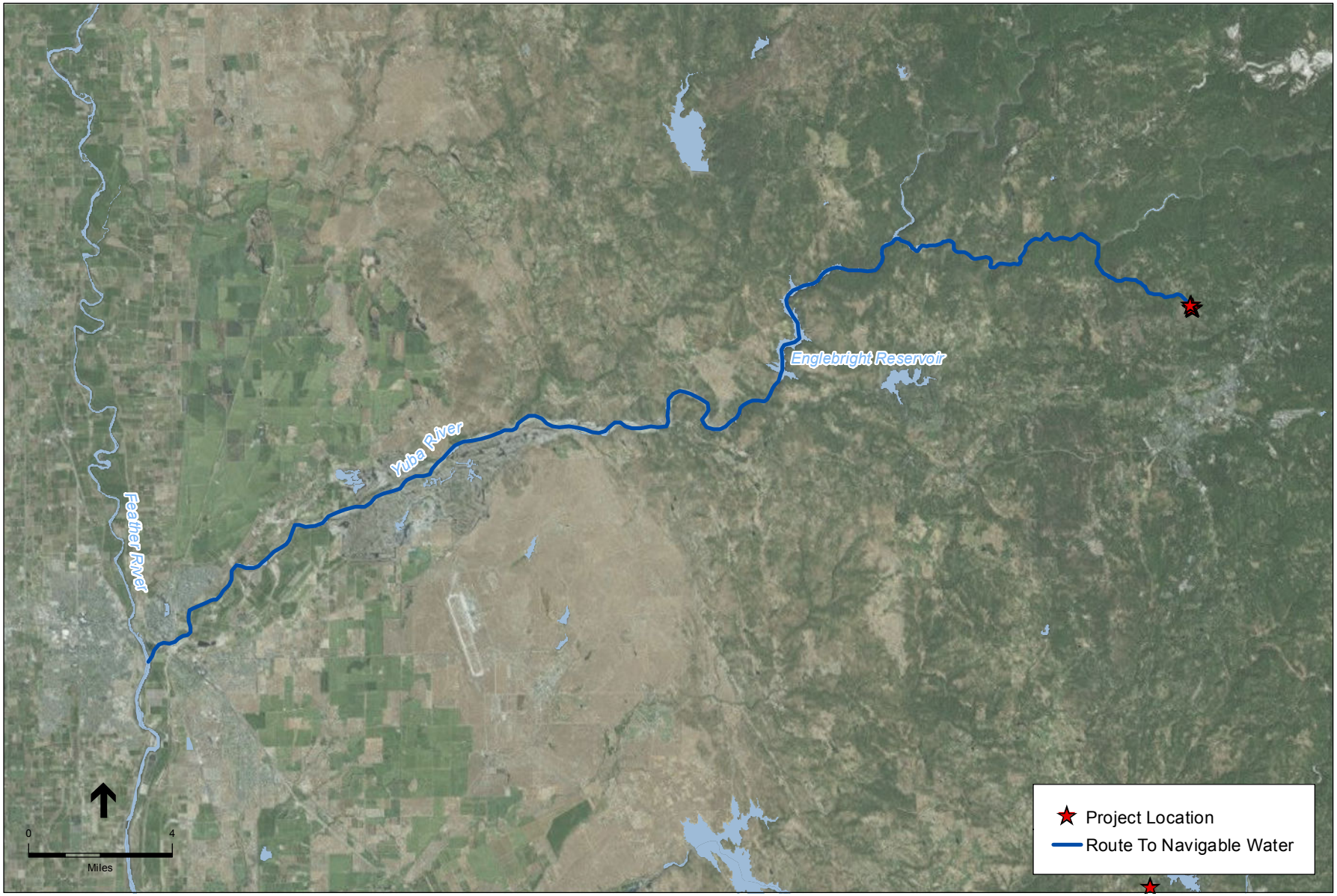
The USACE and EPA issued guidance related to the Rapanos decision on June 5, 2007. The *Rapanos-Carabell* consolidated decisions addressed several issues, including the question of jurisdiction in relation to waters that are relatively permanent (RPW) or are not relatively permanent (non-RPW). It was concluded that non-RPWs that have a "significant ecological nexus" with a TNW, including non-navigable tributaries that do not typically flow year-round or have continuous flow at least seasonally; wetlands adjacent to such tributaries, and wetlands adjacent to but that do not directly abut permanent, non-navigable tributary, may be considered waters of the U.S. A significant nexus can be determined to be present if the tributary, in combination with any adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical, and biological integrity of a TNW. Key considerations when evaluating a significant nexus include volume, duration, and frequency of the flow of water in the tributary and the proximity of the tributary to the TNW, plus hydrologic, ecologic, and other functions related to the tributary and all of its adjacent wetlands.

The ephemeral channels (EC-1 and EC-2) in the study area drain to Rush Creek, a perennial channel which flows to the South Fork Yuba River. The Yuba River eventually drains to the Feather River just south of Marysville. Therefore, the ephemeral channels in the study area are hydrologically connected to the Feather River by surface water (**Figure 4-2**). The Feather River is considered a TNW under Section 404 of the Clean Water Act from Marysville to its confluence with the Sacramento River. The ephemeral channels contribute rainfall runoff water to the TNW seasonally, which contributes to the chemical (minerals, carbon, sediment) and physical (water volume) integrity of the Feather River. Features classified as potentially jurisdictional ephemeral channels exhibit a discernible bed and bank and OHWM and have a continuous flow at least seasonally (flow at least seasonally, typically three months), and they flow directly to a TNW (Feather River). Therefore, it was determined that these channels, and all wetlands associated with these features (SW-1 through SW-5), *would* contribute towards the ecological function of the TNW (Feather River), and therefore should be considered as potentially jurisdictional features under the CWA.

4.2 Conclusions

A total of 0.457 acres of potentially jurisdictional wetlands and waters of the U.S. occur within the 11.70 acre study area- consisting of 0.396 acres of wetlands and 0.061 acres of other waters.

This report documents the wetland boundary delineation and best professional judgment of ESA investigators. All conclusions presented should be considered preliminary and subject to change pending official review and preliminary jurisdictional determination in writing by the USACE.



SOURCE: SOURCE: CNES/Airbus DS, 2008; ESRI, 2012; SunPower, 2015; ESA, 2015

SunPower Nevada County Solar Ranch Property. 150518

Figure 4-2

Route To Navigable Water

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SECTION 5.0
References

Baldwin, B.G., D.H. Goldman, D.J. Keil, R. Patterson, T.J. Rosatti, and D.H. Wilken, editors, 2012. The Jepson manual: Vascular plants of California, second edition. University of California Press, Berkeley, CA

Cowardin, L. M., V. Carter, F. C. Golet, E. T. LaRoe, 1979. *Classification of wetlands and deepwater habitats of the United States*. U. S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. Jamestown, ND: Northern Prairie Wildlife Research Center Online, http://www.npwrc.usgs.gov/resource/wetlands/classwet/ (Version 04DEC98).

Environmental Laboratory, Department of the Army, 1987. *Corps of Engineers Wetland Delineation Manual (Technical Report Y-87-1)*. U.S. Army Corps of Engineers. Waterways Experimental Station. Vicksburg, Mississippi.

Lichvar, R.W., 2015. The National Wetland Plant List – 2015 Wetland Ratings. http://rsgisias.crrel.usace.army.mil/NWPL/#

Natural Resources Conservation Service (NRCS), 2015. *Custom Soil Resource Report for Nevada County Area, California.* United States Department of Agriculture, National Cooperative Soil Survey, websoilsurvey.nrcs.usda.gov.

NRCS, 2014. *List of Hydric Soils.* United States Department of Agriculture,

U.S. Army Corps of Engineers (Corps), 2010. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0)*. ERDC/EL TR-10-3.

U.S. Department of the Interior, 2015. Fish and Wildlife Service, National Wetlands Inventory, www.wetlands.fws.gov.

Western Regional Climate Center, 2015. *Period of Record General Climate Summary for Nevada City, California, 1893 –2015*. Available: http://wrcc.dri.edu/.

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APPENDIX A
NRCS Soils Report

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United States Department of Agriculture

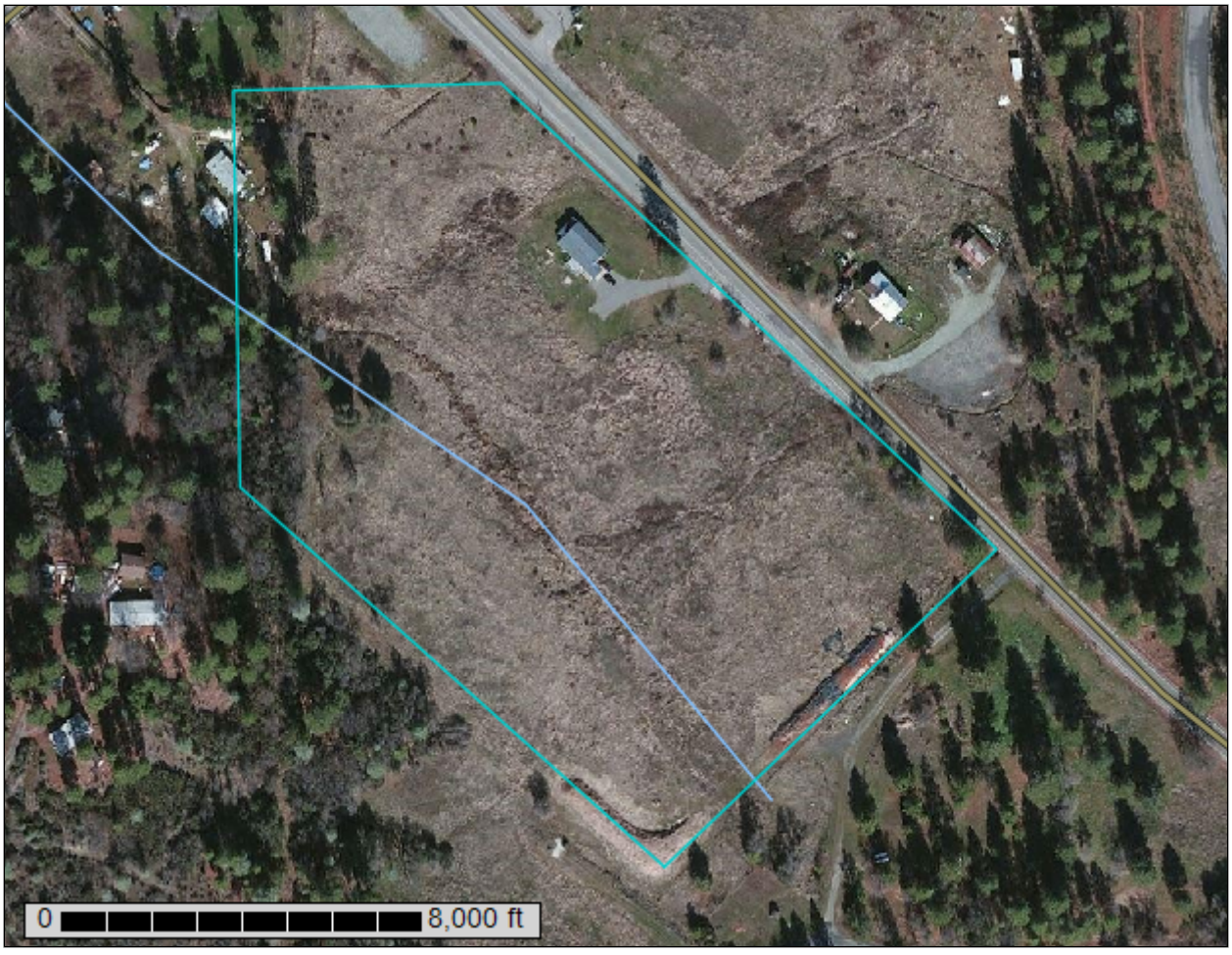
NRCS

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 Nevada County Area, California

Ranch Property



October 23, 2015

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 (http://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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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.

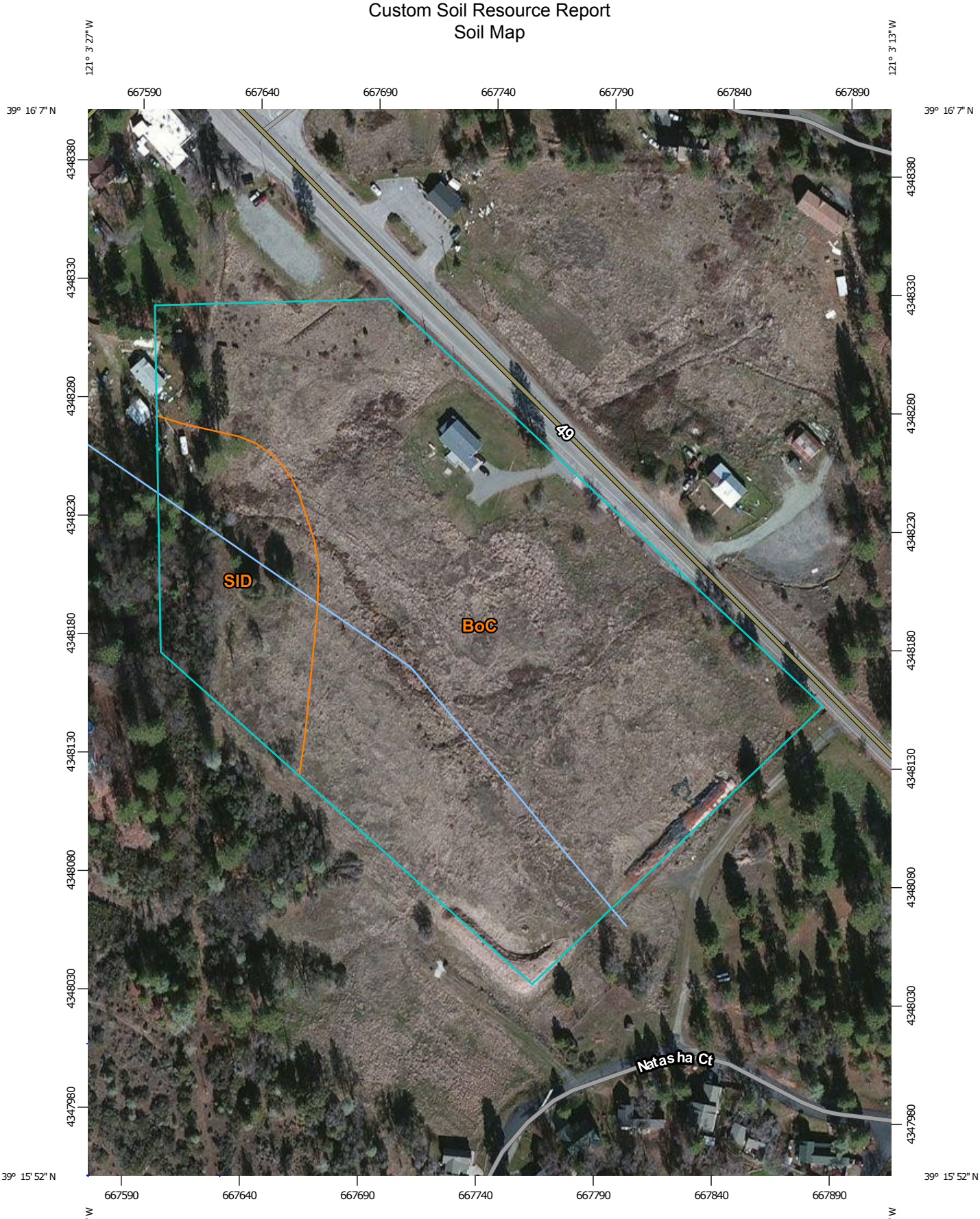
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree 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 Scale: 1:2,190 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 30 60 120 180

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

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: http://websoilsurvey.nrcs.usda.gov
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: Nevada County Area, California
Survey Area Data: Version 8, Sep 16, 2014

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

Date(s) aerial images were photographed: Aug 15, 2011—Apr 29, 2012

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

Nevada County Area, California (CA619)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
BoC	Boomer loam, 5 to 15 percent slopes	9.9	84.2%
SID	Sites loam, 15 to 30 percent slopes	1.8	15.8%
Totals for Area of Interest		**11.7**	**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.

Nevada County Area, California

BoC—Boomer loam, 5 to 15 percent slopes

Map Unit Setting

National map unit symbol: hfvt
Elevation: 1,000 to 2,200 feet
Mean annual precipitation: 30 to 45 inches
Mean annual air temperature: 56 to 58 degrees F
Frost-free period: 200 to 260 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Boomer

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Residuum weathered from metavolcanics

Typical profile

A - 0 to 18 inches: loam
Bt - 18 to 37 inches: clay loam
C - 37 to 47 inches: loam
R - 47 to 51 inches: bedrock

Properties and qualities

Slope: 5 to 15 percent
Depth to restrictive feature: 40 to 60 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 7.3 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: LOAMY (R022XC013CA)

Minor Components

Rock outcrop

Percent of map unit: 5 percent
Landform: Hills

Josephine, loam
Percent of map unit: 2 percent
Landform: Hills

Rescue, loam
Percent of map unit: 2 percent
Landform: Hills

Sites, loam
Percent of map unit: 2 percent
Landform: Hills

Sobrante, loam
Percent of map unit: 2 percent
Landform: Hills

Sites, very stony loam
Percent of map unit: 2 percent
Landform: Hills

SID—Sites loam, 15 to 30 percent slopes

Map Unit Setting

National map unit symbol: hfxt
Elevation: 2,000 to 4,000 feet
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 53 to 57 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Sites

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Metabasic residuum weathered from metasedimentary rock

Typical profile

A - 0 to 12 inches: loam
BAt - 12 to 23 inches: clay loam
Bt - 23 to 68 inches: clay
BCt - 68 to 78 inches: clay loam
R - 78 to 82 inches: bedrock

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: 40 to 80 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 9.3 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C

Minor Components

Rock outcrop

Percent of map unit: 3 percent
Landform: Hills

Cohasset, loam

Percent of map unit: 2 percent
Landform: Hills

Mariposa, loam

Percent of map unit: 2 percent
Landform: Hills

Sites, very stony loam

Percent of map unit: 2 percent
Landform: Hills

Aiken, cobbly loam

Percent of map unit: 2 percent
Landform: Hills

Josephine, loam

Percent of map unit: 1 percent
Landform: Hills

Cohasset, cobbly loam

Percent of map unit: 1 percent
Landform: Hills

Josephine, gravelly loam

Percent of map unit: 1 percent
Landform: Hills

Aiken, loam

Percent of map unit: 1 percent
Landform: Hills

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

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

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

APPENDIX B
Site Photos

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Photo 1
SW-2. October 13, 2015

Photo 2
SW-4. October 13, 2015

Photo 3
EC-1. October 13, 2015

APPENDIX C
Data Sheets

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