Appendixes G, H, I, and J

Environmental Impact Statement for Proposed Demolition and Environmental Cleanup Activities at Santa Susana Field Laboratory, Ventura County, California

Prepared for

National Aeronautics and Space Administration

March 2014

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Appendix H	Supplemental Air Quality and Greenhouse Gas Information and Technical Approach
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Appendix J	Santa Susana Field Laboratory–Paleontological Resources Assessment

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APPENDIX G

Wetlands Delineation Report for NASA-Administered Property at Santa Susana Field Laboratory

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G1: Wetlands and Waters of the United States, Delineation for the NASA-Administered Portions of the Santa Susana Field Laboratory, Ventura County, California, March 2012

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National Aeronautics and Space Administration

George C. Marshall Space Flight Center
Marshall Space Flight Center, AL 35812

April 11, 2012

Reply to Attn of: Office of Center Operations

U.S. Army Corps of Engineers, Los Angeles District
Regulatory Division, Ventura Field Office
Attn: Antal Szijj
2151 Alessandro Drive, Suite 110
Ventura, California 93001

SUBJECT: *Wetlands and Waters of the United States, Request for a Jurisdictional Determination for the NASA-Administered Portions of the Santa Susan Field Laboratory, Ventura County, California.*

Dear Mr. Antal Szijj:

The National Aeronautics and Space Administration (NASA) requests a jurisdictional determination for Wetlands and Waters of the United States within the NASA-Administered property of the Santa Susana Field Laboratory located in Ventura County, California.

The NASA-administered property at SSFL consists of 41.7 acres within Area I and all 409.5 acres of Area II.

A wetland delineation was conducted for NASA in January 2012. The survey was conducted to support NASA's preparation of an Environmental Impact Statement (EIS), which is being prepared to assess the potential impacts of NASA's proposed action to demolish structures and remediate soil and groundwater on the NASA-Administered property at SSFL, as well as to support subsequent permitting that might be required under Section 404 of the Clean Water Act. The results of this delineation are considered preliminary pending your determination. A copy of NASA's survey is enclosed.

If you have any questions, please contact Jeremiah Kolb at (256)544-6304.

Sincerely,

Allen Elliott

Allen Elliott
SSFL Project Director
National Aeronautics and Space Administration (NASA)

Enclosure: *Wetlands and Waters of the United States, Delineation for the NASA-Administered Portions of the Santa Susana Field Laboratory, Ventura County, California*

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Wetlands and Waters of the United States, Delineation for the NASA-Administered Portions of the Santa Susana Field Laboratory, Ventura County, California

National Aeronautics and Space Administration

Huntsville, Alabama

March 2012

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Acronyms and Abbreviations

‰	per mil (per thousand)
°F	degrees Fahrenheit
CFR	*Code of Federal Regulations*
CWA	Clean Water Act
EIS	Environmental Impact Statement
ELV	Expendable Launch Vehicle
HUC	Hydrologic Unit Code
LF	linear foot
LOX	liquid oxygen
NASA	National Aeronautics and Space Administration
NHD	National Hydrology Dataset
NRCS	Natural Resources Conservation Service
NWI	National Wetland Inventory
PABHx	Palustrine Aquatic Bed Permanently Flooded Excavated
PEMC	Palustrine Emergent Seasonally Flooded
PFOA	Palustrine Forested Temporarily Flooded
PLF	Propellant Load Facility
PSSA	Palustrine Scrub-Shrub Temporarily Flooded
PSSB	Palustrine Scrub-Shrub Saturated
PSSC	Palustrine Scrub-Shrub Seasonally Flooded
PUBHx	Palustrine Unconsolidated Bottom Permanently Flooded Excavated
SPA	Storage Propellant Area
SSFL	Santa Susana Field Laboratory
STL	Systems Test Laboratory
U.S.	United States
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey

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SECTION 1

Introduction

Wetlands and other waters are ecological habitats protected under the federal Clean Water Act (CWA). Activities that have the potential to discharge fill materials into "waters of the United States" (U.S.), including wetlands, must be authorized by the U.S. Army Corps of Engineers (USACE) under Section 404 of the CWA. This report presents the results of a wetlands delineation for the National Aeronautics and Space Administration (NASA)–administered property at the Santa Susana Field Laboratory (SSFL) in Ventura County, California. The results of this delineation are considered preliminary, pending verification by the USACE regulatory branch. A general description of the project location and environmental setting are provided in the following text. Study methods and survey results are provided in Sections 2 and 3, respectively.

1.1 Project Location and Description

SSFL is located mostly within an unincorporated part of Ventura County, California (Figure 1-1). The site is in a remote, mountainous area near the crest of the Simi Hills at the western border of the San Fernando Valley, approximately 30 miles northwest of downtown Los Angeles.

SSFL was established shortly after World War II and has been used primarily as a site to develop and test nuclear reactors, rockets, and missiles. The total site is 2,850 acres and is divided into four test areas (Areas I, II, III, and IV) and two buffer areas (northern and southern buffer areas). The NASA-administered property at SSFL consists of 41.7 acres within Area I and all 409.5 acres of Area II, together representing approximately 15.6 percent of the total area of the site (Figure 1-2).

This report presents the results of a wetland delineation of the NASA-administered property at SSFL. The survey was conducted to support NASA's preparation of an Environmental Impact Statement (EIS), which is being prepared to assess the potential impacts of NASA's proposal to demolish structures and remediate soil and groundwater on the NASA-administered property at SSFL, as well as to support subsequent permitting that might be required under Section 404 of the CWA.

1.2 Environmental Setting

SSFL's landscape is dominated by sandstone outcropping hills, areas of natural vegetation, and numerous industrial facilities and roadways. The site is within the central portion of the Southern California Coast ecological subregion, in the Simi Valley–Santa Susana Mountains (261Be) ecological subsection (Miles and Goudey, 1998). This ecological subsection includes steep mountains, moderately steep to steep hills, and nearly level to gently sloping floodplains, terraces, and alluvial fans.

1.2.1 Terrestrial Vegetation

Eight natural terrestrial habitat types as well as ruderal and developed areas have been identified on the NASA-administered property at SSFL (NASA, 2011). These habitat types are described briefly in the following subsections. Table 1-1 provides a comparison of the mapped habitat types and the current California vegetation classification system (Sawyer et al., 2009). Aquatic features including wetlands and drainages are described in more detail in Section 3.

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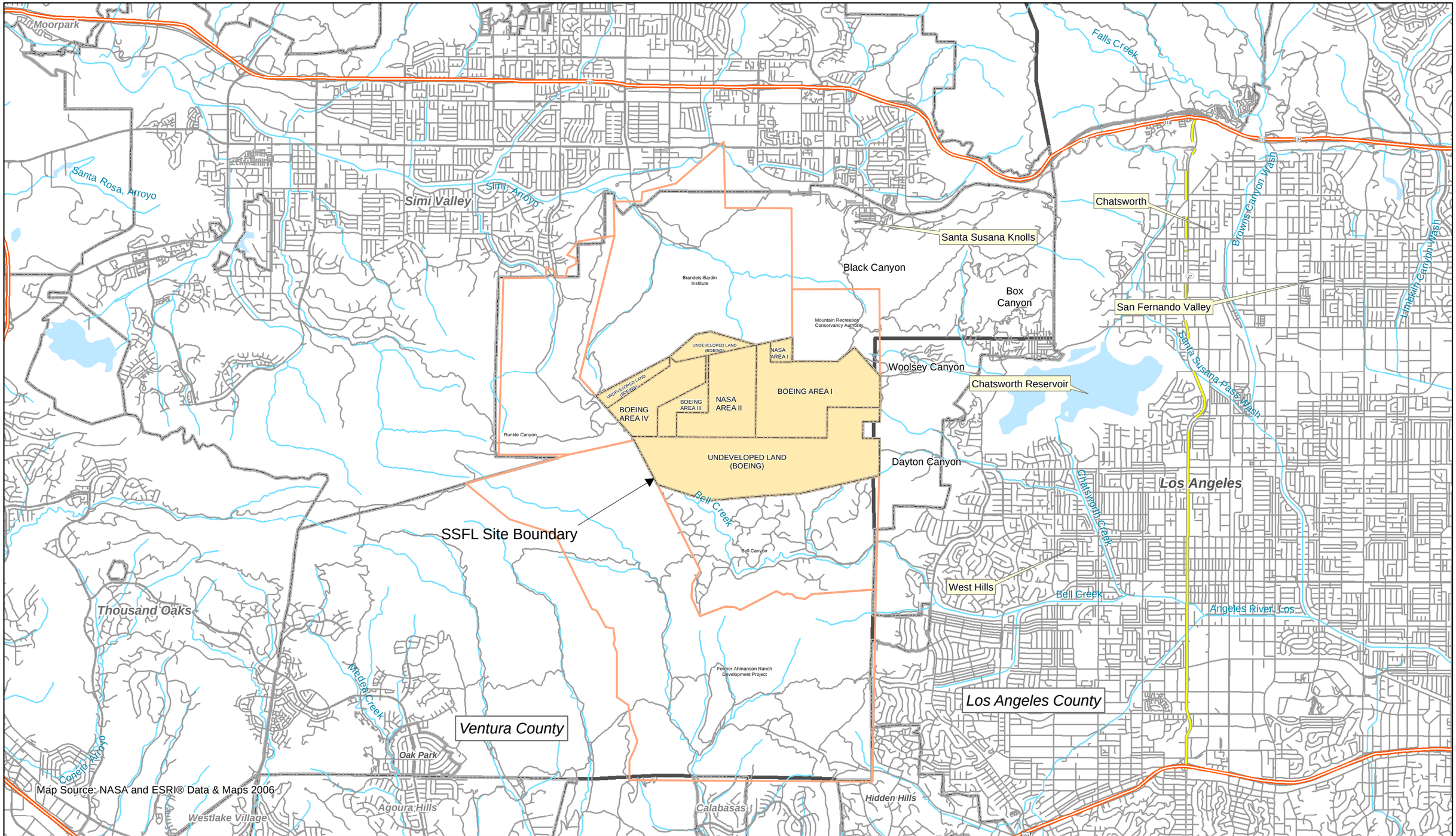

Figure 1-1
Regional Map
NASA Wetlands and Waters of the U.S. Delineation Report
Santa Susana Field Laboratory
Ventura County, California

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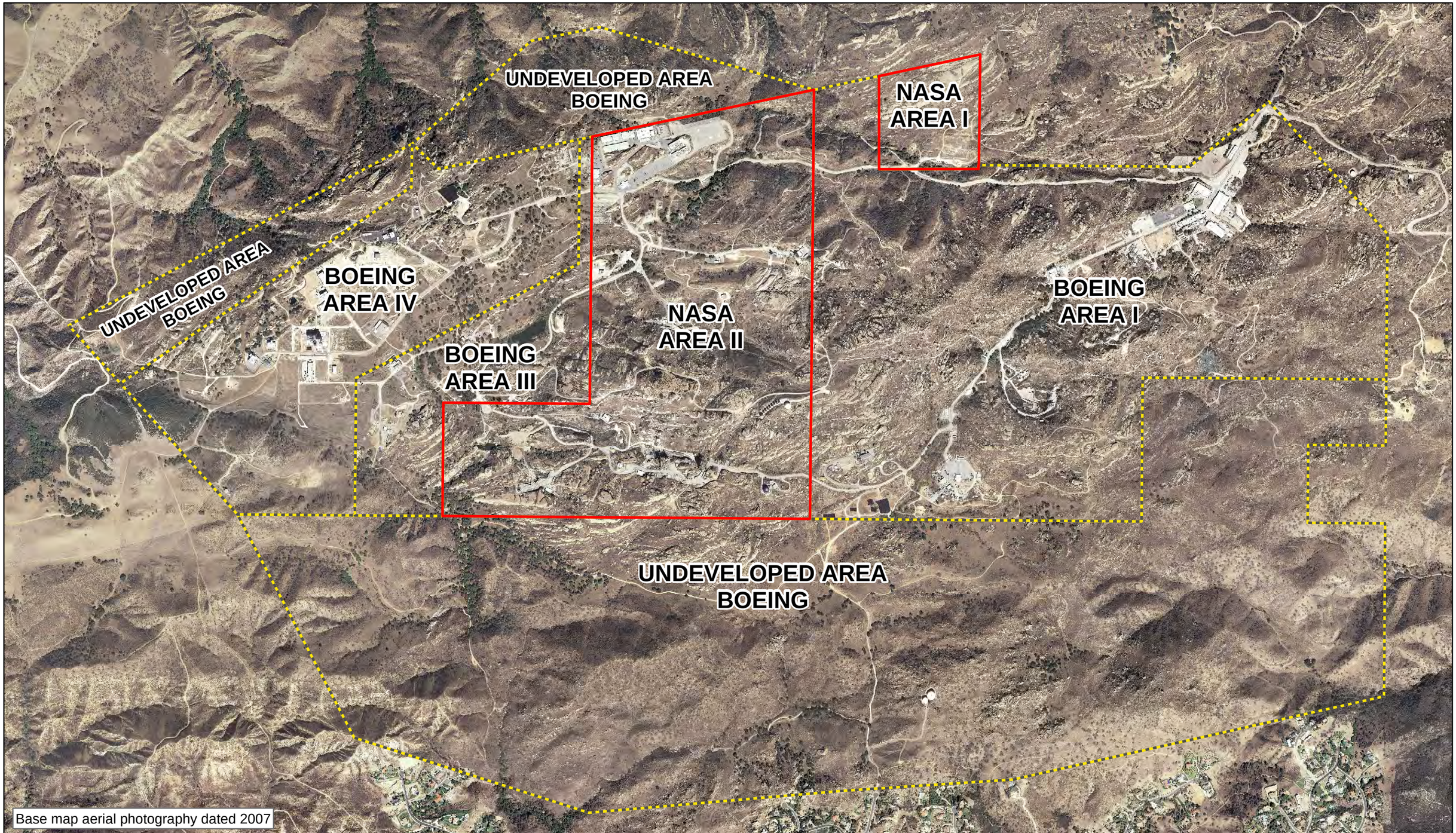

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A. Cooley

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Legend

- NASA-Administered Property Boundary
- SSFL Administrative Areas

Figure 1-2
Site Overview
NASA Wetlands and Waters of the U.S. Delineation Report
Santa Susana Field Laboratory
Ventura County, California

Map Document: O:\NASA\SSFL\maps\EIS_2011\BioSurvey_Spring2011\SSFL_Site_Overview_WetlandsRpt.mxd

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TABLE 1-1
Mapped Habitat Types and Current California Vegetation Classification System
Wetland Delineation for the NASA-Administered Portions of SSFL

Mapped Natural Habitat Types	Current California Vegetation Classification System[a]
Chaparral	*Adenostoma fasciculatum—Salvia mellifera* Shrubland Alliance *Malosma laurina* Shrubland Alliance *Malacothamnus fasciculatus* Shrubland Alliance *Eriodictyon crassifolium* Provisional Shrubland Alliance
Venturan Coastal Sage Scrub	*Artemisia californica –Eriogonum fasciculatum* Shrubland Alliance
Non-Native Grassland	*Avena*(*barbata, fatua*) Semi-Natural Herbaceous Stands
Coast Live Oak Woodland	*Quercus agrifolia* Woodland Alliance
Coast Live Oak Riparian Forest	*Quercus agrifolia* Woodland Alliance
Baccharis Scrub	*Baccharis pilularis* Shrubland Alliance
Mule-fat Scrub	*Baccharis salicifolia* Shrubland Alliance
Southern Willow Scrub	*Salix lasiolepis* Shrubland Alliance

[a] From Sawyer et al. (2009).

1.2.1.1 Chaparral

Chaparral is the most abundant and widespread natural community at the NASA-administered property. This habitat covers 172.6 acres (approximately 38 percent) of the site.[1] Characteristic species include chamise (*Adenostoma fasciculatum*), hoaryleaf ceanothus (*Ceanothus crassifolius*), black sage (*Salvia mellifera*), laurel sumac (*Malosma laurina*), thickleaf yerba santa (*Eriodictyon crassifolium*), Mendocino bushmallow (*Malacothamnus fasciculatus*), and chaparral yucca (*Yucca whipplei*). The abundance of these species is variable within this habitat type depending on soils, aspect, past disturbance, and other environmental factors.

1.2.1.2 Venturan Coastal Sage Scrub

Venturan coastal sage scrub covers 64.4 acres (approximately 15 percent) of the site. Characteristic species include coastal sagebrush (*Artemisia californica*), Eastern Mojave buckwheat (*Eriogonum fasciculatum* var. *fasciculatum*), black sage, chaparral yucca, thickleaf yerba santa, and common deerweed (*Acmispon glaber*).

1.2.1.3 Non-native Grassland

Grassland habitat covers 18.6 acres (approximately 4 percent) of the site and often occurs in a mosaic with other habitat types. Most of the grasslands are characterized by slender oat (*Avena barbata*) intermixed with other introduced annual grasses such as ripgut brome (*Bromus diandrus*), soft brome (*Bromus hordeaceus*), and fescue (*Vulpia* spp). Native grasses including needlegrass (*Nassella* spp.), littleseed muhly (*Muhlenbergia microsperma*), and deergrass (*Muhlenbergia rigens*) are present in a few areas, but generally provide only minimal cover. Common herbaceous species include suncup (*Camissonia* spp.), winecup clarkia (*Clarkia purpurea*), longbeak stork's bill (*Erodium botrys*), and winter vetch (*Vicia villosa*).

1.2.1.4 Coast Live Oak Woodland

Coast live oak woodland is distributed widely across the site but makes up only 13.2 acres (approximately 3 percent) of the NASA-administered property. This habitat is characterized by mature coast live oak (*Quercus agrifolia*) trees. The understory generally consists of annual grasses such as ripgut brome and slender oat, with occasional native grasses including blue wildrye (*Elymus glaucus*) and California brome (*Bromus carinatus*). The

[1] "NASA-administered property" and "site" are synonymous throughout.

understory shrub layer is poorly developed and, where present, generally consists of scattered Pacific poison oak (*Toxicodendron diversilobum*).

1.2.1.5 Coast Live Oak Riparian Forest

Coast live oak riparian forest is found along the edges of the seasonal streams on the site. This habitat type covers 9.2 acres (approximately 2 percent) of the NASA-administered property. The composition of this community is generally similar to the coast live oak woodland habitat described previously, although the understory typically is more diverse in these areas and includes species such as Douglas' sagewort (*Artemisia douglasiana*), creeping snowberry (*Symphoricarpos mollis*), and American black elderberry (*Sambucus nigra*).

1.2.1.6 Baccharis Scrub

Baccharis scrub is limited, covering only 2.6 total acres (less than 1 percent) of the site. This community is characterized by generally pure stands of coyotebrush (*Baccharis pilularis*). In these areas, coyotebrush ranges from dense cover with a sparse herbaceous layer to more open stands with an understory composed of annual grasses and scattered forbs.

1.2.1.7 Mule-fat Scrub

Mule-fat scrub is limited, covering 2.1 acres (less than 1 percent) of the site. This habitat type is characterized by localized, dense stands of mule-fat (*Baccharis salicifolia*).

1.2.1.8 Southern Willow Scrub

Southern willow scrub habitat on the NASA-administered property is characterized by arroyo willow (S*alix lasiolepis*) intermixed with occasional red willow (*Salix laevigata*) and narrowleaf willow (*Salix exigua*). This habitat type is uncommon on the site, covering only 1 acre (less than 1 percent). Southern willow scrub occurs in localized patches around scattered ponds and detention basins and along portions of the seasonal drainages within the site.

1.2.1.9 Sandstone Rock Outcrops

Approximately 85 acres (19 percent) of the NASA-administered property is composed of sandstone outcrops. In many areas the outcrops are devoid of vegetation, while in other areas, the rocks are covered with a diverse assemblage of lichens. In some areas, scattered vascular plants are present. Common plants associated with these rock outcrops include bushy spikemoss (*Selaginella bigelovii*), lanceleaf liveforever (*Dudleya lanceolata*), chalk dudleya (*Dudleya pulverulenta*), cliffbrake (*Pellaea* spp.), orange bush monkey flower (*Mimulus aurantiacus*), and Santa Susana tarweed (*Deinandra minthornii*).

1.2.1.10 Ruderal

Ruderal habitat is common around developed areas and areas that have been subject to human disturbance. Ruderal habitats cover approximately 17 acres (4 percent) of the site. Common species observed in these areas include telegraphweed (*Heterotheca grandiflora*), black mustard (*Brassica nigra*), Maltese star-thistle (*Centaurea melitensis*), silver bird's-foot trefoil (*Acmispon argophyllus*), stork's bill (*Erodium* spp.), and common deerweed.

1.2.1.11 Developed

Developed areas include paved roads, parking areas, buildings, test structures, and other developments. Approximately 58 acres, or 13 percent, of the NASA-administered property have been developed.

1.2.2 Climate and Hydrology

Regional climate data were obtained from the Western Regional Climate Center (2011) and the Natural Resources Conservation Service (NRCS) (2002) for Canoga Park, which is approximately 7 miles southeast of SSFL. Climate data are provided in Appendix A. Average temperatures range from a low of about 39 degrees Fahrenheit (°F) in December and January to a high of 95°F in August. Average annual rainfall is approximately 17 inches. The majority of the precipitation, 87 percent of the total, falls between November and March. The growing season,

defined as having a 50-percent probability of temperatures at or above 32°F, extends from March 6 through November 28, for a total of 267 days (NRCS, 2002).

Precipitation has been measured at SSFL at two onsite monitoring stations since 1960. Precipitation at SSFL is normally in the form of rain, although snow occasionally has fallen during winter months. Precipitation at the site averaged approximately 18.5 inches per year between 1960 and 2008. Annual precipitation has ranged from a low of 6.15 inches in 2007 to a maximum of 41.24 inches in 1998. There was no measurable precipitation in the 2 weeks immediately prior to the wetland delineation field survey, and regional rainfall during December was approximately 40 percent of the average. Overall rainfall in the region between November 1 and December 31, 2011, was approximately 30 percent below the average for this time of year, due largely to slightly above average rainfall during November.

Area I and the northern portion of Area II are located in the 41,142-acre Simi-Valley Hydrologic Sub-Area, which is part of the Calleguas-Conejo Hydrologic Area in the Calleguas Watershed (Hydrologic Unit Code [HUC] 18070103) (CalWater, 2004). Drainage in this area flows north and connects to the drainage in Meier Canyon, which subsequently discharges into Arroyo Simi. Arroyo Semi flows west into Arroyo Las Posas, a tributary to Calleguas Creek, which flows into the Pacific Ocean. Appendix B provides the watershed areas and streams included in the National Hydrology Dataset (NHD) on the NASA-administered property of SSFL.

The southern part of Area II is located in the 184,398-acre Bull Canyon Hydrologic Sub-Area, which is part of the San Fernando Hydrologic Area in the Los Angeles Watershed (HUC 18070105) (CalWater, 2004). Most of the surface water in this area runs off the southern property boundary into the Southwestern Drainage (referred to as Bell Creek on the U.S. Geological Survey [USGS] Calabasas topographic quadrangle map), which subsequently discharges into the Los Angeles River, which flows into the Pacific Ocean (Appendix B).

1.2.3 Soils

Information about soil types within the wetland study area was obtained from the Soil Survey for Ventura County, Web Soil Survey (NRCS, 2012a) and official NRCS (2012b) soil series descriptions. Three NRCS-mapped soil types occur within the NASA-administered property (NRCS, 2012a). These soil types are described generally in the following text; their distribution on the property is shown in Figure 1-3. The soil colors described in the following sections are all for moist soils. Appendix C contains additional soil information.

GrF–Gaviota rocky sandy loam, 15- to 50-percent slopes. This soil-mapping unit occurs in the southern half of Area I and in the northeastern corner of Area II. These soils formed in material weathered from hard sandstone or meta-sandstone and are found on hills and mountains. These soils have a very shallow or shallow-to-lithic (bedrock) contact. In a typical profile the surface layer to a depth of 10 inches is a brown (7.5 YR 4/4) gravelly loam underlain by hard meta-sandstone. These soils are well to excessively well-drained with very low to very high runoff and moderately rapid permeability.

ShE–Saugus sandy loam, 5- to 30-percent slopes. This soil mapping unit occurs in the northwestern and southwestern portions of Area II. This unit consists of deep, well-drained soils that formed from weakly consolidated sediments found on dissected terraces and foothills. In a typical profile the soil is a dark grayish brown (10YR 4/2) loam in the upper 25 inches with gravel content ranging from 5 to 15 percent (increasing with depth). These soils have medium to rapid runoff and moderate permeability.

SnG–Sedimentary rock land. This soil mapping unit occurs in the northern half of Area I and in the northwestern corner and southern half of Area II. This mapping unit consists mostly of exposed sedimentary rock with very thin, discontinuous areas of soil. There is little available information about this mapping unit; however, the potential for erosion is expected to be relatively low, with rapid runoff and very low permeability.

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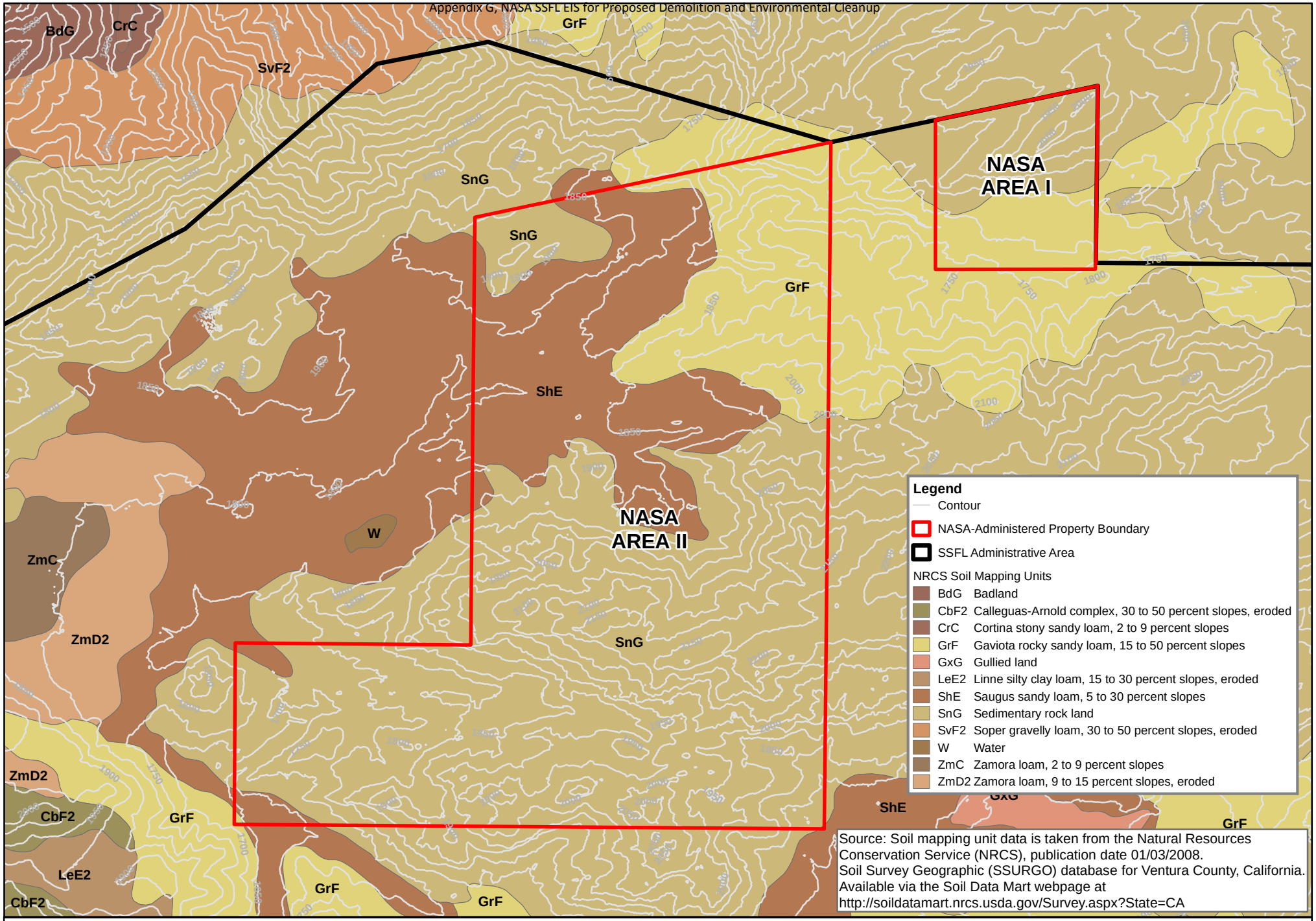

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A. Cooley

Figure 1-3
NRCS Soil Mapping Units
NASA Wetlands and Waters of the U.S. Delineation Report
Santa Susana Field Laboratory
Ventura County, California

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SECTION 2

Methods

A wetland delineation field survey was completed between January 3 and 6, 2012, by CH2M HILL wetland ecologists Russell Huddleston and Steve Long. The purpose of the survey was to identify the limits of wetlands and other waters on the 451.2 acres of NASA-administered property at SSFL (Figure 1-2). The following subsections describe the prefield investigations, field sampling procedures, methods used to delineate and map the wetland boundaries, and wetland classifications.

2.1 Prefield Investigation

Prior to conducting the field work, relevant information pertaining to site conditions was reviewed. The following materials (provided in the appendixes, as indicated) were included in this data review:

- USGS Calabasas quadrangle topographic map and the NHD (Appendix B)
- NRCS-mapped soils and soil series descriptions (Figure 1-3; Appendix C)
- The National Wetland Inventory (NWI) (Appendix D)

2.2 Wetland Delineation

Wetlands are defined as areas that are "inundated by surface water or groundwater with 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. Wetlands generally include swamps, marshes, bogs, and similar areas" (Title 40 *Code of Federal Regulations* [CFR], Section 230.3, and Title 33 CFR, Section 238). The survey methodology followed the *Wetland Delineation Manual* (Environmental Laboratory, 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (USACE, 2008).

Wetland determination data points were established at 10 locations, including 5 wetland data points and 5 upland data points (see the figures in Section 3). Sample points were located in areas that were considered to be representative of the wetland boundary being delineated. Appendix E includes the wetland determination data sheets. The following subsections describe the field methods used during the wetland delineation.

2.2.1 Vegetation

At each sample point, plant species were identified and the percent cover was visually estimated and recorded. Herbaceous vegetation was sampled in an approximately 5-foot radius around the sample point. Taxonomic designations follow *The Jepson Manual: Vascular Plants of California* (Baldwin et al., 2012). The *National List of Plant Species that Occur in Wetlands* (Reed, 1988) was used to evaluate the wetland indicator status of each plant species identified. Dominant species included the most abundant species whose cumulative cover accounted for at least 50 percent of the total cover, and any single species that accounted for at least 20 percent of the total vegetative cover. Appendix F provides a list of plant species observed at the sample points and of other common species observed throughout the wetland study area during the field survey.

2.2.2 Soils

Descriptions of soils were made by examining test pits that had been excavated using a tile spade that ranged in depth from 5 to 24 inches. In some areas, the depth of excavation was limited by shallow sandstone contact. At each data point, soil morphological features such as texture, color, and redoximorphic features (if present) were noted. Soil texture was estimated in the field by feel (Thien, 1979), and moist soil colors were determined using

Munsell color charts. In areas where no hydric soil indicators were observed, hydric conditions were assumed to be present where the following conditions existed:

- Dominant vegetation was composed entirely of obligate and facultative wetland plant species.
- There was evidence of seasonal wetland hydrology.
- There was a noticeable difference between the wetland and adjacent upland habitat.

2.2.3 Hydrology

The presence of wetland hydrology was determined based on current as well as previous field observations of saturation and/or inundation, water staining, sediment deposits, and drift deposits. Seasonal rainfall, site drainage, landscape position, and general site topography also were taken into consideration while making wetland hydrology determinations.

2.2.4 Wetland and Water Boundary Mapping

A Trimble Geo-XT global positioning system (GPS) device was used to map the limits of the wetland boundaries. Wetland boundaries were determined in the field based on observations of hydrophytic vegetation, evidence of wetland hydrology, and onsite microtopography. Because most of the soils lacked evidence of hydric indicators, soil characteristics generally were not useful in differentiating the wetland boundaries.

2.3 Delineation of Nonwetland Waters of the United States

Nonwetland waters of the U.S. include such things as rivers, streams, lakes, and ponds. In the absence of adjacent wetlands, the jurisdiction of the USACE extends to the limits of the ordinary high-water mark, which is defined as "the line on the shore established by fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of the soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas" (33 CFR 328.3 [e]).

Linear features such as creeks and drainages were delineated by walking the channel bed, to the extent possible, and noting the characteristics of the feature such as substrate, in channel and adjacent vegetation, evidence of flow and hydrologic modifications such as culverts or weirs. To the extent possible, the channel bed was mapped in the field with a Trimble Geo-XT. The ordinary high water was determined and measured at representative cross sections (reference the Section 3 figures) based on observed water staining, drift and debris deposits, sediment deposits, scouring, and other indicators of ordinary high-water flows. Stream data sheets are provided in Appendix F and representative site photographs are provided in Appendix G. In total, 54 stream data sheets were completed within the NASA-administered property. The locations where stream sample points were established corresponded generally to the upper; middle, and lower ends of a particular stream segment (reach), adjusting for other significant features such as tributaries and obstructions (dams or diversions).

Nonlinear features including ponds and impoundments were delineated based on the extent of the ordinary high-water mark as determined by indicators such as water staining and sediment deposits. Emergent wetland vegetation was present in some areas but occurred below the limits of the ordinary high water, and therefore, was not considered to be adjacent. The limits of the ordinary high water were then mapped using a Trimble Geo-XT.

2.4 Classification

Classification of wetlands and other waters identified during the survey follows the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al., 1979). This classification methodology was developed by the U.S. Fish and Wildlife Service as part of the NWI program. The hierarchical classification includes systems, subsystems, and classes to generally categorize the various aquatic habitats. Modifiers are used to denote specific water regimes and/or highly altered areas (excavated or impounded wetlands). Additional details regarding the classification of wetlands identified on the NASA-administered property are provided in Section 3.

SECTION 3

Results

3.1 Survey Conditions

No significant recent disturbance was observed; however, the rainfall between November 1 and December 31, 2011, was approximately 30 percent below average. Therefore, the wetlands and drainages might have been drier than would normally be expected for this time of year. In most areas, the ordinary high-water marks clearly were expressed as water marks and/or drift lines. Additionally, the drainages generally had clearly expressed and well-defined channels. For these reasons, the dry seasonal conditions did not preclude an effective delineation of the wetland boundaries and ordinary high-water marks.

3.2 Wetlands and Waters

As listed in Table 3-1, 1.348 acres of Palustrine wetlands and 1.879 acres of Riverine wetlands were identified within the 451.2-acre NASA-administered property at SSFL. An additional 0.439 acre of other features (such as swales, asphalt drainage ditches, and overflow culverts) were identified in this area, as well. The wetland locations within the study area are shown in Figures 3-1 through 3-6. Descriptions of the wetlands and other features are provided in the following subsections.

3.2.1 Palustrine Wetlands

Wetlands classified as part of the Palustrine (P) system are nontidal, freshwater wetlands that might be vegetated with trees, shrubs, herbaceous vegetation or mosses, and lichens. Also included are wetlands lacking such vegetation but with all of the following four characteristics: 1) the total area is less than 20 acres; 2) there are no active wave-formed or bedrock shoreline features; 3) water depth in the deepest part of basin is less than 6 feet at low water; and 4) salinity due to ocean-derived salts is less than 0.5 per mil"/per thousand (‰) (Cowardin et al., 1979). Palustrine wetlands identified on the NASA-administered property fall into two classes: Emergent and Unconsolidated Bottom. The Emergent Class includes wetlands that are characterized by more than 30-percent cover of erect, rooted, herbaceous plants adapted to grow under flooded and/or saturated conditions. The Unconsolidated Bottom Class includes wetlands that are characterized by cobble-gravel, sand, or mud substrates and have less than 30-percent vegetative cover. Water regimes of the Palustrine wetlands identified in the survey area include permanently flooded, seasonally flooded, and temporarily flooded. Descriptions of the Palustrine wetlands are provided in the following subsections.

3.2.1.1 Area I SW-1 (PEMAx)

In the northeastern corner of Area I there is a small (150 square foot) depressional basin that appears to have been excavated. Vegetation observed in the basin during the January 2012 survey included scattered annual plant seedlings of scarlet pimpernel (*Anagalllis arvensis*), smooth cat's ear (*Hypochaeris glabra*), longbeak stork's bill, and black mustard. During the April 2011 botanical surveys, aquatic vegetation observed in this area included water pygmyweed (*Crassula aquatica*), slender woollyheads (*Psilocarphus tenellus*), toad rush (*Juncus bufonius*), and hyssop loosestrife (*Lythrum hyssopifolia*). At the edge of the basin, the surface soil is a brown (10 YR 5/3) sandy loam to a depth of 1 inch, underlain by a mixture of light yellowish-brown (10 YR 6/4) sand and brown (10 YR 4/3) fine sandy loam to a depth of 10 inches. Sandstone rock was encountered at a depth of 10 inches. The small basin was dry at the time of the January 2012 survey, but seasonal precipitation was below the average for the time of year. No definitive evidence of wetland hydrology or hydric soils was observed in this area; however, there is a notable change in the vegetation relative to the surrounding areas, a shallow topographic basin with what appears to be sandstone bedrock at a depth of 10 inches, and past observations of wetland vegetation. Taken together, these characteristics suggest that temporary seasonal ponding is likely to occur under more typical seasonal rainfall conditions.

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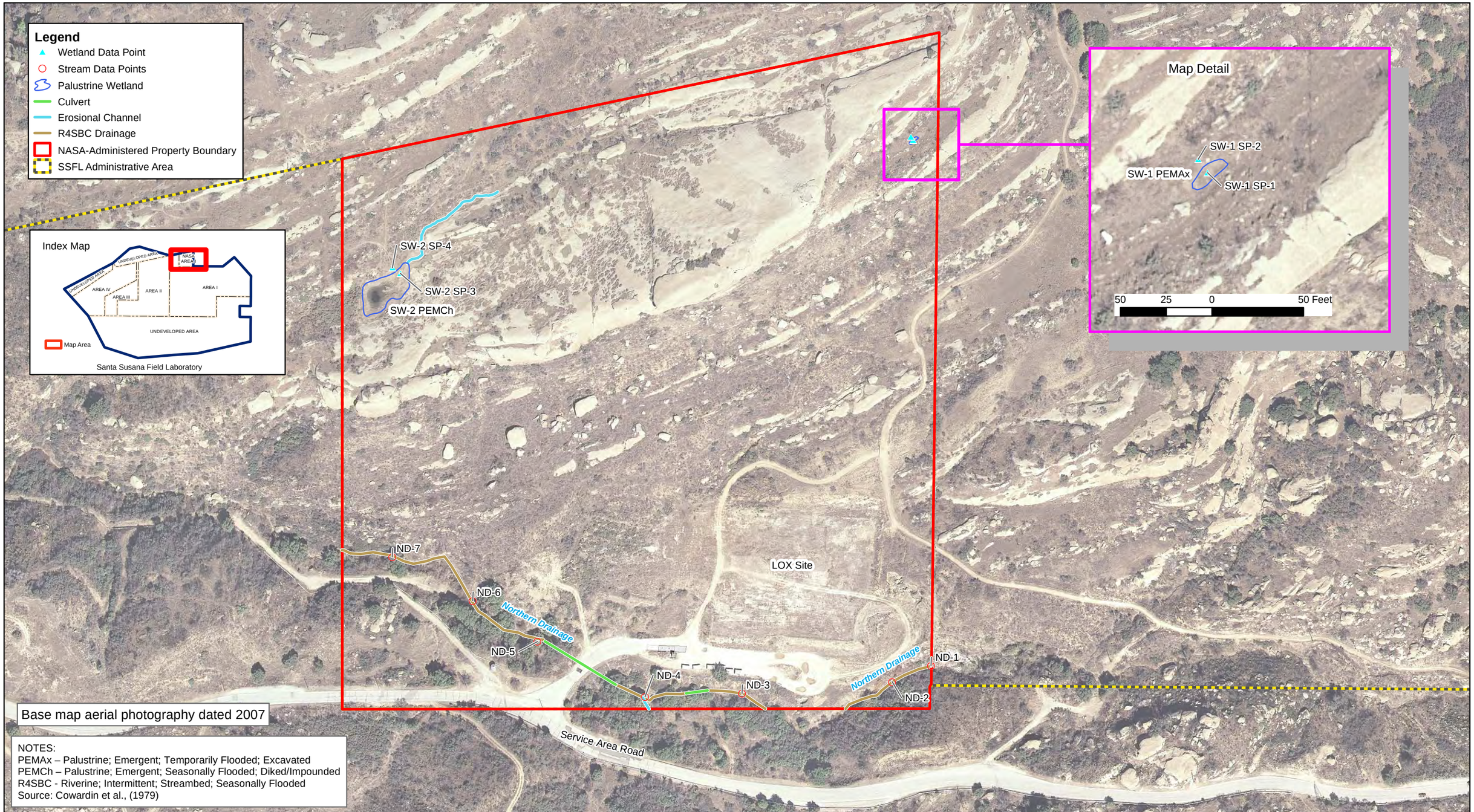

0 100 200 400 Feet

0 15 30 60 90 120 Meters

Wetland Delineation:
Russell Huddleston and Steve Long, January 2012

Drawn By:
A. Cooley
27-Feb-2012

Figure 3-1
Area I
NASA Wetlands and Waters of the U.S. Delineation Report
Santa Susana Field Laboratory
Ventura County, California

Map Document: O:\NASA\SSFL\maps\EIS_2011\WetlandsReport\Wetlands_Area1Pond.mxd

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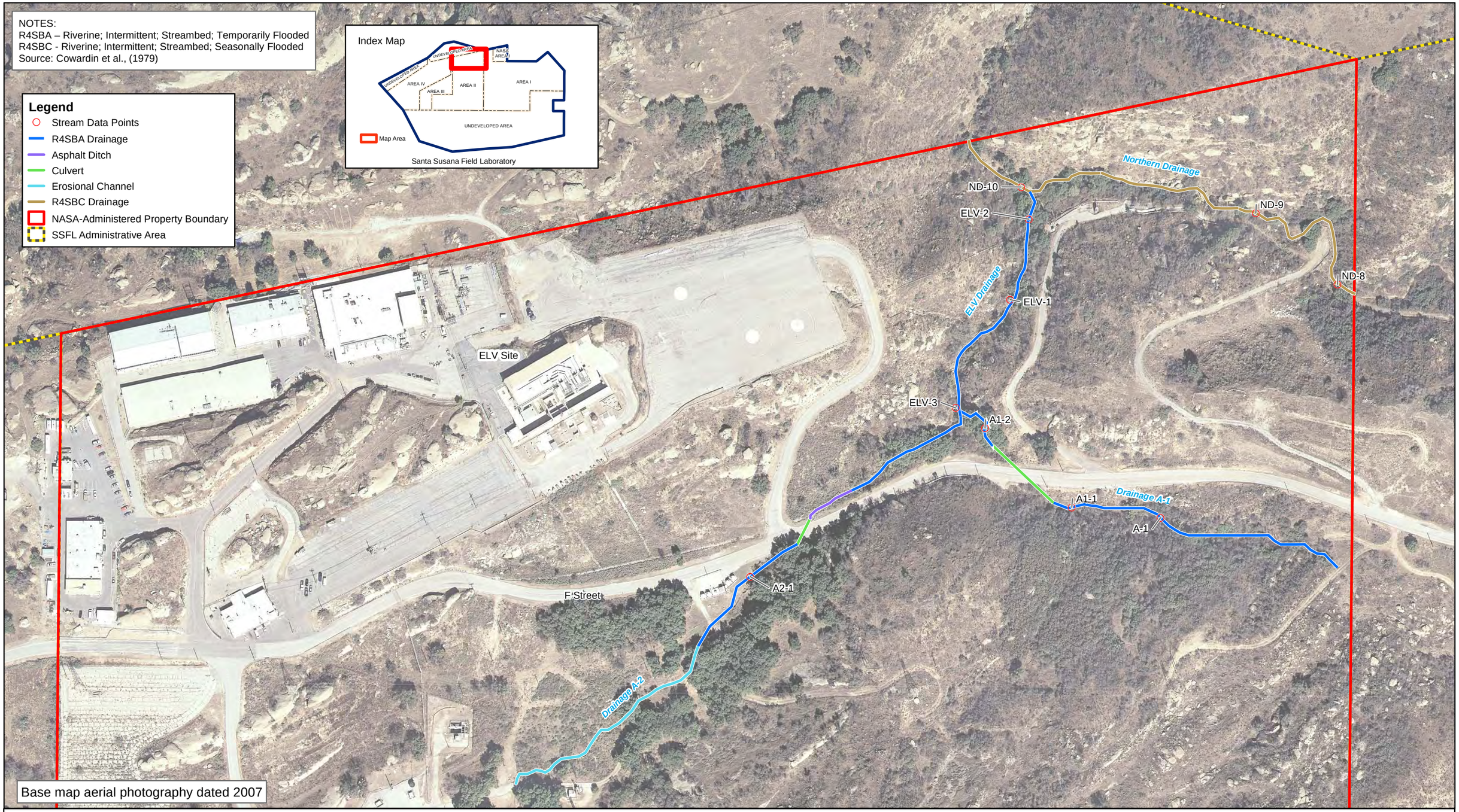

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Wetland Delineation:
Russell Huddleston and Steve Long, January 2012

Drawn By:
A. Cooley
05-Mar-2012

Figure 3-2
Area II North
NASA Wetlands and Waters of the U.S. Delineation Report
Santa Susana Field Laboratory
Ventura County, California

Map Document: O:\NASA\SSFL\maps\EIS_2011\WetlandsReport\Wetlands_AreaII_N.mxd

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Wetland Delineation:
Russell Huddleston and Steve Long, January 2012

Drawn By:
A. Cooley
01-Mar-2012

Figure 3-3
Area II - Central North
NASA Wetlands and Waters of the U.S. Delineation Report
Santa Susana Field Laboratory
Ventura County, California

Map Document: O:\NASA\SSFL\maps\EIS_2011\WetlandsReport\Wetlands_AreaII_CN.mxd

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Wetland Delineation:
Russell Huddleston and Steve Long, January 2012

Drawn By:
A. Cooley
27-Feb-2012

Figure 3-4
Area II - Central South
NASA Wetlands and Waters of the U.S. Delineation Report
Santa Susana Field Laboratory
Ventura County, California

Map Document: O:\NASA\SSFL\maps\EIS_2011\WetlandsReport\Wetlands_AreaII_CS.mxd

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Wetland Delineation:
Russell Huddleston and Steve Long, January 2012

Drawn By:
A. Cooley
27-Feb-2012

Figure 3-5
Area II - Southeast
NASA Wetlands and Waters of the U.S. Delineation Report
Santa Susana Field Laboratory
Ventura County, California

Map Document: O:\NASA\SSFL\maps\EIS_2011\WetlandsReport\Wetlands_AreaII_SE.mxd

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Wetland Delineation:
Russell Huddleston and Steve Long, January 2012

Drawn By:
A. Cooley
01-Mar-2012

Figure 3-6
Area II - Southwest
NASA Wetlands and Waters of the U.S. Delineation Report
Santa Susana Field Laboratory
Ventura County, California

Map Document: O:\NASA\SSFL\maps\EIS_2011\WetlandsReport\Wetlands_AreaII_SW.mxd

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TABLE 3-1
Summary of Wetland Features
Wetland Delineation for the NASA-Administered Portions of SSFL

Feature ID	Acreage
Palustrine Wetlands	
SW-1 (PEMAx)	0.003
SW-1 (PEMCh)	0.152
R2A Pond (PUBHx)	0.511
R2A Pond Overflow (PUBWx)	0.226
R2B Pond (PEMCh)	0.129
Coca Pond (PUBHx)	0.327
Total Palustrine Wetlands	*1.348*
Riverine Wetlands	
Northern Drainage (R4SBC)	**0.488 (3,193 LF)**
Northern Drainage Natural Channel	*0.465* (*2,176 LF*)
Northern Drainage Culverts	*0.023* (*1,017 LF*)
ELV Drainage (R4SBA)	**0.146 (976 LF)**
ELV Natural Channel	0.138 (862 LF)
Asphalt Drainage Ditch	**0.008 (114 LF)**
Southwestern Drainage (R4SBA)	**0.586 (8,826 LF)**
Southwestern Drainage Nature Drainage	*0.394* (*8,049 LF*)
Southwestern Drainage Concrete Ditch	*0.100* (*542 LF*)
Southwestern Drainage Culvert	*0.004* (*65 LF*)
Southwestern Drainage Constructed Outfall	*0.088* (*170 LF*)
Southwestern Drainage Tributary (R4SBA)	**0.034 (371 LF)**
Coca Drainage (R4SBA)	**0.479 (1,899 LF)**
Coca Drainage Natural Channel	*0.203* (*655 LF*)
Coca Drainage Concrete Ditch	*0.265* (*1,155 LF*)
Coca Drainage Culverts	*0.011* (*89 LF*)
PLF Drainage (R4SBA)	**0.040 (758 LF)**
PLF Drainage Natural Channel	0.*029* (*511 LF*)
PLF Drainage Culverts	*0.011* (*247 LF*)
Drainage A-1 (R4SBA)	**0.060 (911 LF)**
Drainage A-1 Natural Channel	*0.050* (*724 LF*)
Drainage A-1—Culvert	*0.010* (*187 LF*)
Drainage A-2 (R4SBA)	**0.046 (935 LF)**
Drainage A-2 Natural Channel	*0.030* (*324 LF*)
Drainage A-2 Erosional Feature	*0.013* (*547 LF*)
Drainage A-2 Culvert	*0.003* (*64 LF*)
Total Riverine Wetlands	*1.879* (17,869)

TABLE 3-1
Summary of Wetland Features
Wetland Delineation for the NASA-Administered Portions of SSFL

Feature ID	Acreage
Other Features	
Southwestern Drainage Swale (Alpha)	0.157 (6,860 LF)
Southwestern Drainage Swale Culverts	0.013 (218 LF)
Southwestern Drainage Swale Overflow Culvert	0.024 (344 LF)
Coca—Shotcrete Swale	0.236 (1,027 LF)
Coca—Shotcrete Swale Culverts	0.009 (68 LF)
Total Other Features	*0.439* (*8,517 LF*)

Notes:
ELV = Expendable Launch Vehicle
LF = linear foot
PLF = Propellant Load Facility

Surrounding vegetation is characterized by scattered coastal sagebrush, chamise, slender oat, longbeak stork's bill, black mustard, Sandberg's bluegrass (*Poa secunda*), and *Cryptantha* sp. The surface soil in the adjacent area is a brown (10 YR 4/3) loamy fine sand to a depth of 19 inches, and there was no evidence of wetland hydrology.

3.2.1.2 Area I SW-2 (PEMCh)

A second, larger constructed wetland feature, known locally as "horse pond," is near the northwestern corner of Area I (Figure 3-1). The NWI describes the pond as a permanently flooded, excavated wetland with Aquatic Bed vegetation, with adjacent areas mapped as saturated Palustrine Scrub-Shrub wetlands (Appendix C). Field observations indicate that this wetland is more accurately classified as a seasonally flooded Palustrine Emergent wetland that has been created by an impoundment. No adjacent Scrub-Shrub wetlands were identified in this area.

The 0.15-acre wetland is located near the base of a large sandstone outcrop. The basin appears to have been excavated, and an earthen berm has been constructed along the western edge that impounds surface water drainage from the hill slope above. An erosional channel, resulting from channelized runoff, extends approximately 250 feet to the northeast of the wetland (Figure 3-1). Vegetation within the wetland basin is dominated by annual rabbitsfoot grass (*Polypogon monspeliensis*), with lesser amounts of water-starwort (*Callitriche marginata*), tall flatsedge (*Cyperus eragrostis*), rough cocklebur (*Xanthium strumarium*), scarlet pimpernel, purslane speedwell (*Veronica peregrina* subsp. *xalapensis*), and pale spikerush (*Eleocharis macrostachya*). Surface soil is a dark grayish-brown (10YR 4/2), fine sandy loam to a depth of 2 inches underlain by a dark brown (10 YR 3/1) loamy fine sand with less than 2 percent yellowish-red (5 YR 5/6) inclusions in the soil matrix to a depth of 16 inches. Some brown (10 YR 5/3) sand also was observed on the soil ped surfaces between 2 and 9 inches. From 16 to 19 inches, the soil is a dark brown (10YR 4/3) sand. At the time of the January 2012 field survey, some shallow surface water was present in the lowest part of the basin, and a shallow water table was present about 18 inches below the surface, near the outer edge of the basin. Seasonal saturation and inundation were observed in this area during botanical surveys conducted in April and June 2011. Other hydrologic indicators included water marks on the adjacent sandstone rocks and drift deposits.

Vegetation in the adjacent areas includes laurel sumac, chamise, thickleaf yerba santa, black sage, and Sandberg's bluegrass, with sparse amounts of curly dock (*Rumex crispus*) and scarlet pimpernel. A dense thicket of poison oak is present on the earthen berm along the western side of the basin. Surface soil is a dark grayish-brown (10 YR 4/2) fine sandy loam to a depth of 1 inch that is underlain by a mixture of dark grayish-brown (10 YR 4/2) and yellowish-red (5 YR 5/6) fine sandy loam to a depth of 6 inches. From 6 to 17 inches, the soil is a mixture of dark brown (10YR 4/3), dark yellowish-brown (10 YR 4/6), and gray (10 YR 5/1) loamy fine sand. Soils in this area are likely the result of spoils created during the excavation of the pond area. No evidence of wetland hydrology

was observed. The wetland/upland edge is defined by a relatively abrupt topographic break, change in the dominant vegetation, and evidence of ordinary high water such as water marks and drift deposits.

3.2.1.3 R2B Pond (PUBCh)

The 0.13-acre R2B pond is in the southwestern portion of Area II (Figure 3-6). The pond was mapped by the NWI together with the R2A pond as a permanently flooded, excavated Palustrine Unconsolidated Bottom wetland (Appendix C). Field observations as well as topographic and hydrologic maps indicate that this smaller pond was created by impounding the Southwestern Drainage. Although this pond is flooded for much of the year, no surface water was observed in the basin during the August 2011 botanical survey. Therefore, this feature is more accurately classified as a seasonally flooded Palustrine Aquatic Bed wetland that is the result of an impoundment. The R2B pond physically is separated from the R2A pond by a concrete apron and earthen dam, and it appears to serve as a settling pond prior to discharging, via a 36-inch-diameter culvert, into the larger R2A pond to the east.

The bottom of the pond is covered with fallen dead stems of southern cattail (*Typha domingensis*), but most of the pond is characterized by open water. Sparse (senesced) southern cattail and tule (*Schoenoplectus* sp.) stems are present along the southern and western edges of the pond, but they provide only minimal cover. Arroyo willow (*Salix lasiolepis*) and mule fat also are present around the edges of the pond. Soils are very shallow to bedrock (5 inches) and are of dark grayish-brown (10YR 4/2) fine sandy loam. No redoximorphic features were observed. The pond partially was flooded at the time of the January 2012 field survey and had an estimated depth of 24 inches. Water staining and sediment deposits on the concrete apron and drift deposits on the mule fat branches indicate that ordinary high water appears to be around 4 feet deep.

Vegetation in the adjacent uplands includes arroyo willow, mule fat, coyotebrush, poison oak, orange bush monkey-flower, ripgut brome, soft brome, and plumeless Italian thistle (*Carduus pycnocephalus*). The surface soil is a dark grayish-brown (10 YR 4/2) loamy fine sand to a depth of 18 inches. No redoximorphic features were observed, and there was no evidence of wetland hydrology. The wetland/upland edge is defined by changes in the dominant vegetation, presence and absence of ordinary high-water marks, and a relatively gradual transition to bedrock outcrop that surrounds the wetland on the western, southern, and eastern sides.

3.2.1.4 R2A Pond (PUBHx/PUBWx)

The 0.74-acre R2A pond is in the southwestern portion of Area II (Figure 3-6). This feature is mapped together with the R2B pond by the NWI as a permanently flooded, excavated Palustrine Unconsolidated Bottom wetland (Appendix C).

The R2A pond is a large constructed pond that receives inflows from the R2B pond via a 36-inch-diameter culvert on the western side and two ephemeral drainages on the eastern side (Figure 3-6). Water levels within the pond actively are managed through a system of pumps and large-volume plastic pipes (intake and outtake) used to transfer water between the R2A pond and the larger Silvernale pond, located to the north-northeast, outside the NASA-administered property. The water transfers are used to minimize surface water discharges into the Southwestern Drainage below the R2A pond. In the event that both the Silvernale and R2 ponds exceed their water storage capacities, there is an overflow spillway and constructed outfall along the southern side of the pond designed to capture sediment before the water is discharged into the downstream section of the Southwestern Drainage.

The western part of the pond was flooded with several feet of water at the time of the January 2012 survey. During previous biological surveys, in 2010 and 2011, surface water was observed at various levels, but the basin was never completely dry. With the exception of a few small patches of narrow-leaf cattail, the western part of the pond generally lacks emergent vegetation. The extent of the ordinary high water in this area was mapped based on water marks on the surrounding sandstone rocks.

The eastern portion of the pond was dry at the time of the January 2012 survey, and no surface water was observed in this part of the pond during any of the 2011 spring and summer botanical surveys. This part of the pond appears be used only for excess water storage, and therefore, was considered to be only intermittently flooded. Extensive dead tule stems litter the bottom of the pond in this area, suggesting that at one time dense

emergent vegetation was present. Currently, vegetation is limited to a few small, scattered mule fat shrubs and occasional tall flat sedge. No live rhizomes or erect, senesced tule stems were present. The upper 2 inches of the soil consist of a very dark grayish-brown (10 YR 3/2) mixture of layered organic material, fine sand, and silt. From 2 to 6 inches, the soil is a mixed very dark grayish-brown (10 YR 3/2) and yellowish-brown loamy fine sand that is underlain by a very dark grayish-brown (10 YR 3/2) fine sandy loam with approximately 2-percent black (10 YR 2/1) and 8-percent dark yellowish-brown (10 YR 4/4) inclusions in the matrix. Although the eastern part of the pond was dry at the time of the survey and appears to be only intermittently flooded, water stains on the adjacent rocks were used to map the extent of the previous ordinary high-water level in this area.

Vegetation in the areas around the pond includes coast live oak, arroyo willow, mule fat, coyotebrush, poison oak, ripgut brome, and branching phacelia (*Phacelia ramosissima*). Surface soil is a very dark grayish-brown (10 YR 3/2) loamy fine sand to a depth of 2 inches underlain by a mixture of dark gray (10YR 4/1) and dark yellowish-brown (10YR 4/4) loamy fine sand to a depth of 14 inches. Between 14 and 24 inches, the soil is a brown (10 YR 4/3) loamy fine sand. No redoximorphic features were observed, and there was no evidence of wetland hydrology.

3.2.1.5 Coca Pond (PUBHx)

The Coca Pond is in the southeastern portion of Area II (Figures 3-5 and 3-6). This feature is mapped as a permanently flooded, excavated Palustrine Unconsolidated Bottom wetland by the NWI (Appendix C).

The 0.33-acre Coca Pond is a constructed pond at the downslope end of a shotcrete swale originating at the Coca test stands to the east (Figure 3-5). The shotcrete swale terminates in a settling basin southeast of the pond, on the southern side of a paved access road. Two 36-inch-diameter culverts that connect to the Coca pond are located in the bottom of the settling basin (Figure 3-5). These culverts were sealed closed at the time of the January 2012 site visit. An overflow discharge on the northern side of the pond empties into a concrete-lined ditch that conveys water west, where it passes beneath Test Area Road and enters a natural ephemeral drainage leading into the northeastern corner of the R2A pond (Figure 3-6).

Along the western side of the pond, some organic soils have accumulated along the concrete apron. In this area, as in others, primarily along the northern side of the pond, southern cattail is present, but it provides less than 30-percent cover. The organic soils are a black (10 YR 2/1) fine sandy loam to a depth of 10 inches with no redoximorphic features. Most of the pond is characterized by open water that was estimated to be between 3 to 4 feet deep at the time of the January 2012 survey. Surface water has been observed in this pond at various times throughout the year during previous biological surveys. The extent of the ordinary high-water mark was established based on water staining on the concrete lining and rocks around the pond.

Characteristic vegetation in the adjacent area includes laurel sumac, thickleaf yerba santa, common deerweed, and branching phacelia. Surface soil is a dark yellowish-brown (10 YR 4/4) mixed with a small amount of very dark grayish-brown (10 YR 3/2) sandy loam to a depth of 10 inches. From 10 to 19 inches, the soil is a light olive brown (2.5 YR 5/4) sand. No redoximorphic features were observed, and there was no evidence of wetland hydrology.

3.2.2 Riverine Features

Wetlands classified as part of the Riverine (R) system include wetlands that are contained within a channel, with the exception of channelized wetlands dominated by trees, shrubs, or persistent emergent vegetation and channels containing ocean-derived salts in excess of 0.5 ‰. Under this system, a channel is defined as “an open conduit either naturally or artificially created which periodically or continuously contains moving water, or which forms a connecting link between two bodies of water” (Cowardin et al., 1979). All of the Riverine wetlands identified on the NASA-administered property are in the Intermittent Subsystem, which includes channels that contain flowing water for only part of the year. When water is not flowing, it might remain in isolated pools or surface water might be absent.

The Riverine wetlands identified on the NASA-administered property are included in the Stream Bed Class, a broad classification that includes a variety of substrates depending on the gradient of the channel, the velocity of the water, and the sediment load of the stream. Common stream bed substrates include bedrock rubble, cobble-gravel, sand, and mud. Although not specifically included in the classification system, for the purpose of this

report, sections of natural drainages that have been concrete lined were included in the Stream Bed Class. Water regimes associated with the Riverine Intermittent wetlands identified in the survey area include seasonally flooded and temporarily flooded. Descriptions of the Riverine wetlands are provided in the following subsections.

3.2.2.1 Northern Drainage (R4SBC)

The Northern Drainage passes through the southern portion of Area I and the northeastern portion of Area II (Figures 3-1 and 3-2). This drainage feature is shown as a blue line stream on the USGS Calabasas topographic quadrangle map and also is included in the NHD as an intermittent stream (Appendix D). The NWI has mapped this area as a temporarily flooded Palustrine Scrub-Shrub wetland (Appendix C). According to onsite staff, water often flows through this area for several months; therefore, this water feature is more appropriately classified as a seasonally flooded Riverine Intermittent Streambed wetland.

In the southeastern corner of Area I, the channel is confined by steep side slopes ranging from approximately 8 to 10 feet high. The approximately 8-foot-wide channel bed is characterized by a rocky-cobble substrate with some sand and gravel. Vegetation is largely absent with the exception of sparse scattered herbaceous species such as annual rabbitsfoot grass (*Polypogon monspeliensis*), plumeless Italian thistle, and curly dock. The channel was dry at the time of the January 2012 survey, but seasonal rainfall was below the average for this time of year. Evidence of flow observed during the survey included drift and debris deposits approximately 24 inches above the channel bottom in some areas, as well as the general absence of upland vegetation. At the western end of this reach, water flows through a 48-inch-diameter culvert under an old and abandoned unpaved roadway. The channel characteristics generally are similar downstream of the culvert, with steep banks and an approximately 8-foot-wide channel, but the substrate becomes more sandy and gravelly, with scattered cobble and sandstone rocks. Vegetation essentially is absent except for scattered seedlings of plumeless Italian thistle and black mustard. A small erosional channel, approximately 2 feet wide and along the southern bank, flows directly in the stream in this area (Figure 3-1). West of the erosional channel the stream enters a 52-inch-diameter culvert under the gravel access road to the Liquid Oxygen (LOX) site (Figure 3-1). East of the culvert the channel bed widens to an average of 12 feet and has a sandy substrate with gravel, cobble, and sandstone boulders present in scattered locations. As with other sections of this drainage, vegetation in this reach is sparse and includes scattered plumeless Italian thistle, smilograss (*Piptatherum miliaceum*), annual rabbitsfoot grass, curly dock, and mule fat.

Coast live oak riparian vegetation is present along the upper banks of the channel throughout Area I. Coast live oak is the sole dominant tree in this area. One arroyo willow tree (approximately 5 inches in diameter at breast height) also is present along the drainage in Area I. Common shrubs along the upper banks include toyon (*Hertermeles arbutifolia*), chamise, poison oak, mule fat, coastal sagebrush, thickleaf yerba santa, Mendocino bush mallow, hoaryleaf ceanothus (*Ceanothus crassifolius*), American black elderberry (*Sambucus nigra* ssp. *caerulea*), and chaparral current (*Ribes malvaceum*). Herbaceous species include smilograss, branching phacelia, black mustard, plumeless Italian thistle, and bedstraw (*Galium* sp.).

In the northeastern corner of Area II, the channel width ranges between 6 and 14 feet (average width of 9 feet), with defined side banks in most areas. The channel substrate along the eastern boundary of the site is sandy, with scattered cobble and sandstone rock. As the channel continues to the west, the substrate becomes rockier, with some sections of the channel characterized by large sandstone boulders. Throughout Area II, vegetation is absent to sparse and includes scattered mule fat, annual rabbitsfoot grass, plumeless Italian thistle, smilograss, curly dock, and orange bush monkey flower. The entire reach of the channel through Area II was dry during the January 2012 surveys, but there was evidence of flow, including drift and debris deposits and an absence of vegetation. No culverts are present in this section of the drainage. There is one ephemeral tributary (the Expendable Launch Vehicle [ELV] Drainage) that enters the stream east of the ELV Site (Figure 3-2).

Coast live oak riparian woodland is present along the upper banks of the channel throughout Area II. Coast live oak is the dominant tree species, but scattered arroyo willow and California laurel (*Umbellularia californica*) trees are present in some areas. Shrub species along the upper banks include toyon, heart-leaved penstemon (*Keckiella cordifolia*), poison oak, California blackberry (*Rubus ursinus*), orange bush monkey flower, birchleaf mountain mahogany (*Cercocarpus betuloides*), and black sage. Common herbaceous species include smilograss, plumeless Italian thistle, and branching phacelia.

3.2.2.2 ELV Drainage (R4SBA)

The ELV Drainage is east of the ELV Site and helicopter landing area, in the northeastern part of Area II. This drainage is a direct tributary to the Northern Drainage (Figure 3-2). Upstream of the confluence with the Northern Drainage, the channel bed width ranges from approximately 4 to 10 feet and is characterized by a sandy-gravel substrate, devoid of vegetation. The upper section of this drainage, parallel to F Street, has been lined with asphalt. Large sandstone rocks and boulders also occur in some sections of the channel. Abundant downed woody debris is present in the upper reaches of the channel, particularly in the section that parallels F Street. Flows in this area appear to be temporary, short-duration events in response to storm events. Evidence of flow in this area included some areas of scouring and debris deposits.

Common vegetation along the upper slopes of the channel includes coast live oak, California laurel, poison oak, Mendocino bush mallow, hairy ceanothus (*Ceanothus oliganthus*), chamise, toyon, laurel sumac, coastal sagebrush, canyon sunflower (*Venegasia carpesioides*), orange bush monkey flower, chaparral current, California wildrose (*Rosa californica*), smilograss, plumeless Italian thistle, and branching phacelia. Two additional channels, Drainage A-1 and Drainage A-2, also flow into this feature (Figure 3-2).

3.2.2.3 Drainage A-1 (R4SBA)

Drainage A-1 is in the northeastern part of Area II and is a tributary to the ELV Drainage (Figure 3-2). On the southern side of F Street are a large amount of boulder riprap and a 29-inch plastic culvert. In the immediate vicinity of the riprap and culvert, the area is a low topographic swale. The only defined drainage feature in this area is a narrow (1- to 2-foot-wide) sandy channel with scattered cobbles that extends east through relatively dense chaparral vegetation (Figure 3-2). It is likely that this area receives additional overland stormwater flows from the hill slope to the south. On the northern side of the road, the channel is approximately 7.5 feet wide with a sandy-cobble substrate, with some asphalt debris also present. No vegetation was present in the channel north of F Street. Evidence of flow in this area included a relatively defined, unvegetated channel and sparse debris deposits. It is likely that this drainage conveys only temporary, short-duration surface flow in response to major storm events.

Vegetation along the channel includes coast live oak, Mendocino bush mallow, chaparral current, laurel sumac, coyotebrush, thickleaf yerba santa and black sage, branching phacelia, and plumeless Italian thistle.

3.2.2.4 Drainage A-2 (R4SBA)

Drainage A-2 is on the southern side of F Street and is tributary to the ELV Drainage via a 24-inch-diameter culvert (Figure 3-2). The channel immediately south of the road is approximately 6 feet wide and has a defined bed and bank, but as it continues south, it gradually becomes a much smaller discontinuous erosional feature. The channel on the southern side of F Street has a sandy substrate that is largely devoid of vegetation with the exception of scattered small poison oak and orange bush monkey flower plants growing along the upper edges of the banks in the area near the road. On the northern side of the road, the culvert discharges into an asphalt drainage ditch. No evidence of recent flow was noted in the channel at the time of the survey.

Adjacent vegetation includes coast live oak, poison oak, plumeless Italian thistle, giant ryegrass (*Elymus condensatus*), branching phacelia, ripgut brome, and two-color rabbit tobacco (*Pseudognaphalium biolettii*).

3.2.2.5 Southwestern Drainage (R4SBA)

The Southwestern Drainage originates just beyond the western edge of the Alfa test stand, where it traverses from east to west through the central-north portion of Area II and around the northern side of the Storage Propellant Area (SPA) site (Figure 3-3). In this area the drainage is indicated as a blue line stream (called Bell Creek) on the Calabasas USGS topographic quadrangle maps and also is shown as an intermittent stream in the NHD. The NWI maps also indicate sections of the drainage as seasonally flooded Palustrine Scrub-Shrub wetlands (Appendix C). The upper reaches of the drainage have been highly altered by culverts, weirs, and earthen dams. In this area there is no defined channel, and no ordinary high-water-mark indicators were observed during the January 2012 survey.

The eastern section of the drainage originates at a 24-inch-diameter culvert outfall near the Alfa test stands (Figure 3-3). At the outfall, more than half of the culvert was filled with sediment and there is no defined channel or evidence of scouring immediately downstream of this location. Vegetation below the outfall is dominated by common iceplant (*Mesembryanthemum crystallinum*), with scattered black mustard and plumeless Italian thistle intermixed.

West of the culvert outfall there is no defined bed and bank feature; rather, the drainage is a characterized low sandy topographic swale that lacks evidence of flowing water, but vegetation within the swale includes riparian species such as mule fat and arroyo willow. Many of the willows were burned and dead as a result of the 2005 Topanga Canyon Fire, and overall, the willows and mule fat appeared to be in poor condition throughout this area.

Upland species including common iceplant, plumeless Italian thistle, ripgut brome, crimson fountain grass (*Pennisetum setaceum*), slender oat and Maltese star-thistle (*Centaurea melitensis*) also were abundant throughout the eastern section of the swale.

Southwest of the westernmost Alfa test stand is a concrete check dam along the swale feature (Figure 3-3). On the southern side of the check dam is a 36-inch-diameter corrugated metal pipe outflow that runs from the top of the check dam west along the hillside on the southern side of the swale (Figure 3-3). A second culvert, with an apparently inoperable flow valve and also located at the check dam, appears to connect to the downstream swale below the dam. Beyond the check dam, the drainage continues along a weakly expressed sandy swale that lacks a defined bed and bank. Most arroyo willows downstream of the dam were burned in the 2005 fire, and no resprouting or regeneration was evident. Most of the swale downstream of the dam is chocked with dead woody debris, with scattered mule fat and abundant plumeless Italian thistle.

An earthen dam is approximately 275 feet downstream (west) of the concrete check dam (Figure 3-3). The culvert that runs along the southern side of the swale from the check dam discharges down a concrete spillway on the western side of the earthen dam. There is also a low-flow release valve at the base of the earthen dam, although the valve appeared to be inoperable at the time of the survey. As with the other sections of the Southwest Drainage through the Alfa site, the drainage downstream of the earthen dam is a low topographic swale with no defined bed and bank channel. Vegetation below the earthen dam is a mixture of mule fat, poison oak, and plumeless Italian thistle.

Approximately 500 feet west of the earthen dam, the swale terminates in a broad flat area east of an unpaved road and the former (now capped) Alfa/Bravo skim pond. Immediately west of the former skim pond is a concrete headwall and two 24-inch-diameter culverts, both filled more than half way with sediment. The culvert outfalls were not found during the January 2012 survey, but presumably they drain into the sandy, swale that continues from this area west to CLT IV Road. Vegetation within the swale feature west of the double culverts includes arroyo willow, mule fat, coyotebrush, poison oak, Mendocino bush mallow, Douglas's sagewort (*Artemisia douglasiana*), plumeless Italian thistle, and branching phacelia.

At CLT IV Road, the swale terminates at a 50-inch-diameter culvert that passes under the road. On the western side of the road, the culvert discharges into a concrete-lined drainage channel that runs along the northern side of the SPA site (Figure 3-2). The first approximately 50 feet of the concrete drainage channel in this area is nearly completely filled with soil. Slumped soils also were noted in other areas of the channel north of the SPA site. The soil in the concrete channel appears to have come from the SPA site and might be the result of erosion from firefighting activities during the 2005 Topanga Canyon fire. Vegetation along the concrete-lined channel includes thickleaf yerba santa, laurel sumac, coyotebrush, hoaryleaf ceanothus, chamise, poison oak, and mule fat.

The concrete channel terminates approximately 450 feet west of the CLT VI Road (Figure 3-3). West of the concrete-lined drainage channel, the natural channel is approximately 6 feet wide and has a sandy-rocky substrate with some gravel. Evidence of ordinary high-water flows such as drift lines, sediment deposits, and scoring were observed in this section of the drainage. Vegetation generally is absent in the bed of the channel, with the exception of the scattered annual rabbitsfoot grass and plumeless Italian thistle. The natural drainage channel continues west for less than 200 feet before exiting the NASA-administered property (Figure 3-3).

Outside of the NASA-administered property, the drainage turns south and passes through the Silvernale Pond before it continues southward toward the R2B Pond. At the point where drainage re-enters the NASA-administered property, the channel is approximately 5 feet wide with a sandy-gravel cobble substrate that is largely devoid of vegetation other than occasional seedlings of plumeless Italian thistle, black mustard, and blessed milkthistle (*Silybum marianum*). Evidence of ordinary high water in this area consisted primarily of a defined bed and bank channel, some scouring along the channel, and a general absence of upland vegetation. Vegetation along the sides of the channel includes coast live oak, laurel sumac, thickleaf yerba santa, coyotebrush, and a few small arroyo willow seedlings and saplings. The channel immediately north of the R2B pond was inaccessible because of a dense thicket of poison oak.

As described previously, the Southwest Drainage is diverted into the R2B and R2A ponds, where water storage actively is regulated through a system of pumps and pipes to minimize outflows from the NASA-administered property. A constructed discharge designed to capture sediments is located along the southern side of the R2A pond and leads back into the natural drainage channel in the southwestern corner of Area II (Figure 3-6). Downstream of the constructed outfall, the channel is approximately 10 feet wide devoid of vegetation, and consists of a sand-gravel-cobble substrate with some large sandstone boulders. Vegetation along the upper banks of the channel includes coast live oak, mule fat, coyotebrush, poison oak, heart-leaved penstemon, laurel sumac, hoaryleaf ceanothus, thickleaf yerba santa, and chaparral current. Herbaceous vegetation is generally sparse and consists of smilograss and branching phacelia.

Approximately 280 feet of the channel in this section downstream of the R2A Pond was inaccessible because of large sandstone boulders within the channel. The channel area downstream of the large boulders is similar to the area upstream. Scattered vegetation in the sandy-gravel channel in this area includes Douglas' sagewort, curly dock, smilograss, and plumeless Italian thistle. A small section of the channel meanders west, off of the NASA-administered property (Figure 3-6). Near the point where the drainage re-enters the property, the channel broadens slightly to approximately 14 feet, and the substrate becomes slightly more cobblely. In some areas of the channel, smilograss is locally abundant. Along the southwestern property boundary, the channel makes a sharp (90-degree) turn to the east, resulting in a highly eroded bank. The channel in this area is approximately 10 feet wide with a sand-gravel-cobble substrate. Scattered vegetation within the channel includes smilograss, black mustard, plumeless Italian thistle, and California blackberry. Vegetation along the sides of the channel in the southwestern corner of Area II includes coast live oak, California sycamore (*Platanus racemosa*), poison oak, laurel sumac, and creeping snowberry.

3.2.2.6 Southwestern Drainage Tributary (R4SBA)

A small tributary to the Southwestern Drainage originates from west of the NASA-administered Area II near the former Systems Test Laboratory (STL)-IV site (Figure 3-6). The channel is 4 feet wide and has a sandy substrate devoid of vegetation. Evidence of flow includes a well-defined bed and back channel debris deposits and the absence of vegetation. Vegetation along the channel includes coast live oak, coyotebrush, hoaryleaf ceanothus, chaparral current, chamise, plumeless Italian thistle, and black mustard.

3.2.2.7 Coca Drainage (R4SBA)

The Coca drainage originates at the base of the Coca test stands, where the eastern section is characterized by a shotcrete swale that drains into a retention basin connected via culverts to the Coca Pond (Figure 3-5). This feature is shown as a blue line on the USGS Calabasas quadrangle map and is included as an intermittent steam in the NHD and NWI.

To the north and west of the Coca Pond, the channel is contained within an approximately 10-foot-wide concrete-lined ditch. The ditch continues to Test Area Road, where water is conveyed through two culverts (42- and 24-inch diameters), as shown in Figure 3-6. At the culvert outfall, on the western side if the road, the natural channel is approximately 10 feet wide and characterized by a sandstone bedrock bed with some sand and gravel. Sparse mule fat and scattered black mustard and plumeless Italian thistle are present in the channel in this area. As the channel continues west, the substrate becomes more sandy and gravely, with some large sandstone boulders, and is devoid of vegetation. A few plunge pools with approximately 6 inches of water were observed in this area

during the January 2012 survey. Just upstream of the R2A pond, the channel width broadens to approximately 14 feet and is characterized by a sand-and-gravel substrate devoid of vegetation. The channel ultimately discharges into the northern end of the R2A pond overflow area (Figure 3-6).

Vegetation along the concrete-lined portion of the drainage ditch is characterized by common deerweed, Eastern Mojave buckwheat (*Eriogonum fasciculatum* var. *fasciculatum*), black mustard, coyotebrush, thickleaf yerba santa, Mendocino bush mallow, poison oak, laurel sumac, and mule fat. West of Test Area Road, vegetation along the channel is characterized by scattered coast live oak trees as well as thickleaf yerba santa, laurel sumac, chaparral current, orange bush monkey flower, coyotebrush, branching phacelia, plumeless Italian thistle, black mustard, smilograss, and two-color rabbit tobacco.

3.2.2.8 PLF Drainage (R4SBA)

This small drainage feature originates at the base of a large sandstone cliff in the northeastern portion of the Delta site (Figure 3-6). The upstream part of the channel is 1 to 2 feet wide and 6 to 12 inches deep. As the channel continues west, it broadens to 3 feet in some areas and becomes more swale-like. The substrate is primarily sand with a few scattered cobbles, and is devoid of vegetation. At the western terminus, the drainage feature empties into a concrete apron and 24-inch-diameter culvert that eventually discharges near the eastern end of the R2A pond. This channel flows through a live oak woodland with an understory of poison oak, chaparral current, coastal sagebrush, canyon sunflower, branching phacelia, ripgut brome, smilograss, and plumeless Italian thistle.

3.3 Nonwetland Features

A number of features were investigated during the survey that were not considered to be waters of the U.S. Such features included constructed stormwater swales associated with developed areas, culverts at road crossings that were not associated with defined drainage channels, and discontinuous erosional channels and weakly expressed upland swale on the hill slopes. Additionally, former skim ponds that have been capped and a former (now dry) basin that had been used to burn off excess fuels were not considered to be waters of the U.S.

3.4 Preliminary Jurisdictional Determination

The USACE ultimately is responsible for determining the limits of waters of the U.S. subject to regulation under the federal CWA. The results and conclusions presented in this wetland delineation are intended to assist the USACE with its determination of jurisdictional waters of the U.S. The results and conclusions presented in this report are preliminary, pending verification and subsequent approval by the USACE.

The small excavated wetland in the northeastern part of Area I and the larger impounded wetland and associated erosional channel in the northwestern part of Area 1 appear, on the basis of the site investigation, to be isolated. There does not appear to be any significant nexus between these constructed basins and any waters of the U.S. Therefore, these wetlands might not be considered jurisdictional waters of the U.S. subject to regulation under Section 404 of the federal CWA.

The jurisdictional status of the section of the Southwest Drainage through the Alfa site (Figure 3-3) is uncertain. This area lacks a defined bed and bank and there was no evidence of an ordinary high-water flow throughout this section. However, this area appears to be a natural drainage, has been mapped as a blue line on the USGS Calabasas topographic quadrangle, and is included as an intermittent stream in NHD. Although it appears that the natural hydrology has been altered significantly in this area, it could still be considered a water of the U.S. because it is considered part of the Southwestern Drainage, and remnants of the natural drainage are still present. In contrast, the easternmost section of the Coca drainage characterized by a shotcrete swale has been altered so dramatically from its original condition that it is unlikely that this section would be considered a water of the U.S. The cement-lined drainage that originates at the Coca Pond and extends west, eventually becoming a natural drainage, is likely to be considered jurisdictional.

Other drainage features identified on the NASA-administered property include extant natural drainages, some of which have been realigned and lined with concrete, but that appear to be natural tributary drainages that would be jurisdictional, and therefore, subject to regulation under Section 404 of the CWA. The R2A, R2B, and Coca ponds appear to have been created along the natural drainage channels and therefore might be considered either impoundments of waters of the U.S. or adjacent to waters of the U.S.

SECTION 4

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Appendix A
Climate Data

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APPENDIX A

Canoga Park Pierce Coll, California (041484)

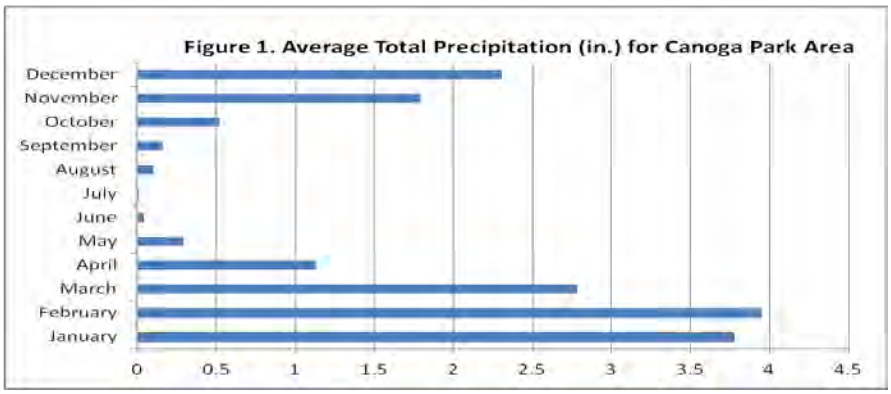
Period of Record Monthly Climate Summary

Period of Record: 7/ 1/1949 to 8/10/2011

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	67.9	70.0	72.3	76.8	81.1	87.4	94.9	95.4	91.7	84.0	74.8	68.8	80.4
Average Min. Temperature (F)	39.3	40.7	41.9	44.6	49.1	53.0	57.0	57.3	54.6	49.0	42.6	38.8	47.3
Average Total Precipitation (in.)	3.78	3.95	2.78	1.13	0.29	0.04	0.01	0.10	0.16	0.52	1.79	2.31	16.86
Average Total Snow Fall (in.)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Average Snow Depth (in.)	0	0	0	0	0	0	0	0	0	0	0	0	0

Percent of possible observations for period of record.
Max. Temp.: 99.9% Min. Temp.: 99.9% Precipitation: 99.7% Snowfall: 99.9% Snow Depth: 99.9%
Check Station Metadata or Metadata graphics for more detail about data completeness.

Western Regional Climate Center, wrcc@dri.edu



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Appendix B
Soil Descriptions

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APPENDIX B

Soil Official Series Descriptions

Gaviota Series

LOCATION GAVIOTA CA
Established Series
Rev. GWH/CAF/KP
10/2007

The Gaviota series consists of very shallow or shallow, well drained soils that formed in material weathered from hard sandstone or meta-sandstone. Gaviota soils are on hills and mountains and have slopes of 2 to 100 percent. The average annual precipitation is about 20 inches and the mean annual temperature is about 60 degrees F.

TAXONOMIC CLASS: Loamy, mixed, superactive, nonacid, thermic Lithic Xerorthents

TYPICAL PEDON: Gaviota gravelly loam, grass range. (Colors are for dry soil unless otherwise noted.)

A1--0 to 6 inches; brown (7.5YR 5/4) gravelly loam, brown (7.5YR 4/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; common very fine tubular pores; neutral (pH 7.0); clear smooth boundary.

A2--6 to 10 inches; brown (7.5YR 5/4) gravelly loam, brown (7.5YR 4/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine tubular pores; neutral (pH 6.8); abrupt wavy boundary.

R--10 to 17 inches; pale brown (10YR 6/3) hard meta-sandstone.

TYPE LOCATION: Stanislaus County, California; nine miles west of the town of Westley, California; 1,700 feet north and 500 feet east of the southwest corner of section 6, T. 5 S., R. 6 E., MDB&M; USGS Solyo, California Quadrangle, NAD 27.

RANGE IN CHARACTERISTICS: Depth to a lithic contact of hard rock is 6 to 20 inches. The soils become moist below a depth of 6 inches some time between mid-October and mid-December and remain moist all the time in some parts below 6 inches until early April or late May. The mean annual soil temperature is 59 to 64 degrees F. and the soil temperature does not go as low as 41 degrees F. at any time. Texture throughout is sandy loam, fine sandy loam, loam, gravelly sandy loam, gravelly fine sandy loam, and gravelly loam. Clay content is 10 to 18 percent. Rock fragment content is less than 25 percent. Sand content is more than 40 percent of the fine earth fraction. Coarse and very coarse sand content is less than 20 percent.

The A horizon has color of 10YR 6/2, 6/3, 6/4, 5/2, 5/3, 5/4, 5/6, 5/8, 4/3; 2.5Y 6/2, 6/4, 5/2; 7.5YR 5/2, 5/4 or 6/4. Moist values are 4 throughout or if less than 4 they occur only in the upper part or have dry values of 6 or more. Reaction is moderately acid to neutral. Some pedons have a C horizon that differs from the A horizon principally by being one value unit lighter.

COMPETING SERIES: These are the Daulton , Exchequer (CA), Ocraig (CA), Snook (CA) and Whiterock (CA) series. Daulton soils have moist value of 3 and have a massive and hard epipedon. Exchequer soils have less than 50 percent sand in the fine earth fraction. Ocraig soils are neutral, have greater than 20 percent coarse and very coarse sand content. Snook soils are dry in all parts from early June to mid October. Whiterock soils have 25 to 50 percent sand and a mean annual soil temperature of 63 to 67 degrees F.

GEOGRAPHIC SETTING: Gaviota soils are on hills and mountains. Slope is 2 to 100 percent. These soils formed in material weathered from sandstone and meta-sandstone. Elevation is 200 to 4,400 feet. Rock outcrops are commonly associated with this soil and occupy from less than 2 percent to 50 percent of the surface area. The climate is dry subhumid with hot dry summers and cool moist winters. Mean annual precipitation is 10 to 30 inches. Mean January temperature is about 42 degrees F. and about 56 degrees F. along the coast of California; mean July temperature is about 75 degrees F.; mean annual temperature is about 56 to 65 degrees F. The frost-free season is 175 to 350 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Altamont, Los Gatos, Los Osos, Vallecitos and Wadesprings soils. Altamont soils, on uplands, hills and mountains, have a fine particle-size control section. Los Gatos soils, on mountains, are moderately deep and have an argillic horizon. Los Osos soils, on uplands, have an argillic horizon and a paralithic contact at a depth of 20 to 40 inches. Vallecitos soils, on hills, have an argillic horizon and a clayey particle-size control section. Wadesprings soils, on uplands, have an argillic horizon and magnesic mineralogy.

DRAINAGE AND PERMEABILITY: Well and excessively well drained; very low to very high runoff; moderately rapid permeability.

USE AND VEGETATION: Used mostly for livestock grazing. Some of the less sloping areas are cropped to dryland grain. Natural vegetation is California sage, chamise, manzanita, purple needlegrass and annual grasses.

DISTRIBUTION AND EXTENT: Mostly in the California Coast Ranges. The soils are extensive. MLRA 15, 20.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Davis, California

SERIES ESTABLISHED: Stanislaus County (Newman Area), California, 1941.

REMARKS: Soils in the Amargosa series as recognized in the Antelope Valley Area, California are not included in the Gaviota series. Soils formed in material weathered from granite are now excluded from the Gaviota series.

The revision made on 09/96 moves the type location to better represent the series as mapped for the Gaviota series.

CEC/Clay ratio estimated from similar soils with laboratory data in the W. Stanislaus Soil Survey Area.

Runoff terminology adjusted 4/96 to adjective criteria of the Soil Survey Manual, 10/93.

Competing series updated 01/2003.

Warmer January temperatures occur along the southern Coastal range. These were phased until a possible later decision to split these out as separate series.

National Cooperative Soil Survey
U.S.A.

SAUGUS SERIES

LOCATION SAUGUS CA
Established Series
Rev. GAW/RCH/LCL/ET
03/2003

The Saugus series consists of deep, well drained soils that formed from weakly consolidated sediments. Saugus soils are on dissected terraces and foothills and have slopes of 9 to 50 percent. The mean annual precipitation is about 16 inches and the mean annual air temperature is about 63 degrees F.

TAXONOMIC CLASS: Coarse-loamy, mixed, superactive, nonacid, thermic Typic Xerorthents

TYPICAL PEDON: Saugus loam, brush and grass. (Colors are for dry soil unless otherwise stated.)

A1--0 to 15 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine medium and coarse roots; common very fine, few fine tubular and common very fine interstitial pores; about 5 percent gravel by volume; neutral (pH 6.8); gradual smooth boundary. (8 to 17 inches thick)

C1--15 to 25 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine, common coarse roots; few very fine tubular, common very fine interstitial pores; about 15 percent gravel by volume; slightly acid (pH 6.5); gradual smooth boundary. (10 to 14 inches thick)

C2--25 to 42 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine, common fine and few coarse roots; few very fine tubular, common very fine interstitial pores; contains about 10 percent gravel by volume; slightly acid (pH 6.5); diffuse smooth boundary. (16 to 25 inches thick)

C3--42 to 50 inches; grayish brown (10YR 5/2) weakly consolidated sediments that crush to gravelly heavy sandy loam, dark grayish brown (10YR 4/2) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine interstitial pores; about 25 percent gravel and 5 percent cobblestones; slightly acid (pH 6.3).

TYPE LOCATION: Los Angeles County, California; in Romero Canyon; NW1/4 NW1/4 section 27, T.5N., R.17W.

RANGE IN CHARACTERISTICS: Depth to a paralithic contact is 40 to 56 inches. Saugus soils are on complex slopes of 9 to 50 percent. The mean annual soil temperature at a depth of 20 inches is 60 degrees F. and the soil temperature is not below 47 degrees F. at any time. Soil between depths of about 5 and 15 inches is continuously dry in all parts from late April or May until late October to early December and is moist in some or all parts all the rest of the year. The soil profile is loam or sandy loam throughout and the 10 to 40 inch control section has less than 18 percent clay. Rock fragments range from 1 to 35 percent and are mostly gravel and a few cobblestones. Usually the amount of rock fragments increases with depth, though in some pedons the immediate surface has a partial layer of fragments. The profile is slightly acid to slightly alkaline and in many pedons the lower part is less acid.

The A horizon is light brownish gray, grayish brown, yellowish brown, brown or pale brown in 10YR or 2.5Y hue when dry. The moist value is 4 or 5. In some pedons the upper 1 to 4 inches is gray, dark gray or dark grayish brown. The upper 7 inches of the A horizon has 0.4 to 1.0 percent organic matter.

The C horizon above the paralithic contact has a color similar to the A horizon or it has one unit higher value.

COMPETING SERIES: These are the Escondido, Hanford, Honcut, Pollasky, Pfeiffer, San Andreas, and Vista series. Escondido and Vista soils have a cambic horizon. Hanford and Honcut soils are on smooth slopes of less than 9 percent and they lack a paralithic contact. Pfeiffer and San Andreas soils have a mollic epipedon. Pollasky soils have a paralithic contact at depths of less than 40 inches.

GEOGRAPHIC SETTING: The Saugus soils are on slopes of dissected terraces and foothills at elevations of 600 to 2,500 feet. Slopes range from 9 to 50 percent. The soils formed in material weathered from weakly consolidated sediments mostly from granitic and closely related rocks. The climate is dry subhumid mesothermal with warm dry summers and cool moist winters. The mean annual precipitation is 14 to 20 inches all in the form of rain. Mean annual temperature is about 63 degrees F., average January temperature is about 54 degrees F., and average July temperature is about 73 degrees F. The freeze-free season is about 250 to 300 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Castaic, Gaviota, Metz, San Andreas, and Sorrento soils. Castaic soils have more than 18 percent clay and have a fine-silty control section. Gaviota soils have a lithic contact less than 20 inches below the surface. Metz soils are sandy and are stratified with layers of finer texture.

DRAINAGE AND PERMEABILITY: Well drained; medium to rapid runoff; moderate permeability.

USE AND VEGETATION: Used for grazing, wildlife, watershed, and small amounts used for industry and urbanization. Native vegetation is chamise and other shrubs plus minor amounts of perennial grasses. Naturalized grasses and forbs make up a small to large portion of the vegetation.

DISTRIBUTION AND EXTENT: Foothills in the western part of southern California. The soils are of moderate extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Davis, California

SERIES ESTABLISHED: San Bernardino County (Southwestern Part), California, 1972.

REMARKS: The activity class was added to the classification in February of 2003. Competing series were not checked at that time. - ET

OSED scanned by SSQA. Last revised by state on 10/75.

National Cooperative Soil Survey
U.S.A.

Appendix C
National Wetland Inventory Map

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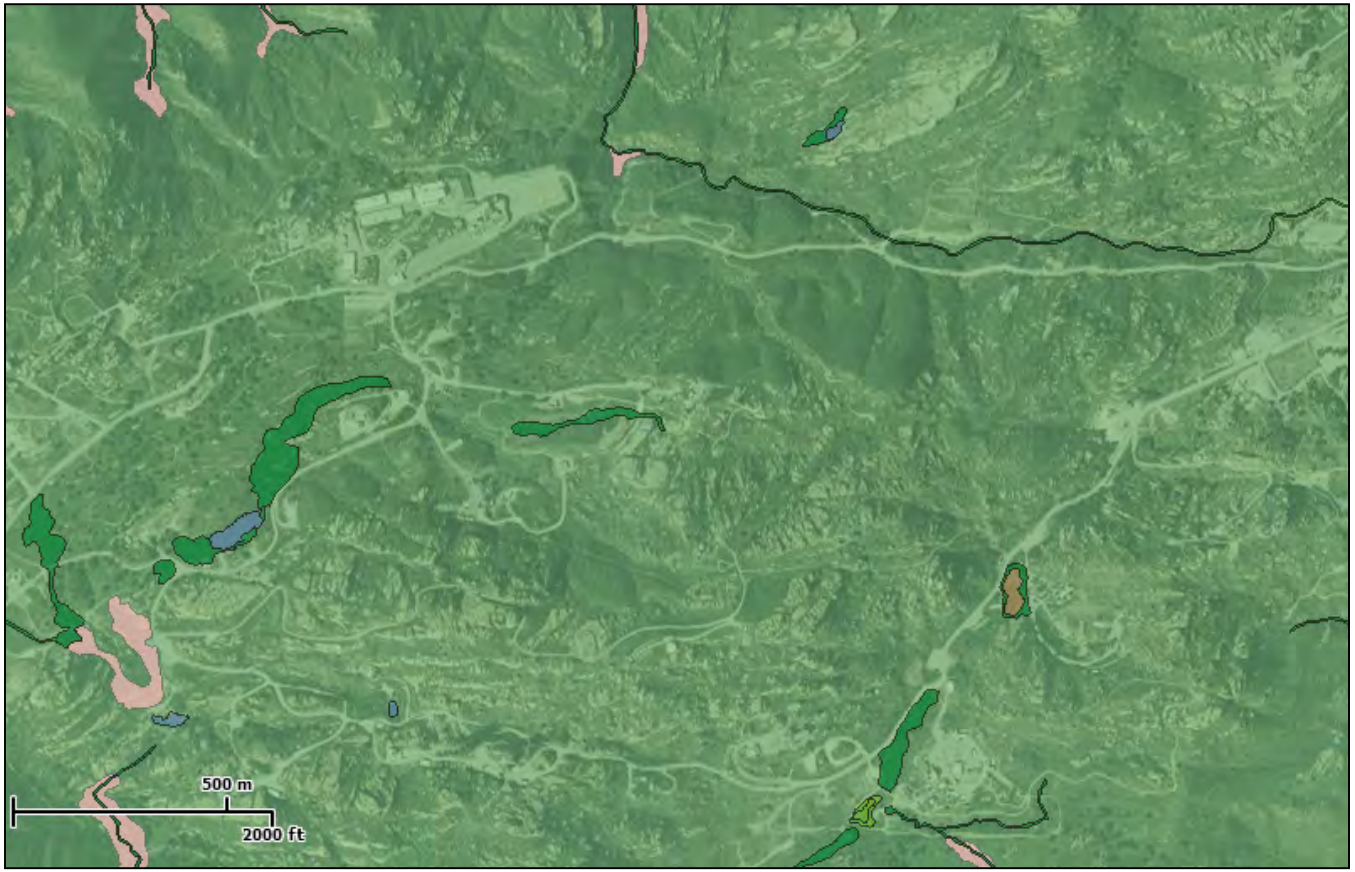
U.S. Fish and Wildlife Service

National Wetlands Inventory

NWI Map NASA Properties at SSFL

Feb 13, 2012



Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

Riparian

- Herbaceous
- Forested/Shrub

Image Scale

- Digital or larger than 1:40k
- 1:40k
- 1:58k
- 1:80k or Smaller
- No Data

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

User Remarks:

Source: http://107.20.228.18/Wetlands/WetlandsMapper.html

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Appendix D
USGS Quadrangle Topographic Map and NHD Information

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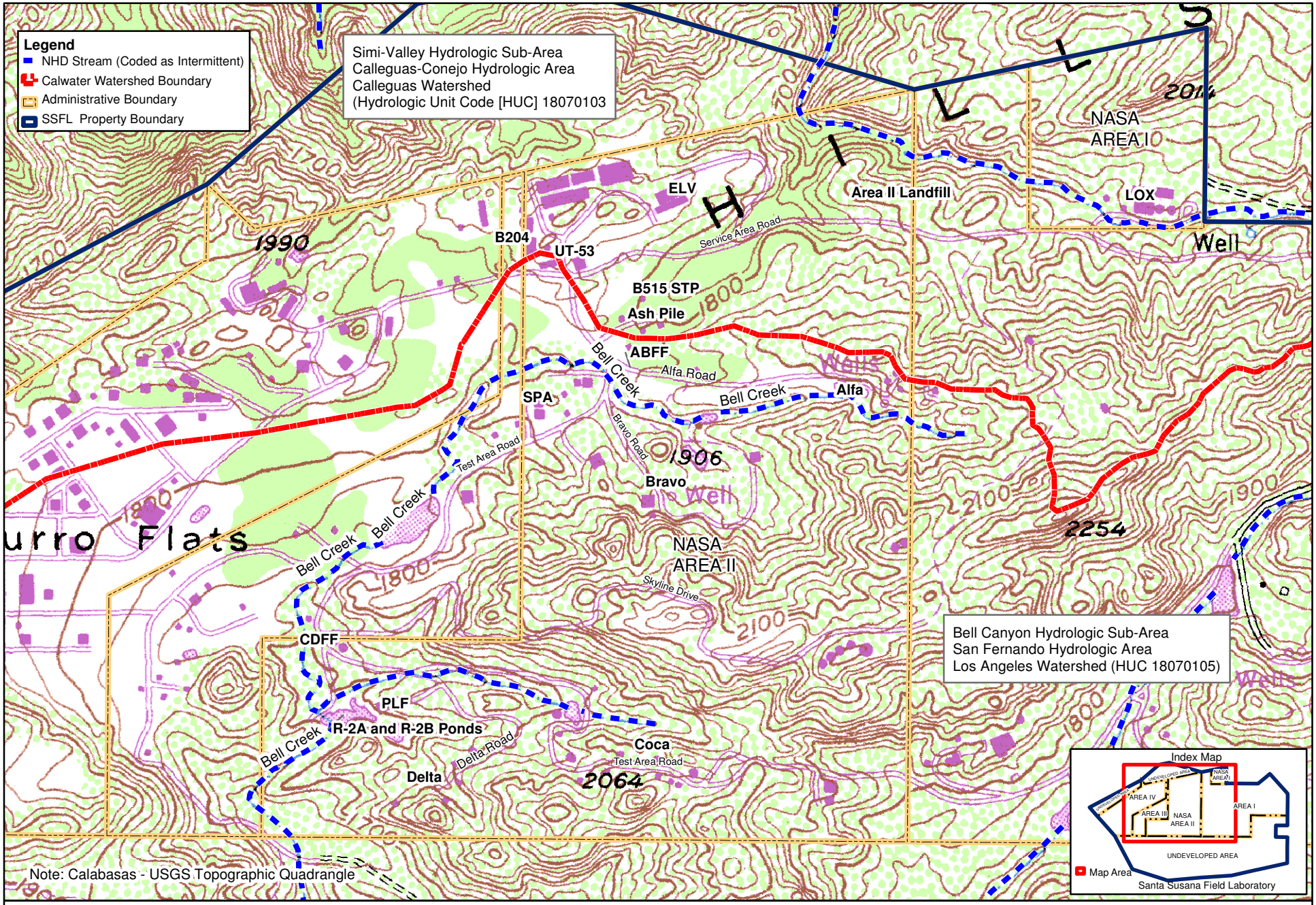

Wetland Delineation:
Russell Huddleston and Steve Long, January 2012

Drawn By:
A. Cooley
19-Mar-2012

Figure D-1
USGS Quadrangle Topographic Map and NHD Information
NASA Wetlands and Waters of the U.S. Delineation Report
Santa Susana Field Laboratory
Ventura County, California

Map Document: O:\NASA\SSFL\maps\EIS_2011\WetlandsReport\EIS_USGS_NHD_SDE.mxd

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Appendix E
Wetland Determination Data Sheets

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WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: SSFL - COCA POND City/County: VENTURA CO. Sampling Date: 1/3/2012

Applicant/Owner: NASA State: CA Sampling Point: COCA SP-1

Investigator(s): R. HUDDLESTON, S. LONG Section, Township, Range: 02N 17W SEC 30 (SBM)

Landform (hillslope, terrace, etc.): TERRACE Local relief (concave, convex, none): CONCAVE Slope (%): 0-2%

Subregion (LRR): C Lat: 34° 13' 36.786" Long: 118° 42' 02.091 Datum: WGS 84

Soil Map Unit Name: Sn6 SEDIMENTARY ROCK LAND NWI classification: PUBHx

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No X (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____
Hydric Soil Present?	Yes ____	No ____
Wetland Hydrology Present?	Yes ✓	No ____

Is the Sampled Area within a Wetland? Yes ✓ No ____

Remarks: BELOW AVE RAINFALL TO DATE

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	____ = Total Cover		

Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
	____ = Total Cover		

Herb Stratum (Plot size: 0.5 m²)			
1. TYPHA DOMINGENSIS	60%	Y	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	____ = Total Cover		

Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum 40 % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	____	x 1 = ____
FACW species	____	x 2 = ____
FAC species	____	x 3 = ____
FACU species	____	x 4 = ____
UPL species	____	x 5 = ____
Column Totals:	____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

__ Prevalence Index is ≤3.0[1]

__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: TYPHA ONLY AROUND EDGES OF THE POND - MOST OF THE AREA IS OPEN WATER

SOIL

Sampling Point: COCA SP-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 2/1	100	-	-	-	-	FSL	VFr, CRUMB
								FIBRIC -MM
								MIXED W/ LOOSE SAND
								AT SURFACE

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR C)
- ___ 1 cm Muck (A9) (LRR D)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (LRR C)
- ___ 2 cm Muck (A10) (LRR B)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: NE

Depth (inches): ___

Hydric Soil Present? Yes X No ___

Remarks: SEDIMENTS ACCUMULATED AT BASE OF CEMENT SLOPE BELOW THE LEVEL OF THE POND OHWM LINE

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- X Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- X Water Marks (B1) (Nonriverine)
- ___ Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (Riverine)
- ___ Sediment Deposits (B2) (Riverine)
- ___ Drift Deposits (B3) (Riverine)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes X No ___ Depth (inches): ?

Water Table Present? Yes ___ No ___ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No ___ Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: WATER IN POND JUST BELOW SAMPLE POINT
WATER MARK ON CEMENT ~2 FT ABOVE SAMPLE POINT

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: SSFL - COCA City/County: VENTURA CO. Sampling Date: 1/3/2012

Applicant/Owner: NASA State: CA Sampling Point: COCA SP-2

Investigator(s): R. HUDDLESTON, S. LONG Section, Township, Range: 02N 17W SEC 30 (SBM)

Landform (hillslope, terrace, etc.): TERRACE Local relief (concave, convex, none): NONE Slope (%): 0-2%

Subregion (LRR): C Lat: 34° 13' 36.765" Long: 118° 42' 02.269" Datum: NGS 84

Soil Map Unit Name: SPG SEDIMENTARY ROCK LAND NWI classification: NONE

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No X (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	Is the Sampled Area within a Wetland? Yes ____ No X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks: BELOW AVE RAINFALL

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 2m²)			
1. MALOSOMA LAURINA	5%	Y	NL
2. ERIODICTYON CRASSIFOLIUM	2%	Y	NL
3.			
4.			
5.			
	____ = Total Cover		
Herb Stratum (Plot size: 1m²)			
1. LOTUS SCOPARIUS	90%	Y	NL
2. PHACALIA RAMOSISSIMA	5%		NL
3.			
4.			
5.			
6.			
7.			
8.			
	____ = Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum 5% % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ___ Dominance Test is >50%
- ___ Prevalence Index is ≤3.0[1]
- ___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks:

SOIL

Sampling Point: COCA SP-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 4/4	95%	–	–	–	–	SL	VFR, SOFT, WM SBK
	10YR 3/2	5%	–	–	–	–		PARTING TO CRUMB
								F-Fi Gravel / COARSE SAND
								VF Med-Fi Roots 5%
10-19	2.5Y 5/4	100%					SAND	TR FINE ROOTS, VFR
								GRAD - VW SBK

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR C)
- ___ 1 cm Muck (A9) (LRR D)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (LRR C)
- ___ 2 cm Muck (A10) (LRR B)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ____ No X

Remarks: APPEARS TO BE FILL ASSOCIATED WITH POND - MIXED, SOME FINE GRAVELS

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (Nonriverine)
- ___ Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (Riverine)
- ___ Sediment Deposits (B2) (Riverine)
- ___ Drift Deposits (B3) (Riverine)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): _____

Water Table Present? Yes ____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): _____

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: APPROX 50 INCHES ABOVE POND OHWM

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: SSFL AREA 1 City/County: VENTURA Sampling Date: 1/4/2012

Applicant/Owner: NASA State: CA Sampling Point: SW-1 SP-1

Investigator(s): R. HUDDLESTON, S. LONG Section, Township, Range: 02N 17W SEC 20 (SBM)

Landform (hillslope, terrace, etc.): HILL SLOPE Local relief (concave, convex, none): CONCAVE Slope (%): 0.5%

Subregion (LRR): C Lat: 34°14' 23.607" Long: 118° 41' 07.334 Datum: WGS 84

Soil Map Unit Name: SnG SEDIMENTARY ROCK LAND NWI classification: NONE

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No X (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology X naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	Is the Sampled Area within a Wetland? Yes ____ No X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks: BELOW AVE RAINFALL TO DATE - SMALL CONSTRUCTED BASIN

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1. NONE			
2.			
3.			
4.			
	____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 2M)			
1. NONE			
2.			
3.			
4.			
5.			
	____ = Total Cover		
Herb Stratum (Plot size: ENTIRE BASIN)			
1. ANAGALLIS ARVENSIS	3%	Y	FAC
2. HYPOCHAERIS GLABRA	2%	Y	NL
3. ERODIUM BOTRYS	2%	Y	NL
4. BRASSICA NIGRA	1%		NL
5.			
6.			
7.			
8.			
	8% = Total Cover		
Woody Vine Stratum (Plot size: ____)			
1. NONE			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum 790 % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	____	x 1 = ____
FACW species	____	x 2 = ____
FAC species	____	x 3 = ____
FACU species	____	x 4 = ____
UPL species	____	x 5 = ____
Column Totals:	____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ___ Dominance Test is >50%
- ___ Prevalence Index is ≤3.0[1]
- ___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: SEEDLINGS ONLY THIS TIME OF YEAR

- MOSS COVERS MUCH OF THE SOILS IN THIS AREA

AREA I

SOIL

Sampling Point: SW-1 SP-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-1	10YR 5/3	100	–	–	–	–	SL	FR, WMSBK, F-VF ROOTS 5%; TRACE FINE GRAVEL
1-10	10YR 6/4	60%					SAND	TRACE F: ROOTS
	10YR 4/3	40%					FSL	VFR, WMSBK - PARTS TO GRAN.
			INCLUSIONS-	FR, WMSBK TR VFI ROOTS				

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR C)
- ___ 1 cm Muck (A9) (LRR D)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (LRR C)
- ___ 2 cm Muck (A10) (LRR B)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: SANDSTONE ROCK

Depth (inches): 6-10 INCHES

Hydric Soil Present? Yes ___ No X

Remarks: APPEARS TO BE AN EXCAVATED BASIN - SOILS BERMED ON NORTH SIDE - BELOW 1 INCH SOILS APPEAR MIXED
ABRUPT TRANSITION TO SANDSTONE ROCK 6-10" BGS

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (Nonriverine)
- ___ Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (Riverine)
- ___ Sediment Deposits (B2) (Riverine)
- ___ Drift Deposits (B3) (Riverine)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: SHALLOW BASIN - NOTABLE ABSENCE OF UPLAND VEGETATION RELATIVE TO SURROUNDING AREAS - BUT NO EVIDENCE OF PONDING BELOW AVERAGE RAINFALL SO PONDING COULD NOT BE DEFINITIVELY RULED OUT IN THIS AREA.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: SSFL AREA 1 City/County: VENTURA Sampling Date: 1/4/2012

Applicant/Owner: NASA State: CA Sampling Point: SW.1-SP-2

Investigator(s): R. HUDDLESTON, S. LONG Section, Township, Range: 02 N 17 W SEC 20 (SBM)

Landform (hillslope, terrace, etc.): HILL SLOPE Local relief (concave, convex, none): CONCAVE Slope (%): 0-5%

Subregion (LRR): C Lat: 34° 14' 23.680" Long: 118° 41' 07.394" Datum: WGS 84

Soil Map Unit Name: SnG SEDIMENTARY ROCK LAND NWI classification: NONE

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No X (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	Is the Sampled Area within a Wetland? Yes ____ No X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks: BELOW AVE RAINFALL FOR DECEMBER -

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1. NONE			
2.			
3.			
4.			
	____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 2m)			
1. ARTEMESIA CALIFORNICA	10%	Y	NL
2. ADENOSTEMA FASCICULATUM	5%	Y	NL
3.			
4.			
5.			
	____ = Total Cover		
Herb Stratum (Plot size: 2M)			
1. AVENA BARBATA	15%	Y	NL
2. ERODIUM BOTRYS	2%		NL
3. BRASSICA NIGRA	2%		NL
4. POA SP. (CF SECUNDA)	2%		NL
5. CRYPTANTHA SP	1%		NL
6.			
7.			
8.			
	~22% = Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum 780% % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ___ Dominance Test is >50%
- ___ Prevalence Index is ≤3.0[1]
- ___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks:

SOIL

Sampling Point: AREA 1 SW-1 SP-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-11	10YR 4/3	100	–	–	–	–	LFS	VF-LOOSE, VW MSBK
								PARTS TO GRAN.
								F-Fi ROOTS <5%
11-19	10YR 4/3	100					LFS	FR -NO ROOTS
								MM ABK

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: NONE ENCOUNTERED

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: NASA SSFL AREA I City/County: VENTURA CO. Sampling Date: 1/4/2012

Applicant/Owner: NASA State: CA Sampling Point: SW-2 SP-3

Investigator(s): R. HUDDLESTON, S. LONG Section, Township, Range: 02N 17W SEC20 (SBM)

Landform (hillslope, terrace, etc.): HILL SLOPE Local relief (concave, convex, none): CONCAVE Slope (%): 5%

Subregion (LRR): C Lat: 34° 14' 20.658 Long: -118° 41' 20.649 Datum: WGS 84

Soil Map Unit Name: Sn6 SEDIMENTARY ROCK LAND NWI classification: PABHx

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No X (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	Is the Sampled Area within a Wetland? Yes ✓ No ____
Hydric Soil Present?	Yes ✓	No ____	
Wetland Hydrology Present?	Yes ✓	No ____	

Remarks: BELOW AVE RAINFALL FOR THIS TIME OF YEAR
CONSTRUCTED IMPOUNDMENT

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	____ = Total Cover		

Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
	____ = Total Cover		

Herb Stratum (Plot size: 1 m²)			
1. POLYPOGON MONSPELIENSIS	10%	Y	FACW+
2. CYPERUS ERAGROSTIS	1%		FACW
3. ANAGALIS ARVENSIS	1%		FAC
4. ELEOCHARIS MACROSTACHYA	1%		OBL
5.			
6.			
7.			
8.			
	____ = Total Cover		

Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum ____ % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

__ Prevalence Index is ≤3.0[1]

__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: SEEDLINGS ONLY AT THIS TIME OF YEAR
VEGETATION GRAZED (HORSES)

AREA I

SOIL

Sampling Point: SW-2 SP-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 4/2	100	–	–	–	–	FSL	FR, WMSBK, M-F ROOTS 20%
2-9	10YR 3/1	90%	5YR 5/6	<2%	C	M	LFS	MMSBK, FR, TR VF ROOTS
	10YR 5/3	10%					SAND	OF PED SURFACES
9-16	10YR 3/1	98%	5YR 5/6	<2%	C	M	LFS	MMSBK, FR
	10YR 5/3	2%					SAND	OF PED SURFACES
16-19	10YR 4/3	100%	–	–	–	–	SAND	LOOSE, MAS, NO ROOTS

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- __ Histosol (A1)
- __ Histic Epipedon (A2)
- __ Black Histic (A3)
- __ Hydrogen Sulfide (A4)
- __ Stratified Layers (A5) (LRR C)
- __ 1 cm Muck (A9) (LRR D)
- __ Depleted Below Dark Surface (A11)
- __ Thick Dark Surface (A12)
- __ Sandy Mucky Mineral (S1)
- __ Sandy Gleyed Matrix (S4)
- __ Sandy Redox (S5)
- __ Stripped Matrix (S6)
- __ Loamy Mucky Mineral (F1)
- __ Loamy Gleyed Matrix (F2)
- __ Depleted Matrix (F3)
- __ Redox Dark Surface (F6)
- __ Depleted Dark Surface (F7)
- __ Redox Depressions (F8)
- __ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- __ 1 cm Muck (A9) (LRR C)
- __ 2 cm Muck (A10) (LRR B)
- __ Reduced Vertic (F18)
- __ Red Parent Material (TF2)
- X Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: NONE ENCOUNTERED

Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks: 2-9" SAND ALONG PED SURFACES – SOME REDOX BUT LESS THAN 2% – SOILS CLEARLY INUNDATED BASED ON POSITION IN BASIN AND EVIDENCE OF ORDINARY HIGH WATER

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- __ Saturation (A3)
- X Water Marks (B1) (Nonriverine)
- __ Sediment Deposits (B2) (Nonriverine)
- X Drift Deposits (B3) (Nonriverine)
- __ Surface Soil Cracks (B6)
- __ Inundation Visible on Aerial Imagery (B7)
- __ Water-Stained Leaves (B9)
- __ Salt Crust (B11)
- __ Biotic Crust (B12)
- __ Aquatic Invertebrates (B13)
- __ Hydrogen Sulfide Odor (C1)
- __ Oxidized Rhizospheres along Living Roots (C3)
- __ Presence of Reduced Iron (C4)
- __ Recent Iron Reduction in Tilled Soils (C6)
- __ Thin Muck Surface (C7)
- __ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- __ Water Marks (B1) (Riverine)
- __ Sediment Deposits (B2) (Riverine)
- __ Drift Deposits (B3) (Riverine)
- __ Drainage Patterns (B10)
- __ Dry-Season Water Table (C2)
- __ Crayfish Burrows (C8)
- __ Saturation Visible on Aerial Imagery (C9)
- __ Shallow Aquitard (D3)
- __ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No _____ Depth (inches): >12"

Water Table Present? Yes ✓ No _____ Depth (inches): 18"

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: SURFACE WATER NOT OBSERVED AT SAMPLE POINT – BUT POINT IS WITHIN POND OTHER – IMPOUNDMENT POND

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: SSFL AREA I City/County: VENTURA CO. Sampling Date: 1/4/2012
Applicant/Owner: NASA State: CA. Sampling Point: SW-2 SP-4
Investigator(s): R. HUDDLESTON, S. LONG Section, Township, Range: 02N 17W SEC 20 (SBM)
Landform (hillslope, terrace, etc.): HILL SLOPE Local relief (concave, convex, none): NONE Slope (%): 5%
Subregion (LRR): C Lat: 34°14' 20.777 Long: 118° 41' 20.857 Datum: WGS 84
Soil Map Unit Name: SnG SEDIMENTARY ROCK LAND NWI classification: PSSB
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No X (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	Is the Sampled Area within a Wetland? Yes ____ No X
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Present?	Yes ____	No X	

Remarks: BELOW AVE RAINFALL FOR THIS TIME OF YEAR

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 2m²)			
1. MALOSOMA LAURINA	30%	Y	NL
2.			
3.			
4.			
5.			
	____ = Total Cover		
Herb Stratum (Plot size: 1m²)			
1. POA (cf) SECUNDA	40%		NL
2. Rumex sp.	1%		FACW
3. Anagalis arvensis	TR		FAC
4.			
5.			
6.			
7.			
8.			
	____ = Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum <60 % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ___ Dominance Test is >50%
- ___ Prevalence Index is ≤3.0[1]
- ___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks:

AREA 1

SOIL

Sampling Point: SW-2 SP-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-1	10YR 4/2	100%	—	—	—	—	FSL	FR WM ABK, F-M ROOTS 5%
1-6	10YR 4/2	70%	10YR 5/6	30%	C	M	FSL	FR WM SBK, VFi-Fi ROOTS 1%
6-17	10YR 4/3	70%	10YR 5/1	5%	C	M	LFS	FR, WM SBK
			10YR 4/6	25%	C	M		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR C)
- ___ 1 cm Muck (A9) (LRR D)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (LRR C)
- ___ 2 cm Muck (A10) (LRR B)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: NE

Depth (inches): ___

Hydric Soil Present? Yes X No ___

Remarks: - SOILS POSSIBLY EXCAVATED TO ENHANCE/ENLARGE NATURAL POND - SAMPLE POINT ABOVE OHWM W/ NO ABUNDANT HYDROPHYTIC VEGETATION PRESENT

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (Nonriverine)
- ___ Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (Riverine)
- ___ Sediment Deposits (B2) (Riverine)
- ___ Drift Deposits (B3) (Riverine)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: ABOVE POND OHWM

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: SSFL R-2A POND City/County: VENTURA Sampling Date: 1/5/2012

Applicant/Owner: NASA State: CA Sampling Point: R2A-SP-1

Investigator(s): R. HUDDLESTON, S. LONG Section, Township, Range: 02N 17W SEC 30 (SBM)

Landform (hillslope, terrace, etc.): TERRACE Local relief (concave, convex, none): CONCAVE Slope (%): 0-5%

Subregion (LRR): C Lat: 34° 13' 35.861" Long: -118° 42' 19.440 Datum: WGS 84

Soil Map Unit Name: SuG SEDIMENTARY ROCK LAND NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No X (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No _____
Hydric Soil Present?	Yes _____	No _____	
Wetland Hydrology Present?	Yes _____	No _____	

Remarks: BELOW AVE RAINFALL TO DATE - HIGHLY MANAGED HYDROLOGY IN CONSTRUCTED POND

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 2 m²)			
1. BACCHARIS SALICIFOLIA	5%	Y	FACW
2.			
3.			
4.			
5.			
	5% = Total Cover		
Herb Stratum (Plot size: 1 m²)			
1. CYPERUS ERAGROSTIS	5%	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	5% = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No _____

Remarks: EXTENSIVE DEAD STEMS OF SCIRPUS THROUGHOUT THIS AREA - NO LIVE TULES OR LIVE ROOTS / RHIZOMES EVIDENT

SOIL

Sampling Point: ZZA-SP-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-2"	10YR 3/2	100%	—	—	—	—	Oi	FINELY LAYERED ORGANIC MATERIAL W/ FINE SAND/SILT
2-6"	10YR 3/2	60%					LFS	- MIXED SAND, LOOSE
	10YR 5/4	40%					LFS	MASSIVE
6-19"	10YR 3/2	90%	10YR 3/1	2%	C	M	FSL	MMSBK, FR
			10YR 4/4	8%	C	PL/RL		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR C)
- ___ 1 cm Muck (A9) (LRR D)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (LRR C)
- ___ 2 cm Muck (A10) (LRR B)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: PONE

Depth (inches): 7/9"

Hydric Soil Present? Yes X No ___

Remarks: - REDOX DARK SURFACE 6" THICK WITHIN UPPER 12 INCHES WITH 8% DISTINCT CONCENTRATIONS ALONG ROOT CHANNELS OR PORE LININGS

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- X Water Marks (B1) (Nonriverine)
- ___ Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (Riverine)
- ___ Sediment Deposits (B2) (Riverine)
- ___ Drift Deposits (B3) (Riverine)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: AREA WAS DRY AT TIME OF SURVEY - NO INDICATION OF RECENT PONDING, BUT SAMPLE LOCATION IS WITHIN THE PAST EXTENT OF CHAM - HYDROLOGY NOW MANAGED BY PUMPING FROM THE POND

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: SSFL RZA POND City/County: VENTURA Sampling Date: 1/5/2012

Applicant/Owner: NASA State: CA Sampling Point: RZA-SP-2

Investigator(s): R. HUDDLESTON, S. LONG Section, Township, Range: 02 N 17W SEC 30 (SBM)

Landform (hillslope, terrace, etc.): TERRACE Local relief (concave, convex, none): NONE Slope (%): 0-5%

Subregion (LRR): C Lat: 34°13' 35.569 Long: -118° 42' 19.624" Datum: WGS 84

Soil Map Unit Name: 546 - SEDIMENTARY ROCK LAND NWI classification: NONE

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No X (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	Is the Sampled Area within a Wetland? Yes ____ No X
Hydric Soil Present?	Yes ____	No ____	
Wetland Hydrology Present?	Yes ____	No X	

Remarks: BELOW AVE RAINFALL

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 10m²)	Absolute % Cover	Dominant Species?	Indicator Status
1. QUERCUS AGRIFOLIA	20%	Y	NL
2.			
3.			
4.			
	20% = Total Cover		
Sapling/Shrub Stratum (Plot size: 5m²)			
1. QUERCUS AGRIFOLIA	20%	Y	NL
2. BACCHARIS SALICIFOLIA	20%	Y	FACW
3. BACCHARIS PILULARIS	10%		NL
4. TOXICODENDRON DIVERSILOBUM	10%		NL
5.			
	60% = Total Cover		
Herb Stratum (Plot size: 1m²)			
1. BROMUS DIANDRUS	10%	Y	NL
2. PHACELIA RAMOSISSIMA	10%	Y	NL
3. [redacted]			
4. PIPTATHERUM MILIACEUM	1%		NL
5. CIRSIUM OCCIDENTALE	1%		NL
6. CARPUCUS PTENOCEPHALUS	TR		NL
7.			
8.			
	~~80~~ 20% = Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum ~80% % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 20% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ___ Dominance Test is >50%
- ___ Prevalence Index is ≤3.0[1]
- ___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: LEAF LITTER ABUNDANT THROUGHOUT AREA.

US Army Corps of Engineers Arid West – Version 2.0

SOIL

Sampling Point: RZA-SP-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 3/2	100%					LFS	VW-FINE SBK → GRAN.
								VFR-SO 20% FINE ROOTS
2-14"	10YR 4/1	70%	MIXED				LFS	WMSBK, VFR, COARSE
	10YR 4/4	30%						TO VF ROOTS 5%
14-24	10YR 4/3	100%					LFS	MASSIVE, GRAP
								1% F-M ROOTS

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: NE

Depth (inches): >24"

Hydric Soil Present? Yes ___ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: ABOVE OHW MARK OF POND - NO EVIDENCE OF WETLAND HYDROLOGY

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: SSFL - RZB POND City/County: VENTURA Sampling Date: 1/5/2012

Applicant/Owner: NASA State: CA Sampling Point: RZB - SP-1

Investigator(s): R. HUDDLESTON, S. LONG Section, Township, Range: 02 N 17W SEC 30 (SBM)

Landform (hillslope, terrace, etc.): TERRACE Local relief (concave, convex, none): CONCAVE Slope (%): 0-5%

Subregion (LRR): C Lat: 34°13' 35.770" Long: 118°42' 25.129" Datum: NAD 1983

Soil Map Unit Name: SUG - SEDIMENTARY ROCK LAND NWI classification: NONE

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No X (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____
Hydric Soil Present?	Yes X	No ____
Wetland Hydrology Present?	Yes X	No ____

Is the Sampled Area within a Wetland? Yes X No ____

Remarks: BELOW AVE RAINFALL TO DATE - CONSTRUCTED IMPOUNDMENT POND

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 2 m²)			
1. SALIX LASIOLEPIS	20%	Y	FACW
2. BACCHARIS SALICIFOLIA	20%	Y	FACW
3.			
4.			
5.			
	40% = Total Cover		
Herb Stratum (Plot size: ____)			
1. BRASSICA NIGRA	2%	Y	NL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	2% = Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____ = Total Cover		

(Leaf litter)

% Bare Ground in Herb Stratum 95% % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

__ Prevalence Index is ≤3.0[1]

__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: SPARSE BRASSICA COMMING INTO THE EDGES - BUT LOW WATER LEVEL IN POND AT TIME OF SURVEY

REMNANT/DEAD TYPHA / SCIRPUS .. BUT NO LIVE ROOTS/RHIZOMES

SOIL

Sampling Point: R2B - SP-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 5"	2.5Y 4/2	100%	–	–	–	–	FSL	MOIST, SOFT, WMSBK
								8% ROOTS F-M

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- X Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: BEDROCK/SANDSTONE BOULDER

Depth (inches): 4 - 5"

Hydric Soil Present? Yes X No ___

Remarks: APPROX 1% 10YR 8/1 INCLUSIONS NOTED IN THE SOIL IN THIS LOCATION, TRACE COARSE SAND. NO HYDRIC SOIL INDICATORS BUT POINT IS WITHIN OHWM OF POND

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- X Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- X Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: SOME WATER PRESENT IN CENTRAL PART OF POND. DRIFT LINES, WATER MARKS INDICATE THIS SAMPLE POINT IS WITHIN THE OHWM OF THE POND

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: SSFL RZB -POND City/County: VENTURA Sampling Date: 1/5/2012
Applicant/Owner: NASA State: CA Sampling Point: RZB-SP-2
Investigator(s): R. HUDDLESTON, S. LONG Section, Township, Range: 02N 17W SEC 30 (SBM)
Landform (hillslope, terrace, etc.): TERRACE Local relief (concave, convex, none): NONE Slope (%): 0-5%
Subregion (LRR): C Lat: 34°13'35.223" Long: -118°42'25.335" Datum: WGS 84
Soil Map Unit Name: SUG - SEDIMENTARY ROCK LAND NWI classification: NONE
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No X (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ✓, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area within a Wetland?** Yes ____ No X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks: BELOW AVERAGE RAINFALL TO DATE

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 2m²)			
1. BACCHARIS PILULARIS	5%	Y	NL
2. MIMULUS AURANTIACUS	2%	Y	NL
3.			
4.			
5.			
	7% = Total Cover		
Herb Stratum (Plot size: 1m²)			
1. BROMUS DIANDRUS / HORDEALEUS	70%	Y	NL-FACU
2. CARDUUS PYCNOCEPHALUS	20%	Y	NL
3. CENTAUREA MELITENSIS	T		NL
4. VICIA VILLOSA	T		NL
5. ERODIUM BOTRYS	T		NL
6.			
7.			
8.			
	+90% = Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum 10% % Cover of Biotic Crust —

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 4 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:
- ___ Dominance Test is >50%
- ___ Prevalence Index is ≤3.0[1]
- ___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: VEGETATION – MOSTLY HERBACEOUS SEEDLINGS

SOIL

Sampling Point: RZB-SP-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-6"	10YR4/2	100%	–	–	–	–	LFS	WMSBK, VFR, 5% ROOTS VF-M
6-18"	10YR4/2	100%	–	–	–	–	LFS	CMSBK, FR TRACE VF ROOTS

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR C)**
- ___ 1 cm Muck (A9) **(LRR D)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR C)**
- ___ 2 cm Muck (A10) **(LRR B)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: SANDSTONE

Depth (inches): 18"

Hydric Soil Present? Yes ___ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) **(Nonriverine)**
- ___ Sediment Deposits (B2) **(Nonriverine)**
- ___ Drift Deposits (B3) **(Nonriverine)**
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) **(Riverine)**
- ___ Sediment Deposits (B2) **(Riverine)**
- ___ Drift Deposits (B3) **(Riverine)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: SAMPLE POINT ABOVE OUTLET OF POND

Appendix F
Stream Data Sheets

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ARID REGIONS - WETLAND DELINEATION DATA SHEET

Project: NASA - Santa Susana Field Lab Date: 1/4/2012

Observers: Russell Huddleston and Steve Long

Feature Name NORTHERN DRAINAGE Sample Point ND-1

GPS Location: 34° 14' 12.275" 118° 41' 06.777"

Geomorphic Feature

☐ River	☐ Lake	☐ Swale
☒ Stream	☐ Pond	☐ Erosional Channel
☐ Canal	☐ Impoundment	☐ Gully
☐ Irrigation Channel	☐ Playa	☐ Depressional Basin
☐ Drainage Channel	☐ Constructed Basin	☐ Rock Basin
☐ Excavated Ditch	☐ Unvegetatted Depression	☐ Other: _____

Apparent Hydrologic Regime

☐ Perennial	☐ Standing Water (Depth:_____)
☒ Intermittent	☐ Flowing Water (Depth_____)
☐ Ephemeral	☒ Dry at time of the survey

Indictors

☐ Standing or flowing water with no indication of recent precipitation	☐ Channel adjacent to shelf with steep side	☐ Natural / irrigation / manmade / ditch flowing into feature
☐ presence of hydrophytic vegetation	☐ Natural line, stain or mineral (salt) deposit	☐ Dated picture / account showing / referring to identifiable features
☐ Presence of hydric soil with or without hydrophytic vegetation	☒ Litter, debris and or clay deposits	☒ Wetland symbol on map (presence of solid or dotted blue line, solid, shaded or stippled blue area on map)
☒ Absence of vegetation or interruption of upland vegetation	☐ Algae or alga mat	☐ Other (Specify)

Notes: - BLUE LINE ON USGS TOPO - CALABASAS QUAD
- NHD INT. STREAM
- NWI - PSSA

- DRIFT / DEBRIS PRESENT 28" ABOVE THE CHANNEL BED IN SOME AREAS

Channel Characteristics

Channel Width	7.3 FT
Channel Depth	> 3FT DEEPLY INCISED CHANNEL
Low Flow Width	6 FT
Low Flow Depth	2.3 FT

Channel Substrate (check all that apply)

- [x] Sand
- [x] Cobble
- [ ] Silt / Clay
- [x] Gravel
- [x] Rock
- [ ] Other SOME SANDSTONE BOULDERS

ROCKY SUBSTRATE W/ SAND AND GRAVEL

Vegetation Characteristics of Channel or Basin

Vegetated Channel or Basin?	☐ Yes ☒ No
Dominant / Characteristic Species	

Vegetation Adjacent to Channel

Dominant / Characteristic Species
HETERMELES ARBUTIFOLIA, SAMBUCUS NIGRA,
QUERCUS AGRIFOLIA, CEANOTHUS CRASSIFOLIUS,
LONICERA SUBSPICATA, ERIODICTYON CRASSIFOLIUM,
PHACELIA RAMOSISSIMA, CARDUUS PYCNOCEPHALUS,
PIPTATHERUM MILIACEUM, RIBES MALVACEUM,
ARTEMESIA CALIFORNICA

Notes: EAST END OF AREA 1 - DEEPLY INCISED CHANNEL OVER 8 FEET STEEP BANKS.

ARID REGIONS - WETLAND DELINEATION DATA SHEET

Project: NASA - Santa Susana Field Lab Date: 1/4/2012

Observers: Russell Huddleston and Steve Long

Feature Name NORTHERN DRAINAGE Sample Point ND-2

GPS Location: 34° 14' 11.926" 118° 41' 07.789"

Geomorphic Feature

☐ River	☐ Lake	☐ Swale
☒ Stream	☐ Pond	☐ Erosional Channel
☐ Canal	☐ Impoundment	☐ Gully
☐ Irrigation Channel	☐ Playa	☐ Depressional Basin
☐ Drainage Channel	☐ Constructed Basin	☐ Rock Basin
☐ Excavated Ditch	☐ Unvegetatted Depression	☐ Other: _____

Apparent Hydrologic Regime

☐ Perennial	☐ Standing Water (Depth:_____)
☒ Intermittent	☐ Flowing Water (Depth_____)
☐ Ephemeral	☒ Dry at time of the survey

Indictors

☐ Standing or flowing water with no indication of recent precipitation	☐ Channel adjacent to shelf with steep side	☐ Natural / irrigation / manmade / ditch flowing into feature
☐ presence of hydrophytic vegetation	☐ Natural line, stain or mineral (salt) deposit	☐ Dated picture / account showing / referring to identifiable features
☐ Presence of hydric soil with or without hydrophytic vegetation	☒ Litter, debris and or clay deposits	☒ Wetland symbol on map (presence of solid or dotted blue line, solid, shaded or stippled blue area on map)
☒ Absence of vegetation or interruption of upland vegetation	☐ Algae or alga mat	☐ Other (Specify)

Notes:
- BLUE LINE ON USGS CALABASAS QUAD
- NHD INT. STREAM
- NWI - PSSA

- DRIFT DEBRIS ON ROCKS WITHIN CHANNEL

Channel Characteristics

Channel Width	9 FT
Channel Depth	1-2 FT
Low Flow Width	5 FT
Low Flow Depth	6 INCHES

Channel Substrate (check all that apply)

- [x] Sand
- [x] Cobble
- [ ] Silt / Clay
- [x] Gravel
- [x] Rock
- [ ] Other_____

ROCKY - BOULDER / COBBLE W/ SOME SAND / GRAVEL

Vegetation Characteristics of Channel or Basin

Vegetated Channel or Basin? [x] Yes [ ] No TOTAL < 5% COVER

Dominant / Characteristic Species

CARDUUS PYCNOCEPHALUS
POLYPOGON MONSPELIENSIS
RUMEX CRISPUS

Vegetation Adjacent to Channel

Dominant / Characteristic Species

TOXICODENDRON DIVERSILOBUM, SALIX LASIOLEPIS, (ONE WILLOW ~4-5" DBH)
PHACELIA RAMOSISSIMA, CARDUUS PYCNOCEPHALUS, PIPTATHERUM MILIACEUM

QUERCUS AGRIFOLIA - UPPER BANK ALONG S. SLOPE

Notes:

LARGE, DEEPLY INCISED CHANNEL - SOME AREAS BANKS OVER 8 FEET TALL - WATER FLOW 1-2 FEET ONLY

- SCATTERED QUERCUS AGRIFOLIA ALONG SOUTH SLOPE - WELL ABOVE ACTIVE FLOW CHANNEL

ARID REGIONS - WETLAND DELINEATION DATA SHEET

Project: NASA - Santa Susana Field Lab Date: 1/4/2012

Observers: Russell Huddleston and Steve Long

Feature Name NORTHERN DRAINAGE Sample Point ND-3

GPS Location: 34° 14' 11.651" 118° 41' 11.688"

Geomorphic Feature

☐ River	☐ Lake	☐ Swale
☒ Stream	☐ Pond	☐ Erosional Channel
☐ Canal	☐ Impoundment	☐ Gully
☐ Irrigation Channel	☐ Playa	☐ Depressional Basin
☐ Drainage Channel	☐ Constructed Basin	☐ Rock Basin
☐ Excavated Ditch	☐ Unvegetatted Depression	☐ Other: _____

Apparent Hydrologic Regime

☐ Perennial	☐ Standing Water (Depth:_____)
☒ Intermittent	☐ Flowing Water (Depth_____)
☐ Ephemeral	☒ Dry at time of the survey

Indictors

☐ Standing or flowing water with no indication of recent precipitation	☐ Channel adjacent to shelf with steep side	☐ Natural / irrigation / manmade / ditch flowing into feature
☐ presence of hydrophytic vegetation	☐ Natural line, stain or mineral (salt) deposit	☐ Dated picture / account showing / referring to identifiable features
☐ Presence of hydric soil with or without hydrophytic vegetation	☒ Litter, debris and or clay deposits	☒ Wetland symbol on map (presence of solid or dotted blue line, solid, shaded or stippled blue area on map)
☒ Absence of vegetation or interruption of upland vegetation	☐ Algae or alga mat	☐ Other (Specify)

Notes:
- BLUE LINE STREAM USGS CALABASAS QUAD
- NHD INT STREAM
- NWI - PSSA.

- SPARSE LITTER / DEBRIS DEPOSITS

Channel Characteristics

Channel Width	8 FT
Channel Depth	1 FT
Low Flow Width	5.5 FT
Low Flow Depth	< 6 INCHES

Channel Substrate (check all that apply)

- [x] Sand
- [ ] Cobble
- [ ] Silt / Clay
- [x] Gravel
- [ ] Rock
- [ ] Other_____

SAND / GRAVEL SUBSTRATE

Vegetation Characteristics of Channel or Basin

Vegetated Channel or Basin?	[ ] Yes [x] No
Dominant / Characteristic Species	

Vegetation Adjacent to Channel

Dominant / Characteristic Species
QUERCUS AGRIFOLIA - SCATTERED ALONG TOP OF CHANNEL BANKS
ERIODICTYON CRASSIFOLIUM, PHACELIA RAMOSISSIMA, BACCHARIS PILULARIS, CARDUUS PYCNOCEPHALUS, PIPTATHERUM MILACEUM, TOXICODENDRON DIVERSILOBUM

Notes: BRASSICA NIGRA

WEAKLY EXPRESSED SAND-GRAVEL CHANNEL WITHIN DEEPLY INCISED CHANNEL

-CHANNEL FLOWS DS INTO 46" DIAM CULVERT THAT IS ~80% FILLED WITH SEDIMENT
NO EVIDENCE OF PONDING BEHIND CULVERT

ARID REGIONS - WETLAND DELINEATION DATA SHEET

Project: NASA - Santa Susana Field Lab Date: 1/4/2012

Observers: Russell Huddleston and Steve Long

Feature Name NORTHERN DRAINAGE Sample Point ND-4

GPS Location: 34° 14' 11.562" 118° 41' 14.209"

Geomorphic Feature

☐ River	☐ Lake	☐ Swale
☒ Stream	☐ Pond	☐ Erosional Channel
☐ Canal	☐ Impoundment	☐ Gully
☐ Irrigation Channel	☐ Playa	☐ Depressional Basin
☐ Drainage Channel	☐ Constructed Basin	☐ Rock Basin
☐ Excavated Ditch	☐ Unvegetatted Depression	☐ Other: _____

Apparent Hydrologic Regime

☐ Perennial	☐ Standing Water (Depth:_____)
☒ Intermittent	☐ Flowing Water (Depth_____)
☐ Ephemeral	☒ Dry at time of the survey

Indictors

☐ Standing or flowing water with no indication of recent precipitation	☐ Channel adjacent to shelf with steep side	☐ Natural / irrigation / manmade / ditch flowing into feature
☐ presence of hydrophytic vegetation	☒ Natural line, stain or mineral (salt) deposit	☐ Dated picture / account showing / referring to identifiable features
☐ Presence of hydric soil with or without hydrophytic vegetation	☒ Litter, debris and or clay deposits	☒ Wetland symbol on map (presence of solid or dotted blue line, solid, shaded or stippled blue area on map)
☐ Absence of vegetation or interruption of upland vegetation	☐ Algae or alga mat	☐ Other (Specify)

Notes:
- BLUE LINE STREAM ON USGS CALABASAS QUAD
- NHD INT. STREAM
- NWI - PSSA

- SPARSE LITTER / DEBRIS DEPOSITS
- WATER STAINING ON DOWN STREAM CULVERT

Channel Characteristics

Channel Width	8 FT
Channel Depth	1 FT
Low Flow Width	3.5 FT
Low Flow Depth	6 INCHES

Channel Substrate (check all that apply)

- [x] Sand
- [x] Cobble
- [ ] Silt / Clay
- [x] Gravel
- [x] Rock
- [ ] Other_____

MOSTLY SAND / GRAVEL W/ SOME COBBLE, SANDSTONE ROCK

Vegetation Characteristics of Channel or Basin

Vegetated Channel or Basin? [x] Yes [ ] No — < 5% TOTAL COVER

Dominant / Characteristic Species — SEEDLINGS

BRASSICA NIGRA

CARDUUS PYCNOCEPHALUS

Vegetation Adjacent to Channel

Dominant / Characteristic Species

QUERCUS AGRIFOLIA AND HETEROMELES ARBUTIFOLIA ALONG UPPER EDGES OF THE CHANNEL

ADENOSTOMA FASCICULATUM, BRASSICA NIGRA, GALIUM SP, CARDUUS PYCNOCEPHALUS PIPTATHERUM MILACEUM

Notes:

CHANNEL FLOWS WEST INTO 52 INCH DIAM CMP UNDER ROAD - WATER STANING ON CULVERT 32 INCHES WIDE, 6 INCHES DEEP

- SMALL TRIBUTARY EROSIONAL CHANNEL SOUTH OF THIS POINT - CHANNEL 12-16 INCHES WIDE, LESS THAN 12 INCHES DEEP

ARID REGIONS - WETLAND DELINEATION DATA SHEET

Project: NASA - Santa Susana Field Lab Date: 1/4/2012

Observers: Russell Huddleston and Steve Long

Feature Name NORTHERN DRAINAGE Sample Point ND-5

GPS Location: 34° 14' 12.741' 118° 41' 17.018"

Geomorphic Feature

☐ River	☐ Lake	☐ Swale
☒ Stream	☐ Pond	☐ Erosional Channel
☐ Canal	☐ Impoundment	☐ Gully
☐ Irrigation Channel	☐ Playa	☐ Depressional Basin
☐ Drainage Channel	☐ Constructed Basin	☐ Rock Basin
☐ Excavated Ditch	☐ Unvegetatted Depression	☐ Other: _____

Apparent Hydrologic Regime

☐ Perennial	☐ Standing Water (Depth:_____)
☒ Intermittent	☐ Flowing Water (Depth_____)
☐ Ephemeral	☒ Dry at time of the survey

Indictors

☐ Standing or flowing water with no indication of recent precipitation	☐ Channel adjacent to shelf with steep side	☐ Natural / irrigation / manmade / ditch flowing into feature
☐ presence of hydrophytic vegetation	☐ Natural line, stain or mineral (salt) deposit	☐ Dated picture / account showing / referring to identifiable features
☐ Presence of hydric soil with or without hydrophytic vegetation	☒ Litter, debris and or clay deposits	☒ Wetland symbol on map (presence of solid or dotted blue line, solid, shaded or stippled blue area on map)
☐ Absence of vegetation or interruption of upland vegetation	☐ Algae or alga mat	☐ Other (Specify)

Notes:

- BLUE LINE STREAM ON USGS CALABASAS QUAD
- NHD INT. STREAM
- NWI PSSA
- SPARSE LITTER / DEBRIS, WRACK LINES IN CHANNEL

Channel Characteristics

Channel Width	11.5 FT
Channel Depth	~1 FT
Low Flow Width	9 FT
Low Flow Depth	<1 FT

Channel Substrate (check all that apply)

- [x] Sand
- [ ] Cobble
- [ ] Silt / Clay
- [ ] Gravel
- [x] Rock
- [ ] Other_____

SANDY CHANNEL W/ SCATTERED SANDSTONE ROCK

Vegetation Characteristics of Channel or Basin

Vegetated Channel or Basin? [x] Yes [ ] No — <5% TOTAL COVER

Dominant / Characteristic Species	
CARDUUS PYCNOCEPHALUS	SEEDLINGS MOSTLY
PIPTATHERUM MILACEUM	

Vegetation Adjacent to Channel

Dominant / Characteristic Species
QUERCUS AGRIFOLIA - ALONG UPPER SLOPES
RIBES MALVACEUM, TOXICODENDRON DIVERSILOBUM,
SAMBUCUS NIGRA, PHACELIA RAMOSISSIMA

Notes: SAMPLE POINT JUST DOWN STREAM OF 52-INCH DIAM CMP OUTFALL

- GOOD RIPARIAN COVER IN THIS AREA

ARID REGIONS - WETLAND DELINEATION DATA SHEET

Project: NASA - Santa Susana Field Lab Date: 1/4/2012

Observers: Russell Huddleston and Steve Long

Feature Name NORTHERN DRAINAGE Sample Point ND-6

GPS Location: 34° 14' 13.612" 118° 41' 18.709"

Geomorphic Feature

☐ River	☐ Lake	☐ Swale
☒ Stream	☐ Pond	☐ Erosional Channel
☐ Canal	☐ Impoundment	☐ Gully
☐ Irrigation Channel	☐ Playa	☐ Depressional Basin
☐ Drainage Channel	☐ Constructed Basin	☐ Rock Basin
☐ Excavated Ditch	☐ Unvegetatted Depression	☐ Other: _____

Apparent Hydrologic Regime

☐ Perennial	☐ Standing Water (Depth:_____)
☒ Intermittent	☐ Flowing Water (Depth_____)
☐ Ephemeral	☒ Dry at time of the survey

Indictors

☐ Standing or flowing water with no indication of recent precipitation	☐ Channel adjacent to shelf with steep side	☐ Natural / irrigation / manmade / ditch flowing into feature
☐ presence of hydrophytic vegetation	☐ Natural line, stain or mineral (salt) deposit	☐ Dated picture / account showing / referring to identifiable features
☐ Presence of hydric soil with or without hydrophytic vegetation	☐ Litter, debris and or clay deposits	☒ Wetland symbol on map (presence of solid or dotted blue line, solid, shaded or stippled blue area on map)
☐ Absence of vegetation or interruption of upland vegetation	☐ Algae or alga mat	☐ Other (Specify)

Notes:

- BLUE LINE ON USGS CALABASAS QUAD
- NHD INT. STREAM
- NWI - PSSA

Channel Characteristics

Channel Width	12 FT
Channel Depth	1-2 FT
Low Flow Width	8 FT
Low Flow Depth	6 INCHES

Channel Substrate (check all that apply)

- [x] Sand
- [x] Cobble
- [ ] Silt / Clay
- [ ] Gravel
- [x] Rock
- [x] Other SANDSTONE BOULDERS

MOSTLY SAND W/ SOME COBBLES / ROCKS

Vegetation Characteristics of Channel or Basin

Vegetated Channel or Basin? [x] Yes [ ] No

< 5% TOTAL COVER

Dominant / Characteristic Species
PIPTATHERUM MILACEUM
POMPOGON MONSPELIENSIS
CARDUUS PYCNOCEPHALUS

Vegetation Adjacent to Channel

Dominant / Characteristic Species
QUERCUS AGRIFOLIA - UPPER SLOPES
TOXICODENDRON DIVERSILOBUM
PHACELIA RAMOSISSIMA

Notes:

ARID REGIONS - WETLAND DELINEATION DATA SHEET

Project: NASA - Santa Susana Field Lab Date: 1/4/2012

Observers: Russell Huddleston and Steve Long

Feature Name NORTHERN DRAINAGE Sample Point ND-7

GPS Location: 34° 14' 14.543" 118° 41' 20.809"

Geomorphic Feature

☐ River	☐ Lake	☐ Swale
☒ Stream	☐ Pond	☐ Erosional Channel
☐ Canal	☐ Impoundment	☐ Gully
☐ Irrigation Channel	☐ Playa	☐ Depressional Basin
☐ Drainage Channel	☐ Constructed Basin	☐ Rock Basin
☐ Excavated Ditch	☐ Unvegetatted Depression	☐ Other: _____

Apparent Hydrologic Regime

☐ Perennial	☐ Standing Water (Depth:_____)
☒ Intermittent	☐ Flowing Water (Depth_____)
☐ Ephemeral	☒ Dry at time of the survey

Indictors

☐ Standing or flowing water with no indication of recent precipitation	☐ Channel adjacent to shelf with steep side	☐ Natural / irrigation / manmade / ditch flowing into feature
☐ presence of hydrophytic vegetation	☐ Natural line, stain or mineral (salt) deposit	☐ Dated picture / account showing / referring to identifiable features
☐ Presence of hydric soil with or without hydrophytic vegetation	☐ Litter, debris and or clay deposits	☒ Wetland symbol on map (presence of solid or dotted blue line, solid, shaded or stippled blue area on map)
☐ Absence of vegetation or interruption of upland vegetation	☐ Algae or alga mat	☐ Other (Specify)

Notes:

- BLUE LINE ON USGS CALABASAS QUAD
- NHD INT. STREAM
- NWI - PSSA

Channel Characteristics

Channel Width	12 FT
Channel Depth	~1 FT
Low Flow Width	6 FT
Low Flow Depth	6 INCHES

Channel Substrate (check all that apply)

- [x] Sand
- [x] Cobble
- [ ] Silt / Clay
- [x] Gravel
- [ ] Rock
- [ ] Other_____

SANDY CHANNEL W/ SOME GRAVELS / COBBLE

Vegetation Characteristics of Channel or Basin

Vegetated Channel or Basin? [x] Yes [ ] No

Dominant / Characteristic Species

BACCHARIS SALICIFOLIA - SPARSE < 5% COVER

PIPTATHERUM MILACEUM
CARDUUS PYCNOCEPHALUS
RUMEX CRISPUS
} LESS THAN 5% TOTAL COVER

Vegetation Adjacent to Channel

Dominant / Characteristic Species

QUERCUS AGRIFOLIA - UPPER SLOPES
ARTEMISIA DOUGLASIANA
MALACOTHAMNUS FASCICULATUS
PIPTATHERUM MILACEUM
PHACELIA RAMOSISSIMA
BRASSICA NIGRA

Notes:

ARID REGIONS - WETLAND DELINEATION DATA SHEET

Project: NASA - Santa Susana Field Lab Date: 1/4 / 2012

Observers: Russell Huddleston and Steve Long

Feature Name AREA 1 - EROSIONAL CHAN. Sample Point _____

GPS Location: ~~PA~~ 34° 14' 22.412" 118° 41' 18.196"

Geomorphic Feature

☐ River	☐ Lake	☐ Swale
☐ Stream	☐ Pond	☒ Erosional Channel
☐ Canal	☐ Impoundment	☐ Gully
☐ Irrigation Channel	☐ Playa	☐ Depressional Basin
☐ Drainage Channel	☐ Constructed Basin	☐ Rock Basin
☐ Excavated Ditch	☐ Unvegetatted Depression	☐ Other: _____

Apparent Hydrologic Regime

☐ Perennial	☐ Standing Water (Depth:_____)
☐ Intermittent	☐ Flowing Water (Depth_____)
☒ Ephemeral	☒ Dry at time of the survey

Indictors

☐ Standing or flowing water with no indication of recent precipitation	☐ Channel adjacent to shelf with steep side	☐ Natural / irrigation / manmade / ditch flowing into feature
☐ presence of hydrophytic vegetation	☐ Natural line, stain or mineral (salt) deposit	☐ Dated picture / account showing / referring to identifiable features
☐ Presence of hydric soil with or without hydrophytic vegetation	☐ Litter, debris and or clay deposits	☐ Wetland symbol on map (presence of solid or dotted blue line, solid, shaded or stippled blue area on map)
☒ Absence of vegetation or interruption of upland vegetation	☐ Algae or alga mat	☒ Other (Specify)

Notes: - DEFINED CUT CHANNEL DUE TO EROSION/ UPSLOPE RUNOFF - CHANNEL FLOWS TO SOUTHWEST INTO IMPOUNDMENT FEATURE

- NOT A BLUE LINE FEATURE

Channel Characteristics

Channel Width	2 FT - 2 1/2 FT
Channel Depth	5 INCHES - 1 FT DEEP
Low Flow Width	1 FT
Low Flow Depth	2-3 INCHES

Channel Substrate (check all that apply)

- [x] Sand
- [ ] Cobble
- [ ] Silt / Clay
- [ ] Gravel
- [x] Rock
- [ ] Other_____

SANDY W/ SOME SANDSTONE BEDROCK

Vegetation Characteristics of Channel or Basin

Vegetated Channel or Basin?	☐ Yes ☒ No
Dominant / Characteristic Species	

Vegetation Adjacent to Channel

Dominant / Characteristic Species
ERIODICTYON CRASSIFOLIUM,
ADENOSTOMA FASICULATUM, MALOSOMA LAURINA,
ERODIUM BOTRYS, CENTAURFA MELITENSIS
POA SECUNDA

Notes:

ARID REGIONS - WETLAND DELINEATION DATA SHEET

Project: NASA - Santa Susana Field Lab Date: 1/4/2012

Observers: Russell Huddleston and Steve Long

Feature Name NORTHERN DRAINAGE Sample Point ND-8

GPS Location: 34° 14' 16.403" 118° 41' 32.614"

Geomorphic Feature

☐ River	☐ Lake	☐ Swale
☒ Stream	☐ Pond	☐ Erosional Channel
☐ Canal	☐ Impoundment	☐ Gully
☐ Irrigation Channel	☐ Playa	☐ Depressional Basin
☐ Drainage Channel	☐ Constructed Basin	☐ Rock Basin
☐ Excavated Ditch	☐ Unvegetatted Depression	☐ Other: _____

Apparent Hydrologic Regime

☐ Perennial	☐ Standing Water (Depth:_____)
☒ Intermittent	☐ Flowing Water (Depth_____)
☐ Ephemeral	☒ Dry at time of the survey

Indictors

☐ Standing or flowing water with no indication of recent precipitation	☒ Channel adjacent to shelf with steep side	☐ Natural / irrigation / manmade / ditch flowing into feature
☐ presence of hydrophytic vegetation	☐ Natural line, stain or mineral (salt) deposit	☐ Dated picture / account showing / referring to identifiable features
☐ Presence of hydric soil with or without hydrophytic vegetation	☒ Litter, debris and or clay deposits	☒ Wetland symbol on map (presence of solid or dotted blue line, solid, shaded or stippled blue area on map)
☐ Absence of vegetation or interruption of upland vegetation	☐ Algae or alga mat	☐ Other (Specify)

Notes:
- BLUE LINE ON USGS CALABASAS QUAD
- NHD INT. STREAM
- NWI - PSSA

- DISTINCT CUT BANKS ALONG CHANNEL
- DRIFT / DEBRIS DEPOSITS

Channel Characteristics

Channel Width	6 FT
Channel Depth	1 FT
Low Flow Width	3 FT
Low Flow Depth	6 INCHES

Channel Substrate (check all that apply)

- [x] Sand
- [x] Cobble
- [ ] Silt / Clay
- [ ] Gravel
- [x] Rock - SANDSTONE BOULDERS
- [ ] Other_____

SANDY SUBSTRATE W/ SOME COBBLE / ROCKS

Vegetation Characteristics of Channel or Basin

Vegetated Channel or Basin? [x] Yes [ ] No

Dominant / Characteristic Species

BACCHARIS SALICIFOLIA - LESS THAN 5% COVER

POLYPOGON MONSPELIENSIS
CARDUUS PYCNOCEPHALUS
RUMEX CRISPUS
} TOTAL LESS THAN 5% COVER

Vegetation Adjacent to Channel

Dominant / Characteristic Species

QUERCUS AGRIFOLIA

SALIX LASIOLEPIS - ONE TREE/SHRUB W/ MULTIPLE STEMS - ALL LESS THAN 3" DBH

TOXICODENDRON DIVERSILOBUM

CARDUUS PYCNOCEPHALUS, PHACELIA RAMOSISSIMA

Notes:

DOWN STREAM OF THIS POINT SCATTERED PATCHES OF POLYPOGON MONSPELIENSIS BUT VEGETATION GENERALLY SPARSE IN CHANNEL

- SCATTERED PIPTATHERUM MILIACEUM ALSO PRESENT IN SOME PARTS OF THE CHANNEL

ARID REGIONS - WETLAND DELINEATION DATA SHEET

Project: NASA - Santa Susana Field Lab Date: 1/4/2012

Observers: Russell Huddleston and Steve Long

Feature Name NORTHERN DRAINAGE Sample Point ND-9

GPS Location: 34° 14' 17.942" 118° 41' 34.771"

Geomorphic Feature

☐ River	☐ Lake	☐ Swale
☒ Stream	☐ Pond	☐ Erosional Channel
☐ Canal	☐ Impoundment	☐ Gully
☐ Irrigation Channel	☐ Playa	☐ Depressional Basin
☐ Drainage Channel	☐ Constructed Basin	☐ Rock Basin
☐ Excavated Ditch	☐ Unvegetatted Depression	☐ Other: _____

Apparent Hydrologic Regime

☐ Perennial	☐ Standing Water (Depth:_____)
☒ Intermittent	☐ Flowing Water (Depth_____)
☐ Ephemeral	☒ Dry at time of the survey

Indictors

☐ Standing or flowing water with no indication of recent precipitation	☐ Channel adjacent to shelf with steep side	☐ Natural / irrigation / manmade / ditch flowing into feature
☐ presence of hydrophytic vegetation	☐ Natural line, stain or mineral (salt) deposit	☐ Dated picture / account showing / referring to identifiable features
☐ Presence of hydric soil with or without hydrophytic vegetation	☒ Litter, debris and or clay deposits	☒ Wetland symbol on map (presence of solid or dotted blue line, solid, shaded or stippled blue area on map)
☐ Absence of vegetation or interruption of upland vegetation	☐ Algae or alga mat	☐ Other (Specify)

Notes:

- BLUE LINE ON USGS CALABASAS QUAD
- NHD INTERMITTENT STREAM
- NWI - PSSA

Channel Characteristics

Channel Width	10 FT
Channel Depth	1.5-2 FT
Low Flow Width	4 FT
Low Flow Depth	< 6 INCHES

Channel Substrate (check all that apply)

- ☐ Sand
- ☐ Cobble
- ☐ Silt / Clay
- ☐ Gravel
- ☒ Rock
- ☐ Other_____

SANDSTONE BEDROCK / BOULDERS

Vegetation Characteristics of Channel or Basin

Vegetated Channel or Basin?	☐ Yes ☒ No
Dominant / Characteristic Species	

Vegetation Adjacent to Channel

Dominant / Characteristic Species
QUERCUS AGRIFOLIA, KECKIELLA CORDIFOLIA,
SALVIA MELIFERA, BRASSICA NIGRA
PHACELIA RAMOSISSIMA, CARDUUS PYCNOCEPHALUS
PIPTATHERUM MILIACEUM

Notes: DOWN STREAM OF THIS POINT VERY LARGE SANDSTONE BOULDERS IN THE CHANNEL FOR APPROX 300 FT
NO ACCESS TO THIS PORTION OF THE CHANNEL - WATER APPEARS TO FLOW UNDER ROCKS IN THIS AREA

ARID REGIONS - WETLAND DELINEATION DATA SHEET

Project: NASA - Santa Susana Field Lab Date: 11/4/2012

Observers: Russell Huddleston and Steve Long

Feature Name NORTHERN DRAINAGE Sample Point ND-10

GPS Location: 34° 14' 18.352" 118°41' 40.599"

Geomorphic Feature

☐ River	☐ Lake	☐ Swale
☒ Stream	☐ Pond	☐ Erosional Channel
☐ Canal	☐ Impoundment	☐ Gully
☐ Irrigation Channel	☐ Playa	☐ Depressional Basin
☐ Drainage Channel	☐ Constructed Basin	☐ Rock Basin
☐ Excavated Ditch	☐ Unvegetatted Depression	☐ Other: _____

Apparent Hydrologic Regime

☐ Perennial	☐ Standing Water (Depth:_____)
☒ Intermittent	☐ Flowing Water (Depth_____)
☐ Ephemeral	☒ Dry at time of the survey

Indictors

☐ Standing or flowing water with no indication of recent precipitation	☐ Channel adjacent to shelf with steep side	☐ Natural / irrigation / manmade / ditch flowing into feature
☐ presence of hydrophytic vegetation	☐ Natural line, stain or mineral (salt) deposit	☐ Dated picture / account showing / referring to identifiable features
☐ Presence of hydric soil with or without hydrophytic vegetation	☒ Litter, debris and or clay deposits	☒ Wetland symbol on map (presence of solid or dotted blue line, solid, shaded or stippled blue area on map)
☐ Absence of vegetation or interruption of upland vegetation	☐ Algae or alga mat	☐ Other (Specify)

Notes:
- BLUE LINE ON USGS CALABASAS QUAD
- NHD INT. STREAM
- NWI - PSSA

Channel Characteristics

Channel Width	7FT
Channel Depth	1-2FT
Low Flow Width	5FT
Low Flow Depth	~6 INCHES

Channel Substrate (check all that apply)

- [x] Sand
- [x] Cobble
- [ ] Silt / Clay
- [ ] Gravel
- [x] Rock
- [ ] Other_____

SANDSTONE ROCK W/ COBBLE AND SOME SAND

Vegetation Characteristics of Channel or Basin

Vegetated Channel or Basin? [ ] Yes [x] No

Dominant / Characteristic Species

Vegetation Adjacent to Channel

Dominant / Characteristic Species
QUERCUS AGRIFOLIA, UMBELLULARIA CALIFORNICA
HETEROMELES ARBUTIFOLIA, RUBIS URSINUS,
SALIX LASIOLEPIS (SMALL SHRUB W/ MULTIPLE STEMS < 3" DBH)
PIPTATHERUM MILACEUM, POLYPOGON MONSPELIENSIS

Notes:

SANDSTONE BOULDERS IN CHANNEL DOWNSTREAM OF THIS POINT

NEAR SAMPLING WEIR

ARID REGIONS - WETLAND DELINEATION DATA SHEET

Project: NASA - Santa Susana Field Lab Date: 1/6/2012

Observers: Russell Huddleston and Steve Long

Feature Name ELV DRAINAGE Sample Point ELV -1

GPS Location: 34° 14' 16.023" 118° 41' 41.211"

Geomorphic Feature

☐ River	☐ Lake	☐ Swale
☒ Stream	☐ Pond	☐ Erosional Channel
☐ Canal	☐ Impoundment	☐ Gully
☐ Irrigation Channel	☐ Playa	☐ Depressional Basin
☐ Drainage Channel	☐ Constructed Basin	☐ Rock Basin
☐ Excavated Ditch	☐ Unvegetatted Depression	☐ Other: _____

Apparent Hydrologic Regime

☐ Perennial	☐ Standing Water (Depth:_____)
☐ Intermittent	☐ Flowing Water (Depth_____)
☒ Ephemeral	☒ Dry at time of the survey

Indictors

☐ Standing or flowing water with no indication of recent precipitation	☐ Channel adjacent to shelf with steep side	☐ Natural / irrigation / manmade / ditch flowing into feature
☐ presence of hydrophytic vegetation	☐ Natural line, stain or mineral (salt) deposit	☐ Dated picture / account showing / referring to identifiable features
☐ Presence of hydric soil with or without hydrophytic vegetation	☐ Litter, debris and or clay deposits	☐ Wetland symbol on map (presence of solid or dotted blue line, solid, shaded or stippled blue area on map)
☐ Absence of vegetation or interruption of upland vegetation	☐ Algae or alga mat	☐ Other (Specify)

Notes: NOT SHOWN AS A BLUE LINE

NO STRONG EVIDENCE OF REGULAR FLOWS OTHER THAN TOPOGRAPHIC LOW WITH SOMEWHAT DEFINED CHANNEL

Channel Characteristics

Channel Width	4 FT
Channel Depth	~1 FT
Low Flow Width	3 FT
Low Flow Depth	6 INCHES

Channel Substrate (check all that apply)

- [x] Sand
- [ ] Cobble
- [ ] Silt / Clay
- [ ] Gravel
- [ ] Rock
- [x] Other SANDSTONE BOULDERS

Vegetation Characteristics of Channel or Basin

Vegetated Channel or Basin?	[ ] Yes [x] No
Dominant / Characteristic Species	

Vegetation Adjacent to Channel

Dominant / Characteristic Species
QUERCUS AGRIFOLIA, UMBELLULARIA CALIFORNICA,
MALACOTHAMNUS FASICULATUS, ADENOSTOMA FASICULATUM,
HERTERMELES ARBUTIFOLIA, CEANOTHUS CRASSIFOLUS,
TOXICODENDRON DIVERSILOBUM, CARDUUS PYCNOCEPHALUS,
PHACELIA RAMOSISSIMA, VENEGASIA CARPESIOIDES
LEYMUS CONDENSATUS

Notes: - MORE DEVELOPED CHANNEL UPSLOPE

LOTS OF DOWNED WOODY DEBRIS IN THE CHANNEL IN THIS AREA

DENSE TOXICODENDRON DIVERSILOBUM IN SOME AREAS

ARID REGIONS - WETLAND DELINEATION DATA SHEET

Project: NASA - Santa Susana Field Lab Date: 1/6/2012

Observers: Russell Huddleston and Steve Long

Feature Name ELV DRAINAGE Sample Point ELV-2

GPS Location: 34° 14' 17.840 118° 41' 41.018

Geomorphic Feature

☐ River	☐ Lake	☐ Swale
☒ Stream	☐ Pond	☐ Erosional Channel
☐ Canal	☐ Impoundment	☐ Gully
☐ Irrigation Channel	☐ Playa	☐ Depressional Basin
☐ Drainage Channel	☐ Constructed Basin	☐ Rock Basin
☐ Excavated Ditch	☐ Unvegetatted Depression	☐ Other: _____

Apparent Hydrologic Regime

☐ Perennial	☐ Standing Water (Depth:_____)
☐ Intermittent	☐ Flowing Water (Depth_____)
☒ Ephemeral	☒ Dry at time of the survey

Indictors

☐ Standing or flowing water with no indication of recent precipitation	☐ Channel adjacent to shelf with steep side	☐ Natural / irrigation / manmade / ditch flowing into feature
☐ presence of hydrophytic vegetation	☐ Natural line, stain or mineral (salt) deposit	☐ Dated picture / account showing / referring to identifiable features
☐ Presence of hydric soil with or without hydrophytic vegetation	☐ Litter, debris and or clay deposits	☐ Wetland symbol on map (presence of solid or dotted blue line, solid, shaded or stippled blue area on map)
☐ Absence of vegetation or interruption of upland vegetation	☐ Algae or alga mat	☐ Other (Specify)

Notes: NOT A BLUE LINE FEATURE

NO EVIDENCE OF RECENT FLOW - LOW TOPOGRAPHIC FEATURE, SOME DEFINED CHANNEL - BUT MORE SWALE LIKE FEATURE

Channel Characteristics

Channel Width	~10 FT
Channel Depth	1 FT
Low Flow Width	2.5 FT
Low Flow Depth	6 INCHES

Channel Substrate (check all that apply)

- ☐ Sand
- ☐ Cobble
- ☐ Silt / Clay
- ☐ Gravel
- ☒ Rock
- ☒ Other SANDSTONE BOULDERS

ROCKY / SWALE

Vegetation Characteristics of Channel or Basin

Vegetated Channel or Basin?	☐ Yes ☒ No
Dominant / Characteristic Species	

Vegetation Adjacent to Channel

Dominant / Characteristic Species
QUERCUS AGRIFOLIA, UMBELLULARIA CALIFORNICA,
TOXICODENDRON DIVERSILOBUM, ROSA CALIFORNICA,
HETEROMELES ARBUTIFOLIA,
MALACOTHAMNUS FASICULATUS
PIPTATHERUM MILEGEUM

Notes:

THIS FEATURE FLOWS INTO THE NORTHERN DRAINAGE JUST UPSTREAM OF SAMPLE WEIR

ARID REGIONS - WETLAND DELINEATION DATA SHEET

Project: NASA - Santa Susana Field Lab Date: 1/6/2012

Observers: Russell Huddleston and Steve Long

Feature Name ELV DRAINAGE Sample Point ELV-3

GPS Location: 34° 14' 13.651" 118° 41' 42.620"

Geomorphic Feature

☐ River	☐ Lake	☐ Swale
☒ Stream	☐ Pond	☐ Erosional Channel
☐ Canal	☐ Impoundment	☐ Gully
☐ Irrigation Channel	☐ Playa	☐ Depressional Basin
☐ Drainage Channel	☐ Constructed Basin	☐ Rock Basin
☐ Excavated Ditch	☐ Unvegetatted Depression	☐ Other: _____

Apparent Hydrologic Regime

☐ Perennial	☐ Standing Water (Depth:_____)
☐ Intermittent	☐ Flowing Water (Depth_____)
☒ Ephemeral	☒ Dry at time of the survey

Indictors

☐ Standing or flowing water with no indication of recent precipitation	☐ Channel adjacent to shelf with steep side	☐ Natural / irrigation / manmade / ditch flowing into feature
☐ presence of hydrophytic vegetation	☐ Natural line, stain or mineral (salt) deposit	☐ Dated picture / account showing / referring to identifiable features
☐ Presence of hydric soil with or without hydrophytic vegetation	☐ Litter, debris and or clay deposits	☐ Wetland symbol on map (presence of solid or dotted blue line, solid, shaded or stippled blue area on map)
☐ Absence of vegetation or interruption of upland vegetation	☐ Algae or alga mat	☐ Other (Specify)

Notes: NOT A BLUE LINE

- NO EVIDENCE OF RECENT FLOW IN THIS AREA, LOW TOPOGRAPHIC AREA - SWALE LIKE FEATURE - MORE DEFINED UPSTREAM

Channel Characteristics

Channel Width	7 FT
Channel Depth	1 FT
Low Flow Width	3.5 FT
Low Flow Depth	<6 INCHES

Channel Substrate (check all that apply)

- [x] Sand
- [ ] Cobble
- [ ] Silt / Clay
- [x] Gravel
- [x] Rock
- [x] Other SANDSTONE BOULDER

Vegetation Characteristics of Channel or Basin

Vegetated Channel or Basin?	[ ] Yes [x] No
Dominant / Characteristic Species	

Vegetation Adjacent to Channel

Dominant / Characteristic Species
QUERCUS AGRIFOLIA, MALACOTHAMNUS FASICULATUM
MALOSOMA LAURINA, RIBES MALVACEUM,
ARTEMESIA CALIFORNICA, MIMULUS AURANTIACUS
PHACALEA RAMOSISSIMA, VENEGASIA CARPESIOIDES

Notes:

ARID REGIONS - WETLAND DELINEATION DATA SHEET

Project: NASA - Santa Susana Field Lab Date: 1/6/2012

Observers: Russell Huddleston and Steve Long

Feature Name DRAINAGE A-1 Sample Point A1-1

GPS Location: 34° 14' 11.482" 118° 41' 39.657"

Geomorphic Feature

☐ River	☐ Lake	☐ Swale
☐ Stream	☐ Pond	☐ Erosional Channel
☐ Canal	☐ Impoundment	☐ Gully
☐ Irrigation Channel	☐ Playa	☐ Depressional Basin
☒ Drainage Channel	☐ Constructed Basin	☐ Rock Basin
☐ Excavated Ditch	☐ Unvegetatted Depression	☐ Other: _____

Apparent Hydrologic Regime

☐ Perennial	☐ Standing Water (Depth:_____)
☐ Intermittent	☐ Flowing Water (Depth_____)
☒ Ephemeral	☒ Dry at time of the survey

Indictors

☐ Standing or flowing water with no indication of recent precipitation	☐ Channel adjacent to shelf with steep side	☐ Natural / irrigation / manmade / ditch flowing into feature
☐ presence of hydrophytic vegetation	☐ Natural line, stain or mineral (salt) deposit	☐ Dated picture / account showing / referring to identifiable features
☐ Presence of hydric soil with or without hydrophytic vegetation	☐ Litter, debris and or clay deposits	☐ Wetland symbol on map (presence of solid or dotted blue line, solid, shaded or stippled blue area on map)
☐ Absence of vegetation or interruption of upland vegetation	☐ Algae or alga mat	☐ Other (Specify)

Notes: NO BLUE LINE

- TOPOGRAPHIC LOW AREA - RIP-RAP / CULVERT AT ROADWAY - UPSLOPE WEAKLY EXPRESSED EROSIONAL FEATURE

Channel Characteristics

Channel Width	2 FT
Channel Depth	1.5 FT
Low Flow Width	1.5 FT
Low Flow Depth	<6 INCHES

Channel Substrate (check all that apply)

- [x] Sand
- [x] Cobble (SPARSE)
- [ ] Silt / Clay
- [ ] Gravel
- [ ] Rock
- [ ] Other_____

Vegetation Characteristics of Channel or Basin

Vegetated Channel or Basin? [ ] Yes [x] No

Dominant / Characteristic Species

Vegetation Adjacent to Channel

Dominant / Characteristic Species
QUERCUS AGRIFOLIA, MALACOTHAMNUS FASICULATUM,
RIBES MALVACEUM, CARDUUS PYCNOCEPHALUS,
PHACELIA RAMOSISSIMA

Notes: SWALE / CHANNEL EMPTIES INTO LOW DEPRESSIONAL AREA W/ RIP-RAP AND 29 INCH DIAM CULVERT (PLASTIC PIPE) UNDER ROAD

ARID REGIONS - WETLAND DELINEATION DATA SHEET

Project: NASA - Santa Susana Field Lab Date: 1/6/2012

Observers: Russell Huddleston and Steve Long

Feature Name DRAINAGE A-1 Sample Point A1-2

GPS Location: 34° 14' 13.533" 118° 41' 42.086"

Geomorphic Feature

☐ River	☐ Lake	☐ Swale
☐ Stream	☐ Pond	☐ Erosional Channel
☐ Canal	☐ Impoundment	☐ Gully
☐ Irrigation Channel	☐ Playa	☐ Depressional Basin
☒ Drainage Channel	☐ Constructed Basin	☐ Rock Basin
☐ Excavated Ditch	☐ Unvegetatted Depression	☐ Other: _____

Apparent Hydrologic Regime

☐ Perennial	☐ Standing Water (Depth:_____)
☐ Intermittent	☐ Flowing Water (Depth_____)
☒ Ephemeral	☒ Dry at time of the survey

Indictors

☐ Standing or flowing water with no indication of recent precipitation	☐ Channel adjacent to shelf with steep side	☐ Natural / irrigation / manmade / ditch flowing into feature
☐ presence of hydrophytic vegetation	☐ Natural line, stain or mineral (salt) deposit	☐ Dated picture / account showing / referring to identifiable features
☐ Presence of hydric soil with or without hydrophytic vegetation	☐ Litter, debris and or clay deposits	☐ Wetland symbol on map (presence of solid or dotted blue line, solid, shaded or stippled blue area on map)
☐ Absence of vegetation or interruption of upland vegetation	☐ Algae or alga mat	☐ Other (Specify)

Notes:

NO BLUE LINE

LOW TOPOGRAPHIC SWALE, WEAKLY EXPRESSED CHANNEL

Channel Characteristics

Channel Width	8 FT
Channel Depth	1 FT
Low Flow Width	3 FT
Low Flow Depth	<6 INCHES

Channel Substrate (check all that apply)

- [x] Sand
- [x] Cobble
- [ ] Silt / Clay
- [ ] Gravel
- [ ] Rock
- [x] Other ASPHALT DEBRIS

Vegetation Characteristics of Channel or Basin

Vegetated Channel or Basin?	[ ] Yes [x] No

Dominant / Characteristic Species

Vegetation Adjacent to Channel

Dominant / Characteristic Species
SALVIA MELIFERA
BACCHARIS PILULARIS
MALOSOMA LAURINA
ERIODICTYON CRASSIFOLIUM

Notes: DOWN STREAM OF 29 INCH DIAM PLASTIC PIPE UNDER ROAD

FLOWS WEST INTO ELV DRAINAGE

ARID REGIONS - WETLAND DELINEATION DATA SHEET

Project: NASA - Santa Susana Field Lab Date: 1/6/2012

Observers: Russell Huddleston and Steve Long

Feature Name DRAINAGE A-2 Sample Point ~~A2-2~~ A2-1

GPS Location: 34° 14' 09.789" 118° 41' 47.834"

Geomorphic Feature

☐ River	☐ Lake	☐ Swale
☐ Stream	☐ Pond	☐ Erosional Channel
☐ Canal	☐ Impoundment	☐ Gully
☐ Irrigation Channel	☐ Playa	☐ Depressional Basin
☒ Drainage Channel	☐ Constructed Basin	☐ Rock Basin
☐ Excavated Ditch	☐ Unvegetatted Depression	☐ Other: _____

Apparent Hydrologic Regime

☐ Perennial	☐ Standing Water (Depth:_____)
☐ Intermittent	☐ Flowing Water (Depth_____)
☒ Ephemeral	☒ Dry at time of the survey

Indictors

☐ Standing or flowing water with no indication of recent precipitation	☒ Channel adjacent to shelf with steep side	☐ Natural / irrigation / manmade / ditch flowing into feature
☐ presence of hydrophytic vegetation	☐ Natural line, stain or mineral (salt) deposit	☐ Dated picture / account showing / referring to identifiable features
☐ Presence of hydric soil with or without hydrophytic vegetation	☐ Litter, debris and or clay deposits	☐ Wetland symbol on map (presence of solid or dotted blue line, solid, shaded or stippled blue area on map)
☐ Absence of vegetation or interruption of upland vegetation	☐ Algae or alga mat	☐ Other (Specify)

Notes: NOT A BLUE LINE

NO EVIDENCE OF RECENT FLOW IN THIS AREA

Channel Characteristics

Channel Width	6FT - NEAR ROAD - NARROWS DS
Channel Depth	2-4 FT
Low Flow Width	
Low Flow Depth	

Channel Substrate (check all that apply)

- [x] Sand
- [ ] Cobble
- [ ] Silt / Clay
- [ ] Gravel
- [ ] Rock
- [ ] Other_____

Vegetation Characteristics of Channel or Basin

Vegetated Channel or Basin? [x] Yes [ ] No

Dominant / Characteristic Species

TOXICODENDRON DIVERSILOBUM } UPPER EDGES
MIMULUS AURANTIACUS } OF CHANNEL

Vegetation Adjacent to Channel

Dominant / Characteristic Species

QUERCUS AGRIFOLIA, TOXICODENDRON DIVERSILOBUM,
CARDUUS PYCNOCEPHALUS, LEYMUS CONDENSATUS
PHACELIA RAMOSISSIMA, BROMUS DIANDRUS
PSEUDOGNAPTHALIUM BIOLETTII

Notes: WELL DEFINED DEEPLY INCISED CHANNEL JUST UP FROM 24 INCH DIAM CMP AT ROAD - CHANNELS BECOMES SMALLER AND MORE NARROW TO THE SOUTH EVENTUALLY BECOMING A DISCONTINUOUS EROSIONAL CHANNEL

NORTH OF ROAD CMP EMPTIES INTO ASPHALT DRAINAGE

ARID REGIONS - WETLAND DELINEATION DATA SHEET

Project: NASA - Santa Susana Field Lab Date: 1/5/2012

Observers: Russell Huddleston and Steve Long

Feature Name BELL CREEK - ALFA Sample Point ~~OFF TRAIL~~ ~~EAST~~ BC-1

GPS Location: AVE POINT: 34° 13' 58.097 118° 41' 36.895"

Geomorphic Feature

☐ River	☐ Lake	☐ Swale
☒ Stream	☐ Pond	☐ Erosional Channel
☐ Canal	☒ Impoundment	☐ Gully
☐ Irrigation Channel	☐ Playa	☐ Depressional Basin
☐ Drainage Channel	☐ Constructed Basin	☐ Rock Basin
☐ Excavated Ditch	☐ Unvegetatted Depression	☐ Other: _____

Apparent Hydrologic Regime

☐ Perennial	☐ Standing Water (Depth:_____)
☐ Intermittent	☐ Flowing Water (Depth_____)
☒ Ephemeral	☒ Dry at time of the survey

Indictors

☐ Standing or flowing water with no indication of recent precipitation	☐ Channel adjacent to shelf with steep side	☐ Natural / irrigation / manmade / ditch flowing into feature
☐ presence of hydrophytic vegetation	☐ Natural line, stain or mineral (salt) deposit	☐ Dated picture / account showing / referring to identifiable features
☐ Presence of hydric soil with or without hydrophytic vegetation	☐ Litter, debris and or clay deposits	☒ Wetland symbol on map (presence of solid or dotted blue line, solid, shaded or stippled blue area on map)
☐ Absence of vegetation or interruption of upland vegetation	☐ Algae or alga mat	☐ Other (Specify)

Notes: SHOWN AS BLUE LINE ON USGS TOPO MAP FOR THE CALABASAS QUAD; NHD STREAM - IMPOUNDED AREAS SHOWN AS PSSC ON NWI (FORESTED/ SHRUB WETLAND)

- NO EVIDENCE OF RECENT FLOW IN THIS AREA

Channel Characteristics

Channel Width	5.5 FT } JUST BEFORE ENTERS
Channel Depth	2.5 FT } 24" CMP AT WEST
High Water Line Width	END OF THE PROJ.
High Water Line Depth	AREA

Channel Substrate (check all that apply)

- [x] Sand
- [ ] Cobble
- [ ] Silt / Clay
- [ ] Gravel
- [ ] Rock
- [ ] Other_____

Vegetation Characteristics of Channel or Basin

Vegetated Channel or Basin? [ ] Yes [x] No

Dominant / Characteristic Species

Vegetation Adjacent to Channel

Dominant / Characteristic Species
BACCHARIS SALICIFOLIA, TOXICODENDRON DIVERSILOBUM,
ADENOSTOMA FASCICULATUM, MALACOTHAMNUS FASCICULATUS,
MALOSOMA LAURINA, ERIODICTYON CRASSIFOLIUM

Notes: UPPER REACH GOES INTO 24 INCH DIAMEER CULVERT UNDER FILL EAST OF ALPHA TEST STANDS

- AT ~~[illegible]~~ CULVERT DISCHARGE - ABOUT 60% FILLED CULVERT OPENING - DENSE MESEMBRYANTHEMUM CRYSTALLINUM IN DISCHARGE AREA - DOWN STREAM NO DEFINED CHANNEL OR OHWM - SOME BACCHARIS SALICIFOLIA, SALIX LASIOLEPIS W/ BRASSICA NIGRA AND CARDUUS PYCNOCEPHALUS, BROMUS DIANDRUS, AVENA, ETC.

ARID REGIONS - WETLAND DELINEATION DATA SHEET

Project: NASA - Santa Susana Field Lab Date: 1/5/2012

Observers: Russell Huddleston and Steve Long [redacted]

Feature Name BELL CREEK - ALFA Sample Point CONCRETE IMPOUNDMENT - [redacted]

GPS Location: 34° 13' 58.837" 118° 41' 40.151"

Geomorphic Feature

☐ River	☐ Lake	☐ Swale
☒ Stream	☐ Pond	☐ Erosional Channel
☐ Canal	☒ Impoundment	☐ Gully
☐ Irrigation Channel	☐ Playa	☐ Depressional Basin
☐ Drainage Channel	☐ Constructed Basin	☐ Rock Basin
☐ Excavated Ditch	☐ Unvegetatted Depression	☐ Other: _____

Apparent Hydrologic Regime

☐ Perennial	☐ Standing Water (Depth:_____)
☐ Intermittent	☐ Flowing Water (Depth_____)
☒ Ephemeral	☒ Dry at time of the survey

Indictors

☐ Standing or flowing water with no indication of recent precipitation	☐ Channel adjacent to shelf with steep side	☐ Natural / irrigation / manmade / ditch flowing into feature
☐ presence of hydrophytic vegetation	☐ Natural line, stain or mineral (salt) deposit	☐ Dated picture / account showing / referring to identifiable features
☐ Presence of hydric soil with or without hydrophytic vegetation	☐ Litter, debris and or clay deposits	☒ Wetland symbol on map (presence of solid or dotted blue line, solid, shaded or stippled blue area on map)
☐ Absence of vegetation or interruption of upland vegetation	☐ Algae or alga mat	☐ Other (Specify)

Notes: SHOWN AS A BLUE LINE ON USGS TOPO FOR THE CALABASAS QUAD; NWI (PSSC) FORESTED/SCRUB WETLAND; NHD STREAM

NO EVIDENCE OF RECENT OHWM / FLOWS IN THIS AREA

Channel Characteristics

/ NO DEFINED BED/ BANK CHANNEL IN THIS AREA

Channel Width	~ 15' WIDE (NO MEASUREMENT TAKEN)
Channel Depth	~ 2 FEET TO TOP OF IMPOUNDMENT
~~High Water Line Width~~	
~~High Water Line Depth~~	

Channel Substrate (check all that apply)

- [x] Sand
- [ ] Cobble
- [ ] Silt / Clay
- [ ] Gravel
- [ ] Rock
- [ ] Other_____

Vegetation Characteristics of Channel or Basin

Vegetated Channel or Basin? [x] Yes [ ] No

Dominant / Characteristic Species

BACCHARIS SALICIFOLIA } FROM IMPOUNDMENT
SALIX LASIOLEPIS - } BACK TO 24" CMP DISCHARGE

- ABUNDANT UPLAND UNDERSTORY HERBS - WILLOWS IN POOR CONDITION - 85-90% DEAD IN SOME AREAS

Vegetation Adjacent to Channel

Dominant / Characteristic Species

BACCHARIS PILULARIS, MALOSMA LAURINA,
AVENA BARBATA, CARDUUS PYCNOCEPHALUS
CENTAUREA MELITENSIS
SMALL QUERCUS AGRIFOLIA

Notes: VERY WEAKLY EXPRESSED / INTERMITTENT DRAINAGE CHANNEL FROM CULVERT OUTFALL DOWN TO THE CONCRETE IMPOUNDMENT - MOSTLY NO DEFINED CHANNEL

TWO CULVERTS AT IMPOUNDMENT - ONE RUNS ALONG THE SOUTH - TOP SLOPE OF THE DRAINAGE - THE SECOND CULVERT APPEARS TO DISCHARGE INTO THE NATURAL CHANNEL ~15' BELOW THE IMPOUNDMENT STRUCTURE

ARID REGIONS - WETLAND DELINEATION DATA SHEET

Project: NASA - Santa Susana Field Lab Date: 1/5/ 2012

Observers: Russell Huddleston and Steve Long

Feature Name BELL CREEK - ALFA Sample Point DOWN STREAM CONCRETE IMPOUND. BC-2

GPS Location: AVE POSITION: 34° 13' 58.906 118° 41' 40.784"

Geomorphic Feature

☐ River	☐ Lake	☐ Swale
☒ Stream	☐ Pond	☐ Erosional Channel
☐ Canal	☒ Impoundment	☐ Gully
☐ Irrigation Channel	☐ Playa	☐ Depressional Basin
☐ Drainage Channel	☐ Constructed Basin	☐ Rock Basin
☐ Excavated Ditch	☐ Unvegetatted Depression	☐ Other: _____

Apparent Hydrologic Regime

☐ Perennial	☐ Standing Water (Depth:_____)
☐ Intermittent	☐ Flowing Water (Depth_____)
☒ Ephemeral	☒ Dry at time of the survey

Indictors

☐ Standing or flowing water with no indication of recent precipitation	☐ Channel adjacent to shelf with steep side	☐ Natural / irrigation / manmade / ditch flowing into feature
☐ presence of hydrophytic vegetation	☐ Natural line, stain or mineral (salt) deposit	☐ Dated picture / account showing / referring to identifiable features
☐ Presence of hydric soil with or without hydrophytic vegetation	☐ Litter, debris and or clay deposits	☒ Wetland symbol on map (presence of solid or dotted blue line, solid, shaded or stippled blue area on map)
☐ Absence of vegetation or interruption of upland vegetation	☐ Algae or alga mat	☐ Other (Specify)

Notes: SHOWN AS A BLUE LINE ON THE USGS TOPO MAP FOR THE CALABASAS QUAD; NWI (PSSC) FORESTED/SCRUB WETLAND AND NHD STREAM

- NO EVIDENCE OF RECENT FLOW IN THIS AREA

Channel Characteristics

Channel Width	NO DEFINED BED / BANK
Channel Depth	CHANNEL PRESENT
~~High Water Line Width~~	
~~High Water Line Depth~~	

Channel Substrate (check all that apply)

- [x] Sand
- [ ] Cobble
- [ ] Silt / Clay
- [ ] Gravel
- [ ] Rock
- [ ] Other_____

Vegetation Characteristics of Channel or Basin

Vegetated Channel or Basin? [x] Yes [ ] No

Dominant / Characteristic Species

CHANNEL THROUGHOUT THE AREA IS FILLED WITH
DEAD / FALLEN WOODY DEBRIS - APPEARS MOSTLY
SALIX LASIOLEPIS - BURNED IN 2005 FIRE
ALMOST NO REGENERATION
DENSE CARDUUS PYCNOCEPHALUS IN "CHANNEL"

Vegetation Adjacent to Channel

Dominant / Characteristic Species

BACCHARIS PILULARIS
MALOSOMA LAURINA
QUERCUS AGRIFOLIA (FEW SMALL TREES)
SPARSE BACCHARIS SALICIFOLIA ALONG LOWER SLOPES
AVENA BARBATA, BROMUS SPP. CENTAUREA MELITENSIS

Notes: COULD NOT ACCESS THIS SECTION DUE TO ABUNDANT FALLEN WOODY DEBRIS - NO APPARENT BED / BANK FEATURE AND NO EVIDENCE OF RECENT FLOWS THROUGH THIS SECTION - DOWN STREAM TO EARTHEN DAM STRUCTURE

ARID REGIONS - WETLAND DELINEATION DATA SHEET

Project: NASA - Santa Susana Field Lab Date: 11/5/2012

Observers: Russell Huddleston and Steve Long

Feature Name BELL CREEK - ALFA Sample Point DOWN STREAM EARTHEN DAM BC-3

GPS Location: 34° 13' 58.352" 118° 41' 43.905"

Geomorphic Feature

☐ River	☐ Lake	☐ Swale
☒ Stream	☐ Pond	☐ Erosional Channel
☐ Canal	☒ Impoundment	☐ Gully
☐ Irrigation Channel	☐ Playa	☐ Depressional Basin
☐ Drainage Channel	☐ Constructed Basin	☐ Rock Basin
☐ Excavated Ditch	☐ Unvegetatted Depression	☐ Other: _____

Apparent Hydrologic Regime

☐ Perennial	☐ Standing Water (Depth: _____)
☐ Intermittent	☐ Flowing Water (Depth _____)
☒ Ephemeral	☒ Dry at time of the survey

Indictors

☐ Standing or flowing water with no indication of recent precipitation	☐ Channel adjacent to shelf with steep side	☐ Natural / irrigation / manmade / ditch flowing into feature
☐ presence of hydrophytic vegetation	☐ Natural line, stain or mineral (salt) deposit	☐ Dated picture / account showing / referring to identifiable features
☐ Presence of hydric soil with or without hydrophytic vegetation	☐ Litter, debris and or clay deposits	☒ Wetland symbol on map (presence of solid or dotted blue line, solid, shaded or stippled blue area on map)
☐ Absence of vegetation or interruption of upland vegetation	☐ Algae or alga mat	☐ Other (Specify)

Notes: SHOWN AS A BLUE LINE ON THE USGS TOPO MAP FOR THE CALABASAS QUAD; NWI (PSSC) FORESTED/SHRUB WETLAND; NHD STREAM

NO EVIDENCE OF RECENT FLOW OR OTHER IN THIS AREA

Channel Characteristics

Channel Width	NO DEFINED BED-BANK
Channel Depth	FEATURE IN THIS AREA
~~High Water Line Width~~	DOWN STREAM OF EARTHEN
~~High Water Line Depth~~	DAM

Channel Substrate (check all that apply)

- [x] Sand
- [ ] Cobble
- [ ] Silt / Clay
- [ ] Gravel
- [ ] Rock
- [ ] Other_____

Vegetation Characteristics of Channel or Basin

Vegetated Channel or Basin? [x] Yes [ ] No

Dominant / Characteristic Species

BACCHARIS SALICIFOLIA
TOXICODENDRON DIVERSILOBUM
CARDUUS PYCNOCEPHALUS

Vegetation Adjacent to Channel

Dominant / Characteristic Species

BRASSICA NIGRA, CENTAUREA MELITENSIS, BROMUS SPP.
ARTEMESIA CALIFORNICA
ERIOGONUM FASCICULATUM
BACCHARIS PILULARIS
MALACOTHAMNUS FASCICULATUS
MALOSOMA LAURINA

} SPARSE, SCATTERED SHRUBS

Notes:

DOWN STREAM NO DEFINED CHANNEL - NO BED/BANK FLAT TOPOGRAPHY BETWEEN SLOPES - NO EVIDENCE OF RECENT FLOW - VEGETATION BACCHARIS PILULARIS, BACCHARIS SALICIFOLIA, DEAD SAMX LASIOLEPIS - ABUNDANT CARDUUS PYCNOCEPHALUS, TOXICODENDRON DIVERSILOBUM AND BRASSICA NIGRA

* NO CULVERT WAS LOCATED AT THE WEST END NEAR THE ROAD

ARID REGIONS - WETLAND DELINEATION DATA SHEET

Project: NASA - Santa Susana Field Lab Date: 1/5/2012

Observers: Russell Huddleston and Steve Long

Feature Name BELL CREEK - ALFA Sample Point WEST, DOWN STREAM OF CAPPED POND

GPS Location: AVE POSITION: 34° 13' 58.550" 118° 41' 57.006"

BC-4

Geomorphic Feature

☐ River	☐ Lake	☐ Swale
☒ Stream	☐ Pond	☐ Erosional Channel
☐ Canal	☐ Impoundment	☐ Gully
☐ Irrigation Channel	☐ Playa	☐ Depressional Basin
☐ Drainage Channel	☐ Constructed Basin	☐ Rock Basin
☐ Excavated Ditch	☐ Unvegetatted Depression	☐ Other: _____

Apparent Hydrologic Regime

☐ Perennial	☐ Standing Water (Depth:_____)
☐ Intermittent	☐ Flowing Water (Depth_____)
☒ Ephemeral	☒ Dry at time of the survey

Indictors

☐ Standing or flowing water with no indication of recent precipitation	☐ Channel adjacent to shelf with steep side	☐ Natural / irrigation / manmade / ditch flowing into feature
☐ presence of hydrophytic vegetation	☐ Natural line, stain or mineral (salt) deposit	☐ Dated picture / account showing / referring to identifiable features
☐ Presence of hydric soil with or without hydrophytic vegetation	☐ Litter, debris and or clay deposits	☒ Wetland symbol on map (presence of solid or dotted blue line, solid, shaded or stippled blue area on map)
☐ Absence of vegetation or interruption of upland vegetation	☐ Algae or alga mat	☐ Other (Specify)

Notes: BLUE LINE ON USGS TOPO MAP FOR THE CALABASAS QUAD; NHD STREAM; NO NWI FEATURE

NO EVIDENCE OF RECENT FLOW

Channel Characteristics

Channel Width	NO DEFINED CHANNEL
Channel Depth	OR BED-BANK IN THIS
~~High Water Line Width~~	AREA
~~High Water Line Depth~~	

Channel Substrate (check all that apply)

- [x] Sand
- [ ] Cobble
- [ ] Silt / Clay
- [ ] Gravel
- [ ] Rock
- [ ] Other_____

Vegetation Characteristics of Channel or Basin

Vegetated Channel or Basin? [x] Yes [ ] No

Dominant / Characteristic Species
BACCHARIS SALICIFOLIA
CARDUUS PYCNOCEPHALUS
BACCHARIS PILULARIS
TOXICODENDRON DIVERSILOBUM
PHACALEIA RAMOSISSIMA

Vegetation Adjacent to Channel

Dominant / Characteristic Species

Notes: TERMINATES AT 50 INCH DIAM CMP JUST BEFORE SPA AREA - (UNDER ROAD)

UPSTREAM OF CULVERT - SOME SALIX LASIOLEPIS, ARTEMESIA DOUGLASIANA WITH MALACOTHAMNUS FASCICULATUS, BACCHARIS SALICIFOLIA - INTERMITTENT 2 FOOT WIDE 2-3 INCH DEEP EROSIONAL CHANNEL BUT NO CHANNEL OR CONTINUOUS BED/BANK FEATURE IN THIS AREA.

ARID REGIONS - WETLAND DELINEATION DATA SHEET

Project: NASA - Santa Susana Field Lab Date: 1/5/2012

Observers: Russell Huddleston and Steve Long BC-5

Feature Name BELL CREEK - SPA Sample Point (CONCRETE LINED)

GPS Location: ~~AVE POSITION: 34° 14' 01.234" 118° 42' 01.249~~
34° 14' 01.469 118° 42' 03.118"

Geomorphic Feature

☐ River	☐ Lake	☐ Swale
☒ Stream	☐ Pond	☐ Erosional Channel
☐ Canal	☐ Impoundment	☐ Gully
☐ Irrigation Channel	☐ Playa	☐ Depressional Basin
☐ Drainage Channel	☐ Constructed Basin	☐ Rock Basin
☐ Excavated Ditch	☐ Unvegetatted Depression	☐ Other: _____

Apparent Hydrologic Regime

☐ Perennial	☐ Standing Water (Depth: _____)
☐ Intermittent	☐ Flowing Water (Depth _____)
☒ Ephemeral	☒ Dry at time of the survey

Indictors

☐ Standing or flowing water with no indication of recent precipitation	☐ Channel adjacent to shelf with steep side	☐ Natural / irrigation / manmade / ditch flowing into feature
☐ presence of hydrophytic vegetation	☒ Natural line, stain or mineral (salt) deposit	☐ Dated picture / account showing / referring to identifiable features
☐ Presence of hydric soil with or without hydrophytic vegetation	☐ Litter, debris and or clay deposits	☒ Wetland symbol on map (presence of solid or dotted blue line, solid, shaded or stippled blue area on map)
☐ Absence of vegetation or interruption of upland vegetation	☐ Algae or alga mat	☐ Other (Specify)

Notes: SHOWN AS A BLUE LINE ON THE USGS TOPO MAP FOR THE CALABASAS QUAD; NHD STREAM - WESTERN PART OF THIS FEATURE SHOWN AS NWI - (PFOA) FORESTED/SCRUB WETLAND

- SOME WATER STAINING ON CONCRETE

Channel Characteristics

CONCRETE LINED DRAINAGE DITCH

Channel Width	5.7 FT - 10.8 FT
Channel Depth	25 INCHES
High Water Line Width	1-3 FEET
High Water Line Depth	2 INCHES

Channel Substrate (check all that apply)

- ☐ Sand
- ☐ Cobble
- ☐ Silt / Clay
- ☐ Gravel
- ☐ Rock
- ☒ Other CONCRETE

Vegetation Characteristics of Channel or Basin

Vegetated Channel or Basin?	☐ Yes ☒ No
Dominant / Characteristic Species	

Vegetation Adjacent to Channel

Dominant / Characteristic Species
MALOSOMA LAURINA, ERIODICTYON CRASSIFOLIUM
BACCHARIS PILULARIS, BACCHARIS SALICIFOLIA
TOXICODENDRON DIVERSILOBUM, RIBES MALVACEUM,
ADENOSTOMA FASCICULATUM, CEANOTHUS CRASSIFOLIUS

Notes: CONCRETE CHANNEL ENDS APPROX 100 FEET DOWN STREAM OF THIS LOCATION

ARID REGIONS - WETLAND DELINEATION DATA SHEET

Project: NASA - Santa Susana Field Lab Date: 1/ 5/2012

Observers: Russell Huddleston and Steve Long

Feature Name BELL CREEK - SPA Sample Point ~~SP~~ BC-6

GPS Location: 34° 14' 00. 432 118° 42° 07. 570

Geomorphic Feature

☐ River	☐ Lake	☐ Swale
☒ Stream	☐ Pond	☐ Erosional Channel
☐ Canal	☐ Impoundment	☐ Gully
☐ Irrigation Channel	☐ Playa	☐ Depressional Basin
☐ Drainage Channel	☐ Constructed Basin	☐ Rock Basin
☐ Excavated Ditch	☐ Unvegetatted Depression	☐ Other: _____

Apparent Hydrologic Regime

☐ Perennial	☐ Standing Water (Depth:_____)
☐ Intermittent	☐ Flowing Water (Depth_____)
☒ Ephemeral	☒ Dry at time of the survey

Indictors

☐ Standing or flowing water with no indication of recent precipitation	☐ Channel adjacent to shelf with steep side	☐ Natural / irrigation / manmade / ditch flowing into feature
☐ presence of hydrophytic vegetation	☐ Natural line, stain or mineral (salt) deposit	☐ Dated picture / account showing / referring to identifiable features
☐ Presence of hydric soil with or without hydrophytic vegetation	☒ Litter, debris and or clay deposits	☒ Wetland symbol on map (presence of solid or dotted blue line, solid, shaded or stippled blue area on map)
☐ Absence of vegetation or interruption of upland vegetation	☐ Algae or alga mat	☒ Other (Specify) SCOURING

Notes: SHOWN AS BLUE LINE ON USGS TOPO MAP FOR THE CALABASAS QUAD, NHD STREAM; NWI - (PFOA) - FORESTED/SHRUB WETLAND

Channel Characteristics

Channel Width	6 FT
Channel Depth	2 FT
High Water Line Width	2.7 FT
High Water Line Depth	4 INCHES

Channel Substrate (check all that apply)

- [x] Sand
- [ ] Cobble
- [ ] Silt / Clay
- [x] Gravel
- [x] Rock
- [ ] Other_____

SAND / ROCK CHANNEL W/ SPARSE GRAVEL

Vegetation Characteristics of Channel or Basin

Vegetated Channel or Basin? [ ] Yes [x] No

Dominant / Characteristic Species

CARDUUS PYCNOCEPHALUS SEEDLINGS } LESS THAN 1% TOTAL
POLYPOGON MONSPELIENSIS } COVER

Vegetation Adjacent to Channel

Dominant / Characteristic Species

BACCHARIS SALICIFOLIA, BACCHARIS PILULARIS
DEAD SALIX SP - NO REGROWTH - BURNED IN 2005 FIRE
MALACOTHAMNUS FASCICULATUS
CARDUUS PYCNOCEPHALUS, BRASSICA NIGRA

Notes: DOWN STREAM OF CONCRETE LINED DITCH - CONTINUES GENERALLY SOUTH INTO SILVERNALE POND OFF NASA PROPERTY

ARID REGIONS - WETLAND DELINEATION DATA SHEET

Project: NASA - Santa Susana Field Lab Date: 1/6/2012

Observers: Russell Huddleston and Steve Long

Feature Name BELL CREEK - CDFF Sample Point BC-7

GPS Location: 34° 13' 41.161" 118° 42' 25.275"

Geomorphic Feature

☐ River	☐ Lake	☐ Swale
☒ Stream	☐ Pond	☐ Erosional Channel
☐ Canal	☐ Impoundment	☐ Gully
☐ Irrigation Channel	☐ Playa	☐ Depressional Basin
☐ Drainage Channel	☐ Constructed Basin	☐ Rock Basin
☐ Excavated Ditch	☐ Unvegetatted Depression	☐ Other: _____

Apparent Hydrologic Regime

☐ Perennial	☐ Standing Water (Depth:_____)
☐ Intermittent	☐ Flowing Water (Depth_____)
☒ Ephemeral	☒ Dry at time of the survey

Indictors

☐ Standing or flowing water with no indication of recent precipitation	☐ Channel adjacent to shelf with steep side	☐ Natural / irrigation / manmade / ditch flowing into feature
☐ presence of hydrophytic vegetation	☐ Natural line, stain or mineral (salt) deposit	☐ Dated picture / account showing / referring to identifiable features
☐ Presence of hydric soil with or without hydrophytic vegetation	☐ Litter, debris and or clay deposits	☒ Wetland symbol on map (presence of solid or dotted blue line, solid, shaded or stippled blue area on map)
☐ Absence of vegetation or interruption of upland vegetation	☐ Algae or alga mat	☐ Other (Specify)

Notes: SHOWN AS A BLUE LINE STREAM ON USGS TOPO MAP FOR THE CALABASAS QUAD; ALSO SHOWN AS A NHD STREAM - NO NWI MAPPED FEATURES THIS AREA

Channel Characteristics

Channel Width	5 FT
Channel Depth	1 FT
High Water Line Width	30 INCHES
High Water Line Depth	1-2 INCHES

Channel Substrate (check all that apply)

- [x] Sand
- [ ] Cobble
- [ ] Silt / Clay
- [x] Gravel
- [ ] Rock
- [ ] Other_____

SANDY W/ SPARSE GRAVEL - MORE COBBLE DOWN STREAM

Vegetation Characteristics of Channel or Basin

Vegetated Channel or Basin? [x] Yes [ ] No

Dominant / Characteristic Species

CARDUUS PYCNOCEPHALUS
BRASSICA NIGRA
SILYBUM MARIANUM

} LESS THAN 2% TOTAL COVER

Vegetation Adjacent to Channel

Dominant / Characteristic Species

BACCHARIS SALICIFOLIA, ADENOSTOMA FASCICULATA,
ERIODICTYON CRASSIFOLIUM, CEANOTHUS SP., MALOSOMA LAURINA
SOME QUERCUS AGRIFOLIA - SALIX LASIOLEPIS SAPLINGS
PHACELIA RAMOSISSIMA, BRASSICA NIGRA

Notes:_____

ARID REGIONS - WETLAND DELINEATION DATA SHEET

Project: NASA - Santa Susana Field Lab Date: 1/6/2012

Observers: Russell Huddleston and Steve Long

Feature Name BELL CREEK - CDFF Sample Point BC-8

GPS Location: 34° 13' 39.469" -118° 42' 25.316"

Geomorphic Feature

☐ River	☐ Lake	☐ Swale
☒ Stream	☐ Pond	☐ Erosional Channel
☐ Canal	☐ Impoundment	☐ Gully
☐ Irrigation Channel	☐ Playa	☐ Depressional Basin
☐ Drainage Channel	☐ Constructed Basin	☐ Rock Basin
☐ Excavated Ditch	☐ Unvegetatted Depression	☐ Other: _____

Apparent Hydrologic Regime

☐ Perennial	☐ Standing Water (Depth:_____)
☐ Intermittent	☐ Flowing Water (Depth_____)
☒ Ephemeral	☒ Dry at time of the survey

Indictors

☐ Standing or flowing water with no indication of recent precipitation	☐ Channel adjacent to shelf with steep side	☐ Natural / irrigation / manmade / ditch flowing into feature
☐ presence of hydrophytic vegetation	☐ Natural line, stain or mineral (salt) deposit	☐ Dated picture / account showing / referring to identifiable features
☐ Presence of hydric soil with or without hydrophytic vegetation	☐ Litter, debris and or clay deposits	☒ Wetland symbol on map (presence of solid or dotted blue line, solid, shaded or stippled blue area on map)
☐ Absence of vegetation or interruption of upland vegetation	☐ Algae or alga mat	☐ Other (Specify)

Notes: SHOWN AS A BLUE LINE ON THE USGS TOPO MAP FOR THE CALABASAS QUAD; NHD STREAM

NO NWI MAPPED WETLANDS

Channel Characteristics

Channel Width	4.8 FT
Channel Depth	8-18 INCHES
High Water Line Width	2.1 FT
High Water Line Depth	3 INCHES

Channel Substrate (check all that apply)

- [x] Sand
- [x] Cobble
- [ ] Silt / Clay
- [x] Gravel
- [ ] Rock
- [ ] Other_____

SAND / GRAVEL SUBSTRATE W/ SPARSE COBBLE

Vegetation Characteristics of Channel or Basin

Vegetated Channel or Basin? [x] Yes [ ] No

Dominant / Characteristic Species

BRASSICA NIGRA } LESS THAN 5% TOTAL
CARDUUS PYCNOCEPHALUS } COVER

Vegetation Adjacent to Channel

Dominant / Characteristic Species

ARTEMESIA DOUGLASIANA, TOXICODENDRON DIVERSILOBUM
ERIODICTYON CRASSIFOLIUM, BACCHARIS SALICIFOLIA,
MALACOTHAMNUS FASCICULATUS, CEANOTHUS SP.
BRASSICA NIGRA, PHACELIA RAMOSISSIMA, BACCHARIS PILULARIS
SILYBUM MARIANUM - OCCASSIONAL SALIX LASIOLEPIS - <4" DBH

Notes:

DOWN STREAM - WELL DEFINED SANDY CHANNEL
FLOWS THROUGH AREA WITH DENSE ARTEMESIA
DOUGLASIANA WITH SCATTERED BRASSICA NIGRA
- SURROUNDED BY BACCHARIS PILULARIS, TOXICODENDRON
DIVERSILOBUM - OCCASSIONAL QUERCUS AGRIFOLIA

- SEGMENT NORTH OF R2B POND DENSE TOXICODENDRON
NO ACCESS TO THE DRAINAGE

ARID REGIONS - WETLAND DELINEATION DATA SHEET

Project: NASA - Santa Susana Field Lab Date: 1/5/2012

Observers: Russell Huddleston and Steve Long

Feature Name BELL CREEK SW Sample Point ~~3~~ BC-9

GPS Location: 34° 13' 33.868" 118° 42' 23.679"

Geomorphic Feature

☐ River	☐ Lake	☐ Swale
☒ Stream	☐ Pond	☐ Erosional Channel
☐ Canal	☐ Impoundment	☐ Gully
☐ Irrigation Channel	☐ Playa	☐ Depressional Basin
☐ Drainage Channel	☐ Constructed Basin	☐ Rock Basin
☐ Excavated Ditch	☐ Unvegetatted Depression	☐ Other: _____

Apparent Hydrologic Regime

☐ Perennial	☐ Standing Water (Depth: _____)
☐ Intermittent	☐ Flowing Water (Depth _____)
☒ Ephemeral	☒ Dry at time of the survey

HYDROLOGY MANAGED - PUMPING TO SILVERNALE POND

Indictors

☐ Standing or flowing water with no indication of recent precipitation	☐ Channel adjacent to shelf with steep side	☐ Natural / irrigation / manmade / ditch flowing into feature
☐ presence of hydrophytic vegetation	☐ Natural line, stain or mineral (salt) deposit	☐ Dated picture / account showing / referring to identifiable features
☐ Presence of hydric soil with or without hydrophytic vegetation	☒ Litter, debris and or clay deposits	☒ Wetland symbol on map (presence of solid or dotted blue line, solid, shaded or stippled blue area on map)
☐ Absence of vegetation or interruption of upland vegetation	☐ Algae or alga mat	☐ Other (Specify)

Notes: - SHOWN AS BLUE LINE ON USGS TOPO FOR THE CALABASAS QUAD; NWI (PFOA) FORESTED/SCRUB WETLAND AND NHD STREAM.

SOME OLD DRIFT LINES / DEBRIS WRACKING EVIDENT

Channel Characteristics

Channel Width	10 FT
Channel Depth	14 INCHES
~~High Water Line Width~~ LOW FLOW	3.7 FT
~~High Water Line Depth~~ LOW FLOW	4 INCHES

Channel Substrate (check all that apply)

- [x] Sand
- [x] Cobble
- [ ] Silt / Clay
- [x] Gravel
- [ ] Rock
- [x] Other BOULDERS

SAND - GRAVEL - COBBLE SUBSTRATE W/ SOME LARGE SANDSTONE BOULDERS

Vegetation Characteristics of Channel or Basin

Vegetated Channel or Basin? [ ] Yes [x] No

Dominant / Characteristic Species

Vegetation Adjacent to Channel

Dominant / Characteristic Species
BACCHARIS SALICIFOLIA
BACCHARIS PILULARIS
TOXICODENDRON DIVERSILOBUM, QUERCUS AGRIFOLIA
ERIODICTYON CRASSIFOLIUM, MALOSOMA LAURINA
PIPTATHERUM MILACEUM, PHACELIA RAMOSISSIMA
~~Value~~ RIBES MALVACEUM

Notes:

DENSE BACCHARIS SALICIFOLIA OVERHANGING THE CHANNEL THROUGHOUT MUCH OF THIS AREA BUT BOTTOM OF CHANNEL GENERALLY DEVOID OF VEGETATION

ARID REGIONS - WETLAND DELINEATION DATA SHEET

Project: NASA - Santa Susana Field Lab Date: 1/5/2012

Observers: Russell Huddleston and Steve Long

Feature Name BELL CREEK SW Sample Point [redacted]

GPS Location: 34° 13' 32.724" -118° 42' 25.084 BC-10

Geomorphic Feature

☐ River	☐ Lake	☐ Swale
☒ Stream	☐ Pond	☐ Erosional Channel
☐ Canal	☐ Impoundment	☐ Gully
☐ Irrigation Channel	☐ Playa	☐ Depressional Basin
☐ Drainage Channel	☐ Constructed Basin	☐ Rock Basin
☐ Excavated Ditch	☐ Unvegetatted Depression	☐ Other: _____

Apparent Hydrologic Regime

☐ Perennial	☐ Standing Water (Depth:_____)
☐ Intermittent	☐ Flowing Water (Depth_____)
☒ Ephemeral	☒ Dry at time of the survey

MANAGED HYDROLOGY - PUMPING INTO SILVERMALE POND

Indictors

☐ Standing or flowing water with no indication of recent precipitation	☐ Channel adjacent to shelf with steep side	☐ Natural / irrigation / manmade / ditch flowing into feature
☐ presence of hydrophytic vegetation	☐ Natural line, stain or mineral (salt) deposit	☐ Dated picture / account showing / referring to identifiable features
☐ Presence of hydric soil with or without hydrophytic vegetation	☒ Litter, debris and or clay deposits	☒ Wetland symbol on map (presence of solid or dotted blue line, solid, shaded or stippled blue area on map)
☐ Absence of vegetation or interruption of upland vegetation	☐ Algae or alga mat	☐ Other (Specify)

Notes: SHOWN AS A BLUE LINE STREAM ON THE USGS CALABASAS TOPO MAP - NWI (PFOA) FORESTED/SCRUB WETLAND AND NHD STREAM

- SOME DRIFT / DEBRIS AND WRACK LINES EVIDENCE OF PAST FLOWS

Channel Characteristics

Channel Width	10.5 FT
Channel Depth	1 FT
~~High Water Line Width~~ LOW FLOW	5.75 FT
~~High Water Line Depth~~ LOW FLOW	2"

Channel Substrate (check all that apply)

- ☐ Sand
- ☒ Cobble
- ☐ Silt / Clay
- ☒ Gravel
- ☐ Rock
- ☒ Other BOULDER

COBBLE / GRAVEL W/ SOME SANDSTONE BOULDERS

Vegetation Characteristics of Channel or Basin

Vegetated Channel or Basin? ☐ Yes ☒ No

Dominant / Characteristic Species

Vegetation Adjacent to Channel

Dominant / Characteristic Species
QUERCUS AGRIFOLIA
BACCHARIS PILULARIS, KEUKIELLA CORDIFOLIA,
MALOSOMA LAURINA, BACCHARIS SALICIFOLIA, CEANOTHUS SP.
ARTEMESIA DOUGLASIANA, TOXICODENDRON DIVERSILOBUM,
PHACALEIA RAMOSISSIMA
~~[illegible]~~

Notes: APPROX 45 FEET DOWNSTREAM OF THIS POINT THE DRAINAGE IS BLOCKED BY LARGE SANDSTONE BOULDERS AND DENSE TOXICODENDRON - COULD NOT ACCESS THIS SECTION OF THE CREEK

- WATER FLOWS AROUND / UNDER BOULDERS THIS SECTION

ARID REGIONS - WETLAND DELINEATION DATA SHEET

Project: NASA - Santa Susana Field Lab Date: 1/5/2012

Observers: Russell Huddleston and Steve Long

Feature Name BELL CREEK SW Sample Point BC-11

GPS Location: 34° 13' 30.874" 118° 42' 28.210"

Geomorphic Feature

☐ River	☐ Lake	☐ Swale
☒ Stream	☐ Pond	☐ Erosional Channel
☐ Canal	☐ Impoundment	☐ Gully
☐ Irrigation Channel	☐ Playa	☐ Depressional Basin
☐ Drainage Channel	☐ Constructed Basin	☐ Rock Basin
☐ Excavated Ditch	☐ Unvegetatted Depression	☐ Other: _____

Apparent Hydrologic Regime

☐ Perennial	☐ Standing Water (Depth:_____)
☐ Intermittent	☐ Flowing Water (Depth_____)
☒ Ephemeral	☒ Dry at time of the survey

MANAGED HYDROLOGY - PUMPING TO SILVERNALE POND

Indictors

☐ Standing or flowing water with no indication of recent precipitation	☐ Channel adjacent to shelf with steep side	☐ Natural / irrigation / manmade / ditch flowing into feature
☐ presence of hydrophytic vegetation	☐ Natural line, stain or mineral (salt) deposit	☐ Dated picture / account showing / referring to identifiable features
☐ Presence of hydric soil with or without hydrophytic vegetation	☐ Litter, debris and or clay deposits	☒ Wetland symbol on map (presence of solid or dotted blue line, solid, shaded or stippled blue area on map)
☐ Absence of vegetation or interruption of upland vegetation	☐ Algae or alga mat	☐ Other (Specify)

Notes: SHOWN AS BLUE LINE ON USGS TOPO MAP FOR THE CALABASAS QUAD; NWI (PFOA) FORESTED/SCRUB WETLAND; NHD STREAM

- NO EVIDENCE OF RECENT FLOWS OBSERVED AT THIS LOCATION

Channel Characteristics

Channel Width	9.7 FT
Channel Depth	18 INCHES
~~High Water Line Width~~ LOW FLOW	4 FT
~~High Water Line Depth~~ LOW FLOW	5 INCHES

Channel Substrate (check all that apply)

- ☒ Sand
- ☒ Cobble
- ☐ Silt / Clay
- ☐ Gravel
- ☒ Rock
- ☒ Other BOULDER

Vegetation Characteristics of Channel or Basin

Vegetated Channel or Basin? ☒ Yes ☐ No

Dominant / Characteristic Species

ARTEMESIA DOUGLASIANA
RUMEX CRISPUS
PIPTATHERUM MILACEUM
CARDUUS PYCNOCEPHALUS

} LESS THAN 5% TOTAL COVER

Vegetation Adjacent to Channel

Dominant / Characteristic Species

TOXICODENDRON DIVERSILOBUM, QUERCUS AGRIFOLIA
SALIX LASIOLEPIS (FALLEN TREE W/ SMALL RESPROUTING BRANCHES)
MIMULUS AURANTIACUS, ARTEMESIA DOUGLASIANA,
PIPTATHERUM MILACEUM, RIBES MALVACEUM
[redacted] PHACELIA RAMOSISSIMA

Notes:

ARID REGIONS - WETLAND DELINEATION DATA SHEET

Project: NASA - Santa Susana Field Lab Date: 1/5/2012

Observers: Russell Huddleston and Steve Long

Feature Name BELL CREEK SW Sample Point ~~SP-4~~ BC-12

GPS Location: 34° 13' 28.989" 118° 42' 28.628"

Geomorphic Feature

☐ River	☐ Lake	☐ Swale
☒ Stream	☐ Pond	☐ Erosional Channel
☐ Canal	☐ Impoundment	☐ Gully
☐ Irrigation Channel	☐ Playa	☐ Depressional Basin
☐ Drainage Channel	☐ Constructed Basin	☐ Rock Basin
☐ Excavated Ditch	☐ Unvegetatted Depression	☐ Other: _____

Apparent Hydrologic Regime

☐ Perennial	☐ Standing Water (Depth:_____)
☐ Intermittent	☐ Flowing Water (Depth_____)
☒ Ephemeral	☒ Dry at time of the survey

MANAGED HYDROLOGY - PUMPING INTO SILVERMALE POND

Indictors

☐ Standing or flowing water with no indication of recent precipitation	☐ Channel adjacent to shelf with steep side	☐ Natural / irrigation / manmade / ditch flowing into feature
☐ presence of hydrophytic vegetation	☐ Natural line, stain or mineral (salt) deposit	☐ Dated picture / account showing / referring to identifiable features
☐ Presence of hydric soil with or without hydrophytic vegetation	☐ Litter, debris and or clay deposits	☒ Wetland symbol on map (presence of solid or dotted blue line, solid, shaded or stippled blue area on map)
☐ Absence of vegetation or interruption of upland vegetation	☐ Algae or alga mat	☐ Other (Specify)

Notes: BLUE LINE ON USGS TOPO MAP FOR CALABASAS QUAD; NWI (PFOA) FORESTED/SHRUB WETLAND AND MHD STREAM

- NO EVIDENCE OF RECENT FLOW IN THIS AREA

Channel Characteristics

Channel Width	13.7 FT
Channel Depth	8 INCHES
~~High Water Line Width~~	N/A
~~High Water Line Depth~~	N/A

Channel Substrate (check all that apply)

- ☐ Sand
- ☒ Cobble
- ☐ Silt / Clay
- ☒ Gravel
- ☐ Rock
- ☐ Other_____

Vegetation Characteristics of Channel or Basin

Vegetated Channel or Basin? ☒ Yes ☐ No

Dominant / Characteristic Species

PIPTATHERUM MILACEUM ~75% COVER WITHIN THE CHANNEL

CARDUUS PYCNOCEPHALUS <5% COVER

Vegetation Adjacent to Channel

Dominant / Characteristic Species

QUERCUS AGRIFOLIA

TOXICODENDRON DIVERSILOBUM

~~Vertical~~

Notes:_____

ARID REGIONS - WETLAND DELINEATION DATA SHEET

Project: NASA - Santa Susana Field Lab Date: 1/5/2012

Observers: Russell Huddleston and Steve Long

Feature Name BELL CREEK SW Sample Point ~~SP-5~~ BC-13

GPS Location: 34° 13' 26.801" 118° 42' 26.356"

Geomorphic Feature

☐ River	☐ Lake	☐ Swale
☒ Stream	☐ Pond	☐ Erosional Channel
☐ Canal	☐ Impoundment	☐ Gully
☐ Irrigation Channel	☐ Playa	☐ Depressional Basin
☐ Drainage Channel	☐ Constructed Basin	☐ Rock Basin
☐ Excavated Ditch	☐ Unvegetatted Depression	☐ Other: _____

Apparent Hydrologic Regime

☐ Perennial	☐ Standing Water (Depth:_____)
☐ Intermittent	☐ Flowing Water (Depth_____)
☒ Ephemeral	☒ Dry at time of the survey

HIGHLY MANAGED - PUMPING INTO SILVERMACE POND

Indictors

☐ Standing or flowing water with no indication of recent precipitation	☐ Channel adjacent to shelf with steep side	☐ Natural / irrigation / manmade / ditch flowing into feature
☐ presence of hydrophytic vegetation	☐ Natural line, stain or mineral (salt) deposit	☐ Dated picture / account showing / referring to identifiable features
☐ Presence of hydric soil with or without hydrophytic vegetation	☐ Litter, debris and or clay deposits	☒ Wetland symbol on map (presence of solid or dotted blue line, solid, shaded or stippled blue area on map)
☐ Absence of vegetation or interruption of upland vegetation	☐ Algae or alga mat	☐ Other (Specify)

Notes: SHOWN AS A BLUE LINE ON USGS TOPO MAP FOR THE CALABASAS QUAD; NWI (PFOA) FORESTED/SCRUB WETLAND; NHD STREAM

NO EVIDENCE OF RECENT FLOW IN THIS AREA

Channel Characteristics

Channel Width	9.4 FT
Channel Depth	10 INCHES
~~High Water Line Width~~ LOW FLOW	5.8 FT
~~High Water Line Depth~~ LOW FLOW	2 INCHES

Channel Substrate (check all that apply)

- [x] Sand
- [x] Cobble
- [ ] Silt / Clay
- [x] Gravel
- [ ] Rock
- [ ] Other_____

Vegetation Characteristics of Channel or Basin

Vegetated Channel or Basin? [x] Yes [ ] No

Dominant / Characteristic Species

PIPTATHERUM MILACEUM
BRASSICA NIGRA
CARDUUS PYCNOCEPHALUS
RUBUS URSINUS

} LESS THAN 10% TOTAL COVER

Vegetation Adjacent to Channel

Dominant / Characteristic Species

TOXICODENDRON DIVERSILOBUM, PLATANUS RACEMOSA
SYMPHORICARPOS MOLLIS, RUBUS URSINUS, GALIUM SP.
RIBES MALVACEUM, KECKIELLA CORDIFOLIA,
PHACELIA RAMOSISSIMA, PIPTATHERUM MILACEUM

Notes:

ARID REGIONS - WETLAND DELINEATION DATA SHEET

Project: NASA - Santa Susana Field Lab Date: 1/6/2012

Observers: Russell Huddleston and Steve Long

Feature Name BELL CREEK CDFF-TRIBUTARY Sample Point ~~SP~~ BCT-1

GPS Location: 34° 13' 39.190" 118° 42' 26.552

Geomorphic Feature

☐ River	☐ Lake	☐ Swale
☒ Stream	☐ Pond	☐ Erosional Channel
☐ Canal	☐ Impoundment	☐ Gully
☐ Irrigation Channel	☐ Playa	☐ Depressional Basin
☐ Drainage Channel	☐ Constructed Basin	☐ Rock Basin
☐ Excavated Ditch	☐ Unvegetatted Depression	☐ Other: _____

Apparent Hydrologic Regime

☐ Perennial	☐ Standing Water (Depth:_____)
☐ Intermittent	☐ Flowing Water (Depth_____)
☒ Ephemeral	☒ Dry at time of the survey

Indictors

☐ Standing or flowing water with no indication of recent precipitation	☒ Channel adjacent to shelf with steep side	☐ Natural / irrigation / manmade / ditch flowing into feature
☐ presence of hydrophytic vegetation	☐ Natural line, stain or mineral (salt) deposit	☐ Dated picture / account showing / referring to identifiable features
☐ Presence of hydric soil with or without hydrophytic vegetation	☒ Litter, debris and or clay deposits	☐ Wetland symbol on map (presence of solid or dotted blue line, solid, shaded or stippled blue area on map)
☒ Absence of vegetation or interruption of upland vegetation	☐ Algae or alga mat	☐ Other (Specify)

Notes: TRIBUTARY CHANNEL TO BELL CREEK - NOT SHOWN AS A BLUE LINE, NHD OR NWI WETLAND - WELL DEFINED CHANNEL WITH DEBRIS LINES AND WRACKING IN THE CHANNEL

Channel Characteristics

Channel Width	4 FT
Channel Depth	12 - 24 INCHES
High Water Line Width	2.3 FT
High Water Line Depth	12 INCHES

Channel Substrate (check all that apply)

- [x] Sand
- [ ] Cobble
- [ ] Silt / Clay
- [ ] Gravel
- [ ] Rock
- [ ] Other_____

Vegetation Characteristics of Channel or Basin

Vegetated Channel or Basin? [ ] Yes [x] No

Dominant / Characteristic Species

Vegetation Adjacent to Channel

Dominant / Characteristic Species
BACCHARIS PILULARIS, CEANOTHUS SP.
RIBES MALVACEUM, ADENOSTOMA FASCICULATUM
QUERCUS AGRIFOLIA, CARDUUS PYCNOCEPHALUS
BRASSICA NIGRA

Notes:

ARID REGIONS - WETLAND DELINEATION DATA SHEET

Project: NASA - Santa Susana Field Lab Date: 1/6/2012

Observers: Russell Huddleston and Steve Long

Feature Name [redacted] PLF DRAINAGE Sample Point —

GPS Location: AVE: 34° 13' 35.238" 118° 42' 14.049"

Geomorphic Feature

☐ River	☐ Lake	☐ Swale
☐ Stream	☐ Pond	☒ Erosional Channel
☐ Canal	☐ Impoundment	☐ Gully
☐ Irrigation Channel	☐ Playa	☐ Depressional Basin
☐ Drainage Channel	☐ Constructed Basin	☐ Rock Basin
☐ Excavated Ditch	☐ Unvegetatted Depression	☐ Other: _____

Apparent Hydrologic Regime

☐ Perennial	☐ Standing Water (Depth:_____)
☐ Intermittent	☐ Flowing Water (Depth_____)
☒ Ephemeral	☒ Dry at time of the survey

Indictors

☐ Standing or flowing water with no indication of recent precipitation	☐ Channel adjacent to shelf with steep side	☐ Natural / irrigation / manmade / ditch flowing into feature
☐ presence of hydrophytic vegetation	☐ Natural line, stain or mineral (salt) deposit	☐ Dated picture / account showing / referring to identifiable features
☐ Presence of hydric soil with or without hydrophytic vegetation	☐ Litter, debris and or clay deposits	☐ Wetland symbol on map (presence of solid or dotted blue line, solid, shaded or stippled blue area on map)
☒ Absence of vegetation or interruption of upland vegetation	☐ Algae or alga mat	☐ Other (Specify)

Notes: NOT SHOWN AS A BLUE LINE ON USGS TOPO, NOT IN NHD, NO NWI MAPPED WETLANDS IN THIS AREA

- EROSIONAL CHANNEL - GENERALLY LACKING VEGETATION - BUT NO SIGNIFICANT EVIDENCE OF RECENT FLOW IN THIS AREA

Channel Characteristics

Channel Width	(1) 2-3 FT
Channel Depth	12-14 INCHES
~~High Water Line Width~~	–
~~High Water Line Depth~~	–

Channel Substrate (check all that apply)

- [x] Sand
- [x] Cobble
- [ ] Silt / Clay
- [ ] Gravel
- [ ] Rock
- [ ] Other_____

SANDY CHANNEL W/ SOME (SPARSE) COBBLE

Vegetation Characteristics of Channel or Basin

Vegetated Channel or Basin? [ ] Yes [x] No

Dominant / Characteristic Species

Vegetation Adjacent to Channel

Dominant / Characteristic Species
QUERCUS AGRIFOLIA, TOXICODENDRON DIVERSILOBUM
RIBES MALVACEUM, VENEGASIA CARPESIOIDES,
ARTEMESIA CALIFORNICA, PHACELIA RAMOSISSIMA,
BROMUS DIANDRUS, PIPTATHERUM MILIACEUM,
CARDUUS PYCNOCEPHALUS

Notes: UPSTREAM PART OF DRAINAGE AT LARGE SANDSTONE ROCKS - 1-2 FOOT WIDE 6-12 INCH DEEP EROSIONAL CHANNEL (SANDY) - SOME GRAVEL COBBLES - BECOMES SLIGHTLY WIDER - 2-3 FT DOWN STREAM

AT END OF EROSIONAL FEATURE - WEAKLY EXPRESSED FLOW CHANNEL INTO CONCRETE APRON AND 24" CULVERT - DRAINS INTO RIPRAP POND OVERFLOW AREA

ARID REGIONS - WETLAND DELINEATION DATA SHEET

Project: NASA - Santa Susana Field Lab Date: 1/3/2012

Observers: Russell Huddleston and Steve Long

Feature Name COCA DRAINAGE Sample Point ~~SP1~~ CD-1

GPS Location: 34° 13' 34.972" 118° 41' 51.677"

Geomorphic Feature

☐ River	☐ Lake	☐ Swale
☒ Stream	☐ Pond	☐ Erosional Channel
☐ Canal	☐ Impoundment	☐ Gully
☐ Irrigation Channel	☐ Playa	☐ Depressional Basin
☐ Drainage Channel	☐ Constructed Basin	☐ Rock Basin
☐ Excavated Ditch	☐ Unvegetatted Depression	☐ Other: _____

Apparent Hydrologic Regime

☐ Perennial	☐ Standing Water (Depth:_____)
☐ Intermittent	☐ Flowing Water (Depth_____)
☒ Ephemeral	☒ Dry at time of the survey

Indictors

☐ Standing or flowing water with no indication of recent precipitation	☐ Channel adjacent to shelf with steep side	☐ Natural / irrigation / manmade / ditch flowing into feature
☐ presence of hydrophytic vegetation	☐ Natural line, stain or mineral (salt) deposit	☐ Dated picture / account showing / referring to identifiable features
☐ Presence of hydric soil with or without hydrophytic vegetation	☐ Litter, debris and or clay deposits	☒ Wetland symbol on map (presence of solid or dotted blue line, solid, shaded or stippled blue area on map)
☐ Absence of vegetation or interruption of upland vegetation	☐ Algae or alga mat	☒ Other (Specify)

Notes: SHOWN AS A BLUE LINE ON USGS 7.5 MIN TOPO MAP FOR THE CALABASAS QUAD. - NOT SHOWN IN THE NHD

- SOME STAINING AND CORROSION ON GUNITE INDICATING WATER FLOW

Channel Characteristics

Channel Width	26 FT
Channel Depth	2 FT
~~High Water Line Width~~ Low flow	4 FT
~~High Water Line Depth~~ Low flow	1-2"

Channel Substrate (check all that apply)

- ☐ Sand
- ☐ Cobble
- ☐ Silt / Clay
- ☐ Gravel
- ☐ Rock
- ☒ Other GUNITE

Vegetation Characteristics of Channel or Basin

Vegetated Channel or Basin? ☒ Yes ☐ No

Dominant / Characteristic Species

BACCHARIS SALICIFOLIA - SPARSELY SCATTERED IN CRACKS

PIPTATHERUM MILACEUM - SPARSE IN CRACKS

- GENERALLY < 5% VEGETATION PRESENT - GUNITE LINED CHANNEL

Vegetation Adjacent to Channel

Dominant / Characteristic Species

MALOSOMA LAURINA

BACCHARIS SALICIFOLIA, B. PILULARIS

SALIX LASIOLEPIS - FEW SAPLINGS SOUTH SIDE < 3" DBH

TOXICODENDRON DIVERSILOBUM

ERIODICTYON ~~CALIFORNICUM~~ CRASSIFOLIUM

AVENA BARBATA, PIPTATHERUM MILACEUM

Notes:

AREA HIGHLY ALTERED BY CONSTRUCTION OF TEST STANDS - GUNITE SLOPES AND DRAINAGE CHANNEL

ARID REGIONS - WETLAND DELINEATION DATA SHEET

Project: NASA - Santa Susana Field Lab Date: 1/3/2012

Observers: Russell Huddleston and Steve Long

Feature Name COCA DRAINAGE Sample Point ~~SP-2~~ CD-2

GPS Location: 34° 13' 35.934" 118° 41' 58.161"

Geomorphic Feature

☐ River	☐ Lake	☐ Swale
☒ Stream	☐ Pond	☐ Erosional Channel
☐ Canal	☐ Impoundment	☐ Gully
☐ Irrigation Channel	☐ Playa	☐ Depressional Basin
☐ Drainage Channel	☐ Constructed Basin	☐ Rock Basin
☐ Excavated Ditch	☐ Unvegetatted Depression	☐ Other: _____

Apparent Hydrologic Regime

☐ Perennial	☐ Standing Water (Depth:_____)
☐ Intermittent	☐ Flowing Water (Depth_____)
☒ Ephemeral	☒ Dry at time of the survey

Indictors

☐ Standing or flowing water with no indication of recent precipitation	☐ Channel adjacent to shelf with steep side	☐ Natural / irrigation / manmade / ditch flowing into feature
☐ presence of hydrophytic vegetation	☐ Natural line, stain or mineral (salt) deposit	☐ Dated picture / account showing / referring to identifiable features
☐ Presence of hydric soil with or without hydrophytic vegetation	☐ Litter, debris and or clay deposits	☒ Wetland symbol on map (presence of solid or dotted blue line, solid, shaded or stippled blue area on map)
☐ Absence of vegetation or interruption of upland vegetation	☐ Algae or alga mat	☐ Other (Specify)

Notes: SHOWN AS BLUE LINE ON USGS 7.5 MIN TOPO QUAD: CALABASAS - NOT INCLUDED IN NHD

- WATER STAINING AND CORROSION EVIDENT IN GUNITE CHANNEL

Channel Characteristics

Channel Width	30 ft
Channel Depth	2 ft
~~High Water Line Width~~ Low Flow	4.5 ft
~~High Water Line Depth~~ Low Flow	1-2 in

Channel Substrate (check all that apply)

- ☐ Sand
- ☐ Cobble
- ☐ Silt / Clay
- ☐ Gravel
- ☐ Rock
- ☒ Other GUNITE

Vegetation Characteristics of Channel or Basin

Vegetated Channel or Basin? ☒ Yes ☐ No

Dominant / Characteristic Species

BACCHARIS SALICIFOLIA - GENERALLY SPARSE AND SCATTERED IN CRACKS BUT LOCALLY DENSE IN A FEW AREAS OF THE CHANNEL

Vegetation Adjacent to Channel

Dominant / Characteristic Species

ERIODICTYON ~~CALIFORNICUM~~ CRASSIFOLIUM

MALOSOMA LAURINA

TOXICODENDRON DIVERSILOBUM

BACCHARIS PILULARIS

CENTAUREA MELITENSIS, HETEROTHECA GRANDIFLORA, PENNISETUM SETACEUM, PSEUDOGNAPHALIUM BIOLETTII

Notes:

GUNITE CHANNEL THAT FLOWS WEST INTO COCA POND. THE UPSTREAM PORTION OF THE CHANNEL NEAR THIS POINT BLOCKED WITH SINGLE ROW OF SAND BAGS THE DOWNSTREAM PORTION OF THE GUNITE CHANNEL TERMINATES AT 3 CULVERTS - ONE CULVERT WITH A CLOSED VALVE AND TWO CULVERTS HAVE BEEN SEALED WITH HEAVY RUBBER COVERS NO INDICATION OF WATER PONDING BEHIND THESE CULVERTS

ARID REGIONS - WETLAND DELINEATION DATA SHEET

Project: NASA - Santa Susana Field Lab Date: 1/ 3/ 2012

Observers: Russell Huddleston and Steve Long

Feature Name COCA DRAINAGE Sample Point ~~CP-3~~ CD-3

GPS Location: 34° 13' 37.907" 118° 42' 02.894"

Geomorphic Feature

☐ River	☐ Lake	☐ Swale
☒ Stream	☐ Pond	☐ Erosional Channel
☐ Canal	☐ Impoundment	☐ Gully
☐ Irrigation Channel	☐ Playa	☐ Depressional Basin
☐ Drainage Channel	☐ Constructed Basin	☐ Rock Basin
☐ Excavated Ditch	☐ Unvegetatted Depression	☐ Other: _____

Apparent Hydrologic Regime

☐ Perennial	☐ Standing Water (Depth:_____)
☐ Intermittent	☐ Flowing Water (Depth_____)
☒ Ephemeral	☒ Dry at time of the survey

Indictors

☐ Standing or flowing water with no indication of recent precipitation	☐ Channel adjacent to shelf with steep side	☐ Natural / irrigation / manmade / ditch flowing into feature
☐ presence of hydrophytic vegetation	☐ Natural line, stain or mineral (salt) deposit	☐ Dated picture / account showing / referring to identifiable features
☐ Presence of hydric soil with or without hydrophytic vegetation	☐ Litter, debris and or clay deposits	☒ Wetland symbol on map (presence of solid or dotted blue line, solid, shaded or stippled blue area on map)
☐ Absence of vegetation or interruption of upland vegetation	☐ Algae or alga mat	☒ Other (Specify)

Notes: SHOWN AS BLUE LINE ON USGS 7.5 MIN. TOPO MAP CALABASAS QUAD - NOT INCLUDED IN THE NHD

- CONSTRUCTED CONCRETE DITCH FOR COCA POND OVERFLOW AND SITE DRAINAGE - HIGHLY ALTERED NATURAL DRAINAGE CHANNEL

Channel Characteristics

Channel Width	12 ft - TOP OF BANK - BANK
Channel Depth	4 - 4.5 ft
~~High Water Line Width~~ LOW FLOW	5 ft
~~High Water Line Depth~~ LOW FLOW	~ 12 INCHES OR LESS

Channel Substrate (check all that apply)

- ☐ Sand
- ☐ Cobble
- ☐ Silt / Clay
- ☐ Gravel
- ☐ Rock
- ☒ Other CONCRETE

Vegetation Characteristics of Channel or Basin

Vegetated Channel or Basin?	☐ Yes ☒ No
Dominant / Characteristic Species	

Vegetation Adjacent to Channel

Dominant / Characteristic Species
ACMISPON GLABER (= LOTUS SCOPARIUS)
ERIOGONUM FASCICULATUM
BRASSICA NIGRA
BACCHARIS PILULARIS
ERIODICTYON ~~CALIFORNICUM~~ CRASSIFOLIUM

Notes: · SOUTH END OF DITCH FILLED WITH SOIL - NO CULVERT EVIDENT AT START OF THE CONCRETE CHANNEL

APPROX 2" OF SAND IN THE BOTTOM OF THE CHANNEL - NO VEGETATION PRESENT AND NO EVIDENCE OF FLOWING WATER IN THIS LOCATION

ARID REGIONS - WETLAND DELINEATION DATA SHEET

Project: NASA - Santa Susana Field Lab Date: 1/3/2012

Observers: Russell Huddleston and Steve Long

Feature Name COCA DRAINAGE Sample Point ~~SP-4~~ CD-4

GPS Location: 34° 13' 37.543" 118° 42' 05.274"

Geomorphic Feature

☐ River	☐ Lake	☐ Swale
☒ Stream	☐ Pond	☐ Erosional Channel
☐ Canal	☐ Impoundment	☐ Gully
☐ Irrigation Channel	☐ Playa	☐ Depressional Basin
☐ Drainage Channel	☐ Constructed Basin	☐ Rock Basin
☐ Excavated Ditch	☐ Unvegetatted Depression	☐ Other: _____

Apparent Hydrologic Regime

☐ Perennial	☐ Standing Water (Depth:_____)
☐ Intermittent	☐ Flowing Water (Depth_____)
☒ Ephemeral	☒ Dry at time of the survey

Indictors

☐ Standing or flowing water with no indication of recent precipitation	☐ Channel adjacent to shelf with steep side	☐ Natural / irrigation / manmade / ditch flowing into feature
☐ presence of hydrophytic vegetation	☐ Natural line, stain or mineral (salt) deposit	☐ Dated picture / account showing / referring to identifiable features
☐ Presence of hydric soil with or without hydrophytic vegetation	☐ Litter, debris and or clay deposits	☒ Wetland symbol on map (presence of solid or dotted blue line, solid, shaded or stippled blue area on map)
☐ Absence of vegetation or interruption of upland vegetation	☐ Algae or alga mat	☒ Other (Specify)

Notes: SHOWN AS BLUE LINE ON USGS 7.5 MIN TOPO FOR THE CALABASAS QUAD. NOT INCLUDED IN THE NHD

- HIGHLY ALTERED NATURAL DRAINAGE FOR COCA POND OVERFLOW AND SITE DRAINAGE

Channel Characteristics

Channel Width	10.8 ft
Channel Depth	2 ft
~~High Water Line Width~~ LOW FLOW	~3 ft
~~High Water Line Depth~~ LOW FLOW	1-2 INCHES

Channel Substrate (check all that apply)

- ☐ Sand
- ☐ Cobble
- ☐ Silt / Clay
- ☐ Gravel
- ☐ Rock
- ☒ Other CONCRETE

Vegetation Characteristics of Channel or Basin

Vegetated Channel or Basin?	☐ Yes ☒ No

Dominant / Characteristic Species

Vegetation Adjacent to Channel

Dominant / Characteristic Species
TOXICODENDRON DIVERSILOBUM
MALACOTHAMNUS FASCICULARIS
BACCHARIS SALICIFOLIA
MALOSOMA LAURINA
BACCHARIS PILULARIS
ERIODICTYON ~~CALIFORNICUM~~ CRASSIFOLIUM

Notes: SAMPLE POINT DOWNSTREAM OF SMALL DRAINAGE INLET - NO SEDIMENT THIS LOCATION, BUT LOTS OF LEAF LITTER - NO EVIDENCE OF RECENT FLOW

ARID REGIONS - WETLAND DELINEATION DATA SHEET

Project: NASA - Santa Susana Field Lab Date: 11 / 3 / 2012

Observers: Russell Huddleston and Steve Long

Feature Name COCA DRAINAGE Sample Point ~~SP-5~~ CD-5

GPS Location: 34° 13' 38.609" 118° 42' 13.874"

Geomorphic Feature

☐ River	☐ Lake	☐ Swale
☒ Stream	☐ Pond	☐ Erosional Channel
☐ Canal	☐ Impoundment	☐ Gully
☐ Irrigation Channel	☐ Playa	☐ Depressional Basin
☐ Drainage Channel	☐ Constructed Basin	☐ Rock Basin
☐ Excavated Ditch	☐ Unvegetatted Depression	☐ Other: _____

Apparent Hydrologic Regime

☐ Perennial	☐ Standing Water (Depth:_____)
☐ Intermittent	☐ Flowing Water (Depth_____)
☒ Ephemeral	☒ Dry at time of the survey

Indictors

☐ Standing or flowing water with no indication of recent precipitation	☐ Channel adjacent to shelf with steep side	☐ Natural / irrigation / manmade / ditch flowing into feature
☐ presence of hydrophytic vegetation	☐ Natural line, stain or mineral (salt) deposit	☐ Dated picture / account showing / referring to identifiable features
☐ Presence of hydric soil with or without hydrophytic vegetation	☒ Litter, debris and or clay deposits	☒ Wetland symbol on map (presence of solid or dotted blue line, solid, shaded or stippled blue area on map)
☐ Absence of vegetation or interruption of upland vegetation	☐ Algae or alga mat	☒ Other (Specify)

Notes: SHOWN AS BLUE LINE ON USGS 7.5 MIN TOPO FOR THE CALABASAS QUAD - NOT INCLUDED IN THE NHD

- SOME WATER STAINING - CORROSION OBSERVED IN TWO UPSTREAM CULVERTS, - SOME LITTER/DEBRIS WRACKING IN THE CHANNEL. ABSENCE OF LEAF LITTER

Channel Characteristics

Channel Width	10 ft
Channel Depth	10 INCHES
~~High Water Line Width~~ LOW FLOW	2 ft
~~High Water Line Depth~~ LOW FLOW	4 INCHES

Channel Substrate (check all that apply)

- [x] Sand
- [ ] Cobble
- [ ] Silt / Clay
- [x] Gravel
- [x] Rock
- [ ] Other _____

SANDSTONE BEDROCK W/ SAND AND SOME GRAVEL

Vegetation Characteristics of Channel or Basin

Vegetated Channel or Basin? [x] Yes [ ] No

Dominant / Characteristic Species

BRASSICA NIGRA - 10-15%

BACCHARIS SALICIFOLIA - SPARSE <5%

CARDUUS PYCNOCEPHALUS - SPARSE

Vegetation Adjacent to Channel

Dominant / Characteristic Species

ERIODICTYON ~~CALIFORNICUM~~ CRASSIFOLIUM, MALOSOMA LAURINA,

RIBES MALVACEUM, MIMULUS AURANTIACUS

BACCHARIS PILULARIS, PHACELIA RAMOSISSIMA,

PSEUDOGNAPTHALIUM BIOLETTII

Notes: SAMPLE POINT TAKEN DOWN STREAM OF DOUBLE CULVERT 42" AND 24" DIAM. - AT THE END OF CONCRETE DRAINAGE CHANNEL. THIS SECTION OF THE CHANNEL APPEARS MORE NATURAL

- FLOWS WEST INTO RZA POND

ARID REGIONS - WETLAND DELINEATION DATA SHEET

Project: NASA - Santa Susana Field Lab Date: 1/3/2012

Observers: Russell Huddleston and Steve Long

Feature Name COCA DRAINAGE Sample Point ~~SP-6~~ CD-6

GPS Location: 34° 13' 38.504" 118° 42' 15.023"

Geomorphic Feature

☐ River	☐ Lake	☐ Swale
☒ Stream	☐ Pond	☐ Erosional Channel
☐ Canal	☐ Impoundment	☐ Gully
☐ Irrigation Channel	☐ Playa	☐ Depressional Basin
☐ Drainage Channel	☐ Constructed Basin	☐ Rock Basin
☐ Excavated Ditch	☐ Unvegetatted Depression	☐ Other: _____

Apparent Hydrologic Regime

☐ Perennial	☐ Standing Water (Depth:_____)
☐ Intermittent	☐ Flowing Water (Depth_____)
☒ Ephemeral	☒ Dry at time of the survey

Indictors

☐ Standing or flowing water with no indication of recent precipitation	☐ Channel adjacent to shelf with steep side	☐ Natural / irrigation / manmade / ditch flowing into feature
☐ presence of hydrophytic vegetation	☐ Natural line, stain or mineral (salt) deposit	☐ Dated picture / account showing / referring to identifiable features
☐ Presence of hydric soil with or without hydrophytic vegetation	☒ Litter, debris and or clay deposits	☒ Wetland symbol on map (presence of solid or dotted blue line, solid, shaded or stippled blue area on map)
☒ Absence of vegetation or interruption of upland vegetation	☐ Algae or alga mat	☐ Other (Specify)

Notes: SHOWN AS A BLUE LINE ON USGS TOPO 7.5 MIN QUAD: CALABASAS - NOT INCLUDED IN NHD

- SMALL AMOUNT OF LITTER / DEBRIS UPSTACKING IN CHANNEL

Channel Characteristics

Channel Width	12 ft
Channel Depth	3 ft
~~High Water Line Width~~ LOW FLOW	2 ft
~~High Water Line Depth~~ LOW FLOW	1 ft

Channel Substrate (check all that apply)

- [x] Sand
- [ ] Cobble
- [ ] Silt / Clay
- [x] Gravel
- [x] Rock
- [ ] Other_____

- SANDSTONE BOULDERS IN CHANNEL - SAND W/ SOME GRAVEL

Vegetation Characteristics of Channel or Basin

Vegetated Channel or Basin?	[ ] Yes [x] No
Dominant / Characteristic Species	

Vegetation Adjacent to Channel

Dominant / Characteristic Species
ERIODICTYON CRASSIFOLIUM
QUERCUS AGRIFOLIA
BRASSICA NIGRA, PHACELIA RAMOSISSIMA,
CARDUUS PYCNOCEPHALUS, MIMULUS AURANTIACUS

Notes: NATURAL DRAINAGE CHANNEL - SEVERAL LARGE SANDSTONE BOULDERS PRESENT WITHIN CHANNEL FLOWS WEST INTO RZA POND

ARID REGIONS - WETLAND DELINEATION DATA SHEET

Project: NASA - Santa Susana Field Lab Date: 1/ 3/ 2012

Observers: Russell Huddleston and Steve Long

Feature Name COCA DRAINAGE Sample Point ~~SP-7~~ CD-7

GPS Location:

Geomorphic Feature

☐ River	☐ Lake	☐ Swale
☒ Stream	☐ Pond	☐ Erosional Channel
☐ Canal	☐ Impoundment	☐ Gully
☐ Irrigation Channel	☐ Playa	☐ Depressional Basin
☐ Drainage Channel	☐ Constructed Basin	☐ Rock Basin
☐ Excavated Ditch	☐ Unvegetatted Depression	☐ Other:

Apparent Hydrologic Regime

☐ Perennial	☐ Standing Water (Depth:)
☐ Intermittent	☐ Flowing Water (Depth)
☒ Ephemeral	☒ Dry at time of the survey

Indictors

☐ Standing or flowing water with no indication of recent precipitation	☐ Channel adjacent to shelf with steep side	☐ Natural / irrigation / manmade / ditch flowing into feature
☐ presence of hydrophytic vegetation	☐ Natural line, stain or mineral (salt) deposit	☐ Dated picture / account showing / referring to identifiable features
☐ Presence of hydric soil with or without hydrophytic vegetation	☐ Litter, debris and or clay deposits	☒ Wetland symbol on map (presence of solid or dotted blue line, solid, shaded or stippled blue area on map)
☒ Absence of vegetation or interruption of upland vegetation	☐ Algae or alga mat	☐ Other (Specify)

Notes: SHOWN AS BLUE LINE ON USGS 7.5 MIN. TOPO FOR THE CALABASAS QUAD - NOT INCLUDED IN THE NHD

- NATURAL DRAINAGE CHANNEL

Channel Characteristics

Channel Width	14 ft
Channel Depth	1.5 FT
~~High Water Line Width~~ LOW FLOW	2 FT
~~High Water Line Depth~~ LOW FLOW	6 INCHES

Channel Substrate (check all that apply)

- [x] Sand
- [ ] Cobble
- [ ] Silt / Clay
- [x] Gravel 10-15%
- [ ] Rock
- [ ] Other_____

Vegetation Characteristics of Channel or Basin

Vegetated Channel or Basin?	☐ Yes ☒ No
Dominant / Characteristic Species	

Vegetation Adjacent to Channel

Dominant / Characteristic Species
ERIODICTYON CRASSIFOLIUM, BACCHARIS PILULARIS,
MALACOTHAMNUS FASCICULATUS, MIMULUS AURANTIACUS,
ADENOSTOMA FASCICULATUM, CEANOTHUS CRASSIFOLIUS
TOXICODENDRON DIVERSILOBUM, PIPTATHERUM MILACEUM

Notes: NATURAL DRAINAGE CHANNEL JUST UPSTREAM OF THE RCA POND AREA

Appendix G
Representative Photographs

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G-1. Coca Pond view north. January 3, 2012.

G-2. Coca Pond view east of the stormwater basin just upstream from Coca Pond. January 3, 2012.

G-3. Coca Pond SP-2 soil pit (out). January 3, 2012

G-4. Coca Pond. Organic sediment accumulation at SP-1. January 3, 2012

G-5. Upper reaches of Coca Drainage. View upstream at Coca test stand at stream data point CD-1. January 3, 2012.

G-6. Bell Creek Tributary (Coca Drainage below Coca Pond). View east (downstream) of concrete lined ditch just below Coca Pond outlet at stream data point CD-3. January 3, 2012.

G-7. Bell Creek Tributary 3 (Drainage within Delta Area). View east (upstream) of plunge pools on stream that still had water at stream data point CD-6. January 3, 2012.

G-8. NASA Area 1. View west (uphill) of seasonal ponding feature SW-1 PEMAx. January 4, 2012

G-9. NASA Area 1. Seasonal ponding feature SW-1 P-1 soil pit (in). January 4, 2012.

G-10. NASA Area 1. Seasonal ponding feature SW-1 P-2 soil pit (out). January 4, 2012.

G-11. NASA Area 1 Impoundment Pond (PEMCh). View west showing berm that creates the impoundment pond described on stream data sheet and wetland data sheet SW-2 in northwestern portion of property. January 4, 2012

G-12. NASA Area 1 Impoundment Pond. SW-2 P-1 soil pit (in). January 4, 2012.

G-13. NASA Area 1 Impoundment Pond. SW-2 P-2 soil pit (out). January 4, 2012

G-14. NASA Area 1 Lower Drainage. View west (downstream) at stream data point ND-4. January 4, 2012.

G-15. NASA Area 2 Northeastern Drainage. View north (downstream) at stream data point SP-3. January 4, 2012

G-16. R2A Pond. View south. January 5, 2012

G-17. R2A Pond. Culvert and gated weir from R2A Pond. January 5, 2012

G-18. R2A Pond. View north. January 5, 2012

G-19. R2A Pond. Soil pit R2A SP-1 (in). January 5, 2012

G-20. R2A Pond. Soil pit R2A SP-2 (out). January 5, 2012

G-21. R2A Pond. R2A Pond Pump intake and piping for water transfers to and from Silvernale Pond. January 5, 2012

G-22. R2B Pond. Drift line of algal matting on R2B pond at 36 inches above current water level. January 5, 2012

G-23. R2B Pond. Soil pit 1 R2B SP-1 (in). January 5, 2012

G-24. R2B Pond. Location of soil pit R2B SP-2 (out) on western margin of pond. January 5, 2012

G-25. Bell Creek SW. View west (downstream) at stream data point BC-11. January 5, 2012.

G-26. Small concrete impoundment controlling flow along Bell Creek from Alfa site (view west). January 5, 2012

G-27. Bell Creek at Alfa Site. Earthen dam along Bell Creek view west-northwest. January 5, 2012

G-28. Bell Creek at Bravo Site. Culvert discharge below and north of capped pond outfall. January 5, 2012

G-29. Bell Creek at SPA Site. View west (downstream) at stream data point BC-6. January 6, 2012. [Designated in report as BC-6]

G-30. Bell Creek near CDFF Site. View north (upstream) at stream data point BC-8 above R2B Pond. January 6, 2012.

G-31. Bell Creek Tributary 1 near CDFF Site. Bell Creek at confluence. January 6, 2012

G-32. Bell Creek Tributary (PLF Site). View north into natural channel above CLORP leading to capped Delta Pond. January 6, 2012

Appendix H
Plant Species Observed

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APPENDIX H

List of Plant Species Observed

APPENDIX H
List of Plant Species Observed

Scientific Name[1]	Common Name[2]	Wetland Indicator Status[3]	Habit and Origin[4]
DICOTS			
AIZOACEAE			
Mesembryanthemum crystallinum	Common iceplant	NL	Herb (A/P); I
ADOXACEAE			
Sambucus nigra ssp. *caerulea* (*Sambucus mexicana*)	American black elderberry	FACU	Shrub/Tree; N
ANACARDIACEAE			
Malosoma laurina	laurel sumac	NI	Shrub; N
Toxicodendron diversilobum	Pacific poison oak	NI	Shrub; N
ASTERACEAE			
Artemisia californica	coastal sagebrush	NI	Shrub; N
Artemisia douglasiana	Douglas' sagewort	FAC+	Herb (P); N
Baccharis pilularis	coyotebrush	NI	Shrub; N
Baccharis salicifolia	mule-fat	FACW	Shrub; N
Carduus pycnocephalus	Italian plumeless thistle	NI	Herb (A); I
Centaurea melitensis	Maltese star-thistle	NI	Herb (A/B); I
Cirsium occidentale var. *occidentale*	cobwebby thistle	NI	Herb (B); N
Conyza canadensis	Canadian horeseweed	FAC	Herb (A/B); N
Heterotheca grandiflora	telegraphweed	NI	Herb (A/P); N
Hypochaeris glabra	smooth cat's ear	NI	Herb (A); I
Pseudognaphalium biolettii (Gnaphalium bicolor)	two-color rabbit-tobacco	NI	Herb/SS (B); N
Psilocarphus tenellus	slender woollyheads	FAC	Herb (A); N
Silybum marianum	blessed milkthistle	NI	Herb (A/B); I
Sonchus asper	spiny sowthistle	FAC	Herb (A); I
Sonchus oleraceus	common sowthistle	NI	Herb (A); I
Venegasia carpesioides	canyon sunflower	NI	SS/Shrub; N
Xanthium strumarium	rough cocklebur	FAC+	Herb (A); N

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Scientific Name[1]	Common Name[2]	Wetland Indicator Status[3]	Habit and Origin[4]
BORAGINACEAE			
Cryptantha sp.	cryptantha	NI	Herb (A); N
Eriodictyon crassifolium	thickleaf yerba santa	NI	Shrub; N
Phacelia cicutaria	caterpillar phacelia	NI	Herb (A); N
Phacelia ramosissima	branching phacelia	NI	Herb/SS (P); N
BRASSICACEAE			
Brassica nigra	black mustard	NI	Herb (A); I
CALLITRICHACEAE			
Callitriche marginata	Water starwort	OBL	Herb(A); N
CAPRIFOLIACEAE			
Lonicera subspicata	southern honeysuckle	NI	Shrub/Vine; N
Symphoricarpos mollis	creeping snowberry	NI	SS/Shrub; N
CRASSULACEAE			
Crassula aquatica	*Crassula aquatica*	OBL	Herb (A); N
FABACEAE			
Acmispon glaber (syn. *Lotus scoparius*)	common deerweed	NI	SS (P); N
Vicia villosa	winter vetch	NI	Herb (A/P); I
FAGACEAE			
Quercus agrifolia	California live oak	NI	Tree/Shrub; N
GERANIACEAE			
Erodium botrys	longbeak stork's bill	NI	Herb (A/B); I
GROSSULARIACEAE			
Ribes malvaceum	chaparral current	NI	Shrub; N
LAMIACEAE			
Salvia mellifera	black sage	NI	SS/Shrub; N
LAURACEAE			
Umbellularia californica	California laurel	FAC	Tree/Shrub; N
MALVACEAE			
Malacothamnus fasciculatus	Mendocino bushmallow	NI	SS/Shrub; N
MYRSINACEAE			
Anagallis arvensis	scarlet pimpernel	FAC	Herb (A/B); I
PHRYMACEAE			
Mimulus aurantiacus	orange bush monkeyflower	NI	Shrub/SS; N

APPENDIX H
List of Plant Species Observed

Scientific Name[1]	Common Name[2]	Wetland Indicator Status[3]	Habit and Origin[4]
PLANTAGINACEAE			
Keckiella cordifolia	heartleaf Keckiella	NI	Shrub/SS; N
Veronica peregrina	Purslane speedwell	OBL	Herb (A); N
PLATANACEAE			
Platanus racemosa	California sycamore	FACW	Tree; N
POLYGONACEAE			
Eriogonum fasciculatum var. *fasciculatum*	Eastern Mojave buckwheat	NI	SS/Shrub; N
Rumex crispus	curly dock	FACW	Herb (P); I
Rumex salicifolius	willow dock	OBL	Herb (P); N
RHAMNACEAE			
Ceanothus crassifolius	hoaryleaf ceanothus	NI	Shrub; N
Ceanothus oliganthus	hairy ceanothus	NI	Shrub; N
Ceanothus spinosus	redheart	NI	Shrub; N
ROSACEAE			
Adenostoma fasciculatum	chamise	NI	Shrub ; N
Cercocarpus betuloides	birchleaf mountain mahogany	NI	Shrub/Tree; N
Herteromeles arbutifolia	toyon	NI	Shrub ; N
Rosa californica	California wildrose	FAC+	Shrub; N
Rubus ursinus	California blackberry	FAC+	SS (P); N
RUBIACEAE			
Galium angustifolium	narrowleaf bedstraw	NI	Herb/SS (P); N
Galium aparine	stickywilly	FACU	Herb (A); N
Galium cliftonsmithii	Santa Barbara bedstraw	NI	Shrub; N
Galium nuttallii	climbing bedstraw	NI	SS/Shrub ; N
Galium parisiense	wall bedstraw	FACU	Herb (A);I
SALICACEAE			
Salix lasiolepis	arroyo willow	FACW	Tree/Shrub; N
MONOCOTS			
CYPERACEAE			
Cyperus eragrostis	tall flatsedge	FACW	Graminoid (P); N
Eleocharis macrostachya	pale spikerush	OBL	Graminoid (P); N
Schoenoplectis sp.	tule	OBL	Graminoid (P); N

APPENDIX H
List of Plant Species Observed

Scientific Name[1]	Common Name[2]	Wetland Indicator Status[3]	Habit and Origin[4]
JUNCACEAE			
Juncus bufonius	toad rush	FACW+	Graminoid (P); N
POACEAE			
Avena barbata	slender oat	NI	Graminoid (A); I
Bromus diandrus	ripgut brome	NI	Graminoid (A); I
Bromus hordeaceus	soft brome	NI	Graminoid (A); I
Bromus madritensis ssp. rubens	red brome	UPL	Graminoid (A); I
Leymus condensatus	giant ryegrass	FACU	Graminoid (P); N
Pennisetum setaceum	crimson fountaingrass	NI	Graminoid (P); I
Piptatherum miliaceum	smilograss	NI	Graminoid (P); I
Poa secunda	Sandberg bluegrass	NI	Graminoid (P); N
Polypogon monspeliensis	annual rabbitsfoot grass	FACW+	Graminoid (A); I
TYPHACEAE			
Typha domingensis	southern cattail	OBL	Herb (P); N

Notes:
N = Native
I = Introduced (non-native species that have become naturalized)
(A) = Annual (B) = Biennial (P) = Perennial SS = Sub-Shrub

1Taxonomy follows the currently accepted nomenclature for plant species occurring in California as indicated on the Jepson On-Line Interchange for California Floristics (University of California, 2011).

2Species common name, origin and grow habitat from the U.S. Department of Agriculture's Plants Database (2011).

3 Wetland Indicator Status is taken from 1998 National List of Plants that Occur in Wetlands (Region 0: California) (Reed, 1988)

Wetland Indicator Status Codes:
OBL = Obligate Wetland. Occurs with an estimated 99 probability in wetlands
FACW = Facultative Wetland. Estimated 67 to 99 percent probability of occurrence in wetlands
FAC = Facultative. Equally likely to occur in wetlands and non-wetlands
NI = No indicator. Insufficient information available to determine an indicator status
FACU = Facultative Upland. Estimated 67 to 99 percent probability of occurrence in uplands

UPL = Obligate Upland. Occurs with an estimated 99 probability in uplands

(+) = Positive sign indicates a frequency toward higher end of category (i.e., more frequently found in wetlands)
(-) = Negative sign indicates a frequency toward lower end of category (i.e., more frequently found in uplands)

G2: U.S. Army Corps of Engineers- Los Angeles District Approved Jurisdictional Determination Regarding Presence/Absence of Geographic Jurisdiction, February 12, 2013

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DEPARTMENT OF THE ARMY
Los Angeles District, Corps of Engineers
Ventura Field Office
2151 Alessandro Drive, Suite 110
Ventura, CA 93001

February 12, 2013

REPLY TO
ATTENTION OF
Regulatory Division

Allen Elliot, SSFL Project Director
National Aeronautics and Space Administration
Office of Center Operations
George C. Marshall Space Flight Center
Marshall Space Flight Center, AL 35812

SUBJECT: Approved Jurisdictional Determination regarding presence/absence of geographic jurisdiction

Dear Mr. Elliot:

Reference is made to your request (File No. SPL-2012-00520-AJS) dated April 11, 2012 for an approved Department of the Army jurisdictional determination (JD) for the NASA-Administered Property at the Santa Susana Field Lab (at long: -118.698205, lat : 34.232447) located near the City of Simi Valley, Ventura County, California.

As you may know, the Corps' evaluation process for determining whether or not a Department of the Army permit is needed involves two tests. If both tests are met, then a permit is required. The first test determines whether or not the proposed project is located in a water of the United States (i.e., it is within the Corps' geographic jurisdiction). The second test determines whether or not the proposed project is a regulated activity under Section 10 of the River and Harbor Act or Section 404 of the Clean Water Act. As part of the evaluation process, pertaining to the first test only, we have made the jurisdictional determination below.

Based on available information, we have determined there are waters of the United States on the project site, as well as non-jurisdictional aquatic resources, in the locations depicted on the enclosed drawing. The Corps concurs with the findings and extent of waters of the United States and wetlands as presented in the "Wetlands and Waters of the United States, Delineation for the NASA-Administered Portions of the Santa Susana Field Laboratory, Ventura County, California" dated March 2012, with the exception of "SW-1 Pond, " "Drainage A-1" and "PLF Drainage." These features consist of poorly defined swales or erosional features lacking an ordinary high water mark and thus not considered waters of the United States. The basis for our determination can be found in the enclosed JD form(s).

The aquatic resource identified as "SW-2 Pond" including the associated tributary drainage on the above drawing is an intrastate isolated water with no apparent interstate or foreign commerce connection. As such, this water is not currently regulated by the Corps of Engineers. This disclaimer of jurisdiction is only for Section 404 of the Clean Water Act. Other Federal, State, and local laws may apply to your activities. In particular, you may need authorization from the California State Water Resources Control Board and/or the U.S. Fish and Wildlife Service.

This letter contains an approved jurisdictional determination for the NASA-Administered Property at the Santa Susana Field Lab. If you object to this decision, you may

request an administrative appeal under Corps regulations at 33 CFR Part 331. Enclosed you will find a Notification of Appeal Process (NAP) fact sheet (Appendix A) and Request for Appeal (RFA) form. If you request to appeal this decision you must submit a completed RFA form to the Corps South Pacific Division Office at the following address:

Tom Cavanaugh
Administrative Appeal Review Officer,
U.S. Army Corps of Engineers
South Pacific Division, CESPD-PDS-O, 2042B
1455 Market Street, San Francisco, California 94103-1399

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete, that it meets the criteria for appeal under 33 C.F.R. Part 331.5, and that it has been received by the Division Office within 60 days of the date on the NAP. Should you decide to submit an RFA form, it must be received at the above address by **April 13, 2013**. It is not necessary to submit an RFA form to the Division office if you do not object to the decision in this letter.

This verification is valid for five years from the date of this letter, unless new information warrants revision of the determination before the expiration date. If you wish to submit new information regarding the approved jurisdictional determination for this site, please submit this information to Antal Szijj at the letterhead address April 13, 2013. The Corps will consider any new information so submitted and respond within 60 days by either revising the prior determination, if appropriate, or reissuing the prior determination. A revised or reissued jurisdictional determination can be appealed as described above.

This determination has been conducted to identify the extent of the Corps' Clean Water Act jurisdiction on the particular project site identified in your request. This determination may not be valid for the wetland conservation provisions of the Food Security Act of 1985. If you or your tenant are USDA program participants, or anticipate participation in USDA programs, you should request a certified wetland determination from the local office of the Natural Resources Conservation Service, prior to starting work.

If you have any questions, please contact Antal Szijj of my staff at 805-585-2147 or via e-mail at Antal.J.Szijj@usace.army.mil.

Please be advised that you can now comment on your experience with Regulatory Division by accessing the Corps web-based customer survey form at: http://per2.nwp.usace.army.mil/survey.html.

Sincerely,

Aaron O. Allen
Chief, North Coast Branch
Regulatory Division

Enclosures

Cf: Steve Long, CH2M Hill

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: NASA		File Number: SPL-2012-520	Date: 12-Feb-2013
Attached is:			See Section below
	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)		A
	PROFFERED PERMIT (Standard Permit or Letter of permission)		B
	PERMIT DENIAL		C
X	APPROVED JURISDICTIONAL DETERMINATION		D
	PRELIMINARY JURISDICTIONAL DETERMINATION		E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at http://www.usace.army.mil/cecw/pages/reg_materials.aspx or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

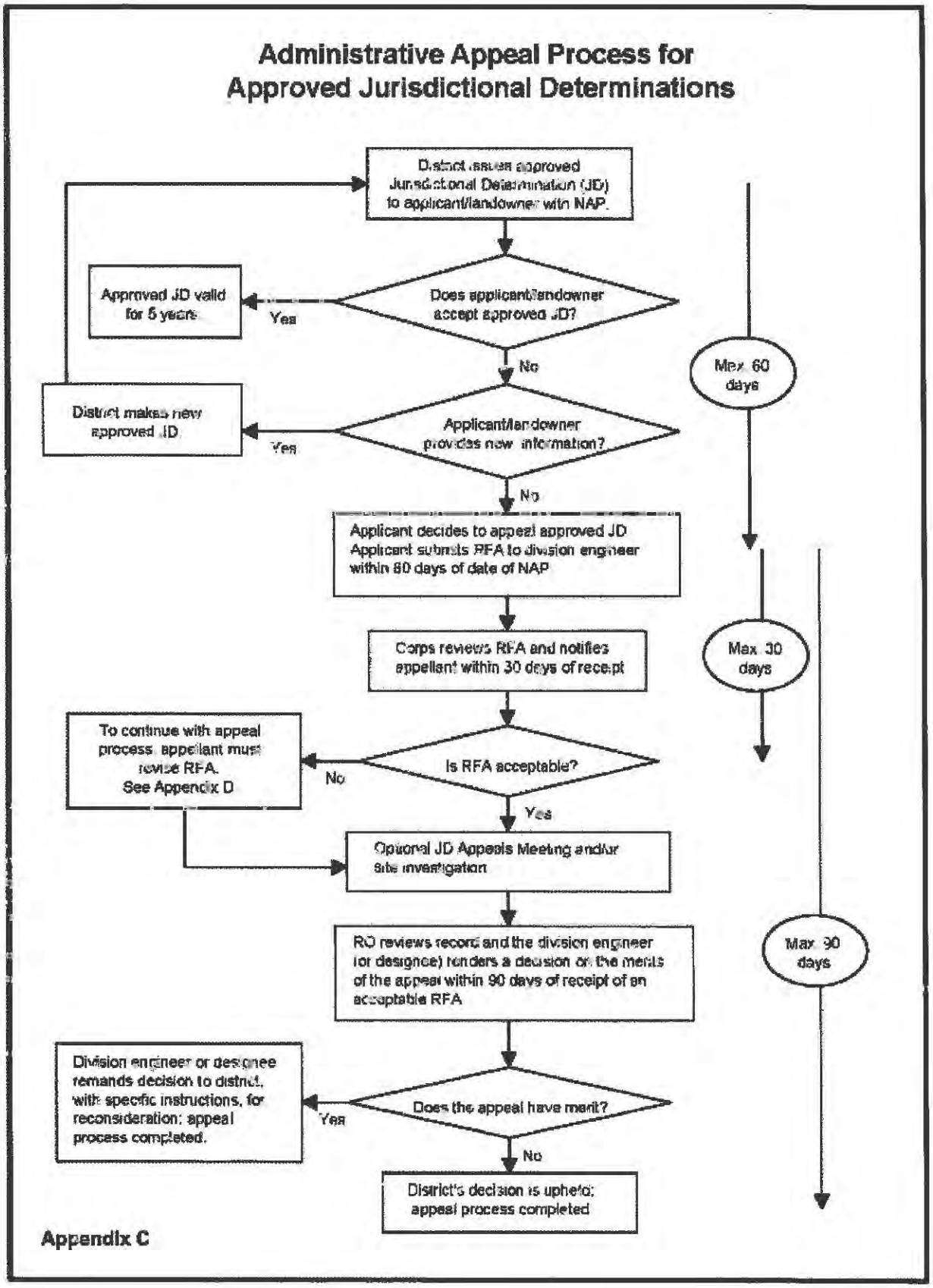
POINT OF CONTACT FOR QUESTIONS OR INFORMATION

If you have questions regarding this decision and/or the appeal process you may contact: Antal Szijj, Senior Project Manager U.S. Army Corps of Engineers Los Angeles District, Ventura Field Office 2151 Alessandro Dr, Suite 110 Ventura, CA 93001 Phone: (805)-585-2147 Fax (805) 585-2154 Email: antal.j.szijj@usace.army.mil	If you only have questions regarding the appeal process you may also contact: Thomas J. Cavanaugh Administrative Appeal Review Officer, U.S. Army Corps of Engineers South Pacific Division 1455 Market Street, 2052B San Francisco, California 94103-1399 Phone: (415) 503-6574 Fax: (415) 503-6646 Email: thomas.j.cavanaugh@usace.army.mil

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

_____ Signature of appellant or agent.	Date:	Telephone number:

-5-


Administrative Appeal Process for
Approved Jurisdictional Determinations
District issues approved Jurisdictional Determination (JD) to applicant/landowner with NAP.
Does applicant/landowner accept approved JD?
Yes
Approved JD valid for 5 years
No
Applicant/landowner provides new information?
Yes
District makes new approved JD
No
Max. 60 days
Applicant decides to appeal approved JD Applicant submits RFA to division engineer within 60 days of date of NAP
Corps reviews RFA and notifies appellant within 30 days of receipt
Max. 30 days
Is RFA acceptable?
No
To continue with appeal process, appellant must revise RFA. See Appendix D
Yes
Optional JD Appeals Meeting and/or site investigation
RO reviews record and the division engineer (or designee) renders a decision on the merits of the appeal within 90 days of receipt of an acceptable RFA
Max. 90 days
Does the appeal have merit?
Yes
Division engineer or designee remands decision to district, with specific instructions, for reconsideration; appeal process completed.
No
District's decision is upheld; appeal process completed
Appendix C

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APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD): 01/14/2013

B. DISTRICT OFFICE, FILE NAME, AND NUMBER: CESPL-RG-N, Ventura Field Office; SSFL NASA Property Delineation; File no. SPL-2012-520-AJS: Southwestern Drainage tributary

C. PROJECT LOCATION AND BACKGROUND INFORMATION:

State: CA County/parish/borough: Ventura City: unincorporated (SSFL)
Center coordinates of site (lat/long in degree decimal format): Lat. 32.2279° N, Long. 118.7080° W
Universal Transverse Mercator:
Name of nearest waterbody: Bell Creek
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Los Angeles River
Name of watershed or Hydrologic Unit Code (HUC): Los Angeles River (18070105)

- ☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
- ☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

- ☒ Office (Desk) Determination. Date: 09/12/2012
- ☒ Field Determination. Date(s): Jan 2012

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There Are no "*navigable waters of the U.S.*" within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]

- ☐ Waters subject to the ebb and flow of the tide.
- ☐ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Explain: .

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There Are "*waters of the U.S.*" within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
   - ☐ TNWs, including territorial seas
   - ☐ Wetlands adjacent to TNWs
   - ☐ Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
   - ☒ Non-RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
   - ☐ Impoundments of jurisdictional waters
   - ☐ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
   Non-wetland waters: 1300 linear feet: 2 width (ft) and/or acres.
   Wetlands: acres.

   c. **Limits (boundaries) of jurisdiction** based on: Established by OHWM.
   Elevation of established OHWM (if known):

2. **Non-regulated waters/wetlands (check if applicable):**[3]
   - ☐ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional. Explain: .

[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. **TNW**
   Identify TNW:

   Summarize rationale supporting determination:

2. **Wetland adjacent to TNW**
   Summarize rationale supporting conclusion that wetland is "adjacent":

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. **Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.**

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. **Characteristics of non-TNWs that flow directly or indirectly into TNW**

   (i) **General Area Conditions:**
   Watershed size: 37 square miles
   Drainage area: 40 acres
   Average annual rainfall: 19 inches
   Average annual snowfall: 0 inches

   (ii) **Physical Characteristics:**
   (a) Relationship with TNW:
   ☐ Tributary flows directly into TNW.
   ☒ Tributary flows through 3 tributaries before entering TNW.

   Project waters are 5-10 river miles from TNW.
   Project waters are 2 (or less) river miles from RPW.
   Project waters are 3-10 aerial (straight) miles from TNW.
   Project waters are 1 (or less) aerial (straight) miles from RPW.
   Project waters cross or serve as state boundaries. Explain: n/a.

[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.

Identify flow route to TNW[5]: Upper Southwestern Drainage flows into R2A Pond, thence to Bell Canyon Channel (natural), thence to the channelized section of lower Bell Canyon. The downstream TNW is upper end of the Los Angeles River, at the confluence of Bell Canyon Channel and Arroyo Calabasas.
Tributary stream order, if known: .

(b) General Tributary Characteristics (check all that apply):
Tributary is: ☐ Natural
☐ Artificial (man-made). Explain: .
☒ Manipulated (man-altered). Explain: culvert, shotcrete swales, water control weirs and impoundments present.

Tributary properties with respect to top of bank (estimate):
Average width: 4-5 feet
Average depth: 1 feet
Average side slopes: 2:1

Primary tributary substrate composition (check all that apply):
☒ Silts ☒ Sands ☒ Concrete
☐ Cobbles ☐ Gravel ☐ Muck
☐ Bedrock ☐ Vegetation. Type/% cover:
☐ Other. Explain:

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: some incision evident.
Presence of run/riffle/pool complexes. Explain: n/a.
Tributary geometry: Meandering
Tributary gradient (approximate average slope): 1 %

(c) Flow:
Tributary provides for: Ephemeral flow
Estimate average number of flow events in review area/year: 2-5
Describe flow regime: ephemeral.
Other information on duration and volume: Channel previously affected by discharges from SSFL test operations requiring cooling water (no longer conducted). Channel and downstream impoundments acted to collect cooling water discharges during rocket engine testing.

Surface flow is: Confined. Characteristics:

Subsurface flow: Unknown. Explain findings:
☐ Dye (or other) test performed: .

Tributary has (check all that apply):
☒ Bed and banks
☒ OHWM[6] (check all indicators that apply):
☒ clear, natural line impressed on the bank
☐ changes in the character of soil
☐ shelving
☐ vegetation matted down, bent, or absent
☐ leaf litter disturbed or washed away
☐ sediment deposition
☐ water staining
☐ other (list):
☐ the presence of litter and debris
☐ destruction of terrestrial vegetation
☐ the presence of wrack line
☐ sediment sorting
☐ scour
☐ multiple observed or predicted flow events
☐ abrupt change in plant community
☐ Discontinuous OHWM.[7] Explain:

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):
☐ High Tide Line indicated by:
☐ oil or scum line along shore objects
☐ fine shell or debris deposits (foreshore)
☐ physical markings/characteristics
☐ tidal gauges
☐ other (list):
☐ Mean High Water Mark indicated by:
☐ survey to available datum;
☐ physical markings;
☐ vegetation lines/changes in vegetation types.

[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.
[6] A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7] Ibid.

(iii) Chemical Characteristics:

Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).

Explain: water not present at time of delineation.

Identify specific pollutants, if known: heavy metals.

5

(iv) Biological Characteristics. Channel supports (check all that apply):

- ☐ Riparian corridor. Characteristics (type, average width): lower reach support mulefat and arroyo willow.
- ☐ Wetland fringe. Characteristics: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings:
  - ☐ Aquatic/wildlife diversity. Explain findings: .

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW

(i) Physical Characteristics:

(a) General Wetland Characteristics:

Properties:

Wetland size: acres

Wetland type. Explain: .

Wetland quality. Explain:

Project wetlands cross or serve as state boundaries. Explain:

(b) General Flow Relationship with Non-TNW:

Flow is: Pick List. Explain: surface water only present in impounded areas.

Surface flow is: Pick List

Characteristics: .

Subsurface flow: Pick List. Explain findings:

- ☐ Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:

- ☐ Directly abutting
- ☐ Not directly abutting
  - ☐ Discrete wetland hydrologic connection. Explain:
  - ☐ Ecological connection. Explain: .
  - ☐ Separated by berm/barrier. Explain: .

(d) Proximity (Relationship) to TNW

Project wetlands are Pick List river miles from TNW.

Project waters are Pick List aerial (straight) miles from TNW.

Flow is from: Pick List.

Estimate approximate location of wetland as within the Pick List floodplain.

(ii) Chemical Characteristics:

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: .

Identify specific pollutants, if known: .

(iii) Biological Characteristics. Wetland supports (check all that apply):

- ☐ Riparian buffer. Characteristics (type, average width):2.
- ☐ Vegetation type/percent cover. Explain: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings:
  - ☐ Aquatic/wildlife diversity. Explain findings: .

3. Characteristics of all wetlands adjacent to the tributary (if any)

All wetland(s) being considered in the cumulative analysis: Pick List

Approximately ( ) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)

Summarize overall biological, chemical and physical functions being performed:

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D: The subject tributary is a small ephemeral drainage with a narrow (approx 2-3 foot) but well-defined ordinary high water mark. The channel itself is largely unvegetated, but adjacent uplands inlcude coast live oak, ceanothus, coyotebrush and chamise. The tributary drains an area that supported the Systems Test Laboratory facilities. Flows are eventurally conveyed to the "southwestern drainage" prior to entering a secondary holding pond and thence to Bell Canyon Channel. The downstream TNW (upper reach of the Los Angeles River) is approximately 8 miles downstream. The total drainage area of the tributary represents approximately 0.002% of the watershed draining to the downstream TNW. Soil testing within the channel and surrounding watershed have revealed elevated levels of heavy metals (lead, cadmium, copper and/or mercury). Bell Canyon Channel, inlcusive of the reach within the reivew area, is included on the list 303(d) impaired waterbodies due to bacterial contamination. The tributary therefore has a significant nexus to the downstream TNW by virtue of its potential to deliver contaminants downstream.

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D:

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: Wetlands present are palustrine in nature as the result of impoundments of tributary. Flow and potential pollutants would be conveyed through wetland, therefore the wetlands in question have a significant nexus to the downstream TNW.

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   - ☐ TNWs: linear feet width (ft), Or, acres.
   - ☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   - ☐ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: .
   - ☐ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally:

   Provide estimates for jurisdictional waters in the review area (check all that apply):
   - ☐ Tributary waters: linear feet width (ft).
   - ☐ Other non-wetland waters: acres.
     Identify type(s) of waters: .

3. **Non-RPWs[8] that flow directly or indirectly into TNWs.**
   - ☒ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

   Provide estimates for jurisdictional waters within the review area (check all that apply):
   - ☒ Tributary waters: **1,300** linear feet; **3** width (ft).
   - ☐ Other non-wetland waters: acres.
     Identify type(s) of waters: .

4. **Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.**
   - ☐ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
     - ☐ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .
     - ☐ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

   Provide acreage estimates for jurisdictional wetlands in the review area: acres.

5. **Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.**
   - ☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

   Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. **Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.**
   - ☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

   Provide estimates for jurisdictional wetlands in the review area: **0.64** acres.

7. **Impoundments of jurisdictional waters.[9]**
   As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.
   - ☐ Demonstrate that impoundment was created from "waters of the U.S.," or
   - ☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
   - ☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]

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[8] See Footnote # 3.
[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.

☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ which are or could be used for industrial purposes by industries in interstate commerce.
☐ Interstate isolated waters. Explain: .
☐ Other factors. Explain:

Identify water body and summarize rationale supporting determination:

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .
☐ Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):
☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
☐ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
☐ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
☐ Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
☐ Lakes/ponds: 0.155 acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource:
☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. **SUPPORTING DATA. Data reviewed for JD (check all that apply** - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):
☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant:
☒ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
☒ Office concurs with data sheets/delineation report.
☐ Office does not concur with data sheets/delineation report.
☐ Data sheets prepared by the Corps: .
☐ Corps navigable waters' study: .
☐ U.S. Geological Survey Hydrologic Atlas:
☐ USGS NHD data.
☐ USGS 8 and 12 digit HUC maps.
☐ U.S. Geological Survey map(s). Cite scale & quad name:
☐ USDA Natural Resources Conservation Service Soil Survey. Citation:
☐ National wetlands inventory map(s). Cite name: .
☐ State/Local wetland inventory map(s): .
☐ FEMA/FIRM maps:
☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
☐ Photographs: ☐ Aerial (Name & Date): .

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[10] Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.*

or ☐ Other (Name & Date):

☒ Previous determination(s). File no. and date of response letter:

☒ Applicable/supporting case law: .

☒ Applicable/supporting scientific literature:

☒ Other information (please specify): .

B. ADDITIONAL COMMENTS TO SUPPORT JD: The subject tributary is a small first order drainage channel with an average OHWM width of 2-3 feet. The drainage area is roughly 40 acres. Soil sampling within the drainage area has identified elevated levels of heavy metals and dioxin. Based on these results, the subject tributary appears to have a significant nexus to the downstream TNW (upper Los Angeles River, approximately 8 river miles downstream) based on the potential to deliver contaminants downstream.

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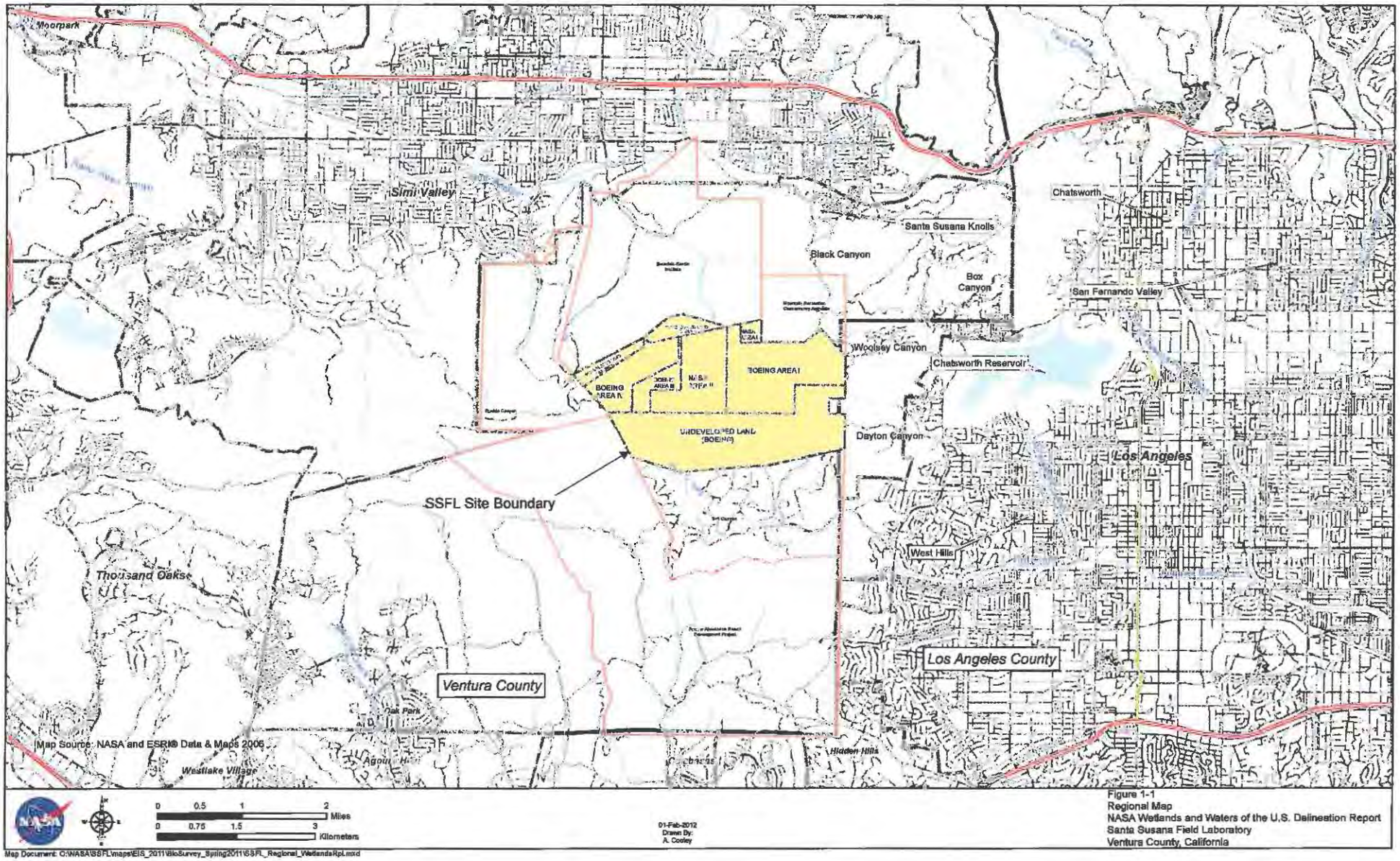

Figure 1-1
Regional Map
NASA Wetlands and Waters of the U.S. Delineation Report
Santa Susana Field Laboratory
Ventura County, California

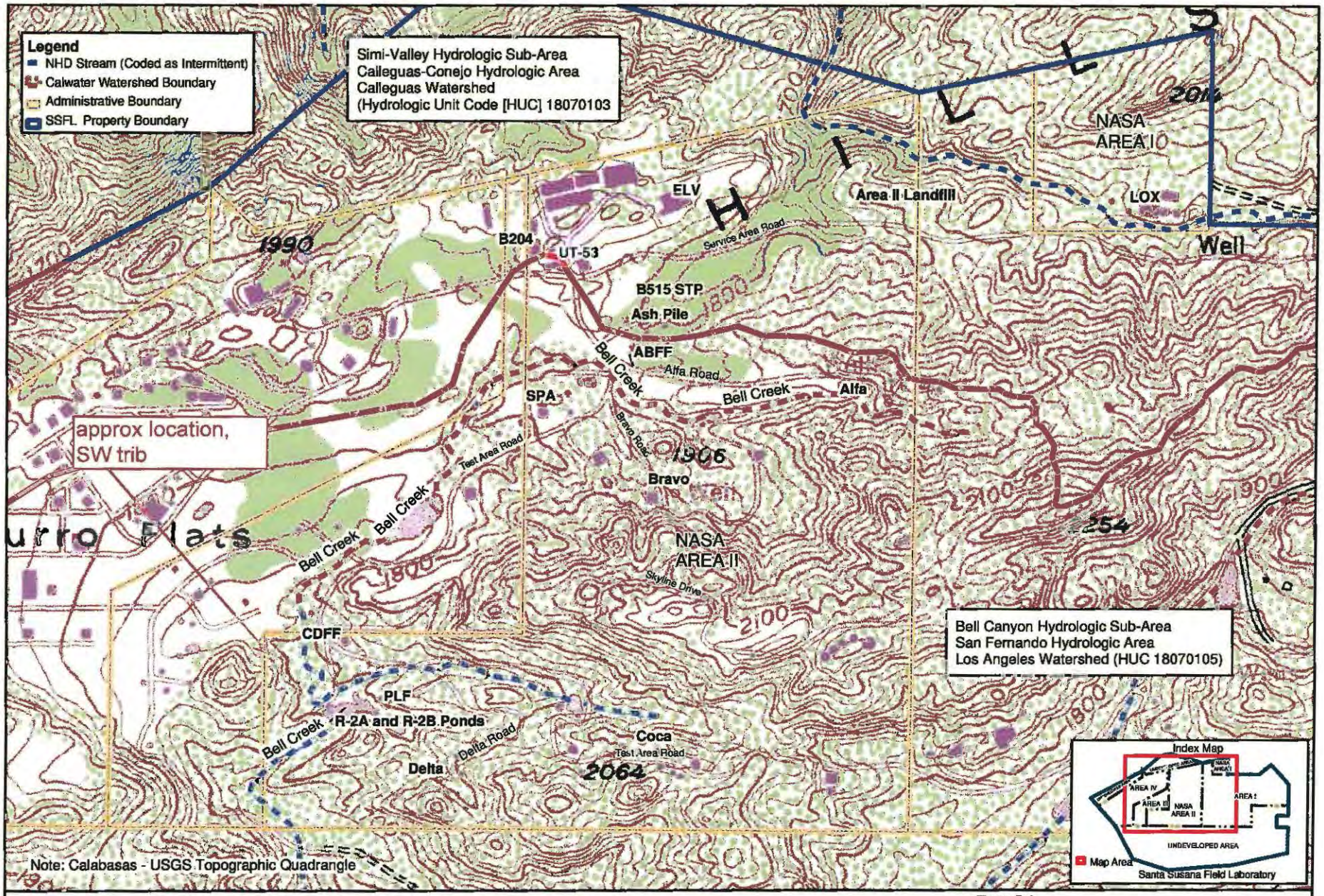

Figure D-1
USGS Quadrangle Topographic Map and NHD Information
NASA Wetlands and Waters of the U.S. Delineation Report
Santa Susana Field Laboratory
Ventura County, California

southwestern drainage trib
E St
10th St
14th St
12th St
16th St
20th St
18th St
G St
F St
22nd St
Adelson Fire Rd
24th St
I St
Street
Test Area Rd
Skyline Dr
Delta Rd
Pea Ave
© 2013 Google
Google
1990
34°14'12.88" N 118°43'05.02" W elev 1295 ft
Eye alt 6151 ft

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APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD): 09/12/2012

B. DISTRICT OFFICE, FILE NAME, AND NUMBER: CESPL-RG-N, Ventura Field Office; SSFL NASA Property Delineation; File no. SPL-2012-520-AJS: Upper Bell Creek (aka Southwestern Drainage)

C. PROJECT LOCATION AND BACKGROUND INFORMATION:

State: CA County/parish/borough: Ventura City: unincorporated (SSFL)
Center coordinates of site (lat/long in degree decimal format): Lat. 32.23245° N, Long. 118.6982° W
Universal Transverse Mercator:
Name of nearest waterbody: Bell Creek
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Los Angeles River
Name of watershed or Hydrologic Unit Code (HUC): Los Angeles River (18070105)

- ☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
- ☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

- ☒ Office (Desk) Determination. Date: 09/12/2012
- ☒ Field Determination. Date(s): Jan 2012

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There [redacted] "*navigable waters of the U.S.*" within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]

- ☐ Waters subject to the ebb and flow of the tide.
- ☐ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Explain:

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There [redacted] "*waters of the U.S.*" within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
   - ☐ TNWs, including territorial seas
   - ☐ Wetlands adjacent to TNWs
   - ☐ Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
   - ☒ Non-RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
   - ☐ Impoundments of jurisdictional waters
   - ☐ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
   Non-wetland waters: 13200 linear feet: 5 width (ft) and/or 1.52 acres.
   Wetlands: 0.64 acres.

   c. **Limits (boundaries) of jurisdiction** based on: [redacted]
   Elevation of established OHWM (if known):

2. **Non-regulated waters/wetlands (check if applicable):**[3]
   - ☐ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional. Explain:

[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. **TNW**
   Identify TNW:

   Summarize rationale supporting determination:

2. **Wetland adjacent to TNW**
   Summarize rationale supporting conclusion that wetland is "adjacent":

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. **Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.**

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. **Characteristics of non-TNWs that flow directly or indirectly into TNW**

   (i) **General Area Conditions:**
   Watershed size: 37 square miles
   Drainage area: 1060 acres
   Average annual rainfall: 19 inches
   Average annual snowfall: 0 inches

   (ii) **Physical Characteristics:**
   (a) Relationship with TNW:
   ☐ Tributary flows directly into TNW.
   ☒ Tributary flows through 3 tributaries before entering TNW.

   Project waters are 5-10 river miles from TNW.
   Project waters are 1 (or less) river miles from RPW.
   Project waters are 5-10 aerial (straight) miles from TNW.
   Project waters are 1 (or less) aerial (straight) miles from RPW.
   Project waters cross or serve as state boundaries. Explain: n/a.

[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.

Identify flow route to TNW[5]: Upper Southwestern Drainage flows into R2A Pond, thence to Bell Canyon Channel (natural), thence to the channelized section of lower Bell Canyon. The downstream TNW is upper end of the Los Angeles River, at the confluence of Bell Canyon Channel and Arroyo Calabasas.
Tributary stream order, if known:

(b) General Tributary Characteristics (check all that apply):
Tributary is: ☐ Natural
☐ Artificial (man-made). Explain:
☒ Manipulated (man-altered). Explain: culvert, shotcrete swales, water control weirs and impoundments present.

Tributary properties with respect to top of bank (estimate):
Average width: 4-5 feet
Average depth: 1 feet
Average side slopes: 2:1

Primary tributary substrate composition (check all that apply):
☒ Silts ☒ Sands ☒ Concrete
☐ Cobbles ☐ Gravel ☐ Muck
☐ Bedrock ☐ Vegetation. Type/% cover:
☐ Other. Explain:

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: some incision evident.
Presence of run/riffle/pool complexes. Explain: n/a.
Tributary geometry: Meandering
Tributary gradient (approximate average slope): 1 %

(c) Flow:
Tributary provides for: Ephemeral flow
Estimate average number of flow events in review area/year: 2-5
Describe flow regime: ephemeral.
Other information on duration and volume: Channel previously affected by discharges from SSFL test operations requiring cooling water (no longer conducted). Channel and downstream impoundments acted to collect cooling water discharges during rocket engine testing.

Surface flow is: Discrete and confined. Characteristics:

Subsurface flow: Unknown. Explain findings:
☐ Dye (or other) test performed:

Tributary has (check all that apply):
☒ Bed and banks
☒ OHWM[6] (check all indicators that apply):
☐ clear, natural line impressed on the bank ☒ the presence of litter and debris
☐ changes in the character of soil ☐ destruction of terrestrial vegetation
☒ shelving ☐ the presence of wrack line
☐ vegetation matted down, bent, or absent ☐ sediment sorting
☐ leaf litter disturbed or washed away ☐ scour
☐ sediment deposition ☐ multiple observed or predicted flow events
☒ water staining ☐ abrupt change in plant community
☐ other (list):
☐ Discontinuous OHWM.[7] Explain:

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):
☐ High Tide Line indicated by: ☐ Mean High Water Mark indicated by:
☐ oil or scum line along shore objects ☐ survey to available datum;
☐ fine shell or debris deposits (foreshore) ☐ physical markings;
☐ physical markings/characteristics ☐ vegetation lines/changes in vegetation types.
☐ tidal gauges
☐ other (list):

[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.
[6] A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7] Ibid.

(iii) Chemical Characteristics:

Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).

Explain: water not present at time of delineation.

Identify specific pollutants, if known: heavy metals.

5

(iv) Biological Characteristics. Channel supports (check all that apply):

☒ Riparian corridor. Characteristics (type, average width): lower reach support mulefat and arroyo willow.
☐ Wetland fringe. Characteristics: .
☐ Habitat for:
- ☐ Federally Listed species. Explain findings: .
- ☐ Fish/spawn areas. Explain findings: .
- ☐ Other environmentally-sensitive species. Explain findings: .
- ☐ Aquatic/wildlife diversity. Explain findings: .

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW

(i) Physical Characteristics:

(a) General Wetland Characteristics:

Properties:

Wetland size: 0.64 acres

Wetland type. Explain: palustrine.

Wetland quality. Explain: poor. formed as a result of 2 impoundments (0.51 and 0.13 acre respectively) intened to collect runoff from testing operations (no longer conducted). An additional impoundment area outside the review area (Boeing property) is also present and likely supports similar degraded palustrine wetlands.

Project wetlands cross or serve as state boundaries. Explain: n/a.

(b) General Flow Relationship with Non-TNW:

Flow is: Ephemeral flow Explain: surface water only present in impounded areas.

Surface flow is: Not present

Characteristics: .

Subsurface flow: Unknown. Explain findings: .

☐ Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:

☒ Directly abutting
☐ Not directly abutting
- ☐ Discrete wetland hydrologic connection. Explain:
- ☐ Ecological connection. Explain: .
- ☐ Separated by berm/barrier. Explain: .

(d) Proximity (Relationship) to TNW

Project wetlands are 5-10 river miles from TNW.

Project waters are 5-10 aerial (straight) miles from TNW.

Flow is from: Wetland to navigable waters.

Estimate approximate location of wetland as within the 2-year or less floodplain.

(ii) Chemical Characteristics:

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: dry at time of delineation.

Identify specific pollutants, if known: heavy metals detected downstream.

(iii) Biological Characteristics. Wetland supports (check all that apply):

☐ Riparian buffer. Characteristics (type, average width):2.

☒ Vegetation type/percent cover. Explain: Open water area varies depending on inundation. Fringe area supports Typha sp. and sparse mulefat and arroyo willow.

☐ Habitat for:
- ☐ Federally Listed species. Explain findings: .
- ☐ Fish/spawn areas. Explain findings: .
- ☐ Other environmentally-sensitive species. Explain findings: .
- ☐ Aquatic/wildlife diversity. Explain findings: .

3. Characteristics of all wetlands adjacent to the tributary (if any)

All wetland(s) being considered in the cumulative analysis: 2

Approximately (.64) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)
y	0.13	y	0.51

Summarize overall biological, chemical and physical functions being performed: 1 very small impoundment area with managed hydrology. Dominated by Typha sp. and unvegetated open water (dry at time of delineation). A second, larger impoundment occurs immeidately downstream also collecting flow from the COCA drain and PLV drain. Impoundments were originally constructed to collect runoff from testing operterations, which may also contain contaminants. An additional impoundment along flow route likely supports palustrine fringe wetlands, however this was outside the assessment area.

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D: .

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: The subject tributary is a small ephemeral drainage with a discontinuous ordinary high water mark averaging 4-5 feet in width. The tributary includes concrete-lined sections and flow control wiers. Historically, the channel functioned to collect and convey runoff from adjacent rocket engine test stands that require substantial amounts of cooling water during testing. Flows are eventurally conveyed to a holding pond off the NASA property (Boeing property) and thence to a secondary pond and thence to Bell Canyon Channel. The downstream TNW (upper reach of the Los Angeles River) is approximately 8 miles downstream. The total drainage area of the tributary represents approximately 2% of the watershed draining to the downstream TNW. Soil testing within the channel and surrounding watershed have revealed elevated levels of heavy metals (lead, cadmium, copper and/or mercury). Bell Canyon Channel, inlcusive of the reach within the reivew area, is included on the list 303(d) impaired waterbodies due to bacterial contamination. The tributary therefore has a significant nexus to the downstream TNW by virtue of its potential to deliver contaminants downstream.

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: Wetlands present are palustrine in nature as the result of impoundments of tributary. Flow and potential pollutants would be conveyed through wetland, therefore the wetlands in question have a significant nexus to the downstream TNW.

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   - ☐ TNWs: linear feet width (ft), Or, acres.
   - ☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   - ☐ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: .
   - ☐ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: .

   Provide estimates for jurisdictional waters in the review area (check all that apply):
   - ☐ Tributary waters: linear feet width (ft).
   - ☐ Other non-wetland waters: acres.
     Identify type(s) of waters: .

3. **Non-RPWs[8] that flow directly or indirectly into TNWs.**
   - ☒ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

   Provide estimates for jurisdictional waters within the review area (check all that apply):
   - ☒ Tributary waters: **10200** linear feet; **5** width (ft).
   - ☐ Other non-wetland waters: acres.
     Identify type(s) of waters: .

4. **Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.**
   - ☐ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
     - ☐ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .
     - ☐ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

   Provide acreage estimates for jurisdictional wetlands in the review area: acres.

5. **Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.**
   - ☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

   Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. **Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.**
   - ☒ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

   Provide estimates for jurisdictional wetlands in the review area: **0.64** acres.

7. **Impoundments of jurisdictional waters.**[9]
   As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.
   - ☐ Demonstrate that impoundment was created from "waters of the U.S.," or
   - ☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
   - ☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

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[8] See Footnote # 3.
[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]

- ☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
- ☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
- ☐ which are or could be used for industrial purposes by industries in interstate commerce.
- ☐ Interstate isolated waters. Explain: .
- ☐ Other factors. Explain:

Identify water body and summarize rationale supporting determination:

Provide estimates for jurisdictional waters in the review area (check all that apply):

- ☐ Tributary waters: linear feet width (ft).
- ☐ Other non-wetland waters: acres.
  - Identify type(s) of waters: .
- ☐ Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):

- ☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
- ☐ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
  - ☐ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
- ☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
- ☐ Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):

- ☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
- ☐ Lakes/ponds: 0.155 acres.
- ☐ Other non-wetland waters: acres. List type of aquatic resource:
- ☐ Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):

- ☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
- ☐ Lakes/ponds: acres.
- ☐ Other non-wetland waters: acres. List type of aquatic resource:
- ☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. **SUPPORTING DATA. Data reviewed for JD (check all that apply** - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):

- ☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant:
- ☒ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
  - ☒ Office concurs with data sheets/delineation report.
  - ☐ Office does not concur with data sheets/delineation report.
- ☐ Data sheets prepared by the Corps: .
- ☐ Corps navigable waters' study: .
- ☐ U.S. Geological Survey Hydrologic Atlas:
  - ☐ USGS NHD data.
  - ☐ USGS 8 and 12 digit HUC maps.
- ☐ U.S. Geological Survey map(s). Cite scale & quad name: .
- ☐ USDA Natural Resources Conservation Service Soil Survey. Citation:
- ☐ National wetlands inventory map(s). Cite name: .

[10] **Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.***

- ☐ State/Local wetland inventory map(s):
- ☐ FEMA/FIRM maps: .
- ☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
- ☐ Photographs: ☐ Aerial (Name & Date): .
  or ☐ Other (Name & Date): .
- ☐ Previous determination(s). File no. and date of response letter: .
- ☐ Applicable/supporting case law: .
- ☐ Applicable/supporting scientific literature:
- ☐ Other information (please specify): .

B. ADDITIONAL COMMENTS TO SUPPORT JD: The subject tributary is a small first order drainage channel with an average OHWM width of 4-5 feet. The drainage area is roughly 1,060 acres. Soil sampling within the drainage area has identified elevated levels of heavy metals and dioxin. Based on these results, the subject tributary appears to have a significant nexus to the downstream TNW (upper Los Angeles River, approximately 8 river miles downstream) based on the potential to deliver contaminants downstream.

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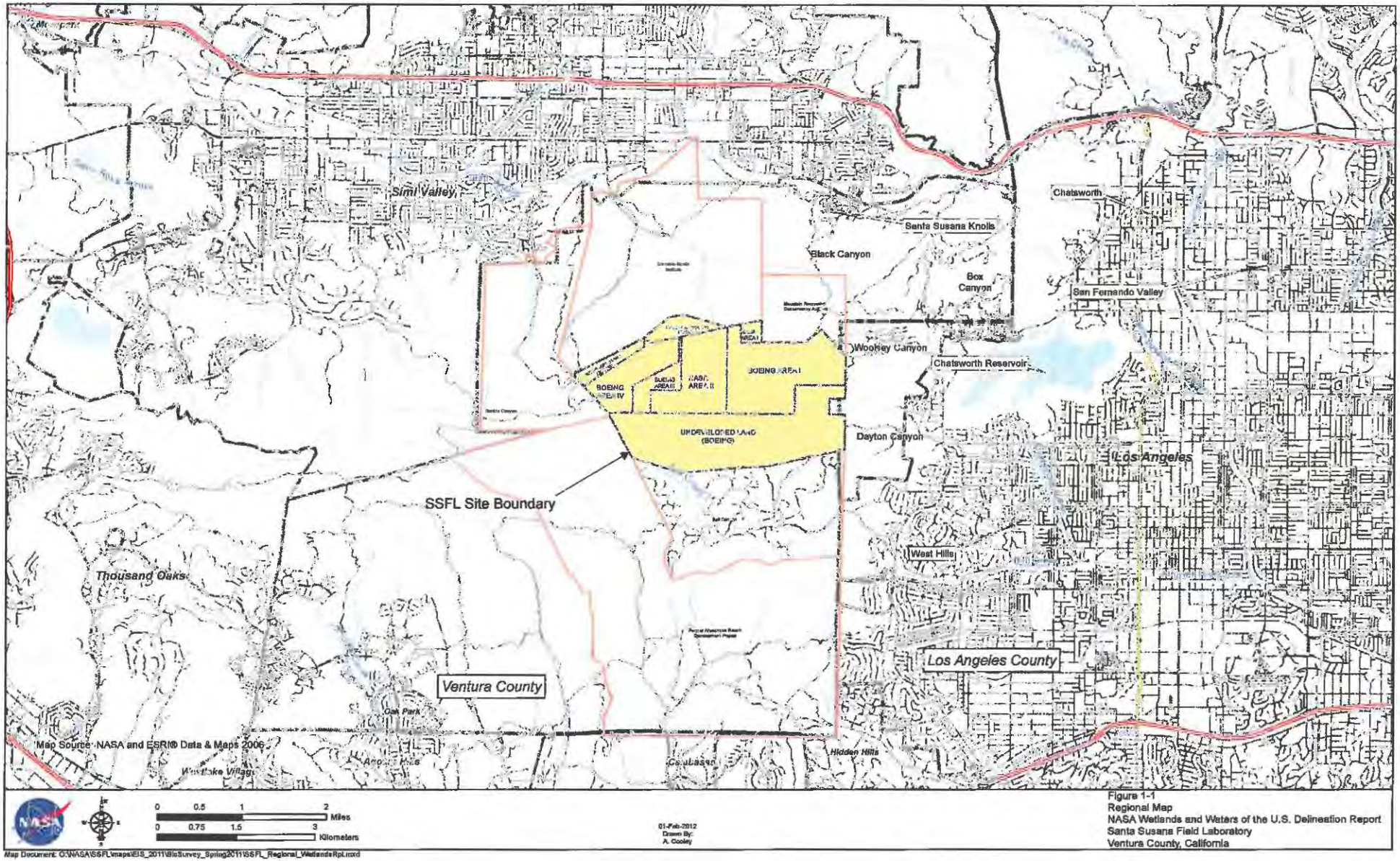

Figure 1-1
Regional Map
NASA Wetlands and Waters of the U.S. Delineation Report
Santa Susana Field Laboratory
Ventura County, California

Map Document: O:\NASA\SSFL\maps\EIS_2011\BioSurvey_Spring2011\SSFL_Regional_WetlandsRpt.mxd

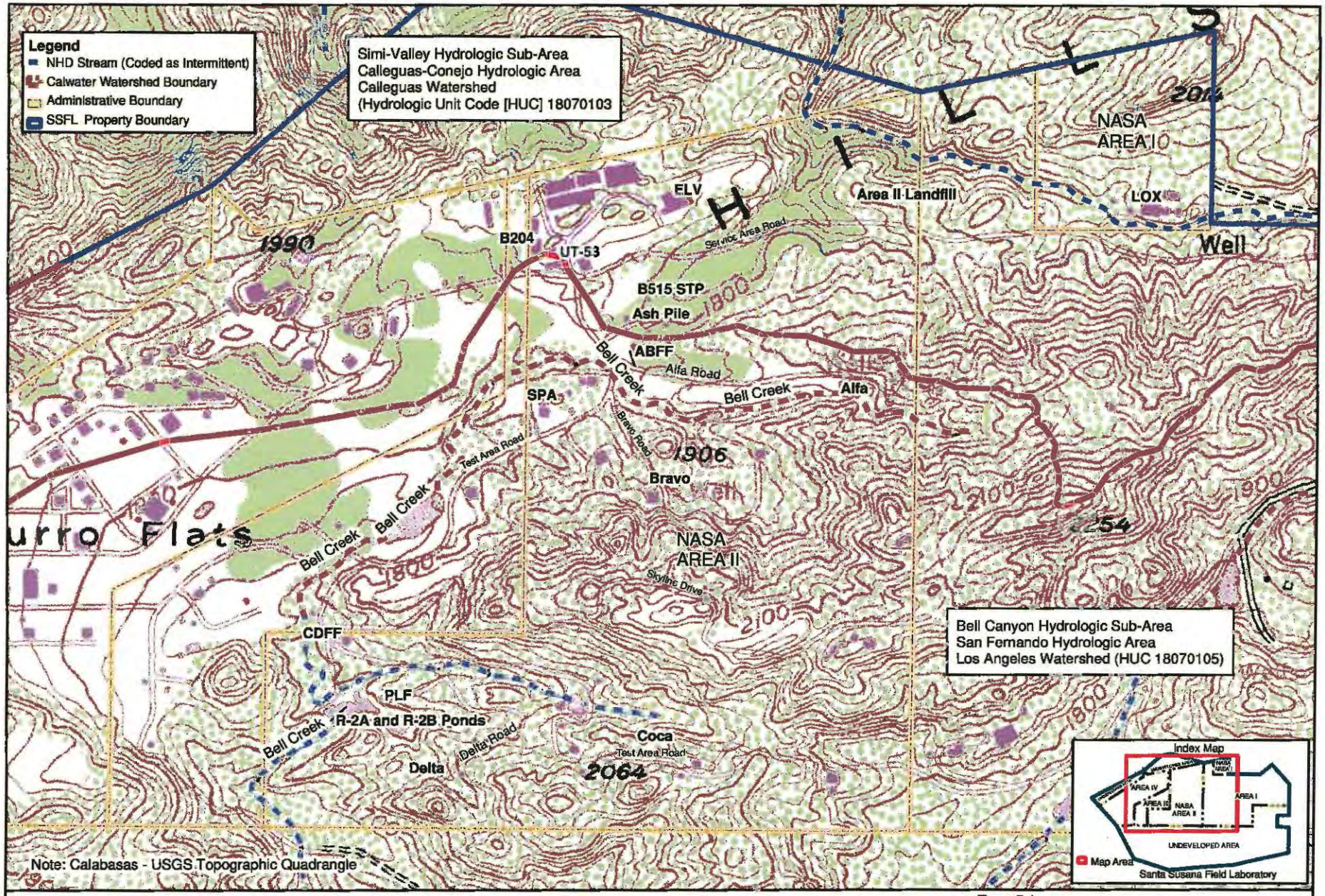

Figure D-1
USGS Quadrangle Topographic Map and NHD Information
NASA Wetlands and Waters of the U.S. Delineation Report
Santa Susana Field Laboratory
Ventura County, California

southwest drainage
R2-B pond
R2-A pond
Image U.S. Geological Survey

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APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD): 11/15/2012

B. DISTRICT OFFICE, FILE NAME, AND NUMBER:CESPL-RG-N, Ventura Field Office, SSFL NASA Property Delineation; file no. SPL-2012-520-AJS: SW-2 Pond

C. PROJECT LOCATION AND BACKGROUND INFORMATION:

State:CA County/parish/borough: Ventura City: unincorporated (SSFL)
Center coordinates of site (lat/long in degree decimal format): Lat. 34.2389° N, Long. 118.6892° W
Universal Transverse Mercator:
Name of nearest waterbody: SW-2 Pond
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: n/a (isolated)
Name of watershed or Hydrologic Unit Code (HUC): Calleguas Creek (18070103)

- ☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
- ☒ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

- ☒ Office (Desk) Determination. Date: 01/09/2013
- ☒ Field Determination. Date(s): 12/20/2012

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There Are no *"navigable waters of the U.S."* within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]

- ☐ Waters subject to the ebb and flow of the tide.
- ☐ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Explain: .

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There Are no *"waters of the U.S."* within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
   - ☐ TNWs, including territorial seas
   - ☐ Wetlands adjacent to TNWs
   - ☐ Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
   - ☐ Non-RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
   - ☐ Impoundments of jurisdictional waters
   - ☐ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
   Non-wetland waters: linear feet: width (ft) and/or acres.
   Wetlands: acres.

   c. **Limits (boundaries) of jurisdiction** based on: Field Data
   Elevation of established OHWM (if known): .

2. **Non-regulated waters/wetlands (check if applicable):**[3]
   - ☒ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional. Explain: **Pond appears to be isolated based on field observations and site topography.**

[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. **TNW**
   Identify TNW:

   Summarize rationale supporting determination:

2. **Wetland adjacent to TNW**
   Summarize rationale supporting conclusion that wetland is "adjacent":

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. **Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.**

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. **Characteristics of non-TNWs that flow directly or indirectly into TNW**

   (i) General Area Conditions:
   Watershed size: Pick List
   Drainage area: Pick List
   Average annual rainfall: inches
   Average annual snowfall: inches

   (ii) Physical Characteristics:
   (a) Relationship with TNW:
   ☐ Tributary flows directly into TNW.
   ☐ Tributary flows through Pick List tributaries before entering TNW.

   Project waters are Pick List river miles from TNW.
   Project waters are Pick List river miles from RPW.
   Project waters are Pick List aerial (straight) miles from TNW.
   Project waters are Pick List aerial (straight) miles from RPW.
   Project waters cross or serve as state boundaries. Explain:

   Identify flow route to TNW[5]:
   Tributary stream order, if known:

[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.
[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

(b) General Tributary Characteristics (check all that apply):

Tributary is:
- ☐ Natural
- ☐ Artificial (man-made). Explain:
- ☐ Manipulated (man-altered). Explain:

Tributary properties with respect to top of bank (estimate):
Average width: feet
Average depth: feet
Average side slopes: Pick List.

Primary tributary substrate composition (check all that apply):
- ☐ Silts
- ☐ Sands
- ☐ Concrete
- ☐ Cobbles
- ☐ Gravel
- ☐ Muck
- ☐ Bedrock
- ☐ Vegetation. Type/% cover:
- ☐ Other. Explain:

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain:
Presence of run/riffle/pool complexes. Explain:
Tributary geometry: Pick List
Tributary gradient (approximate average slope): %

(c) Flow:
Tributary provides for: Pick List
Estimate average number of flow events in review area/year: Pick List
Describe flow regime:
Other information on duration and volume:

Surface flow is: Pick List. Characteristics:

Subsurface flow: Pick List. Explain findings:
- ☐ Dye (or other) test performed:

Tributary has (check all that apply):
- ☐ Bed and banks
- ☐ OHWM[6] (check all indicators that apply):
  - ☐ clear, natural line impressed on the bank
  - ☐ changes in the character of soil
  - ☐ shelving
  - ☐ vegetation matted down, bent, or absent
  - ☐ leaf litter disturbed or washed away
  - ☐ sediment deposition
  - ☐ water staining
  - ☐ other (list):
  - ☐ the presence of litter and debris
  - ☐ destruction of terrestrial vegetation
  - ☐ the presence of wrack line
  - ☐ sediment sorting
  - ☐ scour
  - ☐ multiple observed or predicted flow events
  - ☐ abrupt change in plant community
- ☐ Discontinuous OHWM.[7] Explain:

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):
- ☐ High Tide Line indicated by:
  - ☐ oil or scum line along shore objects
  - ☐ fine shell or debris deposits (foreshore)
  - ☐ physical markings/characteristics
  - ☐ tidal gauges
  - ☐ other (list):
- ☐ Mean High Water Mark indicated by:
  - ☐ survey to available datum;
  - ☐ physical markings;
  - ☐ vegetation lines/changes in vegetation types.

(iii) Chemical Characteristics:
Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain:
Identify specific pollutants, if known:

[6] A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7] Ibid.

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

3. **Non-RPWs[8] that flow directly or indirectly into TNWs.**
☐ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

4. **Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.**
☐ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
☐ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

☐ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

5. **Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.**
☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. **Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.**
☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. **Impoundments of jurisdictional waters.[9]**
As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.
☐ Demonstrate that impoundment was created from "waters of the U.S.," or
☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]
☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ which are or could be used for industrial purposes by industries in interstate commerce.
☐ Interstate isolated waters. Explain: .
☐ Other factors. Explain:

Identify water body and summarize rationale supporting determination:

---

[8]See Footnote # 3.
[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.
[10] **Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.***

Provide estimates for jurisdictional waters in the review area (check all that apply):
- ☐ Tributary waters: linear feet width (ft).
- ☐ Other non-wetland waters: acres.
  - Identify type(s) of waters: .
- ☐ Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):
- ☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
- ☒ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
  - ☒ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
- ☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
- ☐ Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):
- ☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
- ☐ Lakes/ponds: acres.
- ☐ Other non-wetland waters: acres. List type of aquatic resource: .
- ☒ Wetlands: 0.15acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):
- ☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
- ☐ Lakes/ponds: acres.
- ☐ Other non-wetland waters: acres. List type of aquatic resource:
- ☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. **SUPPORTING DATA. Data reviewed for JD (check all that apply** - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):
- ☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant:
- ☒ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
  - ☒ Office concurs with data sheets/delineation report.
  - ☐ Office does not concur with data sheets/delineation report.
- ☐ Data sheets prepared by the Corps: .
- ☐ Corps navigable waters' study: .
- ☐ U.S. Geological Survey Hydrologic Atlas:
  - ☐ USGS NHD data.
  - ☐ USGS 8 and 12 digit HUC maps.
- ☐ U.S. Geological Survey map(s). Cite scale & quad name:
- ☐ USDA Natural Resources Conservation Service Soil Survey. Citation:
- ☐ National wetlands inventory map(s). Cite name: .
- ☐ State/Local wetland inventory map(s): .
- ☐ FEMA/FIRM maps: .
- ☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
- ☒ Photographs: ☒ Aerial (Name & Date):google earth, various dates.
  - or ☒ Other (Name & Date):site photos 12/20/2012.
- ☐ Previous determination(s). File no. and date of response letter:
- ☐ Applicable/supporting case law: .
- ☐ Applicable/supporting scientific literature:
- ☐ Other information (please specify): .

B. **ADDITIONAL COMMENTS TO SUPPORT JD:** The subject pond appears to be an excavated feature approximately 0.15 acre in size that is seasonally ponded and supports wetland characteristics (classified as a seasonally flooded palustrine emergent wetland). There is no evidence indicating the pond overflows and connects with non-isolated drainage features which ultimately drain to a TNW or cross state lines. The pond is within the larger Calleguas Creek watershed and sits within an elevated plateau area surrounded by rock formations to the

north, east and south.. The drainage area of the pond is estimated to be approximately 20 acres. A small area of ponded water was evident within the larger feature during a 12/20/2012 site visit. No evidence of outflow (scour, debris deposits, etc) was observed. The nearest drainage feature, an ephemeral drainage channel ("northnern drainage") untimately draining to Calleguas Creek, is approxmately 500 lateral feet and 100 vertical feet removed from the pond at its nearest point. No sources of interstate commerce were identified.

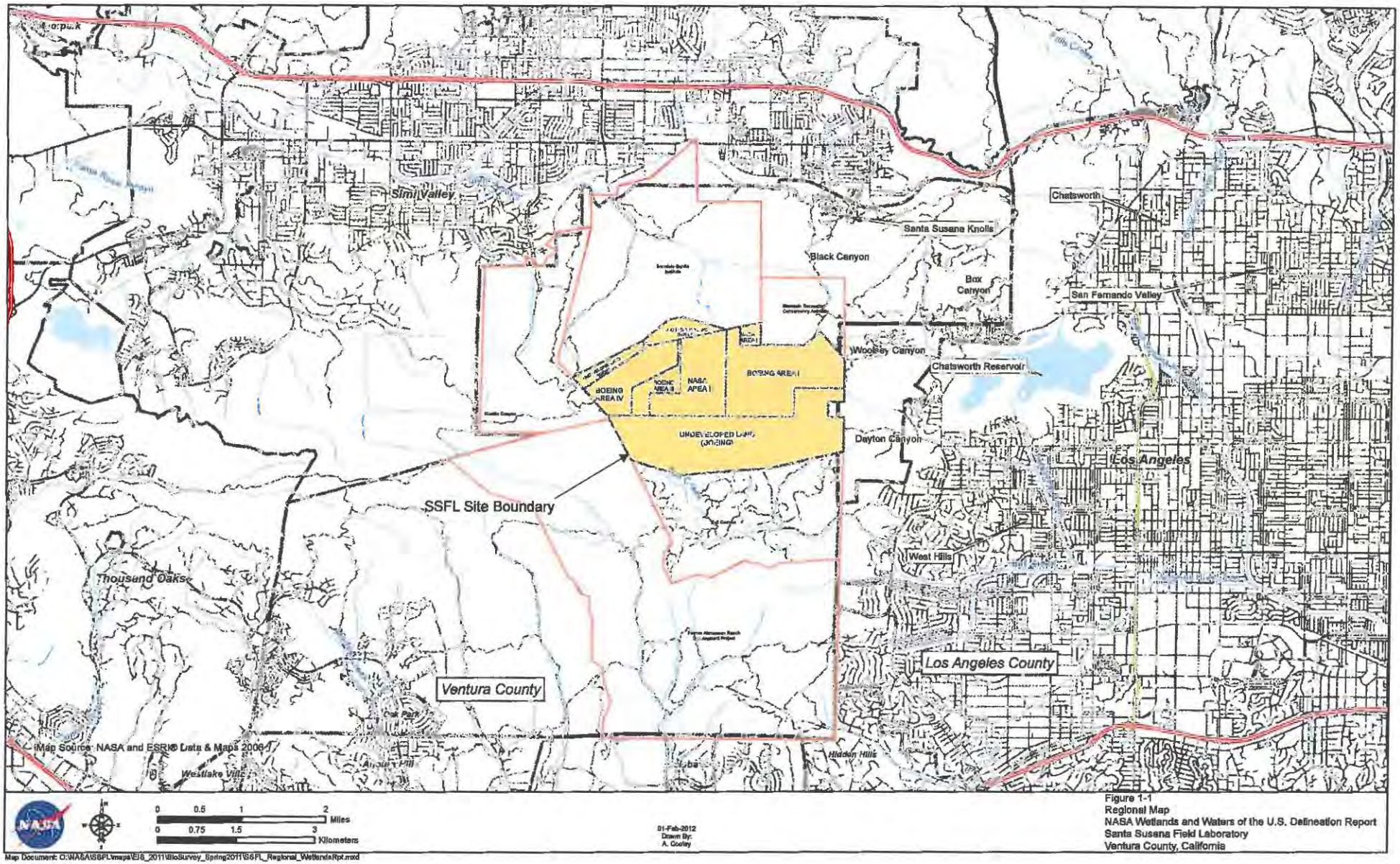
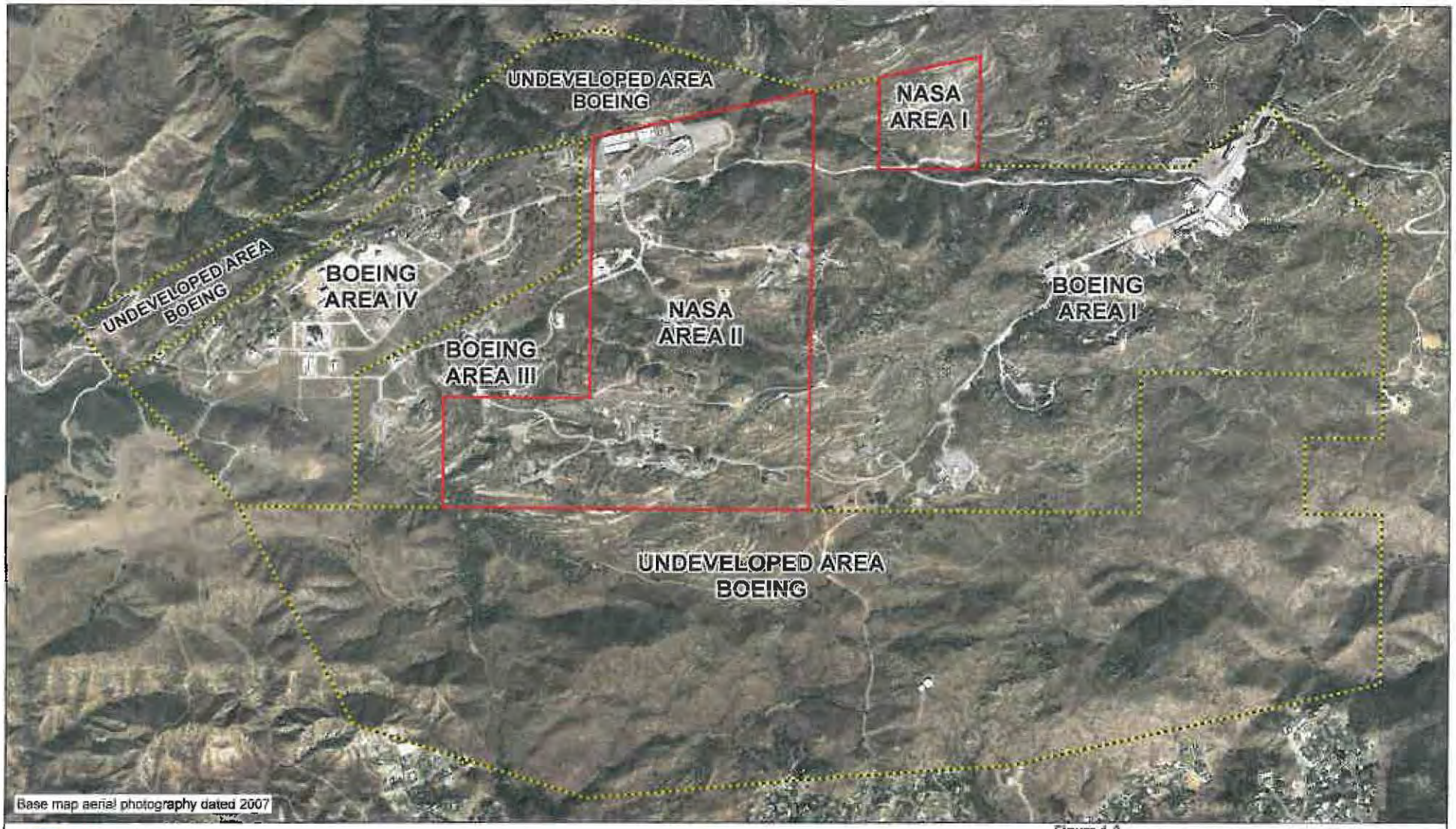


Figure 1-1
Regional Map
NASA Wetlands and Waters of the U.S. Delineation Report
Santa Susana Field Laboratory
Ventura County, California



Legend
NASA-Administered Property Boundary
SSFL Administrative Areas

0 750 1,500 3,000 Feet

Figure 1-2
Site Overview
NASA Wetlands and Waters of the U.S. Delineation Report
Santa Susana Field Laboratory
Ventura County, California

Map Document: O:\NASA\SSFL\maps\EIS_2011\SiteSurvey_Spring2011\SSFL_Site_Overview_WetlandsRpt.mxd

SW-2 pond drainage area (approx 20 acres)

SW-2 pond (12/20/2012)

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APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD): 09/12/2012

B. DISTRICT OFFICE, FILE NAME, AND NUMBER: CESPL-RG-N, Ventura Field Office; SSFL NASA Property Delineation; File no. SPL-2012-520-AJS: Northern Drainage

C. PROJECT LOCATION AND BACKGROUND INFORMATION:
State: CA County/parish/borough: Ventura City: unincorporated (SSFL)
Center coordinates of site (lat/long in degree decimal format): Lat. 32.23245° N, Long. 118.6982° W
Universal Transverse Mercator:
Name of nearest waterbody: Northern Drainage
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Lower Calleguas Creek
Name of watershed or Hydrologic Unit Code (HUC): Calleguas Creek (18070103)
- [x] Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
- [ ] Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):
- [x] Office (Desk) Determination. Date: 09/12/2012
- [x] Field Determination. Date(s): Jan 2012

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There [redacted] "*navigable waters of the U.S.*" within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]
- [ ] Waters subject to the ebb and flow of the tide.
- [ ] Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Explain: .

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There [redacted] "*waters of the U.S.*" within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
   - [ ] TNWs, including territorial seas
   - [ ] Wetlands adjacent to TNWs
   - [ ] Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
   - [x] Non-RPWs that flow directly or indirectly into TNWs
   - [ ] Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
   - [ ] Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
   - [ ] Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
   - [ ] Impoundments of jurisdictional waters
   - [x] Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
   Non-wetland waters: 3200 linear feet: 8width (ft) and/or acres.
   Wetlands: acres.

   c. **Limits (boundaries) of jurisdiction** based on: **[redacted]**
   Elevation of established OHWM (if known):

2. **Non-regulated waters/wetlands (check if applicable):**[3]

[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

☒ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional. Explain: **a small pond, approximately 0.15 acre in size and apparently excavated within the drainage area, was determined to be isolated. A separate JD form was prepared to address this pond.**

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. **TNW**
   Identify TNW:

   Summarize rationale supporting determination:

2. **Wetland adjacent to TNW**
   Summarize rationale supporting conclusion that wetland is "adjacent":

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. **Characteristics of non-TNWs that flow directly or indirectly into TNW**

   (i) **General Area Conditions:**
   Watershed size: 291 square miles
   Drainage area: 400 acres
   Average annual rainfall: 19 inches
   Average annual snowfall: 0 inches

   (ii) **Physical Characteristics:**
   (a) Relationship with TNW:
   ☐ Tributary flows directly into TNW.
   ☒ Tributary flows through 5 tributaries before entering TNW.

   Project waters are 25-30 river miles from TNW.
   Project waters are 2-5 river miles from RPW.
   Project waters are 20-25 aerial (straight) miles from TNW.
   Project waters are 2-5 aerial (straight) miles from RPW.
   Project waters cross or serve as state boundaries. Explain: n/a.

   Identify flow route to TNW[5]: Northern Drainage flows apprxoimately 2.5 miles to Meier Creek, thence to Arroyo Simi, Arroyo Las Posas and Calleguas Creek. The downstream TNW is the upper limit of tidal influence on Calleguas Creek.

[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.
[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

Tributary stream order, if known:

(b) General Tributary Characteristics (check all that apply):

Tributary is:
- ☐ Natural
- ☐ Artificial (man-made). Explain:
- ☒ Manipulated (man-altered). Explain: culverted road xings.

Tributary properties with respect to top of bank (estimate):
Average width: 8 feet
Average depth: 2 feet
Average side slopes: 2:1.

Primary tributary substrate composition (check all that apply):

☒ Silts	☒ Sands	☐ Concrete
☐ Cobbles	☐ Gravel	☐ Muck
☒ Bedrock	☐ Vegetation. Type/% cover:	
☐ Other. Explain:	.	

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: some incision evident.
Presence of run/riffle/pool complexes. Explain: n/a.
Tributary geometry: Meandering
Tributary gradient (approximate average slope): 1 %

(c) Flow:
Tributary provides for: Seasonal flow
Estimate average number of flow events in review area/year: 2-5
Describe flow regime: intermittent.
Other information on duration and volume:

Surface flow is: Confined. Characteristics: .

Subsurface flow: Unknown. Explain findings:
☐ Dye (or other) test performed: .

Tributary has (check all that apply):
- ☒ Bed and banks
- ☒ OHWM[6] (check all indicators that apply):

☐ clear, natural line impressed on the bank	☒ the presence of litter and debris
☐ changes in the character of soil	☐ destruction of terrestrial vegetation
☒ shelving	☐ the presence of wrack line
☐ vegetation matted down, bent, or absent	☐ sediment sorting
☐ leaf litter disturbed or washed away	☐ scour
☐ sediment deposition	☐ multiple observed or predicted flow events
☐ water staining	☐ abrupt change in plant community
☐ other (list):	

- ☐ Discontinuous OHWM.[7] Explain:

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

☐ High Tide Line indicated by:	☐ Mean High Water Mark indicated by:
☐ oil or scum line along shore objects	☐ survey to available datum;
☐ fine shell or debris deposits (foreshore)	☐ physical markings;
☐ physical markings/characteristics	☐ vegetation lines/changes in vegetation types.
☐ tidal gauges	
☐ other (list):	

(iii) Chemical Characteristics:
Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain: water not present at time of delineation.
Identify specific pollutants, if known: heavy metals, dioxin.

[6] A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7] Ibid.

(iv) Biological Characteristics. Channel supports (check all that apply):

- ☐ Riparian corridor. Characteristics (type, average width):
- ☐ Wetland fringe. Characteristics: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings:
  - ☐ Aquatic/wildlife diversity. Explain findings: .

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW

(i) Physical Characteristics:

(a) General Wetland Characteristics:

Properties:

Wetland size: acres

Wetland type. Explain:

Wetland quality. Explain:

Project wetlands cross or serve as state boundaries. Explain:

(b) General Flow Relationship with Non-TNW:

Flow is: Pick List. Explain: .

Surface flow is: Pick List

Characteristics:

Subsurface flow: Pick List. Explain findings:

- ☐ Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:

- ☐ Directly abutting
- ☐ Not directly abutting
  - ☐ Discrete wetland hydrologic connection. Explain:
  - ☐ Ecological connection. Explain: .
  - ☐ Separated by berm/barrier. Explain: .

(d) Proximity (Relationship) to TNW

Project wetlands are Pick List river miles from TNW.

Project waters are Pick List aerial (straight) miles from TNW.

Flow is from: Pick List.

Estimate approximate location of wetland as within the Pick List floodplain.

(ii) Chemical Characteristics:

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: .

Identify specific pollutants, if known: .

(iii) Biological Characteristics. Wetland supports (check all that apply):

- ☐ Riparian buffer. Characteristics (type, average width):
- ☐ Vegetation type/percent cover. Explain: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings:
  - ☐ Aquatic/wildlife diversity. Explain findings: .

3. Characteristics of all wetlands adjacent to the tributary (if any)

All wetland(s) being considered in the cumulative analysis: Pick List

Approximately ( ) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)

Summarize overall biological, chemical and physical functions being performed:

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D:The subject tributary is an ephemeral drainage with an ordinary high water mark of 6-10 feet in width. Estimated discharge volumes at Outfall 009 (which includes the subject tributary plus the contribution from the ELV tributary) is approximately 12 cfs for a 1-year, 24-hour flood event, 49 cfs for the 10-year event and 100 cfs for the 100-year event. The downstream TNW (upper limit of tidal influence on Calleguas Creek) is approximately 28 miles downstream. The total drainage area of the tributary represents approximately 0.21% of the watershed draining to the downstream TNW. Soil testing within the channel and surrounding watershed have revealed elevated levels of heavy metals (lead, cadmium, copper and/or mercury) as well as dioxin at one location. The tributary therefore has a significant nexus to the downstream TNW by virtue of its potential to deliver contaminants downstream.

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   ☐ TNWs: linear feet width (ft), Or, acres.
   ☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**

☐ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: .

☐ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: .

Provide estimates for jurisdictional waters in the review area (check all that apply):

☐ Tributary waters: linear feet width (ft).

☐ Other non-wetland waters: acres.

Identify type(s) of waters: .

3. **Non-RPWs[8] that flow directly or indirectly into TNWs.**

☐ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):

☒ Tributary waters: **3,000** linear feet; **8** width (ft).

☐ Other non-wetland waters: acres.

Identify type(s) of waters: .

4. **Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.**

☐ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.

☐ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

☐ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

5. **Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.**

☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. **Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.**

☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. **Impoundments of jurisdictional waters.[9]**

As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.

☐ Demonstrate that impoundment was created from "waters of the U.S.," or

☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or

☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]

---

[8] See Footnote # 3.

[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.

[10] **Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.***

☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ which are or could be used for industrial purposes by industries in interstate commerce.
☐ Interstate isolated waters. Explain: .
☐ Other factors. Explain:

Identify water body and summarize rationale supporting determination:

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .
☐ Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):
☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
☒ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
☒ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
☐ Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
☒ Lakes/ponds: 0.15 acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource:
☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):
☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant:
☒ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
☒ Office concurs with data sheets/delineation report.
☐ Office does not concur with data sheets/delineation report.
☐ Data sheets prepared by the Corps: .
☐ Corps navigable waters' study: .
☐ U.S. Geological Survey Hydrologic Atlas:
☐ USGS NHD data.
☐ USGS 8 and 12 digit HUC maps.
☐ U.S. Geological Survey map(s). Cite scale & quad name:
☐ USDA Natural Resources Conservation Service Soil Survey. Citation:
☐ National wetlands inventory map(s). Cite name: .
☐ State/Local wetland inventory map(s): .
☐ FEMA/FIRM maps:
☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
☐ Photographs: ☐ Aerial (Name & Date): .
or ☐ Other (Name & Date): .
☒ Previous determination(s). File no. and date of response letter: file no SPL-2009-412-AJS (4/27/2010).

- Applicable/supporting case law:
- Applicable/supporting scientific literature:
- Other information (please specify):

B. ADDITIONAL COMMENTS TO SUPPORT JD: The subject tributary is a small 2nd order drainage channel with an average OHWM width of 6 feet. The drainage area, including the two 1st order streams that feed into tributary 2 (tribs 3 & 4) is roughly 400 acres. Flows from the tributary pass through the Outfall 009 water quality sampling station installed by the applicant. Data from the sampling station (2004-2007) showed exceedences of permit limits of copper on one occasion, lead on 2 occasions and a dioxin congener on three occasions. Soil sampling within the drainage area has identified elevated levels of heavy metals and dioxin. Based on these results, the subject tributary appears to have a significant nexus to the downstream TNW (upper limit of tidal influence on Calleguas Creek) based on the potential to deliver contaminants downstream.

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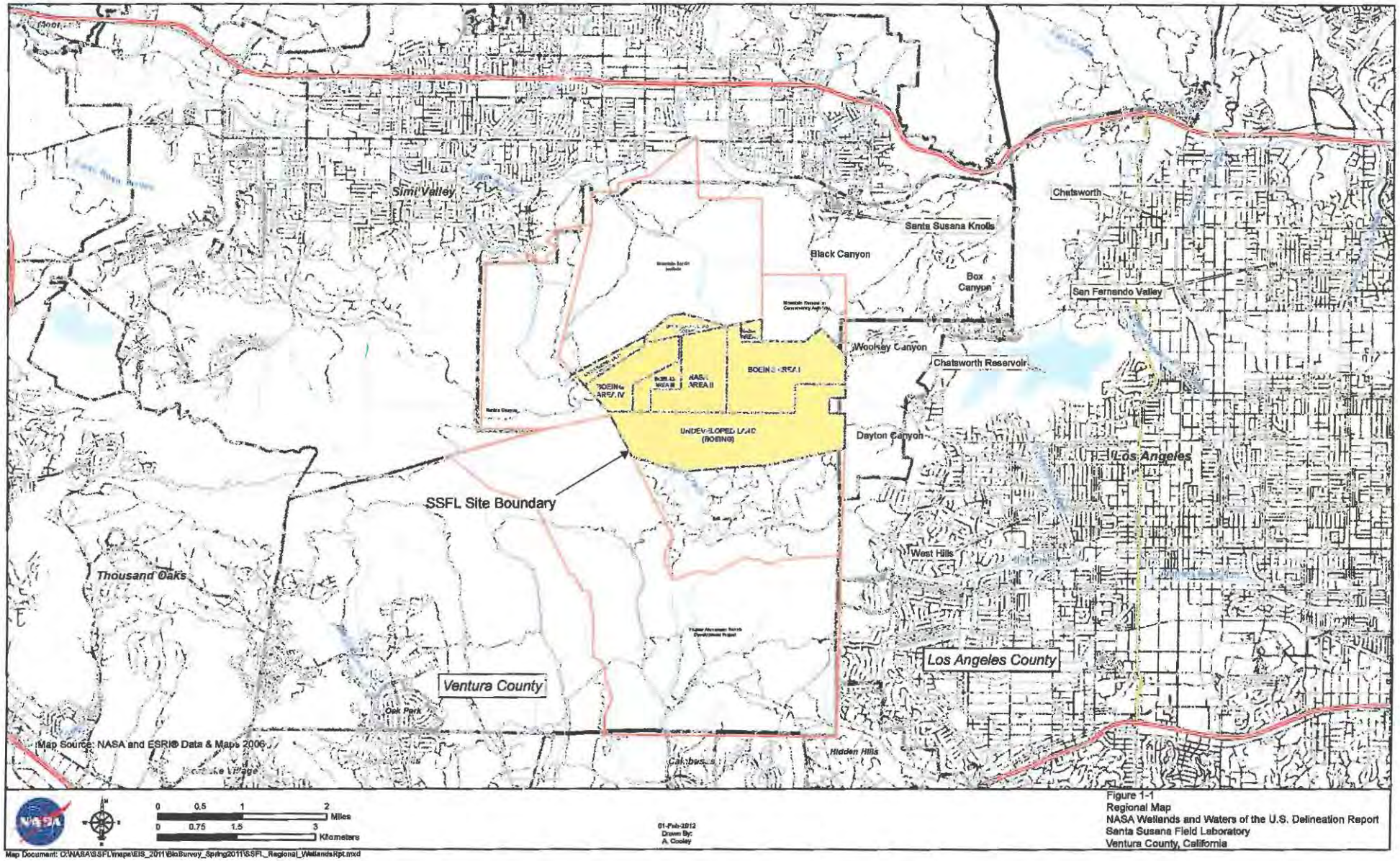

Figure 1-1
Regional Map
NASA Wetlands and Waters of the U.S. Delineation Report
Santa Susana Field Laboratory
Ventura County, California

Map Document: C:\NASA\SSFL\maps\EIS_2011\BioSurvey_Spring2011\SSFL_Regional_WetlandsRpt.mxd

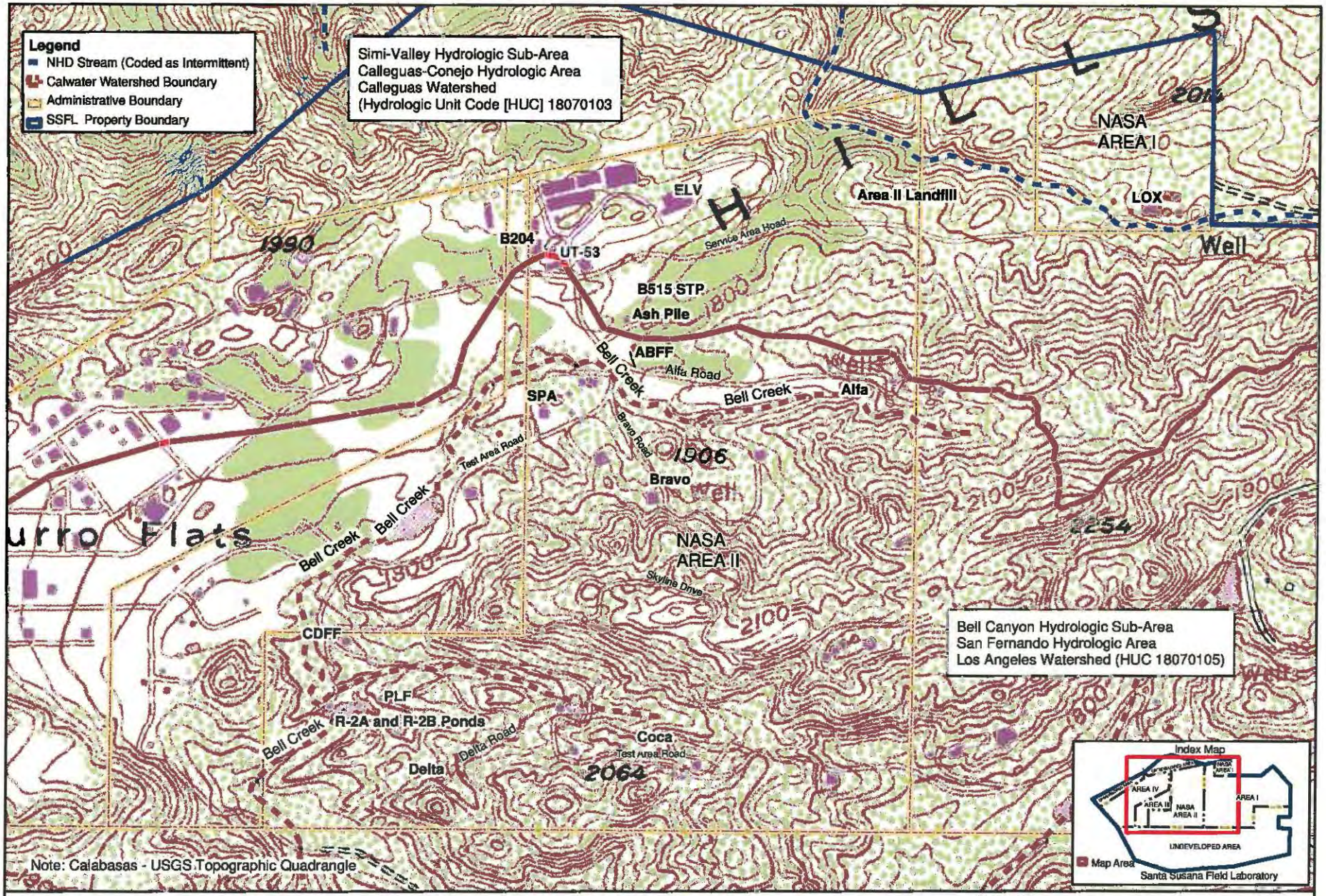

Figure D-1
USGS Quadrangle Topographic Map and NHD Information
NASA Wetlands and Waters of the U.S. Delineation Report
Santa Susana Field Laboratory
Ventura County, California

outfall 009 monitoring sta.
isolated pond
Northern drainage
Woolsey Canyon Rd
Facility Rd
F St
Bravo Rd
Brea Rd
Bowl Rd
Image U.S. Geological Survey

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APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD): 01/15/2013

B. DISTRICT OFFICE, FILE NAME, AND NUMBER: CESPL-RG-N, Ventura Field Office; SSFL NASA Property Delineation; File no. SPL-2012-520-AJS: COCA Drainage

C. PROJECT LOCATION AND BACKGROUND INFORMATION:
State: CA County/parish/borough: Ventura City: unincorporated (SSFL)
Center coordinates of site (lat/long in degree decimal format): Lat. 32.23245° N, Long. 118.6982° W
Universal Transverse Mercator:
Name of nearest waterbody: COCA drainage
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Los Angeles River
Name of watershed or Hydrologic Unit Code (HUC): Los Angeles River (18070105)
- ☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
- ☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):
- ☒ Office (Desk) Determination. Date: 09/12/2012
- ☒ Field Determination. Date(s): Jan 2012

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There Are not "*navigable waters of the U.S.*" within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]
- ☐ Waters subject to the ebb and flow of the tide.
- ☐ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Explain: .

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There Are "*waters of the U.S.*" within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
   - ☒ TNWs, including territorial seas
   - ☒ Wetlands adjacent to TNWs
   - ☒ Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
   - ☒ Non-RPWs that flow directly or indirectly into TNWs
   - ☒ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
   - ☒ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
   - ☒ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
   - ☒ Impoundments of jurisdictional waters
   - ☒ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
   Non-wetland waters: 2,000 linear feet: 5 width (ft) and/or 0.42 acres.
   Wetlands: 0.33 acres.

   c. **Limits (boundaries) of jurisdiction** based on: Established by OHWM.
   Elevation of established OHWM (if known): .

2. **Non-regulated waters/wetlands (check if applicable):**[3]
   - ☐ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional. Explain: .

[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. **TNW**
   Identify TNW: .

   Summarize rationale supporting determination:

2. **Wetland adjacent to TNW**
   Summarize rationale supporting conclusion that wetland is "adjacent":

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. **Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.**

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. **Characteristics of non-TNWs that flow directly or indirectly into TNW**

   (i) General Area Conditions:
   Watershed size: 37[illegible]
   Drainage area: 45 [illegible]
   Average annual rainfall: 19 inches
   Average annual snowfall: 0 inches

   (ii) Physical Characteristics:
   (a) Relationship with TNW:
   ☐ Tributary flows directly into TNW.
   ☒ Tributary flows through 3 tributaries before entering TNW.

   Project waters are 5-10 river miles from TNW.
   Project waters are 1 (or less) river miles from RPW.
   Project waters are 5-10 aerial (straight) miles from TNW.
   Project waters are 1 (or less) aerial (straight) miles from RPW.
   Project waters cross or serve as state boundaries. Explain: n/a.

[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.

Identify flow route to TNW[5]: Upper Southwestern Drainage flows into R2A Pond, thence to Bell Canyon Channel (natural), thence to the channelized section of lower Bell Canyon. The downstream TNW is upper end of the Los Angeles River, at the confluence of Bell Canyon Channel and Arroyo Calabasas.
Tributary stream order, if known: 1.

(b) General Tributary Characteristics (check all that apply):
Tributary is: ☐ Natural
☐ Artificial (man-made). Explain:
☒ Manipulated (man-altered). Explain: culvert, shotcrete swales, water control weirs and impoundments present.

Tributary properties with respect to top of bank (estimate):
Average width: 4-5 feet
Average depth: 1 feet
Average side slopes: 2:1

Primary tributary substrate composition (check all that apply):

☒ Silts	☒ Sands	☒ Concrete
☐ Cobbles	☐ Gravel	☐ Muck
☒ Bedrock	☐ Vegetation. Type/% cover:	
☐ Other. Explain:		

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: some incision evident.
Presence of run/riffle/pool complexes. Explain: n/a.
Tributary geometry: Relatively straight
Tributary gradient (approximate average slope): 1 %

(c) Flow:
Tributary provides for: Ephemeral flow
Estimate average number of flow events in review area/year: 1-5
Describe flow regime: ephemeral.
Other information on duration and volume: Channel previously affected by discharges from SSFL test operations requiring cooling water (no longer conducted). Channel and downstream impoundments acted to collect cooling water discharges during rocket engine testing.

Surface flow is: Discrete and confined. Characteristics:

Subsurface flow: Unknown. Explain findings:
☐ Dye (or other) test performed:

Tributary has (check all that apply):
☒ Bed and banks
☒ OHWM[6] (check all indicators that apply):

☐ clear, natural line impressed on the bank	☐ the presence of litter and debris
☐ changes in the character of soil	☐ destruction of terrestrial vegetation
☒ shelving	☐ the presence of wrack line
☐ vegetation matted down, bent, or absent	☐ sediment sorting
☐ leaf litter disturbed or washed away	☐ scour
☐ sediment deposition	☐ multiple observed or predicted flow events
☒ water staining	☐ abrupt change in plant community
☐ other (list):	

☐ Discontinuous OHWM.[7] Explain:

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

☐ High Tide Line indicated by:	☐ Mean High Water Mark indicated by:
☐ oil or scum line along shore objects	☐ survey to available datum;
☐ fine shell or debris deposits (foreshore)	☐ physical markings;
☐ physical markings/characteristics	☐ vegetation lines/changes in vegetation types.
☐ tidal gauges	
☐ other (list):	

[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.
[6] A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7] Ibid.

(iii) Chemical Characteristics:

Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).

Explain: water not present at time of delineation.

Identify specific pollutants, if known: heavy metals.

5

(iv) Biological Characteristics. Channel supports (check all that apply):

- ☐ Riparian corridor. Characteristics (type, average width):
- ☐ Wetland fringe. Characteristics: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings:
  - ☐ Aquatic/wildlife diversity. Explain findings: .

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW

(i) Physical Characteristics:

(a) General Wetland Characteristics:

Properties:

Wetland size: 0.33 acres

Wetland type. Explain: palustrine.

Wetland quality. Explain: poor. formed as a result of impoundments intened to collect runoff from testing operations (no longer conducted).

Project wetlands cross or serve as state boundaries. Explain: n/a.

(b) General Flow Relationship with Non-TNW:

Flow is: Ephemeral flow Explain: .

Surface flow is: Not present

Characteristics:

Subsurface flow: Unknown Explain findings:

- ☐ Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:

- ☒ Directly abutting
- ☐ Not directly abutting
  - ☐ Discrete wetland hydrologic connection. Explain:
  - ☐ Ecological connection. Explain: .
  - ☐ Separated by berm/barrier. Explain:

(d) Proximity (Relationship) to TNW

Project wetlands are 5-10 river miles from TNW.

Project waters are 5-10 aerial (straight) miles from TNW.

Flow is from: Wetland to navigable waters.

Estimate approximate location of wetland as within the 2-year or less floodplain.

(ii) Chemical Characteristics:

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: dry at time of delineation.

Identify specific pollutants, if known: heavy metals detected downstream.

(iii) Biological Characteristics. Wetland supports (check all that apply):

- ☐ Riparian buffer. Characteristics (type, average width):
- ☐ Vegetation type/percent cover. Explain: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings: .
  - ☐ Aquatic/wildlife diversity. Explain findings: .

3. Characteristics of all wetlands adjacent to the tributary (if any)

All wetland(s) being considered in the cumulative analysis: 1

Approximately (0.33) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)
y	0.33		

Summarize overall biological, chemical and physical functions being performed: very small impoundment area with managed hydrology. Dominated by Typha sp. and unvegetated open water (dry at time of delineation). An additional impoundment along flow route likely supports palustrine fringe wetlands, however this was outside the assessment area.

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D:

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: The subject tributary is a small ephemeral drainage with a discontinuous ordinary high water mark averaging 4-5 feet in width. The tributary includes concrete-lined sections and flow control wiers. Historically, the channel functioned to collect and convey runoff from adjacent rocket engine test stands that require substantial amounts of cooling water during testing. Flows are eventurally conveyed to a holding pond off the NASA property (Boeing property) and thence to a secondary pond ("R2A Pond") and thence to Bell Canyon Channel. The downstream TNW (upper reach of the Los Angeles River) is approximately 8 miles downstream. The total drainage area of the tributary represents approximately 2% of the watershed draining to the downstream TNW. Soil testing within the channel and surrounding watershed have revealed elevated levels of heavy metals (lead, cadmium, copper and/or mercury). The tributary therefore has a significant nexus to the downstream TNW by virtue of its potential to deliver contaminants downstream.

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: Wetlands present are palustrine in nature as the result of impoundments of tributary. Flow and potential pollutants would be conveyed through wetland, therefore the wetlands in question have a significant nexus to the downstream TNW.

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   ☐ TNWs: linear feet width (ft), Or, acres.

☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   ☐ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: .
   ☐ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: .

   Provide estimates for jurisdictional waters in the review area (check all that apply):
   ☐ Tributary waters: linear feet width (ft).
   ☐ Other non-wetland waters: acres.
   Identify type(s) of waters: .

3. **Non-RPWs[8] that flow directly or indirectly into TNWs.**
   ☒ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

   Provide estimates for jurisdictional waters within the review area (check all that apply):
   ☒ Tributary waters: **3700** linear feet; **5** width (ft).
   ☐ Other non-wetland waters: acres.
   Identify type(s) of waters: .

4. **Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.**
   ☐ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
   ☐ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

   ☐ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

   Provide acreage estimates for jurisdictional wetlands in the review area: acres.

5. **Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.**
   ☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

   Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. **Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.**
   ☒ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

   Provide estimates for jurisdictional wetlands in the review area: **0.13** acres.

7. **Impoundments of jurisdictional waters.[9]**
   As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.
   ☐ Demonstrate that impoundment was created from "waters of the U.S.," or
   ☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
   ☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

[8] See Footnote # 3.
[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]

- ☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
- ☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
- ☐ which are or could be used for industrial purposes by industries in interstate commerce.
- ☐ Interstate isolated waters. Explain: .
- ☐ Other factors. Explain: .

Identify water body and summarize rationale supporting determination:

Provide estimates for jurisdictional waters in the review area (check all that apply):

- ☐ Tributary waters: linear feet width (ft).
- ☐ Other non-wetland waters: acres.
  - Identify type(s) of waters: .
- ☐ Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):

- ☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
- ☐ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
  - ☐ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
- ☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
- ☐ Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):

- ☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
- ☐ Lakes/ponds: 0.155 acres.
- ☐ Other non-wetland waters: acres. List type of aquatic resource: .
- ☐ Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):

- ☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
- ☐ Lakes/ponds: acres.
- ☐ Other non-wetland waters: acres. List type of aquatic resource: .
- ☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. **SUPPORTING DATA. Data reviewed for JD (check all that apply** - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):

- ☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant:
- ☒ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
  - ☒ Office concurs with data sheets/delineation report.
  - ☐ Office does not concur with data sheets/delineation report.
- ☐ Data sheets prepared by the Corps: .
- ☐ Corps navigable waters' study: .
- ☐ U.S. Geological Survey Hydrologic Atlas: .
  - ☐ USGS NHD data.
  - ☐ USGS 8 and 12 digit HUC maps.
- ☐ U.S. Geological Survey map(s). Cite scale & quad name: .
- ☐ USDA Natural Resources Conservation Service Soil Survey. Citation:
- ☐ National wetlands inventory map(s). Cite name: .
- ☐ State/Local wetland inventory map(s): .

[10] **Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.***

- ☐ FEMA/FIRM maps: .
- ☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
- ☐ Photographs: ☐ Aerial (Name & Date): .
  or ☐ Other (Name & Date): .
- ☐ Previous determination(s). File no. and date of response letter: .
- ☐ Applicable/supporting case law: .
- ☐ Applicable/supporting scientific literature: .
- ☐ Other information (please specify): .

B. ADDITIONAL COMMENTS TO SUPPORT JD: The subject tributary is a small first order drainage channel with an average OHWM width of 4-5 feet. The drainage area is roughly 495 acres. Soil sampling within the drainage area has identified elevated levels of heavy metals and dioxin. Based on these results, the subject tributary appears to have a significant nexus to the downstream TNW (upper Los Angeles River, approximately 8 river miles downstream) based on the potential to deliver contaminants downstream.

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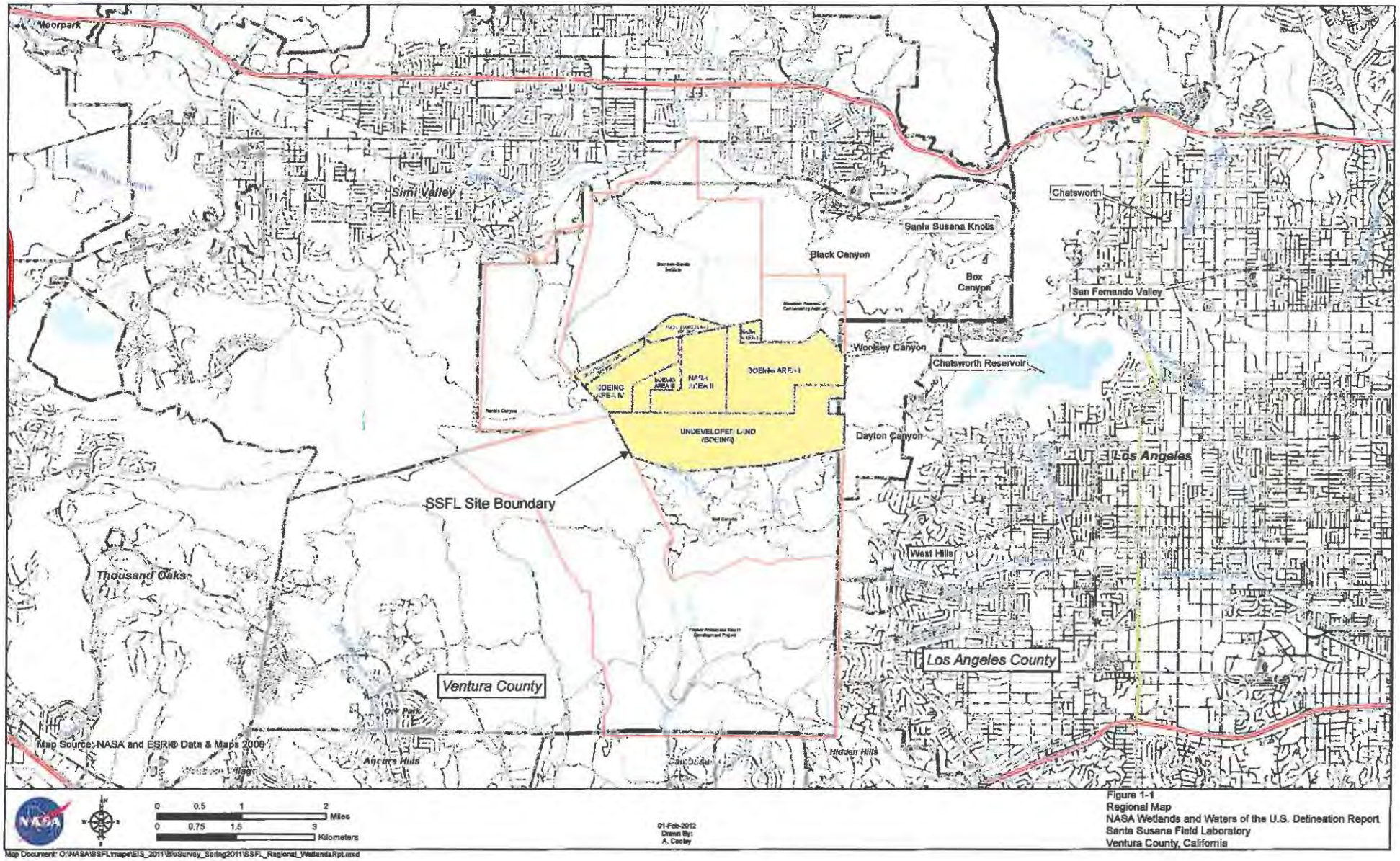

Figure 1-1
Regional Map
NASA Wetlands and Waters of the U.S. Delineation Report
Santa Susana Field Laboratory
Ventura County, California

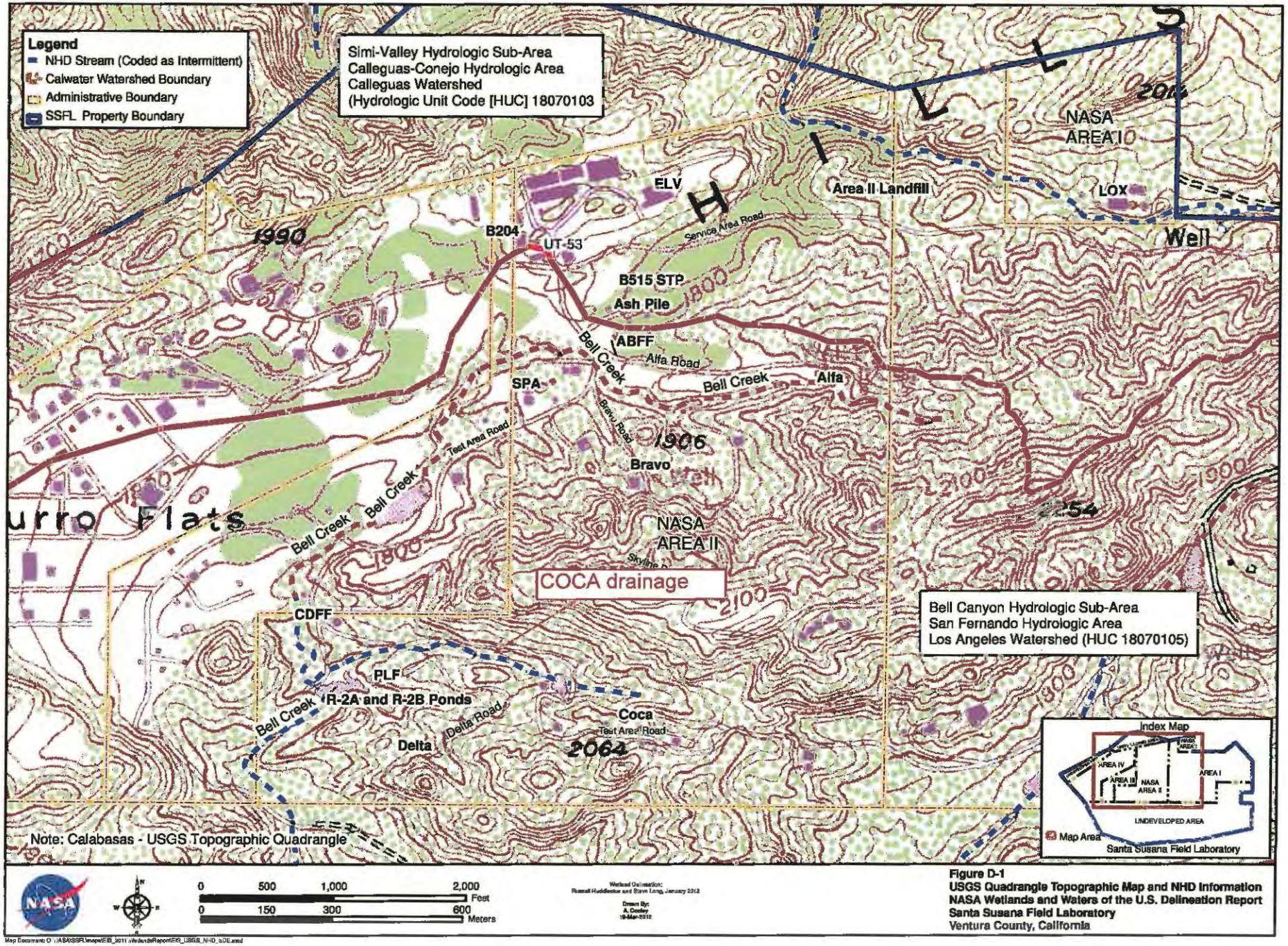

Figure D-1
USGS Quadrangle Topographic Map and NHD Information
NASA Wetlands and Waters of the U.S. Delineation Report
Santa Susana Field Laboratory
Ventura County, California

Bravo Rd
COCA Drainage
Delta CC Rd
Delta Rd
Rota Rd

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APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD): 09/12/2012

B. DISTRICT OFFICE, FILE NAME, AND NUMBER: CESPL-RG-N, Ventura Field Office; SSFL NASA Property Delineation; File no. SPL-2012-520-AJS: ELV Drainage

C. PROJECT LOCATION AND BACKGROUND INFORMATION:

State: CA County/parish/borough: Ventura City: unincorporated (SSFL)
Center coordinates of site (lat/long in degree decimal format): Lat. 32.23245° N, Long. 118.6982° W
Universal Transverse Mercator:
Name of nearest waterbody: ELV Drainage
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Lower Calleguas Creek
Name of watershed or Hydrologic Unit Code (HUC): Calleguas Creek (18070103)

- ☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
- ☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

- ☒ Office (Desk) Determination. Date: 09/12/2012
- ☒ Field Determination. Date(s): Jan 2012

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There [redacted] "*navigable waters of the U.S.*" within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]

- ☐ Waters subject to the ebb and flow of the tide.
- ☐ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Explain: .

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There [redacted] "*waters of the U.S.*" within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
   - ☐ TNWs, including territorial seas
   - ☐ Wetlands adjacent to TNWs
   - ☐ Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
   - ☒ Non-RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
   - ☐ Impoundments of jurisdictional waters
   - ☐ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
   Non-wetland waters: 1250 linear feet: 5 width (ft) and/or 0.171 acres.
   Wetlands: 0 acres.

   c. **Limits (boundaries) of jurisdiction** based on: [redacted]
   Elevation of established OHWM (if known):

2. **Non-regulated waters/wetlands (check if applicable):**[3]
   - ☐ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional. Explain: .

[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. **TNW**
   Identify TNW:

   Summarize rationale supporting determination:

2. **Wetland adjacent to TNW**
   Summarize rationale supporting conclusion that wetland is "adjacent":

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. **Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.**

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. **Characteristics of non-TNWs that flow directly or indirectly into TNW**

   (i) **General Area Conditions:**
   Watershed size: 29[illegible] square miles
   Drainage area: 67 [illegible]
   Average annual rainfall: 19 inches
   Average annual snowfall: 0 inches

   (ii) **Physical Characteristics:**
   (a) Relationship with TNW:
   ☐ Tributary flows directly into TNW.
   ☒ Tributary flows through [illegible] tributaries before entering TNW.

   Project waters are [illegible] river miles from TNW.
   Project waters are [illegible] river miles from RPW.
   Project waters are [illegible] aerial (straight) miles from TNW.
   Project waters are [illegible] aerial (straight) miles from RPW.
   Project waters cross or serve as state boundaries. Explain: n/a.

   Identify flow route to TNW[5]: ELV Drainage flows apprxoimately 2.5 miles to Meier Creek, thence to Arroyo Simi, Arroyo Las Posas and Calleguas Creek. The downstream TNW is the uppoer limit of tidal influence on Calleguas Creek.

[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.
[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

Tributary stream order, if known: 1.

(b) General Tributary Characteristics (check all that apply):
Tributary is: ☐ Natural
☐ Artificial (man-made). Explain:
☒ Manipulated (man-altered). Explain: culverted road xing, and approx 100-foot section has been lined with asphalt.

Tributary properties with respect to top of bank (estimate):
Average width: 5 feet
Average depth: 1 feet
Average side slopes: 2:1

Primary tributary substrate composition (check all that apply):
☒ Silts ☒ Sands ☐ Concrete
☐ Cobbles ☐ Gravel ☐ Muck
☐ Bedrock ☐ Vegetation. Type/% cover:
☐ Other. Explain:

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: some incision evident.
Presence of run/riffle/pool complexes. Explain: n/a.
Tributary geometry: Meandering
Tributary gradient (approximate average slope): 1 %

(c) Flow:
Tributary provides for: Seasonal flow
Estimate average number of flow events in review area/year: 2-5
Describe flow regime: intermittent.
Other information on duration and volume:

Surface flow is: Continuous. Characteristics:

Subsurface flow: Unknown. Explain findings:
☐ Dye (or other) test performed:

Tributary has (check all that apply):
☒ Bed and banks
☒ OHWM[6] (check all indicators that apply):
☐ clear, natural line impressed on the bank ☒ the presence of litter and debris
☐ changes in the character of soil ☐ destruction of terrestrial vegetation
☒ shelving ☐ the presence of wrack line
☐ vegetation matted down, bent, or absent ☐ sediment sorting
☐ leaf litter disturbed or washed away ☐ scour
☐ sediment deposition ☐ multiple observed or predicted flow events
☐ water staining ☐ abrupt change in plant community
☐ other (list):
☐ Discontinuous OHWM.[7] Explain:

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):
☐ High Tide Line indicated by: ☐ Mean High Water Mark indicated by:
☐ oil or scum line along shore objects ☐ survey to available datum;
☐ fine shell or debris deposits (foreshore) ☐ physical markings;
☐ physical markings/characteristics ☐ vegetation lines/changes in vegetation types.
☐ tidal gauges
☐ other (list):

(iii) Chemical Characteristics:
Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain: water not present at time of delineation.
Identify specific pollutants, if known: heavy metals, dioxin recorded at monitoring station (Outfall 009) which includes the subwatershed of this drainage feature. No monitoring results of this specific drainage channel are available, however the drainage area

[6]A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7]Ibid.

includes facilities historically operated as part of the Santa Susanna Field Lab and it likely similar contaminants would be genereated within this drainage area.

5

(iv) Biological Characteristics. Channel supports (check all that apply):

- ☐ Riparian corridor. Characteristics (type, average width):
- ☐ Wetland fringe. Characteristics: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings: .
  - ☐ Aquatic/wildlife diversity. Explain findings: .

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW

(i) Physical Characteristics:

(a) General Wetland Characteristics:

Properties:

Wetland size: acres

Wetland type. Explain: .

Wetland quality. Explain: .

Project wetlands cross or serve as state boundaries. Explain:

(b) General Flow Relationship with Non-TNW:

Flow is: Pick List. Explain:

Surface flow is: Pick List

Characteristics:

Subsurface flow: Pick List. Explain findings:

- ☐ Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:

- ☐ Directly abutting
- ☐ Not directly abutting
  - ☐ Discrete wetland hydrologic connection. Explain:
  - ☐ Ecological connection. Explain: .
  - ☐ Separated by berm/barrier. Explain: .

(d) Proximity (Relationship) to TNW

Project wetlands are Pick List river miles from TNW.

Project waters are Pick List aerial (straight) miles from TNW.

Flow is from: Pick List.

Estimate approximate location of wetland as within the Pick List floodplain.

(ii) Chemical Characteristics:

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: .

Identify specific pollutants, if known: .

(iii) Biological Characteristics. Wetland supports (check all that apply):

- ☐ Riparian buffer. Characteristics (type, average width):
- ☐ Vegetation type/percent cover. Explain: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings:
  - ☐ Aquatic/wildlife diversity. Explain findings: .

3. Characteristics of all wetlands adjacent to the tributary (if any)

All wetland(s) being considered in the cumulative analysis: Pick List

Approximately ( ) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)

Summarize overall biological, chemical and physical functions being performed:

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D:The subject tributary is a small ephemeral drainage with an ordinary high water mark averaging 5 feet in width. Estimated discharge volumes at Outfall 009 (which includes the subject tributary plus the contribution from the Northern Drainage) is approximately 12 cfs for a 1-year, 24-hour flood event, 49 cfs for the 10-year event and 100 cfs for the 100-year event. The downstream TNW (upper limit of tidal influence on Calleguas Creek) is approximately 28 miles downstream. The total drainage area of the tributary represents approximately 0.03% of the watershed draining to the downstream TNW. Soil testing within the channel and surrounding watershed have revealed elevated levels of heavy metals (lead, cadmium, copper and/or mercury) as well as dioxin at one location. The tributary therefore has a significant nexus to the downstream TNW by virtue of its potential to deliver contaminants downstream.

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   - ☐ TNWs: linear feet width (ft), Or, acres.
   - ☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**

☐ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: .

☐ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: .

Provide estimates for jurisdictional waters in the review area (check all that apply):

☐ Tributary waters: linear feet width (ft).

☐ Other non-wetland waters: acres.

Identify type(s) of waters: .

3. **Non-RPWs[8] that flow directly or indirectly into TNWs.**

☒ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):

☒ Tributary waters: **1,200** linear feet; **5** width (ft).

☐ Other non-wetland waters: acres.

Identify type(s) of waters: .

4. **Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.**

☐ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.

☐ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

☐ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

5. **Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.**

☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. **Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.**

☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. **Impoundments of jurisdictional waters.[9]**

As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.

☐ Demonstrate that impoundment was created from "waters of the U.S.," or

☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or

☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]

---

[8] See Footnote # 3.

[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.

[10] **Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.***

☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ which are or could be used for industrial purposes by industries in interstate commerce.
☐ Interstate isolated waters. Explain: .
☐ Other factors. Explain:

Identify water body and summarize rationale supporting determination:

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .
☐ Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):
☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
☐ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
☐ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
☐ Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
☐ Lakes/ponds: 0.155 acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. **SUPPORTING DATA. Data reviewed for JD (check all that apply** - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):
☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant:
☒ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
☒ Office concurs with data sheets/delineation report.
☐ Office does not concur with data sheets/delineation report.
☐ Data sheets prepared by the Corps: .
☐ Corps navigable waters' study: .
☐ U.S. Geological Survey Hydrologic Atlas:
☐ USGS NHD data.
☐ USGS 8 and 12 digit HUC maps.
☐ U.S. Geological Survey map(s). Cite scale & quad name:
☐ USDA Natural Resources Conservation Service Soil Survey. Citation: .
☐ National wetlands inventory map(s). Cite name: .
☐ State/Local wetland inventory map(s): .
☐ FEMA/FIRM maps: .
☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
☐ Photographs: ☐ Aerial (Name & Date): .
or ☐ Other (Name & Date): .
☒ Previous determination(s). File no. and date of response letter: file no SPL-2009-412-AJS (4/27/2010).

- ☐ Applicable/supporting case law:
- ☐ Applicable/supporting scientific literature:
- ☐ Other information (please specify):

B. ADDITIONAL COMMENTS TO SUPPORT JD: The subject tributary is a small first order drainage channel with an average OHWM width of 4 feet. The drainage area is roughly 67 acres. Flows from the tributary pass through the Outfall 009 water quality sampling station installed by the applicant. Data from the sampling station (2004-2007) showed exceedences of permit limits of copper on one occasion, lead on 2 occasions and a dioxin congener on three occasions. Soil sampling within the drainage area has identified elevated levels of heavy metals and dioxin. Based on these results, the subject tributary appears to have a significant nexus to the downstream TNW (upper limit of tidal influence on Calleguas Creek) based on the potential to deliver contaminants downstream.

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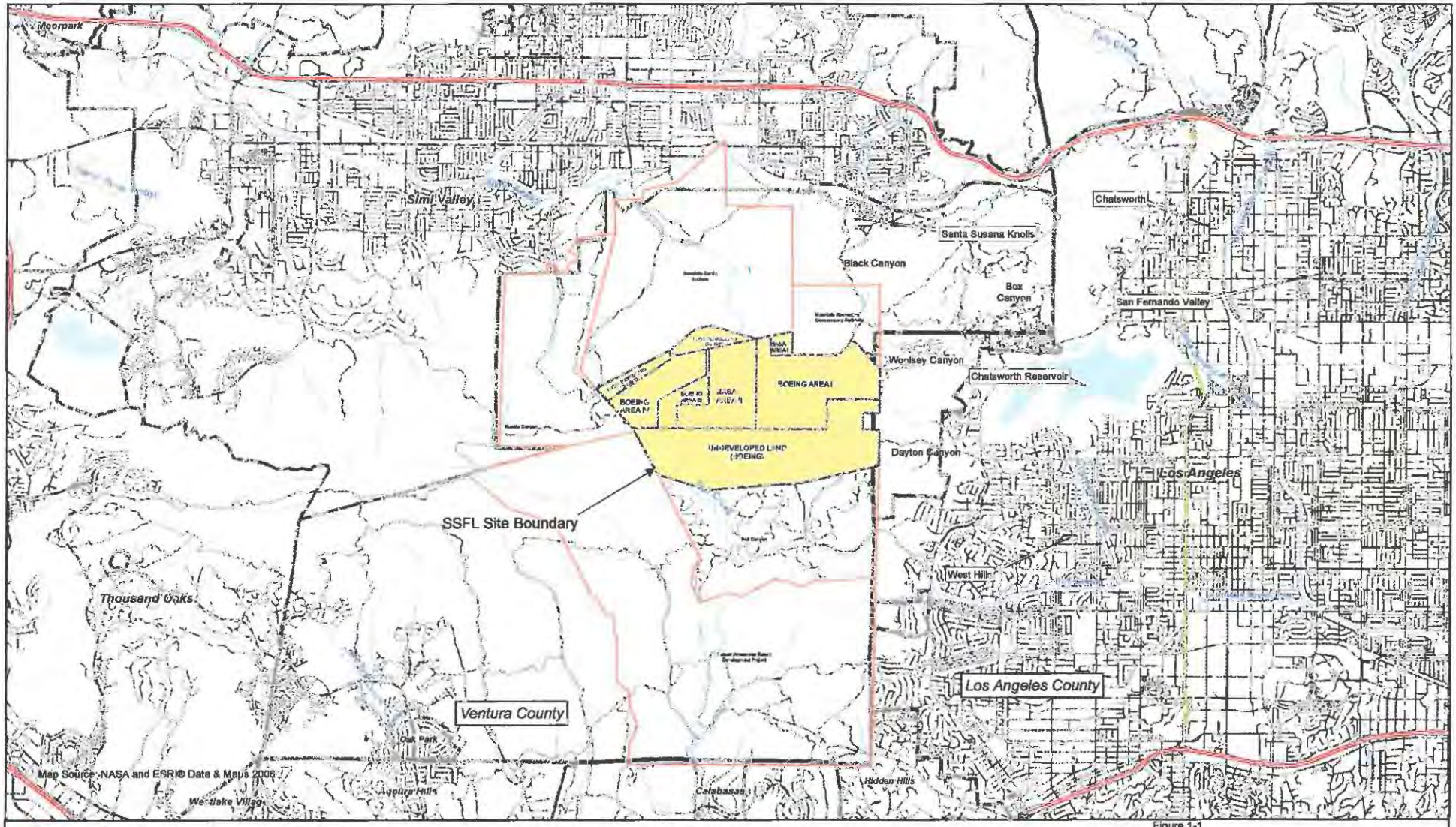

01-Feb-2012
Drawn By:
A. Cooley

Figure 1-1
Regional Map
NASA Wetlands and Waters of the U.S. Delineation Report
Santa Susana Field Laboratory
Ventura County, California

Map Document: O:\NASA\SSFL\maps\EIS_2011\BioSurvey_Spring2011\SSFL_Regional_WetlandsRpt.mxd

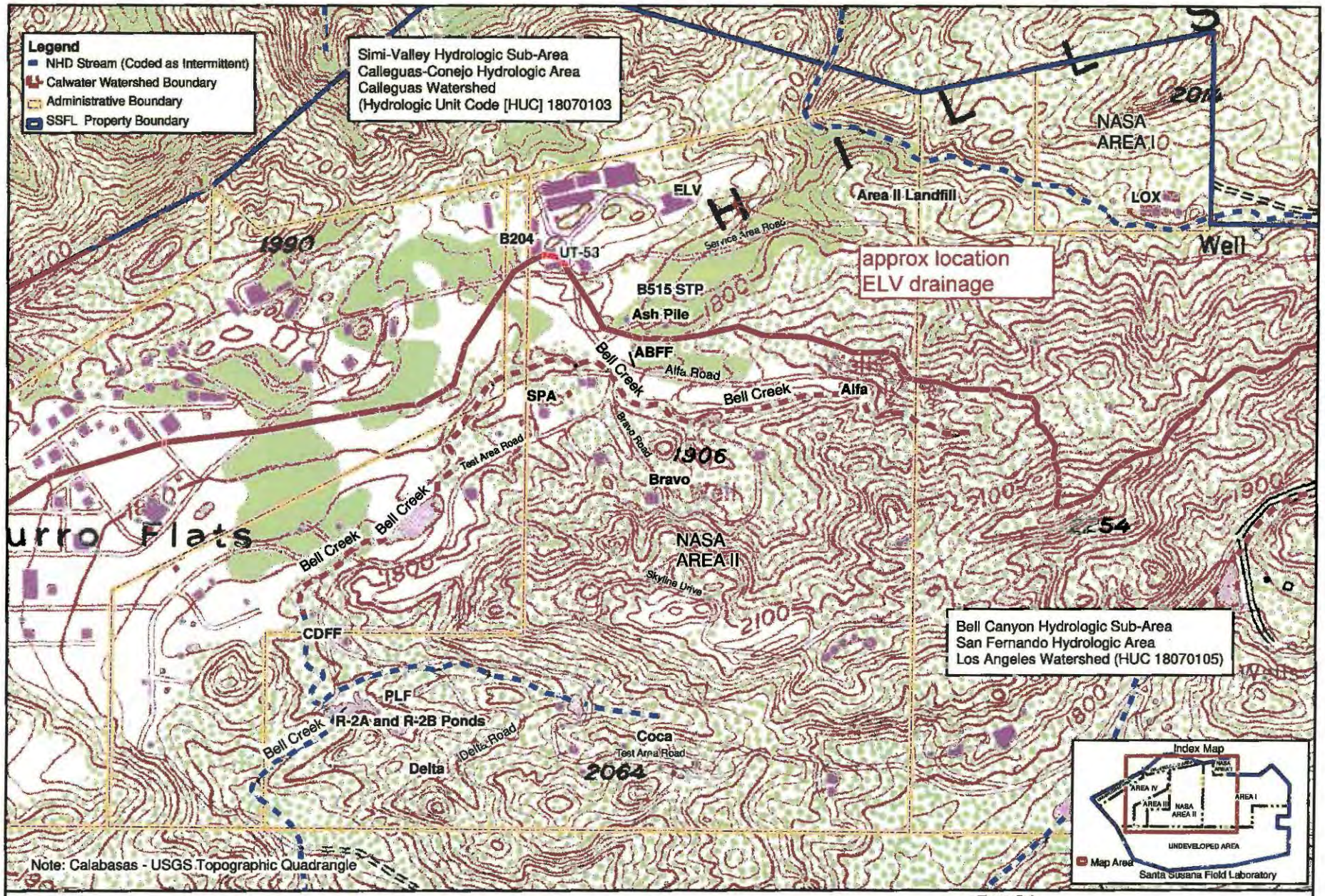

Figure D-1
USGS Quadrangle Topographic Map and NHD Information
NASA Wetlands and Waters of the U.S. Delineation Report
Santa Susana Field Laboratory
Ventura County, California

Gantry Rd
ELV drainage
Gantry Rd

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End of Appendix G

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APPENDIX H

Supplemental Air Quality and Greenhouse Gas Information and Technical Approach

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MEMORANDUM

CH2MHILL®

APPENDIX H

Supplemental Air Quality and Greenhouse Gas Information and Technical Approach

PREPARED FOR: NASA

PREPARED BY: CH2M HILL

DATE: December 2013

This technical memorandum provides a detailed technical approach for the analysis conducted in the *Environmental Impact Statement for Proposed Demolition and Environmental Cleanup Activities at Santa Susana Field Laboratory (SSFL)*, including supplemental information and a description of the analytical methodologies and assumptions used for this study. The supplemental information and specific methodologies discussed are as follows:

- Regional Setting
- Demolition and Excavation
- Operation of Remedial Technologies

As discussed in Section 3.5 of the Environmental Impact Statement (EIS), the air pollutants of concern for this project are criteria pollutants for which ambient air quality standards exist and greenhouse gases (GHGs). Areas are assigned an attainment status based on their ability to meet these ambient air quality standards. The ambient air quality standards relevant to this project are included in Table H-1; Table H-2 provides a summary of the attainment status for the counties potentially affected by the Proposed Action. Section 4.7 of the EIS provides the results of this study, including the expected impacts to air quality and climate change. Appendix I includes a description of the technical approach used to perform the General Conformity analysis, conducted in support of the Section 4.7 results.

TABLE H-1
Ambient Air Quality Standards
NASA SSFL EIS for Proposed Demolition and Environmental Cleanup

Pollutant	Averaging Time	NAAQS [a]	
		Primary	Secondary
Ozone	8 hours 1 hour	0.075 ppm —	0.075 ppm —
PM_{10}	Annual arithmetic mean 24 hours	— 150 µg/m^3	— 150 µg/m^3
$PM_{2.5}$	Annual arithmetic mean 24 hours	12 µg/m^3 35 µg/m^3	15 µg/m^3 35 µg/m^3
CO	8 hours 1 hour	9 ppm 35 ppm	— —
NO_2	Annual arithmetic mean 1 hour	0.053 ppm 0.100 ppm	0.053 ppm —
SO_2	24 hours 3 hours 1 hour	— — 0.075 ppm [b]	— 0.5 ppm —
Lead	Calendar quarter Rolling 3--month average 30--day average	1.5 µg/m^3 0.15 µg/m^3 —	1.5 µg/m^3 — —

Notes:
CO = carbon monoxide
µg/m^3 = micrograms per cubic meter
NAAQS = National Ambient Air Quality Standards
NO_2 = nitrogen dioxide
$PM_{2.5}$ = particulate matter having an aerodynamic equivalent diameter of 2.5 microns or less
PM_{10} = particulate matter having an aerodynamic equivalent diameter of 10 microns or less
ppm = parts per million
SO_2 = sulfur dioxide

[a] National standards other than ozone, particulate matter, and those based on annual averages or annual arithmetic means are not to be exceeded more than once a year. The ozone standard is attained when the fourth-highest 8-hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m^3 is equal to or less than one. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over three years, is equal to or less than the standard.
[b] Final rule signed June 2, 2010. To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 75 parts per billion.

Source: ARB (2013a); accessed at: http://www.arb.ca.gov/research/aaqs/aaqs2.pdf.

TABLE H-2
Federal Attainment Status
NASA SSFL EIS for Proposed Demolition and Environmental Cleanup

County	California Air Basin or State	Attainment Status by Pollutant						
		Ozone [a]	PM_{10}	$PM_{2.5}$	CO	NO_2	SO_2	Lead [a]
Ventura	SCCAB	Serious Nonattainment [b]	Attainment	Attainment	Attainment	Attainment	Attainment	Attainment
Los Angeles	SCAB	Extreme Nonattainment [c]	Maintenance [c]	Nonattainment [c]	Serious Maintenance [c]	Attainment	Attainment [c]	Nonattainment [c]
San Bernardino	SCAB	Extreme Nonattainment [d]	Maintenance [d]	Nonattainment [d]	Serious Maintenance [d]	Attainment	Attainment	Attainment
	MDAB	Moderate Nonattainment [d]	Moderate Nonattainment [d]	Attainment [d]	Attainment [d]	Attainment	Attainment	Attainment
Kern	SJVAB	Extreme Nonattainment [e]	Serious Nonattainment	Nonattainment [f]	Attainment [g]	Attainment	Attainment	Attainment
Kings	SJVAB	Extreme Nonattainment [e]	Maintenance	Nonattainment	Attainment	Attainment	Attainment	Attainment
Inyo	GBVAB	Attainment for all pollutants [h]						
Nye	Nevada	Attainment for all pollutants						
Clark	Nevada	Former Subpart 1 [i]	Serious Nonattainment	Attainment	Serious Maintenance	Attainment	Attainment	Attainment
Lincoln	Nevada	Attainment for all pollutants						
White Pine	Nevada	Attainment	Attainment	Attainment	Attainment	Attainment	Maintenance	Attainment

TABLE H-2
Federal Attainment Status
NASA SSFL EIS for Proposed Demolition and Environmental Cleanup

County	California Air Basin or State	Attainment Status by Pollutant						
		Ozone [a]	PM_{10}	$PM_{2.5}$	CO	NO_2	SO_2	Lead [a]
Elko	Nevada	Attainment for all pollutants						
Tooele	Utah	Attainment	Attainment	Attainment [j]	Attainment	Attainment	Nonattainment [k]	Attainment

Notes:
GBVAB = Great Basin Valley Air Basin
MDAB = Mojave Desert Air Basin
SJVAB = San Joaquin Valley Air Basin
SCCAB = South Central Coast Air Basin
SCAB = South Coast Air Basin
Serious Nonattainment for ozone = area has a design value of 0.107 up to but not including 0.120 parts per million (ppm)
Extreme Nonattainment for ozone = area has a design value of 0.187 ppm and above
Serious Maintenance for CO = area has a design value of 16.5 ppm and above
Serious Nonattainment for PM_{10} = area that cannot practicably attain the standard by the deadline of section 188(b)(1) of the Clean Air Act (CAA)

[a] Considers the 2008 standard for lead and the 8-hour standard for ozone. Because these counties are nonattainment areas, the 1-hour ozone standard no longer applies per the anti-backsliding provisions of 40 Code of Federal Regulations (CFR) 51.905(a)(3) and (4). The anti-backsliding provisions apply to areas that are designated attainment for the 8-hour ozone standard and were, at the time of the 8-hour designations, either attainment areas with maintenance plans for the 1-hour standard or nonattainment for the 1-hour standard. Specifically, the anti-backsliding provisions require these areas to submit a maintenance plan under section 110(a)(1) of the CAA.
[b] Ventura County has partial serious nonattainment for ozone. The portion of the project occurring within Ventura County will occur in the nonattainment portion.
[c] The portion of Los Angeles County located within the SCAB has extreme nonattainment for ozone, maintenance for PM_{10}, nonattainment for $PM_{2.5}$, serious maintenance for CO, and nonattainment for lead. The portion of the project occurring within Los Angeles County will occur in the SCAB and, therefore, in the nonattainment or maintenance areas for these pollutants.
[d] The portion of San Bernardino County located in the SCAB has extreme nonattainment for ozone, maintenance for PM_{10}, nonattainment for $PM_{2.5}$, and serious maintenance for CO whereas the portion located in the MDAB has moderate nonattainment for ozone and PM_{10} and attainment for $PM_{2.5}$ and CO. The project will occur in both of these portions of San Bernardino County.
[e] Kern and Kings counties each have partial extreme nonattainment for ozone. The portion of the project occurring within Kern and Kings counties will occur in the nonattainment portions.
[f] Kern County has partial nonattainment for $PM_{2.5}$. The portion of the project occurring within Kern County will occur in the nonattainment portion.
[g] The metropolitan area of Bakersfield, located within Kern County, has partial maintenance for CO. The portion of the project occurring within Kern County will not occur within this metropolitan area and is, therefore, in attainment.
[h] Inyo County has PM_{10} nonattainment and maintenance for two specific areas: Owens Valley and Coso Junction, respectively. The portion of the project occurring within Inyo County would occur at least 100 miles from these areas. All portions of Inyo County have attainment for all other pollutants.
[i] Clark County has partial Former Subpart 1 status for ozone, serious nonattainment for PM_{10}, and serious maintenance for CO. The portion of the project occurring within Clark County would occur in the nonattainment and maintenance portions for these pollutants.
[j] Tooele County has partial nonattainment for $PM_{2.5}$. The portion of the project occurring within Tooele County would not occur in this nonattainment portion.
[k] Tooele County has partial nonattainment for SO_2. Based on the available data, the portion of the project occurring within Tooele County may or may not occur in the nonattainment portion. As a conservative approach, it was assumed that the project would occur in the nonattainment portion.

Source: EPA (2013b)

Regional Setting

As noted in Section 3.5, the most recent published emission inventory data for the region of influence (ROI), which includes Ventura, Los Angeles, and Kern counties, are provided in Tables H-3 through H-5.

TABLE H-3
Estimated Annual Average Emissions for Ventura County (tons per day)
NASA SSFL EIS for Proposed Demolition and Environmental Cleanup

Source Category	TOG	VOC	CO	NOx	SOx	PM	PM_{10}	$PM_{2.5}$
Stationary Sources								
Fuel Combustion	4.9	0.7	7.7	4.4	0.2	0.6	0.6	0.6
Waste Disposal	20.5	0.2	0.5	0.1	0.1	0.0	0.0	0.0
Cleaning and Surface Coatings	7.6	5.4	-	-	-	0.1	0.1	0.0
Petroleum Production and Marketing	26.3	4.6	0.5	0.1	0.1	0.0	0.0	0.0
Industrial Processes	0.7	0.6	0.7	0.1	0.2	1.0	0.6	0.3
Total Stationary Sources	60.0	11.5	9.4	4.7	0.6	1.7	1.3	0.9
Stationary Sources Percentage of Total	43.3	14.4	3.9	7.3	4.4	3.1	4.0	6.5
Areawide Sources								
Solvent Evaporation	12.3	11.3	-	-	-	-	-	-
Miscellaneous Processes	4.6	1.6	22.2	1.7	0.1	43.5	22.2	5.4
Total Areawide Sources	17.0	12.9	22.2	1.7	0.1	43.5	22.2	5.4
Areawide Sources Percentage of Total	12.3	16.1	9.2	2.6	0.7	80.1	68.7	39.1
Mobile Sources								
On-road Motor Vehicles	11.9	11.0	97.5	17.4	0.1	1.0	1.0	0.7
Other Mobile Sources	12.7	11.7	65.9	39.4	12.3	3.3	3.2	3.0
Total Mobile Sources	24.6	22.7	163.3	56.8	12.4	4.3	4.1	3.6
Mobile Sources Percentage of Total	17.7	28.3	67.9	87.9	91.9	7.9	12.7	26.1
Natural Sources								
Natural (Non-man Made) Sources	37.0	33.0	45.6	1.4	0.4	4.8	4.6	3.9
Total Natural Sources	37.0	33.0	45.6	1.4	0.4	4.8	4.6	3.9
Natural Sources Percentage of Total	26.7	41.2	19.0	2.2	3.0	8.8	14.2	28.3
Grand Total	**138.6**	**80.1**	**240.5**	**64.6**	**13.5**	**54.3**	**32.3**	**13.8**

Notes:
CO = carbon monoxide
NOx = nitrogen oxides
PM = particulate matter
$PM_{2.5}$ = particulate matter having an aerodynamic equivalent diameter of 2.5 microns or less
PM_{10} = particulate matter having an aerodynamic equivalent diameter of 10 microns or less
SOx = sulfur oxides
TOG = total organic gas
VOC = volatile organic compound

Source: ARB (2011)

TABLE H-4
Estimated Annual Average Emissions for Los Angeles County (tons per day)
NASA SSFL EIS for Proposed Demolition and Environmental Cleanup

Source Category	TOG	VOC	CO	NOx	SOx	PM	PM_{10}	$PM_{2.5}$
Stationary Sources								
Fuel Combustion	17.8	4.3	24.1	30.5	6.4	4.1	4.0	3.9
Waste Disposal	16.5	0.9	0.8	1.6	0.4	0.8	0.4	0.2
Cleaning and Surface Coatings	32.9	25.8	0.0	0.1	0.0	0.5	0.4	0.4
Petroleum Production and Marketing	34.5	25.1	8.9	4.4	6.6	3.8	2.5	2.1
Industrial Processes	12.8	11.6	1.3	2.8	2.9	35.9	17.6	5.6
Total Stationary Sources	114.5	67.7	35.0	39.2	16.4	45.1	24.8	12.1
Stationary Sources Percentage of Total	23.7	17.3	1.9	7.6	32.3	13.1	12.7	16.9
Areawide Sources								
Solvent Evaporation	94.6	82.7	-	-	-	0.0	0.0	0.0
Miscellaneous Processes	13.1	5.4	51.2	14.1	0.4	263.7	135.7	30.8
Total Areawide Sources	107.7	88.0	51.2	14.1	0.4	263.7	135.7	30.8
Areawide Sources Percentage of Total	22.3	22.5	2.8	2.7	0.8	76.4	69.3	42.9
Mobile Sources								
On-road Motor Vehicles	124.3	113.1	1,096.3	248.3	1.3	15.3	15.1	11.0
Other Mobile Sources	89.1	81.0	579.5	210.1	32.0	14.1	13.6	12.4
Total Mobile Sources	213.4	194.1	1,675.8	458.4	33.3	29.4	28.8	23.3
Mobile Sources Percentage of Total	44.2	49.7	91.7	89.2	65.7	8.5	14.7	32.5
Natural Sources								
Natural (Non-man Made) Sources	46.8	40.5	65.0	1.9	0.6	6.8	6.6	5.6
Total Natural Sources	46.8	40.5	65.0	1.9	0.6	6.8	6.6	5.6
Natural Sources Percentage of Total	9.7	1.3	3.6	0.4	1.2	2.0	3.4	7.8
Grand Total	**482.3**	**390.3**	**1,827.1**	**513.7**	**50.7**	**345.1**	**195.9**	**71.8**

Notes:
CO = carbon monoxide
NOx = nitrogen oxides
PM = particulate matter
$PM_{2.5}$ = particulate matter having an aerodynamic equivalent diameter of 2.5 microns or less
PM_{10} = particulate matter having an aerodynamic equivalent diameter of 10 microns or less
SOx = sulfur oxides
TOG = total organic gas
VOC = volatile organic compound

Source: ARB (2011)

TABLE H-5
Estimated Annual Average Emissions for Kern County (tons per day)
NASA SSFL EIS for Proposed Demolition and Environmental Cleanup

Source Category	TOG	VOC	CO	NOx	SOx	PM	PM_{10}	$PM_{2.5}$
Stationary Sources								
Fuel Combustion	28.1	8.4	18.0	27.1	4.5	4.6	4.3	4.2
Waste Disposal	28.1	0.3	0.1	0.0	0.0	0.2	0.1	0.0
Cleaning and Surface Coatings	2.5	2.3	0.0	-	-	0.0	0.0	0.0
Petroleum Production and Marketing	69.3	28.8	1.1	0.4	0.2	0.2	0.2	0.1
Industrial Processes	2.5	2.2	9.4	18.4	3.3	15.4	9.4	3.9
Total Stationary Sources	130.4	42.1	28.6	45.9	8.0	20.4	14.0	8.3
Stationary Sources Percentage of Total	43.7	30.1	7.7	23.3	85.1	13.8	16.1	24.7
Areawide Sources								
Solvent Evaporation	15.0	14.0	-	-	-	-	-	-
Miscellaneous Processes	66.5	7.4	30.2	2.3	0.1	112.3	58.0	11.8
Total Areawide Sources	81.5	21.3	30.2	2.3	0.1	112.3	58.0	11.8
Areawide Sources Percentage of Total	27.3	15.2	8.2	1.2	1.1	75.7	66.5	35.1
Mobile Sources								
On-road Motor Vehicles	21.4	19.3	166.1	111.4	0.2	5.0	4.9	4.1
Other Mobile Sources	14.3	12.8	87.4	35.2	0.5	4.6	4.5	4.3
Total Mobile Sources	35.7	32.1	253.5	146.5	0.7	9.6	9.4	8.4
Mobile Sources Percentage of Total	12.0	23.0	68.5	74.5	7.4	6.5	10.8	25.0
Natural Sources								
Natural (Non-man Made) Sources	50.6	44.2	57.7	1.8	0.6	6.1	5.9	5.0
Total Natural Sources	50.6	44.2	57.7	1.8	0.6	6.1	5.9	5.0
Natural Sources Percentage of Total	17.0	31.6	15.6	0.9	6.4	4.1	6.8	14.9
Grand Total	**298.2**	**139.8**	**370.0**	**196.6**	**9.4**	**148.3**	**87.2**	**33.6**

Notes:
CO = carbon monoxide
NOx = nitrogen oxides
PM = particulate matter
$PM_{2.5}$ = particulate matter having an aerodynamic equivalent diameter of 2.5 microns or less
PM_{10} = particulate matter having an aerodynamic equivalent diameter of 10 microns or less
SOx = sulfur oxides
TOG = total organic gas
VOC = volatile organic compound

Source: ARB (2011)

Local Setting

A summary of ambient criteria pollutant concentrations at air quality monitoring stations near SSFL, as identified in Section 3.5, is provided in Table H-6.

TABLE H-6
Ambient Criteria Pollutant Concentrations at Air Quality Monitoring Stations near SSFL
NASA SSFL EIS for Proposed Demolition and Environmental Cleanup

Pollutant	Standard / Exceedance	Simi Valley			Reseda			Burbank		
		2010	2011	2012	2010	2011	2012	2010	2011	2012
Ozone [a]	Year Coverage	99	100	100	97	93	95	93	92	94
	Maximum 8-hour Concentration (ppm)	0.087	0.085	0.088	0.092	0.103	0.099	0.084	0.084	0.089
	Maximum 1-hour Concentration (ppm)	0.098	0.108	0.106	0.122	0.130	0.129	0.111	0.120	0.117
	# Days > Federal 8-hour Standard of 0.075 ppm	8	7	14	19	26	23	4	6	8
PM_{10}	Year Coverage	94	100	96	NM	NM	NM	95	0	99
	Annual Average (µg/m^3)	19.1	19.9	19.5	NM	NM	NM	27.5	25.0	26.4
	Maximum 24-hour Concentration (µg/m^3)	35.2	45.8	39.5	NM	NM	NM	51.0	96.7	55.0
	# Days > Federal 24-hour Standard of 150 µg/m^3	0	0	0	NM	NM	NM	0	0	0
$PM_{2.5}$	Year Coverage	99	96	98	82	95	90	100	100	100
	Annual Average (µg/m^3)	10.0	9.9	10.4	NA	10.2	11.8	12.7	13.4	12.5
	Maximum 24-hour Concentration (µg/m^3)	42.4	30.5	35.3	50.3	52.7	41.6	43.7	47.8	54.2
	# Days > Federal 24-hour Standard of 35 µg/m^3	0	0	0	1	1	2	4	5	4
CO [a]	Year Coverage	NM	NM	NM	99	84	44	85	96	38
	Maximum 8-hour Concentration (ppm)	NM	NM	NM	2.60	2.77	2.85	2.35	2.37	2.35
	Maximum 1-hour Concentration (ppm)	NM	NM	NM	3.3	3.2	3.4	2.6	2.8	2.8
	# Days > Federal 8-hour Standard of 9 ppm	NM	NM	NM	0	0	0	0	0	0
	# Days > Federal 1-hour Standard of 35 ppm	NM	NM	NM	0	0	0	0	0	0
NO_2	Year Coverage	99	99	99	99	93	62	77	67	74
	Annual Average (ppm)	0.010	0.009	0.010	0.016	0.016	NA	NA	NA	NA
	Maximum 1-hour Concentration (ppm)	0.069	0.041	0.058	0.075	0.070	0.071	0.082	0.068	0.080

TABLE H-6
Ambient Criteria Pollutant Concentrations at Air Quality Monitoring Stations near SSFL
NASA SSFL EIS for Proposed Demolition and Environmental Cleanup

Pollutant	Standard / Exceedance	Simi Valley			Reseda			Burbank		
		2010	2011	2012	2010	2011	2012	2010	2011	2012
SO_2 [b]	Year Coverage	NM	NM	NM	NM	NM	NM	83	69	32
	Maximum 24-hour Concentration (ppm)	NM	NM	NM	NM	NM	NM	0.004	0.002	0.002
	Maximum 3-hour Concentration (ppm)	NM	NM	NM	NM	NM	NM	NA	NA	NA
	Maximum 1-hour Concentration (ppm)	NM	NM	NM	NM	NM	NM	0.015	0.009	0.007
	# Days > Federal 3-hour Standard of 0.5 ppm	NM	NM	NM	NM	NM	NM	NA	NA	NA

Notes:
CO = carbon monoxide
$\mu g/m^3$ = micrograms per cubic meter
NA = not available
NM = not monitored
NO_2 = nitrogen dioxide
$PM_{2.5}$ = particulate matter having an aerodynamic equivalent diameter of 2.5 microns or less
PM_{10} = particulate matter having an aerodynamic equivalent diameter of 10 microns or less
ppm = parts per million
SO_2 = sulfur dioxide

[a] Year Coverage is for the 8-hour standard.
[b] Year Coverage is for the 24-hour standard.

Sources: EPA (2013a); ARB (2013d)

Demolition and Excavation

To evaluate the potential impact to air quality and climate change from demolition and remediation activities, criteria pollutant and GHG emissions were estimated from equipment operation associated with demolition, excavation, and road repairs; truck travel associated with material and equipment hauling; and worker commutes. Fugitive dust emissions were also estimated as a result of demolition and earthmoving activities. Although the EIS analyzes the potential air quality and GHG emissions related to numerous soil and groundwater remedial technologies, a quantitative analysis was developed based on the Excavation and Offsite Disposal technology to represent the highest levels of potential emissions. As discussed in Section 4.7, two soil removal estimates were quantitatively considered under the Excavation and Offsite Disposal technology. The high soil removal estimate assumes that the contaminated soil will be untreatable and must all be removed, whereas the low soil removal estimate assumes that, in certain areas, soil 2 feet or more below the ground surface will be treatable such that the soil removal volume will be reduced.

For each phase evaluated, activities were expected to occur five days per week and up to 10 hours per day, based on SSFL's daily operational schedule of 7 a.m. to 7 p.m. NASA provided a site-specific equipment list for demolition activities. In the absence of site-specific data for excavation and road repair activities, equipment lists were pulled from the *California Emissions Estimator Model (CalEEMod) User's Guide* (Environ International Corporation [Environ], 2013) and the Sacramento Metropolitan Air Quality Management District's (SMAQMD) Road Construction Emissions Model (Version 6.3.2) (SMAQMD, 2009), respectively. For excavation, the maximum possible equipment counts for grading were assumed[1]; for road repairs, the road characteristics and repair durations were used as input to the Road Construction Emissions Model.

Direct emissions from off-road construction equipment were calculated using emission factors from the California Air Resources Board's (ARB) OFFROAD 2011 (Version 3) model (ARB, 2013c) and the equipment hours of operation. These emission factors[2] were obtained from the *CalEEMod User's Guide*, based on the average equipment horsepower ratings presented[3] (Environ, 2013). Unless otherwise noted, off-road construction equipment contributes to onsite emissions.

Direct emissions from on-road vehicles, including haul trucks and worker vehicles, were calculated using emission factors from the ARB's EMFAC2011-PL (Version 1.1) model with EMFAC2007 vehicle categories (ARB, 2013b) and the vehicle miles traveled (VMT) by each vehicle. The emission factors from EMFAC2011-PL were generated using the following model parameters:

- A vehicle speed of 15 miles per hour (mph) for onsite activities
- A vehicle speed of 55 mph for offsite activities

On-road vehicles contribute to both onsite and offsite emissions. The VMT for onsite vehicles, including 15-passenger vans[4], supervisory vehicles, and flatbed and dump trucks, was determined by estimating the round trip distance between the activity locations and the SSFL entrance. The VMT for offsite vehicles, including haul trucks and workers, was determined by assuming particular haul routes to the potential offsite disposal locations identified in Section 4.7 and particular routes for commuting to work assuming crew members live within 20 miles of SSFL (50 percent in Ventura County and 50 percent in Los Angeles County), respectively. The crew size expected for each construction phase is included in Table H-7.

[1] Equipment list was obtained from Table 3.2 of Appendix D of the *CalEEMod User's Guide* (Environ, 2013).

[2] Emission factors were obtained from Table 3.4 of Appendix D of the *CalEEMod User's Guide* (Environ, 2013).

[3] Horsepower ratings were obtained from Table 3.3 of Appendix D of the *CalEEMod User's Guide* (Environ, 2013).

[4] It was assumed that crew members would be transported around SSFL using 15-passenger vans.

TABLE H-7
Crew Sizes
NASA SSFL EIS for Proposed Demolition and Environmental Cleanup

Construction Phase	Crew Size	Source
Demolition	34	Site-specific information
Excavation / Material Hauling	15	Assumed to allow for at least one crew member per equipment
Road Repairs	30	Estimated using the SMAQMD Roadway Construction Emissions Model
Note: SMAQMD = Sacramento Metropolitan Air Quality Management District		

Since OFFROAD 2011 and EMFAC2011-PL do not provide emission factors for lead, an emission factor for diesel stationary and portable internal combustion engines was assumed representative of off-road construction equipment and on-road vehicles. This emission factor[5] was obtained from the *Supplemental Instructions: Reporting Procedures for AB2588 Facilities for Reporting their Quadrennial Air Toxics Emissions Inventory* (SCAQMD, 2010). To make the emission factor units compatible with the available equipment or vehicle data, the following assumptions were used:

- For construction equipment, assumed a diesel fuel consumption rate of 0.066 gallons per brake-horsepower hour[6], which is a generally accepted value for compliance reporting.
- For on-road vehicles, assumed a passenger vehicle gasoline fuel economy of 35.6 miles per gallon (mpg)[7], a pick-up truck gasoline fuel economy of 25.0 mpg[7], and a heavy-heavy duty truck diesel fuel economy of 5.572 mph for 2014 and 5.569 mph for 2016/2017[8].

Fugitive dust emissions of particulate matter having an aerodynamic equivalent diameter of 10 microns or less (PM_{10}) and particulate matter having an aerodynamic equivalent diameter of 2.5 microns or less ($PM_{2.5}$) were estimated using source specific data for the following sources:

- Demolition activities: Using the volume of buildings and structures demolished on a daily basis.
- Loading debris into haul trucks: Using the mass of debris generated by demolition on a daily basis.
- Open stockpiles: Using the total area covered by stockpiles.
- Loading material into haul trucks: Using a daily quantity of material handled, determined based on the total material excavated and backfilled, and the activity duration.
- Excavation activities: Using a daily quantity of material handled, determined based on the total material excavated and backfilled, the activity duration, and the total area disturbed during excavation.

Default emission factors[9] from the *California Environmental Quality Act (CEQA) Handbook* (SCAQMD, 1993) were used for demolition activities and open stockpiles. A default emission factor[10] for debris loading was taken from the *CalEEMod User's Guide* (Environ, 2013). Per the *CEQA Handbook* (SCAQMD, 1993), a site-specific emission factor was estimated for material loading activities[11] assuming an average wind speed of 2.69 meters per

[5] The emission factor of 0.0083 pounds per 1,000 gallons was obtained from Table B-2 of the *Supplemental Instructions: Reporting Procedures for AB2588 Facilities for Reporting their Quadrennial Air Toxics Emissions Inventory* (SCAQMD, 2010).

[6] The diesel fuel consumption rate was obtained from Table A9-8-C of the *CEQA Handbook* (SCAQMD, 1993).

[7] The gasoline fuel economies for passenger vehicles and pick-up trucks were obtained from Table 4-23 of the *National Transportation Statistics 2013* (Bureau of Transportation Statistics [BTS], 2013).

[8] The statewide diesel fuel economy for heavy-heavy duty trucks was calculated using the EMFAC2011 Web Based Emissions Database (accessible at http://www.arb.ca.gov/emfac/), assuming the California fuel economy would be representative of the fuel economy in other states.

[9] Default emission factors for demolition and open stockpiles were obtained from Table A9-9 of the *CEQA Handbook* (SCAQMD, 1993).

[10] The emission factor of 0.0203 pounds per ton (lbs/ton) was obtained from Appendix A of the *CalEEMod User's Guide* (Environ, 2013).

[11] The site-specific emission factor was developed based on Table A9-9-G of the *CEQA Handbook* (SCAQMD, 1993).

second[12] and dry soil moisture conditions. Default emission factors[13] from the *Software User's Guide: URBEMIS2007 for Windows* (JSA, 2007) were used for excavation activities, assuming a low level of activity detail.

For all construction-related activities, $PM_{2.5}$ emissions were assumed to be 20.8 percent of the PM_{10} emissions, per the *Final–Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds* (SCAQMD, 2006). Unless otherwise noted, fugitive dust emissions (PM_{10} and $PM_{2.5}$) contribute to onsite emissions.

Following the methodology discussed for construction activities, GHG emissions from off-road equipment were calculated using carbon dioxide (CO_2) and methane (CH_4) emission factors from ARB's OFFROAD 2011 model and equipment hours of operation. GHG emissions from on-road vehicles were calculated using CO_2 emission factors from ARB's EMFAC2011-PL model, based on vehicle speed, type, and analysis year, CH_4 emission factors from The Climate Registry's (TCR) *General Reporting Protocol* (Version 2.0) (TCR, 2013), and estimated VMT.

The complete set of data used to estimate construction emissions for the EIS, as well as the emissions calculations, are captured in the *Air Quality Analysis Workbooks*, which are included in Attachments 1 and 2 of this memorandum. Note that Attachment 1 presents the results for the high soil removal estimate; Attachment 2 presents the results for the low soil removal estimate, excluding any parameters and emissions previously provided in Attachment 1 that are not affected by the soil removal volume.

Operation of Remedial Technologies

To determine the potential impact to air quality and climate change from operation of the remedial technologies, a screening assessment was performed. Technologies that would require a significant power source, use combustion, generate fugitive dust or volatile organic compound (VOC) emissions, or rely on heavy duty trucks or equipment, were evaluated qualitatively based on preliminary engineering data or industry standard practices. Additionally, the operational duration for each remedial technology was considered in this evaluation.

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[12] Wind speed taken as the average for the years 2002 through 2006, as measured at a meteorological tower located at SSFL and operated by Boeing.

[13] Default emission factors for excavation activities were obtained from Table A-4 of Appendix A of the *Software User's Guide: URBEMIS2007 for Windows* (JSA, 2007).

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Attachments

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ATTACHMENT 1-1

General Conformity Estimates for Demolition, Excavation, and Offsite Disposal (High Soil Removal Estimate)

NASA SSFL EIS: Air Quality

General Conformity Estimates for the Demolition, Excavation, and Offsite Disposal

Pollutant	Pollutant Thresholds (tons/year)	High Soil Removal Annual Emissions (tons/year)		
		2014	2016	2017
South Central Coast Air Basin (SCCAB)				
VOC	50	2	1	1
CO	N/A	11	9	9
NOx	50	20	15	15
SO_2	N/A	0	0	0
PM_{10}	N/A	2	1,050	1,146
$PM_{2.5}$	N/A	1	219	239
Pb	N/A	0	0	0
South Coast Air Basin (SCAB) [a]				
VOC	10	0	1	1
CO	100	1	4	5
NOx	10	3	20	19
SO_2	100	0	0	0
PM_{10}	100	0	1	1
$PM_{2.5}$	100	0	0	1
Pb	25	0	0	0
San Joaquin Valley Air Basin (SJVAB) [a]				
VOC	10	N/A	0	0
CO	N/A	N/A	3	3
NOx	10	N/A	14	14
SO_2	100	N/A	0	0
PM_{10}	70	N/A	1	1
$PM_{2.5}$	100	N/A	0	0
Pb	N/A	N/A	0	0
Mojave Desert Air Basin (MDAB)				
VOC	100	0	1	1
CO	N/A	0	5	5
NOx	100	1	18	16
SO_2	N/A	0	0	0
PM_{10}	100	0	1	1
$PM_{2.5}$	N/A	0	1	1
Pb	N/A	0	0	0
Great Basin Valley Air Basin (GBVAB) [b]				
VOC	N/A	0	0	0
CO	N/A	0	1	1
NOx	N/A	1	6	6
SO_2	N/A	0	0	0
PM_{10}	N/A	0	0	0
$PM_{2.5}$	N/A	0	0	0
Pb	N/A	0	0	0
Nevada [a]				
VOC	100	0	2	2
CO	100	0	13	14
NOx	100	0	68	65
SO_2	100	0	0	0
PM_{10}	70	0	2	2
$PM_{2.5}$	N/A	0	2	2
Pb	N/A	0	0	0
Utah				
VOC	N/A	N/A	0	0
CO	N/A	N/A	2	2
NOx	N/A	N/A	9	9
SO_2	100	N/A	0	0
PM_{10}	N/A	N/A	0	0
$PM_{2.5}$	N/A	N/A	0	0
Pb	N/A	N/A	0	0

Notes:

Red shaded cells indicate that the general conformity threshold is exceeded

[a] The minimum general conformity threshold was assigned for each pollutant within air basins that have multiple affected counties.

[b] GBVAB has attainment for all pollutants considered.

ATTACHMENT 1-1

General Conformity Estimates for Demolition, Excavation, and Offsite Disposal (High Soil Removal Estimate)

NASA SSFL EIS: Air Quality

General Conformity Thresholds

State or California Air Basin	SCCAB		SCAB				MDAB		SJVAB				Nevada				Utah	
Pollutant	Federal Attainment Status / General Conformity *De Minimis* Threshold Values (tons/year) [a, b]																	
	Ventura		Los Angeles		San Bernardino				Kern		Kings		Clark		White Pine		Tooele	
Ozone	Serious N	50	Extreme N	10	Extreme N	10	Moderate N [c]	100	Extreme N	10	Extreme N	10	Former Subpart 1 [d]	100	A	N/A	A	N/A
Ozone Precursor (NOx)	Serious N	50	Extreme N	10	Extreme N	10	Moderate N [c]	100	Extreme N	10	Extreme N	10	Former Subpart 1 [d]	100	A	N/A	A	N/A
Ozone Precursor (VOC)	Serious N	50	Extreme N	10	Extreme N	10	Moderate N [c]	100	Extreme N	10	Extreme N	10	Former Subpart 1 [d]	100	A	N/A	A	N/A
PM_{10}	A	N/A	M	100	M	100	Moderate N	100	Serious N	70	M	100	Serious N	70	A	N/A	A	N/A
$PM_{2.5}$ (Direct Emissions)	A	N/A	N	100	N	100	A	N/A	N	100	N	100	A	N/A	A	N/A	A	N/A
$PM_{2.5}$ Precursor (SO_2)	A	N/A	N	100	N	100	A	N/A	N	100	N	100	A	N/A	A	N/A	A	N/A
$PM_{2.5}$ Precursor (NOx)	A	N/A	N	100	N	100	A	N/A	N	100	N	100	A	N/A	A	N/A	A	N/A
$PM_{2.5}$ Precursor (VOC)	A	N/A	N	100	N	100	A	N/A	N	100	N	100	A	N/A	A	N/A	A	N/A
CO	A	N/A	Serious M	100	Serious M	100	A	N/A	A	N/A	A	N/A	Serious M	100	A	N/A	A	N/A
NO_2	A	N/A	A	N/A	A	N/A	A	N/A	A	N/A	A	N/A	A	N/A	A	N/A	A	N/A
SO_2	A	N/A	A	N/A	A	N/A	A	N/A	A	N/A	A	N/A	A	N/A	M	100	N	100
Lead (2008 standard)	A	N/A	N	25	A	N/A	A	N/A	A	N/A	A	N/A	A	N/A	A	N/A	A	N/A

Notes:

A = Attainment

M = Maintenance

N = Nonattainment

N/A = Not Applicable

[a] General Conformity *de minimis* threshold values from 40 CFR Parts 51 and 93, EPA-HQ-OAR-2004-0491; FRL-8197-4.

[b] Refer to Table H-2 of Appendix H for details on which counties are in partial nonattainment, maintenance, or attainment areas.

[c] California is not located in an ozone transportation region (http://www.epa.gov/glo/fs20080317.html). As a result, the General Conformity *de minimis* threshold value for an ozone attainment status of "Moderate Nonattainment" was taken as 100 tons/year.

[d] Per 76 FR 17373, the designation status of the Clark County ozone nonattainment area remains nonattainment despite the EPA's determination that the area has attained the NAAQS. Since Clark County is not located in an ozone transportation region, the General Conformity *de minimis* threshold value of 100 tons/year was used.

ATTACHMENT 1-2

Summary of Emissions for Demolition, Excavation, and Offsite Disposal (High Soil Removal Estimate)

NASA SSFL EIS: Air Quality

Equations differ from neighboring cells to incorporate fugitive dust emissions.

Demolition, Excavation, and Offsite Disposal Emissions

Emissions Location	Emissions (lbs/day)									Emissions (tons/year) [a]								
	VOC	CO	NOx	SOx	PM_{10}	$PM_{2.5}$	Pb	CO_2	CH_4	VOC	CO	NOx	SOx	PM_{10} [b]	$PM_{2.5}$ [b]	Pb	CO_2	CH_4
Year 2014 [c]																		
SCCAB Emissions																		
Onsite	27	149	262	0	32	17	0	26,087	6	2	11	20	0	2	1	0	1,957	0
Offsite	0	1	1	0	0	0	0	328	0	0	0	0	0	0	0	0	25	0
Total	27	149	264	0	32	17	0	26,415	6	2	11	20	0	2	1	0	1,981	0
SCAB Emissions																		
Offsite	1	11	42	0	2	1	0	9,860	0	0	1	3	0	0	0	0	740	0
MDAB Emissions																		
Offsite	1	4	17	0	1	0	0	4,847	0	0	0	1	0	0	0	0	364	0
GBVAB Emissions																		
Offsite	0	1	7	0	0	0	0	1,713	0	0	0	1	0	0	0	0	128	0
Nevada Emissions																		
Offsite	0	1	6	0	0	0	0	1,228	0	0	0	0	0	0	0	0	92	0
Year 2016 [d]																		
SCCAB Emissions																		
Onsite	15	104	159	0	8,833	1,843	0	14,106	4	1	9	13	0	1,050	219	0	1,151	0
Offsite [e]	1	8	24	0	3	1	0	5,025	0	0	0	2	0	0	0	0	524	0
Total	16	112	183	0	8,837	1,844	0	19,132	4	1	9	15	0	1,050	219	0	1,675	0
SCAB Emissions																		
Offsite [e]	8	55	192	1	18	7	0	49,904	1	1	4	20	0	1	0	0	5,583	0
MDAB Emissions																		
Offsite	6	41	147	1	8	5	0	60,474	0	1	5	18	0	1	1	0	7,206	0
SJVAB Emissions																		
Offsite	4	26	121	0	5	3	0	38,415	0	0	3	14	0	1	0	0	4,578	0
GBVAB Emissions																		
Offsite	2	12	51	0	2	2	0	18,066	0	0	1	6	0	0	0	0	2,153	0
Nevada Emissions																		
Offsite	16	108	569	2	19	13	0	148,441	0	2	13	68	0	2	2	0	17,689	0
Utah Emissions																		
Offsite	2	15	77	0	3	2	0	20,191	0	0	2	9	0	0	0	0	2,406	0
Year 2017 [d]																		
SCCAB Emissions																		
Onsite	14	100	148	0	8,833	1,842	0	13,903	4	1	9	13	0	1,146	239	0	1,232	0
Offsite [e]	1	7	21	0	3	1	0	5,009	0	0	0	2	0	0	0	0	570	0
Total	15	107	170	0	8,836	1,844	0	18,912	4	1	9	15	0	1,146	239	0	1,802	0
SCAB Emissions																		
Offsite [e]	8	54	175	1	17	7	0	49,796	1	1	5	19	0	1	1	0	6,077	0
MDAB Emissions																		
Offsite	6	39	126	1	7	5	0	60,346	0	1	5	16	0	1	1	0	7,845	0
SJVAB Emissions																		
Offsite	4	25	105	0	5	3	0	38,335	0	0	3	14	0	1	0	0	4,984	0
GBVAB Emissions																		
Offsite	2	11	45	0	2	1	0	18,029	0	0	1	6	0	0	0	0	2,344	0
Nevada Emissions																		
Offsite	16	106	503	2	18	12	0	148,181	0	2	14	65	0	2	2	0	19,263	0
Utah Emissions																		
Offsite	2	14	68	0	2	2	0	20,156	0	0	2	9	0	0	0	0	2,620	0

Notes:

[a] Annual emissions were scaled to account for the actual duration of construction activity within each calendar year, as documented in Attachment 1-8.

[b] Scaling was not required for the fugitive dust emissions as they were scaled in Attachment 1-5 and Attachment 1-6.

[c] Emissions presented for Year 2014 are associated with demolition activities.

[d] Emissions presented for Years 2016 and 2017 are associated with excavation, material hauling, and road repair activities.

[e] Annual emissions from road repair, an offsite activity, were scaled by the number of rebuilds per year since the emissions per rebuild were estimated in Attachment 1-6.

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ATTACHMENT 1-3

Summary of GHG Emissions for Demolition, Excavation, and Offsite Disposal (High Soil Removal Estimate)

NASA SSFL EIS: Air Quality

Demolition, Excavation, and Offsite Disposal GHG Emissions

Emissions Location	Emissions (metric tons/year)		
	CO_2	CH_4	CO_2e [a]
Year 2014 [b]			
SCCAB Emissions			
Onsite	1,775	0	1,783
Offsite	22	0	22
Total	1,797	0	1,806
SCAB Emissions			
Offsite	671	0	671
MDAB Emissions			
Offsite	330	0	330
GBVAB Emissions			
Offsite	117	0	117
Nevada Emissions			
Offsite	84	0	84
Total Year 2014	**2,998**	**0**	**3,007**
Year 2016 [c]			
SCCAB Emissions			
Onsite	1,044	0	1,050
Offsite	475	0	475
Total	1,520	0	1,526
SCAB Emissions			
Offsite	5,064	0	5,065
MDAB Emissions			
Offsite	6,538	0	6,538
SJVAB Emissions			
Offsite	4,153	0	4,153
GBVAB Emissions			
Offsite	1,953	0	1,953
Nevada Emissions			
Offsite	16,048	0	16,049
Utah Emissions			
Offsite	2,183	0	2,183
Total Year 2016	**37,458**	**0**	**37,467**
Year 2017 [c]			
SCCAB Emissions			
Onsite	1,118	0	1,125
Offsite	517	0	517
Total	1,635	0	1,642
SCAB Emissions			
Offsite	5,513	0	5,514
MDAB Emissions			
Offsite	7,117	0	7,117
SJVAB Emissions			
Offsite	4,521	0	4,521
GBVAB Emissions			
Offsite	2,126	0	2,126
Nevada Emissions			
Offsite	17,476	0	17,477
Utah Emissions			
Offsite	2,377	0	2,377
Total Year 2017	**40,765**	**0**	**40,775**

Notes:

[a] CO_2e emissions were estimated using the following global warming potentials: 1 for CO_2 and 21 for CH_4.

[b] Emissions presented for Year 2014 are associated with demolition activities.

[c] Emissions presented for Years 2016 and 2017 are associated with excavation, material hauling, and road repair activities.

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ATTACHMENT 1-4

Demolition Emissions (High and Low Soil Removal Estimate)

NASA SSFL EIS: Air Quality

Construction Equipment Emissions

Construction Equipment	Emissions (lbs/day) [a]									Emissions (tons/year) [b]								
	VOC	CO	NOx	SOx	PM_{10}	$PM_{2.5}$	Pb	CO_2	CH_4	VOC	CO	NOx	SOx	PM_{10}	$PM_{2.5}$	Pb	CO_2	CH_4
Year 2014																		
Excavators	2.663	21.537	31.796	0.033	1.563	1.438	0.0017	3,529.232	1.043	0.200	1.615	2.385	0.0025	0.117	0.108	0.00013	264.692	0.078
Crawler Cranes [c]	0.955	3.939	11.357	0.007	0.521	0.479	0.0004	747.993	0.221	0.072	0.295	0.852	0.0005	0.039	0.036	0.00003	56.099	0.017
All-Terrain Cranes [c]	1.909	7.878	22.714	0.014	1.041	0.958	0.0007	1,495.986	0.442	0.143	0.591	1.704	0.0011	0.078	0.072	0.00005	112.199	0.033
Manlifts [d]	0.174	2.772	2.904	0.004	0.138	0.127	0.0002	444.939	0.131	0.013	0.208	0.218	0.0003	0.010	0.010	0.00002	33.370	0.010
Wheel Loaders [e]	1.291	4.716	17.446	0.015	0.593	0.546	0.0008	1,632.434	0.483	0.097	0.354	1.308	0.0011	0.044	0.041	0.00006	122.433	0.036
Off-highway Trucks	2.637	13.908	31.404	0.033	1.203	1.107	0.0017	3,492.095	1.032	0.198	1.043	2.355	0.0025	0.090	0.083	0.00012	261.907	0.077
Dozers [f]	1.590	13.862	18.120	0.011	0.845	0.777	0.0006	1,179.827	0.349	0.119	1.040	1.359	0.0008	0.063	0.058	0.00004	88.487	0.026
Vacuum Trucks [g]	1.318	6.954	15.702	0.016	0.601	0.554	0.0008	1,746.047	0.516	0.099	0.522	1.178	0.0012	0.045	0.042	0.00006	130.954	0.039
Motor Graders [h]	1.340	6.249	13.765	0.008	0.773	0.711	0.0004	834.922	0.247	0.100	0.469	1.032	0.0006	0.058	0.053	0.00003	62.619	0.019
Skid-steer Loaders	0.645	7.080	8.511	0.010	0.497	0.458	0.0005	1,096.591	0.324	0.048	0.531	0.638	0.0008	0.037	0.034	0.00004	82.244	0.024
Miscellaneous Small Equipment [i, j]	12.350	58.986	85.939	0.099	6.627	6.627	0.0041	9,345.361	1.102	0.926	4.424	6.445	0.0074	0.497	0.497	0.00031	700.902	0.083
Total Onsite (Within the SCCAB) [k]	**26.871**	**147.882**	**259.658**	**0.251**	**14.402**	**13.781**	**0.0118**	**25,545.427**	**5.890**	**2.015**	**11.091**	**19.474**	**0.0189**	**1.080**	**1.034**	**0.00089**	**1,915.907**	**0.442**

Notes:

[a] Daily Emissions (lbs/day) = Emission Factor (g/bhp-hr) x Quantity X Horsepower x Load Factor x Hours of Operation per Day / 453.6 (g/lb).

[b] Annual emissions were estimated assuming activities occur 150 days per year, as documented in Attachment 1-7.

[c] Emissions for Crawler Cranes and All-Terrain Cranes were estimated using emission factors for 'Cranes'.

[d] Emissions for Manlifts were estimated using emission factors for 'Aerial Lifts'.

[e] Emissions for Wheel Loaders were estimated using emission factors for 'Rubber Tired Loaders'.

[f] Emissions for Dozers were estimated using emission factors for 'Rubber Tired Dozers'.

[g] Emissions for Vacuum Trucks were estimated using emission factors for 'Off-highway Trucks'.

[h] Emissions for Motor Graders were estimated using emission factors for 'Graders'.

[i] Emissions for Miscellaneous Small Equipment were estimated using emission factors for 'Pumps'.

[j] While Miscellaneous Small Equipment may include compressors, lighting, pumps, etc., emissions were estimated assuming all equipment were pumps.

[k] All construction activities occur onsite, which is located within the SCCAB.

Construction Equipment Emission Factors

Construction Equipment	Emission Factors (g/bhp-hr) [a]								
	VOC	CO	NOx	SOx	PM_{10}	$PM_{2.5}$	Pb [b, c]	CO_2	CH_4
Year 2014									
Excavators	0.390	3.154	4.657	0.005	0.229	0.211	0.0002	516.907	0.153
Cranes	0.661	2.726	7.860	0.005	0.360	0.331	0.0002	517.683	0.153
Aerial Lifts	0.202	3.220	3.373	0.005	0.161	0.148	0.0002	516.703	0.153
Rubber Tired Loaders	0.407	1.486	5.495	0.005	0.187	0.172	0.0002	514.217	0.152
Off-highway Trucks	0.393	2.075	4.686	0.005	0.180	0.165	0.0002	521.057	0.154
Rubber Tired Dozers	0.707	6.165	8.058	0.005	0.376	0.346	0.0002	524.676	0.155
Graders	0.847	3.951	8.702	0.005	0.488	0.449	0.0002	527.834	0.156
Skid-steer Loaders	0.304	3.338	4.013	0.005	0.235	0.216	0.0002	517.062	0.153
Pumps	0.751	3.587	5.226	0.006	0.403	0.403	0.0002	568.299	0.067

Notes:

[a] Emission factors were obtained from Table 3.4 of Appendix D of the *CalEEMod User's Guide* (Environ, 2013).

[b] A lead emission factor for stationary and portable internal combustion engines was assumed representative of construction equipment. This factor was obtained from Table B-2 of the *Supplemental Instructions: Reporting Procedures for AB2588 Facilities for Reporting their Quadrennial Air Toxics Emissions Inventory* (SCAQMD, 2010): 0.0083 lbs/1,000 gallons

[c] For construction equipment, assumed the following diesel fuel consumption per Table A9-8-C of the *CEQA Handbook* (SCAQMD, 1993): 0.066 gallons/bhp-hr

ATTACHMENT 1-4
Demolition Emissions (High and Low Soil Removal Estimate)
NASA SSFL EIS: Air Quality

Fugitive Dust Emissions From Demolition

Fugitive Dust	Emissions (lbs/day)		Emissions (tons/year) [b]	
	PM_{10}	$PM_{2.5}$ [a]	PM_{10}	$PM_{2.5}$
Year 2014				
Demolition Fugitive Dust [c]	3.866	0.804	0.290	0.060
Debris Loading Fugitive Dust [d]	13.416	2.791	1.006	0.209
Total Onsite (Within the SCCAB) [e]	**17.283**	**3.595**	**1.296**	**0.270**

Notes:

[a] Per Appendix A of the *Final - Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds* (SCAQMD, 2006), $PM_{2.5}$ emissions from construction activities were assumed to be: 20.8% of the PM_{10} emissions

[b] Annual emissions were estimated assuming activities occur 150 days per year, as documented in Attachment 1-7.

[c] Demolition Fugitive Dust emissions were calculated using Table A9-9-H from the *CEQA Handbook* (SCAQMD, 1993) as follows:

Daily PM_{10} Emissions (lbs/day) = Emission Factor (lb PM_{10}/ft^3) x Volume Handled per Day (ft^3/day).

PM_{10} Emission Factor (lbs/ft^3) is: 0.00042

[d] Emission factor for debris loading was calculated per Appendix A of the *CalEEMod User's Guide* (Environ, 2013) as follows:

Daily PM_{10} Emissions (lbs/day) = Emission Factor (lbs PM_{10}/ton) x Quantity Handled per Day (tons/day)

PM_{10} Emission Factor (lbs/ton) is: 0.0203

[e] All construction activities occur onsite, which is located within the SCCAB.

Vehicle Emissions

Vehicle Type	Emissions (lbs/day) [a]									Emissions (tons/year) [b]								
	VOC	CO	NOx	SOx	PM_{10}	$PM_{2.5}$	Pb	CO_2	CH_4	VOC	CO	NOx	SOx	PM_{10}	$PM_{2.5}$	Pb	CO_2	CH_4
Onsite Emissions for Year 2014 [c]																		
Crew Vans [d]	0.002	0.037	0.003	0.0001	0.001	0.0004	0.000002	10.932	0.0003	0.0001	0.003	0.0002	0.000004	0.0001	0.00003	0.0000001	0.820	0.00002
Supervisory Vehicles [e]	0.007	0.148	0.014	0.0001	0.002	0.0009	0.000005	27.571	0.0006	0.0006	0.011	0.0011	0.000011	0.0001	0.00007	0.0000004	2.068	0.00004
Tractor-trailer End Dump Trucks (25 ton) [f]	0.064	0.174	0.760	0.0009	0.021	0.0166	0.000036	143.705	0.0003	0.0048	0.013	0.0570	0.000066	0.0016	0.00125	0.0000027	10.778	0.00002
Standard Tractor-trailer Flatbeds [f]	0.021	0.058	0.253	0.0003	0.007	0.0055	0.000012	47.902	0.0001	0.0016	0.004	0.0190	0.000022	0.0005	0.00042	0.0000009	3.593	0.00001
Tractor-trailer End Dump Trucks (25 ton) [f]	0.053	0.145	0.634	0.0007	0.018	0.0139	0.000030	119.755	0.0002	0.0040	0.011	0.0475	0.000055	0.0013	0.00104	0.0000022	8.982	0.00002
Tractor-trailer End Dump Trucks (25 ton) [f]	0.086	0.232	1.014	0.0012	0.028	0.0222	0.000048	191.607	0.0004	0.0064	0.017	0.0760	0.000088	0.0021	0.00166	0.0000036	14.371	0.00003
Total Onsite (Within the SCCAB)	**0.234**	**0.793**	**2.679**	**0.0033**	**0.077**	**0.0595**	**0.000132**	**541.473**	**0.0018**	**0.0175**	**0.060**	**0.2009**	**0.000245**	**0.0057**	**0.00446**	**0.0000099**	**40.610**	**0.00014**
Offsite Emissions for Year 2014 [c]																		
Travel Within the SCCAB																		
Tractor-trailer End Dump Trucks (25 ton) [f, g]	0.003	0.017	0.111	0.0002	0.004	0.003	0.000009	21.242	0.00007	0.0002	0.0013	0.008	0.00002	0.0003	0.0002	0.0000007	1.593	0.000005
Standard Tractor-trailer Flatbeds [f, h]	0.001	0.006	0.037	0.0001	0.001	0.001	0.000003	7.081	0.00002	0.0001	0.0004	0.003	0.00001	0.0001	0.0001	0.0000002	0.531	0.000002
Tractor-trailer End Dump Trucks (25 ton) [f, i]	0.002	0.014	0.092	0.0002	0.003	0.002	0.000007	17.701	0.00006	0.0002	0.0011	0.007	0.00001	0.0002	0.0002	0.0000006	1.328	0.000004
Tractor-trailer End Dump Trucks (25 ton) [f, j]	0.002	0.014	0.092	0.0002	0.003	0.002	0.000007	17.701	0.00006	0.0002	0.0011	0.007	0.00001	0.0002	0.0002	0.0000006	1.328	0.000004
Tractor-trailer End Dump Trucks (25 ton) [f, k]	0.002	0.014	0.092	0.0002	0.003	0.002	0.000007	17.701	0.00006	0.0002	0.0011	0.007	0.00001	0.0002	0.0002	0.0000006	1.328	0.000004
Tractor-trailer End Dump Trucks (25 ton) [f, l]	0.024	0.138	0.887	0.0018	0.028	0.020	0.000072	169.933	0.00054	0.0018	0.0103	0.067	0.00013	0.0021	0.0015	0.0000054	12.745	0.000040
Worker Commute [m]	0.011	0.354	0.040	0.0009	0.012	0.005	0.000028	76.434	0.00454	0.0008	0.0265	0.003	0.00006	0.0009	0.0004	0.0000021	5.733	0.000340
Total Offsite (Within the SCCAB)	**0.047**	**0.557**	**1.352**	**0.0034**	**0.054**	**0.035**	**0.000134**	**327.793**	**0.00534**	**0.0035**	**0.0418**	**0.101**	**0.00026**	**0.0040**	**0.003**	**0.0000100**	**24.584**	**0.000400**
Travel Within the SCAB																		
Tractor-trailer End Dump Trucks (25 ton) [f, g]	0.205	1.263	6.924	0.016	0.234	0.165	0.0006	1,503.465	0.005	0.015	0.095	0.519	0.0012	0.018	0.012	0.00005	112.760	0.0004
Standard Tractor-trailer Flatbeds [f, h]	0.047	0.291	1.593	0.004	0.054	0.038	0.0001	345.867	0.001	0.004	0.022	0.119	0.0003	0.004	0.003	0.00001	25.940	0.0001
Tractor-trailer End Dump Trucks (25 ton) [f, i]	0.561	3.453	18.934	0.043	0.639	0.451	0.0017	4,111.587	0.013	0.042	0.259	1.420	0.0032	0.048	0.034	0.00013	308.369	0.0010
Tractor-trailer End Dump Trucks (25 ton) [f, j]	0.176	1.082	5.932	0.013	0.200	0.141	0.0005	1,288.180	0.004	0.013	0.081	0.445	0.0010	0.015	0.011	0.00004	96.613	0.0003
Tractor-trailer End Dump Trucks (25 ton) [f, k]	0.176	1.082	5.932	0.013	0.200	0.141	0.0005	1,288.180	0.004	0.013	0.081	0.445	0.0010	0.015	0.011	0.00004	96.613	0.0003
Tractor-trailer End Dump Trucks (25 ton) [f, l]	0.069	0.427	2.340	0.005	0.079	0.056	0.0002	508.213	0.002	0.005	0.032	0.176	0.0004	0.006	0.004	0.00002	38.116	0.0001
Worker Commute [m]	0.081	3.062	0.309	0.010	0.126	0.052	0.0003	814.640	0.047	0.006	0.230	0.023	0.0007	0.009	0.004	0.00002	61.098	0.0035
Total Offsite (Within the SCAB)	**1.315**	**10.660**	**41.964**	**0.103**	**1.533**	**1.045**	**0.0041**	**9,860.132**	**0.076**	**0.099**	**0.799**	**3.147**	**0.0078**	**0.115**	**0.078**	**0.00031**	**739.510**	**0.0057**

ATTACHMENT 1-4

Demolition Emissions (High and Low Soil Removal Estimate)

NASA SSFL EIS: Air Quality

Travel Within the MDAB																		
Tractor-trailer End Dump Trucks (25 ton) [f, i]	0.562	3.688	17.296	0.049	0.714	0.491	0.002	4,847.088	0.016	0.042	0.277	1.297	0.004	0.054	0.037	0.0002	363.532	0.001
Travel Within the GBVAB																		
Tractor-trailer End Dump Trucks (25 ton) [f, i]	0.219	1.363	7.062	0.018	0.277	0.196	0.001	1,713.186	0.006	0.016	0.102	0.530	0.001	0.021	0.015	0.0001	128.489	0.0004
Travel Within Nevada																		
Tractor-trailer End Dump Trucks (25 ton) [f, i]	0.172	1.029	6.411	0.013	0.203	0.147	0.001	1,228.473	0.004	0.013	0.077	0.481	0.001	0.015	0.011	0.00004	92.135	0.0003

Notes:

[a] Daily Emissions (lbs/day) = Quantity of Vehicles x Daily VMT (miles/day) x Emission Factor (g/mile) / 453.6 (g/lb).

[b] Annual emissions were estimated assuming activities occur 150 days per year, as documented in Attachment 1-7.

[c] Onsite emissions all occur within the SCCAB; offsite emissions were distributed amongst the air basins based on the haul routes for each vehicle, as presented in Attachment 1-7.

[d] Emissions for Crew Vans were estimated using emission factors for 'Passenger Vehicles'.

[e] Emissions for Supervisory Vehicles were estimated using emission factors for 'Pick-up Trucks'.

[f] Emissions for Tractor-trailer End Dump Trucks and Standard Tractor-trailer Flatbeds were estimated using emission factors for 'Heavy-Heavy Duty Trucks'.

[g] The first Tractor-trailer End Dump Trucks listed above transport scrap metal to San Pedro for export.

[h] The Standard Tractor-trailer Flatbeds listed above transport salvaged equipment to a dealer in Los Angeles County.

[i] The second Tractor-trailer End Dump Trucks listed above transport hazardous concrete to U.S. Ecology.

[j] The third Tractor-trailer End Dump Trucks listed above transport non-hazardous concrete to Chiquita Canyon Landfill.

[k] The fourth Tractor-trailer End Dump Trucks listed above transport C&D waste to Chiquita Canyon Landfill.

[l] The fifth Tractor-trailer End Dump Trucks listed above transport asphalt to a facility in Simi Valley.

[m] Assumed workers live in Ventura County and Los Angeles County as listed below. It was also assumed workers commute in passenger vehicles.

Ventura County	50%
Los Angeles County	50%

Vehicle Emission Factors

Vehicle Type	Emission Factors (g/mile) [a]								
	VOC	CO	NOx	SOx	PM_{10} [b]	$PM_{2.5}$ [b]	Pb [c]	CO_2	CH_4 [d]
Onsite Emission Factors (15 mph)									
SCCAB Emission Factors									
Passenger Vehicles [e]	0.105	2.122	0.170	0.003	0.050	0.022	0.0001	619.871	0.017
Pick-up Trucks [f, g]	0.211	4.200	0.407	0.004	0.054	0.026	0.0002	781.647	0.016
Heavy-Heavy Duty Trucks [h]	1.212	3.282	14.371	0.017	0.399	0.314	0.001	2,716.032	0.005
Offsite Emission Factors (55 mph)									
SCCAB Emission Factors									
Passenger Vehicles [e]	0.043	1.349	0.152	0.003	0.046	0.019	0.0001	291.347	0.017
Pick-up Trucks [f, g]	0.097	2.768	0.367	0.004	0.047	0.020	0.0002	368.191	0.016
Heavy-Heavy Duty Trucks [h]	0.225	1.301	8.381	0.017	0.266	0.192	0.001	1,605.866	0.005
SCAB Emission Factors									
Passenger Vehicles [e]	0.030	1.119	0.113	0.004	0.046	0.019	0.0001	297.760	0.017
Pick-up Trucks [f, g]	0.057	2.171	0.262	0.005	0.047	0.020	0.0002	374.646	0.016
Heavy-Heavy Duty Trucks [h]	0.218	1.345	7.372	0.017	0.249	0.176	0.001	1,600.872	0.005
MDAB Emission Factors									
Heavy-Heavy Duty Trucks [h]	0.183	1.204	5.648	0.016	0.233	0.160	0.001	1,582.893	0.005

ATTACHMENT 1-4

Demolition Emissions (High and Low Soil Removal Estimate)

NASA SSFL EIS: Air Quality

GBVAB Emission Factors									
Heavy-Heavy Duty Trucks [h]	0.202	1.262	6.537	0.017	0.256	0.182	0.001	1,585.921	0.005
Nevada Emission Factors [i]									
Heavy-Heavy Duty Trucks [h]	0.225	1.345	8.381	0.017	0.266	0.192	0.001	1,605.866	0.005

Notes:

[a] Unless otherwise noted, emission factors are from EMFAC2011-PL for each air basin.

[b] PM_{10} and $PM_{2.5}$ emission factors account for particulate emissions from running exhaust, tire wear, and break wear.

[c] A lead emission factor for stationary and portable internal combustion engines was assumed representative of on-road vehicles. This factor was obtained from Table B-2 of the *Supplemental Instructions: Reporting Procedures for AB2588 Facilities for Reporting their Quadrennial Air Toxics Emissions Inventory* (SCAQMD, 2010). Due to limited available data, this emission factor was assumed equal for all air basins, all vehicle speeds, and all construction years: 0.0083 lbs/1,000 gallons

[d] CH_4 emission factors taken from Table 13-5 of the *General Reporting Protocol* (Version 2.0) for the most recent model year available (TCR, 2013).

[e] Per Table 4-23 of the *National Transportation Statistics 2013* (BTS, 2013), assumed a passenger fuel economy of: 35.6 miles per gallon

[f] EMFAC2011-PL emission factors for Pick-Up Trucks assume an equal mix of LDT1 and LDT2 vehicles.

[g] Per Table 4-23 of the *National Transportation Statistics 2013* (BTS, 2013), assumed a pick-up truck fuel economy of: 25.0 miles per gallon

[h] As calculated using the EMFAC2011 Web Based Emissions Database for California (which was assumed to be representative of Nevada), the heavy-heavy duty truck (diesel) fuel economy is: 5.572 miles per gallon

[i] As a conservative estimate, the maximum California emission factors were assumed representative of Nevada.

ATTACHMENT 1-5

Excavation Emissions (High Soil Removal Estimate)

NASA SSFL EIS: Air Quality

Construction Equipment Emissions

Construction Equipment	Emissions (lbs/day) [a]									Emissions (tons/year) [b]								
	VOC	CO	NOx	SOx	PM_{10}	$PM_{2.5}$	Pb	CO_2	CH_4	VOC	CO	NOx	SOx	PM_{10}	$PM_{2.5}$	Pb	CO_2	CH_4
Year 2016																		
Rubber Tired Dozers	1.548	13.106	17.338	0.011	0.807	0.742	0.0006	1,154.271	0.348	0.201	1.704	2.254	0.001	0.105	0.096	0.00007	150.055	0.045
Concrete/Industrial Saws	0.808	4.719	5.777	0.008	0.434	0.434	0.0003	740.820	0.072	0.105	0.613	0.751	0.001	0.056	0.056	0.00004	96.307	0.009
Tractors/Loaders/Backhoes	1.290	9.140	12.332	0.012	0.949	0.874	0.0006	1,226.283	0.370	0.168	1.188	1.603	0.002	0.123	0.114	0.00008	159.417	0.048
Graders	1.281	6.195	13.049	0.008	0.733	0.674	0.0004	816.410	0.246	0.167	0.805	1.696	0.001	0.095	0.088	0.00005	106.133	0.032
Excavators	0.976	8.624	11.145	0.013	0.548	0.504	0.0007	1,383.258	0.417	0.127	1.121	1.449	0.002	0.071	0.066	0.00009	179.824	0.054
Scrapers	3.466	27.629	44.110	0.038	1.778	1.636	0.0019	3,879.340	1.170	0.451	3.592	5.734	0.005	0.231	0.213	0.00025	504.314	0.152
Total Onsite (Within the SCCAB) [c]	**9.369**	**69.413**	**103.752**	**0.089**	**5.250**	**4.865**	**0.0045**	**9,200.381**	**2.623**	**1.218**	**9.024**	**13.488**	**0.012**	**0.683**	**0.632**	**0.00058**	**1,196.050**	**0.341**
Year 2017																		
Rubber Tired Dozers	1.488	12.425	16.491	0.011	0.766	0.705	0.0006	1,137.492	0.349	0.193	1.615	2.144	0.001	0.100	0.092	0.00007	147.874	0.045
Concrete/Industrial Saws	0.726	4.686	5.326	0.008	0.383	0.383	0.0003	740.818	0.065	0.094	0.609	0.692	0.001	0.050	0.050	0.00004	96.306	0.008
Tractors/Loaders/Backhoes	1.200	9.069	11.532	0.012	0.867	0.798	0.0006	1,205.777	0.370	0.156	1.179	1.499	0.002	0.113	0.104	0.00008	156.751	0.048
Graders	1.198	6.082	12.121	0.008	0.681	0.626	0.0004	801.569	0.246	0.156	0.791	1.576	0.001	0.089	0.081	0.00005	104.204	0.032
Excavators	0.911	8.605	10.104	0.013	0.497	0.457	0.0007	1,361.484	0.417	0.118	1.119	1.314	0.002	0.065	0.059	0.00009	176.993	0.054
Scrapers	3.257	25.566	40.908	0.038	1.642	1.510	0.0019	3,818.867	1.170	0.423	3.324	5.318	0.005	0.213	0.196	0.00025	496.453	0.152
Total Onsite (Within the SCCAB) [c]	**8.780**	**66.435**	**96.482**	**0.089**	**4.836**	**4.480**	**0.0045**	**9,066.008**	**2.616**	**1.141**	**8.636**	**12.543**	**0.012**	**0.629**	**0.582**	**0.00058**	**1,178.581**	**0.340**

Notes:

[a] Daily Emissions = Emission Factor (g/bhp-hr) x Equipment Quantity X Horsepower x Load Factor x Hours of Operation per Day / 453.6 (g/lb).

[b] Annual emissions assume activities occur: 260 days per year

[c] All construction activities occur onsite, which is located within the SCCAB.

Construction Equipment Emission Factors

Construction Equipment	Emission Factors (g/bhp-hr) [a]								
	VOC	CO	NOx	SOx	PM_{10}	$PM_{2.5}$	Pb [b, c]	CO_2	CH_4
Year 2016									
Rubber Tired Dozers	0.688	5.828	7.710	0.005	0.359	0.330	0.0002	513.311	0.155
Concrete/Industrial Saws	0.620	3.620	4.432	0.006	0.333	0.333	0.0002	568.300	0.055
Tractors/Loaders/Backhoes	0.538	3.811	5.142	0.005	0.396	0.364	0.0002	511.346	0.154
Graders	0.810	3.916	8.250	0.005	0.464	0.426	0.0002	516.131	0.156
Excavators	0.358	3.158	4.081	0.005	0.201	0.185	0.0002	506.495	0.153
Scrapers	0.452	3.606	5.757	0.005	0.232	0.214	0.0002	506.350	0.153
Year 2017									
Rubber Tired Dozers	0.662	5.526	7.333	0.005	0.341	0.313	0.0002	505.849	0.155
Concrete/Industrial Saws	0.557	3.595	4.086	0.006	0.294	0.294	0.0002	568.299	0.050
Tractors/Loaders/Backhoes	0.501	3.782	4.809	0.005	0.362	0.333	0.0002	502.795	0.154
Graders	0.757	3.845	7.663	0.005	0.430	0.396	0.0002	506.748	0.155
Excavators	0.334	3.151	3.700	0.005	0.182	0.168	0.0002	498.522	0.153
Scrapers	0.425	3.337	5.340	0.005	0.214	0.197	0.0002	498.457	0.153

Notes:

[a] Emission factors were obtained from Table 3.4 of Appendix D of the *CalEEMod User's Guide* (Environ, 2013).

[b] A lead emission factor for stationary and portable internal combustion engines was assumed representative of construction equipment. This factor was obtained from Table B-2 of the *Supplemental Instructions: Reporting Procedures for AB2588 Facilities for Reporting their Quadrennial Air Toxics Emissions Inventory* (SCAQMD, 2010): 0.0083 lbs/1,000 gallons

[c] For construction equipment, assumed the following diesel fuel consumption per Table A9-8-C of the *CEQA Handbook* (SCAQMD, 1993): 0.066 gallons/bhp-hr

ATTACHMENT 1-5
Excavation Emissions (High Soil Removal Estimate)
NASA SSFL EIS: Air Quality

Fugitive Dust Emissions

Pollutant	Emissions (lbs/day)	Emissions (tons/year)
Year 2016		
Open Stockpile Fugitive Dust [a, b]		
PM_{10} Emissions	4,442.543	529.403
$PM_{2.5}$ Emissions [c]	924.049	110.116
Truck Loading Fugitive Dust [b, d]		
PM_{10} Emissions	2.419	0.288
$PM_{2.5}$ Emissions [c]	0.503	0.060
Earthmoving Fugitive Dust [e, f, g]		
PM_{10} Emissions	4,361.281	519.719
$PM_{2.5}$ Emissions [c]	907.146	108.102
PM_{10} Total Onsite (Within the SCCAB) [h]	**8,806.243**	**1,049.411**
$PM_{2.5}$ Total Onsite (Within the SCCAB) [h]	**1,831.699**	**218.277**
Year 2017		
Open Stockpile Fugitive Dust [a, b]		
PM_{10} Emissions	4,442.543	577.531
$PM_{2.5}$ Emissions [c]	924.049	120.126
Truck Loading Fugitive Dust [b, d]		
PM_{10} Emissions	2.419	0.315
$PM_{2.5}$ Emissions [c]	0.503	0.065
Earthmoving Fugitive Dust [e, f, g]		
PM_{10} Emissions	4,361.281	566.967
$PM_{2.5}$ Emissions [c]	907.146	117.929
PM_{10} Total Onsite (Within the SCCAB) [h]	**8,806.243**	**1,144.812**
$PM_{2.5}$ Total Onsite (Within the SCCAB) [h]	**1,831.699**	**238.121**

Notes:

[a] For open storage piles from Table A9-9 of the *CEQA Handbook* (SCAQMD, 1993), daily PM_{10} Emissions (lbs/day) = Area Covered by Storage Piles (acres) x Emission Factor (lbs/day/acre).

[b] Annual emissions for open stockpiles and truck loading were estimated assuming the entire allowable duration, as documented in Attachment 1-8.

[c] Per Appendix A of the *Final - Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds* (SCAQMD, 2006), $PM_{2.5}$ emissions from construction activities were assumed to be: 20.8% of the PM_{10} emissions

[d] For truck loading from Table A9-9 of the *CEQA Handbook* (SCAQMD, 1993), daily PM_{10} Emissions (lbs/day) = Material Handled (tons/day) x Emission Factor (lbs/ton).

[e] For earthmoving (cut/fill), daily PM_{10} Emissions (lbs/day) = Area Excavated (acres) / Monthly Schedule (days/month) x Construction Activity Emission Factor (lbs/acre-month) + Daily Material Handled (tons/day) / Material Density (tons/cy) x Onsite Cut/Fill Emission Factor (lbs/1,000 cy).

[f] For earthmoving (cut/fill), made the following assumptions:

Material Density:	1.34	tons/cy	(documented in Attachment 1-8)
Monthly Schedule:	22	days per month	(consistent with the schedule documented in Attachment 1-6)

[g] Annual emissions for earthmoving were estimated assuming the same duration as excavation activities, as documented in Attachment 1-8.

[h] All construction activities occur onsite, which is located within the SCCAB.

ATTACHMENT 1-5
Excavation Emissions (High Soil Removal Estimate)
NASA SSFL EIS: Air Quality

Fugitive Dust Emission Factors

Construction Element	Emission Factors	
	PM_{10}	Units
Open Stockpile Fugitive Dust [a]	85.6	lbs/day/acre
Truck Loading Fugitive Dust [b]	0.0014	lbs/ton
Earthmoving Fugitive Dust [c]		
Construction Activity	0.11	ton/acre-month
	220	lbs/acre-month
Onsite Cut/Fill	0.059	ton/1,000 cy
	118	lbs/1,000 cy

Notes:

[a] Default emission factor for open storage piles from Table A9-9 from the *CEQA Handbook* (SCAQMD, 1993).

[b] Emission factor for truck loading was calculated using Table A9-9-G from the *CEQA Handbook* (SCAQMD, 1993) as follows:

Emission Factor (lbs/ton) = 0.00112 x {[(Average Wind Speed / 5) ^ 1.3] / [(Dirt Moisture Content / 2) ^ 1.4]}

Average Wind Speed:	6.0	mph	(value of 2.69 m/s, as measured onsite)
Dirt Moisture Content:	2.0	%	(assumed dry soil)

[c] Default emission factor for earthmoving (cut/fill) from Table A-4 of Appendix A of the *Software User's Guide: URBEMIS2007 for Windows* (JSA, 2007).

Vehicle Emissions

Vehicle Type	Emissions (lbs/day) [a]									Emissions (tons/year) [b]								
	VOC	CO	NOx	SOx	PM_{10}	$PM_{2.5}$	Pb	CO_2	CH_4	VOC	CO	NOx	SOx	PM_{10}	$PM_{2.5}$	Pb	CO_2	CH_4
Onsite Emissions for Year 2016 [c]																		
Crew Vans [d]	0.001	0.015	0.001	0.00003	0.0004	0.0002	0.000001	5.469	0.0002	0.0001	0.002	0.0002	0.000004	0.0001	0.00003	0.0000001	0.711	0.00002
Offsite Emissions for Year 2016 [c]																		
Travel Within the SCCAB																		
Removal Haul Truck Travel [e]	0.0003	0.002	0.014	0.00004	0.0004	0.0003	0.000001	3.523	0.00001	0.00004	0.0003	0.002	0.000005	0.0001	0.00004	0.0000002	0.458	0.000001
Backfill Haul Truck Travel [e]	0.0227	0.145	0.891	0.00240	0.0287	0.0187	0.000098	232.550	0.00074	0.00295	0.0188	0.116	0.000312	0.0037	0.00243	0.0000128	30.231	0.000096
Worker Commute [f]	0.0033	0.118	0.014	0.00038	0.0053	0.0022	0.000012	33.742	0.00200	0.00043	0.0154	0.002	0.000049	0.0007	0.00029	0.0000016	4.386	0.000260
Total Offsite (Within the SCCAB)	**0.0263**	**0.265**	**0.918**	**0.00281**	**0.0345**	**0.0212**	**0.000112**	**269.816**	**0.00276**	**0.00342**	**0.0345**	**0.119**	**0.000366**	**0.0045**	**0.00276**	**0.0000146**	**35.076**	**0.000358**
Travel Within the SCAB																		
Removal Haul Truck Travel [e]	0.089	0.596	2.867	0.008	0.102	0.066	0.0003	818.743	0.0026	0.012	0.077	0.373	0.0011	0.013	0.009	0.00005	106.437	0.0003
Backfill Haul Truck Travel [e]	0.017	0.113	0.541	0.002	0.019	0.013	0.0001	154.612	0.0005	0.002	0.015	0.070	0.0002	0.003	0.002	0.00001	20.100	0.0001
Worker Commute [f]	0.025	1.062	0.108	0.004	0.055	0.023	0.0001	359.711	0.0209	0.003	0.138	0.014	0.0006	0.007	0.003	0.00002	46.762	0.0027
Total Offsite (Within the SCAB)	**0.130**	**1.770**	**3.517**	**0.014**	**0.177**	**0.102**	**0.0005**	**1,333.067**	**0.0240**	**0.017**	**0.230**	**0.457**	**0.0019**	**0.023**	**0.013**	**0.00007**	**173.299**	**0.0031**
Travel Within the MDAB																		
Removal Haul Truck Travel [e]	0.113	0.777	2.775	0.011	0.143	0.092	0.0005	1,139.742	0.004	0.015	0.101	0.361	0.001	0.019	0.012	0.0001	148.166	0.0005
Travel Within the SJVAB																		
Removal Haul Truck Travel [e]	0.073	0.491	2.276	0.008	0.093	0.061	0.0003	723.996	0.002	0.010	0.064	0.296	0.001	0.012	0.008	0.00004	94.119	0.0003
Travel Within the GBVAB																		
Removal Haul Truck Travel [e]	0.034	0.229	0.967	0.004	0.045	0.029	0.0001	340.491	0.001	0.004	0.030	0.126	0.0005	0.006	0.004	0.00002	44.264	0.0001
Travel Within Nevada																		
Removal Haul Truck Travel [e]	0.303	2.031	10.724	0.029	0.362	0.238	0.001	2,797.646	0.009	0.039	0.264	1.394	0.004	0.047	0.031	0.0002	363.694	0.001
Travel Within Utah																		
Removal Haul Truck Travel [e]	0.041	0.276	1.459	0.004	0.049	0.032	0.0002	380.536	0.001	0.005	0.036	0.190	0.001	0.006	0.004	0.00002	49.470	0.0002
Onsite Emissions for Year 2017 [c]																		
Crew Vans [d]	0.001	0.013	0.001	0.00003	0.0004	0.0002	0.000001	5.471	0.0002	0.0001	0.002	0.0001	0.000004	0.0001	0.00003	0.0000001	0.711	0.00002

ATTACHMENT 1-5
Excavation Emissions (High Soil Removal Estimate)
NASA SSFL EIS: Air Quality

Offsite Emissions for Year 2017 [c]																		
Travel Within the SCCAB																		
Removal Haul Truck Travel [e]	0.0003	0.002	0.012	0.00004	0.0004	0.0003	0.000001	3.517	0.00001	0.00004	0.0003	0.002	0.000005	0.0001	0.00003	0.0000002	0.457	0.000001
Backfill Haul Truck Travel [e]	0.0210	0.137	0.789	0.00239	0.0268	0.0169	0.000098	232.143	0.00074	0.00273	0.0179	0.103	0.000311	0.0035	0.00220	0.0000128	30.179	0.000096
Worker Commute [f]	0.0026	0.103	0.012	0.00038	0.0053	0.0022	0.000012	33.753	0.00200	0.00034	0.0134	0.002	0.000049	0.0007	0.00029	0.0000016	4.388	0.000260
Total Offsite (Within the SCCAB)	**0.0240**	**0.242**	**0.813**	**0.00281**	**0.0325**	**0.0194**	**0.000112**	**269.413**	**0.00276**	**0.00311**	**0.0315**	**0.106**	**0.000365**	**0.0042**	**0.00252**	**0.0000146**	**35.024**	**0.000358**
Travel Within the SCAB																		
Removal Haul Truck Travel [e]	0.087	0.589	2.610	0.008	0.098	0.063	0.0003	817.477	0.0026	0.011	0.077	0.339	0.0011	0.013	0.008	0.00005	106.272	0.0003
Backfill Haul Truck Travel [e]	0.016	0.111	0.493	0.002	0.018	0.012	0.0001	154.373	0.0005	0.002	0.014	0.064	0.0002	0.002	0.002	0.00001	20.069	0.0001
Worker Commute [f]	0.020	0.944	0.097	0.004	0.055	0.023	0.0001	359.878	0.0209	0.003	0.123	0.013	0.0006	0.007	0.003	0.00002	46.784	0.0027
Total Offsite (Within the SCAB)	**0.123**	**1.644**	**3.200**	**0.014**	**0.172**	**0.097**	**0.0005**	**1,331.728**	**0.0240**	**0.016**	**0.214**	**0.416**	**0.0019**	**0.022**	**0.013**	**0.00007**	**173.125**	**0.0031**
Travel Within the MDAB																		
Removal Haul Truck Travel [e]	0.106	0.739	2.373	0.011	0.135	0.085	0.0005	1,137.336	0.004	0.014	0.096	0.309	0.001	0.018	0.011	0.0001	147.854	0.0005
Travel Within the SJVAB																		
Removal Haul Truck Travel [e]	0.069	0.468	1.973	0.008	0.087	0.055	0.0003	722.501	0.002	0.009	0.061	0.256	0.001	0.011	0.007	0.00004	93.925	0.0003
Travel Within the GBVAB																		
Removal Haul Truck Travel [e]	0.032	0.216	0.840	0.004	0.042	0.027	0.0001	339.798	0.001	0.004	0.028	0.109	0.0005	0.005	0.003	0.00002	44.174	0.0001
Travel Within Nevada																		
Removal Haul Truck Travel [e]	0.295	2.005	9.487	0.029	0.340	0.218	0.001	2,792.748	0.009	0.038	0.261	1.233	0.004	0.044	0.028	0.0002	363.057	0.001
Travel Within Utah																		
Removal Haul Truck Travel [e]	0.040	0.273	1.290	0.004	0.046	0.030	0.0002	379.870	0.001	0.005	0.035	0.168	0.001	0.006	0.004	0.00002	49.383	0.0002

Notes:
[a] Daily Emissions (lbs/day) = Quantity of Vehicles x Daily VMT (miles/day) x Emission Factor (g/mile) / 453.6 (g/lb).
[b] Annual emissions were estimated assuming activities occur: 260 days per year
[c] Onsite emissions all occur within the SCCAB; offsite emissions were distributed amongst the air basins based on the haul routes for each vehicle, as presented in Attachment 1-9.
[d] Assumed crew members were transported around the site using one crew van; the emissions for Crew Vans were estimated using emission factors for 'Passenger Vehicles'.
[e] Emissions for Haul Trucks were estimated using emission factors for 'Heavy-Heavy Duty Trucks'. The daily and annual emissions will be multiplied by the quantity of vehicles in Attachment 1-2.
[f] Assumed workers live in Ventura County and Los Angeles County as listed below. It was also assumed workers commute in passenger vehicles.

Ventura County	50%
Los Angeles County	50%

Vehicle Emission Factors

Vehicle Type	Emission Factors (g/mile) [a]								
	VOC	CO	NOx	SOx	PM_{10} [b]	$PM_{2.5}$ [b]	Pb [c]	CO_2	CH_4 [d]
2016 Onsite Emission Factors (15 mph)									
SCCAB Emission Factors									
Passenger Vehicles [e]	0.075	1.661	0.139	0.003	0.049	0.022	0.0001	620.233	0.017
Heavy-Heavy Duty Trucks [f]	0.843	2.123	10.848	0.016	0.218	0.148	0.001	2,702.921	0.005
2016 Offsite Emission Factors (55 mph)									
SCCAB Emission Factors									
Passenger Vehicles [e]	0.029	1.022	0.118	0.003	0.046	0.019	0.0001	291.533	0.017
Heavy-Heavy Duty Trucks [f]	0.156	0.995	6.126	0.016	0.197	0.129	0.001	1,598.252	0.005
SCAB Emission Factors									
Passenger Vehicles [e]	0.020	0.880	0.089	0.004	0.046	0.019	0.0001	298.018	0.017
Heavy-Heavy Duty Trucks [f]	0.173	1.160	5.582	0.017	0.198	0.129	0.001	1,593.914	0.005
MDAB Emission Factors									
Heavy-Heavy Duty Trucks [f]	0.156	1.072	3.830	0.016	0.197	0.127	0.001	1,573.301	0.005
SJVAB Emission Factors									
Heavy-Heavy Duty Trucks [f]	0.160	1.071	4.963	0.017	0.203	0.133	0.001	1,578.868	0.005

ATTACHMENT 1-5

Excavation Emissions (High Soil Removal Estimate)

NASA SSFL EIS: Air Quality

GBVAB Emission Factors									
Heavy-Heavy Duty Trucks [f]	0.159	1.060	4.477	0.017	0.207	0.136	0.001	1,575.989	0.005
Nevada Emission Factors									
Heavy-Heavy Duty Trucks [g]	0.173	1.160	6.126	0.017	0.207	0.136	0.001	1,598.252	0.005
Utah Emission Factors									
Heavy-Heavy Duty Trucks [g]	0.173	1.160	6.126	0.017	0.207	0.136	0.001	1,598.252	0.005
2017 Onsite Emission Factors (15 mph)									
SCCAB Emission Factors									
Passenger Vehicles [e]	0.061	1.464	0.126	0.003	0.049	0.022	0.0001	620.453	0.017
Heavy-Heavy Duty Trucks [f]	0.776	1.933	9.706	0.016	0.189	0.122	0.001	2,698.156	0.005
2017 Offsite Emission Factors (55 mph)									
SCCAB Emission Factors									
Passenger Vehicles [e]	0.023	0.890	0.104	0.003	0.046	0.019	0.0001	291.623	0.017
Heavy-Heavy Duty Trucks [f]	0.144	0.944	5.420	0.016	0.184	0.116	0.001	1,595.454	0.005
SCAB Emission Factors									
Passenger Vehicles [e]	0.017	0.782	0.080	0.004	0.046	0.019	0.0001	298.156	0.017
Heavy-Heavy Duty Trucks [f]	0.169	1.146	5.082	0.016	0.191	0.122	0.001	1,591.449	0.005
MDAB Emission Factors									
Heavy-Heavy Duty Trucks [f]	0.147	1.020	3.276	0.016	0.186	0.117	0.001	1,569.980	0.005
SJVAB Emission Factors									
Heavy-Heavy Duty Trucks [f]	0.150	1.021	4.302	0.016	0.190	0.121	0.001	1,575.607	0.005
GBVAB Emission Factors									
Heavy-Heavy Duty Trucks [f]	0.148	1.001	3.886	0.016	0.194	0.125	0.001	1,572.781	0.005
Nevada Emission Factors									
Heavy-Heavy Duty Trucks [g]	0.169	1.146	5.420	0.016	0.194	0.125	0.001	1,595.454	0.005
Utah Emission Factors									
Heavy-Heavy Duty Trucks [g]	0.169	1.146	5.420	0.016	0.194	0.125	0.001	1,595.454	0.005

Notes:

[a] Unless otherwise noted, emission factors are from EMFAC2011-PL for each air basin.

[b] PM_{10} and $PM_{2.5}$ emission factors account for particulate emissions from running exhaust, tire wear, and break wear.

[c] A lead emission factor for stationary and portable internal combustion engines was assumed representative of on-road vehicles. This factor was obtained from Table B-2 of the *Supplemental Instructions: Reporting Procedures for AB2588 Facilities for Reporting their Quadrennial Air Toxics Emissions Inventory* (SCAQMD, 2010). Due to limited available data, this emission factor was assumed equal for all air basins, all vehicle speeds, and all construction years: 0.0083 lbs/1,000 gallons

[d] CH_4 emission factors taken from Table 13-5 of the *General Reporting Protocol* (Version 2.0) for the most recent model year available (TCR, 2013).

[e] Per Table 4-23 of the *National Transportation Statistics 2013* (BTS, 2013), assumed a passenger fuel economy of: 35.6 miles per gallon

[f] As calculated using the EMFAC2011 Web Based Emissions Database for California (which was assumed to be representative of Nevada and Utah), the heavy-heavy duty truck (diesel) fuel economy is: 5.569 miles per gallon

[g] As a conservative estimate, the maximum California emission factors were assumed representative of Nevada and Utah.

ATTACHMENT 1-6

Road Repair Emissions (High and Low Soil Removal Estimates)

NASA SSFL EIS: Air Quality

Construction Equipment Emissions

Construction Equipment	Emissions (lbs/day) [a]									Emissions (tons/year) [b]								
	VOC	CO	NOx	SOx	PM_{10}	$PM_{2.5}$	Pb	CO_2	CH_4	VOC	CO	NOx	SOx	PM_{10}	$PM_{2.5}$	Pb	CO_2	CH_4
Year 2016																		
Rubber Tired Dozers	1.548	13.106	17.338	0.011	0.807	0.742	0.00056	1,154.271	0.348	0.017	0.144	0.191	0.00012	0.0089	0.0082	0.0000061	12.697	0.00383
Scrapers	1.733	13.815	22.055	0.019	0.889	0.818	0.00095	1,939.670	0.585	0.019	0.152	0.243	0.00021	0.0098	0.0090	0.0000105	21.336	0.00643
Signal Boards	0.932	4.891	5.840	0.011	0.227	0.227	0.00035	801.332	0.083	0.010	0.054	0.064	0.00012	0.0025	0.0025	0.0000039	8.815	0.00092
Excavators	0.488	4.312	5.573	0.007	0.274	0.252	0.00034	691.629	0.209	0.005	0.047	0.061	0.00007	0.0030	0.0028	0.0000037	7.608	0.00230
Graders	1.281	6.195	13.049	0.008	0.733	0.674	0.00039	816.410	0.246	0.014	0.068	0.144	0.00009	0.0081	0.0074	0.0000043	8.981	0.00271
Rubber Tired Loaders	0.624	2.305	8.119	0.008	0.277	0.255	0.00039	799.451	0.241	0.007	0.025	0.089	0.00008	0.0030	0.0028	0.0000043	8.794	0.00265
Plate Compactors	0.050	0.263	0.314	0.001	0.012	0.012	0.00002	43.099	0.004	0.001	0.003	0.003	0.00001	0.0001	0.0001	0.0000002	0.474	0.00005
Trenchers	0.704	3.561	6.163	0.004	0.483	0.445	0.00022	455.270	0.137	0.008	0.039	0.068	0.00005	0.0053	0.0049	0.0000024	5.008	0.00151
Pavers	0.505	3.594	5.686	0.006	0.283	0.260	0.00029	590.963	0.178	0.006	0.040	0.063	0.00006	0.0031	0.0029	0.0000032	6.501	0.00196
Paving Equipment	0.387	3.203	4.493	0.005	0.223	0.205	0.00026	524.853	0.158	0.004	0.035	0.049	0.00006	0.0025	0.0023	0.0000028	5.773	0.00174
Rollers	0.426	2.548	3.940	0.003	0.290	0.267	0.00017	344.849	0.104	0.005	0.028	0.043	0.00004	0.0032	0.0029	0.0000019	3.793	0.00114
Total Onsite (Within the SCCAB) [c]	**5.199**	**34.621**	**55.455**	**0.049**	**2.695**	**2.491**	**0.00236**	**4,889.378**	**1.375**	**0.057**	**0.381**	**0.610**	**0.00054**	**0.0296**	**0.0274**	**0.0000260**	**53.783**	**0.01512**
Total Offsite (Within the SCCAB) [c]	**0.682**	**4.543**	**7.278**	**0.006**	**0.354**	**0.327**	**0.00031**	**641.651**	**0.180**	**0.008**	**0.050**	**0.080**	**0.00007**	**0.0039**	**0.0036**	**0.0000034**	**7.058**	**0.00198**
Total Offsite (Within the SCAB) [c]	**2.797**	**18.628**	**29.838**	**0.027**	**1.450**	**1.340**	**0.00127**	**2,630.768**	**0.740**	**0.031**	**0.205**	**0.328**	**0.00029**	**0.0159**	**0.0147**	**0.0000140**	**28.938**	**0.00814**
Year 2017																		
Rubber Tired Dozers	1.488	12.425	16.491	0.011	0.766	0.705	0.00056	1,137.492	0.349	0.016	0.137	0.181	0.00012	0.0084	0.0078	0.0000061	12.512	0.00383
Scrapers	1.628	12.783	20.454	0.019	0.821	0.755	0.00095	1,909.434	0.585	0.018	0.141	0.225	0.00021	0.0090	0.0083	0.0000105	21.004	0.00643
Signal Boards	0.932	4.891	5.840	0.011	0.227	0.227	0.00035	801.332	0.083	0.010	0.054	0.064	0.00012	0.0025	0.0025	0.0000039	8.815	0.00092
Excavators	0.456	4.303	5.052	0.007	0.249	0.229	0.00034	680.742	0.209	0.005	0.047	0.056	0.00007	0.0027	0.0025	0.0000037	7.488	0.00229
Graders	1.198	6.082	12.121	0.008	0.681	0.626	0.00039	801.569	0.246	0.013	0.067	0.133	0.00009	0.0075	0.0069	0.0000043	8.817	0.00270
Rubber Tired Loaders	0.592	2.250	7.547	0.008	0.257	0.237	0.00039	787.222	0.241	0.007	0.025	0.083	0.00008	0.0028	0.0026	0.0000043	8.659	0.00265
Plate Compactors	0.050	0.263	0.314	0.001	0.012	0.012	0.00002	43.099	0.004	0.001	0.003	0.003	0.00001	0.0001	0.0001	0.0000002	0.474	0.00005
Trenchers	0.680	3.543	5.963	0.004	0.467	0.430	0.00022	448.207	0.137	0.007	0.039	0.066	0.00005	0.0051	0.0047	0.0000024	4.930	0.00151
Pavers	0.454	3.573	5.079	0.006	0.250	0.230	0.00029	582.128	0.178	0.005	0.039	0.056	0.00006	0.0027	0.0025	0.0000032	6.403	0.00196
Paving Equipment	0.356	3.195	4.051	0.005	0.202	0.186	0.00026	516.876	0.158	0.004	0.035	0.045	0.00006	0.0022	0.0020	0.0000028	5.686	0.00174
Rollers	0.394	2.520	3.672	0.003	0.266	0.245	0.00017	339.389	0.104	0.004	0.028	0.040	0.00004	0.0029	0.0027	0.0000019	3.733	0.00114
Total Onsite (Within the SCCAB) [c]	**4.928**	**33.445**	**51.869**	**0.049**	**2.515**	**2.325**	**0.00236**	**4,820.901**	**1.375**	**0.054**	**0.368**	**0.571**	**0.00054**	**0.0277**	**0.0256**	**0.0000260**	**53.030**	**0.01512**
Total Offsite (Within the SCCAB) [c]	**0.647**	**4.389**	**6.807**	**0.006**	**0.330**	**0.305**	**0.00031**	**632.664**	**0.180**	**0.007**	**0.048**	**0.075**	**0.00007**	**0.0036**	**0.0034**	**0.0000034**	**6.959**	**0.00198**
Total Offsite (Within the SCAB) [c]	**2.652**	**17.995**	**27.908**	**0.027**	**1.353**	**1.251**	**0.00127**	**2,593.923**	**0.740**	**0.029**	**0.198**	**0.307**	**0.00029**	**0.0149**	**0.0138**	**0.0000140**	**28.533**	**0.00814**

Notes:

[a] Daily Emissions = Emission Factor (g/bhp-hr) x Equipment Quantity X Horsepower x Load Factor x Hours of Operation per Day / 453.6 (g/lb).

[b] Annual emissions will be scaled by the number of rebuilds occurring within each year. Annual emissions assume 1 road repair lasts 1 month or: 22 days

[c] Since the roads to be repaired are located both in Ventura and Los Angeles counties and both on- and offsite, assumed activities occur within Ventura County (SCCAB; on- and offsite) and Los Angeles County (SCAB) as follows:

Onsite SCCAB	60%
Offsite SCCAB	8%
Offsite SCAB	32%

ATTACHMENT 1-6

Road Repair Emissions (High and Low Soil Removal Estimates)

NASA SSFL EIS: Air Quality

Construction Equipment Emission Factors

Construction Equipment	Emission Factors (g/bhp-hr) [a]								
	VOC	CO	NOx	SOx	PM_{10}	$PM_{2.5}$	Pb [b, c]	CO_2	CH_4
Year 2016									
Rubber Tired Dozers	0.688	5.828	7.710	0.005	0.359	0.330	0.0002	513.311	0.155
Scrapers	0.452	3.606	5.757	0.005	0.232	0.214	0.0002	506.350	0.153
Signal Boards	0.661	3.469	4.142	0.008	0.161	0.161	0.0002	568.299	0.059
Excavators	0.358	3.158	4.081	0.005	0.201	0.185	0.0002	506.495	0.153
Graders	0.810	3.916	8.250	0.005	0.464	0.426	0.0002	516.131	0.156
Rubber Tired Loaders	0.393	1.452	5.115	0.005	0.175	0.161	0.0002	503.654	0.152
Plate Compactors	0.661	3.469	4.142	0.008	0.161	0.161	0.0002	568.299	0.059
Trenchers	0.788	3.988	6.902	0.005	0.541	0.498	0.0002	509.903	0.154
Pavers	0.433	3.080	4.874	0.005	0.242	0.223	0.0002	506.540	0.153
Paving Equipment	0.372	3.081	4.322	0.005	0.215	0.197	0.0002	504.820	0.152
Rollers	0.628	3.755	5.806	0.005	0.428	0.393	0.0002	508.199	0.153
Year 2017									
Rubber Tired Dozers	0.662	5.526	7.333	0.005	0.341	0.313	0.0002	505.849	0.155
Scrapers	0.425	3.337	5.340	0.005	0.214	0.197	0.0002	498.457	0.153
Signal Boards	0.661	3.469	4.142	0.008	0.161	0.161	0.0002	568.299	0.059
Excavators	0.334	3.151	3.700	0.005	0.182	0.168	0.0002	498.522	0.153
Graders	0.757	3.845	7.663	0.005	0.430	0.396	0.0002	506.748	0.155
Rubber Tired Loaders	0.373	1.417	4.755	0.005	0.162	0.149	0.0002	495.950	0.152
Plate Compactors	0.661	3.469	4.142	0.008	0.161	0.161	0.0002	568.299	0.059
Trenchers	0.762	3.968	6.679	0.005	0.523	0.481	0.0002	501.992	0.154
Pavers	0.389	3.063	4.353	0.005	0.214	0.197	0.0002	498.967	0.153
Paving Equipment	0.343	3.073	3.896	0.005	0.195	0.179	0.0002	497.148	0.152
Rollers	0.580	3.713	5.411	0.005	0.392	0.361	0.0002	500.153	0.153

Notes:

[a] Emission factors were obtained from Table 3.4 of Appendix D of the *CalEEMod User's Guide* (Environ, 2013).

[b] A lead emission factor for stationary and portable internal combustion engines was assumed representative of construction equipment. This factor was obtained from Table B-2 of the *Supplemental Instructions: Reporting Procedures for AB2588 Facilities for Reporting their Quadrennial Air Toxics Emissions Inventory* (SCAQMD, 2010): 0.0083 lbs/1,000 gallons

[c] For construction equipment, assumed the following diesel fuel consumption per Table A9-8-C of the *CEQA Handbook* (1993): 0.066 gallons/bhp-hr

Fugitive Dust Emissions From Disturbed Surfaces

Pollutant	Emissions (lbs/day) [a, b]	Emissions (tons/year) [c]
Year 2016		
PM_{10} Emissions	32.000	0.352
$PM_{2.5}$ Emissions [d]	6.656	0.073
Total Onsite Within the SCCAB [e]		
PM_{10} Total Emissions	**19.170**	**0.211**
$PM_{2.5}$ Total Emissions	**3.987**	**0.044**
Total Offsite Within the SCCAB [e]		
PM_{10} Total Emissions	**2.516**	**0.028**
$PM_{2.5}$ Total Emissions	**0.523**	**0.006**
Total Offsite Within the SCAB [e]		
PM_{10} Total Emissions	**10.314**	**0.113**
$PM_{2.5}$ Total Emissions	**2.145**	**0.024**

ATTACHMENT 1-6

Road Repair Emissions (High and Low Soil Removal Estimates)

NASA SSFL EIS: Air Quality

Year 2017		
PM_{10} Emissions	32.000	0.352
$PM_{2.5}$ Emissions [d]	6.656	0.073
Total Onsite Within the SCCAB [e]		
PM_{10} Total Emissions	**19.170**	**0.211**
$PM_{2.5}$ Total Emissions	**3.987**	**0.044**
Total Offsite Within the SCCAB [e]		
PM_{10} Total Emissions	**2.516**	**0.028**
$PM_{2.5}$ Total Emissions	**0.523**	**0.006**
Total Offsite Within the SCAB [e]		
PM_{10} Total Emissions	**10.314**	**0.113**
$PM_{2.5}$ Total Emissions	**2.145**	**0.024**

Notes:

[a] Daily PM_{10} Emissions (lbs/day) = Maximum Area Disturbed per Day (acres) x Emission Factor (lbs/day/acre).

[b] The PM_{10} Emission Factor was taken from Table A-4 of Appendix A of the *URBEMIS User's Guide* (JSA, 2007): 20 lbs/acre/day

[c] Annual emissions were estimated by scaling the daily emissions by the number of days each rebuild lasts and the number of rebuilds occurring per year, as documented in Attachment 1-10. Each month was assumed to have: 22 days

[d] Per Appendix A of the *Final - Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds* (SCAQMD, 2006), $PM_{2.5}$ emissions from construction activities were assumed to be: 20.8% of the PM_{10} emissions

[e] Since the roads to be repaired are located both in Ventura and Los Angeles counties and both on- and offsite, assumed activities occur within Ventura County (SCCAB; on- and offsite) and Los Angeles County (SCAB) as follows:

Onsite SCCAB	60%
Offsite SCCAB	8%
Offsite SCAB	32%

Vehicle Emissions

Vehicle Type	Emissions (lbs/day) [a]									Emissions (tons/year) [b]								
	VOC	**CO**	**NOx**	**SOx**	**PM_{10}**	**$PM_{2.5}$**	**Pb**	**CO_2**	**CH_4**	**VOC**	**CO**	**NOx**	**SOx**	**PM_{10}**	**$PM_{2.5}$**	**Pb**	**CO_2**	**CH_4**
Onsite Emissions for Year 2016 [c]																		
Crew Vans [d]	0.001	0.029	0.002	0.0001	0.001	0.0004	0.000002	10.939	0.0003	0.00001	0.0003	0.00003	0.000001	0.00001	0.000004	0.00000002	0.120	0.000003
Offsite Emissions for Year 2016 [c]																		
Travel Within the SCCAB																		
Worker Commute [e]	0.005	0.176	0.020	0.0006	0.008	0.0033	0.000018	50.131	0.0030	0.00005	0.0019	0.00022	0.000006	0.00009	0.000036	0.00000020	0.551	0.000033
Travel Within the SCAB																		
Worker Commute [e]	0.050	2.176	0.221	0.0089	0.114	0.0467	0.000262	737.162	0.0428	0.00056	0.0239	0.00243	0.000098	0.00125	0.000514	0.00000288	8.109	0.000471
Onsite Emissions for Year 2017 [c]																		
Crew Vans [d]	0.001	0.026	0.002	0.0001	0.001	0.0004	0.000002	10.943	0.0003	0.00001	0.0003	0.00002	0.000001	0.00001	0.000004	0.00000002	0.120	0.000003
Offsite Emissions for Year 2017 [c]																		
Travel Within the SCCAB																		
Worker Commute [e]	0.004	0.153	0.018	0.0006	0.008	0.0033	0.000018	50.147	0.0030	0.00004	0.0017	0.00020	0.000006	0.00009	0.000036	0.00000020	0.552	0.000033

ATTACHMENT 1-6

Road Repair Emissions (High and Low Soil Removal Estimates)

NASA SSFL EIS: Air Quality

Travel Within the SCAB																		
Worker Commute [e]	0.041	1.934	0.198	0.0089	0.114	0.0466	0.000262	737.503	0.0428	0.00045	0.0213	0.00218	0.000098	0.00125	0.000513	0.00000288	8.113	0.000471

Notes:

[a] Daily Emissions (lbs/day) = Quantity of Vehicles x Daily VMT (miles/day) x Emission Factor (g/mile) / 453.6 (g/lb).

[b] Annual emissions will be scaled by the number of rebuilds occurring within each year. Annual emissions assume 1 road repair lasts 1 month or: 22 days

[c] Onsite emissions all occur within the SCCAB; offsite emissions were distributed amongst the air basins based on the commute routes, as presented in Attachment 1-10.

[d] Assumed crew members were transported around the site using two crew vans; the emissions for Crew Vans were estimated using emission factors for 'Passenger Vehicles'.

[e] Assumed workers live in Ventura County and Los Angeles County as listed below. It was also assumed workers commute in passenger vehicles.

Ventura County	50%
Los Angeles County	50%

Vehicle Emission Factors

Vehicle Type	Emission Factors (g/mile) [a]								
	VOC	CO	NOx	SOx	PM_{10} [b]	$PM_{2.5}$ [b]	Pb [c]	CO_2	CH_4 [d]
2016 Onsite Emission Factors (15 mph)									
SCCAB Emission Factors									
Passenger Vehicles [e]	0.075	1.661	0.139	0.003	0.049	0.022	0.0001	620.233	0.017
2016 Offsite Emission Factors (55 mph)									
SCCAB Emission Factors									
Passenger Vehicles [e]	0.029	1.022	0.118	0.003	0.046	0.019	0.0001	291.533	0.017
SCAB Emission Factors									
Passenger Vehicles [e]	0.020	0.880	0.089	0.004	0.046	0.019	0.0001	298.018	0.017
2017 Onsite Emission Factors (15 mph)									
SCCAB Emission Factors									
Passenger Vehicles [e]	0.061	1.464	0.126	0.003	0.049	0.022	0.0001	620.453	0.017
2017 Offsite Emission Factors (55 mph)									
SCCAB Emission Factors									
Passenger Vehicles [e]	0.023	0.890	0.104	0.003	0.046	0.019	0.0001	291.623	0.017
SCAB Emission Factors									
Passenger Vehicles [e]	0.017	0.782	0.080	0.004	0.046	0.019	0.0001	298.156	0.017

Notes:

[a] Unless otherwise noted, emission factors are from EMFAC2011-PL for each air basin.

[b] PM_{10} and $PM_{2.5}$ emission factors account for particulate emissions from running exhaust, tire wear, and break wear.

[c] A lead emission factor for stationary and portable internal combustion engines was assumed representative of on-road vehicles. This factor was obtained from Table B-2 of the *Supplemental Instructions: Reporting Procedures for AB2588 Facilities for Reporting their Quadrennial Air Toxics Emissions Inventory* (SCAQMD, 2010). Due to limited available data, this emission factor was assumed equal for all air basins, all vehicle speeds, and all construction years: 0.0083 lbs/1,000 gallons

[d] CH_4 emission factors taken from Table 13-5 of the *General Reporting Protocol* (Version 2.0) for the most recent model year available (TCR, 2013).

[e] Per Table 4-23 of the *National Transportation Statistics 2013* (BTS, 2013), assumed a passenger fuel economy of: 35.6 miles per gallon

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ATTACHMENT 1-7
Demolition Data (High and Low Soil Removal Estimates)
NASA SSFL EIS: Air Quality

Demolition Schedule

Start Date (Month and Year) [a]	January 2014
Project Duration (Months) [b]	12
Work Days per Week [c]	5
Work Hours per Day [d]	10
Work Days per Year [b]	150
Total Mass Demolished (tons) [e]	99,134
Total Mass Demolished per Day (tons/day)	661
Total Volume Demolished (ft^3) [f]	1,380,847
Volume Demolished per Day (ft^3/day)	9,206

Notes:

[a] The DOPAA indicates that demolition activities will occur between 2014 and 2016. For this analysis, conservatively assumed activities begin January 2014. Per K. Criswell/NASA, demolition may actually occur on and off for up to two years as NASA is approved for funding for fiscal years 2014 and 2015 (Fwd: SSFL EIS - Demolition Truth-checking (UNCLASSIFIED).msg).

[b] Conservatively assumed activities last up to 12 months although data provided by K. Criswell/NASA, shown in the 'Demolition Equipment Estimates' table, was intended for an 8 month period (or 150 days).

[c] Assume demolition activities occur 5 days per week.

[d] To allow for heightened activity, assume demolition activities occur up to 10 hours per day within the SSFL operational hours of 7 am to 7 pm. Per R. Dean/CH2M HILL, this is consistent with the Boeing ISRA activities (RE: SSFL EIS - AQ Calculations Table.msg).

[e] Total Mass Demolished taken from 'Demolition Equipment Estimates' table or Appendix 2 of the *Site Visit Report and Demolition Budget Cost Estimate* (Frankie Friend & Associates, Inc., 2011). Mass per material category is as follows:

Concrete	42,750	tons
Scrap Metal	8,250	tons
Salvaged Equipment	8,134	tons
C&D Waste	5,000	tons
Asphalt	35,000	tons

[f] To convert Total Mass Demolished to a Total Volume Demolished, conservatively used the density for concrete (kg/m^3): 2,300

Demolition Equipment Estimates [a, b, c]

Description	Quantity	Vehicle Trips	Estimated Total Round Trips (To/From Site)	Onsite Round Trip Distance (miles) [d, e]	Offsite Round Trip Distance (miles)	Comments	Air Quality Assumptions / Questions
On-road Equipment Requirements							
Crew Van	2	150	300	4	0	15 Passenger Van	Vehicles never leave the site; Section 2 of the SSFL EIS indicates 30 crew workers onsite each day. Assumed 2 crew vehicles would be necessary to transport all 30 workers and that each van would make one trip to/from the site each day of demolition activity (150 days).
Supervisory Vehicles	4	150	600	4	0	Cars or Pickup Trucks	Vehicles never leave the site; assume 4 supervisors onsite each day.
Tractor-trailer End Dump Truck (25 ton)	6	55	330	4	72	Used for scrap metal transport.	Estimates indicate that 8,250 tons of scrap metal will be transported. Scrap metal is likely to be hauled to San Pedro for export (approximately 72 miles roundtrip).
Standard Tractor-trailer Flatbed	2	10	20	4	50	Used for transport of useable salvaged equipment such as A/C units and electrical equipment.	Useable salvaged equipment is likely to be hauled to an equipment dealer within 25 miles of the site.
Tractor-trailer End Dump Truck (25 ton) [f]	5	38	190	0	679	Used for transporting hazardous concrete.	Assumed that hazardous concrete is transported to U.S. Ecology, which is located approximately 340 miles from the site in Beatty, Nevada.
Tractor-trailer End Dump Truck (25 ton) [f]	5	304	1,520	0	74	Used for transporting non-hazardous concrete.	Assumed that non-hazardous concrete is transported to Chiquita Canyon Landfill, which is located approximately 37 miles from the site.
Tractor-trailer End Dump Truck (25 ton) [f]	5	40	200	4	74	Used for transporting C&D waste.	Assumed that C&D waste is transported to Chiquita Canyon Landfill, which is located approximately 37 miles from the site.
Tractor-trailer End Dump Truck (25 ton)	8	175	1,400	4	24	Used for hauling asphalt paving to a recycle firm in the area over a total of 100 work days (approximately 14 loads per day).	Assumed that asphalt is transported to P.W. Gillibrand Co., Inc., which is 12 miles from the site. Estimates indicate that 35,000 tons of asphalt will be transported.

ATTACHMENT 1-7
Demolition Data (High and Low Soil Removal Estimates)
NASA SSFL EIS: Air Quality

Description	Quantity	Vehicle Trips	Estimated Total Round Trips (To/From Site)	Horsepower [g]	Load Factor [g]	Comments	Air Quality Assumptions / Questions
Off-road Equipment Requirements							
Excavators (one 75 ton; two 50 ton; and two 25 ton)	5	8	20	163	0.38	Includes attachments and counterweights, if needed.	Emissions based on 10 hours per day of operation. Conservatively assume all equipment operates at the same time. Emissions from Miscellaneous Small Equipment will be represented using a pump emission factor.
Crawler Crane (100 ton)	1	8	8	226	0.29	Includes boom and counterweights.	
All-terrain Crane (50 ton)	2	4	8	226	0.29		
Manlifts (60 ft or 80 ft)	2	6	12	63	0.31		
Wheel Loaders (5 cy)	2	4	8	200	0.36		
Off-highway Trucks (40 ton)	2	4	8	400	0.38		
Doser (D-6 size)	1	4	4	255	0.40		
Vacuum Truck	1	4	4	400	0.38		
Motor Grader	1	6	6	175	0.41		
Skid-steer Loaders	4	2	8	65	0.37		
Miscellaneous Small Equipment	12	2	24	84	0.74	Includes compressors, pumps, lighting plants, dust control equipment, etc.	

Notes:
[a] Equipment estimates provided are for 100% Demolition.
[b] Unless otherwise noted, data provided by K. Criswell/NASA (RE: SSFL Demolition Alternative Data Needs.msg and SSFL Demo Proj - Estimated Truck Equip Rqmt.pdf).
[c] Except for the Tractor-trailer End Dump Truck vehicle trips, values presented are based on an estimated project duration of 150 working days.
[d] Except for the crushed concrete transport, the round trip distance between the site location and entrance gate was estimated to be 1.5 to 4 miles using Google Earth™. As a conservative estimate, a distance of 4 miles will be used for onsite travel.
[e] It was assumed that the crushed concrete would be transported a negligible distance as the laydown areas are expected to be near the site locations, as provided by K. Criswell/NASA (RE: SSFL Demolition Alternative Data Needs.msg).
[f] For the concrete and C&D waste transport, the total number of round trips and the number of trips per truck were estimated based on the truck capacity (25 tons) and the amount of concrete to be crushed (4,750 tons of hazardous concrete and 38,000 tons of non-hazardous concrete) or C&D waste to be generated (5,000 tons), as provided by J. Glasgow/CH2M HILL (RE: NASA SSFL EIS.msg).
[g] Horsepower and load factors taken as the average for each equipment type from Table 3.3 of Appendix D of the *CalEEMod User's Guide* (Environ, 2013).

Crew Member Estimates for Demolition

Round Trip Distance Traveled to Site (miles) [a, b]	40
Round Trip Distance Traveled Onsite (miles) [a, c]	4
Number of Crew Members [d, e]	34

Notes:
[a] Assumed that crew members travel to the site using personal vehicles and are transported around the site using 15-passenger vans.
[b] The round trip distance crew members may travel to the site was estimated at 40 miles due to the isolated site and surrounding city locations.
[c] The round trip distance crew members may travel onsite was taken from the 'Demolition Equipment Estimates' table.
[d] Assumed 34 crew members onsite for demolition (30 workers per Section 2 of the SSFL EIS and 4 supervisors) based on the vehicles described in the 'Demolition Equipment Estimates' table.
[e] Crew member estimates provided are for 100% Demolition.

ATTACHMENT 1-7
Demolition Data (High and Low Soil Removal Estimates)
NASA SSFL EIS: Air Quality

Haul Route to San Pedro

County	Roundtrip Distance (miles) [a]	Percent of Trip Distance	Air Basin
Los Angeles	71	99%	SCAB
Ventura	1	1%	SCCAB
Total	**72**	**100%**	

Notes:
[a] Per project-specific data, the roundtrip distance (miles) to San Pedro (where the port for export is located) is 72 miles. The distance traveled within Los Angeles County was back-calculated from the known total distance and the known distance from the site to the Ventura County border.

Haul Route to Los Angeles County Equipment Dealer

County	Roundtrip Distance (miles) [a]	Percent of Trip Distance	Air Basin
Los Angeles	49	98%	SCAB
Ventura	1	2%	SCCAB
Total	**50**	**100%**	

Notes:
[a] Per project-specific data, the roundtrip distance (miles) to the equipment dealer is 50 miles. It was assumed that the dealer is located in Los Angeles County. As such, all travel takes place in Los Angeles County once the truck crosses the Los Angeles County border, located approximately 1 mile from the facility entrance.

Haul Route to U.S. Ecology

County	Roundtrip Distance (miles) [a]	Percent of Trip Distance	Air Basin / State
Nye	69	10%	Nevada
Inyo	98	14%	GBVAB
San Bernardino	278	41%	MDAB
San Bernardino	89	13%	SCAB
Los Angeles	144	21%	SCAB
Ventura	1	0%	SCCAB
Total	**679**	**100%**	

Notes:
[a] The roundtrip distance (miles) within each air basin was estimated using Google Earth, as documented in Attachment 1-9.

Haul Route to Chiquita Canyon Landfill

County	Roundtrip Distance (miles) [a]	Percent of Trip Distance	Air Basin
Los Angeles	73	99%	SCAB
Ventura	1	1%	SCCAB
Total	**74**	**100%**	

Notes:
[a] The total roundtrip distance (miles) was estimated using Google Earth. Since the landfill is located in Los Angeles County, all travel takes place in Los Angeles County once the truck crosses the Los Angeles County border, located approximately 1 mile from the facility entrance.

Haul Route to Simi Valley

County	Roundtrip Distance (miles) [a]	Percent of Trip Distance	Air Basin
Los Angeles	18	75%	SCAB
Ventura	6	25%	SCCAB
Total	**24**	**100%**	

Notes:
[a] Per project-specific data, the roundtrip distance (miles) to Simi Valley (where asphalt is transported) is 24 miles. The distance traveled within Los Angeles and Ventura counties was estimated assuming trucks travel within Los Angeles County to reach Highway 118.

ATTACHMENT 1-7
Demolition Data (High and Low Soil Removal Estimates)
NASA SSFL EIS: Air Quality

Worker Commute from Los Angeles County

County	Roundtrip Distance (miles) [a]	Percent of Trip Distance	Air Basin
Los Angeles	39	98%	SCAB
Ventura	1	3%	SCCAB
Total	**40**	**100%**	

Notes:
[a] Per project-specific data, the roundtrip distance (miles) for commuting is 40 miles. If employees live in Los Angeles County, all travel takes place in Los Angeles County once the employee crosses the Los Angeles County border, located approximately 1 mile from the facility entrance.

Worker Commute from Ventura County

County	Roundtrip Distance (miles) [a]	Percent of Trip Distance	Air Basin
Los Angeles	34	85%	SCAB
Ventura	6	15%	SCCAB
Total	**40**	**100%**	

Notes:
[a] Per project-specific data, the roundtrip distance (miles) for commuting is 40 miles. The distance traveled within Los Angeles and Ventura counties was estimated assuming employees travel within Los Angeles County to reach Highway 118 and travel a bit beyond the location for asphalt disposal.

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ATTACHMENT 1-8

Excavation Data (High Soil Removal Estimate)

NASA SSFL EIS: Air Quality

Activity Durations for Annual Scaling [a]

Excavation Duration (Days) [b]	
Construction Year 2016	238
Construction Year 2017	260
Material Hauling / Stockpile Duration (Days) [c]	
Construction Year 2016	238
Construction Year 2017	260

Notes:

[a] The durations presented were used to scale annual emissions based on a full 260 day schedule to match the actual project schedule.

[b] For excavation, the 2016 duration accounts for activities beginning in February 2016 per the schedule provided. Excavation activities would also occur in 2017 if the required duration was longer than the 11 months of 2016.

[c] For material hauling, the 2016 duration accounts for activities beginning in February 2016 per the schedule provided. It was assumed that material hauling would take the entire allowable duration. Stockpiling would be necessary from the start of excavation (simultaneous with material hauling) to the completion of material hauling.

Excavation Schedule for the High Soil Removal Estimate [a]

Excavation Start Date (Month and Year) [b]	February 2016
Excavation Duration (Months)	23
Excavation Duration (Days)	498
Work Days per Week [c]	5
Work Hours per Day [d]	10

Notes:

[a] Per Section 1.2.2 of the SSFL EIS, the NASA-administered area over which excavation activities occur is: 421.2 acres

[b] The SSFL EIS indicates that excavation activities for the High Soil Removal Estimate will occur from February 2016 to December 2017. Assume material hauling begins at the same time. Hauling duration is presented in 'Soil Hauling Truck Estimates' table.

[c] Assume excavation and hauling activities occur 5 days per week.

[d] To allow for heightened activity, assume excavation activities occur up to 10 hours per day within the SSFL operational hours of 7 a.m. to 7 p.m. Per R. Dean/CH2M HILL, this is consistent with the Boeing ISRA activities (RE: SSFL EIS - AQ Calculations Table.msg).

ATTACHMENT 1-8

Excavation Data (High Soil Removal Estimate)

NASA SSFL EIS: Air Quality

Soil Hauling Truck Estimates for the High Soil Removal Estimate

Truck Capacity (cy/truck) [a]	19
Removal Volume (cy) [b]	502,381
Removal Trucks	26,441
Removal Frequency (trucks/day) [c]	53
Backfill Volume (cy) [d]	167,460
Backfill Trucks	8,814
Backfill Frequency (trucks/day) [c]	18
Hauling Duration (days)	498
Daily Material Handled (tons/day) [e]	1,698

Notes:

[a] According to C. Brady/Kettleman Hills Landfill (559-318-6086), a realistic average load for light-weight truck and trailer combinations is 19 cy (approximately 24 tons).

[b] Removal volumes (cy) provided by O. Edwards/CH2M HILL (CY summary for ea scenario.pdf).

[c] The frequency of trucks was back-calculated from the maximum duration (hauling must be completed by 2017) and the total trucks necessary to off-haul the soil or bring in clean backfill.

[d] According to L. Tice/CH2M HILL and J. Glasgow/CH2M HILL (RE: SSFL EIS - AQ Calculations Table(2).msg), up to 1/3rd of the soil excavated will be replaced using clean backfill taken from onsite areas adjacent to the excavation areas. Since the clean backfill will be from an onsite source, additional offsite truck hauling will not be required. Additionally, the backfilling activities will be performed using the excavation equipment during downtime. Assume stockpiling of the backfill is not required.

[e] Estimated the Daily Material Handled by considering the total removal and backfill volumes, a soil density of 24 tons per 19 cy (per note a above), and the number of active days in 2016 through 2017 (during which stockpiles may be formed or trucks may be loaded).

ATTACHMENT 1-8

Excavation Data (High Soil Removal Estimate)

NASA SSFL EIS: Air Quality

Excavation Equipment Estimates for the High Soil Removal Estimate

Equipment Type [a]	Quantity [a]	Daily Hours of Operation [b]	Horsepower [c]	Load Factor [c]
Rubber Tired Dozers	1	10	255	0.40
Concrete/Industrial Saws	1	10	81	0.73
Tractors/Loaders/Backhoes	3	10	98	0.37
Graders	1	10	175	0.41
Excavators	2	10	163	0.38
Scrapers	2	10	362	0.48

Notes:

[a] The equipment list and quantity of each equipment type were taken as the maximum possible equipment counts for grading from Table 3.2 of Appendix D of the *CalEEMod User's Guide* (Environ, 2013).

[b] Assumed each equipment would operate 10 hours per day, consistent with the schedule provided in the 'Excavation Schedule' table.

[c] Horsepower and load factors taken as the average for each equipment type from Table 3.3 of Appendix D of the *CalEEMod User's Guide* (Environ, 2013).

Stockpile Estimates for the High Soil Removal Estimate

Stockpiles Utilized (Y or N) [a]	Yes
Number of Stockpiles [b]	377
Maximum Size of Stockpiles (acres) [c]	0.14

Notes:

[a] As a conservative estimate, assumed that the stockpiles would be used from the start of excavation/hauling activities to the end of hauling activities, which coincides with the total hauling duration.

[b] Number of Stockpiles was estimated based on the total soil removal and backfill volumes, the Maximum Size of Stockpiles, and the conservative assumption that, per SCAQMD Rule 1157(d)(6)(C), each stockpile has a maximum height of: 8 feet

[c] Based on VCAPCD Rule 74.29, Maximum Size of Stockpiles conservatively assumed to be: 6,000 square feet

ATTACHMENT 1-8

Excavation Data (High Soil Removal Estimate)

NASA SSFL EIS: Air Quality

Crew Member Estimates for the High Soil Removal Estimate

Round Trip Distance Traveled to Site (miles) [a, b]	40
Round Trip Distance Traveled Onsite (miles) [a, c]	4
Number of Crew Members [d]	15

Notes:

[a] Assumed that crew members travel to the site using personal vehicles and are transported around the site using 15-passenger vans.

[b] The round trip distance crew members may travel to the site was estimated at 40 miles due to the isolated site and surrounding city locations.

[c] The round trip distance crew members may travel onsite was assumed to be the same distance as that for demolition activities (see Attachment 1-7).

[d] Assumed 15 crew members to allow for at least one crew member per excavation equipment and a few extras.

Worker Commute from Los Angeles County

County	Roundtrip Distance (miles) [a]	Percent of Trip Distance	Air Basin
Los Angeles	39	98%	SCAB
Ventura	1	3%	SCCAB
Total	**40**	**100%**	

Notes:

[a] Per project-specific data, the roundtrip distance (miles) for commuting is 40 miles. If employees live in Los Angeles County, all travel takes place in Los Angeles County once the employee crosses the Los Angeles County border, located approximately 1 mile from the facility entrance.

Worker Commute from Ventura County

County	Roundtrip Distance (miles) [a]	Percent of Trip Distance	Air Basin
Los Angeles	34	85%	SCAB
Ventura	6	15%	SCCAB
Total	**40**	**100%**	

Notes:

[a] Per project-specific data, the roundtrip distance (miles) for commuting is 40 miles. The distance traveled within Los Angeles and Ventura counties was estimated assuming employees travel within Los Angeles County to reach Highway 118 and travel a bit beyond the location for asphalt disposal, as described in Attachment 1-7.

ATTACHMENT 1-9

Haul Routes Considered (High and Low Soil Removal Estimates)

NASA SSFL EIS: Air Quality

Haul Routes to Possible Landfills for Soil Removal

State or California Air Basin		SCCAB	SCAB		MDAB	SJVAB		GBVAB	Nevada					Utah
Landfill	Total Roundtrip Distance (miles)	Roundtrip Distance per County (miles) [a]												
		Ventura	Los Angeles	San Bernardino		Kern	Kings	Inyo	Nye	Clark	Lincoln	White Pine	Elko	Tooele
Kettleman Hills	335	1	126			170	38							
Buttonwillow	252	1	126			125								
U.S. Ecology	679	1	144.2	88.8	277.8			98	69.4					
Antelope Valley	141	1	140											
Energy Solutions	1,465	1	144.2	88.8	328.6				78	178	200	226	112	108
Maximum Distance per County (miles)		**1**	**144.2**	**88.8**	**328.6**	**170**	**38**	**98**	**78**	**178**	**200**	**226**	**112**	**108**
Maximum Distance per California Air Basin or State (miles)		**1**	**233**		**328.6**	**208**		**98**	**794**					**108**

Notes:

Shaded cells indicate counties that have attainment for all pollutants considered.

[a] The roundtrip distance (miles) within each air basin was estimated using Google Earth.

Haul Routes from Possible Aggregate Suppliers for Clean Backfill

State or California Air Basin		SCCAB	SCAB
Aggregate Supplier	Total Roundtrip Distance (miles)	Roundtrip Distance per County (miles) [a]	
		Ventura	Los Angeles
P.W. Gillibrand Co.	45	21.4	23.4
Rindge Dam	45	1.0	44.0
Santa Paula Materials	89	66.0	23.4
Grimes Rock	66	42.8	23.4
Tapo Rock and Sand Products	43	19.4	23.4
Maximum Distance per County (miles)		**66**	**44**
Maximum Distance per California Air Basin (miles)		**66**	**44**

Notes:

[a] The roundtrip distance (miles) within each air basin was estimated using Google Earth.

ATTACHMENT 1-10

Road Repair Data (High and Low Soil Removal Estimates)

NASA SSFL EIS: Air Quality

General Comments:

1) Road repairs may be used as a mitigation measure per the text shown below:

Some local roadways used by heavy vehicles to access and egress the project site are not designated freight routes by the city or county of Los Angeles. As such, there is increased potential for roadway damage to occur on these facilities over the course of project construction. In anticipation of this roadway damage, the project team will coordinate with the City and County Road Maintenance Departments to restore and repair roadway damage that creates an unsafe or hazardous roadway condition on an as-needed basis. Additionally, the project team will conduct annual maintenance and preventive repair on non-freight designated local roadways. Annual maintenance will include repairing potholes, applying sealant, resurfacing, restructuring, and restriping where necessary. At completion of the project, non-freight roadways will be repaired to their pre-construction condition.

Road Repair Schedule for Excavation and Offsite Disposal

Frequency of Rebuilds (per year) [a, b]	1
Rebuild Duration (months) [a, b]	1
Maximum Area Disturbed per Day (acres) [b]	1.6
Work Days per Week [c]	5
Work Hours per Day [d]	10
Years Repair Necessary [e]	2016 - 2017
Description of Repairs (e.g., patching, rebuild) [a]	Patching, overlay, resurface, reconstruction

Notes:

[a] Data provided by G. Satterwhite/CH2M HILL (Air Quality Data_111811_NoGC_GS.xlsx and FW AQ Calculations.msg).

[b] Data provided by R. Diven/NASA (RJ Diven Review_Air Quality Data_111811_NoGC.xlsx and Fwd: SSFL EIS - Demolition Truth-checking (UNCLASSIFIED).msg). If the same data were provided by G. Satterwhite/CH2M HILL (per note a), the more conservative value was used for this analysis.

[c] Assume road repair activities occur 5 days per week.

[d] To allow for heightened activity, assume excavation activities occur up to 10 hours per day within the SSFL operational hours of 7 a.m. to 7 p.m. Per R. Dean/CH2M HILL, this is consistent with the Boeing ISRA activities (RE: SSFL EIS - AQ Calculations Table.msg).

[e] Years Repair Necessary correspond to the duration during which material hauling will occur. If material hauling is not occurring, road repair should not be required.

ATTACHMENT 1-10

Road Repair Data (High and Low Soil Removal Estimates)

NASA SSFL EIS: Air Quality

Road Details

Road	Woolsey Canyon Road	Onsite Roads [a]
Length (miles) [b]	2.55	3.81
Width (miles) [c]	0.0045	0.0045
Area (acres)	7.42	11.08
Type of Road	Sand Gravel	Sand Gravel

Notes:

[a] Onsite roads include the roads used solely by NASA as mixed-use roads are repaired by Boeing.

[b] Road lengths provided by S. Stevens/NASA (RE: onsite road repair.msg) and A. Cooley/NASA (RE: onsite road repair(3).msg).

[c] Road width estimated assuming 12 feet per lane.

Road Repair Equipment Estimates for Excavation and Offsite Disposal

Equipment Type [a]	Quantity [a]	Daily Hours of Operation [b]	Horsepower [c]	Load Factor [c]
Rubber Tired Dozers	1	10	255	0.40
Scrapers	1	10	362	0.48
Signal Boards	13	10	6	0.82
Excavators	1	10	163	0.38
Graders	1	10	175	0.41
Rubber Tired Loaders	1	10	200	0.36
Plate Compactors	1	10	8	0.43
Trenchers	1	10	81	0.5
Pavers	1	10	126	0.42
Paving Equipment	1	10	131	0.36
Rollers	1	10	81	0.38

Notes:

[a] The equipment list was determined based on the Sacramento Roadway Model, using the parameters detailed in the previous tables.

[b] Assumed each equipment would operate 10 hours per day, consistent with the schedule provided in the 'Road Repair Schedule' table.

[c] Horsepower and load factors taken as the average for each equipment type from Table 3.3 of Appendix D of the *CalEEMod User's Guide* (Environ, 2013) to be consistent with the Excavation and Demolition equipment estimates.

ATTACHMENT 1-10

Road Repair Data (High and Low Soil Removal Estimates)

NASA SSFL EIS: Air Quality

Crew Member Estimates for Excavation and Offsite Disposal

Round Trip Distance Traveled to Site (miles) [a, b]	40
Round Trip Distance Traveled Onsite (miles) [a, c]	4
Number of Crew Members [d]	30

Notes:

[a] Assumed that crew members travel to the site using personal vehicles and are transported around the site using 15-passenger vans.

[b] The round trip distance crew members may travel to the site was estimated at 40 miles due to the isolated site and surrounding city locations.

[c] The round trip distance crew members may travel onsite was assumed to be the same distance as that for demolition activities (see Attachment 1-7).

[d] The number of crew members was determined based on the Sacramento Roadway Construction Model, using the parameters detailed in the above tables.

Worker Commute from Los Angeles County

County	Roundtrip Distance (miles) [a]	Percent of Trip Distance	Air Basin
Los Angeles	40	100%	SCAB
Ventura	0	0%	SCCAB
Total	**40**	**100%**	

Notes:

[a] Per project-specific data, the roundtrip distance (miles) for commuting is 40 miles. If employees live in Los Angeles County, all travel takes place in Los Angeles County, assuming employees park their personal vehicles in Los Angeles County.

Worker Commute from Ventura County

County	Roundtrip Distance (miles) [a]	Percent of Trip Distance	Air Basin
Los Angeles	35	87%	SCAB
Ventura	5	13%	SCCAB
Total	**40**	**100%**	

Notes:

[a] Per project-specific data, the roundtrip distance (miles) for commuting is 40 miles. The distance traveled within Los Angeles and Ventura counties was estimated assuming employees travel within Los Angeles County to reach Highway 118 and travel a bit beyond the location for asphalt disposal, as described in Attachment 1-7. Assumed employees park their personal vehicles in Los Angeles County, slightly reducing the distance traveled within the SCCAB.

ATTACHMENT 2-1

General Conformity Estimates for Demolition, Excavation, and Offsite Disposal (Low Soil Removal Estimate)

NASA SSFL EIS: Air Quality

General Conformity Estimates for Demolition, Excavation, and Offsite Disposal

Pollutant	Pollutant Thresholds (tons/year)	Low Soil Removal Annual Emissions (tons/year)			High Soil Removal Annual Emissions (tons/year)			Percent Reductions Relative to High Soil Removal		
		2014	2016	2017	2014	2016	2017	2014	2016	2017
South Central Coast Air Basin (SCCAB)										
VOC	50	2	1	1	2	1	1	0%	-1%	-1%
CO	N/A	11	9	9	11	9	9	0%	-1%	-1%
NOx	50	20	14	14	20	15	15	0%	-5%	-5%
SO_2	N/A	0	0	0	0	0	0	0%	-12%	-12%
PM_{10}	N/A	2	852	929	2	1,050	1,146	0%	-19%	-19%
$PM_{2.5}$	N/A	1	178	194	1	219	239	0%	-19%	-19%
Pb	N/A	0	0	0	0	0	0	0%	-10%	-10%
South Coast Air Basin (SCAB) [a]										
VOC	10	0	0	0	0	1	1	0%	-34%	-35%
CO	100	1	3	3	1	4	5	0%	-33%	-34%
NOx	10	3	13	13	3	20	19	0%	-36%	-36%
SO_2	100	0	0	0	0	0	0	0%	-36%	-36%
PM_{10}	100	0	1	1	0	1	1	0%	-30%	-30%
$PM_{2.5}$	100	0	0	0	0	0	1	0%	-33%	-33%
Pb	25	0	0	0	0	0	0	0%	-36%	-36%
San Joaquin Valley Air Basin (SJVAB) [a]										
VOC	10	N/A	0	0	N/A	0	0	N/A	-36%	-36%
CO	N/A	N/A	2	2	N/A	3	3	N/A	-36%	-36%
NOx	10	N/A	9	9	N/A	14	14	N/A	-36%	-36%
SO_2	100	N/A	0	0	N/A	0	0	N/A	-36%	-36%
PM_{10}	70	N/A	0	0	N/A	1	1	N/A	-36%	-36%
$PM_{2.5}$	100	N/A	0	0	N/A	0	0	N/A	-36%	-36%
Pb	N/A	N/A	0	0	N/A	0	0	N/A	-36%	-36%
Mojave Desert Air Basin (MDAB)										
VOC	100	0	0	0	0	1	1	0%	-36%	-36%
CO	N/A	0	3	3	0	5	5	0%	-36%	-36%
NOx	100	1	11	10	1	18	16	0%	-36%	-36%
SO_2	N/A	0	0	0	0	0	0	0%	-36%	-36%
PM_{10}	100	0	1	1	0	1	1	0%	-36%	-36%
$PM_{2.5}$	N/A	0	0	0	0	1	1	0%	-36%	-36%
Pb	N/A	0	0	0	0	0	0	0%	-36%	-36%
Great Basin Valley Air Basin (GBVAB) [b]										
VOC	N/A	0	0	0	0	0	0	0%	-36%	-36%
CO	N/A	0	1	1	0	1	1	0%	-36%	-36%
NOx	N/A	1	4	4	1	6	6	0%	-36%	-36%
SO_2	N/A	0	0	0	0	0	0	0%	-36%	-36%
PM_{10}	N/A	0	0	0	0	0	0	0%	-36%	-36%
$PM_{2.5}$	N/A	0	0	0	0	0	0	0%	-36%	-36%
Pb	N/A	0	0	0	0	0	0	0%	-36%	-36%
Nevada [a]										
VOC	100	0	1	1	0	2	2	0%	-36%	-36%
CO	100	0	8	9	0	13	14	0%	-36%	-36%
NOx	100	0	43	42	0	68	65	0%	-36%	-36%
SO_2	100	0	0	0	0	0	0	0%	-36%	-36%
PM_{10}	70	0	1	1	0	2	2	0%	-36%	-36%
$PM_{2.5}$	N/A	0	1	1	0	2	2	0%	-36%	-36%
Pb	N/A	0	0	0	0	0	0	0%	-36%	-36%
Utah										
VOC	N/A	N/A	0	0	N/A	0	0	N/A	-36%	-36%
CO	N/A	N/A	1	1	N/A	2	2	N/A	-36%	-36%
NOx	N/A	N/A	6	6	N/A	9	9	N/A	-36%	-36%
SO_2	100	N/A	0	0	N/A	0	0	N/A	-36%	-36%
PM_{10}	N/A	N/A	0	0	N/A	0	0	N/A	-36%	-36%
$PM_{2.5}$	N/A	N/A	0	0	N/A	0	0	N/A	-36%	-36%
Pb	N/A	N/A	0	0	N/A	0	0	N/A	-36%	-36%

Notes:

Red shaded cells indicate that the general conformity threshold is exceeded

[a] The minimum general conformity threshold was assigned for each pollutant within air basins that have multiple affected counties.

[b] GBVAB has attainment for all pollutants considered.

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ATTACHMENT 2-2

Summary of Emissions for Demolition, Excavation, and Offsite Disposal (Low Soil Removal Estimate)

NASA SSFL EIS: Air Quality

Equations differ from neighboring cells to incorporate fugitive dust emissions.

Demolition, Excavation, and Offsite Disposal Emissions

Emissions Location	Emissions (lbs/day)									Emissions (tons/year) [a]								
	VOC	CO	NOx	SOx	PM_{10}	$PM_{2.5}$	Pb	CO_2	CH_4	VOC	CO	NOx	SOx	PM_{10} [b]	$PM_{2.5}$ [b]	Pb	CO_2	CH_4
Year 2014 [c]																		
SCCAB Emissions																		
Onsite	27	149	262	0	32	17	0	26,087	6	2	11	20	0	2	1	0	1,957	0
Offsite	0	1	1	0	0	0	0	328	0	0	0	0	0	0	0	0	25	0
Total	27	149	264	0	32	17	0	26,415	6	2	11	20	0	2	1	0	1,981	0
SCAB Emissions																		
Offsite	1	11	42	0	2	1	0	9,860	0	0	1	3	0	0	0	0	740	0
MDAB Emissions																		
Offsite	1	4	17	0	1	0	0	4,847	0	0	0	1	0	0	0	0	364	0
GBVAB Emissions																		
Offsite	0	1	7	0	0	0	0	1,713	0	0	0	1	0	0	0	0	128	0
Nevada Emissions																		
Offsite	0	1	6	0	0	0	0	1,228	0	0	0	0	0	0	0	0	92	0
Year 2016 [d]																		
SCCAB Emissions																		
Onsite	15	104	159	0	7,165	1,496	0	14,106	4	1	9	13	0	852	178	0	1,151	0
Offsite [e]	1	7	18	0	3	1	0	3,464	0	0	0	1	0	0	0	0	338	0
Total	16	111	177	0	7,169	1,497	0	17,571	4	1	9	14	0	852	178	0	1,489	0
SCAB Emissions																		
Offsite [e]	6	43	133	0	16	6	0	33,140	1	0	3	13	0	1	0	0	3,585	0
MDAB Emissions																		
Offsite	4	26	94	0	5	3	0	38,520	0	0	3	11	0	1	0	0	4,590	0
SJVAB Emissions																		
Offsite	2	17	77	0	3	2	0	24,469	0	0	2	9	0	0	0	0	2,916	0
GBVAB Emissions																		
Offsite	1	8	33	0	2	1	0	11,508	0	0	1	4	0	0	0	0	1,371	0
Nevada Emissions																		
Offsite	10	69	362	1	12	8	0	94,552	0	1	8	43	0	1	1	0	11,267	0
Utah Emissions																		
Offsite	1	9	49	0	2	1	0	12,861	0	0	1	6	0	0	0	0	1,533	0
Year 2017 [d]																		
SCCAB Emissions																		
Onsite	14	100	148	0	7,165	1,496	0	13,903	4	1	9	13	0	929	194	0	1,232	0
Offsite [e]	1	6	16	0	3	1	0	3,451	0	0	0	1	0	0	0	0	367	0
Total	15	106	164	0	7,168	1,497	0	17,354	4	1	9	14	0	929	194	0	1,600	0
SCAB Emissions																		
Offsite [e]	6	42	122	0	15	6	0	33,059	1	0	3	13	0	1	0	0	3,901	0
MDAB Emissions																		
Offsite	4	25	80	0	5	3	0	38,438	0	0	3	10	0	1	0	0	4,997	0
SJVAB Emissions																		
Offsite	2	16	67	0	3	2	0	24,418	0	0	2	9	0	0	0	0	3,174	0
GBVAB Emissions																		
Offsite	1	7	28	0	1	1	0	11,484	0	0	1	4	0	0	0	0	1,493	0
Nevada Emissions																		
Offsite	10	68	321	1	11	7	0	94,386	0	1	9	42	0	1	1	0	12,270	0
Utah Emissions																		
Offsite	1	9	44	0	2	1	0	12,838	0	0	1	6	0	0	0	0	1,669	0

Notes:

[a] Annual emissions were scaled to account for the actual duration of construction activity within each calendar year, as documented in Attachment 2-5.

[b] Scaling was not required for the fugitive dust emissions as they were scaled in Attachment 2-4 and Attachment 1-6.

[c] Emissions presented for Year 2014 are associated with demolition activities.

[d] Emissions presented for Years 2016 and 2017 are associated with excavation, material hauling, and road repair activities.

[e] Annual emissions from road repair, an offsite activity, were scaled by the number of rebuilds per year since the emissions per rebuild were estimated in Attachment 1-6.

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ATTACHMENT 2-3

Summary of GHG Emissions for Demolition, Excavation, and Offsite Disposal (Low Soil Removal Estimate)

NASA SSFL EIS: Air Quality

Demolition, Excavation, and Offsite Disposal GHG Emissions

Emissions Location	Emissions (metric tons/year)		
	CO_2	CH_4	CO_2e [a]
Year 2014 [b]			
SCCAB Emissions			
Onsite	1,775	0	1,783
Offsite	22	0	22
Total	1,797	0	1,806
SCAB Emissions			
Offsite	671	0	671
MDAB Emissions			
Offsite	330	0	330
GBVAB Emissions			
Offsite	117	0	117
Nevada Emissions			
Offsite	84	0	84
Total Year 2014	**2,998**	**0**	**3,007**
Year 2016 [c]			
SCCAB Emissions			
Onsite	1,044	0	1,050
Offsite	307	0	307
Total	1,351	0	1,357
SCAB Emissions			
Offsite	3,252	0	3,253
MDAB Emissions			
Offsite	4,164	0	4,165
SJVAB Emissions			
Offsite	2,645	0	2,645
GBVAB Emissions			
Offsite	1,244	0	1,244
Nevada Emissions			
Offsite	10,222	0	10,222
Utah Emissions			
Offsite	1,390	0	1,390
Total Year 2016	**24,269**	**0**	**24,277**
Year 2017 [c]			
SCCAB Emissions			
Onsite	1,118	0	1,125
Offsite	333	0	333
Total	1,451	0	1,458
SCAB Emissions			
Offsite	3,539	0	3,540
MDAB Emissions			
Offsite	4,533	0	4,534
SJVAB Emissions			
Offsite	2,880	0	2,880
GBVAB Emissions			
Offsite	1,354	0	1,354

ATTACHMENT 2-3

Summary of GHG Emissions for Demolition, Excavation, and Offsite Disposal (Low Soil Removal Estimate)

NASA SSFL EIS: Air Quality

Nevada Emissions			
Offsite	11,131	0	11,132
Utah Emissions			
Offsite	1,514	0	1,514
Total Year 2017	**26,403**	**0**	**26,412**

Notes:

[a] CO_2e emissions were estimated using the following global warming potentials: 1 for CO_2 and 21 for CH_4.

[b] Emissions presented for Year 2014 are associated with demolition activities.

[c] Emissions presented for Years 2016 and 2017 are associated with excavation, material hauling, and road repair activities.

ATTACHMENT 2-4

Excavation Emissions (Low Soil Removal Estimate)

NASA SSFL EIS: Air Quality

Construction Equipment Emissions

Construction Equipment	Emissions (lbs/day) [a]									Emissions (tons/year) [b]								
	VOC	CO	NOx	SOx	PM_{10}	$PM_{2.5}$	Pb	CO_2	CH_4	VOC	CO	NOx	SOx	PM_{10}	$PM_{2.5}$	Pb	CO_2	CH_4
Year 2016																		
Rubber Tired Dozers	1.548	13.106	17.338	0.011	0.807	0.742	0.0006	1,154.271	0.348	0.201	1.704	2.254	0.001	0.105	0.096	0.00007	150.055	0.045
Concrete/Industrial Saws	0.808	4.719	5.777	0.008	0.434	0.434	0.0003	740.820	0.072	0.105	0.613	0.751	0.001	0.056	0.056	0.00004	96.307	0.009
Tractors/Loaders/Backhoes	1.290	9.140	12.332	0.012	0.949	0.874	0.0006	1,226.283	0.370	0.168	1.188	1.603	0.002	0.123	0.114	0.00008	159.417	0.048
Graders	1.281	6.195	13.049	0.008	0.733	0.674	0.0004	816.410	0.246	0.167	0.805	1.696	0.001	0.095	0.088	0.00005	106.133	0.032
Excavators	0.976	8.624	11.145	0.013	0.548	0.504	0.0007	1,383.258	0.417	0.127	1.121	1.449	0.002	0.071	0.066	0.00009	179.824	0.054
Scrapers	3.466	27.629	44.110	0.038	1.778	1.636	0.0019	3,879.340	1.170	0.451	3.592	5.734	0.005	0.231	0.213	0.00025	504.314	0.152
Total Onsite (Within the SCCAB) [c]	**9.369**	**69.413**	**103.752**	**0.089**	**5.250**	**4.865**	**0.0045**	**9,200.381**	**2.623**	**1.218**	**9.024**	**13.488**	**0.012**	**0.683**	**0.632**	**0.00058**	**1,196.050**	**0.341**
Year 2017																		
Rubber Tired Dozers	1.488	12.425	16.491	0.011	0.766	0.705	0.0006	1,137.492	0.349	0.193	1.615	2.144	0.001	0.100	0.092	0.00007	147.874	0.045
Concrete/Industrial Saws	0.726	4.686	5.326	0.008	0.383	0.383	0.0003	740.818	0.065	0.094	0.609	0.692	0.001	0.050	0.050	0.00004	96.306	0.008
Tractors/Loaders/Backhoes	1.200	9.069	11.532	0.012	0.867	0.798	0.0006	1,205.777	0.370	0.156	1.179	1.499	0.002	0.113	0.104	0.00008	156.751	0.048
Graders	1.198	6.082	12.121	0.008	0.681	0.626	0.0004	801.569	0.246	0.156	0.791	1.576	0.001	0.089	0.081	0.00005	104.204	0.032
Excavators	0.911	8.605	10.104	0.013	0.497	0.457	0.0007	1,361.484	0.417	0.118	1.119	1.314	0.002	0.065	0.059	0.00009	176.993	0.054
Scrapers	3.257	25.566	40.908	0.038	1.642	1.510	0.0019	3,818.867	1.170	0.423	3.324	5.318	0.005	0.213	0.196	0.00025	496.453	0.152
Total Onsite (Within the SCCAB) [c]	**8.780**	**66.435**	**96.482**	**0.089**	**4.836**	**4.480**	**0.0045**	**9,066.008**	**2.616**	**1.141**	**8.636**	**12.543**	**0.012**	**0.629**	**0.582**	**0.00058**	**1,178.581**	**0.340**

Notes:

[a] Daily Emissions = Emission Factor (g/bhp-hr) x Equipment Quantity X Horsepower x Load Factor x Hours of Operation per Day / 453.6 (g/lb).

[b] Annual emissions assume activities occur: 260 days per year

[c] All construction activities occur onsite, which is located within the SCCAB.

Construction Equipment Emission Factors

Construction Equipment	Emission Factors (g/bhp-hr) [a]								
	VOC	CO	NOx	SOx	PM_{10}	$PM_{2.5}$	Pb [b, c]	CO_2	CH_4
Year 2016									
Rubber Tired Dozers	0.688	5.828	7.710	0.005	0.359	0.330	0.0002	513.311	0.155
Concrete/Industrial Saws	0.620	3.620	4.432	0.006	0.333	0.333	0.0002	568.300	0.055
Tractors/Loaders/Backhoes	0.538	3.811	5.142	0.005	0.396	0.364	0.0002	511.346	0.154
Graders	0.810	3.916	8.250	0.005	0.464	0.426	0.0002	516.131	0.156
Excavators	0.358	3.158	4.081	0.005	0.201	0.185	0.0002	506.495	0.153
Scrapers	0.452	3.606	5.757	0.005	0.232	0.214	0.0002	506.350	0.153
Year 2017									
Rubber Tired Dozers	0.662	5.526	7.333	0.005	0.341	0.313	0.0002	505.849	0.155
Concrete/Industrial Saws	0.557	3.595	4.086	0.006	0.294	0.294	0.0002	568.299	0.050
Tractors/Loaders/Backhoes	0.501	3.782	4.809	0.005	0.362	0.333	0.0002	502.795	0.154
Graders	0.757	3.845	7.663	0.005	0.430	0.396	0.0002	506.748	0.155
Excavators	0.334	3.151	3.700	0.005	0.182	0.168	0.0002	498.522	0.153
Scrapers	0.425	3.337	5.340	0.005	0.214	0.197	0.0002	498.457	0.153

Notes:

[a] Emission factors were obtained from Table 3.4 of Appendix D of the *CalEEMod User's Guide* (Environ, 2013).

[b] A lead emission factor for stationary and portable internal combustion engines was assumed representative of construction equipment. This factor was obtained from Table B-2 of the *Supplemental Instructions: Reporting Procedures for AB2588 Facilities for Reporting their Quadrennial Air Toxics Emissions Inventory* (SCAQMD, 2010): 0.0083 lbs/1,000 gallons

[c] For construction equipment, assumed the following diesel fuel consumption per Table A9-8-C of the *CEQA Handbook* (SCAQMD, 1993): 0.066 gallons/bhp-hr

ATTACHMENT 2-4
Excavation Emissions (Low Soil Removal Estimate)
NASA SSFL EIS: Air Quality

Fugitive Dust Emissions

Pollutant	Emissions (lbs/day)	Emissions (tons/year)
Year 2016		
Open Stockpile Fugitive Dust [a, b]		
PM_{10} Emissions	2,829.752	337.212
$PM_{2.5}$ Emissions [c]	588.588	70.140
Truck Loading Fugitive Dust [b, d]		
PM_{10} Emissions	1.541	0.184
$PM_{2.5}$ Emissions [c]	0.321	0.038
Earthmoving Fugitive Dust [e, f, g]		
PM_{10} Emissions	4,307.087	513.261
$PM_{2.5}$ Emissions [c]	895.874	106.758
PM_{10} Total Onsite (Within the SCCAB) [h]	**7,138.380**	**850.657**
$PM_{2.5}$ Total Onsite (Within the SCCAB) [h]	**1,484.783**	**176.937**
Year 2017		
Open Stockpile Fugitive Dust [a, b]		
PM_{10} Emissions	2,829.752	367.868
$PM_{2.5}$ Emissions [c]	588.588	76.516
Truck Loading Fugitive Dust [b, d]		
PM_{10} Emissions	1.541	0.200
$PM_{2.5}$ Emissions [c]	0.321	0.042
Earthmoving Fugitive Dust [e, f, g]		
PM_{10} Emissions	4,307.087	559.921
$PM_{2.5}$ Emissions [c]	895.874	116.464
PM_{10} Total Onsite (Within the SCCAB) [h]	**7,138.380**	**927.989**
$PM_{2.5}$ Total Onsite (Within the SCCAB) [h]	**1,484.783**	**193.022**

Notes:

[a] For open storage piles from Table A9-9 of the *CEQA Handbook* (SCAQMD, 1993), daily PM_{10} Emissions (lbs/day) = Area Covered by Storage Piles (acres) x Emission Factor (lbs/day/acre).

[b] Annual emissions for open stockpiles and truck loading were estimated assuming the entire allowable duration, as documented in Attachment 2-5.

[c] Per Appendix A of the *Final - Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds* (SCAQMD, 2006), $PM_{2.5}$ emissions from construction activities were assumed to be: 20.8% of the PM_{10} emissions

[d] For truck loading from Table A9-9 of the *CEQA Handbook* (SCAQMD, 1993), daily PM_{10} Emissions (lbs/day) = Material Handled (tons/day) x Emission Factor (lbs/ton).

[e] For earthmoving (cut/fill), daily PM_{10} Emissions (lbs/day) = Area Excavated (acres) / Monthly Schedule (days/month) x Construction Activity Emission Factor (lbs/acre-month) + Daily Material Handled (tons/day) / Material Density (tons/cy) x Onsite Cut/Fill Emission Factor (lbs/1,000 cy).

[f] For earthmoving (cut/fill), made the following assumptions:

Material Density:	1.34	tons/cy	(documented in Attachment 2-5)
Monthly Schedule:	22	days per month	(consistent with the schedule documented in Attachment 1-6)

[g] Annual emissions for earthmoving were estimated assuming the same duration as excavation activities, as documented in Attachment 2-5.

[h] All construction activities occur onsite, which is located within the SCCAB.

ATTACHMENT 2-4
Excavation Emissions (Low Soil Removal Estimate)
NASA SSFL EIS: Air Quality

Fugitive Dust Emission Factors

Construction Element	Emission Factors	
	PM_{10}	Units
Open Stockpile Fugitive Dust [a]	85.6	lbs/day/acre
Truck Loading Fugitive Dust [b]	0.0014	lbs/ton
Earthmoving Fugitive Dust [c]		
Construction Activity	0.11	ton/acre-month
	220	lbs/acre-month
Onsite Cut/Fill	0.059	ton/1,000 cy
	118	lbs/1,000 cy

Notes:

[a] Default emission factor for open storage piles from Table A9-9 from the *CEQA Handbook* (SCAQMD, 1993).

[b] Emission factor for truck loading was calculated using Table A9-9-G from the *CEQA Handbook* (SCAQMD, 1993) as follows:

Emission Factor (lbs/ton) = 0.00112 x {[(Average Wind Speed / 5) ^ 1.3] / [(Dirt Moisture Content / 2) ^ 1.4]}

Average Wind Speed:	6.0	mph	(value of 2.69 m/s, as measured onsite)
Dirt Moisture Content:	2.0	%	(assumed dry soil)

[c] Default emission factor for earthmoving (cut/fill) from Table A-4 of Appendix A of the *Software User's Guide: URBEMIS2007 for Windows* (JSA, 2007).

Vehicle Emissions

Vehicle Type	Emissions (lbs/day) [a]									Emissions (tons/year) [b]								
	VOC	CO	NOx	SOx	PM_{10}	$PM_{2.5}$	Pb	CO_2	CH_4	VOC	CO	NOx	SOx	PM_{10}	$PM_{2.5}$	Pb	CO_2	CH_4
Onsite Emissions for Year 2016 [c]																		
Crew Vans [d]	0.001	0.015	0.001	0.00003	0.0004	0.0002	0.000001	5.469	0.0002	0.0001	0.002	0.0002	0.000004	0.0001	0.00003	0.0000001	0.711	0.00002
Offsite Emissions for Year 2016 [c]																		
Travel Within the SCCAB																		
Removal Haul Truck Travel [e]	0.0003	0.002	0.014	0.00004	0.0004	0.0003	0.000001	3.523	0.00001	0.00004	0.0003	0.002	0.000005	0.0001	0.00004	0.0000002	0.458	0.000001
Backfill Haul Truck Travel [e]	0.0227	0.145	0.891	0.00240	0.0287	0.0187	0.000098	232.550	0.00074	0.00295	0.0188	0.116	0.000312	0.0037	0.00243	0.0000128	30.231	0.000096
Worker Commute [f]	0.0033	0.118	0.014	0.00038	0.0053	0.0022	0.000012	33.742	0.00200	0.00043	0.0154	0.002	0.000049	0.0007	0.00029	0.0000016	4.386	0.000260
Total Offsite (Within the SCCAB)	**0.0263**	**0.265**	**0.918**	**0.00281**	**0.0345**	**0.0212**	**0.000112**	**269.816**	**0.00276**	**0.00342**	**0.0345**	**0.119**	**0.000366**	**0.0045**	**0.00276**	**0.0000146**	**35.076**	**0.000358**
Travel Within the SCAB																		
Removal Haul Truck Travel [e]	0.089	0.596	2.867	0.008	0.102	0.066	0.0003	818.743	0.0026	0.012	0.077	0.373	0.0011	0.013	0.009	0.00005	106.437	0.0003
Backfill Haul Truck Travel [e]	0.017	0.113	0.541	0.002	0.019	0.013	0.0001	154.612	0.0005	0.002	0.015	0.070	0.0002	0.003	0.002	0.00001	20.100	0.0001
Worker Commute [f]	0.025	1.062	0.108	0.004	0.055	0.023	0.0001	359.711	0.0209	0.003	0.138	0.014	0.0006	0.007	0.003	0.00002	46.762	0.0027
Total Offsite (Within the SCAB)	**0.130**	**1.770**	**3.517**	**0.014**	**0.177**	**0.102**	**0.0005**	**1,333.067**	**0.0240**	**0.017**	**0.230**	**0.457**	**0.0019**	**0.023**	**0.013**	**0.00007**	**173.299**	**0.0031**
Travel Within the MDAB																		
Removal Haul Truck Travel [e]	0.113	0.777	2.775	0.011	0.143	0.092	0.0005	1,139.742	0.004	0.015	0.101	0.361	0.001	0.019	0.012	0.0001	148.166	0.0005
Travel Within the SJVAB																		
Removal Haul Truck Travel [e]	0.073	0.491	2.276	0.008	0.093	0.061	0.0003	723.996	0.002	0.010	0.064	0.296	0.001	0.012	0.008	0.00004	94.119	0.0003
Travel Within the GBVAB																		
Removal Haul Truck Travel [e]	0.034	0.229	0.967	0.004	0.045	0.029	0.0001	340.491	0.001	0.004	0.030	0.126	0.0005	0.006	0.004	0.00002	44.264	0.0001
Travel Within Nevada																		
Removal Haul Truck Travel [e]	0.303	2.031	10.724	0.029	0.362	0.238	0.001	2,797.646	0.009	0.039	0.264	1.394	0.004	0.047	0.031	0.0002	363.694	0.001
Travel Within Utah																		
Removal Haul Truck Travel [e]	0.041	0.276	1.459	0.004	0.049	0.032	0.0002	380.536	0.001	0.005	0.036	0.190	0.001	0.006	0.004	0.00002	49.470	0.0002
Onsite Emissions for Year 2017 [c]																		
Crew Vans [d]	0.001	0.013	0.001	0.00003	0.0004	0.0002	0.000001	5.471	0.0002	0.0001	0.002	0.0001	0.000004	0.0001	0.00003	0.0000001	0.711	0.00002

ATTACHMENT 2-4

Excavation Emissions (Low Soil Removal Estimate)

NASA SSFL EIS: Air Quality

Offsite Emissions for Year 2017 [c]																		
Travel Within the SCCAB																		
Removal Haul Truck Travel [e]	0.0003	0.002	0.012	0.00004	0.0004	0.0003	0.000001	3.517	0.00001	0.00004	0.0003	0.002	0.000005	0.0001	0.00003	0.0000002	0.457	0.000001
Backfill Haul Truck Travel [e]	0.0210	0.137	0.789	0.00239	0.0268	0.0169	0.000098	232.143	0.00074	0.00273	0.0179	0.103	0.000311	0.0035	0.00220	0.0000128	30.179	0.000096
Worker Commute [f]	0.0026	0.103	0.012	0.00038	0.0053	0.0022	0.000012	33.753	0.00200	0.00034	0.0134	0.002	0.000049	0.0007	0.00029	0.0000016	4.388	0.000260
Total Offsite (Within the SCCAB)	**0.0240**	**0.242**	**0.813**	**0.00281**	**0.0325**	**0.0194**	**0.000112**	**269.413**	**0.00276**	**0.00311**	**0.0315**	**0.106**	**0.000365**	**0.0042**	**0.00252**	**0.0000146**	**35.024**	**0.000358**
Travel Within the SCAB																		
Removal Haul Truck Travel [e]	0.087	0.589	2.610	0.008	0.098	0.063	0.0003	817.477	0.0026	0.011	0.077	0.339	0.0011	0.013	0.008	0.00005	106.272	0.0003
Backfill Haul Truck Travel [e]	0.016	0.111	0.493	0.002	0.018	0.012	0.0001	154.373	0.0005	0.002	0.014	0.064	0.0002	0.002	0.002	0.00001	20.069	0.0001
Worker Commute [f]	0.020	0.944	0.097	0.004	0.055	0.023	0.0001	359.878	0.0209	0.003	0.123	0.013	0.0006	0.007	0.003	0.00002	46.784	0.0027
Total Offsite (Within the SCAB)	**0.123**	**1.644**	**3.200**	**0.014**	**0.172**	**0.097**	**0.0005**	**1,331.728**	**0.0240**	**0.016**	**0.214**	**0.416**	**0.0019**	**0.022**	**0.013**	**0.00007**	**173.125**	**0.0031**
Travel Within the MDAB																		
Removal Haul Truck Travel [e]	0.106	0.739	2.373	0.011	0.135	0.085	0.0005	1,137.336	0.004	0.014	0.096	0.309	0.001	0.018	0.011	0.0001	147.854	0.0005
Travel Within the SJVAB																		
Removal Haul Truck Travel [e]	0.069	0.468	1.973	0.008	0.087	0.055	0.0003	722.501	0.002	0.009	0.061	0.256	0.001	0.011	0.007	0.00004	93.925	0.0003
Travel Within the GBVAB																		
Removal Haul Truck Travel [e]	0.032	0.216	0.840	0.004	0.042	0.027	0.0001	339.798	0.001	0.004	0.028	0.109	0.0005	0.005	0.003	0.00002	44.174	0.0001
Travel Within Nevada																		
Removal Haul Truck Travel [e]	0.295	2.005	9.487	0.029	0.340	0.218	0.001	2,792.748	0.009	0.038	0.261	1.233	0.004	0.044	0.028	0.0002	363.057	0.001
Travel Within Utah																		
Removal Haul Truck Travel [e]	0.040	0.273	1.290	0.004	0.046	0.030	0.0002	379.870	0.001	0.005	0.035	0.168	0.001	0.006	0.004	0.00002	49.383	0.0002

Notes:

[a] Daily Emissions (lbs/day) = Quantity of Vehicles x Daily VMT (miles/day) x Emission Factor (g/mile) / 453.6 (g/lb).

[b] Annual emissions were estimated assuming activities occur: 260 days per year

[c] Onsite emissions all occur within the SCCAB; offsite emissions were distributed amongst the air basins based on the haul routes for each vehicle, as presented in Attachment 1-9.

[d] Assumed crew members were transported around the site using one crew van; the emissions for Crew Vans were estimated using emission factors for 'Passenger Vehicles'.

[e] Emissions for Haul Trucks were estimated using emission factors for 'Heavy-Heavy Duty Trucks'. The daily and annual emissions will be multiplied by the quantity of vehicles in Attachment 2-2.

[f] Assumed workers live in Ventura County and Los Angeles County as listed below. It was also assumed workers commute in passenger vehicles.

Ventura County	50%
Los Angeles County	50%

Vehicle Emission Factors

Vehicle Type	Emission Factors (g/mile) [a]								
	VOC	CO	NOx	SOx	PM_{10} [b]	$PM_{2.5}$ [b]	Pb [c]	CO_2	CH_4 [d]
2016 Onsite Emission Factors (15 mph)									
SCCAB Emission Factors									
Passenger Vehicles [e]	0.075	1.661	0.139	0.003	0.049	0.022	0.0001	620.233	0.017
Heavy-Heavy Duty Trucks [f]	0.843	2.123	10.848	0.016	0.218	0.148	0.001	2,702.921	0.005
2016 Offsite Emission Factors (55 mph)									
SCCAB Emission Factors									
Passenger Vehicles [e]	0.029	1.022	0.118	0.003	0.046	0.019	0.0001	291.533	0.017
Heavy-Heavy Duty Trucks [f]	0.156	0.995	6.126	0.016	0.197	0.129	0.001	1,598.252	0.005
SCAB Emission Factors									
Passenger Vehicles [e]	0.020	0.880	0.089	0.004	0.046	0.019	0.0001	298.018	0.017
Heavy-Heavy Duty Trucks [f]	0.173	1.160	5.582	0.017	0.198	0.129	0.001	1,593.914	0.005
MDAB Emission Factors									
Heavy-Heavy Duty Trucks [f]	0.156	1.072	3.830	0.016	0.197	0.127	0.001	1,573.301	0.005
SJVAB Emission Factors									
Heavy-Heavy Duty Trucks [f]	0.160	1.071	4.963	0.017	0.203	0.133	0.001	1,578.868	0.005

ATTACHMENT 2-4

Excavation Emissions (Low Soil Removal Estimate)

NASA SSFL EIS: Air Quality

GBVAB Emission Factors									
Heavy-Heavy Duty Trucks [f]	0.159	1.060	4.477	0.017	0.207	0.136	0.001	1,575.989	0.005
Nevada Emission Factors									
Heavy-Heavy Duty Trucks [g]	0.173	1.160	6.126	0.017	0.207	0.136	0.001	1,598.252	0.005
Utah Emission Factors									
Heavy-Heavy Duty Trucks [g]	0.173	1.160	6.126	0.017	0.207	0.136	0.001	1,598.252	0.005
2017 Onsite Emission Factors (15 mph)									
SCCAB Emission Factors									
Passenger Vehicles [e]	0.061	1.464	0.126	0.003	0.049	0.022	0.0001	620.453	0.017
Heavy-Heavy Duty Trucks [f]	0.776	1.933	9.706	0.016	0.189	0.122	0.001	2,698.156	0.005
2017 Offsite Emission Factors (55 mph)									
SCCAB Emission Factors									
Passenger Vehicles [e]	0.023	0.890	0.104	0.003	0.046	0.019	0.0001	291.623	0.017
Heavy-Heavy Duty Trucks [f]	0.144	0.944	5.420	0.016	0.184	0.116	0.001	1,595.454	0.005
SCAB Emission Factors									
Passenger Vehicles [e]	0.017	0.782	0.080	0.004	0.046	0.019	0.0001	298.156	0.017
Heavy-Heavy Duty Trucks [f]	0.169	1.146	5.082	0.016	0.191	0.122	0.001	1,591.449	0.005
MDAB Emission Factors									
Heavy-Heavy Duty Trucks [f]	0.147	1.020	3.276	0.016	0.186	0.117	0.001	1,569.980	0.005
SJVAB Emission Factors									
Heavy-Heavy Duty Trucks [f]	0.150	1.021	4.302	0.016	0.190	0.121	0.001	1,575.607	0.005
GBVAB Emission Factors									
Heavy-Heavy Duty Trucks [f]	0.148	1.001	3.886	0.016	0.194	0.125	0.001	1,572.781	0.005
Nevada Emission Factors									
Heavy-Heavy Duty Trucks [g]	0.169	1.146	5.420	0.016	0.194	0.125	0.001	1,595.454	0.005
Utah Emission Factors									
Heavy-Heavy Duty Trucks [g]	0.169	1.146	5.420	0.016	0.194	0.125	0.001	1,595.454	0.005

Notes:

[a] Unless otherwise noted, emission factors are from EMFAC2011-PL for each air basin.

[b] PM_{10} and $PM_{2.5}$ emission factors account for particulate emissions from running exhaust, tire wear, and break wear.

[c] A lead emission factor for stationary and portable internal combustion engines was assumed representative of on-road vehicles. This factor was obtained from Table B-2 of the *Supplemental Instructions: Reporting Procedures for AB2588 Facilities for Reporting their Quadrennial Air Toxics Emissions Inventory* (SCAQMD, 2010). Due to limited available data, this emission factor was assumed equal for all air basins, all vehicle speeds, and all construction years: 0.0083 lbs/1,000 gallons

[d] CH_4 emission factors taken from Table 13-5 of the *General Reporting Protocol* (Version 2.0) for the most recent model year available (TCR, 2013).

[e] Per Table 4-23 of the *National Transportation Statistics 2013* (BTS, 2013), assumed a passenger fuel economy of: 35.6 miles per gallon

[f] As calculated using the EMFAC2011 Web Based Emissions Database for California (which was assumed to be representative of Nevada and Utah), the heavy-heavy duty truck (diesel) fuel economy is: 5.569 miles per gallon

[g] As a conservative estimate, the maximum California emission factors were assumed representative of Nevada and Utah.

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ATTACHMENT 2-5

Excavation Data (Low Soil Removal Estimate)

NASA SSFL EIS: Air Quality

Activity Durations for Annual Scaling [a]

Excavation Duration (Days) [b]	
Construction Year 2016	238
Construction Year 2017	260
Material Hauling / Stockpile Duration (Days) [c]	
Construction Year 2016	238
Construction Year 2017	260

Notes:

[a] The durations presented were used to scale annual emissions based on a full 260 day schedule to match the actual project schedule.

[b] For excavation, the 2016 duration accounts for activities beginning in February 2016 per the schedule provided. Excavation activities would also occur in 2017 if the required duration was longer than the 11 months of 2016.

[c] For material hauling, the 2016 duration accounts for activities beginning in February 2016 per the schedule provided. It was assumed that material hauling would take the entire allowable duration. Stockpiling would be necessary from the start of excavation (simultaneous with material hauling) to the completion of material hauling.

Excavation Schedule for the Low Soil Removal Estimate [a]

Excavation Start Date (Month and Year) [b]	February 2016
Excavation Duration (Months)	23
Excavation Duration (Days)	498
Work Days per Week [c]	5
Work Hours per Day [d]	10

Notes:

[a] Per Section 1.2.2 of the SSFL EIS, the NASA-administered area over which excavation activities occur is: 421.2 acres

[b] The SSFL EIS indicates that excavation activities for the Proposed Action will occur from February 2016 to December 2017. Assume material hauling begins at the same time. Hauling duration is presented in 'Soil Hauling Truck Estimates' table.

[c] Assume excavation and hauling activities occur 5 days per week.

[d] To allow for heightened activity, assume excavation activities occur up to 10 hours per day within the SSFL operational hours of 7 a.m. to 7 p.m. Per R. Dean/CH2M HILL, this is consistent with the Boeing ISRA activities (RE: SSFL EIS - AQ Calculations Table.msg).

ATTACHMENT 2-5

Excavation Data (Low Soil Removal Estimate)

NASA SSFL EIS: Air Quality

Soil Hauling Truck Estimates for the Low Soil Removal Estimate

Truck Capacity (cy/truck) [a]	19
Removal Volume (cy) [b]	320,000
Removal Trucks	16,842
Removal Frequency (trucks/day) [c]	34
Backfill Volume (cy) [d]	106,667
Backfill Trucks	5,614
Backfill Frequency (trucks/day) [c]	11
Hauling Duration (days)	498
Daily Material Handled (tons/day) [e]	1,081

Notes:

[a] According to C. Brady/Kettleman Hills Landfill (559-318-6086), a realistic average load for light-weight truck and trailer combinations is 19 cy (approximately 24 tons).

[b] Removal volumes (cy) provided by J. Glasgow/CH2M HILL (NASA SSFL EIS Soil Volumes.msg).

[c] The frequency of trucks was back-calculated from the maximum duration (hauling must be completed by 2017) and the total trucks necessary to off-haul the soil or bring in clean backfill.

[d] According to L. Tice/CH2M HILL and J. Glasgow/CH2M HILL (RE: SSFL EIS - AQ Calculations Table(2).msg), up to 1/3rd of the soil excavated will be replaced using clean backfill taken from onsite areas adjacent to the excavation areas. Since the clean backfill will be from an onsite source, additional offsite truck hauling will not be required. Additionally, the backfilling activities will be performed using the excavation equipment during downtime. Assume stockpiling of the backfill is not required.

[e] Estimated the Daily Material Handled by considering the total removal and backfill volumes, a soil density of 24 tons per 19 cy (per note a above), and the number of active days in 2016 through 2017 (during which stockpiles may be formed or trucks may be loaded).

ATTACHMENT 2-5

Excavation Data (Low Soil Removal Estimate)

NASA SSFL EIS: Air Quality

Excavation Equipment Estimates for the Low Soil Removal Estimate

Equipment Type [a]	Quantity [a]	Daily Hours of Operation [b]	Horsepower [c]	Load Factor [c]
Rubber Tired Dozers	1	10	255	0.40
Concrete/Industrial Saws	1	10	81	0.73
Tractors/Loaders/Backhoes	3	10	98	0.37
Graders	1	10	175	0.41
Excavators	2	10	163	0.38
Scrapers	2	10	362	0.48

Notes:

[a] The equipment list and quantity of each equipment type were taken as the maximum possible equipment counts for grading from Table 3.2 of Appendix D of the *CalEEMod User's Guide* (Environ, 2013).

[b] Assumed each equipment would operate 10 hours per day, consistent with the schedule provided in the 'Excavation Schedule' table.

[c] Horsepower and load factors taken as the average for each equipment type from Table 3.3 of Appendix D of the *CalEEMod User's Guide* (Environ, 2013).

Stockpile Estimates for the Low Soil Removal Estimate

Stockpiles Utilized (Y or N) [a]	Yes
Number of Stockpiles [b]	240
Maximum Size of Stockpiles (acres) [c]	0.14

Notes:

[a] As a conservative estimate, assumed that the stockpiles would be used from the start of excavation/hauling activities to the end of hauling activities, which coincides with the total hauling duration.

[b] Number of Stockpiles was estimated based on the total soil removal and backfill volumes, the Maximum Size of Stockpiles, and the conservative assumption that, per SCAQMD Rule 1157(d)(6)(C), each stockpile has a maximum height of: 8 feet

[c] Based on VCAPCD Rule 74.29, Maximum Size of Stockpiles conservatively assumed to be: 6,000 square feet

ATTACHMENT 2-5

Excavation Data (Low Soil Removal Estimate)

NASA SSFL EIS: Air Quality

Crew Member Estimates for the Low Soil Removal Estimate

Round Trip Distance Traveled to Site (miles) [a, b]	40
Round Trip Distance Traveled Onsite (miles) [a, c]	4
Number of Crew Members [d]	15

Notes:

[a] Assumed that crew members travel to the site using personal vehicles and are transported around the site using 15-passenger vans.

[b] The round trip distance crew members may travel to the site was estimated at 40 miles due to the isolated site and surrounding city locations.

[c] The round trip distance crew members may travel onsite was assumed to be the same distance as that for demolition activities (see Attachment 1-7).

[d] Assumed 15 crew members to allow for at least one crew member per excavation equipment and a few extras.

Worker Commute from Los Angeles County

County	Roundtrip Distance (miles) [a]	Percent of Trip Distance	Air Basin
Los Angeles	39	98%	SCAB
Ventura	1	3%	SCCAB
Total	**40**	**100%**	

Notes:

[a] Per project-specific data, the roundtrip distance (miles) for commuting is 40 miles. If employees live in Los Angeles County, all travel takes place in Los Angeles County once the employee crosses the Los Angeles County border, located approximately 1 mile from the facility entrance.

Worker Commute from Ventura County

County	Roundtrip Distance (miles) [a]	Percent of Trip Distance	Air Basin
Los Angeles	34	85%	SCAB
Ventura	6	15%	SCCAB
Total	**40**	**100%**	

Notes:

[a] Per project-specific data, the roundtrip distance (miles) for commuting is 40 miles. The distance traveled within Los Angeles and Ventura counties was estimated assuming employees travel within Los Angeles County to reach Highway 118 and travel a bit beyond the location for asphalt disposal, as described in Attachment 1-7.

End of Appendix H

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APPENDIX I

Air Quality General Conformity Analysis

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TECHNICAL MEMORANDUM CH2MHILL®

APPENDIX I

Air Quality General Conformity Analysis

PREPARED FOR: National Aeronautics and Space Administration

PREPARED BY: CH2M HILL

DATE: December 2013

This technical memorandum provides a detailed technical approach for the General Conformity screening analysis conducted in support of the *Environmental Impact Statement for Proposed Demolition and Environmental Cleanup Activities at Santa Susana Field Laboratory (SSFL)*, including supplemental information and a description of the methodologies and assumptions used for this study. The supplemental information and methodologies discussed are as follows:

- Compliance
- Threshold Values
- Methodology
- Results

Note that the methodology and results presented in this appendix pertain only to a screening analysis performed prior to the final emission calculations presented in the Environmental Impact Statement (EIS). This screening analysis was conducted to give a preliminary indication of the potential project impacts associated with the Excavation and Offsite Disposal technology (high soil removal estimate) described in Section 4.7 of the EIS. As discussed later within this appendix, this screening analysis was not redone as new information became available because the new information was fully captured in the final emission calculations presented in Section 4.7.

Compliance

To decide whether projects require a General Conformity analysis, the U.S. Environmental Protection Agency (EPA) has established General Conformity *de minimis*[1] threshold values (in tons per calendar year) for each of the criteria pollutants for each type of designated nonattainment and maintenance area. If the annual emissions generated by a project on an area-wide basis (i.e., per air basin) are less than these threshold values, a General Conformity analysis is not required. If the emissions are greater than these threshold values, compliance with the General Conformity Rule must be demonstrated.

Compliance with the General Conformity Rule can be demonstrated in one or more of the following ways and must be completed before construction begins:

- By reducing emissions to below the General Conformity *de minimis* threshold values
- By showing that the emissions are included in the area's emission budget for the state implementation plan (SIP)
- By demonstrating that the state agrees to include the emission increases in the area's SIP without exceeding emission budgets
- By offsetting the project's emissions in each year that the General Conformity *de minimis* threshold values are exceeded
- By an air quality modeling analysis demonstrating the project would not cause or exacerbate a national ambient air quality standard (NAAQS)

[1] Proposed Actions with emissions below the applicable *de minimis* threshold are those that are not considered to have a significant environmental impact per 40 *Code of Federal Regulations* (CFR) Parts 51 and 93. The *de minimis* thresholds correspond to the emission rates defined in 40 CFR 51.165-51.166 as "significant" (71 Federal Register [FR] 40420).

As discussed in Section 4.7 of the EIS and later in this appendix, NASA would need to demonstrate conformance for the Excavation and Offsite Disposal technology (high soil removal estimate)[2]. NASA plans to conform by purchasing criteria pollutant offsets for the affected counties. The quantity of criteria pollutant offsets purchased would equal the quantity by which the General Conformity *de minimis* threshold values are exceeded.

Threshold Values

As presented in Appendix H, multiple counties potentially might be affected by the Excavation and Offsite Disposal technology as a result of material and equipment hauling. The attainment statuses of these counties are presented in Appendix H. The associated General Conformity *de minimis* threshold values for each of these counties are summarized in Table I-1. Note that Table I-1 only presents the General Conformity *de minimis* threshold values for counties designated as nonattainment or maintenance for at least one criteria pollutant.

General Conformity is evaluated separately for each air basin and Table I-2 presents the threshold value for each criteria pollutant within each air basin potentially affected by the Excavation and Offsite Disposal technology. Similar to Table I-1, Table I-2 only presents the counties designated as nonattainment or maintenance areas for at least one criteria pollutant. If an air basin included multiple counties designated as nonattainment or maintenance, then the most stringent threshold for each criteria pollutant was considered.

Precursors are compounds known to contribute to the formation of established criteria pollutants and are evaluated against the General Conformity *de minimis* threshold values for the criteria pollutants they form. Nitrogen oxides (NOx) and volatile organic compounds (VOCs) are considered ozone precursors and sulfur dioxide (SO_2), NOx, and VOCs are considered precursors to particulate matter having an aerodynamic equivalent diameter of 2.5 microns or less ($PM_{2.5}$). For ozone, project NOx and VOC emissions are estimated and compared to the ozone General Conformity *de minimis* threshold value. Because NOx is also a $PM_{2.5}$ precursor, the General Conformity *de minimis* threshold value used for comparison against project NOx emissions would be the most conservative threshold (the minimum threshold) available. The threshold values presented in Table I-2 take precursors into consideration.

Methodology

To understand the potential impacts to air quality as a result of the Excavation and Offsite Disposal technology (high soil removal estimate), a screening analysis was performed to identify whether the General Conformity *de minimis* threshold values could be met given the project constraints (that is, pre-determined soil removal volumes and limited activity duration). This was done by back-calculating the soil volumes that feasibly could be removed within the allotted duration from the General Conformity *de minimis* threshold values. The resulting values were compared to the project's predetermined soil removal volumes. Note that this analysis was only performed for counties designated as nonattainment or maintenance areas for at least one criteria pollutant.

[2] Note that the low soil removal estimate or other remedial technologies requiring Excavation and Offsite Disposal also would warrant the need to conform, as discussed throughout Section 4.7.

TABLE I-1
General Conformity *De Minimis* Threshold Values
NASA SSFL EIS for Proposed Demolition and Environmental Cleanup

County	California Air Basin or State	General Conformity *De Minimis* Threshold Values (tpy) [a, b]						
		Ozone	PM_{10}	$PM_{2.5}$	CO	NO_2	SO_2	Lead
Ventura	SCCAB	50	N/A	N/A	N/A	N/A	N/A	N/A
Los Angeles	SCAB	10	100	100	100	N/A	N/A	25
San Bernardino	SCAB	10	100	100	100	N/A	N/A	N/A
	MDAB	100 [c]	100	N/A	N/A	N/A	N/A	N/A
Kern	SJVAB	10	70	100	N/A	N/A	N/A	N/A
Kings	SJVAB	10	100	100	N/A	N/A	N/A	N/A
Clark	Nevada	100 [d]	70	N/A	100	N/A	N/A	N/A
White Pine	Nevada	N/A	N/A	N/A	N/A	N/A	100	N/A
Tooele	Utah	N/A	N/A	N/A	N/A	N/A	100	N/A

Notes:
CO = carbon monoxide
MDAB = Mojave Desert Air Basin
N/A = Not applicable because the area is in attainment
NO_2 = nitrogen dioxide
$PM_{2.5}$ = particulate matter having an aerodynamic equivalent diameter of 2.5 microns or less
PM_{10} = particulate matter having an aerodynamic equivalent diameter of 10 microns or less
SCCAB = South Central Coast Air Basin
SCAB = South Coast Air Basin
SJVAB = San Joaquin Valley Air Basin
SO_2 = sulfur dioxide
tpy = tons per year
[a] General Conformity *de minimis* threshold values from 40 Code of Federal Regulations (CFR) Parts 51 and 93.
[b] Refer to Appendix H for details about which counties are in partial nonattainment, maintenance, or attainment areas, thus dictating the applicable threshold.
[c] California is not located in an ozone transportation region. As a result, the General Conformity *de minimis* threshold value for an ozone attainment status of "Moderate Nonattainment" was taken as 100 tpy.
[d] Per 76 *Federal Register* (FR) 17373, the designation status of the Clark County ozone nonattainment area remains nonattainment despite the EPA's determination that the area has attained the NAAQS. Because Clark County is not located in an ozone transportation region, the General Conformity *de minimis* threshold value of 100 tpy was used.

TABLE I-2
Threshold Values Applicable to the Project
NASA SSFL EIS for Proposed Demolition and Environmental Cleanup

	General Conformity *De Minimis* Threshold Values (tpy)						
California Air Basin or State	**VOC**	**CO**	**NOx**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**	**Lead**
SCCAB	50	N/A	50	N/A	N/A	N/A	N/A
SCAB [a]	10	100	10	100	100	100	25
MDAB	100	N/A	100	N/A	100	N/A	N/A
SJVAB [a]	10	N/A	10	100	70	100	N/A
Nevada [a]	100	100	100	100	70	N/A	N/A
Utah	N/A	N/A	N/A	100	N/A	N/A	N/A

Notes:
CO = carbon monoxide
MDAB = Mojave Desert Air Basin
N/A = Not applicable because the area is in attainment
NOx = nitrogen oxides
$PM_{2.5}$ = particulate matter having an aerodynamic equivalent diameter of 2.5 microns or less
PM_{10} = particulate matter having an aerodynamic equivalent diameter of 10 microns or less
SCCAB = South Central Coast Air Basin
SCAB = South Coast Air Basin
SJVAB = San Joaquin Valley Air Basin
SO_2 = sulfur dioxide
tpy = tons per year
VOC = volatile organic compound

[a] The minimum threshold value was assigned for each pollutant within air basins that have multiple affected counties.

The first step in the screening analysis was calculating the annual vehicle miles traveled (VMT) by material haul trucks and the annual number of material haul truck trips possible based on the General Conformity *de minimis* threshold values. This was computed using the following equations for each criteria pollutant:

$$Annual\ VMT\ (miles/year) = \frac{[Threshold\ Value\ (tpy) - \ Constant\ Emissions\ (tpy)]x\ 907{,}185\ (g/ton)}{Haul\ Truck\ Emission\ Factor\ \ (g/mile)}$$ [3]

$$Annual\ Truck\ Trips(trips/year) = \frac{Annual\ VMT\ (miles/year)}{Maximum\ Distance\ Traveled\ per\ Round\ Trip\ (miles/trip)}$$

The constant emissions included in the previous equation were estimated from the activities that would occur regardless of material hauling, which include emissions from onsite excavation activities, emissions from worker commutes, and fugitive dust emissions from earthmoving and stockpiles. Although road repair activities would not occur without material hauling, the magnitude of road repair activities would be independent of the magnitude of material hauling. As a result, emissions from road repair activities were considered to be constant emissions.

The second step in the screening analysis was calculating the annual material that could be hauled using the annual truck trips determined in the first step of the screening analysis. This was computed using the following equation for each criteria pollutant:

$$Annual\ Material\ Hauled\ (tons/year) = Annual\ Truck\ Trips\ (trips/year)\ x\ Truck\ Capacity\ (cy/truck)$$ [4]

Once estimated, the annual material hauled quantities for both years of environmental cleanup activities were summed, resulting in a total soil volume capable of being removed by the project based on the General Conformity *de minimis* threshold values. Because this value was determined separately for each criteria pollutant, the smallest number estimated, regardless of pollutant, was compared to the project's pre-determined soil removal volumes. If the total possible soil volume was greater than the pre-determined soil removal volumes, the General Conformity *de minimis* threshold values could be met with the project constraints. If the total possible soil volume was less than the pre-determined soil removal volumes, the General Conformity *de minimis* threshold values would not be met.

If the total possible soil volume capable of being removed by the project indicated an exceedance of the General Conformity *de minimis* threshold values, a secondary analysis was performed using the minimum distance hauled within each county instead of the maximum distance. If the resulting total possible soil volume was greater than the pre-determined soil volumes, some landfill destinations would be preferable to others. If the resulting total possible soil volume was less than the pre-determined soil volumes, the General Conformity *de minimis* threshold values would not be met regardless of landfill selected and the project would need to demonstrate conformance for at least each criteria pollutant causing an exceedance.

Results

The previous screening analysis was performed for the Excavation and Offsite Disposal technology (high soil removal estimate). The analysis results are described in the following subsections and summarized in Table I-3.

[3] Haul truck emission factors (grams [g] per mile) were taken from the California Air Resources Board's (ARB's) EMFAC2011-PL (Version 1.1) model (ARB, 2013) using the model parameters documented in Appendix H. The maximum California emission factor for each pollutant conservatively was used to represent Nevada and Utah vehicle emission factors.

[4] A truck capacity of 19 cubic yards was used, as consistent with the truck capacity reported in Table 4.7-3.

TABLE I-3
Screening Analysis Results
NASA SSFL EIS for Proposed Demolition and Environmental Cleanup

		General Conformity *De Minimis* Threshold Values Exceeded?
County	**California Air Basin or State**	**Excavation and Offsite Disposal Technology (High Soil Removal Estimate)**
Ventura	SCCAB	No
Los Angeles	SCAB	Yes, NOx
San Bernardino	SCAB	No
	MDAB	No
Kern	SJVAB	Yes, NOx
Kings	SJVAB	No
Clark	Nevada	No
White Pine	Nevada	No
Tooele	Utah	No

Notes:
MDAB = Mojave Desert Air Basin
NOx = nitrogen oxides
SCCAB = South Central Coast Air Basin
SCAB = South Coast Air Basin
SJVAB = San Joaquin Valley Air Basin

As listed in Table I-3, the South Coast Air Basin (SCAB) and San Joaquin Valley Air Basin (SJVAB) are the two air basins beyond the project site that potentially might be affected by material-hauling activities. This result led to the inclusion of the SCAB and SJVAB in the region of influence (ROI) defined in Section 3.5 of the EIS. Because SSFL physically is located in Ventura County, the South Central Coast Air Basin (SCCAB) also is included in the ROI so that the constant emissions (demolition, excavation, and fugitive dust) can be evaluated adequately.

NASA must demonstrate conformance for each air basin in which the NOx General Conformity *de minimis* threshold values are exceeded, in this case within the SCAB and SJVAB. As would be discussed with the air districts governing each of these air basins, NASA plans to conform by adhering to an annual truck limit based on the daily truck frequencies presented in Table 4.7-1 of the EIS and by purchasing NOx offsets for the affected counties. The quantity of NOx offsets purchased would equal the quantity by which the General Conformity *de minimis* threshold values are exceeded; for the Excavation and Offsite Disposal technology (high soil removal estimate), these values are presented in Table 4.7-4 of the EIS.

Excavation and Offsite Disposal Technology

The total possible soil volumes estimated for Ventura, San Bernardino, Kings, Clark, White Pine, and Tooele counties were greater than the soil removal volume defined for the Excavation and Offsite Disposal technology (high soil removal estimate); therefore, the General Conformity *de minimis* threshold values would be met in those counties. The total possible soil volumes estimated for Los Angeles and Kern counties were less than the soil removal volume defined for the high soil removal estimate (Attachment 1). The total possible soil volumes were re-estimated for Los Angeles and Kern counties using the minimum distance hauled within each county; however, this calculation also resulted in total possible soil volumes less than the soil removal volume defined for the high soil removal estimate. As a result, the General Conformity *de minimis* threshold values could not be met with implementation of the project constraints. For both counties, the limiting criteria pollutant was NOx.

Because the identified landfills require material haul trucks to pass through Los Angeles County, NASA must demonstrate conformance for the SCAB regardless of the landfill used for offsite disposal of excavated soil. However, only two of the identified landfills require material haul trucks to pass through Kern County. As a result,

NASA must only demonstrate conformance for the SJVAB if the Kettleman Hills Landfill or the Clean Harbors Buttonwillow Landfill is used for offsite disposal of excavated soil.

Disclaimer

As noted at the beginning of this appendix, the screening analysis was performed before the final emission calculations were prepared and presented in the EIS. The screening analysis was performed assuming that the backfill was provided using onsite sources. Since the screening analysis was performed, additional information was provided suggesting that backfill might be brought to SSFL from offsite aggregate suppliers located in Ventura and Los Angeles counties. The screening analysis was not redone to incorporate this new information because the conclusions would not change, per the following discussion:

- Using the screening analysis, the total possible soil volumes estimated for Ventura County are at least 500 times greater than the pre-determined soil removal volumes. Although increasing the maximum distance hauled in Ventura County and increasing the predetermined soil volumes to include backfill would decrease this margin by a factor of 100, the overall results of the screening analysis would remain unchanged. As a result, Ventura County would still have emissions less than the applicable General Conformity *de minimis* threshold values.
- Using the screening analysis, the total possible soil volumes estimated for Los Angeles County are at most 1.3 times smaller than the pre-determined soil removal volumes. Although increasing the maximum distance hauled in Los Angeles County and increasing the predetermined soil volumes to include backfill would increase this margin by a factor of 1, the overall results of the screening analysis would remain unchanged. As a result, Los Angeles County would still have emissions greater than the applicable General Conformity *de minimis* threshold values and NASA would still need to demonstrate conformance within the SCAB. Because accounting for the backfill material haul trips would increase the soil volume margin, the quantity of NOx offsets required for purchase would be greater than predicted under the original screening analysis.
- Kern County would not be affected by the inclusion of backfill material haul trips because the possible aggregate suppliers are located only within Ventura and Los Angeles counties. As a result, Kern County would still have emissions greater than the applicable General Conformity *de minimis* threshold values and NASA would still need to demonstrate conformance within the SJVAB if either Kettleman Hills Landfill or Clean Harbors Buttonwillow Landfill is used for offsite disposal of excavated soil.
- San Bernardino, Kings, Clark, White Pine, and Tooele counties would not be affected by the inclusion of backfill material haul trips because the possible aggregate suppliers are located only within Ventura and Los Angeles counties. As a result, these counties would still have emissions less than the applicable General Conformity *de minimis* threshold values.

Summary

This screening analysis was performed to help identify the potential project impacts, as related to General Conformity, given the project constraints (pre-determined soil removal volumes and limited activity duration). Based on this screening analysis, the Excavation and Offsite Disposal technology (high soil removal estimate) would cause an exceedance of the NOx General Conformity *de minimis* threshold values in both the SCAB and the SJVAB. This result is consistent with the information presented in Section 4.7. Although additional information was obtained after the screening analysis was performed, the screening analysis was not redone because the overall results did not change and the additional information was fully captured in the final emission calculations presented in Section 4.7of the EIS.

References

California Air Resources Board (ARB). 2013. EMFAC2011-PL (Version 1.1). January.

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Attachment 1

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ATTACHMENT 1-1

Summary of Hauling Routes

NASA SSFL EIS - Air Quality General Conformity Analysis

Introduction:

Shaded cells indicate that a General Conformity analysis is not necessary since the county is in attainment for all pollutants.

Italicized, bold cells indicate that the route presents the worst-case scenario for hauling.

The General Conformity analysis will be a hybrid of routes, using the maximum distance traveled in each county to identify the maximum number of trucks.

State or California Air Basin			South Central Coast	South Coast		Mojave Desert	San Joaquin Valley		Great Basin Valleys	Nevada					Utah
Landfill	**Location**	**Total Roundtrip Distance (miles)**	**Roundtrip Distance (miles) per County**												
			Ventura	**Los Angeles**	**San Bernardino**		**Kern**	**Kings**	**Inyo**	**Nye**	**Clark**	**Lincoln**	**White Pine**	**Elko**	**Tooele**
Kettleman Hills	Kettleman City, California	335	1	126			***170***	***38***							
Buttonwillow	Buttonwillow, California	252	1	126			125								
U.S. Ecology	Beatty, Nevada	828	1	144.2	88.8	277.8			98	69.4					
Antelope Valley	Lancaster, California	141	1	140											
Energy Solutions	Clive, Utah	1,428	***1***	***144.2***	***88.8***	***328.6***				78	***178***	200	***226***	112	***108***
Pollutant			**County Attainment Status**												
Ozone [a]			Serious N [b]	Extreme N [c]	Extreme N [d]	Moderate N [d]	Extreme N [e]	Extreme N [e]	A	A	Former Subpart I [i]	A	A	A	A
PM_{10}			A	M [c]	M [d]	Moderate N [d]	Serious N	M	A [h]	A	Serious N [i]	A	A	A	A
$PM_{2.5}$ (Direct Emissions)			A	N [c]	N [d]	A [d]	N [f]	N	A	A	A	A	A	A	A [j]
CO			A	Serious M [c]	Serious M [d]	A [d]	A [g]	A	A	A	Serious M [i]	A	A	A	A
NO_2			A	A	A	A	A	A	A	A	A	A	A	A	A
SO_2			A	A [c]	A	A	A	A	A	A	A	A	M	A	N [k]
Lead (2008 standard)			A	N [c]	A	A	A	A	A	A	A	A	A	A	A

Notes:

A = Attainment

M = Maintenance

N = Nonattainment

[a] These area designations are based on the 8-hour ozone standard. The 1-hour ozone standard no longer applies to the counties in nonattainment areas per the anti-backsliding provisions of 40 CFR 51.905(a)(3) and (4). The anti-backsliding provisions apply to areas that are designated attainment for the 8-hour ozone standard and were, at the time of the 8-hour designations, either attainment areas with maintenance plans for the 1-hour standard or nonattainment for the 1-hour standard. Specifically, the anti-backsliding provisions require these areas to submit a maintenance plan under section 110(a)(1) of the CAA. The counties in attainment for the 8-hour ozone standard were also in attainment for the 1-hour ozone standard and were not required to submit maintenance plans at the time of 8-hour designations.

[b] Ventura County has partial serious nonattainment for the 8-hour ozone standard. The portion of the project occurring within Ventura County will occur in the nonattainment portion.

[c] The portion of Los Angeles County located within the SCAB has extreme nonattainment for the 8-hour ozone standard, maintenance for PM_{10}, nonattainment for $PM_{2.5}$, serious maintenance for CO, and nonattainment for the 2008 lead standard. The portion of the project occurring within Los Angeles County will occur in the SCAB and, therefore, in the nonattainment or maintenance areas for these pollutants.

[d] The portion of San Bernardino County located in the SCAB has extreme nonattainment for the 8-hour ozone standard, maintenance for PM_{10}, nonattainment for $PM_{2.5}$, and maintenance for CO whereas the portion located in the MDAB has moderate nonattainment for the 8-hour ozone standard and PM_{10} and attainment for $PM_{2.5}$ and CO. The project will occur in both of these portions of San Bernardino County.

[e] Kern and Kings counties each have partial extreme nonattainment for the 8-hour ozone standard. The portion of the project occurring within Kern and Kings counties will occur in the nonattainment portions.

[f] Kern County has partial nonattainment for $PM_{2.5}$. The portion of the project occurring within Kern County will occur in the nonattainment portion.

[g] The metropolitan area of Bakersfield, located within Kern County, has partial maintenance for CO. The portion of the project occurring within Kern County will not occur within this metropolitan area and is, therefore, in attainment.

[h] Inyo County has PM_{10} nonattainment and maintenance for two specific areas: Owens Valley and Coso Junction, respectively. The portion of the project occurring within Inyo County would occur at least 100 miles from these areas.

[i] Clark County has partial Former Subpart 1 status for the 8-hour ozone standard, serious nonattainment for PM_{10}, and serious maintenance for CO. The portion of the project occurring within Clark County would occur in the nonattainment and maintenance portions for these pollutants.

[j] Tooele County has partial nonattainment for $PM_{2.5}$. The portion of the project occurring within Tooele County would not occur in this nonattainment portion.

[k] Tooele County has partial nonattainment for SO_2. Based on the available data, the portion of the project occurring within Tooele County may or may not occur in the nonattainment portion. As a conservative approach, it was assumed that the project would occur in the nonattainment portion.

ATTACHMENT 1-2

General Conformity *De Minimis* Threshold Values

NASA SSFL EIS - Air Quality General Conformity Analysis

Introduction:

The General Conformity *de minimis* threshold values are presented only for the counties which will be evaluated in the General Conformity analysis, as described on the Haul Route Summary tab.

State or California Air Basin	South Central Coast		South Coast				Mojave Desert		San Joaquin Valley				Nevada				Utah	
Pollutant	County Attainment Status / General Conformity *De Minimis* Threshold Values (tons/year) [a, b]																	
	Ventura		Los Angeles		San Bernardino				Kern		Kings		Clark		White Pine		Tooele	
Ozone	Serious N	50	Extreme N	10	Extreme N	10	Moderate N [c]	100	Extreme N	10	Extreme N	10	Former Subpart I [d]	100	A	N/A	A	N/A
Ozone Precursor (NOx)	Serious N	50	Extreme N	10	Extreme N	10	Moderate N [c]	100	Extreme N	10	Extreme N	10	Former Subpart I [d]	100	A	N/A	A	N/A
Ozone Precursor (VOC)	Serious N	50	Extreme N	10	Extreme N	10	Moderate N [c]	100	Extreme N	10	Extreme N	10	Former Subpart I [d]	100	A	N/A	A	N/A
PM_{10}	A	N/A	M	100	M	100	Moderate N	100	Serious N	70	M	100	Serious N	70	A	N/A	A	N/A
$PM_{2.5}$ (Direct Emissions)	A	N/A	N	100	N	100	A	N/A	N	100	N	100	A	N/A	A	N/A	A	N/A
$PM_{2.5}$ Precursor (SO_2)	A	N/A	N	100	N	100	A	N/A	N	100	N	100	A	N/A	A	N/A	A	N/A
$PM_{2.5}$ Precursor (NOx)	A	N/A	N	100	N	100	A	N/A	N	100	N	100	A	N/A	A	N/A	A	N/A
$PM_{2.5}$ Precursor (VOC)	A	N/A	N	100	N	100	A	N/A	N	100	N	100	A	N/A	A	N/A	A	N/A
CO	A	N/A	Serious M	100	Serious M	100	A	N/A	A	N/A	A	N/A	Serious M	100	A	N/A	A	N/A
NO_2	A	N/A	A	N/A	A	N/A	A	N/A	A	N/A	A	N/A	A	N/A	A	N/A	A	N/A
SO_2	A	N/A	A	N/A	A	N/A	A	N/A	A	N/A	A	N/A	A	N/A	M	100	N	100
Lead (2008 standard)	A	N/A	N	25	A	N/A	A	N/A	A	N/A	A	N/A	A	N/A	A	N/A	A	N/A

Notes:

A = Attainment

M = Maintenance

N = Nonattainment

N/A = Not Applicable

[a] General Conformity *de minimis* threshold values from 40 CFR Parts 51 and 93, EPA-HQ-OAR-2004-0491; FRL-8197-4.

[b] Refer to the notes on the 'Haul Route Summary' tab for details on which counties are in partial nonattainment, maintenance, or attainment areas.

[c] California is not located in an ozone transportation region (http://www.epa.gov/glo/fs20080317.html). As a result, the General Conformity *de minimis* threshold value for an ozone attainment status of "Moderate Nonattainment" was taken as 100 tons/year.

[d] Per 76 FR 17373, the designation status of the Clark County ozone nonattainment area remains nonattainment despite the EPA's determination that the area has attained the National Ambient Air Quality Standard. Since Clark County is not located in an ozone transportation region, the General Conformity *de minimis* threshold value of 100 tons/year was used.

ATTACHMENT 1-3

Truck Trip Analysis for the Maximum Distance Traveled in Ventura County (SCCAB)

NASA SSFL EIS - Air Quality General Conformity Analysis

Introduction:

This tab identifies whether the 2017 deadline can be met based on the county's General Conformity *de minimis* threshold values, the project emissions occurring regardless of hauling activities, and the maximum possible mileage traveled within the county.

Truck Trip Analysis

Pollutant	VOC	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$	Pb
General Conformity *De Minimis* Threshold (tons/year)	50	N/A	50	N/A	N/A	N/A	N/A
Haul Year 2016							
Constant Emissions (tons/year) [a]	2	8	12	0	1,051	219	0
Road Repair Emissions (tons/year) [b]	0	0	0	0	0	0	0
Annual VMT Allowable (miles/year) [c]	281,234,417	N/A	5,485,195	N/A	N/A	N/A	N/A
Annual Truck Trips Allowed (trucks/year) [d]	281,234,417	N/A	5,485,195	N/A	N/A	N/A	N/A
Annual Material Hauled in Allowable Truck Trips (cy/year) [e]	5,343,453,925	N/A	104,218,700	N/A	N/A	N/A	N/A
Haul Year 2017							
Constant Emissions (tons/year) [a]	2	9	12	0	1,146	239	0
Road Repair Emissions (tons/year) [b]	0	0	0	0	0	0	0
Annual VMT Allowable (miles/year) [c]	303,340,753	N/A	6,209,226	N/A	N/A	N/A	N/A
Annual Truck Trips Allowed (trucks/year) [d]	303,340,753	N/A	6,209,226	N/A	N/A	N/A	N/A
Annual Material Hauled in Allowable Truck Trips (cy/year) [e]	5,763,474,301	N/A	117,975,300	N/A	N/A	N/A	N/A
Summary							
Total Material Hauled in Allowable Truck Trips (cy/project)	11,106,928,226	N/A	222,194,000	N/A	N/A	N/A	N/A
Soil Volume to be Removed from SSFL (cy/project)	502,381						
Is the 2017 Deadline Met (Yes/No)?	Yes						

Notes:

[a] Constant emissions are a result of onsite construction activities and worker commutes.

[b] Road repair emissions occur only in conjunction with material hauling activities.

[c] Conversion factor: 1 short ton: 907,185 grams

[d] Distance Traveled per Roundtrip: 1 VMT/trip

[e] Truck Capacity: 19 cy/truck

Vehicle Emission Factors

Vehicle Type	Emission Factors (g/mile) [a]						
	VOC	CO	NOx	SOx	PM_{10} [b]	$PM_{2.5}$ [b]	Pb [c]
2016 Offsite Emission Factors (55 mph)							
Heavy-Heavy Duty Trucks [d]	0.156	0.995	6.126	0.016	0.197	0.129	0.001
2017 Offsite Emission Factors (55 mph)							
Heavy-Heavy Duty Trucks [d]	0.144	0.944	5.420	0.016	0.184	0.116	0.001

Notes:

[a] Unless otherwise noted, emission factors are from EMFAC2011-PL.

[b] PM_{10} and $PM_{2.5}$ emission factors account for particulate emissions from running exhaust, tire wear, and break wear.

[c] A lead emission factor for stationary and portable internal combustion engines was assumed representative of on-road vehicles. This factor was obtained from Table B-2 of the *Supplemental Instructions: Reporting Procedures for AB2588 Facilities for Reporting their Quadrennial Air Toxics Emissions Inventory* (SCAQMD, 2010). Due to limited available data, this emission factor was assumed equal for all vehicle speeds and all construction years: 0.0083 lbs/1,000 gallons

[d] As calculated using the EMFAC2011 Web Based Emissions Database for California, the heavy-heavy duty truck (diesel) fuel economy is: 5.569 miles per gallon

ATTACHMENT 1-6

Truck Trip Analysis for the Maximum Distance Traveled in San Bernardino County (SCAB)

NASA SSFL EIS - Air Quality General Conformity Analysis

Introduction:

This tab identifies whether the 2017 deadline can be met based on the county's General Conformity *de minimis* threshold values, the project emissions occurring regardless of hauling activities, and the maximum possible mileage traveled within the county.

Truck Trip Analysis

Pollutant	VOC	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$	Pb
General Conformity *De Minimis* Threshold (tons/year)	10	100	10	100	100	100	N/A
Haul Year 2016							
Constant and Road Repair Emissions (tons/year) [a]	0	0	0	0	0	0	0
Annual VMT Allowable (miles/year) [b]	52,392,517	78,194,102	1,625,191	5,497,775,277	457,472,398	703,011,437	N/A
Annual Truck Trips Allowed (trucks/year) [c]	590,006	880,564	18,302	61,911,884	5,151,716	7,916,795	N/A
Annual Material Hauled in Allowable Truck Trips (cy/year) [d]	11,210,111	16,730,720	347,732	1,176,325,791	97,882,608	150,419,114	N/A
Haul Year 2017							
Constant and Road Repair Emissions (tons/year) [a]	0	0	0	0	0	0	0
Annual VMT Allowable (miles/year) [b]	53,751,954	79,181,740	1,785,196	5,506,220,101	476,036,730	744,078,504	N/A
Annual Truck Trips Allowed (trucks/year) [c]	605,315	891,686	20,104	62,006,983	5,360,774	8,379,262	N/A
Annual Material Hauled in Allowable Truck Trips (cy/year) [d]	11,500,981	16,942,039	381,968	1,178,132,679	101,854,706	159,205,986	N/A
Summary							
Total Material Hauled in Allowable Truck Trips (cy/project)	22,711,092	33,672,759	729,700	2,354,458,471	199,737,313	309,625,100	N/A
Soil Volume to be Removed from SSFL (cy/project)	502,381						
Is the 2017 Deadline Met (Yes/No)?	Yes						

Notes:

[a] There are no constant, non-hauling emissions expected to occur in San Bernardino County. Additionally, road repair activities will not occur in San Bernardino County.

[b] Conversion factor: 1 short ton: 907,185 grams

[c] Distance Traveled per Roundtrip: 89 VMT/trip

[d] Truck Capacity: 19 cy/truck

Vehicle Emission Factors

Vehicle Type	Emission Factors (g/mile) [a]						
	VOC	**CO**	**NOx**	**SOx**	**PM_{10} [b]**	**$PM_{2.5}$ [b]**	**Pb [c]**
2016 Offsite Emission Factors (55 mph)							
Heavy-Heavy Duty Trucks [d]	0.173	1.160	5.582	0.017	0.198	0.129	0.001
2017 Offsite Emission Factors (55 mph)							
Heavy-Heavy Duty Trucks [d]	0.169	1.146	5.082	0.016	0.191	0.122	0.001

Notes:

[a] Unless otherwise noted, emission factors are from EMFAC2011-PL.

[b] PM_{10} and $PM_{2.5}$ emission factors account for particulate emissions from running exhaust, tire wear, and break wear.

[c] A lead emission factor for stationary and portable internal combustion engines was assumed representative of on-road vehicles. This factor was obtained from Table B-2 of the *Supplemental Instructions: Reporting Procedures for AB2588 Facilities for Reporting their Quadrennial Air Toxics Emissions Inventory* (SCAQMD, 2010). Due to limited available data, this emission factor was assumed equal for all vehicle speeds and all construction years: 0.0083 lbs/1,000 gallons

[d] As calculated using the EMFAC2011 Web Based Emissions Database for California, the heavy-heavy duty truck (diesel) fuel economy is: 5.569 miles per gallon

ATTACHMENT 1-7

Truck Trip Analysis for the Maximum Distance Traveled in San Bernardino County (MDAB)

NASA SSFL EIS - Air Quality General Conformity Analysis

Introduction:

This tab identifies whether the 2017 deadline can be met based on the county's General Conformity *de minimis* threshold values, the project emissions occurring regardless of hauling activities, and the maximum possible mileage traveled within the county.

Truck Trip Analysis

Pollutant	VOC	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$	Pb
General Conformity *De Minimis* Threshold (tons/year)	100	N/A	100	N/A	100	N/A	N/A
Haul Year 2016							
Constant and Road Repair Emissions (tons/year) [a]	0	0	0	0	0	0	0
Annual VMT Allowable (miles/year) [b]	582,002,211	N/A	23,685,061	N/A	460,118,753	N/A	N/A
Annual Truck Trips Allowed (trucks/year) [c]	1,771,157	N/A	72,079	N/A	1,400,240	N/A	N/A
Annual Material Hauled in Allowable Truck Trips (cy/year) [d]	33,651,984	N/A	1,369,495	N/A	26,604,554	N/A	N/A
Haul Year 2017							
Constant and Road Repair Emissions (tons/year) [a]	0	0	0	0	0	0	0
Annual VMT Allowable (miles/year) [b]	617,447,333	N/A	27,689,578	N/A	486,748,885	N/A	N/A
Annual Truck Trips Allowed (trucks/year) [c]	1,879,024	N/A	84,265	N/A	1,481,281	N/A	N/A
Annual Material Hauled in Allowable Truck Trips (cy/year) [d]	35,701,459	N/A	1,601,041	N/A	28,144,336	N/A	N/A
Summary							
Total Material Hauled in Allowable Truck Trips (cy/project)	69,353,443	N/A	2,970,536	N/A	54,748,890	N/A	N/A
Soil Volume to be Removed from SSFL (cy/project)	502,381						
Is the 2017 Deadline Met (Yes/No)?	Yes						

Notes:

[a] There are no constant, non-hauling emissions expected to occur in San Bernardino County. Additionally, road repair activities will not occur in San Bernardino County.

[b] Conversion factor: 1 short ton: 907,185 grams

[c] Distance Traveled per Roundtrip: 329 VMT/trip

[d] Truck Capacity: 19 cy/truck

Vehicle Emission Factors

Vehicle Type	Emission Factors (g/mile) [a]						
	VOC	**CO**	**NOx**	**SOx**	**PM_{10} [b]**	**$PM_{2.5}$ [b]**	**Pb [c]**
2016 Offsite Emission Factors (55 mph)							
Heavy-Heavy Duty Trucks [d]	0.156	1.072	3.830	0.016	0.197	0.127	0.001
2017 Offsite Emission Factors (55 mph)							
Heavy-Heavy Duty Trucks [d]	0.147	1.020	3.276	0.016	0.186	0.117	0.001

Notes:

[a] Unless otherwise noted, emission factors are from EMFAC2011-PL.

[b] PM_{10} and $PM_{2.5}$ emission factors account for particulate emissions from running exhaust, tire wear, and break wear.

[c] A lead emission factor for stationary and portable internal combustion engines was assumed representative of on-road vehicles. This factor was obtained from Table B-2 of the *Supplemental Instructions: Reporting Procedures for AB2588 Facilities for Reporting their Quadrennial Air Toxics Emissions Inventory* (SCAQMD, 2010). Due to limited available data, this emission factor was assumed equal for all vehicle speeds and all construction years: 0.0083 lbs/1,000 gallons

[d] As calculated using the EMFAC2011 Web Based Emissions Database for California, the heavy-heavy duty truck (diesel) fuel economy is: 5.569 miles per gallon

ATTACHMENT 1-9

Truck Trip Analysis for the Minimum Distance Traveled in Kern County (SJVAB)

NASA SSFL EIS - Air Quality General Conformity Analysis

Introduction:

This tab identifies whether the 2017 deadline can be met based on the county's General Conformity *de minimis* threshold values, the project emissions occurring regardless of hauling activities, and the minimum possible mileage traveled within the county.

Truck Trip Analysis

Pollutant	VOC	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$	Pb
General Conformity *De Minimis* Threshold (tons/year)	10	N/A	10	100	70	100	N/A
Haul Year 2016							
Constant and Road Repair Emissions (tons/year) [a]	0	0	0	0	0	0	0
Annual VMT Allowable (miles/year) [b]	56,605,856	N/A	1,827,796	5,491,312,228	312,893,953	684,560,067	N/A
Annual Truck Trips Allowed (trucks/year) [c]	452,847	N/A	14,622	43,930,498	2,503,152	5,476,481	N/A
Annual Material Hauled in Allowable Truck Trips (cy/year) [d]	8,604,090	N/A	277,825	834,679,459	47,559,881	104,053,130	N/A
Haul Year 2017							
Constant and Road Repair Emissions (tons/year) [a]	0	0	0	0	0	0	0
Annual VMT Allowable (miles/year) [b]	60,501,736	N/A	2,108,581	5,502,675,083	333,814,732	750,867,135	N/A
Annual Truck Trips Allowed (trucks/year) [c]	484,014	N/A	16,869	44,021,401	2,670,518	6,006,937	N/A
Annual Material Hauled in Allowable Truck Trips (cy/year) [d]	9,196,264	N/A	320,504	836,406,613	50,739,839	114,131,804	N/A
Summary							
Total Material Hauled in Allowable Truck Trips (cy/project)	17,800,354	N/A	598,329	1,671,086,071	98,299,720	218,184,935	N/A
Soil Volume to be Removed from SSFL (cy/project)	502,381						
Is the 2017 Deadline Met (Yes/No)?	Yes						
Duration Required to Complete Hauling (Years)	1.68						

Notes:

[a] There are no constant, non-hauling emissions expected to occur in Kern County. Additionally, road repair activities will not occur in Kern County.

[b] Conversion factor: 1 short ton: 907,185 grams

[c] Distance Traveled per Roundtrip: 125 VMT/trip

[d] Truck Capacity: 19 cy/truck

Vehicle Emission Factors

Vehicle Type	Emission Factors (g/mile) [a]						
	VOC	**CO**	**NOx**	**SOx**	**PM_{10} [b]**	**$PM_{2.5}$ [b]**	**Pb [c]**
2016 Offsite Emission Factors (55 mph)							
Heavy-Heavy Duty Trucks [d]	0.160	1.071	4.963	0.017	0.203	0.133	0.001
2017 Offsite Emission Factors (55 mph)							
Heavy-Heavy Duty Trucks [d]	0.150	1.021	4.302	0.016	0.190	0.121	0.001

Notes:

[a] Unless otherwise noted, emission factors are from EMFAC2011-PL.

[b] PM_{10} and $PM_{2.5}$ emission factors account for particulate emissions from running exhaust, tire wear, and break wear.

[c] A lead emission factor for stationary and portable internal combustion engines was assumed representative of on-road vehicles. This factor was obtained from Table B-2 of the *Supplemental Instructions: Reporting Procedures for AB2588 Facilities for Reporting their Quadrennial Air Toxics Emissions Inventory* (SCAQMD, 2010). Due to limited available data, this emission factor was assumed equal for all vehicle speeds and all construction years: 0.0083 lbs/1,000 gallons

[d] As calculated using the EMFAC2011 Web Based Emissions Database for California, the heavy-heavy duty truck (diesel) fuel economy is: 5.569 miles per gallon

ATTACHMENT 1-10

Truck Trip Analysis for the Maximum Distance Traveled in Kings County (SJVAB)

NASA SSFL EIS - Air Quality General Conformity Analysis

Introduction:

This tab identifies whether the 2017 deadline can be met based on the county's General Conformity *de minimis* threshold values, the project emissions occurring regardless of hauling activities, and the maximum possible mileage traveled within the county.

Truck Trip Analysis

Pollutant	VOC	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$	Pb
General Conformity *De Minimis* Threshold (tons/year)	10	N/A	10	100	100	100	N/A
Haul Year 2016							
Constant and Road Repair Emissions (tons/year) [a]	0	0	0	0	0	0	0
Annual VMT Allowable (miles/year) [b]	56,605,856	N/A	1,827,796	5,491,312,228	446,991,362	684,560,067	N/A
Annual Truck Trips Allowed (trucks/year) [c]	1,489,628	N/A	48,100	144,508,217	11,762,931	18,014,739	N/A
Annual Material Hauled in Allowable Truck Trips (cy/year) [d]	28,302,928	N/A	913,898	2,745,656,114	223,495,681	342,280,033	N/A
Haul Year 2017							
Constant and Road Repair Emissions (tons/year) [a]	0	0	0	0	0	0	0
Annual VMT Allowable (miles/year) [b]	60,501,736	N/A	2,108,581	5,502,675,083	476,878,189	750,867,135	N/A
Annual Truck Trips Allowed (trucks/year) [c]	1,592,151	N/A	55,489	144,807,239	12,549,426	19,759,661	N/A
Annual Material Hauled in Allowable Truck Trips (cy/year) [d]	30,250,868	N/A	1,054,291	2,751,337,542	238,439,095	375,433,567	N/A
Summary							
Total Material Hauled in Allowable Truck Trips (cy/project)	58,553,796	N/A	1,968,189	5,496,993,656	461,934,775	717,713,601	N/A
Soil Volume to be Removed from SSFL (cy/project)	502,381						
Is the 2017 Deadline Met (Yes/No)?	Yes						

Notes:

[a] There are no constant, non-hauling emissions expected to occur in Kings County. Additionally, road repair activities will not occur in Kings County.

[b] Conversion factor: 1 short ton: 907,185 grams

[c] Distance Traveled per Roundtrip: 38 VMT/trip

[d] Truck Capacity: 19 cy/truck

Vehicle Emission Factors

Vehicle Type	Emission Factors (g/mile) [a]						
	VOC	**CO**	**NOx**	**SOx**	**PM_{10} [b]**	**$PM_{2.5}$ [b]**	**Pb [c]**
2016 Offsite Emission Factors (55 mph)							
Heavy-Heavy Duty Trucks [d]	0.160	1.071	4.963	0.017	0.203	0.133	0.001
2017 Offsite Emission Factors (55 mph)							
Heavy-Heavy Duty Trucks [d]	0.150	1.021	4.302	0.016	0.190	0.121	0.001

Notes:

[a] Unless otherwise noted, emission factors are from EMFAC2011-PL.

[b] PM_{10} and $PM_{2.5}$ emission factors account for particulate emissions from running exhaust, tire wear, and break wear.

[c] A lead emission factor for stationary and portable internal combustion engines was assumed representative of on-road vehicles. This factor was obtained from Table B-2 of the *Supplemental Instructions: Reporting Procedures for AB2588 Facilities for Reporting their Quadrennial Air Toxics Emissions Inventory* (SCAQMD, 2010). Due to limited available data, this emission factor was assumed equal for all vehicle speeds and all construction years: 0.0083 lbs/1,000 gallons

[d] As calculated using the EMFAC2011 Web Based Emissions Database for California, the heavy-heavy duty truck (diesel) fuel economy is: 5.569 miles per gallon

ATTACHMENT 1-11

Truck Trip Analysis for the Maximum Distance Traveled in Clark County (Nevada)

NASA SSFL EIS - Air Quality General Conformity Analysis

Introduction:

This tab identifies whether the 2017 deadline can be met based on the county's General Conformity *de minimis* threshold values, the project emissions occurring regardless of hauling activities, and the maximum possible mileage traveled within the county.

Truck Trip Analysis

Pollutant	VOC	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$	Pb
General Conformity *De Minimis* Threshold (tons/year)	100	100	100	N/A	70	N/A	N/A
Haul Year 2016							
Constant and Road Repair Emissions (tons/year) [a]	0	0	0	0	0	0	0
Annual VMT Allowable (miles/year) [b]	523,925,172	78,194,102	14,808,331	N/A	312,893,953	N/A	N/A
Annual Truck Trips Allowed (trucks/year) [c]	2,943,400	439,293	83,193	N/A	1,757,831	N/A	N/A
Annual Material Hauled in Allowable Truck Trips (cy/year) [d]	55,924,597	8,346,561	1,580,665	N/A	33,398,793	N/A	N/A
Haul Year 2017							
Constant and Road Repair Emissions (tons/year) [a]	0	0	0	0	0	0	0
Annual VMT Allowable (miles/year) [b]	537,519,536	79,181,740	16,738,781	N/A	333,225,711	N/A	N/A
Annual Truck Trips Allowed (trucks/year) [c]	3,019,773	444,841	94,038	N/A	1,872,055	N/A	N/A
Annual Material Hauled in Allowable Truck Trips (cy/year) [d]	57,375,681	8,451,983	1,786,724	N/A	35,569,037	N/A	N/A
Summary							
Total Material Hauled in Allowable Truck Trips (cy/project)	113,300,278	16,798,545	3,367,388	N/A	68,967,829	N/A	N/A
Soil Volume to be Removed from SSFL (cy/project)	502,381						
Is the 2017 Deadline Met (Yes/No)?	Yes						

Notes:

[a] There are no constant, non-hauling emissions expected to occur in Clark County. Additionally, road repair activities will not occur in Clark County.

[b] Conversion factor: 1 short ton: 907,185 grams

[c] Distance Traveled per Roundtrip: 178 VMT/trip

[d] Truck Capacity: 19 cy/truck

Vehicle Emission Factors

Vehicle Type	Emission Factors (g/mile) [a]						
	VOC	**CO**	**NOx**	**SOx**	**PM_{10} [b]**	**$PM_{2.5}$ [b]**	**Pb [c]**
2016 Offsite Emission Factors (55 mph)							
Heavy-Heavy Duty Trucks [d]	0.173	1.160	6.126	0.017	0.203	0.133	0.001
2017 Offsite Emission Factors (55 mph)							
Heavy-Heavy Duty Trucks [d]	0.169	1.146	5.420	0.016	0.191	0.122	0.001

Notes:

[a] As a conservative estimate, the maximum California emission factors were assumed representative of Clark County.

[b] PM_{10} and $PM_{2.5}$ emission factors account for particulate emissions from running exhaust, tire wear, and break wear.

[c] A lead emission factor for stationary and portable internal combustion engines was assumed representative of on-road vehicles. This factor was obtained from Table B-2 of the *Supplemental Instructions: Reporting Procedures for AB2588 Facilities for Reporting their Quadrennial Air Toxics Emissions Inventory* (SCAQMD, 2010). Due to limited available data, this emission factor was assumed equal for all vehicle speeds and all construction years: 0.0083 lbs/1,000 gallons

[d] As calculated using the EMFAC2011 Web Based Emissions Database for California, the heavy-heavy duty truck (diesel) fuel economy is: 5.569 miles per gallon

ATTACHMENT 1-12

Truck Trip Analysis for the Maximum Distance Traveled in White Pine County (Nevada)

NASA SSFL EIS - Air Quality General Conformity Analysis

Introduction:

This tab identifies whether the 2017 deadline can be met based on the county's General Conformity *de minimis* threshold values, the project emissions occurring regardless of hauling activities, and the maximum possible mileage traveled within the county.

Truck Trip Analysis

Pollutant	VOC	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$	Pb
General Conformity *De Minimis* Threshold (tons/year)	N/A	N/A	N/A	100	N/A	N/A	N/A
Haul Year 2016							
Constant and Road Repair Emissions (tons/year) [a]	0	0	0	0	0	0	0
Annual VMT Allowable (miles/year) [b]	N/A	N/A	N/A	5,491,312,228	N/A	N/A	N/A
Annual Truck Trips Allowed (trucks/year) [c]	N/A	N/A	N/A	24,297,842	N/A	N/A	N/A
Annual Material Hauled in Allowable Truck Trips (cy/year) [d]	N/A	N/A	N/A	461,658,993	N/A	N/A	N/A
Haul Year 2017							
Constant and Road Repair Emissions (tons/year) [a]	0	0	0	0	0	0	0
Annual VMT Allowable (miles/year) [b]	N/A	N/A	N/A	5,502,675,083	N/A	N/A	N/A
Annual Truck Trips Allowed (trucks/year) [c]	N/A	N/A	N/A	24,348,120	N/A	N/A	N/A
Annual Material Hauled in Allowable Truck Trips (cy/year) [d]	N/A	N/A	N/A	462,614,277	N/A	N/A	N/A
Summary							
Total Material Hauled in Allowable Truck Trips (cy/project)	N/A	N/A	N/A	924,273,270	N/A	N/A	N/A
Soil Volume to be Removed from SSFL (cy/project)	502,381						
Is the 2017 Deadline Met (Yes/No)?	Yes						

Notes:

[a] There are no constant, non-hauling emissions expected to occur in White Pine County. Additionally, road repair activities will not occur in White Pine County.

[b] Conversion factor: 1 short ton: 907,185 grams

[c] Distance Traveled per Roundtrip: 226 VMT/trip

[d] Truck Capacity: 19 cy/truck

Vehicle Emission Factors

Vehicle Type	Emission Factors (g/mile) [a]						
	VOC	**CO**	**NOx**	**SOx**	**PM_{10} [b]**	**$PM_{2.5}$ [b]**	**Pb [c]**
2016 Offsite Emission Factors (55 mph)							
Heavy-Heavy Duty Trucks [d]	0.173	1.160	6.126	0.017	0.203	0.133	0.001
2017 Offsite Emission Factors (55 mph)							
Heavy-Heavy Duty Trucks [d]	0.169	1.146	5.420	0.016	0.191	0.122	0.001

Notes:

[a] As a conservative estimate, the maximum California emission factors were assumed representative of White Pine County.

[b] PM_{10} and $PM_{2.5}$ emission factors account for particulate emissions from running exhaust, tire wear, and break wear.

[c] A lead emission factor for stationary and portable internal combustion engines was assumed representative of on-road vehicles. This factor was obtained from Table B-2 of the *Supplemental Instructions: Reporting Procedures for AB2588 Facilities for Reporting their Quadrennial Air Toxics Emissions Inventory* (SCAQMD, 2010). Due to limited available data, this emission factor was assumed equal for all vehicle speeds and all construction years: 0.0083 lbs/1,000 gallons

[d] As calculated using the EMFAC2011 Web Based Emissions Database for California, the heavy-heavy duty truck (diesel) fuel economy is: 5.569 miles per gallon

ATTACHMENT 1-13

Truck Trip Analysis for the Maximum Distance Traveled in Tooele County (Utah)

NASA SSFL EIS - Air Quality General Conformity Analysis

Introduction:

This tab identifies whether the 2017 deadline can be met based on the county's General Conformity *de minimis* threshold values, the project emissions occurring regardless of hauling activities, and the maximum possible mileage traveled within the county.

Truck Trip Analysis

Pollutant	VOC	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$	Pb
General Conformity *De Minimis* Threshold (tons/year)	N/A	N/A	N/A	100	N/A	N/A	N/A
Haul Year 2016							
Constant and Road Repair Emissions (tons/year) [a]	0	0	0	0	0	0	0
Annual VMT Allowable (miles/year) [b]	N/A	N/A	N/A	5,491,312,228	N/A	N/A	N/A
Annual Truck Trips Allowed (trucks/year) [c]	N/A	N/A	N/A	50,845,484	N/A	N/A	N/A
Annual Material Hauled in Allowable Truck Trips (cy/year) [d]	N/A	N/A	N/A	966,064,188	N/A	N/A	N/A
Haul Year 2017							
Constant and Road Repair Emissions (tons/year) [a]	0	0	0	0	0	0	0
Annual VMT Allowable (miles/year) [b]	N/A	N/A	N/A	5,502,675,083	N/A	N/A	N/A
Annual Truck Trips Allowed (trucks/year) [c]	N/A	N/A	N/A	50,950,695	N/A	N/A	N/A
Annual Material Hauled in Allowable Truck Trips (cy/year) [d]	N/A	N/A	N/A	968,063,209	N/A	N/A	N/A
Summary							
Total Material Hauled in Allowable Truck Trips (cy/project)	N/A	N/A	N/A	1,934,127,397	N/A	N/A	N/A
Soil Volume to be Removed from SSFL (cy/project)	502,381						
Is the 2017 Deadline Met (Yes/No)?	Yes						

Notes:

[a] There are no constant, non-hauling emissions expected to occur in Tooele County. Additionally, road repair activities will not occur in Tooele County.

[b] Conversion factor: 1 short ton: 907,185 grams

[c] Distance Traveled per Roundtrip: 108 VMT/trip

[d] Truck Capacity: 19 cy/truck

Vehicle Emission Factors

Vehicle Type	Emission Factors (g/mile) [a]						
	VOC	**CO**	**NOx**	**SOx**	**PM_{10} [b]**	**$PM_{2.5}$ [b]**	**Pb [c]**
2016 Offsite Emission Factors (55 mph)							
Heavy-Heavy Duty Trucks [d]	0.173	1.160	6.126	0.017	0.203	0.133	0.001
2017 Offsite Emission Factors (55 mph)							
Heavy-Heavy Duty Trucks [d]	0.169	1.146	5.420	0.016	0.191	0.122	0.001

Notes:

[a] As a conservative estimate, the maximum California emission factors were assumed representative of Tooele County.

[b] PM_{10} and $PM_{2.5}$ emission factors account for particulate emissions from running exhaust, tire wear, and break wear.

[c] A lead emission factor for stationary and portable internal combustion engines was assumed representative of on-road vehicles. This factor was obtained from Table B-2 of the *Supplemental Instructions: Reporting Procedures for AB2588 Facilities for Reporting their Quadrennial Air Toxics Emissions Inventory* (SCAQMD, 2010). Due to limited available data, this emission factor was assumed equal for all vehicle speeds and all construction years: 0.0083 lbs/1,000 gallons

[d] As calculated using the EMFAC2011 Web Based Emissions Database for California, the heavy-heavy duty truck (diesel) fuel economy is: 5.569 miles per gallon

End of Appendix I

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APPENDIX J

Santa Susana Field Laboratory–Paleontological Resources Assessment

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TECHNICAL MEMORANDUM CH2MHILL®

APPENDIX J

Santa Susana Field Laboratory–Paleontological Resources Assessment

PREPARED FOR: Amy Keith/NASA
Allen Elliott/NASA

PREPARED BY: James Verhoff/CH2M HILL
Geof Spaulding/CH2M HILL

COPIES: Beth Vaughan/CH2M HILL
Leslie Tice/CH2M HILL

DATE: November 30, 2011

Introduction

The purpose of this technical memorandum is to evaluate the potential for encountering paleontological resources (more commonly known as fossils) and to identify the potential impacts to paleontological resources that could result from the National Aeronautic and Space Administration's (NASA's) proposal to demolish structures and conduct soil and groundwater remediation on the NASA-administered property at the Santa Susana Field Laboratory (SSFL). For the purpose of this analysis, the NASA-administered property of SSFL is termed the "study area," as portrayed in Figure 1.

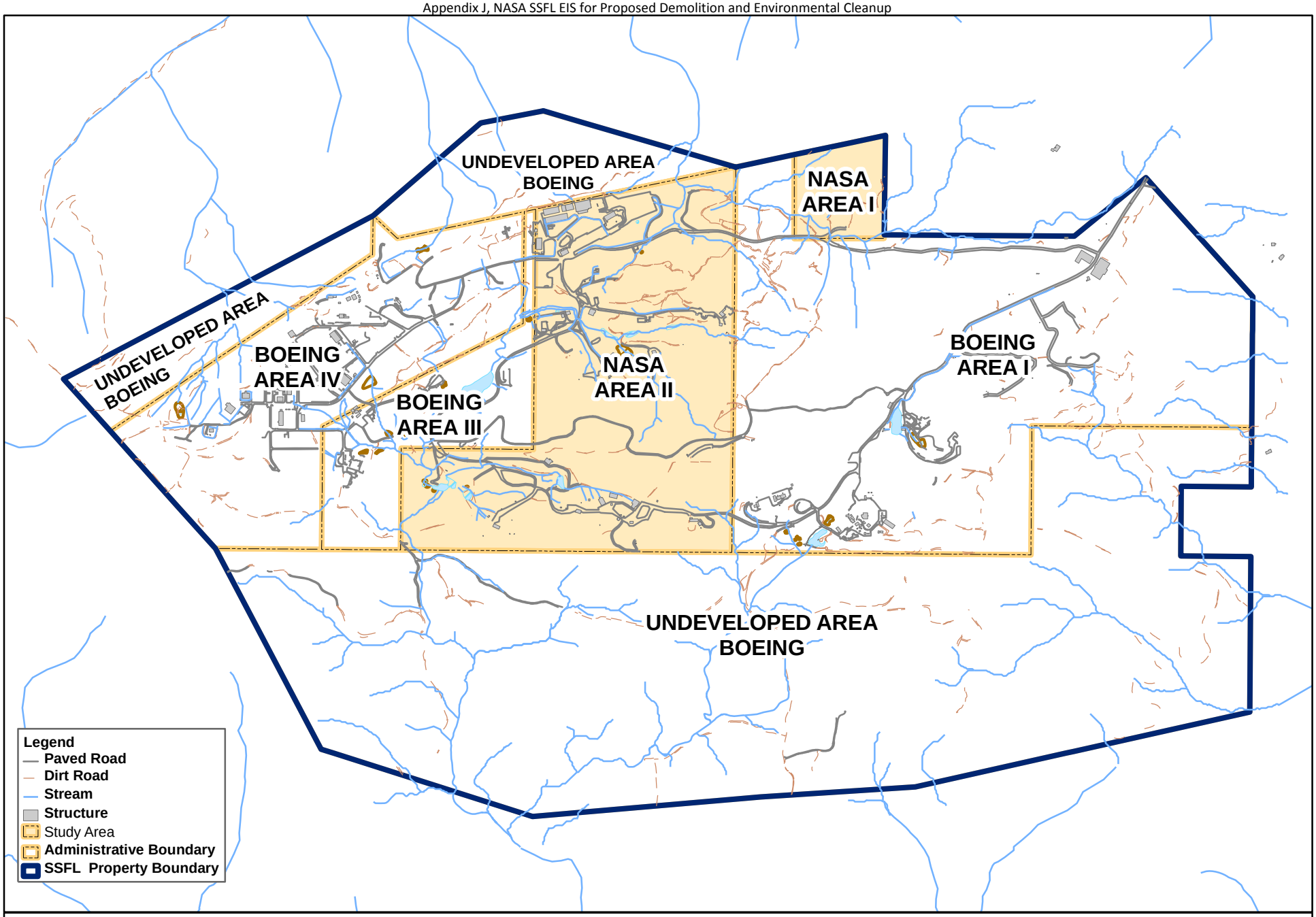
This study was prepared in conjunction with the federal Environmental Impact Statement (EIS). NASA is considering the following in its EIS:

- Up to 100-percent demolition of structures located on the NASA-administered portion of SSFL
- Soil remediation across the site by applying one or more remedial technologies including excavation, ex-situ treatments (which require excavation, treatment, and replacement of treated soils), soil vapor extraction, in-situ treatments (which include installing wells and injecting chemical, biological, or thermal treatments), phytoremediation, monitored natural attenuation, or institutional controls
- Groundwater treatment across the site by installing wells and applying one or more remedial technologies including pump and treat, vacuum extraction, iron-particle injection, thermal extraction, in-situ chemical or biological treatments, monitored natural attenuation, or institutional controls

Figures 2a and 2b identify the areas in which soil and groundwater remediation activities could take place. This assessment considers the potential to encounter paleontological resources as a result of the implementation of these proposed actions.

Although this assessment was conducted to support the EIS, other activities such as characterization of contamination and site operations also potentially could encounter or adversely affect paleontological resources. These activities are outside the scope of the EIS, but will be considered in the overall assessment.

This study included a literature search, which included reviewing available geologic maps, scientific publications, and technical reports for SSFL. A review of available museum and database records also was conducted. This study was conducted in compliance with professional guidelines and legislation relevant to paleontological resources management and mitigation, discussed in Section 3.



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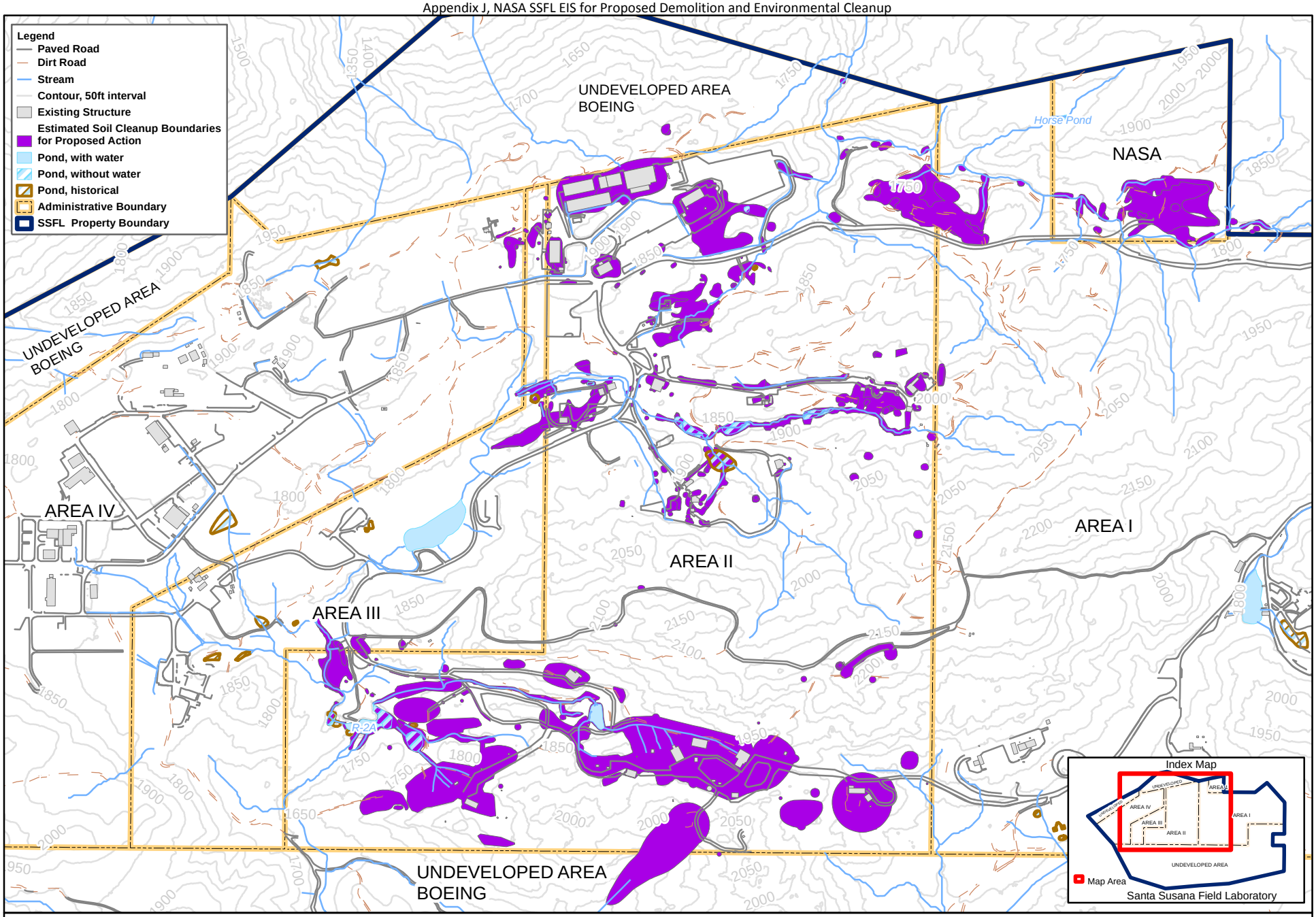
28-Nov-2011
Drawn By:
A. Cooley

Figure 1
Regional Map
NASA - Santa Susana Field Laboratory
Paleontological Resources Assessment

Map Document: O:\NASA\SSFL\maps\EIS_2011\PRA_Regional.mxd



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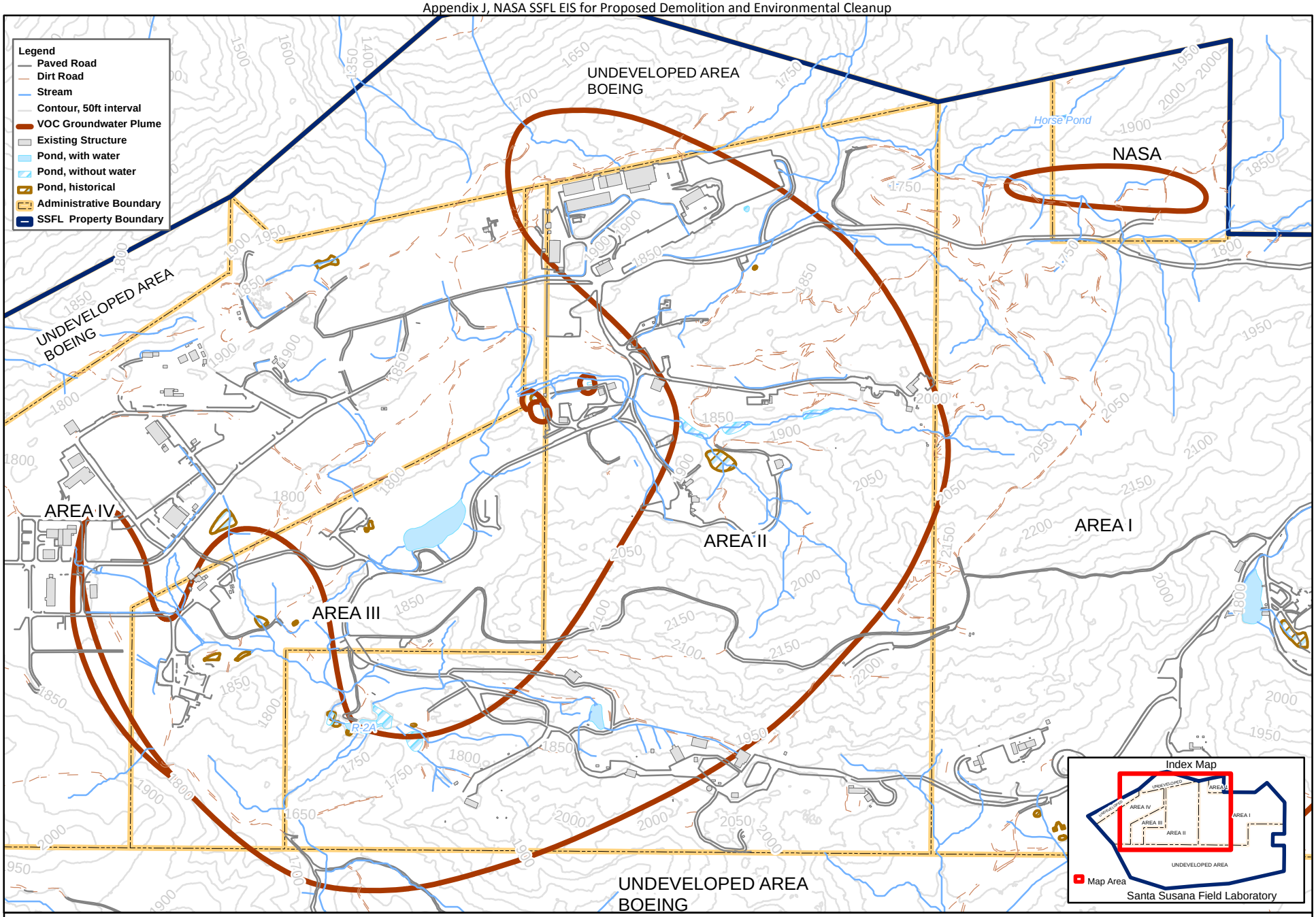
28-Nov-2011
Drawn By:
A. Cooley

Figure 2A
Proposed Soil Remediation Area Under the Proposed Action
NASA - Santa Susana Field Laboratory
Paleontological Resources Assessment

Map Document: O:\NASA\SSFL\maps\EIS_2011\PRA_ProposedCleanup.mxd



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28-Nov-2011
Drawn By:
A. Cooley

Figure 2B
Proposed Groundwater Remediation Area Under All Action Alternatives
NASA - Santa Susana Field Laboratory
Paleontological Resources Assessment

Map Document: O:\NASA\SSFL\maps\EIS_2011\PRA_GroundwaterRemediation.mxd

The environmental setting, including a discussion of the geologic setting, is presented in Section 2. A description of the laws, ordinances, regulations, and standards applicable to paleontological resources is presented in Section 3. Section 4 provides a discussion of the project impacts and associated mitigation measures. References are provided in Section 5.

Environmental Setting

SSFL consists of approximately 2,850 acres of hilly terrain approximately 29 miles northwest of downtown Los Angeles, California, and immediately southeast of Simi Valley, on the southeastern corner of Ventura County, California. The site is at approximately 2,100 feet of elevation with more than 1,000 feet of topographic relief within the study area.

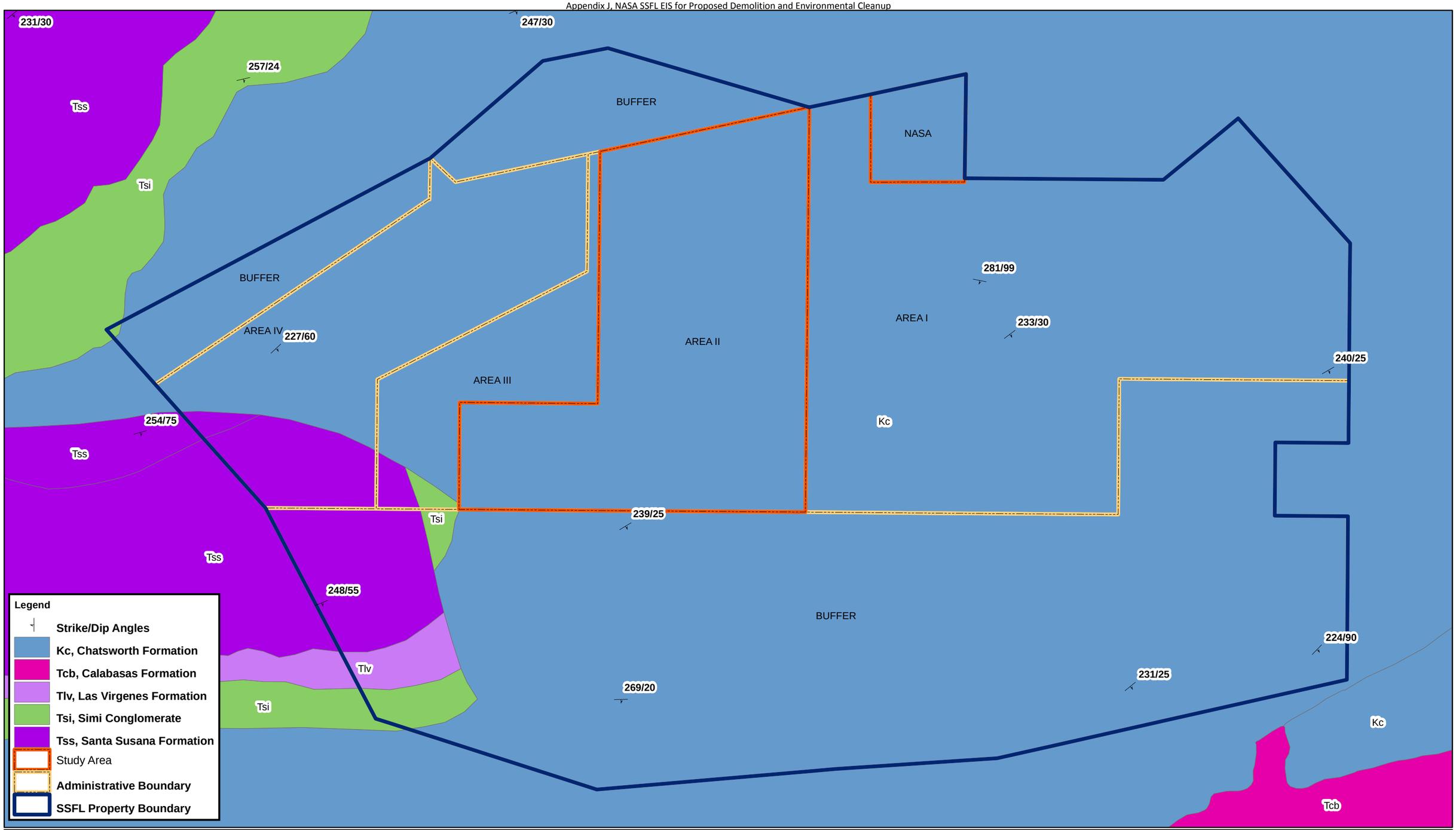
Regional Geology

SSFL is situated in the Transverse Ranges, a geomorphic province dominated by rugged, mountainous terrain. The geologic structures of the Transverse Ranges, including the province itself, run predominantly east-west because of north-south compression from the numerous faults in the region, predominantly the San Andreas Fault Zone (MWH, 2007). The Transverse Ranges themselves are largely granitic, but sedimentary rocks also are preserved in certain areas, particularly on the flanks of the uplifts. As might be expected from its proximity to the Pacific Ocean, the sedimentary formations of the region preserve a predominantly marine history, with several non-marine episodes, and have produced a nearly continuous record from the Late Cretaceous to the Quaternary (MWH, 2009). Since the Early Miocene the region has undergone several episodes of intense deformation, including rotation of the entire region, which continues today (Nicholson et al., 1994), and later rifting (MWH, 2009). Together, these tectonic events create a complex regional geology that includes numerous large folds and faults as ever more Pacific Ocean sediment is accreted to the western edge of North America.

Local Geology

Figure 3 shows the geological units within this rugged area. In general, the local geology of an area establishes the potential to encounter paleontological resources within that area. The geologic unit that underlies the entire study area is the Cretaceous Chatsworth Formation (Kew, 1924; MWH, 2007), which is now defined as encompassing the fine-grained marine sandstones of the Late Cretaceous in the Simi Hills that had previously been considered part of the Chico Formation (Colburn et al., 1981a; Kew, 1924). The Chatsworth Formation is bounded at the top by an angular unconformity, which forms the contact with the overlying Simi Conglomerate; the bottom contact of the unit is not exposed (Colburn et al., 1981a; MWH, 2007; MWH, 2009), but seismic data suggest that the formation unconformably overlies continental basement rock (Colburn, 1981b). In the study area, the formation generally dips to the northwest and is deformed by numerous faults and folds (Kew, 1924; Colburn et al., 1981a).The formation is interpreted to be a preserved submarine fan, composed primarily of turbidite sandstones and interbedded mudstone (Colburn et al., 1981a). For the purposes of this report, the Chatsworth Formation has been divided into a lower member, which is exposed at the southeastern corner of the site and generally dips northeast to underlie the site at unknown, but presumably great, depths; and an upper member, which dominates the surface geology of the site and forms the dramatic cliffs in the area. More recent work (MWH, 2007; MWH, 2009) has subdivided the upper portion of the Chatsworth Formation into numerous members, based generally on grain size and bed thickness, and provides detailed stratigraphic analysis of the upper member of the formation. The division between the upper and lower members of the Chatsworth Formation is based on the percentages of fine-grained to coarse-grained beds visible in outcrops, although the lithology of both members is similar and both include beds ranging from coarse sandstone to shale (MWH, 2007). In satellite imagery the upper member of the Chatsworth Formation is identifiable by the more rugged topography, which includes numerous cliffs and shear faces. In contrast, the lower member of the Chatsworth Formation, which is exposed in only a small portion of the southeastern corner of the study area, has produced a relatively less rugged topography with fewer outcrops and cliff faces.

The predominant sedimentary structures throughout the Chatsworth Formation, both upper and lower member, are turbidites (Colburn et al., 1981a). These, along with a sparse and re-worked local fauna (Colburn et al., 1981a) and numerous soft-sediment deformation structures (MWH, 2007), indicate that this formation was deposited in a



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28-Nov-2011
Drawn By:
A. Cooley

Figure 3
Regional Geologic Units
NASA - Santa Susana Field Laboratory
Paleontological Resources Assessment

Map Document: O:\NASA\SSFL\maps\EIS_2011\PRA_Paleo.mxd

submarine fan environment. Submarine fans are broad, conical structures that form at the mouths of submarine canyons (canyons that form on the continental slopes), as shown in Link et al. (1981). This deposition has resulted in a geologic unit that generally is composed of laterally discontinuous beds. Turbidite deposits within these fans usually consist of sandstone and siltstone layers, decreasing in both grain size and bed thickness up-section, and typically are channelized and of limited geographic extent (Link, 1981). In places, part or all of the fine-grained portions of the turbidite sequence might have been stripped from the deposit by the processes that formed subsequent turbidite deposits, resulting in thick layers of sandstone with little to no shale between depositional beds (Link et al., 1981). Conglomerates and coquina-like shell deposits, such as those found in Dayton and Bell Canyons, are located in the lowest portions of the turbidite sequences (Link et al., 1981).

The only other units within the study area are quaternary alluvium, which consists of thin layers (typically 5 feet thick or less) of material eroded from the Chatsworth Formation scattered throughout the site (MWH, 2007); and disturbed fill from historic construction activities.

Younger sedimentary formations lie to the northwest and southeast of the study area. These include the Simi Conglomerate, the Las Virgenes Formation, the Santa Susana Formation, and the Calabasas Formation. In particular, the marine Santa Susana Formation lies immediately west of the southwestern study area boundary (Figure 3). This formation, however, is separated from the study area by a fault (MWH, 2007) and is not known to underlie any portion of the study area. These formations will not be affected adversely by the proposed demolition and remediation activities, and therefore, are not considered further.

Paleontological Records Search Results

A part of the assessment includes the review of available geologic maps, scientific publications, technical reports, and other references to identify geologic formations that would likely contain paleontological resources and to identify paleontological resources that have been previously identified by others neat the study area. The results of this review are discussed in this subsection.

Few references to fossils within the Chatsworth Formation are available. In large part, this might lack be due to the relative rarity of fossils within this unit. Megafossils (generally, fossils large enough to be seen in the field and without the aid of microscopes) are restricted to the lower member of the formation, and are rare within that member (Link et al., 1981). This lack of fossil records from the Chatsworth formation, in part, also could be because the formation name is relatively new (Link et al., 1981); therefore, fossils previously found in these beds would be attributed to other formations. The formation also was determined to have no potential to produce petroleum (Kew, 1924), which likely further reduced commercial interest in this formation.

To verify that the fossil record of the sediments underlying the study area was adequately addressed, the history of the sediments was reviewed, as were records of fossils found within the sediments before the adoption of the name “Chatsworth Formation.” Prior to 1981, the Cretaceous marine shales of the Simi Hills were described as being part of the Chico Formation (Link et al., 1981; Waring, 1917). No fossils were found in the overlying sandstone (what is now called the upper member of the Chatsworth Formation); however, invertebrate fossils, including gastropods, cephalopods, pelecypods (bivalves), echinoderms, and brittle stars were found in the shales now referred to as the lower member of the Chatsworth Formation (Waring, 1917). Later work (Kew, 1924) attributed both the shale-rich and overlying sandstone-rich units as part of the Chico Formation. The lithology of the fossil-bearing material also was defined more precisely–fossils were predominantly found in brown, calcite-rich, fine-grained sandstone at the base of the lower shale-rich unit (Kew, 1924). Kew (1924) confirms earlier reports that the upper sandstone units of Cretaceous age in this region are not fossiliferous.

More recently, field work in the Simi Hills area, and examination of museum records collected from beds now attributed to the Chatsworth Formation, have produced a sparse assemblage of invertebrate fossils including gastropods, cephalopods, and bivalves (Saul and Alderson, 1981), as well as trace fossils (Bottjer, 1981), from a small number of sites within the lower member of the formation. Although it has been estimated that more than 100 species of mollusks have been found, the majority have not yet been described (Saul and Alderson, 1981). The body fossils (fossils of the organism itself, as opposed to the trace fossils such as trackways and burrows) tend to be preserved in discrete packets of the rock (generally referred to as lenses due to their shape, which resembles a

convex lens) that represent the lowermost portions of channelized turbidite deposits within the lower member of the formation (Link, 1981). These fossil assemblages likely represent communities living at more shallow depths that were transported into the area by the turbidity currents that created this formation (Colburn et al., 1981a). Predominantly, these fossils have been found in the Dayton and Black Canyons (Saul and Alderson, 1981; Welton and Alderson, 1981; Waring, 1917), with the nearest lying 1.5 miles east of the study area (Link et al., 1981), within the lower member of the Chatsworth Formation.

The only vertebrate remains recorded from the Chatsworth Formation are shark teeth and fish bone found in two locations within the lower member of the formation, in association with large numbers of mollusk shells (Welton and Alderson, 1981). Few teeth are visible in hand-samples at either location; most of the fish remains were discovered by dissolution of rock from these locations in formic acid, which produced teeth, vertebrae, and placoid scales (Welton and Alderson, 1981).

Several microfossil sites (sites that have yielded fossils of microscopic organisms such as radiolaria, diatoms, and foraminifera) are located in the upper and lower members of the Chatsworth Formation. These include benthic foraminifera (Almgren, 1981) and calcareous nanofossils (Filewicz, 1981), which have contributed to identifying the age and depositional setting of the formation (Colburn et al., 1981a). Finally, plant fossils, including twigs and leaves, have been found in the fine-grained units within the Chatsworth Formation (Colburn et al., 1981a), although no details regarding the stratigraphic context of these fossils are available.

Along with the literature reviewed, two standard online databases (the PaleoBiology Database [not dated (n.d.)] and the University of California Museum of Paleontology [UCMP] database [n.d.]) were reviewed. The PaleoBiology Database (n.d.) records four gastropod species (*Perissitys colocara, P. pacifica, Murphitys Madonna,* and *M. corona*) from the formation. No information about the stratigraphy is provided (PaleoBiology Database, n.d.), and the study to which these records were attributed (Popenoe and Saul, 1987) does not provide a detailed stratigraphic analysis of these finds. The UCMP database (n.d.) does not include any records from the Chatsworth Formation Several records attributed to the Chico Formation within Ventura County in the UCMP database (UCMP, n.d.) are almost certainly references to outcrops now classified as the Chatsworth Formation; however, these references do not include faunal lists (UCMP, n.d.).

No fossils were attributed to the Quaternary alluvium at the site.

Because disturbed sediments, including disturbed native sediment and any non-native fill, have no potential to produce scientifically significant paleontological resources, these sediments were not included in the literature or records review.

Regulatory Setting

Potentially applicable federal, state, and local laws, ordinances, regulations, and standards governing the assessment and protection of paleontological resources are discussed in the following subsections.

Federal Regulations

Paleontological resources are protected by federal regulations, most of which apply only to excavations and construction on federal land. Because the project is on land owned by the federal government and administered by NASA, these federal laws, ordinances, regulations, and standards are applicable to the study area.

Paleontological resources were first protected by the Federal Antiquities Act of 1906 (Public Law [P.L.] 59-209; 16 United States Code [U.S.C.] 431 et seq.; 34 Stat. 225), which calls for the protection of historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest on federal lands. Fossils, as prehistoric structures and objects of scientific interest, are therefore protected by this act.

Further federal protection of paleontological resources is provided by the Federal Land Management and Policy Act (43 U.S.C. 1712[c], 1732[b]); sec. 2, Federal Land Management and Policy Act of 1962 [30 U.S.C. 611]; Subpart 3631.0 et seq.), *Federal Register* Vol. 47, No. 159 (1982). This regulation charges federal agencies to manage public lands in a manner that protects the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, archaeological, and water resources and, where appropriate, to preserve and protect certain

public lands in their natural conditions (Section 102[a][8][11]); to periodically inventory public lands so that the data can be used to make informed land-use decisions (Section 102[a][2]); and to regulate the use and development of public lands and resources through easements, licenses, and permits (Section 302[b]). Although paleontological resources are not mentioned specifically, scientifically significant fossils are understood to be scientific resources to be protected under this act.

The National Historic Preservation Act of 1966 includes more-specific regulations protecting paleontological resources. The statute provides for the survey, recovery, and preservation of significant paleontological data when such data could be destroyed or lost due to a federal, federally licensed, or federally funded project (P. L. 89 665; 80 Stat. 915, 16 U.S.C. 470 et seq.)

The *Code of Federal Regulations* Title 43, Section 8365.1-5 prohibits the collection of scientific resources, including vertebrate fossils, without a permit, as well as the use of fossils found on federal land for commercial purposes. However, the collection of reasonable amounts of common invertebrate fossils for non-commercial purposes is allowed.

State of California

The state of California has several regulations that protect paleontological resources, the most important being the California Environmental Quality Act (CEQA). However, because the study area is under federal jurisdiction, these regulations are not applicable to activities within the study area.

Ventura County

The Ventura County General Plan (County of Ventura, 2011) calls for an assessment of any potential impacts to paleontological resources for any discretionary project, and if impacts are expected either redesign of the project or mitigation of anticipated impacts. Because NASA is exempt from county regulations, the Ventura County General Plan is not applicable to activity within the study area.

Professional Standards and Guidelines

The Society of Vertebrate Paleontology (SVP), an international scientific organization of professional paleontologists, has established guidelines that outline acceptable professional practices in the conduct of paleontological resource assessments and surveys, monitoring and mitigation, data recovery, specimen preparation, analysis, and curation (SVP, 1995). Most practicing professional paleontologists follow the SVP guidelines, with appropriate accommodations for the last 16 years of advancement in paleontological resources management. More recently, paleontological resource management guidelines were promulgated by the U.S. Department of the Interior (USDI) Bureau of Land Management (BLM) *Instructional Memorandum 2008-009* (2008). These guidelines incorporate advancements that are being followed by many professional paleontologists conducting paleontological studies on federally managed land and elsewhere.

Environmental Impacts and Recommendations

The potential effects on paleontological resources from the proposed demolition and remediation activities within the study area are assessed in Section 4. These potential impacts consist of damage or destruction of fossils, or improper removal of fossils from the sediments in which they are found as a result of earth-moving activities including demolition, excavation, or well installation activities associated with the proposed actions. Because paleontological resources are non-renewable resources (SVP, 1995), all impacts to paleontological resources should be considered long-term impacts.

Sensitivity Criteria

In its guidelines for assessment and mitigation of adverse impacts to paleontological resources, the SVP (1995) established three categories of paleontological sensitivity for the geologic units–high, low, and undetermined. To these categories is added that of “moderate,” following current usage in federal guidelines (BLM, 2008). The paleontological importance or sensitivity of a geologic unit reflects its potential paleontological productivity as well as the scientific significance of the fossils it has produced. The potential paleontological productivity of a geologic unit exposed in the study area is inferred from the abundance of fossil specimens and/or previously recorded fossil

sites in exposures of the unit, or of similar units in similar geological settings. The underlying assumption of this assessment method is that a stratigraphic unit is most likely to yield fossil remains in a quantity and of a quality similar to those previously recorded from the unit elsewhere in the region.

An individual fossil specimen is considered scientifically important and therefore "significant" if it is identifiable; complete; well preserved; age diagnostic; useful in paleoenvironmental reconstruction; a member of a rare species; and/or a skeletal element different from, or a specimen more complete than, those now available for the species (SVP, 1995). For example, vertebrate remains are comparatively rare in the fossil record and most identifiable vertebrate remains, therefore, are scientifically significant. Invertebrate fossils, in contrast, are frequently part of a paleontologically significant fauna represented by many collections, but individually are of low scientific significance. That said, dense concentrations of invertebrate fossils can be considered scientifically significant due to the potential to catalog an entire, possibly diverse fauna, and the potential for finding rare taxa.

Significance Criteria

Federal and state statutes, as well as professional standards, agree that the damage or destruction of a unique paleontological resource or site is a significant and adverse impact to paleontological resources (for example, CEQA Section 3.1.2) (SVP, 1995; BLM, 2008). This type of damage most typically is thought of as occurring from heavy-equipment damage to fossils, but also might occur when fossils are looted, improperly removed from the surrounding sediment, or otherwise lost to the scientific world. Because fossils are a non-renewable resource (SVP, 1995), all impacts to paleontological resources are considered adverse and potentially significant unless they result in recovery of the scientific and educational values of the resource.

Generally, the probability of adverse impacts during excavations within a geologic unit is proportionate to the paleontological sensitivity of the unit in question. Although it is theoretically possible to adversely affect paleontological resources in low-sensitivity geologic units, the possibility would be remote. The highest probability of significant adverse effects to paleontological resources results from disturbance of stratigraphic units with high paleontological sensitivity. These are geological units that have produced scientifically significant fossils, and in which recorded fossil localities are sufficiently frequent to anticipate encountering more (SVP, 1995). Significant impacts are possible from excavation in moderate sensitivity units; however, such impacts are less likely than in high sensitivity units, because fossil sites in these units tend to be widely scattered or of low scientific significance (BLM, 2008).

Paleontological resources that remain undisturbed in the sediment are considered to be unaffected by the proposed demolition and remediation activities within the study area and are considered adequately protected. Because fossils will only be exposed during the earth-moving phases of the project (including any demolition, excavation, and well installation activities), operation of treatment systems and monitoring activities that would not result in subsurface disturbances usually have no potential to affect paleontological resources.

Sensitivity of Geologic Units

The lower member of the Chatsworth Formation has produced invertebrate fossils, typically deposited down slope from their location in life (Colburn et al., 1981a) and confined to geographically discontinuous beds that represent the bottommost portion of channelized turbidite sequences (Links, 1981). Where present, invertebrate fossils tend to be extremely numerous, in places forming coquina-like deposits (Welton and Alderson, 1981). The only vertebrate fossils–shark remains–are known from two locations, both south of the study area and in members older than those present in the study area (Welton and Alderson, 1981). Professional standards (BLM, 2008) state that formations which produce such invertebrate faunas, of sufficient numbers for hobby collecting, should be considered to be of moderate paleontological sensitivity; therefore, the lower member of the Chatsworth Formation is considered to possess moderate paleontological sensitivity.

The only fossils that have been attributed to the upper member of the Chatsworth Formation are microfossils. Because microfossils generally are not individually considered to be scientifically significant, the upper member of the Chatsworth Formation is considered to possess low paleontological sensitivity.

Direct Impacts

The potential for the proposed demolition and remediation activities (along with site characterization sampling and site operation activities) to affect significant paleontological resources depends on the type of activity, as well as on the paleontological sensitivity of each geological unit affected. In general, paleontological resources are considered to be affected when they are damaged or removed from the surrounding sediment other than during a scientifically controlled excavation (SVP, 1995; BLM, 2008).

Proposed demolition activities would include removal of structural components up to 5 feet below grade and primarily would affect low-sensitivity disturbed sediment. Proposed excavation and ex-situ treatments would include removal of soils up to 20 feet below grade and primarily would affect low-sensitivity Quaternary alluvium and weathered material derived from the low-sensitivity upper member of the Chatsworth Formation. New well installations could reach depths of between 50 and 900 feet below grade and predominantly would encounter the low-sensitivity upper member of the Chatsworth formation; however, deep wells, particularly in the southern portion of the study area, might encounter the moderate-sensitivity lower member of the Chatsworth Formation. Soil borings (for site characterizations) could be advanced to the top of the weathered bedrock, and therefore would affect low-sensitivity alluvium and weathered material derived from the low-sensitivity upper member of the Chatsworth Formation. General site operation activities likely would be limited to activities such as infrastructure maintenance, plantings, pipe installation, and road or culvert maintenance, and would result only in surficial impacts to low-sensitivity alluvium.

The impacts of remediation disturbance on paleontological resources can be mitigated by scientifically recovering the fossil(s). Although well installation is the primary activity that might affect paleontological resources, reconsidering the locations where wells would be installed is not recommended because the exact locations of paleontological resources in the subsurface are not known.

Figure 3 shows the geology in the study area, which is underlain predominantly by the low-sensitivity upper member of the Chatsworth Formation; impacts to scientifically significant paleontological resources are not likely in this member. However, the moderate-sensitivity lower member of the Chatsworth Formation might be encountered during well installation activities, particularly in the southern portion of the study area. Also, a small part of the southeastern portion of the study area is underlain by the lower member of the Chatsworth Formation.

Activities that do not involve excavations or other subsurface disturbances will not affect fossils buried in the sediment, including activities such as in-situ treatment operations or monitoring activities that might affect the groundwater, but not the surrounding rock. The following mitigation recommendations are applicable only to the excavation phase of any site remediation activities, when adverse impacts are most possible.

Conclusions and Recommendations

Implementation of the mitigation measures described in the following subsections would reduce the potential for adverse impacts to paleontological resources to a negligible level. In fact, any paleontological resources recovered during excavation activities could be considered a positive impact, because much of the paleontological record from California comes from monitoring excavation activities, and any fossils uncovered during excavations into this little-studied formation could contribute to this body of knowledge.

Paleontological Field Survey.
Because the majority of the site is underlain by the low-sensitivity upper member of the Chatsworth Formation, and within the study area there are no substantial geological exposures of potentially fossiliferous sediment, no field survey is recommended. Furthermore, the moderate-sensitivity lower member of the Chatsworth Formation, which could be affected by well installation activities, could not be surveyed adequately in the study area without substantial and more invasive excavation.

Monitoring and Mitigation Plan.
Once NASA selects an alternative (including which buildings would be demolished and what types of remedial technologies would be applied to clean up soil and groundwater contamination), a paleontological monitoring and mitigation plan (PRMMP) should be developed, in compliance with CEQA and other relevant legislation, to be

implemented for activities that would extend to the moderate-sensitivity lower member of the Chatsworth Formation. The PRMMP should outline a coordination strategy so that construction disturbances of the moderate-sensitivity lower member of the Chatsworth Formation would be monitored adequately. The PRMMP should stipulate the frequency of monitoring, methods of sampling and other appropriate procedures. It also should detail the significance criteria to be used for deciding which resources would be recovered for their data potential. The PRMMP should detail methods of recovery, post-excavation preparation and analysis of specimens, final curation of specimens at an accredited facility, data analyses, and reporting. The PRMMP should stipulate that paleontological work undertaken during this project will be conducted by qualified professionals.

Construction Personnel Training.
For activities that extend to the moderate-sensitivity lower member of the Chatsworth Formation, construction personnel should be trained in recognizing possible buried paleontological resources and protecting paleontological resources during activities in the moderate-sensitivity lower member of the Chatsworth Formation in compliance with CEQA and other relevant legislation. This training should occur before activities that could affect the lower member of the Chatsworth Formation are initiated. Construction personnel should be trained on the procedures to be followed upon the discovery of paleontological materials. Personnel should be instructed that unauthorized collection or disturbance of fossils is unlawful.

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End of Appendix J