Appendix K
Supporting Biological Resources Information

USFWS, CNDDB, and CNPS Species List

Selected Elements by Common Name

California Department of Fish and Wildlife

California Natural Diversity Database

Query Criteria: Quad IS (Denair (3712057) OR Ceres (3712058) OR Turlock (3712047) OR Cressey (3712046) OR Arena (3712036) OR Atwater (3712035) OR Merced (3712034))

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
alkali milk-vetch *Astragalus tener var. tener*	PDFAB0F8R1	None	None	G2T1	S1	1B.2
bald eagle *Haliaeetus leucocephalus*	ABNKC10010	Delisted	Endangered	G5	S3	FP
burrowing owl *Athene cunicularia*	ABNSB10010	None	None	G4	S3	SSC
California alkali grass *Puccinellia simplex*	PMPOA53110	None	None	G3	S2	1B.2
California linderiella *Linderiella occidentalis*	ICBRA06010	None	None	G2G3	S2S3	
California tiger salamander *Ambystoma californiense*	AAAAA01180	Threatened	Threatened	G2G3	S2S3	WL
coast horned lizard *Phrynosoma blainvillii*	ARACF12100	None	None	G3G4	S3S4	SSC
Colusa grass *Neostapfia colusana*	PMPOA4C010	Threatened	Endangered	G1	S1	1B.1
Conservancy fairy shrimp *Branchinecta conservatio*	ICBRA03010	Endangered	None	G2	S2	
Coulter's goldfields *Lasthenia glabrata ssp. coulteri*	PDAST5L0A1	None	None	G4T2	S2	1B.1
Crotch bumble bee *Bombus crotchii*	IIHYM24480	None	Candidate Endangered	G3G4	S1S2	
dwarf downingia *Downingia pusilla*	PDCAM060C0	None	None	GU	S2	2B.2
ferruginous hawk *Buteo regalis*	ABNKC19120	None	None	G4	S3S4	WL
forked hare-leaf *Lagophylla dichotoma*	PDAST5J070	None	None	G2	S2	1B.1
giant gartersnake *Thamnophis gigas*	ARADB36150	Threatened	Threatened	G2	S2	
hairy Orcutt grass *Orcuttia pilosa*	PMPOA4G040	Endangered	Endangered	G1	S1	1B.1
hardhead *Mylopharodon conocephalus*	AFCJB25010	None	None	G3	S3	SSC
heartscale *Atriplex cordulata var. cordulata*	PDCHE040B0	None	None	G3T2	S2	1B.2
Heckard's pepper-grass *Lepidium latipes var. heckardii*	PDBRA1M0K1	None	None	G4T1	S1	1B.2

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
hoary bat *Lasiurus cinereus*	AMACC05030	None	None	G5	S4	
Keck's checkerbloom *Sidalcea keckii*	PDMAL110D0	Endangered	None	G2	S2	1B.1
least Bell's vireo *Vireo bellii pusillus*	ABPBW01114	Endangered	Endangered	G5T2	S2	
lesser saltscale *Atriplex minuscula*	PDCHE042M0	None	None	G2	S2	1B.1
Merced kangaroo rat *Dipodomys heermanni dixoni*	AMAFD03062	None	None	G3G4T2T3	S2S3	
Merced monardella *Monardella leucocephala*	PDLAM180C0	None	None	GX	SX	1A
Merced phacelia *Phacelia ciliata var. opaca*	PDHYD0C0S2	None	None	G5TH	SH	3.2
midvalley fairy shrimp *Branchinecta mesovallensis*	ICBRA03150	None	None	G2	S2S3	
moestan blister beetle *Lytta moesta*	IICOL4C020	None	None	G2	S2	
mountain plover *Charadrius montanus*	ABNNB03100	None	None	G3	S2S3	SSC
northern California legless lizard *Anniella pulchra*	ARACC01020	None	None	G3	S3	SSC
Northern Claypan Vernal Pool *Northern Claypan Vernal Pool*	CTT44120CA	None	None	G1	S1.1	
Northern Hardpan Vernal Pool *Northern Hardpan Vernal Pool*	CTT44110CA	None	None	G3	S3.1	
obscure bumble bee *Bombus caliginosus*	IIHYM24380	None	None	G4?	S1S2	
prostrate vernal pool navarretia *Navarretia prostrata*	PDPLM0C0Q0	None	None	G2	S2	1B.2
San Joaquin kit fox *Vulpes macrotis mutica*	AMAJA03041	Endangered	Threatened	G4T2	S2	
San Joaquin spearscale *Extriplex joaquinana*	PDCHE041F3	None	None	G2	S2	1B.2
San Joaquin Valley Orcutt grass *Orcuttia inaequalis*	PMPOA4G060	Threatened	Endangered	G1	S1	1B.1
Sanford's arrowhead *Sagittaria sanfordii*	PMALI040Q0	None	None	G3	S3	1B.2
shining navarretia *Navarretia nigelliformis ssp. radians*	PDPLM0C0J2	None	None	G4T2	S2	1B.2
spiny-sepaled button-celery *Eryngium spinosepalum*	PDAPI0Z0Y0	None	None	G2	S2	1B.2

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
steelhead - Central Valley DPS *Oncorhynchus mykiss irideus pop. 11*	AFCHA0209K	Threatened	None	G5T2Q	S2	
subtle orache *Atriplex subtilis*	PDCHE042T0	None	None	G1	S1	1B.2
succulent owl's-clover *Castilleja campestris var. succulenta*	PDSCR0D3Z1	Threatened	Endangered	G4?T2T3	S2S3	1B.2
Swainson's hawk *Buteo swainsoni*	ABNKC19070	None	Threatened	G5	S3	
Townsend's big-eared bat *Corynorhinus townsendii*	AMACC08010	None	None	G3G4	S2	SSC
tricolored blackbird *Agelaius tricolor*	ABPBXB0020	None	Threatened	G2G3	S1S2	SSC
valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	IICOL48011	Threatened	None	G3T2	S2	
vernal pool fairy shrimp *Branchinecta lynchi*	ICBRA03030	Threatened	None	G3	S3	
vernal pool smallscale *Atriplex persistens*	PDCHE042P0	None	None	G2	S2	1B.2
vernal pool tadpole shrimp *Lepidurus packardi*	ICBRA10010	Endangered	None	G4	S3S4	
watershield *Brasenia schreberi*	PDCAB01010	None	None	G5	S3	2B.3
western mastiff bat *Eumops perotis californicus*	AMACD02011	None	None	G5T4	S3S4	SSC
western pond turtle *Emys marmorata*	ARAAD02030	None	None	G3G4	S3	SSC
western spadefoot *Spea hammondii*	AAABF02020	None	None	G3	S3	SSC

Record Count: 54

CNPS California Native Plant Society

Inventory of Rare and Endangered Plants

*The database used to provide updates to the Online Inventory is under construction. View updates and changes made since May 2019 here.

Plant List

29 matches found. *Click on scientific name for details*

Search Criteria

Found in Quads 3712036, 3712035, 3712058, 3712046, 3712064, 3712034, 3712068, 3712161 3712047 and 3712045;

Modify Search Criteria Export to Excel Modify Columns Modify Sort Display Photos

Scientific Name	Common Name	Family	Lifeform	Blooming Period	CA Rare Plant Rank	State Rank	Global Rank
Astragalus tener var. tener	alkali milk-vetch	Fabaceae	annual herb	Mar-Jun	1B.2	S1	G2T1
Atriplex cordulata var. cordulata	heartscale	Chenopodiaceae	annual herb	Apr-Oct	1B.2	S2	G3T2
Atriplex minuscula	lesser saltscale	Chenopodiaceae	annual herb	May-Oct	1B.1	S2	G2
Atriplex persistens	vernal pool smallscale	Chenopodiaceae	annual herb	Jun,Aug,Sep,Oct	1B.2	S2	G2
Atriplex subtilis	subtle orache	Chenopodiaceae	annual herb	Jun,Aug,Sep(Oct)	1B.2	S1	G1
Brasenia schreberi	watershield	Cabombaceae	perennial rhizomatous herb (aquatic)	Jun-Sep	2B.3	S3	G5
Calycadenia hooveri	Hoover's calycadenia	Asteraceae	annual herb	Jul-Sep	1B.3	S2	G2
Castilleja campestris var. succulenta	succulent owl's-clover	Orobanchaceae	annual herb (hemiparasitic)	(Mar)Apr-May	1B.2	S2S3	G4? T2T3
Convolvulus simulans	small-flowered morning-glory	Convolvulaceae	annual herb	Mar-Jul	4.2	S4	G4
Cryptantha mariposae	Mariposa cryptantha	Boraginaceae	annual herb	Apr-Jun	1B.3	S2S3	G2G3
Downingia pusilla	dwarf downingia	Campanulaceae	annual herb	Mar-May	2B.2	S2	GU
Eryngium racemosum	Delta button-celery	Apiaceae	annual / perennial herb	Jun-Oct	1B.1	S1	G1
Eryngium spinosepalum	spiny-sepaled button-celery	Apiaceae	annual / perennial herb	Apr-Jun	1B.2	S2	G2
Extriplex joaquinana	San Joaquin spearscale	Chenopodiaceae	annual herb	Apr-Oct	1B.2	S2	G2
Hesperevax caulescens	hogwallow starfish	Asteraceae	annual herb	Mar-Jun	4.2	S3	G3
Lagophylla dichotoma	forked hare-leaf	Asteraceae	annual herb	Apr-May	1B.1	S2	G2

Lasthenia glabrata ssp. coulteri	Coulter's goldfields	Asteraceae	annual herb	Feb-Jun	1B.1	S2	G4T2
Lepidium latipes var. heckardii	Heckard's pepper-grass	Brassicaceae	annual herb	Mar-May	1B.2	S1	G4T1
Monardella leucocephala	Merced monardella	Lamiaceae	annual herb	May-Aug	1A	SH	GH
Myosurus minimus ssp. apus	little mousetail	Ranunculaceae	annual herb	Mar-Jun	3.1	S2	G5T2Q
Navarretia nigelliformis ssp. radians	shining navarretia	Polemoniaceae	annual herb	(Mar)Apr-Jul	1B.2	S2	G4T2
Navarretia prostrata	prostrate vernal pool navarretia	Polemoniaceae	annual herb	Apr-Jul	1B.1	S2	G2
Neostapfia colusana	Colusa grass	Poaceae	annual herb	May-Aug	1B.1	S1	G1
Orcuttia inaequalis	San Joaquin Valley Orcutt grass	Poaceae	annual herb	Apr-Sep	1B.1	S1	G1
Orcuttia pilosa	hairy Orcutt grass	Poaceae	annual herb	May-Sep	1B.1	S1	G1
Phacelia ciliata var. opaca	Merced phacelia	Hydrophyllaceae	annual herb	Feb-May	3.2	SH	G5TH
Pseudobahia bahiifolia	Hartweg's golden sunburst	Asteraceae	annual herb	Mar-Apr	1B.1	S2	G2
Puccinellia simplex	California alkali grass	Poaceae	annual herb	Mar-May	1B.2	S2	G3
Sagittaria sanfordii	Sanford's arrowhead	Alismataceae	perennial rhizomatous herb (emergent)	May-Oct(Nov)	1B.2	S3	G3

Suggested Citation

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish And Wildlife Office
Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846
Phone: (916) 414-6600 Fax: (916) 414-6713

In Reply Refer To: July 21, 2020
Consultation Code: 08ESMF00-2020-SLI-2409
Event Code: 08ESMF00-2020-E-07437
Project Name: ACE Extension Ceres to Merced

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, under the jurisdiction of the U.S. Fish and Wildlife Service (Service) that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the Service under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

Please follow the link below to see if your proposed project has the potential to affect other species or their habitats under the jurisdiction of the National Marine Fisheries Service:

http://www.nwr.noaa.gov/protected_species/species_list/species_lists.html

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Sacramento Fish And Wildlife Office
Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846
(916) 414-6600

Project Summary

Consultation Code: 08ESMF00-2020-SLI-2409

Event Code: 08ESMF00-2020-E-07437

Project Name: ACE Extension Ceres to Merced

Project Type: TRANSPORTATION

Project Description: The Altamont Corridor Express (ACE) service presently focuses on connecting northern San Joaquin County, the Tri-Valley, and the Silicon Valley by providing daily train service from Stockton to San Jose. The San Joaquin Regional Rail Commission is proposing to expand ACE service to Merced.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/37.44292634143818N120.78858706859259W

Counties: Merced, CA | Stanislaus, CA

Endangered Species Act Species

There is a total of 15 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Fresno Kangaroo Rat *Dipodomys nitratoides exilis* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5150 Species survey guidelines: https://ecos.fws.gov/ipac/guideline/survey/population/37/office/11420.pdf	Endangered
San Joaquin Kit Fox *Vulpes macrotis mutica* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2873	Endangered

Reptiles

NAME	STATUS
Blunt-nosed Leopard Lizard *Gambelia silus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/625	Endangered
Giant Garter Snake *Thamnophis gigas* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4482	Threatened

Amphibians

NAME	STATUS
California Red-legged Frog *Rana draytonii* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2891 Species survey guidelines: https://ecos.fws.gov/ipac/guideline/survey/population/205/office/11420.pdf	Threatened
California Tiger Salamander *Ambystoma californiense* Population: U.S.A. (Central CA DPS) There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2076	Threatened

Fishes

NAME	STATUS
Delta Smelt *Hypomesus transpacificus* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/321	Threatened

Insects

NAME	STATUS
Valley Elderberry Longhorn Beetle *Desmocerus californicus dimorphus* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/7850 Habitat assessment guidelines: https://ecos.fws.gov/ipac/guideline/assessment/population/436/office/11420.pdf	Threatened

Crustaceans

NAME	STATUS
Conservancy Fairy Shrimp *Branchinecta conservatio* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8246	Endangered
Vernal Pool Fairy Shrimp *Branchinecta lynchi* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/498	Threatened
Vernal Pool Tadpole Shrimp *Lepidurus packardi* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2246	Endangered

Flowering Plants

NAME	STATUS
Colusa Grass *Neostapfia colusana* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5690	Threatened
Fleshy Owl's-clover *Castilleja campestris ssp. succulenta* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8095	Threatened
Hairy Orcutt Grass *Orcuttia pilosa* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2262	Endangered
San Joaquin Orcutt Grass *Orcuttia inaequalis* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5506	Threatened

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

Special-Status Species Accounts

Special-Status Species Accounts

Special-Status Plants Species Accounts

Alkali milk vetch (*Astragalus tener* var. *tener*) – CRPR 1B.2

Alkali milk vetch is an annual herb in the legume family (*Fabaceae*). It occurs in playas, grassland, and vernal pools below 60 meters above mean sea level (MSL). This species is associated with adobe clay and alkaline soils. Alkali milk vetch blooms from March through June and is known to occur in the southern Sacramento Valley, northern San Joaquin Valley, and east of the San Francisco Bay Area. No CNDDB records are documented within two miles of the study area (California Department of Fish and Wildlife 2020) but suitable seasonal wetlands and vernal pools are present in the Proposed Project. Surveys conducted in the Summer 2020 resulted in negative findings for this species within the study area.

California alkali grass (*Puccinellia simplex*) – CRPR 1B.2

California alkali grass is an annual grass in the *Poaceae* family that occurs in the Central Valley between 5 and 900 meters above MSL. California alkali grass is found on saline soils of vernal pools, grasslands, seeps, chenopod scrub, and meadows and blooms from March through May. No CNDDB records are documented within two miles of the study area (California Department of Fish and Wildlife 2020) but suitable vernal pool and seasonal wetland habitat exists in the Proposed Project. Surveys conducted in the Summer 2020 resulted in negative findings for this species within the study area.

Colusa grass (*Neostapfia colusana*) – CRPR 1B.1

Colusa grass is an annual grass in the *Poaceae* family. It occurs in Colusa, Glenn, Merced Solano, Stanislaus, and Yolo Counties between 5 and 200 meters above MSL. Colusa grass is found on adobe soils of vernal pools and blooms from May through August. No CNDDB records are documented within two miles of the study area (California Department of Fish and Wildlife 2020) but suitable vernal pool and seasonal wetland habitat exists in the Proposed Project. Surveys conducted in the Summer 2020 resulted in negative findings for this species within the study area.

Coulter’s goldfields (*Lasthenia glabrata* ssp*. coulteri*) – CRPR 1B.1

Coulter’s goldfields is an annual sunflower species in the *Asteraceae* family. It occurs from in Colusa, and Merced Counties between 5 and 1220 meters above MSL. Coulter’s goldfields is found on adobe soils of vernal pools and blooms from February through June. No CNDDB records are documented within two miles of the study area (California Department of Fish and Wildlife 2020) but suitable vernal pool and seasonal wetland habitat exists in the Proposed Project. Surveys conducted in the Summer 2020 resulted in negative findings for this species within the study area.

Delta button-celery (*Eryngium raemosum*) – State Endangered, CRPR 1B.1

Delta button-celery, an annual herb in the carrot family (*Apiaceae*), is found in riparian scrub in seasonally inundated depressions on clay soils from 3 to 30 meters above MSL. This species blooms from June through October and is known from the San Joaquin River delta, floodplains, and adjacent Sierra Nevada foothills including Calaveras, Contra Costa, Merced, San Joaquin, and Stanislaus

Counties. No CNDDB records are documented within two miles of the study area (California Department of Fish and Wildlife 2020) but suitable riparian habitat exists in the Proposed Project. Surveys conducted in the Summer 2020 resulted in negative findings for this species within the study area.

Dwarf downingia (*Downingia pusilla*) – CRPR 2B.2

Dwarf downingia, an annual herb in the bellflower family (*Campanulaceae*), is found in vernal pools and mesic valley and foothill grasslands below 445 meters above MSL. This species blooms from March to May and is known from the Central Valley. No CNDDB records of this species occur within two miles of the study area (California Department of Fish and Wildlife 2020) but suitable vernal pool and seasonal wetland habitat exists in the Proposed Project. Surveys conducted in the Summer 2020 resulted in negative findings for this species within the study area.

Forked hare-leaf (*Lagophylla dichotoma*) – CRPR 1B.1

Forked hare-leaf, an annual herb in the sunflower family (*Asteraceae*), is found in valley and foothill grasslands or cismontane woodlands between 50 and 760 meters above MSL. This species blooms from April to September and is known from the Central Valley. No recent CNDDB records of this species occur within two miles of the study area (California Department of Fish and Wildlife 2020) but suitable grassland habitat exists in the Proposed Project. Surveys conducted in the Summer 2020 resulted in negative findings for this species within the study area.

Hairy Orcutt grass (*Orcuttia pilosa*) – Federally Endangered, State Endangered, CRPR 1B.1

Hairy Orcutt grass, an annual grass in the *Poaceae* family, is found in vernal pools from 46 to 200 meters above MSL and blooms May through September. This species has a scattered distribution along the eastern edge of the Central Valley and adjacent foothills from Tehama to Merced Counties. No CNDDB records of this species occur within two miles of the study area (California Department of Fish and Wildlife 2020) but suitable vernal pool and seasonal wetland habitat exists in the Proposed Project. Surveys conducted in the Summer 2020 resulted in negative findings for this species within the study area.

Heartscale (*Atriplex cordulata* var. *cordulata*) – CRPR 1B.2

Heartscale is an annual herb in the goosefoot family. Heartscale is found in chenopod scrub, meadows and seeps, and annual grassland below 560 meters above MSL. This species blooms from April through October and is associated with saline or alkaline soils. It is known from the Western Central Valley and valleys of adjacent foothills. No recent CNDDB occurrences of heartscale occur within two miles of the study area (California Department of Fish and Wildlife 2020) but suitable seasonal wetland and annual grassland habitat is present in the Proposed Project. Surveys conducted in the Summer 2020 resulted in negative findings for this species within the study area.

Lesser saltscale (*Atriplex minuscula*) – CRPR 1B.1

Lesser saltscale is known from the Sacramento and San Joaquin Valleys, Butte County, and from Merced to Kern County. This species is an annual herb in the goosefoot family that occurs in chenopod scrub, playas, and annual grassland from 15-200 meters above MSL. It blooms from May through October and is associated with sandy, alkaline soils. No CNDDB records are documented within two miles of the study area (California Department of Fish and Wildlife 2020). Suitable alkaline seasonal wetlands and annual grassland habitat is present in the Proposed Project. Surveys conducted in the Summer 2020 resulted in negative findings for this species within the study area.

Prostrate vernal pool navarretia (*Navarretia prostrata*) – CRPR 1B.1

Prostrate vernal pool navarretia, an annual herb in the phlox family (*Polemoniaceae*), is found in vernal pools, coastal scrub, and alkali grasslands from 15-1,210 meters above MSL. This species blooms from April through July. It is known from western San Joaquin Valley, interior South Coast Ranges, central South Coast, Peninsular Ranges and Alameda, Los Angeles, Merced, Monterey, Orange, Riverside, San Bernardino, San Diego, and San Luis Obispo counties. No CNDDB records of this species occur within two miles of the study area (California Department of Fish and Wildlife 2020), but suitable vernal pool and seasonal wetland habitat exists in the Proposed Project. Surveys conducted in the Summer 2020 resulted in negative findings for this species within the study area.

Sanford's arrowhead (*Sagittaria sanfordii*) – CRPR 1B.2

Sanford's arrowhead, a perennial rhizomatous herb in the water-plantain family (*Alismataceae*), is found in freshwater marshes, sloughs, canals, and other slow-moving water below 650 meters above MSL. This species blooms from May through October. It is known from scattered locations in the Central Valley and Coast Ranges. One CNDDB occurrence of Sanford's arrowhead is documented in the Proposed Project (California Department of Fish and Wildlife 2020). Suitable freshwater marsh and canal habitat is present in the Proposed Project, however, surveys conducted in the Summer 2020 resulted in negative findings for this species within the study area.

San Joaquin spearscale (*Extriplex joaquinanai*) – CRPR 1B.2

San Joaquin spearscale is an annual herb in the goosefoot family, commonly found in chenopod scrub, meadows and seeps, playas, and annual grassland from 1 to 835 meters above MSL. It blooms from April through October and is associated with alkaline soils. San Joaquin spearscale is known from Glenn to Tulare County on the west edge of the Central Valley. No CNDDB records of this species occur within two miles of the study area (California Department of Fish and Wildlife 2020). Suitable seasonal wetland and annual grassland habitat are present within the Proposed Project. Surveys conducted in the Summer 2020 resulted in negative findings for this species within the study area.

San Joaquin Valley Orcutt grass (*Orcuttia inaequalis*) – Federally Threatened, State Endangered, CRPR 1B.1

San Joaquin Valley Orcutt grass, an annual herb in the *Poceae* family (*Polemoniaceae*), is found in vernal pools from 10 to 755 meters above MSL. This species blooms from April through September. It is known from scattered locations along the east edge of San Joaquin Valley and adjacent foothills from Stanislaus County to Tulare County. No CNDDB records of this species occur within two miles of the study area (California Department of Fish and Wildlife 2020) but suitable vernal pool and seasonal wetland habitat exists in the Proposed Project. Surveys conducted in the Summer 2020 resulted in negative findings for this species within the study area.

Spiny-sepaled button-celery (*Eryngium spinosepalum*) – CRPR 1B.2

Spiny-sepaled button-celery is an annual/perennial herb in the carrot family. It is found in annual grassland and vernal pools from 80 to 255 meters above MSL. This species blooms from April through May. Spiny-sepaled button-celery is known from eastern San Joaquin Valley and Sierra

Nevada foothills. No CNDDB records of this species occur within two miles of the study area (California Department of Fish and Wildlife 2020). Suitable annual grassland, seasonal wetland, and vernal pool habitat is present in the Proposed Project. Surveys conducted in the Summer 2020 resulted in negative findings for this species within the study area.

Succulent owl's clover (*Castilleja campestris* var. *succulenta*) – Federally Threatened, State Endangered, CRPR 1B.2

Succulent owl's clover, an annual hemiparasitic herb in the broomrape family (*Orobanchaceae*), is found in vernal pools typically with acidic soils from 50 to 750 meters above MSL. This species blooms from April through May. It is known from scattered locations along the east edge of San Joaquin Valley and adjacent foothills from Stanislaus County to Fresno County. No CNDDB records of this species occur within two miles of the study area (California Department of Fish and Wildlife 2020) but suitable vernal pool and seasonal wetland habitat exists in the Proposed Project. Surveys conducted in the Summer 2020 resulted in negative findings for this species within the study area.

Vernal pool smallscale (*Atriplex persistens*) – CRPR 1B.2

Vernal pool smallscale, an annual herb in the goosefoot family (*Chenopodiaceae*), is found in dry vernal pools from 10 to 115 meters above MSL. This species blooms from June through October. It is known from the Central Valley from Glenn County to Tulare County. No CNDDB records of this species occur within two miles of the study area (California Department of Fish and Wildlife 2020) but suitable vernal pool and seasonal wetland habitat exists in the Proposed Project. Surveys conducted in the Summer 2020 resulted in negative findings for this species within the study area.

Watershield (*Brasenia schreberi*) – CRPR 2B.3

Watershield is known from scattered occurrences in north and central California. It is a perennial rhizomatous herb in the watershield family (*Cabombaceae*) found in freshwater marshes from 30 to 2,200 meters above MSL. This species blooms from June through September. No recent CNDDB occurrences of watershield are documented within two miles of the study area (California Department of Fish and Wildlife 2020) but suitable freshwater marsh habitat is present in the Proposed Project. Surveys conducted in the Summer 2020 resulted in negative findings for this species within the study area.

Special-Status Wildlife Species Accounts

Invertebrates

Conservancy Fairy Shrimp (Branchinecta conservatio)

Conservancy fairy shrimp is a small invertebrate that inhabits vernal pools formed by hardpan, claypan, and sandstone rock outcrop pools. Ten known populations of conservancy fairy shrimp include areas within the Los Padres National Forest, in Ventura County; U.C. Merced Area, Highway 165, and Sandy Mush Road, in Merced County; Mapes Ranch, in Stanislaus County; Sacramento National Wildlife Refuge, in Glen County; Yolo Bypass Wildlife Area, in Yolo County; Jepson Prairie, in Solano County; Mariner Conservation Bank, in Placer County; and Vina Plains, in Butte and Tehama Counties (U.S. Fish and Wildlife Service 2012a). This species has potential to occur within the seasonal wetlands and vernal pools throughout the study area, particularly south of Keyes to north of West Monte Vista Ave. There are no records of this species within 2 miles of the study area (California Department of Fish and Wildlife 2020).

Vernal Pool Fairy Shrimp (Branchinecta lynchi)

Vernal pool fairy shrimp is a small invertebrate that inhabits vernal pools formed by hardpan, claypan, and sandstone rock outcrops. This species ranges across California's Central Valley and south into the Coast Ranges in Santa Barbara County, with some isolated populations in Riverside County. This species has potential to occur within the seasonal wetlands and vernal pools throughout the study area, particularly south of Keyes within vernal pool land cover types. There are two records of this species within 2 miles of the study area, both records are located northwest of Merced in Merced County. The nearest record is approximately 1 mile from the proposed Merced Layover & Maintenance Facility, located north of Merced (California Department of Fish and Wildlife 2020).

Monarch butterfly (Danaus plexippus plexippus) – California Overwintering Population 1

Monarch butterfly occurs throughout the western United States to southern Canada, but is uncommon in western Washington, northwest Oregon, and western British Columbia. Overwintering western population of Monarch butterfly occurs along the California coast, from Mendocino County, south to northern Baja California. In California, the species overwinters within relatively dense groves of trees, primarily eucalyptus (*Eucalyptus* spp.), Monterey pine (*Pinus radiata*), Monterey cypress (*Hesperocyparis macrocarpus*), and coast redwood (*Sequoia sempervirens*), that provide protection from wind and climatic variation on the Pacific Coast. Monarchs use a variety of roosting trees during migration. Spring and fall migratory individuals occur from coastal California, inland toward Rockies and to Pacific Northwest. Summer breeding range is North America where nectar and breeding resources are present. Habitat includes breeding, migratory, and overwintering sites with floral resources (nectar sources). Milkweed (primarily *Asclepias* spp.) is the obligate host plant for oviposition and larvae feeding. Adults feed on a diversity of blooming nectar resources and nectar and milkweed resources are required year-round. Nectar and milkweed resources are often associated with riparian corridors and milkweed may function as the principal nectar source for monarchs in arid regions. No known monarch butterfly overwintering sites are known to occur within or near the study area. However, during the spring, summer, and fall, the species has potential to occur where milkweed and nectar resources are present in the study area. Both adult and milkweed plants have been documented within the study area (Western Monarch Milkweed Mapper 2021). Nectar and milkweed resources may be found in undeveloped landcover types (annual grassland, valley foothill riparian, mixed riparian forest woodland), as well as developed/landscaped land cover (e.g., urban gardens).

Vernal Pool Tadpole Shrimp (Lepidurus packardi)

Vernal pool tadpole shrimp is a small invertebrate that inhabits vernal pools, seasonal wetlands, and ephemeral stock ponds formed by hardpan and claypan. This species ranges across California's Central Valley from Shasta County to Merced County, with some isolated populations in Fresno, Alameda, and Tulare Counties. This species has potential to occur within the seasonal wetlands, vernal pools, and ephemeral stock ponds throughout the study area, particularly south of Keyes within vernal pool land cover types. There are no records of this species within 2 miles of the study area (California Department of Fish and Wildlife 2020).

Valley Elderberry Longhorn Beetle (Desmocerus californicus dimorphus)

Valley elderberry longhorn beetle (VELB) is found only in association with its host plant, blue elderberry (*Sambucus nigra* ssp. *caerulea*), which is commonly found in riparian forests and adjacent uplands in the Central Valley and foothills (U.S. Fish and Wildlife Service 1999). Elderberries often grow vegetatively from rhizomes, resulting in shrubs that frequently have common root systems with multiple main stems (Talley et al. 2006) and multiple root crowns. Adult VELBs feed on elderberry foliage and are present from March through early June, during which time the adults mate. Females lay their eggs in bark crevices or at the junction of stem/trunk or leaf petiole/stem. After hatching, the larva burrows into the stem to feed and develop into pupa and adult. After transforming into an adult, it chews an exit hole and emerges. The life cycle of VELB ranges from 1 to 2 years (Barr 1991:4–5).

This species has potential to occur within the elderberry shrubs primarily within riparian habitat throughout the study area, particularly along major river systems. VELB can inhabit individual elderberry shrubs, but generally occur within areas where multiple host plants are present. There are three records of this species within 2 miles of the study area, one record is located within riparian habitat on the Tuolumne River in Stanislaus County, and two records are on the Merced River north of Livingston in Merced County. The nearest record is located within the study area, located north of Livingston (California Department of Fish and Wildlife 2020). Suitable habitat occurs within riparian land cover in the study area, particularly along major river systems. Elderberry shrubs were observed on the south bank of the Merced River during the reconnaissance-level survey on July 14, 2020.

Crotch bumble bee (Bombus crotchii)

The Crotch bumble bee has limited distribution in southwestern North America. In California, the species primarily occurs in the Mediterranean region, Pacific Coast, Western Desert, Central Valley, and adjacent foothills through most of southwestern California (Williams et al. 2014). Crotch bumble bee is also found in Baja California and Baja California sur (Williams et al. 2014). The species was historically common in the Central Valley, but now appears to be absent from the center of its historic range where the Central Valley has been developed for agriculture and urbanization (Xerces Society 2018; Hatfield et al. 2014). In California, Crotch bumble bee inhabits open grassland and scrub habitats. It nests underground and overwinters in soft, undisturbed soil, under leaf litter, or other debris (Xerces Society 2018; Goulson 2010). Crotch bumble bee are generalist foragers and visit a wide variety of flowering plants and forages at open flowers with short corollas. Plant families most commonly associated with Crotch bumble bee include Fabaceae, Apocynaceae, Asteraceae, Lamiaceae, and Hydrophylloideae, Boraginaceae. The flight period for queens is from late February to late October; the flight period for work and males is from late March through September (Xerces Society 2018; Thorp et al. 1983). This species has potential to occur within annual grassland landcover where suitable foraging resources are present. There are two records of this species within the study area; both records overlap with the northern portion of the study area at Ceres and Turlock in Modesto County (California Department of Fish and Wildlife 2020).

Amphibians

California Tiger Salamander (Ambystoma californiense)

California tiger salamander ranges from Yolo County to Tulare County and San Luis Obispo County in the respective Central Valley and Coast Range [both considered the Central Valley Distinct Population Segment (DPS)]. Two other DPS of the species also occur in Sonoma and Santa Barbara Counties. California tiger salamander spends most of the year underground within Botta's pocket gopher (*Thomomys bottae*) or California ground squirrel (*Otospermophilus beecheyi*) burrows, typically in grasslands. During the late fall to winter, adults migrate to vernal pools and ephemeral stock ponds to breed. As the pools and ponds begin to dry, adults and metamorphs migrate back to the rodent burrows in the surrounding uplands. Proximity to vernal pools is generally the limiting habitat factor; therefore, the species has potential to occur within grasslands and other natural upland land cover that support rodent burrows within 1.3 miles of suitable aquatic breeding habitat.

There are no records of this species within 2 miles of the study area. The nearest extant record is located approximately 3.6 miles northeast of the City of Atwater, in Merced County (California Department of Fish and Wildlife 2020). Suitable upland habitat occurs within grasslands and other undeveloped upland land cover with ground squirrels or gophers within 1.3 miles of suitable aquatic habitat. This species could occur within suitable habitat in the study area.

Western Spadefoot Toad (Spea hammondii)

Western spadefoot toad is a small toad that lives underground during the dry season and inhabits seasonal wetlands, ephemeral drainages, and vernal pools during the rainy season. This species occurs throughout much of the Central Valley, from Shasta County to Kern County, and along Central and Southern California Coast. This species has the potential to occur within seasonal wetlands, vernal pools, ephemeral drainages, and associated undeveloped upland land cover throughout the study area. There are no records of this species within 2 miles of the study area (California Department of Fish and Wildlife 2020). This species could occur within suitable habitat between Ceres and Merced.

Reptiles

Western Pond Turtle (Emys marmorata)

Western pond turtle is an olive-drab turtle that inhabits a wide variety of water bodies, including ponds, marshes, rivers, streams, and irrigation canals. This species can tolerate full-strength seawater for a short period of time, but normally is found in freshwater. Western pond turtle females migrate away from their water bodies into surrounding uplands, where they dig underground nests and lay eggs from April to August. This species has potential to occur within wetlands, stock ponds, ditches, and other aquatic habitat types including adjacent undeveloped upland habitat within 1,150 feet (0.22-mile) from suitable aquatic habitat (Pilliod *et al.* 2013). There is one record of this species within 2 miles of the study area located at the Livingston Industrial Wastewater Treatment Plant near the Merced River in Merced County. The nearest extant record is located approximately 0.50-mile east of the study area (California Department of Fish and Wildlife 2020). This species could occur within suitable habitat in the study area. Suitable aquatic habitat was observed in agricultural canals and along the Merced River and Bear Creek during the reconnaissance-level surveys on July 13 and 14th, 2020.

Coast Horned Lizard (Phrynosoma blainvillii)

Coast horned lizard is a flat-bodied lizard with large spiny scales along its back, head, and sides. This species is found in much of California (throughout the Central Valley to the Sierra Nevada foothills up to 4,000 feet above mean sea level (MSL), coastal areas south of San Francisco, and the deserts in southwestern California) and further south into Baja California. This species has potential to occur within a broad variety of habitat types including brush-dominated land cover and coniferous forest, with open areas for exothermic regulation by exposure to sun and relatively friable soils. There are no records of this species within 2 miles of the study area; the closest extant record is located approximately 12 miles southwest of Merced (California Department of Fish and Wildlife 2020). This species could occur within suitable habitat between Ceres and Merced.

Northern California Legless Lizard (Anniella pulchra)

Northern California legless lizard is a type of lizard that has no legs and inhabits loose soils and sandy habitat. This species occurs in the Coast, Transverse, and Peninsular Ranges within California from Contra Costa County south to San Diego County, with sparse records from the San Joaquin Valley. In the study area, this species has potential to occur within habitat with loose soil, sand, thick leaf litter within ephemeral sandy washes and riparian, woodland, and scrub habitat. There are three records of this species within 2 miles of the study area; one record overlaps with the City of Turlock, another record is located immediately west of Delhi, and another record is southeast of Delhi, north of the Merced River (California Department of Fish and Wildlife 2020). This species could occur within suitable habitat between Ceres and Merced.

Giant Garter Snake (Thamnophis gigas)

Giant garter snakes inhabit agricultural wetlands and other waterways, including irrigation and drainage canals, rice fields, marshes, sloughs, ponds, small lakes, and low-gradient streams, as well as adjacent upland areas. They do not occur in larger rivers and wetlands with sand, gravel, or rock substrates. Giant garter snake requires permanent water during its active season (early spring through mid-fall) to maintain dense populations of food organisms. The snake also requires herbaceous, emergent vegetation for protective cover and foraging habitat and open areas and grassy banks for basking. In addition, higher elevation upland habitats for cover and refuge from floodwaters are needed during the winter when the snake is inactive. Riparian woodland generally is considered unsuitable habitat because of the lack of basking sites, excessive shade, and lack of prey. Giant garter snakes begin to search for mates soon after emergence from overwintering sites. The breeding season extends from March through May and females give birth to live young from late July to early September (U.S. Fish and Wildlife Service 2017). There is one record of this species within 2 miles of the study area located near the Bear River in Merced in Merced County. The record is considered possibly extirpated, as it is located within an area that is entirely developed, but it is located within the study area at the terminus of the proposed alignment (California Department of Fish and Wildlife 2020). This species could occur within suitable habitat between Ceres and Merced. Suitable aquatic habitat was observed within agricultural canal during the reconnaissance-level surveys on July 13th and 14th, 2020.

Birds

Golden Eagle (Aquila chrysaetos)

Golden eagle is a large raptor that forages over a variety of open habitats, such as grasslands, chaparral, and oak woodlands, and nests on cliffs, escarpments, or in tall trees overlooking open areas. Observations of golden eagle have documented on eBird.org foraging near Merced (eBird.org 2020). This species has potential to forage within grasslands and other open habitats primarily within the study area. There are no records of this species within 2 miles of the study area, but it is known to occur in the Coast Range and Sierra Nevada and forage widely. This species has generally been observed flying over the Central Valley but it is relatively uncommon and not known to nest within the Valley floor. Nesting activities are absent from the region surrounding the Ceres to Merced area (California Department of Fish and Wildlife 2020).

Short-eared owl (Asio flammeus)

Short-eared owl are small raptors that usually found in open natural habitat with sparse trees such as annual and perennial grasslands, prairies, dunes, irrigated lands, and emergent wetlands (California Department of Fish and Wildlife 2005). The species requires dense vegetation for cover and will use tall grasses, brush, ditches, and wetlands for resting and roosting cover. Short-eared owls are winter migrants, found primarily in the Central Valley, in the western Sierra Nevada foothills, and along the coast. The species nests in Northern California, San Francisco Bay Delta, and parts of San Joaquin Valley (western Merced County south to western Kern County) (California Department of Fish and Wildlife 2005). The owl nests on the ground in a small depression concealed in vegetation and occasionally the owls nests in burrows (California Department of Fish and Wildlife 2005). There are no CNDDB records of this species nesting within 2 miles of the study area; the closest reported Central Valley nesting attempt was recorded in Fresno County (California Department of Fish and Wildlife 2020).

Grasshopper sparrow (Ammodramus savannarum)

Grasshopper sparrows are small passerines that occur in dry, dense grasslands with tall grasses and forbs with scattered shrubs (California Department of Fish and Wildlife 2008). Native grasslands with a mix of grasses and forbs used for foraging and nesting is preferred by the species. The sparrows are local, summer resident and breeder in foothills and lowlands west of the Sierra Nevada crest from Trinity County south to San Diego County; the species' summer and breeding range overlaps with the study area (California Department of Fish and Wildlife 2008). Grasshopper sparrow are secretive in winter and may occur more regularly than indicated by infrequent occurrence records; however, the species generally winters in coastal southern California (California Department of Fish and Wildlife 2008). There are no CNDDB records of this species nesting within 2 miles of the study area; the closest reported nesting attempt was recorded in eastern Alameda County (California Department of Fish and Wildlife 2020).

Swainson's Hawk (Buteo swainsoni)

Swainson's hawk forage in grasslands, grazed pastures, alfalfa and other hay crops, and certain grain and row croplands. Vineyards, orchards, rice, and cotton crops are generally unsuitable for foraging because of the density of the vegetation (California Department of Fish and Game 1993:41). The majority of Swainson's hawk individuals winter in South America, although some winter in the United States. Swainson's hawk arrives in California in early March to establish nesting territories and breed (California Department of Fish and Game 1994). They usually nest in large, mature trees. Most nest sites (87%) in the Central Valley are found in riparian habitats (Estep 1989:35), primarily because trees are more available there. Swainson's hawk also nest in mature roadside trees and in isolated trees in agricultural fields or pastures. The breeding season is from March through August (Estep 1989:12, 35).

There are seven records of Swainson's hawk within 2 miles of the study area. The majority of these records are for observations of nests and multiple records are located within and immediately adjacent to the study area. Six of the CNDDB records are located within Merced County and 1 record is located in Stanislaus County (California Department of Fish and Wildlife 2020). The study area and adjacent areas contain numerous suitable nest trees for Swainson's hawks. Grazed or mowed grasslands, low height field and row crops (especially alfalfa) and ruderal areas provide suitable foraging habitat for Swainson's hawks throughout the study area within 10 miles of each active nest. Swainson's hawk was observed foraging over the study area during the reconnaissance-level survey on July 14, 2020.

Northern Harrier (Circus cyaneus)

Northern harrier is a medium sized raptor that forages primarily for small mammals over open habitats, including grassland, tidal salt marsh, and agricultural fields. This species nests on the ground within grassland habitat. The range of northern harrier encompasses all of lowland California, but this species has been observed at high elevations. There are no records of northern harrier within 2 miles of the study area (California Department of Fish and Wildlife 2020), but the species is known to occur throughout the study area based on eBird.org sightings (eBird.org 2020b). Grasslands, marshes, pastures, wetlands, and agricultural fields provide suitable foraging habitat for this species throughout the study area. The study area and adjacent areas contain numerous suitable nesting substrate for northern harrier between Ceres and Merced in undeveloped (excluding agriculture) areas.

White-Tailed Kite (Elanus leucurus)

White-tailed kite is a small raptor that forages primarily for small mammals over open habitats, including grassland, tidal salt marsh, and agricultural fields. The range of this species includes lowland areas west of the Sierra Nevada from the northern extent of the Sacramento Valley south, including coastal foothills to western San Diego County. This species nests within trees suitable of supporting its nest that offer at least partial shade within the canopy. There are no records of this species within 2 miles of the study area (California Department of Fish and Wildlife 2020), but the species is known to occur throughout the Central Valley based on eBird.org sightings (eBird.org 2020c). Grasslands, marshes, pastures, wetlands, and agricultural fields provide suitable foraging habitat for this species throughout the study area. The study area and adjacent areas contain numerous suitable nest trees for white-tailed kite.

Mountain Plover (Charadrius montanus)

Mountain plover is a small migratory bird that inhabits short-grass prairie and shrub-steppe habitat. Uses short grasslands and plowed fields with little vegetation and open sagebrush areas of the Central Valley during winter residency. Roosts in depressions such as ungulate hoof prints and plow furrows. This species over-winters in California, Mexico, southern Arizona, and Texas, but it nests in the Rocky Mountains and Great Plains. There are no records of this species within 2 miles of the study area (California Department of Fish and Wildlife 2020).

Western Yellow-Billed Cuckoo (Coccyzus americanus)

Western yellow-billed cuckoo occurs at isolated sites in the Sacramento Valley in northern California and along the Kern and Colorado River systems in southern California during the breeding season and winters primarily in South America. Western yellow-billed cuckoos arrive at breeding grounds starting in mid- to late May and depart for wintering grounds between late August and mid-September. Once initiated, the breeding cycle is extremely rapid and requires only 17 days from egg-laying to fledging of young. Birds generally prefer open woodland with clearings and low, dense, scrubby vegetation often associated with watercourses. Western yellow-billed cuckoos occupy various woodlands, riparian forests, and thickets along streams and marshes, and successional shrub land. The suggested minimum patch size to benefit the species is approximately 50–100 acres, with a minimum width of 300 feet (Riparian Habitat Joint Venture 2004). Western yellow-billed cuckoos feed primarily on large insects, including caterpillars, katydids, cicadas, grasshoppers, and crickets in open areas, woodlands, orchards, and areas adjacent to streams (Hughes 1999).

There are no records of occurrences of western yellow-billed cuckoo within 2 miles of the study area (California Department of Fish and Wildlife 2020). Portions of riparian habitat (woodland and scrub), primarily along the Merced River, in and adjacent to the study area may provide suitable habitat for yellow-billed cuckoo.

Burrowing Owl (Athene cunicularia)

Burrowing owl is a small owl that lives in burrows created by small mammals, such as ground squirrels and pocket gophers. Burrowing owls will also use pipes, culverts, k-rails, holes under sidewalk and rip/rap as cover where burrows are scarce (Robertson 1929). The species has also been observed in buildings (Zambrano 1998). This species forages over grassland and open salt marsh vegetation for small mammals, insects, and lizards and is most active at dawn and dusk. This species ranges throughout lowland portions of California but is absent from the southern coastal areas of the state. There are three burrowing owl occurrence records within 2 miles of the study area, located in Merced County (near Merced and Atwater) (California Department of Fish and Wildlife 2020). Burrowing owl has been reported on eBird.org just north of Turlock (eBird.org 2020e). Grassland, pastures, scrub, freshwater marsh, and wetlands with populations of California ground squirrels or Botta's pocket gophers provide suitable foraging and nesting habitat. Other open habitats (e.g., agricultural fields) provide suitable foraging habitat. Such land cover in and adjacent to the study area provides suitable habitat for burrowing owl between Ceres and Merced.

Loggerhead Shrike (Lanius ludovicianus)

Loggerhead shrikes occur in open habitats with scattered trees, shrubs, posts, fences, utility lines, or other types of perches. Nests are built in trees or shrubs with dense foliage and are usually hidden well. Loggerhead shrikes search for prey from perches and frequently impale their prey on thorns, sharp twigs, or barbed-wire. The nesting period for loggerhead shrikes is March through June (Zeiner et al. 1990a:546).

There are no records of loggerhead shrike nests within 2 miles of the study area (California Department of Fish and Wildlife 2020), however there are numerous observations of loggerhead shrike on eBird.org (eBird.org 2020f). Open habitat, such as freshwater marsh, wetlands, grassland, open woodland, and agricultural fields provide suitable foraging habitat for loggerhead shrike, and trees and shrubs near foraging habitat provide suitable nesting substrate for the species in the study area. Such land covers are located in and adjacent to the study area between Ceres and Merced.

Least Bell's vireo (Vireo bellii pusilus)

Least Bell's vireo nests in dense woodlands near rivers, but will also inhabit suitable habitat along dry, intermittent streams. The species uses thickets of willow and other low shrubs for nesting and roosting. Least Bell's vireos are migratory and usually arrive to California nesting grounds in mid-March to early April from their wintering grounds in Mexico. Observations of banded birds suggest that returning adult breeders may arrive earlier than first-year birds by a few weeks. Least Bell's vireo begin departing from their wintering grounds by late July but are generally present on their nesting grounds until late September. Riparian woodlands within the study area, particularly around Merced River, may provide suitable nesting habitat for Least Bell's vireo.

There is one record of least Bell's vireo occurrence within two miles of the study area (California Department of Fish and Wildlife 2020); the occurrence is mapped near Delhi but is considered extirpated. Portions of riparian habitat (woodland and scrub), primarily along the Merced River, in and adjacent to the study area may provide suitable habitat for least Bell's vireo.

Song Sparrow (Melospiza melodia) – Modesto Population

The Modesto Population of song sparrow is a California endemic found in the north-central portion of the Central Valley (from Glenn and Butte Counties to the northern extent of Stanislaus County), with the highest densities occurring in the Butte Sink area of the Sacramento Valley and in the Sacramento-San Joaquin River Delta (Shuford and Gardali 2008). This population of song sparrow is strongly associated with woody riparian habitat (Point Blue 2016). There are no CNDDB records of this species within 2 miles of the study area (California Department of Fish and Wildlife 2020); however, eBird.org reports numerous observation of song sparrow (eBird.org 2020h). Riparian woodland provides suitable nesting and foraging substrate for the species along rivers.

Tricolored Blackbird (Agelaius tricolor)

Tricolored blackbird is a permanent resident of the Central Valley but breeds in a couple scattered coastal locations from Marin County to San Diego. This species nests colonially, with minimum size of 50 pairs, in dense marsh vegetation such as cattails (*Typha* spp.) and bulrush (*Schoenoplectus* spp.). Tricolored blackbird has potential to nest within dense marsh vegetation and blackberry (*Rubus* spp.) associated with streams, rivers, stock ponds, and other aquatic features. There are 9 records of the species within 2 miles of the study area, located in Merced County in or around Merced, Livingston, and Delhi (California Department of Fish and Wildlife 2020). This species has potential to occur within riparian, wetland, and aquatic land cover between Ceres and Merced.

Yellow-Headed Blackbird (Xanthocephalus xanthocephalus)

Yellow-headed blackbird is a primarily a migrant and a summer resident in California. This species nests with red-winged blackbirds in dense marsh vegetation such as cattails (*Typha* spp.) and bulrush (*Schoenoplectus* spp.). Yellow-headed blackbird has potential to nest within dense marsh vegetation associated with streams, rivers, stock ponds, and other aquatic features. This species is known to nest in the Central Valley, northeastern California, the east side of the Sierra Nevada and near Lake Tahoe, and in isolated populations in San Bernardino and Riverside Counties. There are no records of the species within 2 miles of the study area (California Department of Fish and Wildlife 2020). This species has potential to occur within riparian, wetland, and aquatic land cover in the Central Valley between Ceres and Merced.

Mammals

Pallid Bat (Antrozous pallidus)

Pallid bat is found throughout most of California at low to middle elevations (6,000 feet). Pallid bats are found in a variety of habitats, including desert, brushy terrain, coniferous forest, and non-coniferous woodlands. In central and northern California, the species is associated with oak, ponderosa pine, redwood, and giant sequoia land cover. Pallid bats forage among vegetation and above the ground surface, eating large ground-dwelling arthropods and large moths. Daytime roost sites include rock outcrops, mines, caves, hollow trees, buildings, and bridges. Night roosts are commonly under bridges but are also in caves and mines (Brown and Pierson 1996). Hibernation may occur during late November through March. Pallid bats breed from late October through February (Zeiner et al. 1990b:70), and one or two young are born in May or June (Brown and Pierson 1996).

There are no records of occurrences for pallid bat within two miles of the study area (California Department of Fish and Wildlife 2020). Woodland, riparian woodland, caves, and anthropogenic structures (e.g., bridges, buildings) with stable thermal regimes in the study area offer suitable roosting habitat for this species. Such habitat is located between Ceres and Merced.

Townsend's Big-Eared Bat (Corynorhinus townsendii)

Townsend's big-eared bat is currently listed as a species of special concern and by CDFW and also listed as a species with high regional priority by Western Bat Working Group (Western Bat Working Group 2016). Townsend's big-eared bat occurs throughout California in a wide variety of habitats ranging from sea level to 10,800 feet above MSL from Del Norte County to Santa Barbara County. This species is typically associated with coniferous forests, mixed meso-phytic forests, deserts, native prairies, riparian communities, active agricultural areas, and coastal habitat types. Species distribution is also strongly correlated with availability of caves or cave-like roosting habitat. Townsend's big-eared bats have been observed utilizing buildings, bridges, rock crevices, and hollow trees as roost sites (Western Bat Working Group 2016). Townsend's big-eared bats are highly sensitive to disturbance and therefore are highly unlikely to roost within suitable habitat along highly developed portions of the study area. There are no records of the species within two miles of the study area (California Department of Fish and Wildlife 2020). This species could occur within woodland, riparian, scrub, and agricultural land cover and anthropogenic structures with stable thermal regimes in the study area offer suitable roosting habitat for this species. Suitable habitat is located between Ceres and Merced.

Hoary Bat (Lasiurus cinereus)

Hoary bat's range covers all of California. This species roosts in trees that are typically within forests or various types. Hoary bat has potential to occur within the woodland and riparian woodland land cover study area. There is one record within two miles of the study area, located in Turlock in Stanislaus County between Ceres and Merced (California Department of Fish and Wildlife 2020). Hoary bat has the potential to occur within woodland and riparian land cover in the study area between Ceres and Merced.

Western Mastiff Bat (Eumops perotis californicus)

Western mastiff bat occupies a wide variety of habitat types and roosts and breeds in deep, narrow rock crevices, and possibly crevices in trees, buildings, and tunnels. This species is known is known to occur from central Mexico to across the southwestern U.S. from California to Texas; however, the individuals have been found near the Oregon border. Western mastiff bat has potential to forage in open land cover near suitable roost and breeding habitat in the study area. There is one record within two miles of the study area, located in Merced in Merced County (California Department of Fish and Wildlife 2020). Western mastiff bat has the potential to occur within grassland, woodland, riparian, scrub, and anthropogenic structures with stable thermal regimes in the study area offer suitable roosting habitat for this species. Such habitat is located between Ceres and Merced.

Western Red Bat (Lasiurus blossevillii)

Western red bats occur at lower elevations in the Central Valley and along the central and southern coasts. Historically western red bats used old-growth riparian habitat and are highly tied to riparian vegetation for all life stages. Western red bats use riparian and associated habitat (orchards) for all of their life stages, including roosting and feeding in riparian zones. Mature riparian broadleaf forest in the Central Valley is the primary summer breeding habitat for the species in California (females and pups). Riverside orchards may also be used as maternity roosts. Western red bats can roost alone or in small family groups in tree foliage and occasionally in shrubs; prefers habitat edges and mosaics with trees that are protected from above and open below with open areas for foraging, including grasslands, shrublands, and open woodlands. This species has potential to occur within orchards and riparian habitat throughout the study area, particularly along river systems. There are no records of this species within 2 miles of the study area (California Department of Fish and Wildlife 2020). Suitable habitat occurs within orchards and riparian land cover between Ceres and Merced.

San Joaquin Kit Fox (Vulpes macrotis mutica)

San Joaquin kit foxes occur in a variety of land cover types, including grasslands, scrublands, vernal pool areas, alkali meadows and playas, and an agricultural matrix of row crops, irrigated pastures, orchards, vineyards, and grazed annual grasslands (U.S. Fish and Wildlife Service 1998). San Joaquin foxes occur in some areas of suitable habitat on the floor of the San Joaquin Valley and in the surrounding foothills of the Coast Ranges, Sierra Nevada, and Tehachapi Mountains from Kern County north to Contra Costa, Alameda, and San Joaquin Counties (U.S. Fish and Wildlife Service 1998). San Joaquin kit fox has potential to occur within the grassland, wetland (including vernal pool and seasonal wetlands), and agricultural land in the Central Valley region. There is one record of this species within two miles of the study area in Atwater in Merced County (California Department of Fish and Wildlife 2020). Suitable habitat is located between Ceres and Merced.

American Badger (Taxidea taxus)

American badgers occur in a wide variety of open, arid habitats but are most commonly associated with grasslands, savannas, mountain meadows, and open areas of desert scrub (Stephenson and Calcarone 1999). In California, American badgers occur throughout the state except in humid coastal forests of northwestern California in Del Norte and Humboldt Counties (Williams 1986). The primary factor that determines whether habitat is suitable for American badger is the presence of a sufficient prey-base, typically consisting of California ground squirrel and/or pocket gopher. American badger has potential to occur within the open areas of grassland habitat throughout the project area. There are no records of this species within two miles of the study area (California Department of Fish and Wildlife 2020). Suitable habitat is located between Ceres and Merced.

Fish

Pacific and Kern Brook Lamprey

Both Pacific lamprey (*Entosphenus tridentatus*) and Kern Brook lamprey (*Lampetra hubbsi*) occur in the Merced River (Stillwater Sciences 2008). Both are designated as a California Species of Special Concern. Pacific lamprey are anadromous species that occurs from Japan along the west coast to Mexico (Moyle 2002). In California, Pacific lamprey is found in the Klamath-Trinity, Eel and Sacramento San Joaquin rivers. In the Central Valley, Pacific lamprey is found in the lower Sacramento and San Joaquin River drainages, including the Stanislaus, Merced and Tuolumne Rivers. They may exist in other tributaries of these rivers, but are often overlooked and have been the subject of few targeted sampling efforts (Moyle 2002). Population trends are unknown in California, although declines are thought to have occurred concurrently with freshwater habitat degradation (Moyle 2002).

Pacific lamprey adults enter freshwater and reside there for a few months to a few years prior to spawning. Migration into freshwater usually occurs in the spring (April to June; Beamish 1980). Adults spawn in gravel at the tailouts of pools and riffles in nests that are constructed by rock lifting and digging. Adults die after spawning. After hatching ammocoetes (larvae) drift downstream to areas of sand and fine organic matter where they can bury themselves. Ammocoetes filter feed on detritus, diatoms and algae. After maturation, Pacific lamprey are parasitic on fish. (USFWS 2019)

Kern brook lamprey are only found in the lower reaches of the Merced River, Kawheah River, Kings River and the San Joaquin River and in the Friant-Kern Canal. They are non-parasitic and habitat requirements are silty backwater shallow pools along edges of run areas. Common substrates are sand, gravel and rubble and ammocoetes favor sand/mud substrate. They also filter deed diatoms and other microorganisms from the water column. Kern brook lamprey are not anadromous – they over-winter and spawn the following spring after maturation in freshwater. (CDFG no date)

There are no records of this species within two miles of the study area (California Department of Fish and Wildlife 2020). Both lamprey species could occur in most waterbodies of the study area and was observed by Stillwater Sciences (2008). They would use the freshwater area such as the Merced River for spawning and ammocoete rearing.

Steelhead, Central Valley DPS (Oncorhynchus mykiss irideus)

The Central Valley steelhead distinct population unit (DPS) was listed as a threatened species under the federal Endangered Species Act (ESA) on March 19, 1998. This DPS includes all naturally spawned populations of steelhead in the Sacramento and San Joaquin Rivers and their tributaries, including the San Francisco Bay/Sacramento–San Joaquin River Delta (Bay-Delta) (63 *Federal Register* [FR] 13347). Central Valley steelhead are also designated as a California Species of Special Concern.

Information on the status and geographic distribution of Central Valley steelhead is extremely limited (The Nature Conservancy et al. 2008). Adult steelhead typically migrate upstream and spawn during the winter months when river flows are high and water clarity is low. Unlike Chinook salmon, adult steelhead do not necessarily die after spawning and can return to coastal waters.

Adult Central Valley steelhead migrating into the San Joaquin River and its tributaries use the central, southern, and eastern edge of the Delta.

Central Valley steelhead generally leave the ocean and migrate upstream from June through March (Busby et al. 1996; Hallock et al. 1957; National Marine Fisheries Service 2009), and spawn from October through April (Newton and Stafford 2011; U.S. Bureau of Reclamation 2008). Peak spawning typically occurs from January through March in small streams and tributaries where cool, well-oxygenated water is available year-round (Hallock et al. 1961; McEwan and Jackson 1996). Timing of upstream migration corresponds with higher flow events (e.g., freshets), associated lower water temperatures, and increased turbidity.

Some juvenile steelhead may use brackish tidal marsh areas, nontidal marshes, and other shallow water areas in the Delta and estuary as rearing areas for short periods prior to their emigration to the ocean.

There are two records of this species within two miles of the study area in the Tuolumne River in Stanislaus County and the Merced River in Merced County (California Department of Fish and Wildlife 2020). Stillwater Sciences (2008) captured steelhead during their surveys. Central Valley steelhead use the San Joaquin River and its tributaries for migration and spawning.

Central Valley Chinook Salmon (Fall-Run) (Oncorhynchus tshawytscha)

The Central Valley fall-run Chinook salmon evolutionary significant unit (ESU) includes all naturally spawned populations of fall-run Chinook salmon in the Sacramento and San Joaquin River basins and their tributaries east of Carquinez Strait, California (64 Federal Register [FR] 50394). On April 15, 2004, the Central Valley fall-run Chinook salmon ESU was identified by NMFS as a Species of Concern (69 FR 19975) and are also a California Species of Concern.

Central Valley fall-run Chinook salmon historically spawned in all major tributaries, as well as the mainstem of the Sacramento and San Joaquin Rivers. A large percentage of fall-run Chinook spawning areas in the Sacramento and San Joaquin Rivers historically inhabited the lower gradient reaches of the rivers downstream of sites now occupied by major dams, such as Shasta and Friant Dams. Long-term trends in adult fall-run Chinook salmon escapement indicate that abundance in the Sacramento River has been consistently higher than abundance in the San Joaquin River. Adult escapement in the San Joaquin River appears to be cyclical and may be related to hydrology during the juvenile rearing and migration period, among other factors (San Joaquin River Group Authority 2010; California Department of Fish and Game 2008).

Central Valley fall-run Chinook salmon exhibit an ocean-type life history. Ocean-type Chinook salmon spend significantly less time in fresh water, spawning soon after entering fresh water as adults and migrating to the ocean as juvenile fry or parr in their first year. Adult fall-run Chinook salmon migrate through the Delta and into Central Valley rivers from June through December and spawn from September through December. Peak spawning activity usually occurs in October and November. Chinook salmon spawn in clean, loose gravel in swift, relatively shallow riffles, or along the margins of deeper river reaches where suitable water temperatures, depths, and velocities favor redd construction and oxygenation of incubating eggs. Chinook salmon spawning typically occurs in gravel beds located at the tails or downstream ends of holding pools (U.S. Fish and Wildlife Service 1995).

There are no records of this species within two miles of the study area (California Department of Fish and Wildlife 2020). Stillwater Sciences (2008) captured Chinook salmon during their surveys.

In the study area, fall-run Chinook salmon are present in the San Joaquin River and its eastside tributaries, Stanislaus, Tuolumne, and Merced rivers.

Hardhead (Mylopharodon conocephalus)

Hardhead, a California Species of Special Concern, is a large, native cyprinid (minnow) species that is widely distributed throughout the Sacramento–San Joaquin River system, although it is absent from the valley reaches of the San Joaquin River (Moyle 2002). Hardhead generally occur in large, undisturbed low- to mid-elevation rivers and streams of the region (Moyle 2002). Most spawning is restricted to foothill streams (Wang and Reyes 2007). Most streams in which hardhead occur have summer water temperatures above 20°C (68°F), while their optimal temperatures appear to be about 24°C to 28°C (75°F to 82°F) (Moyle 2002).

There is one record of this species within two miles of the study area in the Tuolumne River in Stanislaus County (California Department of Fish and Wildlife 2020). Hardhead were captured in the Merced River during Stillwater Sciences (2008) study.

Sacramento Splittail (Pogonichthys macrolepidotus)

Sacramento splittail was listed as threatened under ESA on February 8, 1999 (64 FR 5963); however, the listing was withdrawn on September 22, 2003 (68 FR 55139). Sacramento splittail is not listed under CESA; however, CDFW considers the species to be a California species of special concern.

Sacramento splittail were endemic to the sloughs, lakes, and rivers of California’s Central Valley but are now confined to the downstream reaches of the Sacramento and San Joaquin Rivers, and the Delta. In the Sacramento River, splittail range from the Delta up to the Red Bluff Diversion Dam; in the San Joaquin River, they range from the Delta up to RM 135.

Adult splittail exhibit a gradual movement upstream during winter and spring, presumably to forage and spawn in flooded areas. They have been observed to leave Suisun Bay and the Delta during December through March, and it appears that the Yolo and Sutter Bypasses provide important spawning habitat in years when the bypasses are flooded (Sommer et al. 1997). In the Sacramento River, adult splittail spawn between Knights Landing and Colusa in most years and occasionally spawn as far upstream as Hamilton City (Moyle et al. 2004). Splittail spawn in late April and May in Suisun Marsh and between early March and May in the upper Delta and lower reaches and flood bypasses of the Sacramento and San Joaquin Rivers, and on the Cosumnes River Preserve (Moyle et al. 1989, 2004). Spawning has been observed to occur as early as January and may continue through early July (Wang 1986; Moyle 2002), although spawning typically occurs from late February through April (Moyle et al. 2004). The adhesive eggs are deposited over flooded terrestrial or aquatic vegetation when water temperature is between 48 and 68°F (8.9 and 20°C) (Moyle 2002; Wang 1986).

Sacramento splittail may use the Merced River in the study area for rearing. They were captured by Stillwater Sciences (2008) during their study.

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Special-Status Species Known or with Potential to Occur in the Study Area

Table K-1. Special-Status Plant Species Known or with Potential to Occur in the Study Area

Common Name Scientific Name	Status[a] Federal/State /CNPS	Geographic Distribution	General Habitat Description	Habitat Present/ Absent	Rationale
Alkali milk vetch *Astragalus tener* var. *tener*	–/–/1B.2	Southern Sacramento Valley, northern San Joaquin Valley, east San Francisco Bay Area	Playas, on adobe clay in valley and foothill grassland, vernal pools on alkaline soils; 1-60 meters; blooms Mar-Jun	Present	Suitable annual grassland, seasonal wetland, and vernal pools present
California alkali grass *Puccinellia simplex*	–/–/1B.2	Tehachapi Mountain Area Subregion, Great Central Valley Region, San Francisco Bay Area Subregion, west Mojave Desert Region	Alkaline, vernally mesic; sinks, flats, and lake margins; chenopod scrub; meadows and seeps; valley and foothill grassland; vernal pools; (Saline flats, mineral springs) below 900 meters; blooms Mar-May	Present	Suitable annual grassland and wetlands present
Colusa grass *Neostapfia colusana*	T/E/1B.1	Central Valley: Colusa*, Glenn, Merced, Solano, Stanislaus, and Yolo Counties	Adobe soils of vernal pools; 5-200 meters; blooms May-Aug	Present	Suitable seasonal wetland and vernal pool habitat present
Coulter's goldfields *Lasthenia glabrata* ssp. *coulteri*	–/–/1B.1	Colusa, Kern*, Los Angeles*, Merced, Orange, Riverside, Santa Barbara, San Bernardino*, San Diego, San Luis Obispo, Solano, Santa Rosa Island, Tehama, Tulare, Ventura, and Yolo Counties.	Coastal salt marshes and swamps, playas, and vernal pools; below 1220 meters; blooms Feb-Jun	Present	Suitable seasonal wetland and vernal pool habitat present
Delta button-celery *Eryngium racemosum*	–/E/1B.1	San Joaquin River delta, floodplains, and adjacent Sierra Nevada Foothills: Calaveras, Contra Costa, Merced, San Joaquin*, and Stanislaus Counties	Riparian scrub in seasonally inundated depressions on clay soils; 3-30 meters; blooms Jun-Oct	Present	Suitable riparian habitat present

Common Name **Scientific Name**	**Status[a]** **Federal/State** **/CNPS**	**Geographic Distribution**	**General Habitat Description**	**Habitat Present/ Absent**	**Rationale**
Dwarf downingia *Downingia pusilla*	–/–/2B.2	Central Valley	Vernal pools and mesic valley and foothill grasslands; below 445 meters; blooms Mar-May	Present	Suitable seasonal wetland and vernal pool habitat present
Forked hare-leaf *Lagophylla dichotoma*	–/–/1B.1	Butte *, Calaveras, Fresno, Merced *, Monterey, San Benito, and Stanislaus Counties	Cismontane woodland, valley and foothill grassland, sometimes on clay soils; 50-760 meters; blooms Apr-Sep	Present	Suitable grassland habitat present. CNDDB occurrence within project area.
Hairy Orcutt grass *Orcuttia pilosa*	E/E/1B.1	Scattered locations along east edge of the Central Valley and adjacent foothills from Tehama to Merced Counties	Vernal pools; 46-200 meters; blooms May-Sep	Present	Suitable seasonal wetland and vernal pool habitat present
Heartscale *Atriplex cordulata* var. *cordulata*	–/–/1B.2	Western Central Valley and valleys of adjacent foothills	Saline or alkaline area in chenopod scrub, meadows and seeps, sandy soils in valley and foothill grassland; below 560 meters; blooms Apr-Oct	Present	Suitable annual grassland and seasonal wetlands present
Heckard's pepper-grass *Lepidium latipes* var. *heckardii*	–/–/1B.2	Southern Sacramento Valley, in Glenn, Merced, Sacramento, Solano, and Yolo Counties	On margins of alkali scalds in annual grassland; below 200 meters; blooms Mar-May	Absent	Suitable alkali scald habitat absent
Lesser saltscale *Atriplex minuscula*	–/–/1B.1	Sacramento and San Joaquin Valley, Butte County and from Merced County to Kern County	Sandy alkaline soils in chenopod scrub, playas, valley and foothill grassland; 15-200 meters; blooms May-Oct	Present	Suitable annual grassland and seasonal wetlands present

Common Name Scientific Name	Status[a] Federal/State /CNPS	Geographic Distribution	General Habitat Description	Habitat Present/ Absent	Rationale
Merced monardella *Monardella leucocephala*	–/–/1A	Presumed extirpated, last seen in 1941, historically known from northern San Joaquin Valley in Merced and Stanislaus Counties	Moist, sub-alkaline soils associated with low elevation grassland, in sandy depressions and riverbeds; 35-100 meters; blooms May-Aug	Absent	Suitable habitat absent
Prostrate vernal pool navarretia *Navarretia prostrata*	–/–/1B.1	Western San Joaquin Valley, interior South Coast Ranges, central South Coast, Peninsular Ranges: Alameda, Los Angeles, Merced, Monterey, Orange, Riverside, San Bernardino*?, San Diego, and San Luis Obispo Counties	Vernal pools and mesic areas in coastal scrub and alkali grasslands; 15-1210 meters; blooms Apr-Jul	Present	Suitable seasonal wetland and vernal pool habitat present
Sanford's arrowhead *Sagittaria sanfordii*	–/–/1B.2	Scattered locations in Central Valley and Coast Ranges	Freshwater marshes, sloughs, canals, and other slow-moving water habitats; below 650 meters; blooms May-Oct	Present	Suitable marsh and ditch/canal habitat
San Joaquin spearscale *Extriplex joaquinana*	–/–/1B.2	West edge of Central Valley from Glenn County to Tulare County	Alkaline soils in chenopod scrub, meadows and seeps, playas, valley and foothill grassland; 1-835 meters; blooms Apr-Oct	Present	Suitable annual grassland and seasonal wetland habitat present
San Joaquin Valley Orcutt grass *Orcuttia inaequalis*	T/E/1B.1	Scattered locations along east edge of the San Joaquin Valley and adjacent foothills, from Stanislaus County to Tulare County	Vernal pools; 10-755 meters; blooms Apr-Sep	Present	Suitable seasonal wetland and vernal pool habitat present

Common Name **Scientific Name**	**Status[a] Federal/State /CNPS**	**Geographic Distribution**	**General Habitat Description**	**Habitat Present/ Absent**	**Rationale**
Shining navarretia *Navarretia nigelliformis* ssp. *radians*	–/–/1B.2	Interior foothills of South Coast Ranges from Merced County to San Luis Obispo County	Mesic areas with heavy clay soils, in swales and clay flats, in oak woodland, grassland; 76-1000 meters; blooms Apr-Jul	Absent	Suitable habitat absent, project elevation range is significantly below species' elevation range
Spiny-sepaled button-celery *Eryngium spinosepalum*	–/–/1B.2	Eastern San Joaquin Valley and Sierra Nevada Foothills in Fresno, Madera, Merced, Stanislaus, Tulare, and Tuolumne Counties	Valley and foothill grassland, vernal pools; 80-255 meters; blooms Apr-May	Present	Suitable annual grassland, seasonal wetland, and vernal pool habitat present
Subtle orache *Atriplex subtilis*	–/–/1B.2	Central Valley, especially San Joaquin Valley with occurrences in Butte, Fresno, Kings, Kern, Madera, Merced, and Tulare Counties	Alkali scalds and alkali grasslands, often near vernal pools; 40-100 meters; blooms Jun-Aug (Oct)	Absent	Suitable habitat absent
Succulent owl's clover *Castilleja campestris* var. *succulenta*	T/E/1B.2	Eastern edge of San Joaquin Valley and adjacent foothills, from Stanislaus to Fresno Counties	Vernal pools, often on acidic soils; 50-750 meters; blooms Apr-May	Present	Suitable seasonal wetland and vernal pool habitat present
Vernal pool smallscale *Atriplex persistens*	–/–/1B.2	Central Valley, from Glenn to Tulare County	Dry beds of vernal pools on alkaline soils; 10-115 meters; blooms Jun-Oct	Present	Suitable seasonal wetland and vernal pool habitat present
Watershield *Brasenia schreberi*	–/–/2B.3	Scattered occurrences in north and central California; widespread across US	Freshwater marshes; 30-2200 meters; blooms Jun-Sep	Present	Suitable freshwater marsh habitat present

Common Name Scientific Name	Status[a] Federal/State /CNPS	Geographic Distribution	General Habitat Description	Habitat Present/ Absent	Rationale

* = populations extirpated in the county.
[a] Status explanations:
Federal
E = listed as endangered under the federal Endangered Species Act (ESA).
T = listed as threatened under ESA.
– = no listing.
State
E = listed as endangered under the California Endangered Species Act (CESA).
R = listed as rare under CESA
– = no listing.
California Native Plant Society (CNPS) California Rare Plant Rank
1A = List 1A species: plants presumed extirpated in California and either rare or extinct elsewhere.
1B = List 1B species: plants rare, threatened, or endangered in California and elsewhere.
2B = List 2B species: plants rare, threatened, or endangered in California, but more common elsewhere.
CNPS Code Extensions:
0.1 = seriously endangered in California (over 80% of occurrences threatened/high degree and immediacy of threat).
0.2 = fairly endangered in California (20-80% of occurrences threatened).
0.3 = not very threatened in California (<20% of occurrences threatened/low degree and immediacy of threat or no current threats known.)

Table K-2. Special-Status Wildlife Known or with Potential to Occur in the Study Area

Common Name Scientific Name	Status[a] Federal/ State/ Other	Geographic Range	General Habitat Description	Habitat Presence/ Absence in Study Area	Rationale
Invertebrates					
Conservancy fairy shrimp *Branchinecta conservatio*	FE/–/–	Disjunct occurrences in Solano, Merced, Tehama, Ventura, Butte, and Glenn Counties	Large, deep vernal pools in annual grasslands	Present	Study area includes vernal pools and similar habitat; however, pools occur in disturbed areas and potential for the species is low.
Longhorn fairy shrimp *Branchinecta longiantenna*	FE/–/–	Eastern margin of central Coast Ranges from Contra Costa County to San Luis Obispo County; disjunct population in Madera County	Small, clear pools in sandstone rock outcrops of clear to moderately turbid clay- or grass-bottomed pools	Absent	Study area lacks rock outcrops.
Vernal pool fairy shrimp *Branchinecta lynchi*	FT/–/–	Central Valley, central and south Coast Ranges from Tehama to Santa Barbara County; isolated populations in Riverside County	Common in vernal pools; also found in sandstone rock outcrop pools	Present	Study area includes vernal pools and similar habitat. Pools occur in disturbed areas and potential for species is low.

Monarch butterfly *Danaus plexippus plexippus*	FC/–/–	Occurs throughout the western United States to southern Canada, but uncommon in western Washington, northwest Oregon, and western British Columbia. Overwintering western population occurs along the California coast, from Mendocino County, south to northern Baja California. Spring and fall migratory individuals occur from coastal California, inland toward Rockies and to Pacific Northwest. Summer breeding range is North America where nectar and breeding resources are present.	Habitat includes breeding, migratory, and overwintering sites with floral resources (nectar sources). Milkweed (primarily *Asclepias* spp.) is the obligate host plant for oviposition and larvae feeding. Adults feed on a diversity of blooming nectar resources. Nectar and milkweed resources required year-round. Nectar and milkweed resources are often associated with riparian corridors and milkweed may function as the principal nectar source for monarchs in arid regions. Uses a variety of roosting trees along migration route. Wintering roosting groves include the following tree species – blue gum eucalyptus (*Eucalyptus globulus*), Monterey pine (*Pinus radiata*), and Monterey cypress (*Hesperocyparis macrocarpa*).	Present - Spring, Summer, Fall Absent- Winter	Study area occurs within the spring and summer breeding range of the species. Western Monarch Milkweed Mapper (a collaborative mapping project with the Xerces Society, U.S. Fish and Wildlife, and State Wildlife Agencies to document species and habitat occurrence [https://www.monarchmilkweedmapper.org/]) indicate that milkweed plants and monarch butterfly are present in the study area. Nectar and milkweed resources may be found in undeveloped landcover types (annual grassland, valley foothill riparian, mixed riparian forest woodland), as well as developed/landscaped land cover (e.g., urban gardens). Based on interpretation of aerial imagery, nectaring and breeding sources are absent in the footprints of the Turlock Station, Livingston Station, Merced Station, Atwater Station Alternative, and Merced Layover & Maintenance Facilities. Thus, this species would be absent at these facilities. However, there is the potential for the species to be present at the Ceres to Merced Extension Alignment. Study area lacks suitable overwintering habitat (groves of trees generally within 1.5 miles of the Pacific Ocean or San Francisco Bay).
Vernal pool tadpole shrimp	FE/–/–	Shasta County south to Merced County	Found in vernal pools and ephemeral stock ponds	Present	Study area includes vernal pools and similar habitat. Pools occur in disturbed areas and potential for species is low.

Common Name Scientific Name	Status[a] Federal/ State/ Other	Geographic Range	General Habitat Description	Habitat Presence/ Absence in Study Area	Rationale
Lepidurus packardi					
Valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	FT/–/–	Riparian habitats below 3,000 feet throughout the Central Valley	Valley elderberry longhorn beetle (VELB) is found only in association with its host plant, blue elderberry, which is commonly found in riparian forests and adjacent uplands in the Central Valley and foothills	Present	Elderberry shrubs occur within portions of study area that overlap with species' range. Elderberry shrubs were observed on the south bank of the Merced River during the reconnaissance-level survey on July 14, 2020. Species known to occur in study area.
Crotch bumble bee *Bombus crotchii*	–/CE/–	Pacific coast, Western desert, Central Valley and adjacent foothills through most of southwestern CA,	Open grassland and scrub habitat. Nesting occurs underground. Select food plant genera: *Antirrhinum, Phalcelia, Clarkia, Dendromecon, Eschscholzia, Eriognum.*	Present	Study area includes grassland habitat that may provide suitable foraging resources. Species known to occur in study area.
Amphibians					
California tiger salamander *Ambystoma californiense*	FT/ST/–	Central Valley, including Sierra Nevada foothills, up to approximately 1,000 feet in elevation, and coastal region from Sonoma County south to Santa Barbara County	Small ponds, lakes, or vernal pools in grasslands and oak woodlands for breeding; rodent burrows, rock crevices, or fallen logs for upland cover during dry season	Present	Study area includes suitable upland habitat within 1.2 miles of suitable aquatic habitat (wetlands, stock ponds). Low potential for species to occur
Western spadefoot toad *Spea hammondii*	–/–/SSC	Sierra Nevada foothills, Central Valley, Coast Ranges, coastal counties in southern California	Shallow streams with riffles and seasonal wetlands, such as vernal pools in annual grasslands and oak woodlands	Present	Suitable upland habitat occurs within the area that may be affected by the ACE Extension. Study area includes vernal pools and similar habitat. Pools occur in disturbed areas and potential for species is low.

Common Name Scientific Name	Status[a] Federal/ State/ Other	Geographic Range	General Habitat Description	Habitat Presence/ Absence in Study Area	Rationale
California red-legged frog *Rana draytonii*	FT/–/SSC	Along the coast and coastal mountain ranges of California from Mendocino County to San Diego County and in the Sierra Nevada from Butte County to Stanislaus County	Permanent and semipermanent aquatic habitats, such as creeks and coldwater ponds, with emergent and submergent vegetation; may aestivate in rodent burrows or cracks during dry periods.	Absent	The species has likely been extirpated from the Central Valley floor (U.S. Fish and Wildlife Service 1996, 2002). No CNDDB records in Stanislaus and Merced County. No potential for species to occur.
Reptiles					
Western pond turtle *Emys marmorata*	–/–/SSC	From the Oregon border of Del Norte and Siskiyou Counties south along the coast to San Francisco Bay, inland through the Sacramento Valley, and on the western slope of Sierra Nevada	Ponds, marshes, rivers, streams, and irrigation canals with muddy or rocky bottoms and with watercress, cattails, water lilies, or other aquatic vegetation in woodlands, grasslands, and open forests	Present	Study area includes several streams and canals that provide high-quality aquatic habitat. Species known to occur in study area.
Blunt-nosed leopard lizard *Gambelia silus*	FE/SE, FP	Scattered sites in the San Joaquin Valley and adjacent foothills. From Merced County south through Kern County, southwestern Tulare County, eastern San Luis Obispo and Santa Barbara Counties, and northwestern Ventura Co.	Sparsely vegetated alkali flats, large desert washes, arroyos, canyons, desert scrub habitats, and low foothills.	Absent	Study area lacks suitable alkali scrub habitat. No potential for species to occur.

Common Name Scientific Name	Status[a] Federal/ State/ Other	Geographic Range	General Habitat Description	Habitat Presence/ Absence in Study Area	Rationale
Coast horned lizard *Phrynosoma blainvillii*	–/–/SSC	Sacramento Valley, including foothills, south through Transverse and Peninsular Ranges from Ventura to San Diego County in southern California; Coast Ranges south of Sonoma County; below 4,000 feet in northern California	Valley-foothill hardwood, conifer and riparian habitats, as well as annual grassland habitats; requires open areas for sunning	Present	Suitable grassland and riparian habitat occur within the Central Valley where natural, open land cover and friable substrate exists in the study area. Low potential for species to occur.
Northern California legless lizard *Anniella pulchra*	–/–/SSC	Along the Coast, Transverse, and Peninsular Ranges from Contra Costa County to San Diego County with spotty occurrences in the San Joaquin Valley	Habitats with loose soil for burrowing or thick duff or leaf litter; often forages in leaf litter at plant bases; may be found on beaches, sandy washes, and in woodland, chaparral, and riparian areas	Present	Open, natural habitat and riparian habitat with suitable substrate (occurs in San Joaquin Valley portion of study area and along Merced River). Species known to occur in the study area.
Giant gartersnake *Thamnophis gigas*	FT/ST/–	Central Valley from the vicinity of Burrel in Fresno County north to near Chico in Butte County; has been extirpated from areas south of Fresno	Sloughs, canals, low gradient streams and freshwater marsh habitats where there is a prey base of small fish and amphibians; also found in irrigation ditches and rice fields; requires grassy banks and emergent vegetation for basking and areas of high ground protected from flooding during winter	Present	Suitable aquatic habitat (canals and ditches) occurs in Central Valley portions of study area that overlap with species' known range. CNDDB occurrence overlaps with rail alignment, however, the presence is considered “possibly extirpated”. Low potential for species to occur.

Common Name Scientific Name	Status[a] Federal/ State/ Other	Geographic Range	General Habitat Description	Habitat Presence/ Absence in Study Area	Rationale
Birds					
Golden eagle *Aquila chrysaetos*	PR/–/FP	Foothills and mountains throughout California. Uncommon nonbreeding visitor to lowlands such as the Central Valley	Nest on cliffs and escarpments or in tall trees overlooking open country. Forages in annual grasslands, chaparral, and oak woodlands with plentiful medium and large-sized mammals	Present	Foraging habitat is present within and/or near study area, but study area does not include suitable nesting substrate due to routine disturbance from existing trains and the lack of high nesting substrate. Low potential for species to occur.
Short-eared owl *Asio flammeus*	–/–/SSC	Winter migrant found primarily in the Central Valley, western Sierra Nevada foothills, and along coastline. Nests in northern California, San Francisco Bay Delta, and parts of San Joaquin Valley (western Merced County south to western Kern County).	Open areas with few trees, annual and perennial grasslands, prairies, dunes, irrigated lands, emergent wetlands. Uses tall, dense vegetation for cover. Ditches and wetlands used for resting and roosting.	Present	Foraging and roosting habitat is present; however, the species does not nest within the study area. Low potential for species to occur.
Grasshopper Sparrow *Ammodramus savannarum*	–/–/SSC	Summer breeder in foothills and lowlands west of Cascade-Sierra Nevada crest from Trinity County south to San Diego County.	Occurs in dry, dense grassland, especially where tall forbs and shrubs are present.	Present	Foraging and nesting habitat (grassland) is present. Low potential for species to occur.

Common Name Scientific Name	Status[a] Federal/ State/ Other	Geographic Range	General Habitat Description	Habitat Presence/ Absence in Study Area	Rationale
Swainson's hawk *Buteo swainsoni*	–/ST/–	Lower Sacramento and San Joaquin Valleys, the Klamath Basin, and Butte Valley; highest nesting densities occur near Davis and Woodland, Yolo County	Nests in oaks or cottonwoods in or near riparian habitats; forages in grasslands, irrigated pastures, and grain fields	Present	Suitable riparian (nesting) and grassland habitat, and open agricultural fields located within and/or near study area. Swainson's hawk was observed foraging over the study area during the site assessment on July 14, 2020. High potential for species to occur in study area.
Snowy plover (interior population) *Charadrius alexandrines nivosus*	-/–/SSC	Year round in California, though seasonal status varies. Inland breeds remain year-round in San Joaquin Valley and Salton Sea. Nests in southern San Joaquin Valley; documented in Merced County (Los Banos & Kesterson Reservoir) and Stanislaus County (Modesto sewage ponds).	Nests on barren to sparsely vegetated flats and along shores of terminal alkaline lake, saline lakes, reservoirs, braided river channels, agricultural evaporation ponds, sewage ponds, ponds that receive agricultural drainwater (Shuford et. al 2008, Page et al. 1995). Forage near shallow water (1-2 cm deep).	Absent	Suitable foraging and nesting habitat are absent from the study area. Low potential for species to occur.
Northern harrier *Circus cyaneus*	–/–/SSC	Throughout lowland California, but species has been recorded in fall at high elevations	Grasslands, meadows, marshes, and seasonal and agricultural wetlands; nests on the ground within a thicket of vegetation	Present	Suitable foraging and nesting habitat is present in grassland habitat located within and/or near study area. Moderate potential for species to occur.

Common Name Scientific Name	Status[a] Federal/ State/ Other	Geographic Range	General Habitat Description	Habitat Presence/ Absence in Study Area	Rationale
White-tailed kite *Elanus leucurus*	–/–/FP	Lowland areas west of Sierra Nevada from the head of the Sacramento Valley south, including coastal valleys and foothills, to western San Diego County at the Mexico border	Dense-topped trees or shrubs for nesting, open grasslands, marshes, or agricultural fields for foraging	Present	Suitable nesting and foraging habitat occur within and/or near study area. Moderate potential for species to occur.
Mountain plover *Charadrius montanus*	–/–/SSC	Does not breed in California; in winter, found in the Central Valley south of Yuba County, along the coast in parts of San Luis Obispo, Santa Barbara, Ventura, and San Diego Counties; parts of Imperial, Riverside, Kern, and Los Angeles Counties	Occupies open plains or rolling hills with short grasses or very sparse vegetation; nearby bodies of water are not needed; may use newly plowed or sprouting grainfields	Present	Suitable foraging habitat is present in and/or near study area, but nesting does not occur in California. Low potential for species to occur.
Western yellow-billed cuckoo *Coccyzus americanus*	FT/SE/–	Nests along upper Sacramento, lower Feather, south fork of the Kern, Amargosa, Santa Ana, and Colorado Rivers	Wide, dense riparian forests with a thick understory of willows for nesting; sites with a dominant cottonwood overstory are preferred for foraging; may avoid valley-oak riparian habitats where scrub jays are abundant	Present	Suitable riparian habitat occurs along the Merced River; however, study area does not overlap with species range and the species is not known to nest on the portion of the Merced River that overlaps with the study area. Low potential for species to occur.

Common Name *Scientific Name*	Status[a] Federal/ State/ Other	Geographic Range	General Habitat Description	Habitat Presence/ Absence in Study Area	Rationale
Burrowing owl *Athene cunicularia*	–/–/SSC	Lowlands throughout California, including the Central Valley, northeastern plateau, southeastern deserts, and coastal areas; rare along south coast	Level, open, dry, heavily grazed or low stature grassland or desert vegetation to forage in with available burrows for refuge and nesting	Present	Study area includes suitable grassland habitat and surrogate burrows were observed during field surveys. Moderate potential for species to occur.
Loggerhead shrike *Lanius ludovicianus*	–/–/SSC	Resident and winter visitor in lowlands and foothills throughout California; rare on coastal slope north of Mendocino County, occurring only in winter	Prefers open habitats with scattered shrubs, trees, posts, fences, utility lines, or other perches	Present	Study area includes suitable foraging and nesting habitat. Moderate potential for species to occur.
Least Bell's vireo *Vireo bellii pusilus*	SE/SE/–	Nests in North America and overwinters primarily along Pacific Coast in southern Mexico. Additional nesting sites and/or small populations in southern Inyo, southern San Bernardino, Riverside, San Diego, Orange, Los Angeles, Ventura, and Santa Barbara Counties. Nesting also reported in southern Santa Clara, southeastern Monterey, and Stanislaus Counties (San Joaquin River NWR) (USFWS 2006).	Riparian thickets either near water or in dry portions of river bottoms; nests along margins of bushes and forages low to the ground; may also be found using mesquite and arrow weed in desert canyons	Present	Study area located within the historic range, but is outside of the species' current range (Kus 2002). CNDDB occurrence is considered extirpated. Potentially suitable riparian habitat occurs along the Merced River. Low/No potential for species to occur.

Common Name Scientific Name	Status[a] Federal/ State/ Other	Geographic Range	General Habitat Description	Habitat Presence/ Absence in Study Area	Rationale
Bank swallow *Riparia ripiaria*	–/ST/–	Occurs along the Sacramento River from Tehama County to Sacramento County, along the Feather and lower American Rivers, in the Owens Valley; and in the plains east of the Cascade Range in Modoc, Lassen, and northern Siskiyou Counties; small populations near the coast from San Francisco County to Monterey County	Nests in bluffs or banks, usually adjacent to water, where the soil consists of sand or sandy loam	Absent	Study area does not overlap with species current range (BSTAC 2013). Species does not occur in southern Central Valley due to loss of nesting habitat from flood and erosion control projects (Garrison et al. 1987, Small 1994). Breeding population generally confined to the Sacramento and Feather Rivers and their major tributaries (Garrison 1998). Suitable stream-side habitat is absent along Merced River and Bear Creek. Low/No potential for species to occur.
Song sparrow (Modesto population) *Melospiza melodia*	–/–/SSC	Stanislaus, eastern Contra Costa, eastern Alameda, San Joaquin, Sacramento, eastern Solano, Yolo, eastern Colusa, Sutter, western Yuba, and western Placer Counties	Emergent freshwater marshes, valley oak dominated riparian forests (including recent restoration sites), vegetated irrigation canals and levees	Present	Study area includes suitable riparian habitat, and vegetated canals and levees. Moderate potential for species to occur.

Common Name Scientific Name	Status[a] Federal/ State/ Other	Geographic Range	General Habitat Description	Habitat Presence/ Absence in Study Area	Rationale
Tricolored blackbird (nesting colony) *Agelaius tricolor*	–/T/SSC	Permanent resident in the Central Valley from Butte County to Kern County; breeds at scattered coastal locations from Marin County south to San Diego County, and at scattered locations in Lake, Sonoma, and Solano Counties; rare nester in Siskiyou, Modoc, and Lassen Counties	Nests in dense colonies in emergent marsh vegetation, such as tules and cattails, or upland sites with blackberries, nettles, thistles, and grainfields; habitat must be large enough to support 50 pairs; probably requires water at or near the nesting colony.	Present	Study area includes suitable riparian (nesting) habitat and open agricultural fields and freshwater wetland provide suitable foraging habitat. Moderate potential for species to occur.
Yellow-headed blackbird *Xanthocephalus xanthocephalus*	–/–/SSC	Central Valley and southeastern California year-round; spends winter in southern Arizona, Texas, New Mexico, and Mexico; spends summer in the Great Basin to Canada	Wetlands in prairies, meadows, aspen stands, marshes, pond shallows, and river banks with emergent vegetation	Present	Study area includes suitable nesting and foraging habitat- riparian habitat and vegetated ditches. Moderate potential for species to occur.

Common Name Scientific Name	Status[a] Federal/ State/ Other	Geographic Range	General Habitat Description	Habitat Presence/ Absence in Study Area	Rationale
Mammals					
Pallid bat *Antrozous pallidus*	–/–/SSC, WBWG-High	Widespread throughout California, except for high Sierra Nevada from Shasta to Kern Counties and northwestern Del Norte, Siskiyou and northern Mendocino Counties.	Occurs in a variety of habitats from desert to coniferous forest; most closely associated with oak, yellow pine, redwood, and giant sequoia habitats in northern California and oak woodland, grassland, and desert scrub in southern California; relies heavily on trees for cavity roosts, but will use crevices in man-made structures	Present	Study area includes suitable riparian habitat and man-made structures for foraging and roosting. Low potential for species to occur.
Townsend's big-eared bat *Corynorhinus townsendii*	–/–/SSC, WBWG-High	Throughout California, although detail of distribution is not well known in all but subalpine and alpine habitats.	May occur in all but subalpine and alpine habitats. Roosts in caves, tunnels, mines, and dark attics of abandoned buildings; very sensitive to disturbances and may abandon a roost after one onsite visit. Reported to utilize buildings, bridges, rock crevices and hollow trees as roost sites.	Present	Suitable roosting habitat (e.g., man-made structures) are present. Low potential for species to occur.
Hoary bat *Lasiurus cinereus*	–/–/WBWG-Medium	Widespread throughout California	Roosts in trees, typically within forests. Roosts are typically at the edges of a clearing.	Present	Study area contains suitable rooting habitat. Species known to occur in study area.

Common Name Scientific Name	Status[a] Federal/ State/ Other	Geographic Range	General Habitat Description	Habitat Presence/ Absence in Study Area	Rationale
Western mastiff bat *Eumops perotis californicus*	–/–/SSC, WBWG-High	Occurs along the western Sierra primarily at low to mid elevations and widely distributed throughout the southern coast ranges; recent surveys have detected the species north to the Oregon border	Found in a wide variety of habitats from desert scrub to montane conifer; roosts and breeds in deep, narrow rock crevices, but may also use crevices in trees, buildings, and tunnels	Present	Study area contains suitable roosting and foraging habitat (riparian habitat and man-made structures). Species known to occur in study area.
Western red bat *Lasiurus blossevillii*	–/SSC	Year-round range spans the Central Valley, Sierra Nevada foothills, Coast Ranges, and coast except Humboldt and Del Norte Counties	Mature riparian broadleaf forest in the Central Valley is primary summer breeding habitat for the species in California (females and pups); riverside orchards may also be used as maternity roosts; roosts alone or in small family groups in tree foliage, occasionally shrubs; prefers habitat edges and mosaics with trees that are protected from above and open below with open areas for foraging, including grasslands, shrublands, and open woodlands; unsubstantiated records of hibernation in leaf litter during the winter	Present	Study area contains suitable roosting and foraging habitat in orchards and riparian edges. Species known to occur in study area.

Common Name Scientific Name	Status[a] Federal/ State/ Other	Geographic Range	General Habitat Description	Habitat Presence/ Absence in Study Area	Rationale
Fresno kangaroo rat *Dipodomys nitratoides exilis*	FE/SE/–	Southwestern San Joaquin Valley from Merced County to the northern boarder of Kings County	Sands and saline sandy soils in chenopod scrub and annual grassland communities on the Central Valley floor between 200-300 ft in elevation.	Absent	Chenopod scrub habitat absent and annual grassland communities within the project area are disturbed by human activity (e.g. tilling). No potential for species to occur.
San Joaquin kit fox *Vulpies macrotis mutica*	FE/ST/–	San Joaquin Valley and adjacent open foothills to the west; recent records from 17 counties extending from Kern County north to Contra Costa County	Saltbush scrub, grassland, oak, savanna, and freshwater scrub	Present	Study area contains suitable grassland and other open habitat. Low potential to occur in the study area.
American badger *Taxidea taxus*	–/–/SSC	The majority of the northern, western, and central United States south to Baja California	Grasslands, savannas, mountain meadows, and open areas of desert scrub that support small mammal burrow complexes	Present	Study area contains grasslands and other open habitat for the species. Low potential to occur in the study area.

Common Name Scientific Name	Status[a] Federal/ State/ Other	Geographic Range	General Habitat Description	Habitat Presence/ Absence in Study Area	Rationale
Mountain lion, Central Coast North ESU *Puma concolor*	–/SC/–	Widespread throughout California, except croplands of the Central Valley and inland Mojave and Colorado desert. Ranging from sea level to alpine elevations. Seasonal movements within fixed range.	Requires extensive areas of riparian vegetation and brushy stages of most habitats (pine forest, riparian and oak woodland, streams, chaparral, grassland, and desert) with interspersions of irregular terrain, rocky outcrops, and tree/brush edges. Generally, avoid areas with human disturbance, but will use it for traveling or hunting. Uses caves and natural cavities for cover. Closely associated with deer population.	Absent	Suitable habitat is absent. Extensive brushy and woodland habitat absent, riparian area limited. Study area dominated by cropland and located in the Central Valley where the species prey source is absent.

Notes:

[a] Status Codes

–	no listing.
FE	listed as endangered under the federal Endangered Species Act.
FT	listed as threatened under the federal Endangered Species Act.
FC	candidate species for listing under the federal Endangered Species Act.
PD	proposed for delisting under the federal Endangered Species Act.
D	delisted.
SE	listed as endangered under the California Endangered Species Act.
ST	listed as threatened under the California Endangered Species Act.
SSC	listed as a Species of Special Concern by the State of California.
SCT	candidate for state threatened listing under the California Endangered Species Act.
FP	California fully protected species.
WBWG	Western Bat Working Group conservation priority (High or Medium)

Table K-4.2. Special-Status Fish Species Known or with Potential to Occur in the Study Area

Common Name Scientific Name	Status[a] Federal/ State/ Other	Geographic Range	General Habitat Description	Habitat Presence/ Absence in Study Area	Rationale
Fish					
River lamprey *Lampetra ayresi*	–/–/SSC	San Francisco Bay to just north of Juneau, Alaska. Recorded from Sacramento- San Joaquin Delta, tributaries to Sacramento and San Joaquin rivers	Adults live in the ocean and migrate into larger coastal fresh water river systems to spawn.	Present	Study area located in species' known range in the Merced River.
Steelhead, Central Valley DPS *Oncorhynchus mykiss irideus*	FT/–/CH	Sacramento and San Joaquin River and their tributaries	Occurs in the Sacramento and San Joaquin Rivers and their tributaries in well-oxygenated, cool, riverine habitat with water temperatures from 7.8 to 18°C (Moyle 2002); habitat types are riffles, runs, and pools.	Present	Study area located in the species' known range in the Merced River (NMFS 2020a).
Central Valley Chinook salmon *Oncorhynchus tshawytscha*	FT, ESA experimental population in the San Joaquin River/– (spring run) FE/– (winter run) –/SSC (fall run)	Sacramento and San Joaquin River and their tributaries.	Occurs in well-oxygenated, cool, riverine habitat with water temperatures from 8.0 to 12.5°C; habitat types are riffles, runs, and pools. (Moyle 2002)	Present	Fall-run and spring-run Chinook salmon occur in the San Joaquin and Merced Rivers (NMFS 2020b).

Common Name Scientific Name	Status[a] Federal/ State/ Other	Geographic Range	General Habitat Description	Habitat Presence/ Absence in Study Area	Rationale
Delta smelt *Hypomesus transpacificus*	FT/SE/–	Primarily in the Sacramento–San Joaquin Estuary, but has been found as far upstream as the mouth of the American River on the Sacramento River and Mossdale on the San Joaquin River; range extends downstream to San Pablo Bay	Occurs in estuary habitat in the Delta where fresh and brackish water mix in the salinity range of 2–7 parts per thousand (Moyle 2002)	Absent	Study area located outside of species' known range
Hardhead *Mylopharodon conocephalus*	–/–/SSC	Tributary streams in the San Joaquin drainage; large tributary streams in the Sacramento River and the main stem	Reside in low to mid-elevation streams and prefer clear, deep pools and runs with slow velocities; also occur in reservoirs	Present	Study area is within the species range and Bear Creek and Merced River provide suitable habitat.

Notes:

Notes:

[a] Status Codes

–	no listing.
FE	listed as endangered under the federal Endangered Species Act.
FT	listed as threatened under the federal Endangered Species Act.
SE	listed as endangered under the California Endangered Species Act.
SSC	listed as a Species of Special Concern by the State of California.
CH	Critical Habitat

Rare Plant Survey Findings

Memorandum

To:	Kevin Sheridan, San Joaquin Regional Rail Commission
From:	Sierra Spooner, ICF Botanist
Date:	10/20/2020
Re:	**Rare Plant Survey Findings for the ACE Ceres to Merced Extension Alignment Project**

Introduction

This document provides a summary of the methodology and results of botanical surveys conducted from May 29 and June 5, 2020, and on October 12, 2020 along the Union Pacific (UPRR) railroad tracks from Ceres to Merced, California for the ACE Ceres–Merced Extension Project (Project) (Figure 1). Below is information on the Project location, environmental setting, survey methodology, and field results of the May, June, and October 2020 rare plant surveys.

Environmental Setting

The Project site is located within central Stanislaus County and eastern Merced County, California, stretching approximately 34 miles from Ceres, California to central Merced, California. The Project site follows a current UPRR track and is accessed via State Highway 99 and numerous surface roads. The Project site is relatively flat, with local topographic variation around drainages and water features. At the scale of the entire project, there is a gentle 0-2% slope toward the northwest, dropping in elevation from approximately 165 feet above mean sea level in Merced to approximately 90 feet above mean sea level in Ceres, California.

The survey area consists of the environmental footprint of the Project, as well as a 100-foot lateral buffer along approximately 34 miles of UPRR railroad tracks, in addition to three proposed stations, one layover & maintenance facility, and one alternative station location. Approximately 317.76 acres of the 423.62-acre environmental footprint consists of developed or landscaped land cover types and an additional 103.46 acres of the environmental footprint are either agricultural or ruderal land cover types. Irrigated farming occurs in addition to dry land farming, orchards, and cattle grazing within the agricultural areas. There are a total of eleven land cover types in the survey area: developed/landscaped, ruderal, orchard, row crops, riverine, pond, California annual grassland, mixed riparian forest and woodland, valley foothill riparian, freshwater marsh, and vernal pool. Of these, California annual grassland, mixed riparian forest and woodland, valley foothill riparian, freshwater marsh, and vernal pool may have the potential to support rare plants. Land cover types were classified in accordance with A Manual of California Vegetation (2nd edition) (Sawyer, et. al. 2009).

The Project proposes to improve an existing railroad alignment and create three new passenger stations and a new layover & maintenance facility. The environmental footprint of this Project will cross the Merced River and Bear Creek, as well as two small areas of California annual grassland. At the time of the 2020 plant surveys the Merced River and Bear Creek crossings were characterized by mixed riparian forest and woodland made up of Valley oak (*Quercus lobate)*, blue elderberry (*Sambucus nigra* ssp*. caerulea*), and willows (*Salix* spp.); and valley foothill riparian dominated by Fremont's cottonwood (*Populus fremontii*) and California sycamore (*Platanus racemosa*). The one vernal pool adjacent to the Project footprint and at the edge of the 100-ft buffer was characterized by Italian ryegrass (*Festuca perennis*), gumweed (*Grindelia camporum*), Spanish clover (*Acmispon americanus*), common sunflower (*Helianthus annuus*), wild oats (*Avena* spp.), and yellow star thistle (*Centauria solstitialis*). The California annual grassland was characterized by senesced wild oats (*Avena* spp.), brome (*Bromus diandrus*, *Bromus madritensis*), and ruderal weeds. The freshwater marsh was dominated by various rush (*Juncus* spp.) species as well as bulrush (*Schoenoplectus acutus*), cattail (*Typha latifolia*), and buttonwillow (*Cephalanthus occidentalis*). Below is a summary of the methodology and results of the rare plant survey.

Methods

ICF botanist, Sierra Spooner, conducted rare plant surveys of the Project survey area, which consisted of the environmental footprint and a 100-foot lateral buffer on May 29; June 5, 2020; and October 12, 2020. Prior to the site visits, the California Natural Diversity Database, Information for Planning and Consultation Database, and California Native Plant Society Rare Plant Inventory were queried for Stanislaus and Merced Counties. The regional special-status plant species with the potential to occur in the environmental footprint are listed below in Table 1-1.

Table 1-1. Special Status Plant Species with a Moderate or Higher Potential to Occur

Common Name	Latin Name	Legal Status Federal/ State/CRPR	Habitat Requirements
California alkaligrass	*Puccinellia simplex*	1B.2	Alkaline vernally mesic sinks, flats, and lake margins. Chenopod scrub, meadows and seeps, valley and foothill grassland, and vernal pools; 2-930 meters
Colusa grass	*Neostapfia colusana*	T/E/1B.1	Adobe soils of vernal pools; 5-200 meters
Coulter's goldfields	*Lasthenia glabrata* ssp. *coulteri*	–/–/1B.1	Coastal salt marshes and swamps, Grasslands, vernal pools, alkali sinks, playas, in alkaline soils; 1-1220 meters
Delta button-celery	*Eryngium racemosum*	–/E/1B.1	Riparian scrub in seasonally inundated depressions on clay soils; 3-30 meters

Common Name	Latin Name	Legal Status Federal/ State/CRPR	Habitat Requirements
dwarf Downingia	*Downingia pusilla*	–/–/2B.2	Vernal pools and mesic valley and foothill grasslands; below 445 meters
hairy Orcutt grass	*Orcuttia pilosa*	E/E/1B.1	Vernal pools; 46-200 meters
succulent owl's clover	*Castilleja campestris var. succulenta*	T/E/1B.2	Vernal pools, often on acidic soils; 50-750 meters
heartscale	*Atriplex cordulata var. cordulata*	–/–/1B.2	Saline or alkaline area in chenopod scrub, meadows and seeps, sandy soils in valley and foothill grassland; below 560 meters
lesser saltscale	*Atriplex minuscula*	–/–/1B.1	Sandy alkaline soils in chenopod scrub, playas, valley and foothill grassland; 15-200 meters
prostrate vernal pool navarretia	*Navarretia prostrata*	–/–/1B.1	Vernal pools and mesic areas in coastal scrub and alkali grasslands; 15-1210 meters
Sanford's arrowhead	*Sagittaria sanfordii*	–/–/1B.2	Freshwater marshes, sloughs, canals, and other slow-moving water habitats; below 650 meters
San Juaquin spearscale	*Atriplex joaquiniana*	–/–/1B.2	Alkaline soils in chenopod scrub, meadows and seeps, playas, valley and foothill grassland; 1-835 meters
San Juaquin Valley Orcutt grass	*Orcuttia inaequalis*	T/E/1B.1	Vernal pools; 10-755 meters
spiny-sepaled button-celery	*Eryngium spinosepalum*	–/–/1B.2	Valley and foothill grassland, vernal pools; 80-255 meters
watershield	*Brasenia schreberi*	–/–/2B.3	Freshwater marshes; 30-2200 meters

E=Endangered; = Threatened; R=Rare
CA Rare Plant Rank

1A	Plants presumed extinct in CA and rare/extinct elsewhere
1B.1	Plants rare, threatened, or endangered in CA and elsewhere; seriously threatened in CA
1B.2	Plants rare, threatened, or endangered in CA and elsewhere; fairly threatened in CA
1B.3	Plants rare, threatened, or endangered in CA and elsewhere; not very threatened in CA
2A	Plants presumed extirpated in CA, but more common elsewhere
2B.1	Plants rare, threatened, or endangered in CA, but more common elsewhere; seriously threatened in CA
2B.2	Plants rare, threatened, or endangered in CA, but more common elsewhere; fairly threatened in CA
2B.3	Plants rare, threatened, or endangered in CA, but more common elsewhere; not very threatened in CA
3.1	Plants about which we need more information; seriously threatened in CA
3.2	Plants about which we need more information; fairly threatened in CA
3.3	Plants about which we need more information: not very threatened in CA

The botanical surveys were floristic in nature (Baldwin et al. 2012) and followed methodologies consistent with CDFW's *Protocols for Surveying and Evaluating Impact to Special-Status Native Plant Populations and Natural Communities* (2018). A list of plant species observed in the survey area is included in Table 1-2 below.

On May 29 and June 5, 2020, Ms. Spooner traversed the areas of the survey area that are classified as riverine, pond, mixed riparian woodland and forest, valley foothill riparian, California annual grassland, freshwater marsh, and vernal pool plant communities, as well as areas within the developed/landscaped, agricultural, and ruderal communities that appeared to be of potential interest. Ms. Spooner conducted on-foot transects spaced approximately 10 feet apart within all riparian, aquatic, wetland, and grassland types. Site visits to developed, landscaped, agricultural, and ruderal vegetation communities were performed to ensure that they were correctly classified and did not contain pockets of undisturbed vegetation. Vegetation communities that were determined to be misclassified as developed, landscaped, agricultural, or ruderal on the survey dates were reclassified and then surveyed at approximately 10-foot intervals.

On October 12, 2020, Ms. Spooner traversed the areas of the survey area that were observed to be potential rare plant habitat during the May and June 2020 survey. This included all areas classified as vernal pool habitat as well as higher quality vegetative habitat within the other natural vegetation communities. Ms. Spooner conducted on-foot transects spaced approximately 10 feet apart within all potential rare plant habitat within the Project footprint.

These surveys were completed during the middle, and end of the growing season following the timeline stipulated in the CDFW's *Protocols for Surveying and Evaluating Impact to Special-Status Native Plant Populations and Natural Communities* (2018). A spring blooming survey is planned for April 2021. Below are the results of the May and June 2020, and the October 2020 rare plant surveys.

Results

Ms. Spooner did not observe special-status plant populations on the Project environmental footprint or within the 100-foot buffer area during the 2020 plant surveys (see plant list Table 1-2 below). The overall survey area was characterized by relatively flat terrain dominated by developed, landscaped, agricultural, and ruderal land types, with some California annual grasslands, mixed riparian forest and woodland, valley foothill riparian, freshwater marsh, vernal pool, pond, and riverine communities. The vegetation phenology during the May and June 2020 survey varied from immature to senescent with dried fruiting structures still present, and the vegetation phenology during the October 2020 survey varied from mature to senescent.

Limiting Survey Factors

The precipitation total for 2019-2020 in the Merced region is approximately 14.36 inches, which is 101 percent of normal for the year (NOAA 2020). As the current rainfall totals are close to the average for the region, precipitation should not be viewed as a significant limiting survey factor.

The May/June 2020 survey dates capture the middle of the growing season and the October 2020 survey date captures the end of the growing season for this location. Any species that bloom in the early season would not be captured by these surveys. An additional survey is planned for April 2021 to capture early season plants.

If you have any questions, feel free to contact me at Sierra.Spooner@icf.com.

Sincerely,

Sierra Spooner

Botanist / Wetland Ecologist

201 Mission St, 15th Floor

San Francisco, California 94105

(707) 321-4815

Table 1-2. Plant Species Observed in the Survey Area

Scientific Name	**Common Name**	**Non-native?**
Acer negundo	box elder	
Acer sp.	ornamental maple	Y
Acmispon americanus	Spanish clover	
Ailanthus altissima	tree of heaven	Y
Amaranthus hybridus	slim amaranth	Y
Amsinckia sp.	fiddleneck	
Arundo donax	giant reed	Y
Atriplex serenana var. *serenana*	bract scale	
Avena barbata	wild oat	Y
Avena fatua	wild oat	Y
Brassica nigra	black mustard	Y
Bromus diandrus	rip-gut brome	Y
Bromus madritensis	compact brome	Y
Carex barbarae	Santa Barbara sedge	
Carex sp.	sedge	
Cedrus deodara	Deodar cedar	Y
Celtis australis	hackberry	Y
Centaurea solstitialis	yellow star thistle	Y
Centromadia pungens	common tarweed	
Cephalanthus occidentalis	buttonwillow	
Chenopodium desiccatum	aridland goosefoot	
Citrullus lanatus var. *citroides*	watermellon	Y
Convolvulus arvensis	bindweed	Y
Croton setiger	doveweed	
Cuscuta californica	dodder	
Cyclospermum leptophyllum	marsh parsley	Y
Cynodon dactylon	Bermuda grass	Y
Cyperus eragrostis	tall flatsedge	
Datura wrightii	jimsonweed	Y
Distichlis spicata	saltgrass	
Dittrichia graveolens	stinkwort	Y
Epilobium brachycarpum	tall annual willowherb	
Erigeron bonariensis	flax leaved horseweed	Y
Erigeron canadensis	horseweed	
Erodium botrys	long filaree	Y
Erodium cicutaruim	red stem filaree	Y
Eucalyptus camaldulensis	red gum eucalyptus	Y

Scientific Name	**Common Name**	**Non-native?**
Euphorbia maculata	spotted spurge	Y
Festuca arundinacea	tall fescue	Y
Festuca perennis	Italian ryegrass	Y
Fraxinus angustifolia	narrow leafed ash	Y
Gastridium phleoides	Nit grass	Y
Gnaphalium palustre	western marsh cudweed	
Grindelia camporum	gumweed	
Helianthus annuus	common sunflower	
Heterotheca grandiflora	telegraph weed	
Holcus lanatus	purple velvet grass	Y
Hordeum marinum	seaside barley	Y
Hordeum murinum	wall barley	Y
Juglans californica	black walnut	
Jugland hindsii	California black walnut	
Juncus effusus	soft rush	
Juncus xiphioides.	iris leaf rush	
Lactuca serriola	prickly lettuce	Y
Lagerstroemia indica	crepe myrtle	Y
Liquidambar styraciflua	American sweetgum	Y
Lythrum hyssopifolia	hyssop loosestrife	Y
Malva nicaeensis	French mallow	Y
Malva parviflora	cheeseweed	Y
Medicago sativa	alfalfa	Y
Modiola caroliniana	Carolina bristle-mallow	Y
Morus alba	mulberry	Y
Nerium oleander	oleander	Y
Nicotiana glauca	tree tobacco	Y
Oenothera laciniata	cutleaf evening primrose	Y
Olea europaea	Olive	Y
Panicum capillare	witchgrass	
Paspalum dilatatum	Dallas grass	Y
Persicaria lapathifolia	pale smartweed	Y
Pinus contorta	lodgepole pine	
Pistacia chinensis	Chinese pistache	Y
Platanus occidentalis	American sycamore	Y
Platanus racemosa	Western sycamore	
Polygonum argyrocoleon	silversheath knotweed	Y
Polygonum aviculare	prostrate knotweed	Y
Populus fremontii	Fremont cottonwood	

Scientific Name	Common Name	Non-native?
Portulaca oleracea	common purslane	Y
Prunus dulcis	almond	Y
Pyracantha koidzumii	firethorn	Y
Pyrus calleryana	callery pear	Y
Quercus douglasii	blue oak	
Quercus lobata	valley oak	
Quercus wislizenii	interior live oak	
Raphanus raphanistrum	jointed charlock	Y
Robinia pseudoacacia	black locust	Y
Rubus armeniacus	Himalayan blackberry	Y
Rumex crispus	curly dock	Y
Salix exigua	sandbar willow	
Salix laevigata	red willow	
Salsola tragus	Russian thistle	Y
Sambucus nigra ssp. caerulea	blue elderberry	
Schoenoplectus acutus	hard-stem bull-rush	
Secale cereale	cereal rye	Y
Setaria parviflora	marsh bristlegrass	
Sequoia sempervirens	coast redwood	
Silybum marianum	milk thistle	Y
Solanum sp.	nightshade	
Sonchus oleraceus	sow thistle	Y
Sorghum halepense	Johnson grass	Y
Spergularia sp.	sand spurry	
Stipa miliacea	smilo grass	Y
Toxicodendron diversilobum	poison oak	
Tribulus terrestris	Caltrops	Y
Typha latifolia	Broad-leaf cattail	
Veronica anagallis-aquatica	water speedwell	Y
Vicia villosa	winter vetch	Y
Washingtonia robusta	Mexican fan palm	Y
Xanthium strumarium	cockleburr	

Representative Photographs

1) View of a vernal pool inside the 100-foot lateral buffer just south of Turlock, California. Photo taken facing east from the road shoulder in June, 2020.

2) View of a vernal pool inside the 100-foot lateral buffer just south of Turlock, California. Photo taken facing south on October, 2020.

3) View of a remnant of mixed riparian woodland and forest north of the Merced River. This location is surrounded by agricultural fields and developed areas. Photograph taken facing northeast from an agricultural access road, June 2020.

4) View of the south bank of the Merced River. Photograph taken from the north bank. June, 2020.

5) View of the south bank of the Merced River showing valley foothill riparian habitat. Photograph taken facing northeast. June, 2020.

6) View of Bear Creek, north of Merced, California. Photograph taken from the north bank facing south. May, 2020.

7) View of freshwater marsh habitat in an unlined irrigation canal north of Merced, California. Photograph taken facing east. May, 2020.

8) View of California annual grassland habitat in Delhi, California, facing west. October, 2020.

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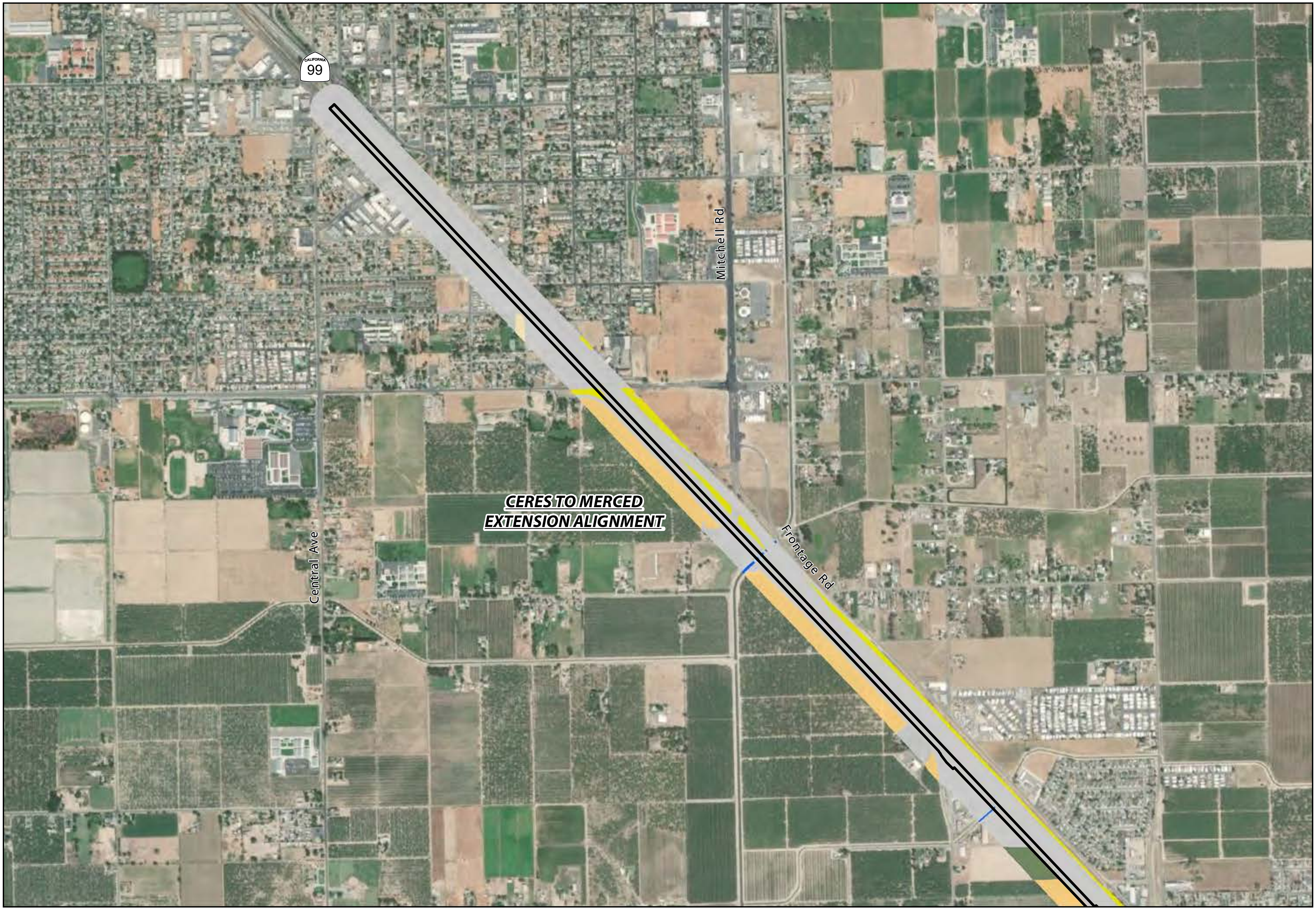


Direct Impacts Study Area

Land Cover

Aquatic, Riverine

Cropland

Cropland, Orchard

Cropland, Row Crops

Developed/Landscaped

Ruderal

N

0 0.125 0.25
Miles

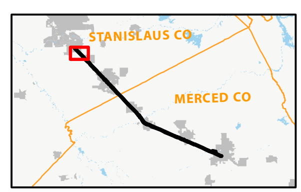
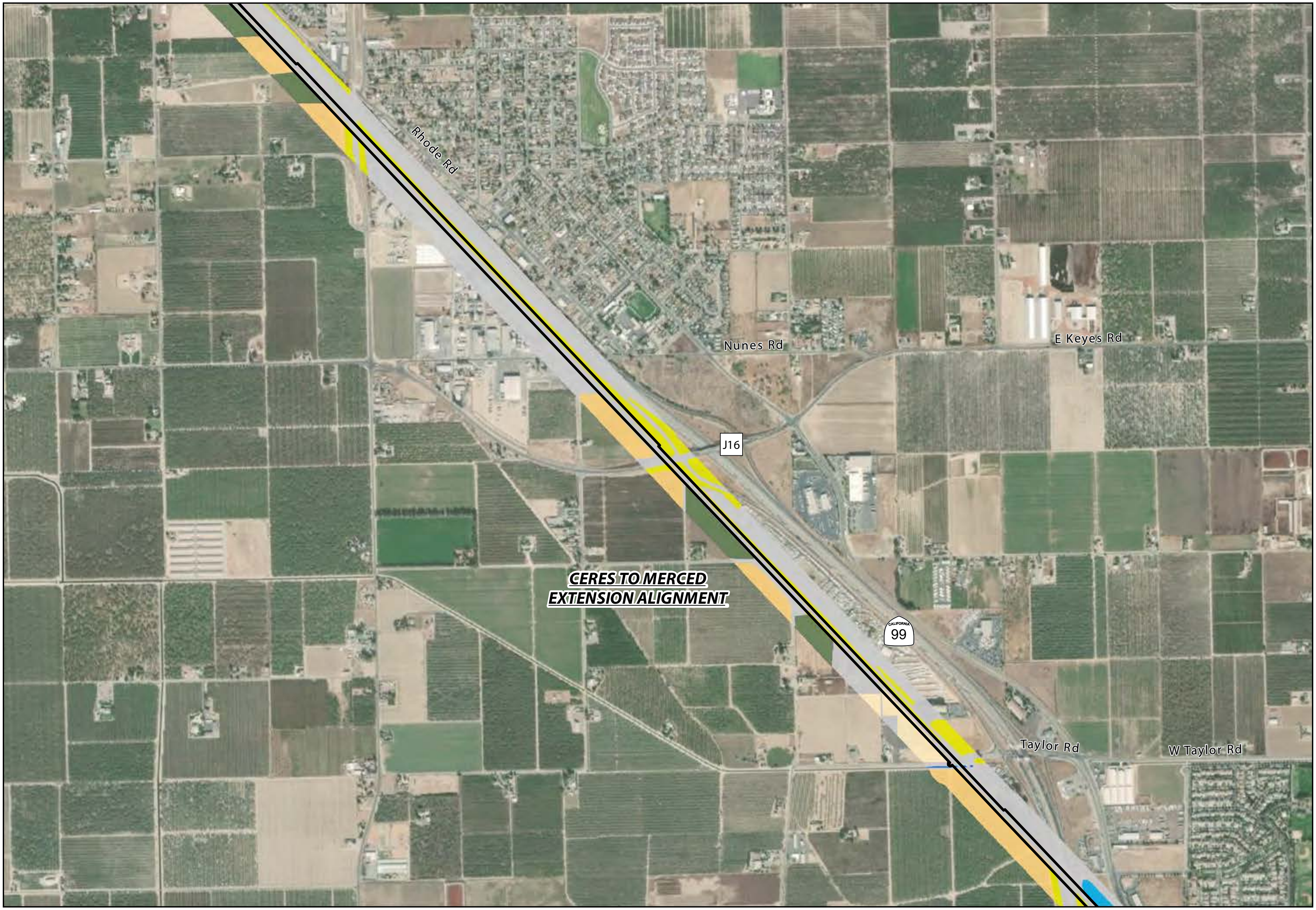


Figure 1
Land Cover
ACE Ceres-Merced Extension
Rare Plant Survey Findings



ACE ALTAMONT CORRIDOR EXPRESS

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0 0.125 0.25
Miles

Direct Impacts Study Area

Land Cover

- Aquatic, Pond
- Aquatic, Riverine
- Cropland
- Cropland, Orchard
- Cropland, Row Crops
- Developed/Landscaped
- Ruderal

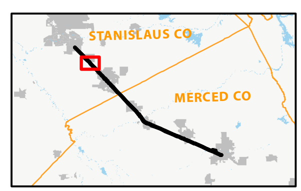


Figure 1
Land Cover
ACE Ceres-Merced Extension
Rare Plant Survey Findings

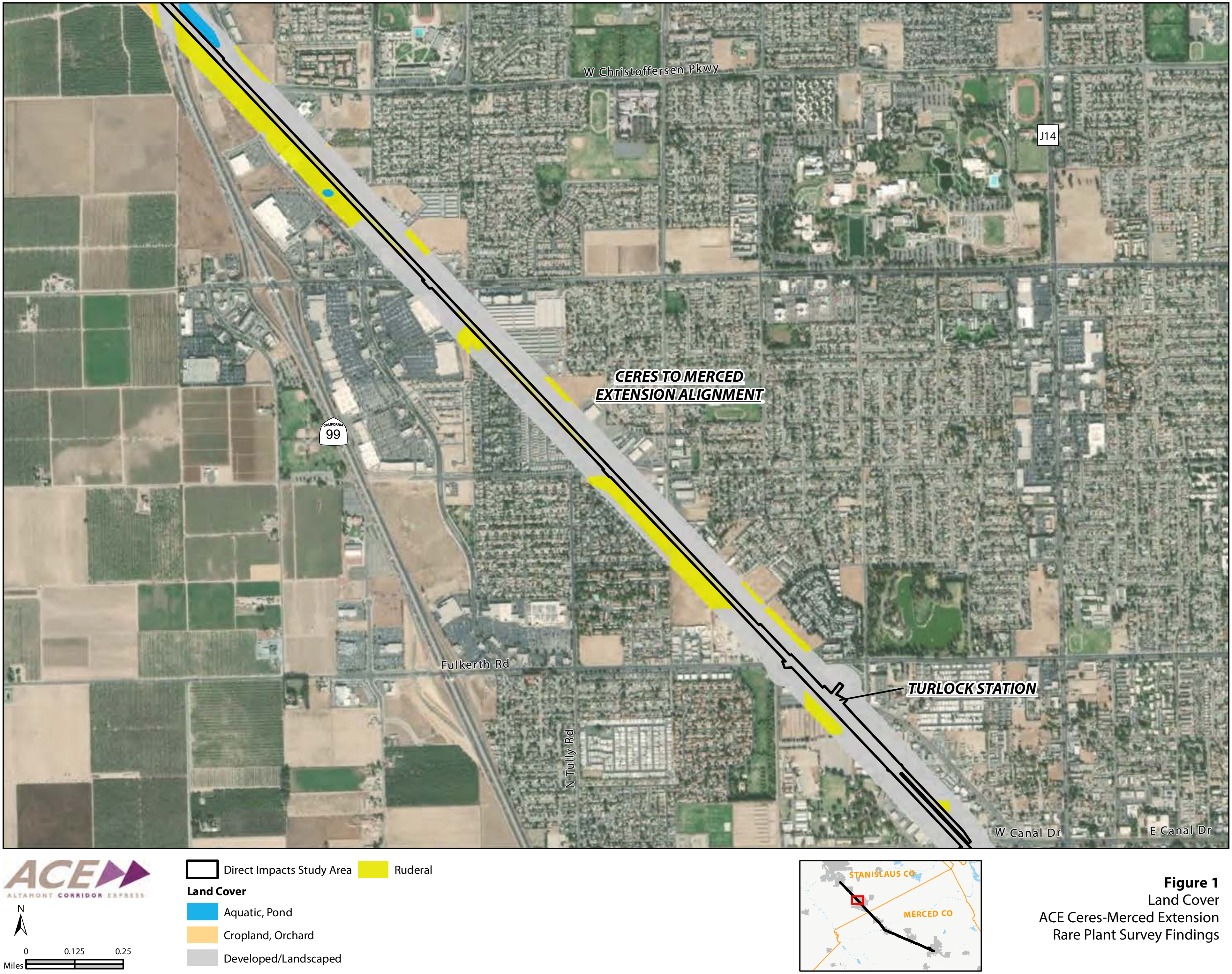
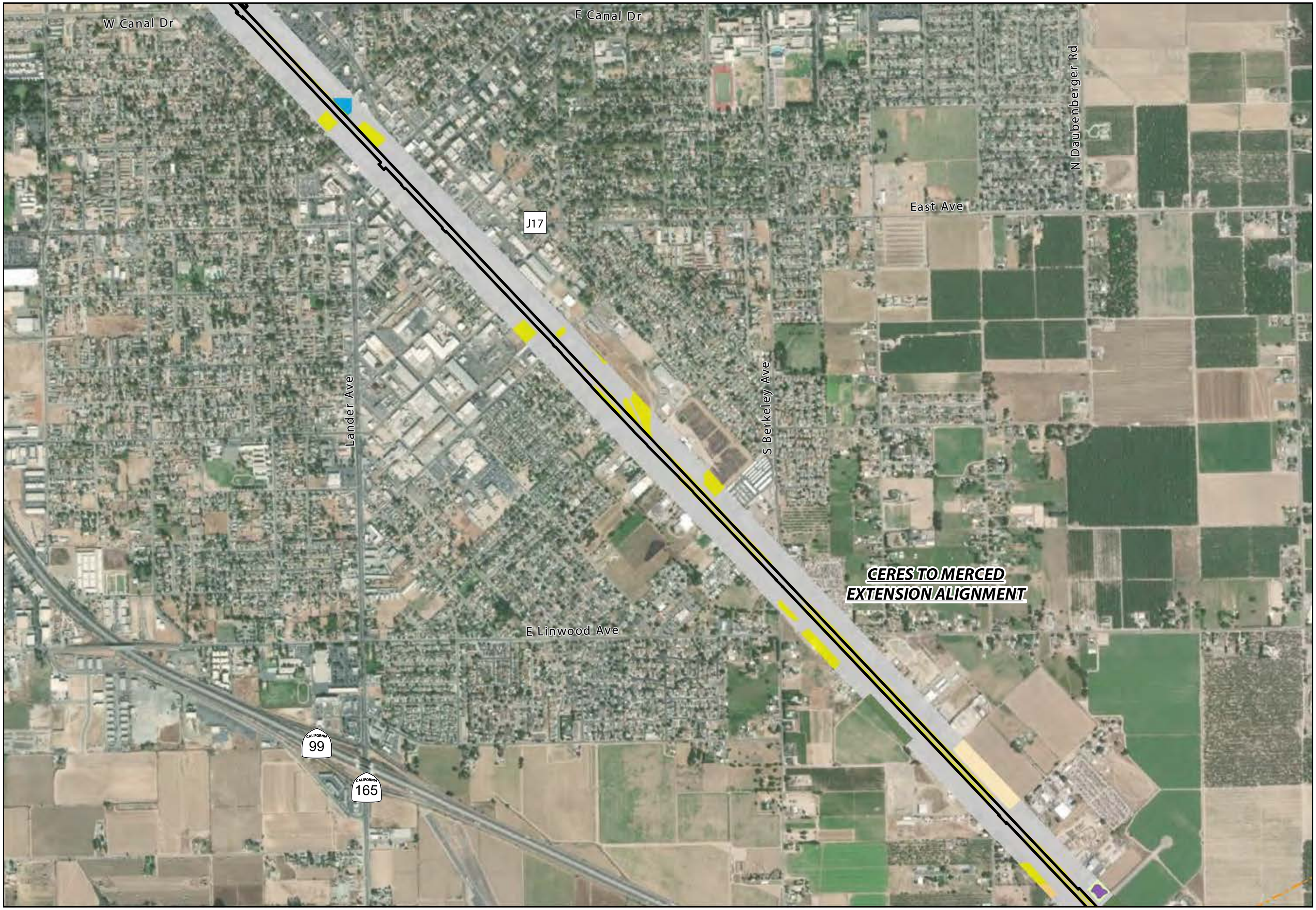
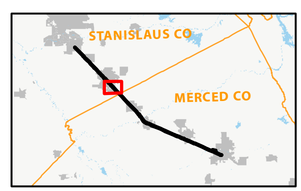


Figure 1
Land Cover
ACE Ceres-Merced Extension
Rare Plant Survey Findings





N

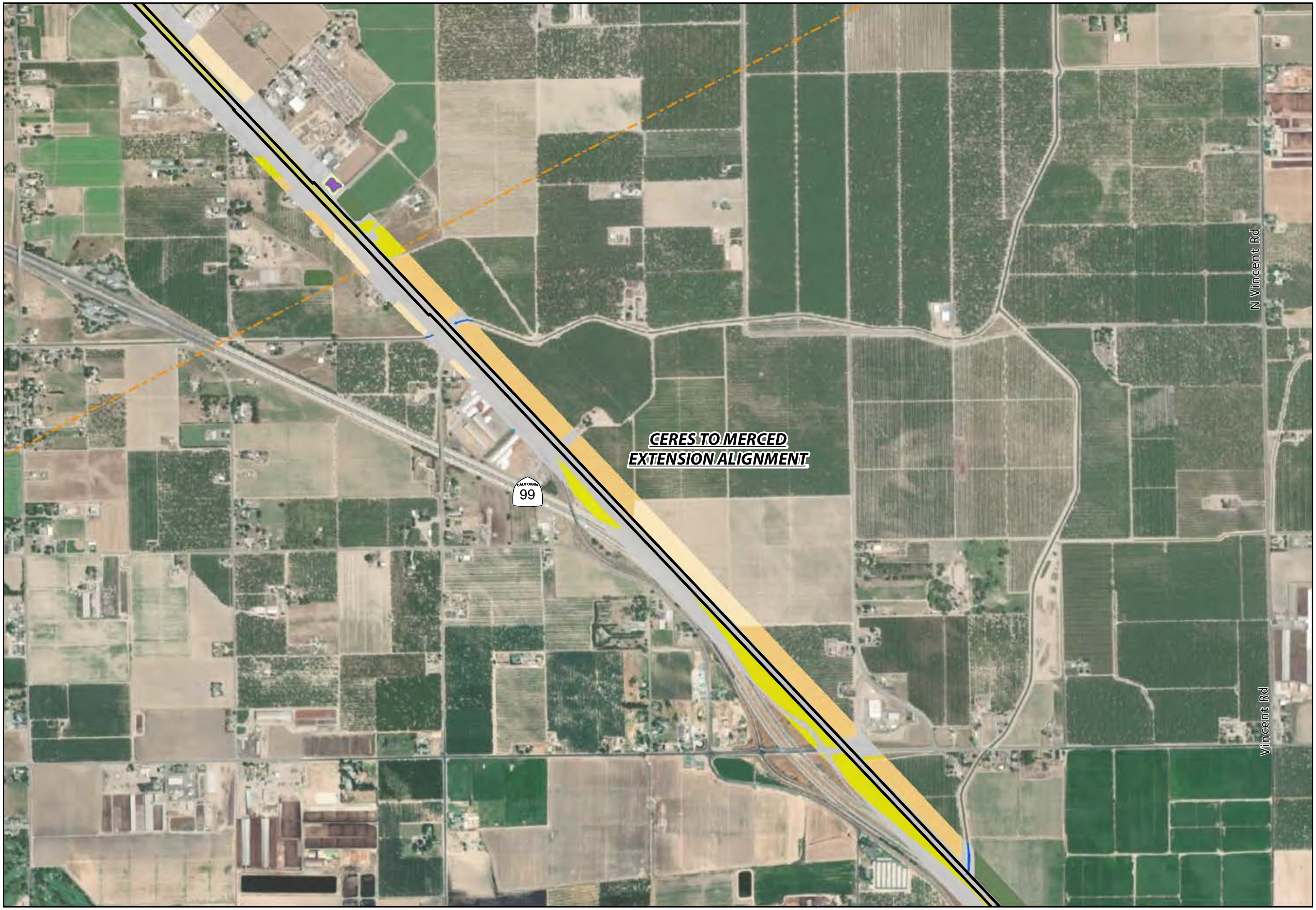
0 0.125 0.25
Miles

Direct Impacts Study Area

Land Cover

- Aquatic, Pond
- Cropland
- Cropland, Orchard
- Cropland, Row Crops
- Developed/Landscaped
- Grassland, California Annual Grassland
- Ruderal
- Wetland, Vernal Pool

Figure 1
Land Cover
ACE Ceres-Merced Extension
Rare Plant Survey Findings



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Miles

Direct Impacts Study Area

Land Cover

Aquatic, Pond

Aquatic, Riverine

Cropland

Cropland, Orchard

Cropland, Row Crops

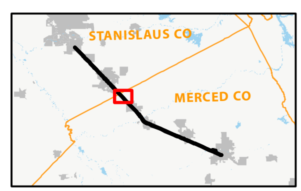
Developed/Landscaped

Grassland, California Annual Grassland

Riparian, Mixed Riparian

Ruderal

Wetland, Vernal Pool



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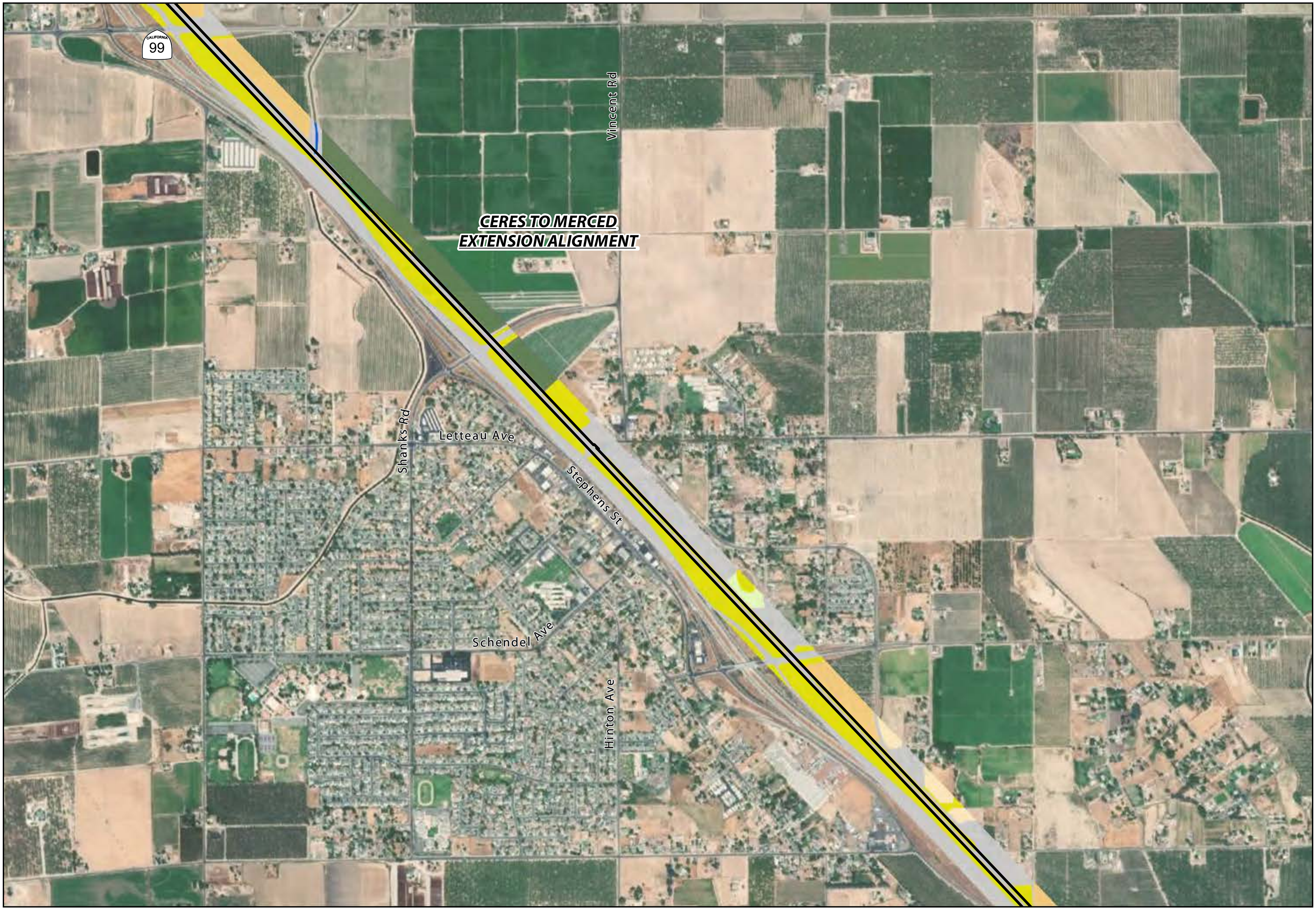
ACE Ceres-Merced Extension
Rare Plant Survey Findings



ACE ALTAMONT CORRIDOR EXPRESS

N

0 0.125 0.25
Miles

Direct Impacts Study Area

Land Cover

Aquatic, Riverine
Cropland
Cropland, Orchard
Cropland, Row Crops
Developed/Landscaped
Grassland, California Annual Grassland
Riparian, Mixed Riparian
Ruderal

Figure 1
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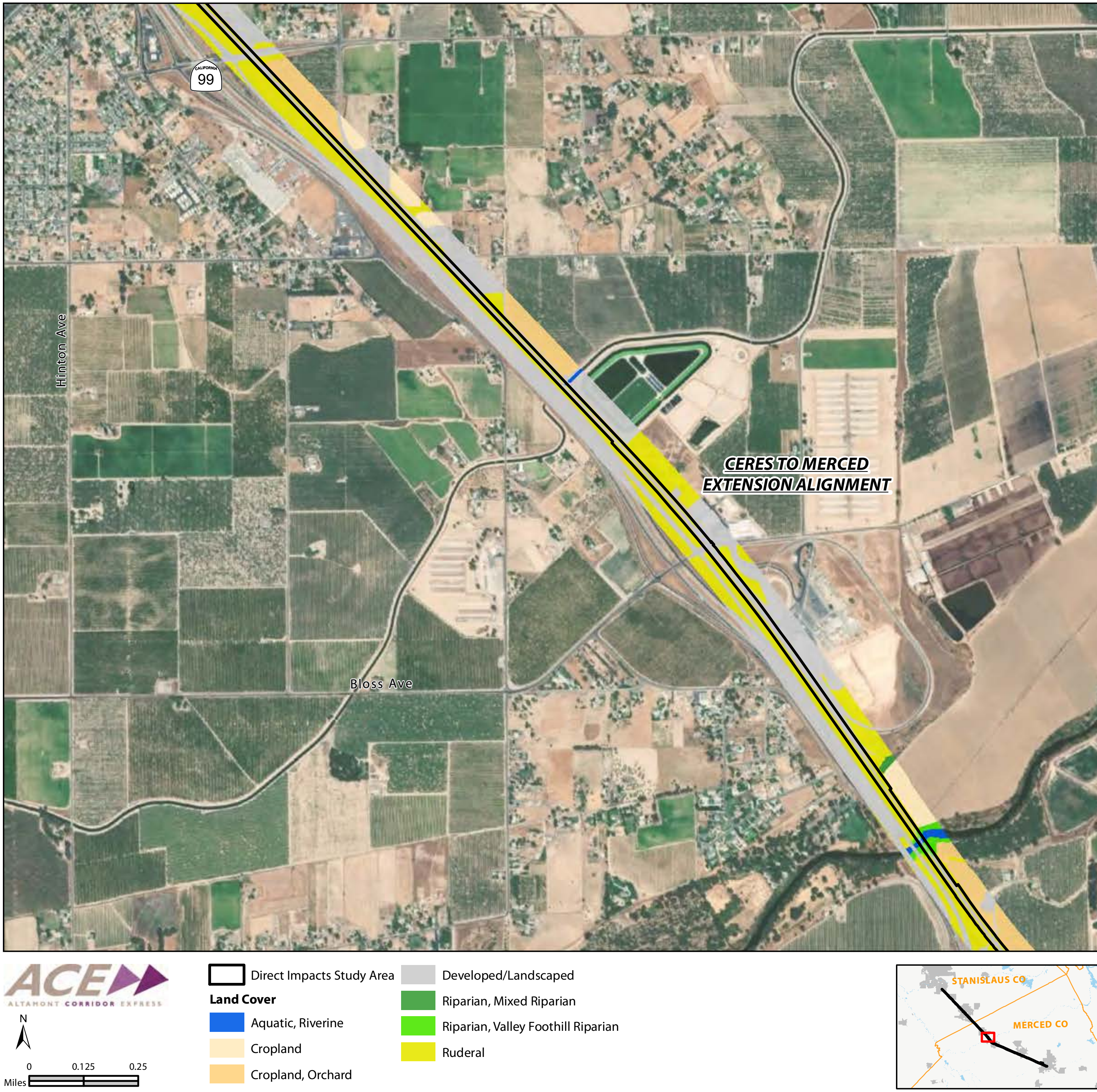

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ACE Ceres-Merced Extension
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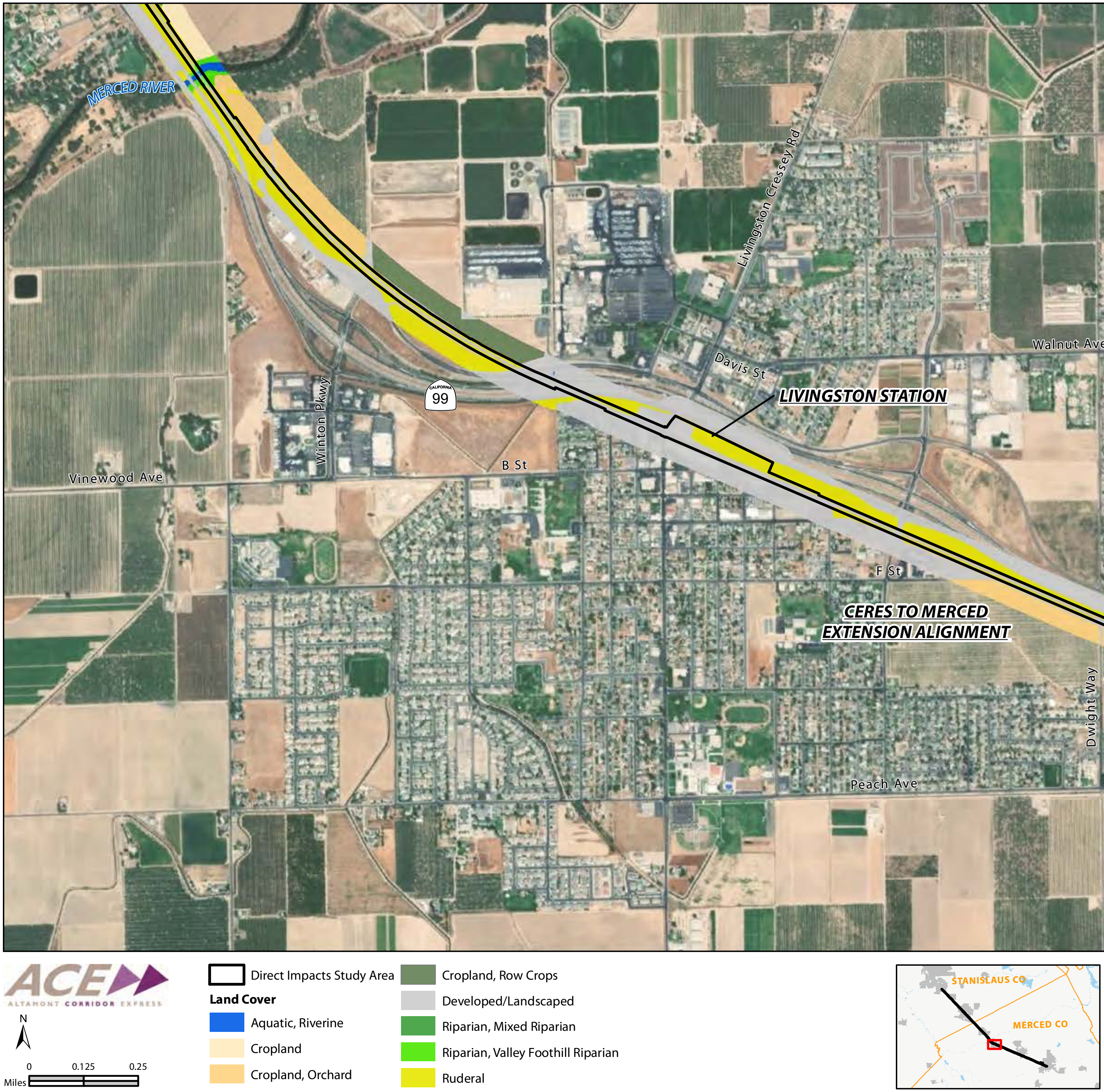

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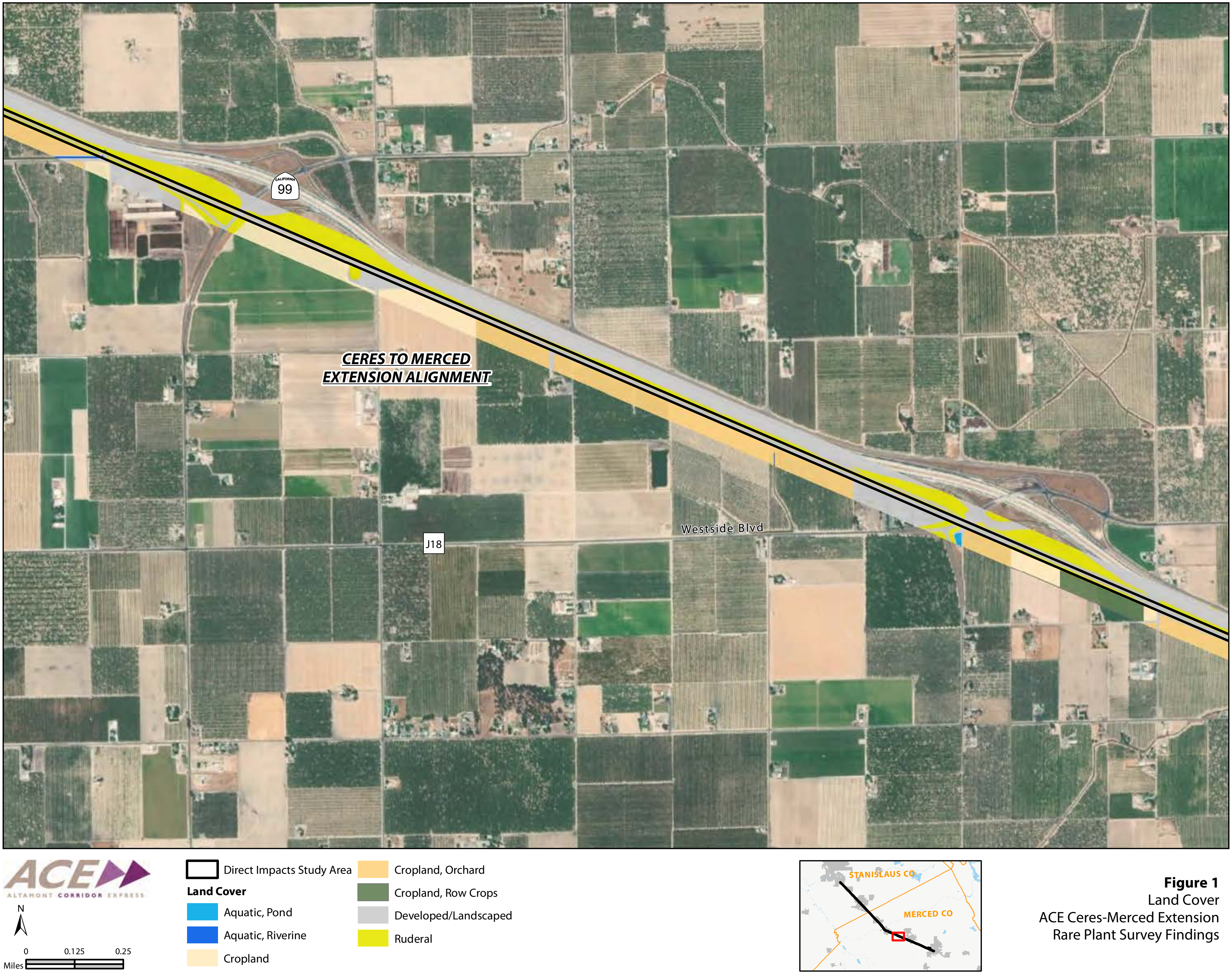

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ACE Ceres-Merced Extension
Rare Plant Survey Findings

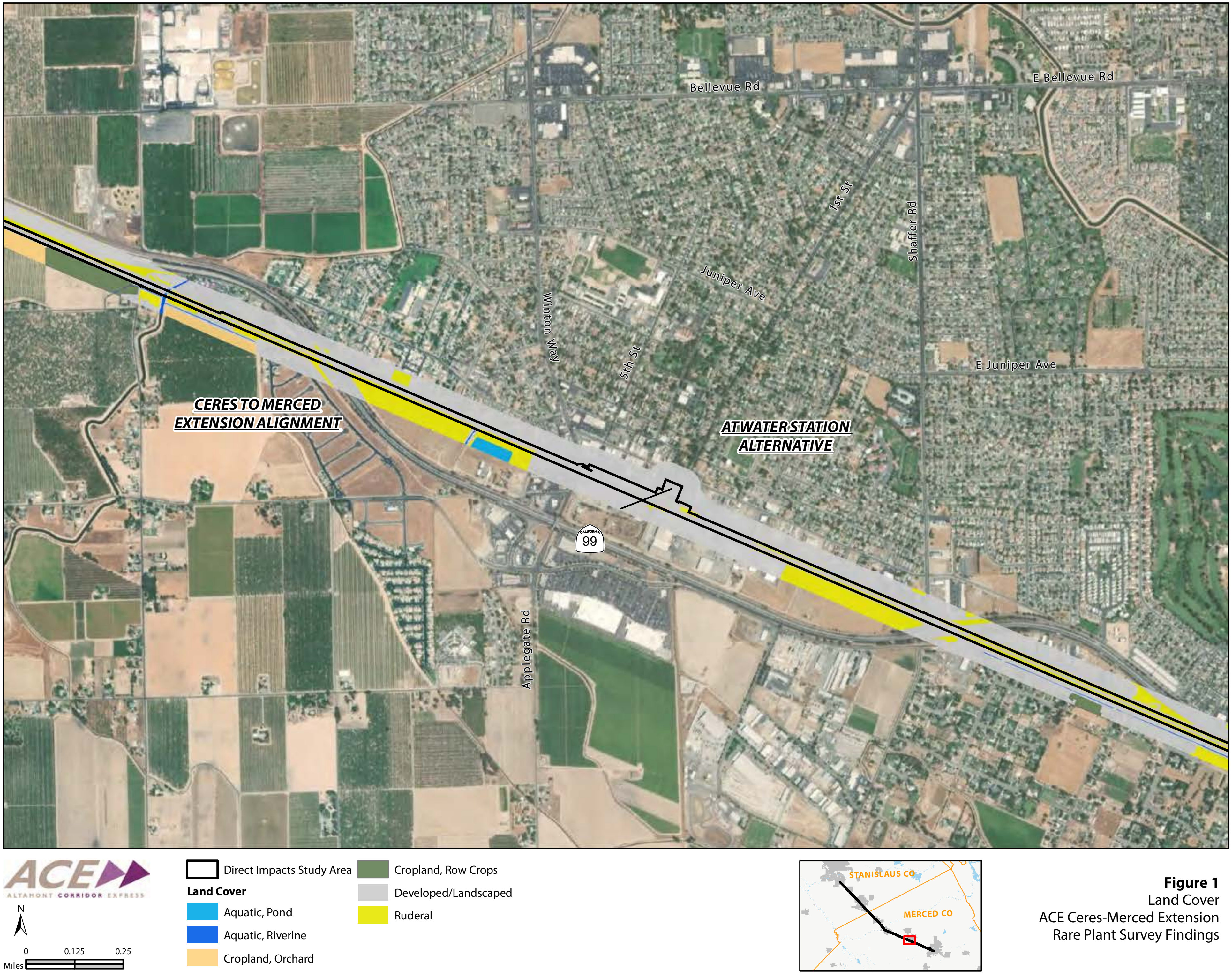


Figure 1
Land Cover
ACE Ceres-Merced Extension
Rare Plant Survey Findings

ACE ALTAMONT CORRIDOR EXPRESS

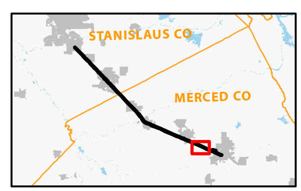
N

0 0.125 0.25
Miles

Direct Impacts Study Area

Land Cover

Aquatic, Pond
Aquatic, Riverine
Cropland
Cropland, Orchard
Cropland, Row Crops
Developed/Landscaped
Riparian, Mixed Riparian
Ruderal
Wetland, Freshwater Marsh



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ACE Ceres-Merced Extension
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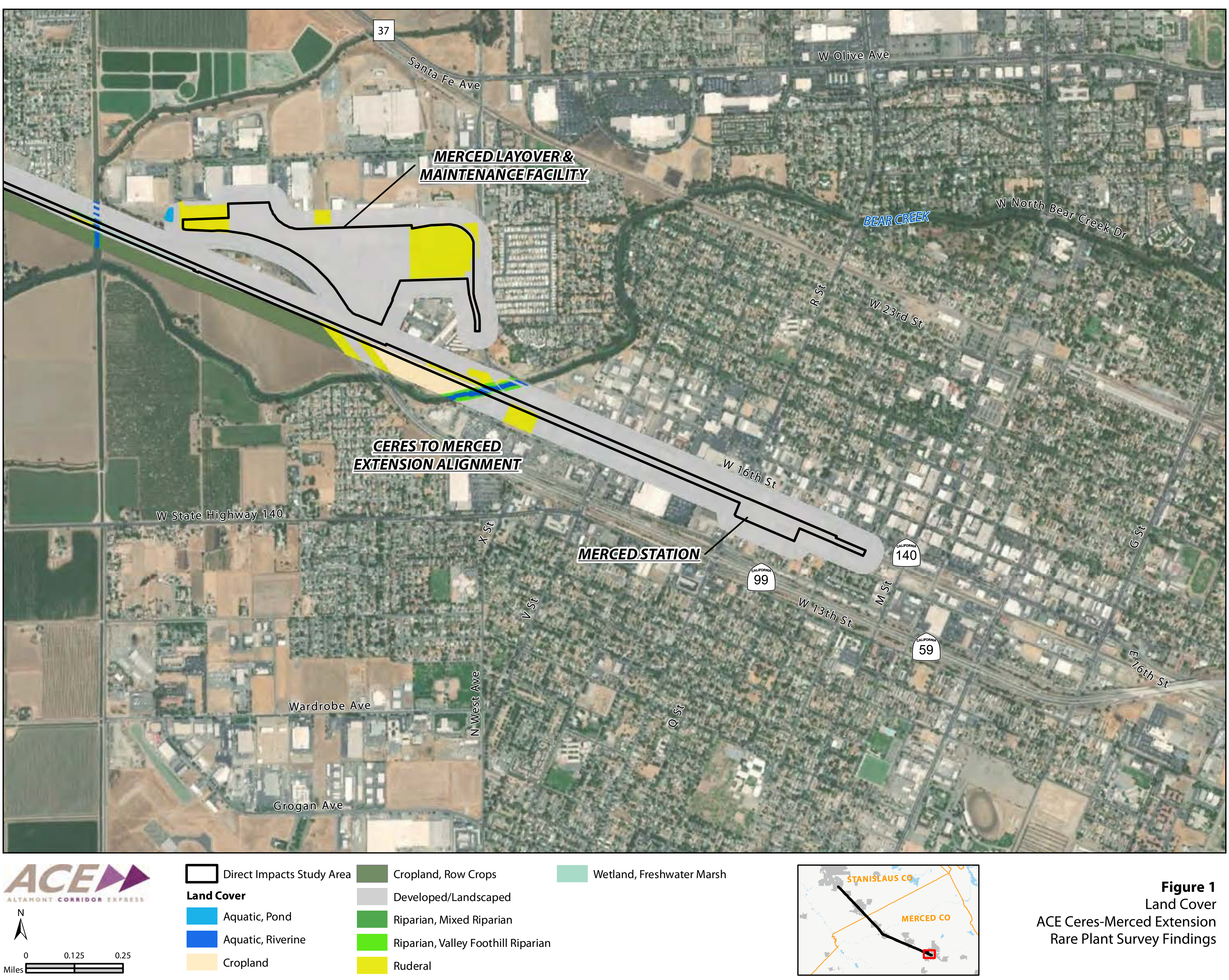

Figure 1
Land Cover
ACE Ceres-Merced Extension
Rare Plant Survey Findings

Preliminary Aquatic Resources Delineation Report

ACE Ceres–Merced Extension Project

Preliminary Aquatic Resources Delineation Report

Prepared for:

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October 2020

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ICF. 2020. *ACE Ceres–Merced Extension Project, Preliminary Aquatic Resources Delineation Report*. October. (ICF 00144.20) San Jose, CA. Prepared for San Joaquin Regional Rail Commission, Stockton, CA.

Contents

Tables

Table **Page**

Acronyms and Abbreviations

Arid West Supplement	*Regional Supplement to the Corps of Engineers Wetlands Delineation Manual: Arid West Region*
FW	freshwater wetland
GPS	global positioning system
HTL	high-tide line
MHWM	mean high-water mark
MSL	mean sea level
NAVD	North American Vertical Datum
OHWM	ordinary high-water mark
other waters	other waters of the United States
PJD	preliminary jurisdictional determination
Project	ACE Ceres to Merced Extension Alignment Project
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey
WETS	Wetland Evaluation Technique Summary

ACE Ceres–Merced Extension Project Preliminary Aquatic Resources Delineation Report

1 Executive Summary

This report presents the results of a formal delineation of wetlands and other waters conducted for the ACE Ceres–Merced Extension Project (Project) in Stanislaus and Merced Counties, California. The delineation was conducted to assist the San Joaquin Regional Rail Commission in determining the type and extent of wetlands and other waters of the United States (other waters) in the delineation study area that may be subject to regulation by the U.S. Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act.

Table 1 summarizes the habitat types and acreages that were delineated as potential jurisdictional waters of the United States in the study area. In summary, a total of 2.43 acres of jurisdictional wetlands and 10.29 acres of other waters of the United States were delineated in the study area.

Table 1. Summary of the Area of Wetlands and Other Waters Delineated

Habitat Type	Area (acres)
Freshwater Wetland (FW)	2.43
Other Waters[2]	10.29
Total[1]	12.72

[1.] May not total because of rounding.

[2.] Includes dry streambeds and open water features within the ordinary high-water mark.

A description of the wetlands and other waters mapped in the delineation study area is provided in Section 4, *Results*, and their locations are shown in Exhibit A, *Figure 1 and Delineation Maps*.

This report was prepared to support the San Joaquin Regional Rail Commission's request for a preliminary jurisdictional determination (PJD) by the USACE Sacramento District. Under a PJD, questions regarding the jurisdictional status of wetlands and non-wetland waters in the delineation study area are waived or set aside by San Joaquin Regional Rail Commission. Therefore, under a PJD, all wetlands and other waters mapped therein are subject to regulation as waters of the United States.

This report is intended to comply with the USACE's *Minimum Standards for Acceptance of Aquatic Resource Delineation Reports* (U.S. Army Corps of Engineers 2016a) and the *Updated Map and Drawing Standards for the South Pacific Division Regulatory Program* (U.S. Army Corps of Engineers 2016b), where applicable. Mapping of potential jurisdictional features presented in this report are subject to verification by the USACE. Mapping of the aquatic resources shown in Exhibit A was based on whether they appeared to meet the technical criteria for waters of the United States. All mapped jurisdictional boundaries are preliminary and subject to verification by the USACE Sacramento District. Accordingly, all parties are advised to treat the information contained herein as preliminary until the USACE provides written verification of the extent of its jurisdiction.

2 Introduction

The delineation study area evaluated for the Project encompasses 2,529 acres from Ceres to Merced along the existing Union Pacific Rail Road (UPRR) right-of-way (Figure 1). The study area also includes a 250-foot buffer encompassing both sides of the Project alignment in mostly upland and urban areas. All potential jurisdictional waters within the study area that could be directly or indirectly disturbed during implementation of the Project were assessed.

The Project is proposed to provide improved rail transportation for commuters in the Central Valley. The Project is expected to consist of a combination of rail and bridge modifications and construction of new rail stations in Turlock, Livingston[1], and Merced.

The lead agency is the San Joaquin Regional Rail Commission. The contact for the lead agency is:

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949 East Channel Street
Stockton, CA 95202
800.411.7245

This delineation report was prepared by Danielle Tannourji and Sierra Spooner, both wetland ecologists at ICF. Mrs. Tannourji has a Master's Degree in Wetland Plant Ecology from San Jose State University and has been certified to conduct wetland delineations since 2004.

2.1 Site Location and Driving Directions

The delineation study area is in central Stanislaus County and eastern Merced County, including towns of Ceres, Keyes, Delhi, Turlock, Livingston, and Merced. Figure 1 in Exhibit A, *Figure 1 and Delineation Maps*, shows the location of the delineation study area and its relationship to the surrounding towns and highways.

The delineation study area is within the Ceres, Denair, Turlock, Cressey, Arena, Atwater, and Merced U.S. Geological Survey (USGS) 7.5-minute topographic quadrangles, as shown in Figure 1 (Exhibit A). The approximate centroid of the delineation study area is at 37.431536 ° north latitude and 120.676878 ° west longitude.

To reach the northern portion of the delineation study area, drive State Route 99 south from Sacramento for approximately 80 miles. Take Exit 222 toward Whitmore Ave. Turn left onto El Camino Road and right onto N. Central Ave. Then make a left onto Whitmore Ave and another left onto Railroad Ave.

2.2 Site Description

2.2.1 General

The delineation study area flanks the existing right of way of the UPRR corridor, which traverses the Central Valley floor in a northwest-southeasterly direction crossing several major watersheds east of

[1] An alternative station at Atwater is also being considered. The Atwater Station Alternative would be an alternative to the proposed Livingston Station.

the San Joaquin River. The predominant land use is agricultural with sections of residential and commercial developments associated with Ceres, Turlock, Atwater, Livingston, and Merced. Multiple lined and unlined canals, drainages, creeks, and rivers intersect the delineation study area draining into the San Joaquin River, located approximately 10 miles to the west. Generally, the banks of the waterways in the delineation study area average approximately 15 to 30 feet high and have nearly vertical slopes.

The Project site is relatively flat, with local topographic variation around drainages and water features. At the scale of the entire project, there is a gentle 0-2% slope toward the northwest, dropping in elevation from approximately 165 feet above mean sea level (MSL) (referenced to the North American Vertical Datum [NAVD]) in Merced to approximately 90 feet above MSL in Ceres, California.

2.2.2 Hydrology

The delineation study area traverses three major watersheds including the Middle San Joaquin-Lower Merced-Lower Stanislaus hydrologic unit (HUC 18040002), Upper Merced (HUC 18040008) and the Middle San Joaquin-Lower Chowchilla (HUC 18040001) (U.S. Geological Survey 2020) (Exhibit A). From Ceres to Turlock, multiple lined canals direct surface flows of the Middle San Joaquin-Lower Merced-Lower Stanislaus watershed (HUC 18040002) in a southwesterly direction towards the San Joaquin River floodplain. North of the town of Livingston, the Merced River flows under SR-99 and the UPRR tracks in a southwesterly direction and is the major floodplain of the Upper Merced watershed (HUC 18040008). Four named waterways flowing west in the Middle San Joaquin-Lower Chowchilla (HUC 18040001) watershed intersect the delineation study area between Atwater and Merced: Atwater Canal, Canal Creek, Black Rascal Creek, and Bear Creek (Exhibit A). All surface flows in the delineation study area are derived from the foothills of the Sierra Nevada mountain range, located approximately 25 miles to the east draining about 5,700 square miles of the Central Valley floor.

Based on a review of historic aerial photographs of the delineation study area, the Project site has become significantly converted for agricultural purposes since the 1930s. Historical USGS topographic maps show the major waterways in the delineation study area following nearly the same paths as today. Although the overall watercourses have changed little in the past century, the banks have been highly modified and channelized over the decades as more agriculture and urbanization spreads throughout the valley. This is evident along many of the lined canals and shored riverbanks where riprap and rock gabion sidewalls are present. These altered banks are often devoid of vegetation or covered with ruderal herbaceous vegetation, which are rooted in the soil above or below the toe of the slopes.

2.2.3 Soils

The U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (2020a) has mapped the soils within the delineation study area. Salient characteristics of the soil map units observed at each water crossing are summarized in Table 2. All of the map units consist partly or wholly of various thicknesses of fill material, which has been placed on top of the native soil. In intensively developed areas, little remains of the native soil profile.

Table 2. Soils in the Delineation Study Area

Soil Map Symbol	Soil Map Unit	Landform	Natural Drainage Class	Hydric Status of Primary Component* and Inclusions of Map Unit
AgA	Atwater loamy sand, deep over hardpan, 0% to 3% slopes	Alluvial fans and floodplains	Well	Primary component: non-hydric Inclusions: non-hydric
AnA	Atwater sand, 0% to 3% slopes	Alluvial fans and floodplains	Well	Primary component: non-hydric Inclusions: non-hydric
DhA	Delhi sand, 0% to 3% slopes	Alluvial fans and floodplains	Well	Primary component: non-hydric Inclusions: non-hydric
DrA	Dinuba sandy loam, 0% to 1% slopes	Alluvial fans and floodplains	Well	Primary component: non-hydric Inclusions: non-hydric
GeA	Greenfield sandy loam, deep over hardpan, poorly drained variant	Alluvial fans and floodplains	Poor	Primary component: hydric Inclusions: hydric
HdA	Handford sandy loam, 0% to 3% slopes	Alluvial fans and floodplains	Well	Primary component: non-hydric Inclusions: non-hydric
HmA	Hilmar sand, 0% to 3% slopes	Alluvial fans and floodplains	Poor	Primary component: hydric Inclusions: hydric
HtA	Honcut silt loam, 0% to 1% slopes	Alluvial fans and floodplains	Well	Primary component: non-hydric Inclusions: non-hydric
SmA	Snelling sandy loam, imperfectly drained variant, 0% to 1% slopes	Alluvial fans and floodplains	Well	Primary component: non-hydric Inclusions: non-hydric
TuA	Tujunga loamy sand, 0% to 3% slopes	Alluvial fans and floodplains	Well	Primary component: non-hydric Inclusions: non-hydric
WoA	Wyman clay loam, 0% to 3% slopes	Alluvial fans and floodplains	Well	Primary component: non-hydric Inclusions: non-hydric

Source: Natural Resources Conservation Service 2020a.

* "Primary component" refers to the soil that makes up approximately 85% or more of the map unit. The remaining soils in the map unit are inclusions.

A map of the soils in the delineation study area and associated hydric soil information are provided in Attachment A, *Soil Map and WETS Table*.

2.2.4 Precipitation and Growing Season

The climate in the delineation study area is characterized by warm, dry summers and cool, moist winters. National Weather Service cooperative weather stations number CA 049073 (Turlock #2) and 023257 (Merced Municipal Airport) are the closest weather stations to the delineation study area, located within approximately 0.5 to 1.5 miles of the Project. Average annual precipitation at these weather stations range from 10.75 to 12.15 inches, with most falling as rain from October to May (Natural Resources Conservation Service 2020b) (see Wetland Evaluation Technique Summary [WETS] table in Attachment A). Rainfall for the precipitation year preceding the delineation field survey conducted in May 2020 (i.e., precipitation year October 1, 2019–May 28, 2020) was roughly

89% of the average to date in the vicinity (Attachment A). The average annual temperature is approximately 63 degrees Fahrenheit (Natural Resources Conservation Service 2020b). Because of the temperate climate, the growing season is typically year-round (Attachment A).

2.2.5 Vegetation

The delineation study area is within the San Joaquin Basin subregion of the Central California Valley region of the California Floristic Province (Hickman 1993).

In addition to the aquatic habitats described in Section 4, *Results*, below, the upper banks of Bear Creek and the Merced River also support Valley Foothill Riparian forest and scrub. Beyond the watercourses, the delineation study area supports a variety of vegetation or land cover types, including annual grasslands, ruderal areas, agricultural fields, and urbanized areas. The scientific names of the plant species that were observed while conducting the delineation field surveys and their wetland indicator status are provided in Attachment B, *Plant Species Observed in the Delineation Study Area*. The wetland plant communities found in the delineation study area are described in Section 4, *Results*, of this report (agricultural and urbanized areas are not included).

3 Delineation Methods

3.1 Field Delineation Methods for Jurisdictional Wetlands

ICF wetland ecologist Sierra Spooner conducted delineation survey on May 29 and June 5, 2020. The delineation was conducted using the routine onsite determination method described in the 1987 *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) and the supplemental procedures and wetland indicators provided in the Arid West Supplement (U.S. Army Corps of Engineers 2008). The 2020 survey complies with the USACE's *San Francisco District Information Requested for Verification of Corps Jurisdiction* (U.S. Army Corps of Engineers 2016a) and the *Updated Map and Drawing Standards for the South Pacific Division Regulatory Program* (U.S. Army Corps of Engineers 2016b). The majority of the delineation study area was accessible and surveyed on foot during the field visits, however private landowners did not permit soil sampling.

As detailed in the Arid West Supplement, data on vegetation, soil, and hydrology characteristics used as the basis for wetland boundary determinations were collected and recorded on Arid West Supplement data forms (Attachment C). In most cases, upland data points were not evaluated because wetlands were either at the toe or top of the slope and surrounded by unvegetated creek bed or levee road material; therefore, hydrology and hydrophytic vegetation were used to locate the wetland boundary. Potentially jurisdictional wetlands were then assigned individual alphanumeric numbers, as shown in Exhibit A, *Figures 2 and 3 Delineation Maps*. Because several wetland and water polygons within the delineation study area were recorded for state wetland mapping, the polygons and any associated wetland pits were removed from this delineation mapping. Therefore, the existing alphanumeric numbers, as shown in Exhibit A, *Figures 2 and 3 Delineation Maps,* are not in sequential order.

The wetland indicator status of each plant species was based on the *National List of Plant Species that Occur in Wetlands: California* (Lichvar 2016). Common and scientific plant names were taken from *The Jepson Manual: Vascular Plants of California* (Baldwin et al. 2012).

3.2 Field Delineation Methods for Other Waters of the United States

Other waters of the United States encountered in the delineation study area are limited to creeks, rivers, and irrigation canals with a surface connection to the San Joaquin River. For each feature, the ordinary high water mark (OHWM) represents the limit of potential USACE jurisdiction under Section 404 of the Clean Water Act. The OHWM was interpreted from color aerial images (Google Inc. 2020), digitized for the delineation study area during an initial desktop delineation, and then verified in the field, based on hydrologic indicators. During the field visits, a Trimble GeoXT global positioning system (GPS) receiver, typically accurate to less than 1 meter horizontally, was used to record the location of the data points, map wetlands, and verify the OHWM jurisdictional boundaries.

In the delineation study area at Merced River and Bear Creek, riparian communities are present within the creek channels. They are generally above the OHWM at the top of bank and dominated by hydrophytic trees such as red willow (*Salix laevigata*) and nonnative grasses. In addition, these areas generally did not meet the vegetation cover criterion. Riparian-dominated areas in these two river systems are outside of the proposed footprint and characterized by an understory of non-native grasses. Riparian communities that occur within the OHWM of these two systems would be considered other waters of the United States, not wetlands, but still subject to regulation by the USACE.

4 Results

Table 3 provides the individual areas (in acres) of each wetland mapped in the delineation study area. Photographs of representative wetlands and other waters of the creek are provided in Attachment D, *Representative Photographs*.

Table 3. Area of Individual Wetlands in the Delineation Study Area

Feature	Area (acres)
Freshwater Wetlands	
11-W	1.107
16-W	0.170
18-W	0.434
21-W	0.723
Grand total	**2.434**

4.1 Wetlands

Approximately 2.43 acres of freshwater wetlands were mapped at scattered locations throughout the delineation study area, from Ceres to Merced at, below, and/or adjacent to the OHWM. The freshwater wetland community (represented by data points in Table 3) met the hydrophytic vegetation criterion, based on a dominance of hard-stem bulrush (*Schoenoplectus acutus*) (OBL), broad-leaf cattail (*Typha latifolia*) (OBL), common buttonbush (*Cephalanthus occidentalis*) (OBL), California mugwort (*Artemisia douglasiana*) (FACW), and Himalayan blackberry (*Rubus armeniacus*) (FAC). Wetland hydrology was documented by the presence of surface water (A1), high water table (A2), saturation (A3), water marks (B1), sediment deposits (B2), drift deposits (B3), drainage patterns (B10), dry-season water table (C2), and saturation visible on aerial imagery (C9). As described in the Arid West Supplement, based on the presence of hydrophytic vegetation and hydrology indicators, as well as suitable landscape position (low-lying areas below the OHWM), the soils were assumed to be hydric. Wetlands 11-W and 21-W are associated with portions of Black Rascal Creek and Canal Creek drainage systems, respectively, in the delineation study area. The other two wetlands are within drainages that are unnamed. Attachment D includes representative photographs of the wetlands at each these locations.

4.2 Other Waters

Aquatic areas mapped as other waters were less than 5% vegetated; therefore, they qualify as other waters (U.S. Army Corps of Engineers 2008). Approximately 10.29 acres of other waters of the United States were mapped and characterized in the delineation study area (Exhibit A). The majority of the features contained surface waters; where surface waters were absent, indicators such as drift deposits, water marks, and drainage patterns were evident. Named perennial features include five features: Merced River, Canal Creek, Atwater Canal, Black Rascal Creek, and Bear Creek (Exhibit A). Surface waters of these named features connect to the San Joaquin River system west of and downstream of the delineation study area. Therefore, these named features would be subject to regulation by the USACE.

Approximately 11 unnamed concrete-lined canals were identified in addition to the Atwater Canal (32-W). Approximately three unnamed features include dirt-bottom drainages that are currently used for irrigation conveyance. The surface waters of all these features connect to the San Joaquin River system west of and downstream of the delineation study area. The OHWMs were evident by either surface waters or sediment deposits, drift deposits, watermarks, vegetation changes, and drainage patterns. The features are generally intermittent throughout the growing season. Therefore, these unnamed features would also be subject to regulation by the USACE.

One feature is characterized by a small daylighted drainage next to a highway culvert (13-W) less than 1,000 feet west of Black Rascal Creek (11-W). This feature may sheet flow and connect to Black Rascal Creek during winter storms. Therefore, this unnamed feature may be subject to regulation by the USACE.

Table 4 depicts the acreage and linear footage for the 32 mapped waters and Exhibit A, *Figures 2 and 3 Delineation Maps,* outline their extent within the delineation study area.

Upland vegetation is present in some areas along the fringes of the OHWM. Plant communities in these areas include non-native grassland and ruderal and riparian scrub. Generally, these communities were dominated exclusively by either Himalayan blackberry or non-native grasses. Upland vegetation outside of the OHWMs would not be subject to regulation by the USACE.

Table 4. Area and Length of Individual Other Waters of the U.S. in the Delineation Study Area

Feature #	Feature Name or Type	Area (acres)	Length (Linear Feet)
Other Waters of the U.S.			
03-01-W	**Bear Creek**	2.087	2,083
11-W	**Black Rascal Creek**	0.251	1,271
12-W	Concrete-lined Canal	0.013	2,736
13-W	Culvert	0.480	287
16-W	Concrete-lined Canal	0.320	2,086
17-W	Drainage	0.222	838
18-W	Concrete-lined Canal	0.020	1,218
20-W	Drainage	1.098	1,149
21-W	**Canal Creek**	0.271	1,724
22-W	Concrete-lined Canal	0.427	367
23-W	Concrete-lined Canal	0.174	10,568
32-W	**Atwater Canal**	0.287	2,664
33-W	Concrete-lined Canal	1.371	1,310
35-W	Concrete-lined Canal	0.336	1,439
44-W	Drainage	0.277	1,428
51-W	**Merced River**	0.304	1,264
55-W	Concrete-lined Canal	0.207	1,162
59-W	Concrete-lined Canal	0.111	900
61-W	Concrete-lined Canal	0.382	1,290
83-D	Concrete-lined Canal	1.126	1,156
90-W	Concrete-lined Canal	0.137	668
92-W	Concrete-lined Canal	0.391	1,160
Grand total		**10.292**	**38,769**

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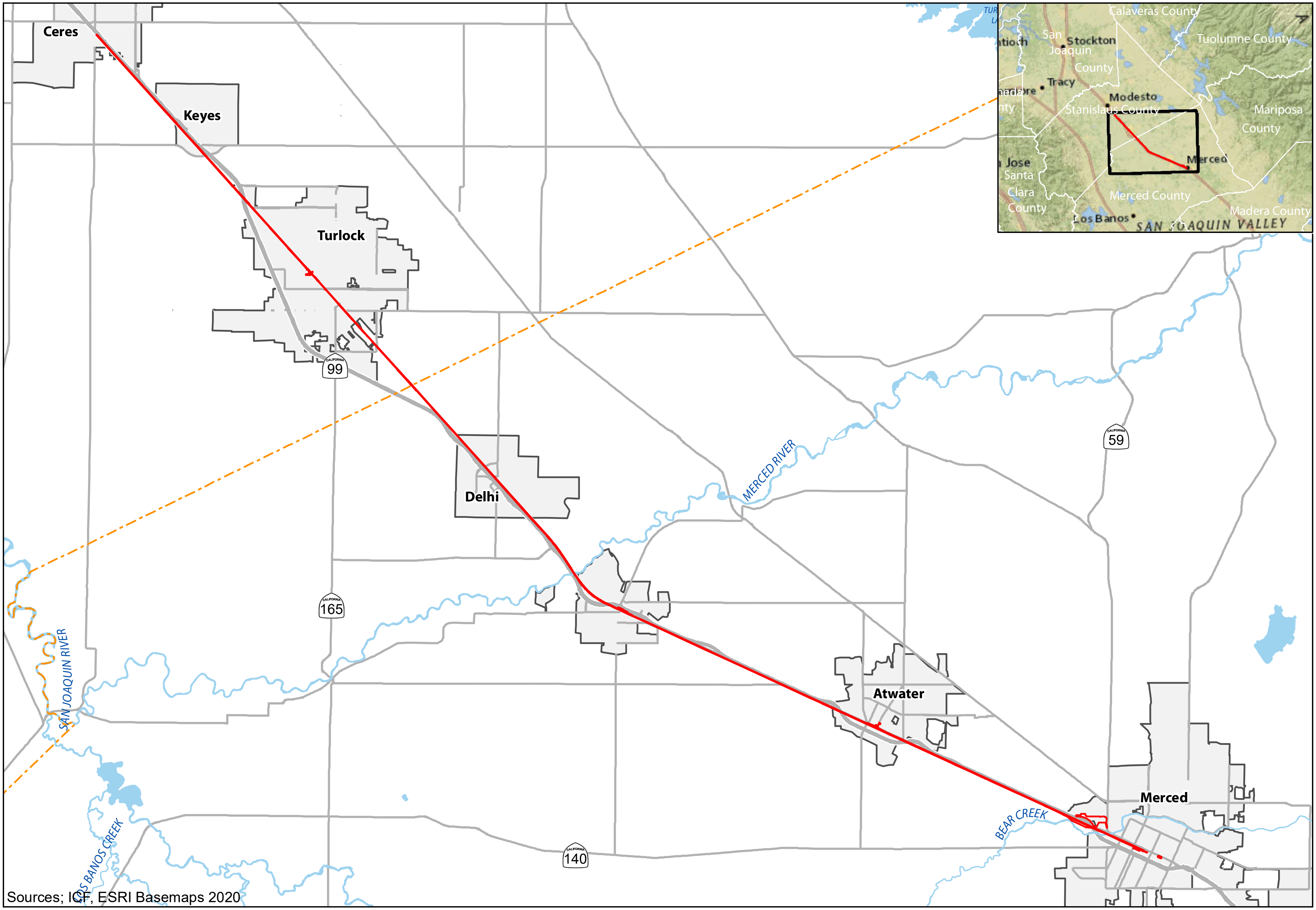
Exhibit A

Figure 1 Overview and Figures 2-3 Delineation Maps



Footprint

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Figure 1
General Location
ACE Ceres-Merced Extension

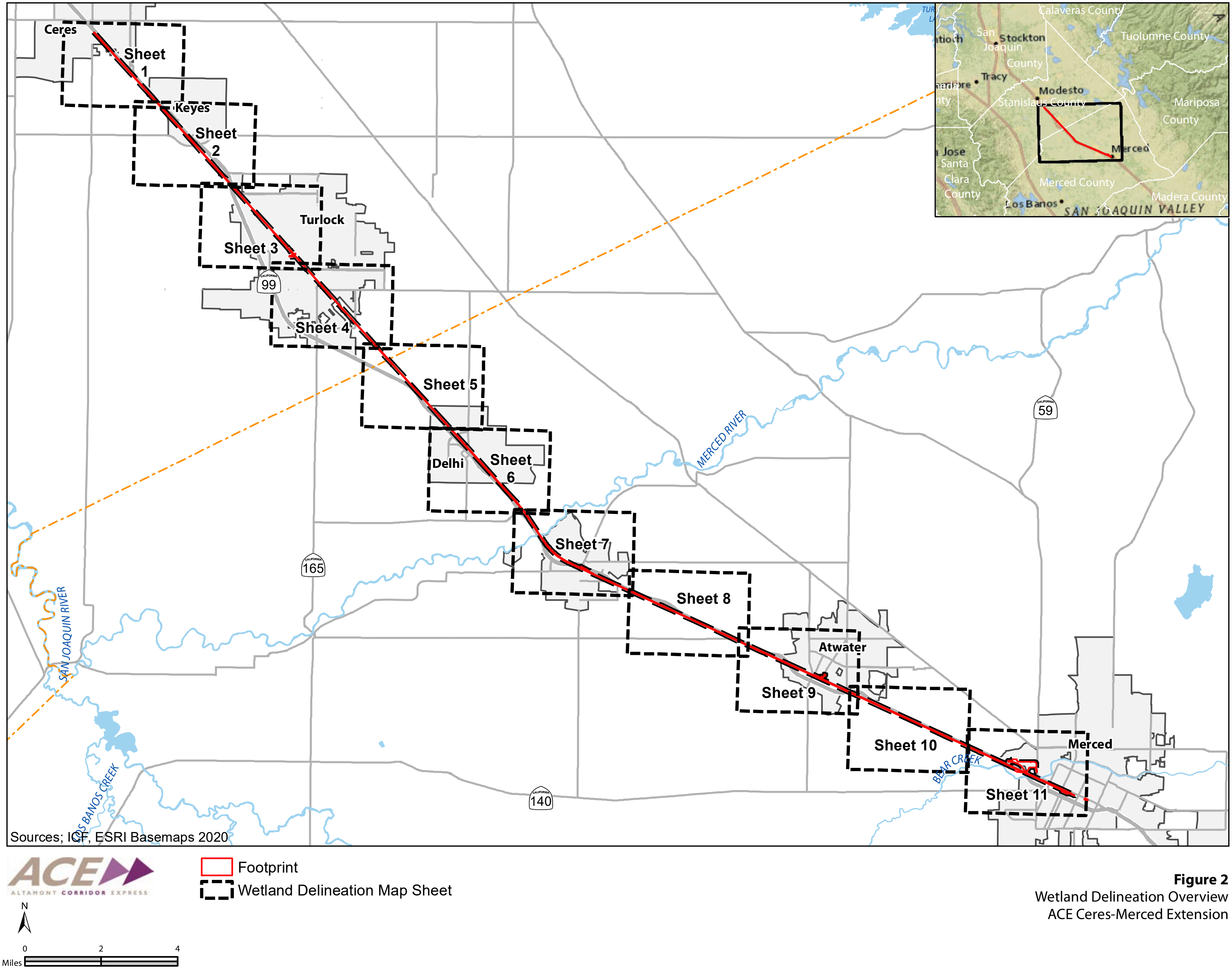
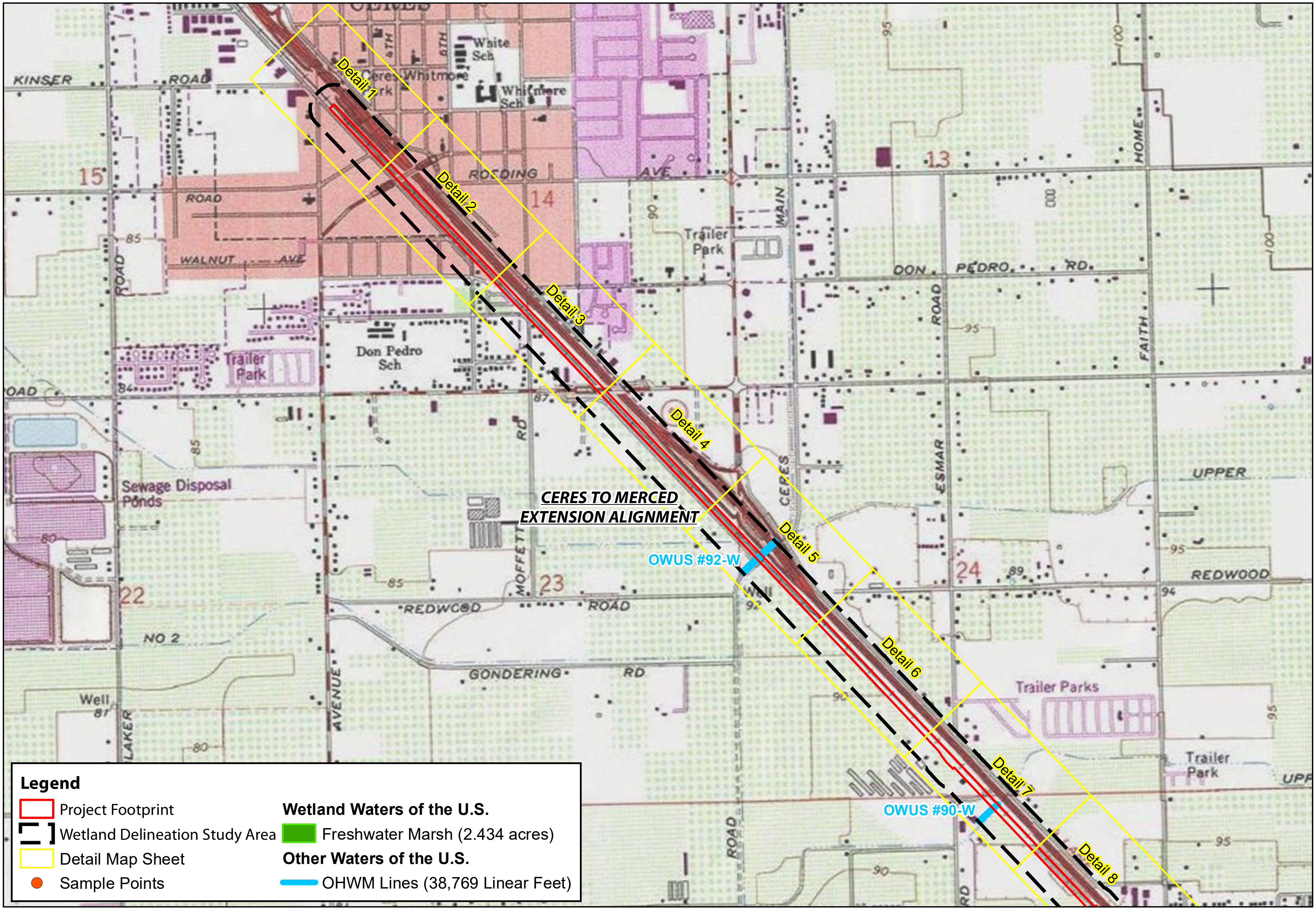


Figure 2
Wetland Delineation Overview
ACE Ceres-Merced Extension



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Miles

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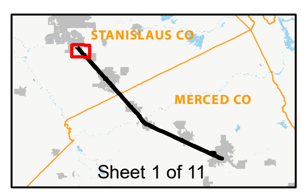
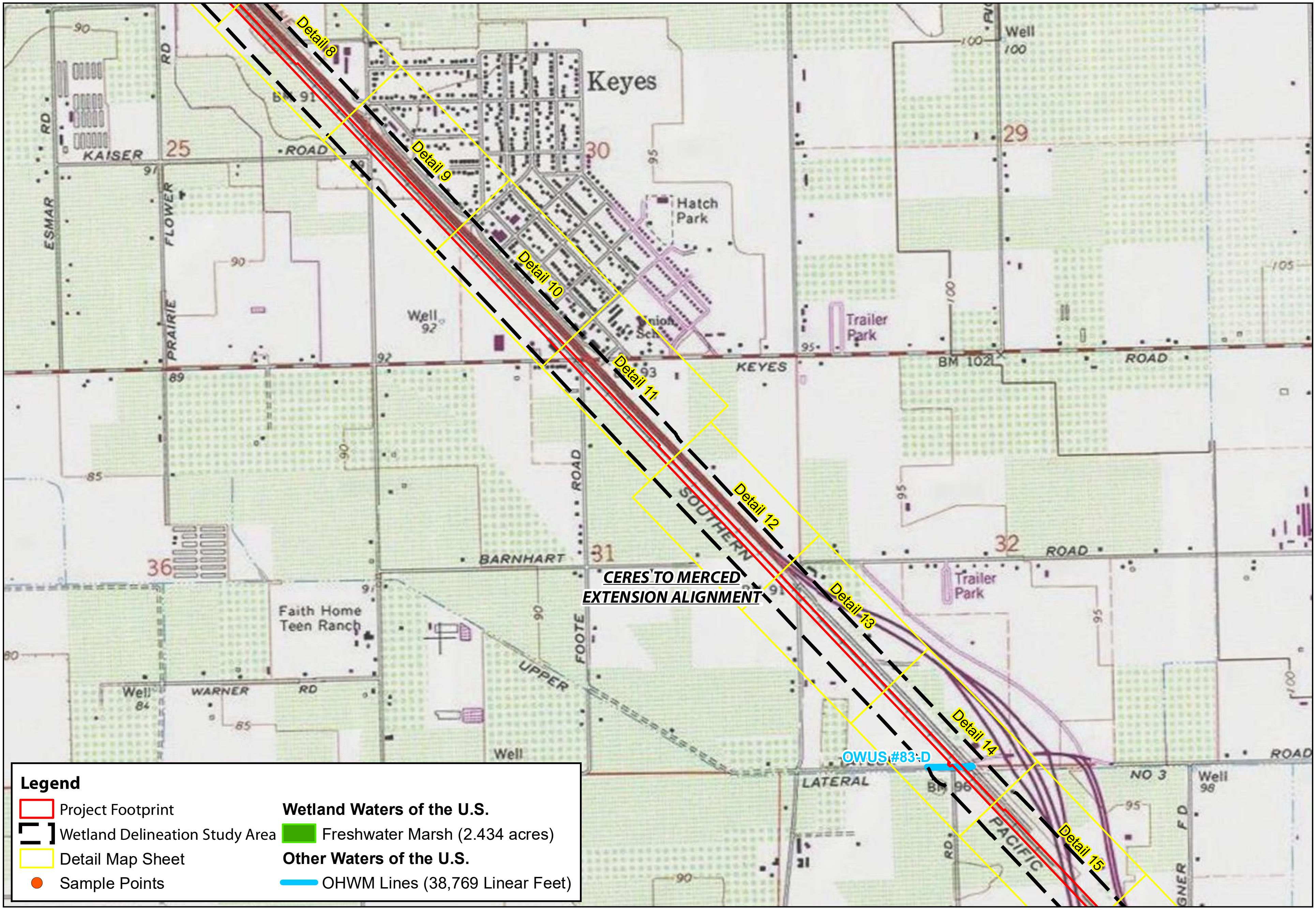


Figure 2-1
Wetland Delineation
ACE Ceres-Merced Extension



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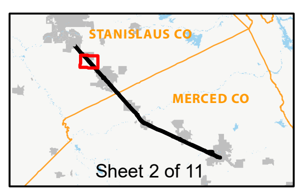

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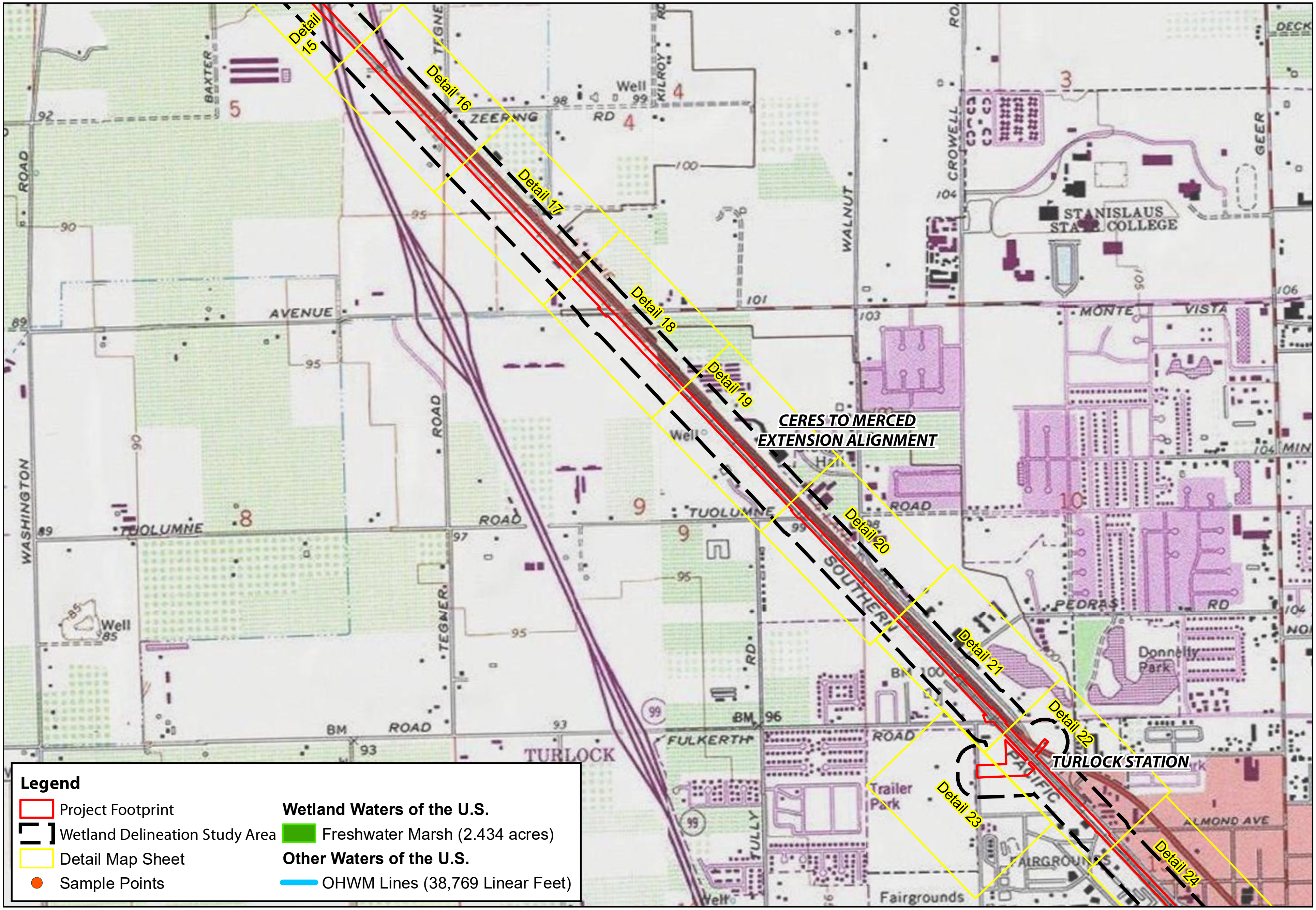
Wetland Delineation
ACE Ceres-Merced Extension



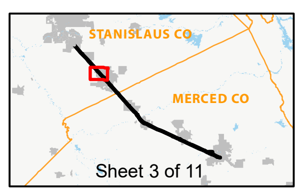


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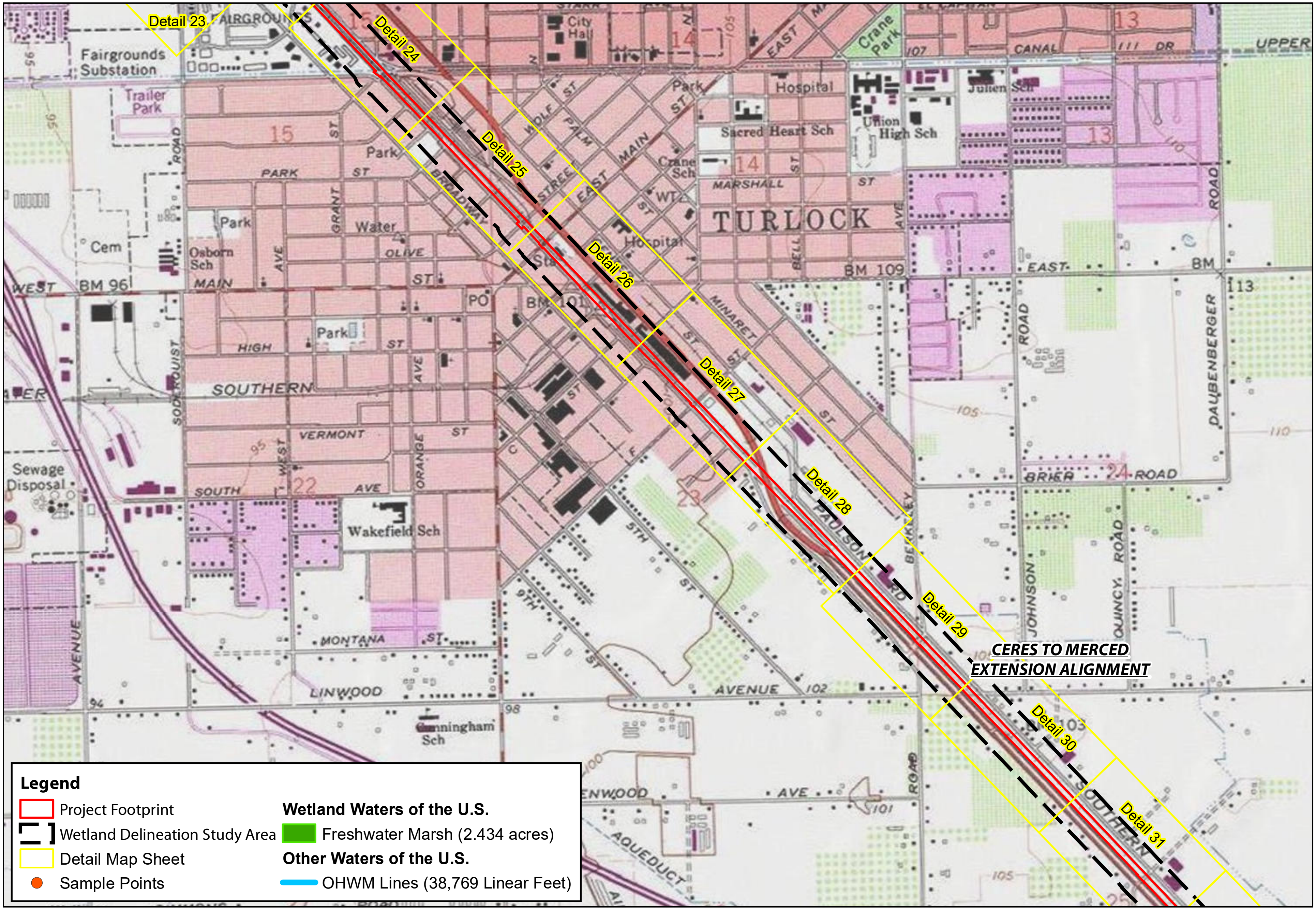
Figure 2-3
Wetland Delineation
ACE Ceres-Merced Extension



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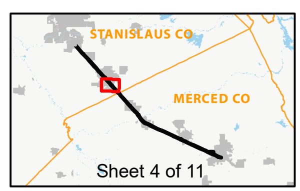
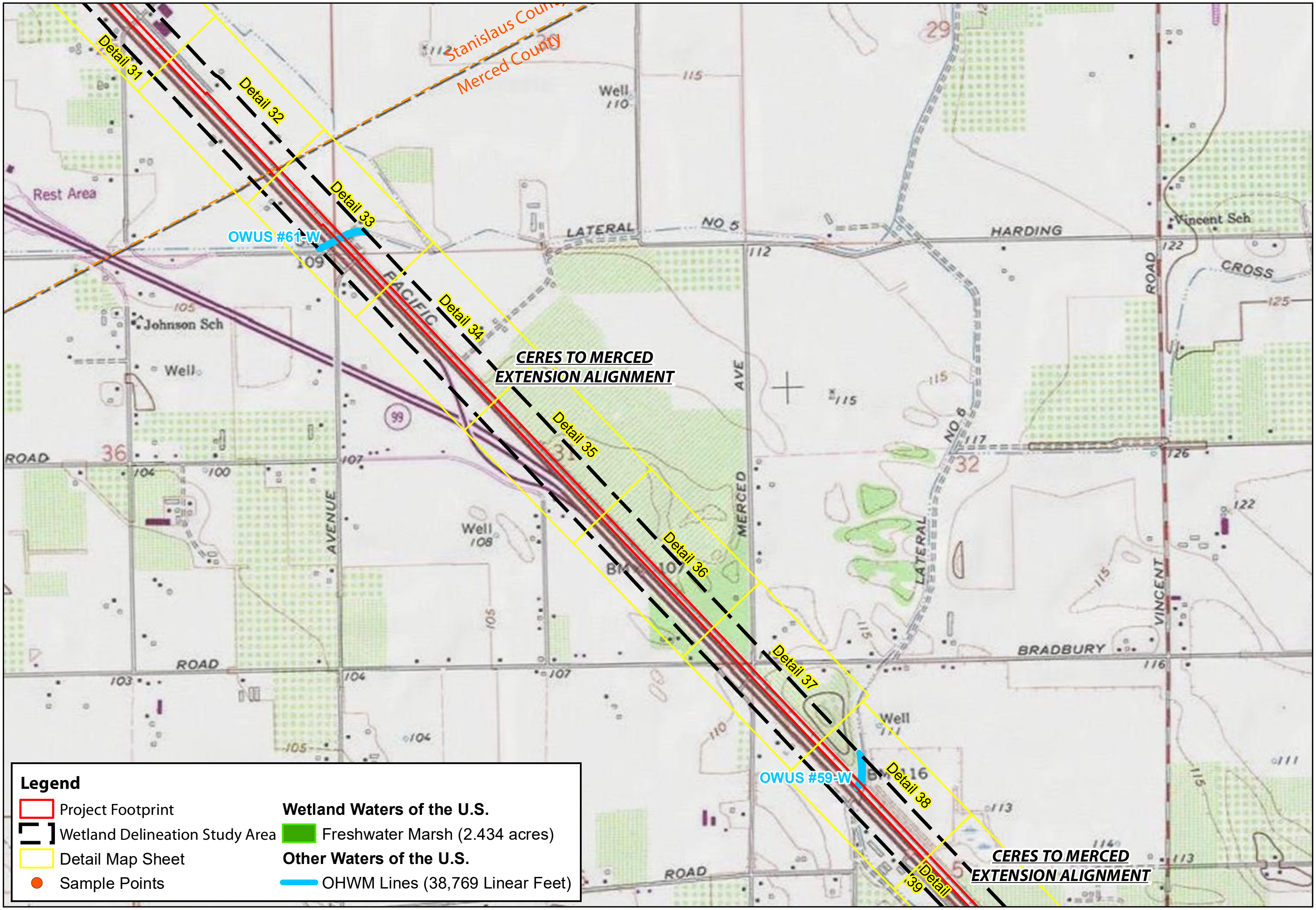


Figure 2-4
Wetland Delineation
ACE Ceres-Merced Extension



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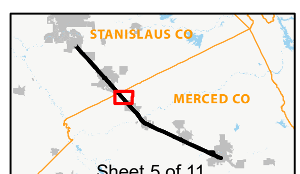

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Figure 2-5
Wetland Delineation
ACE Ceres-Merced Extension

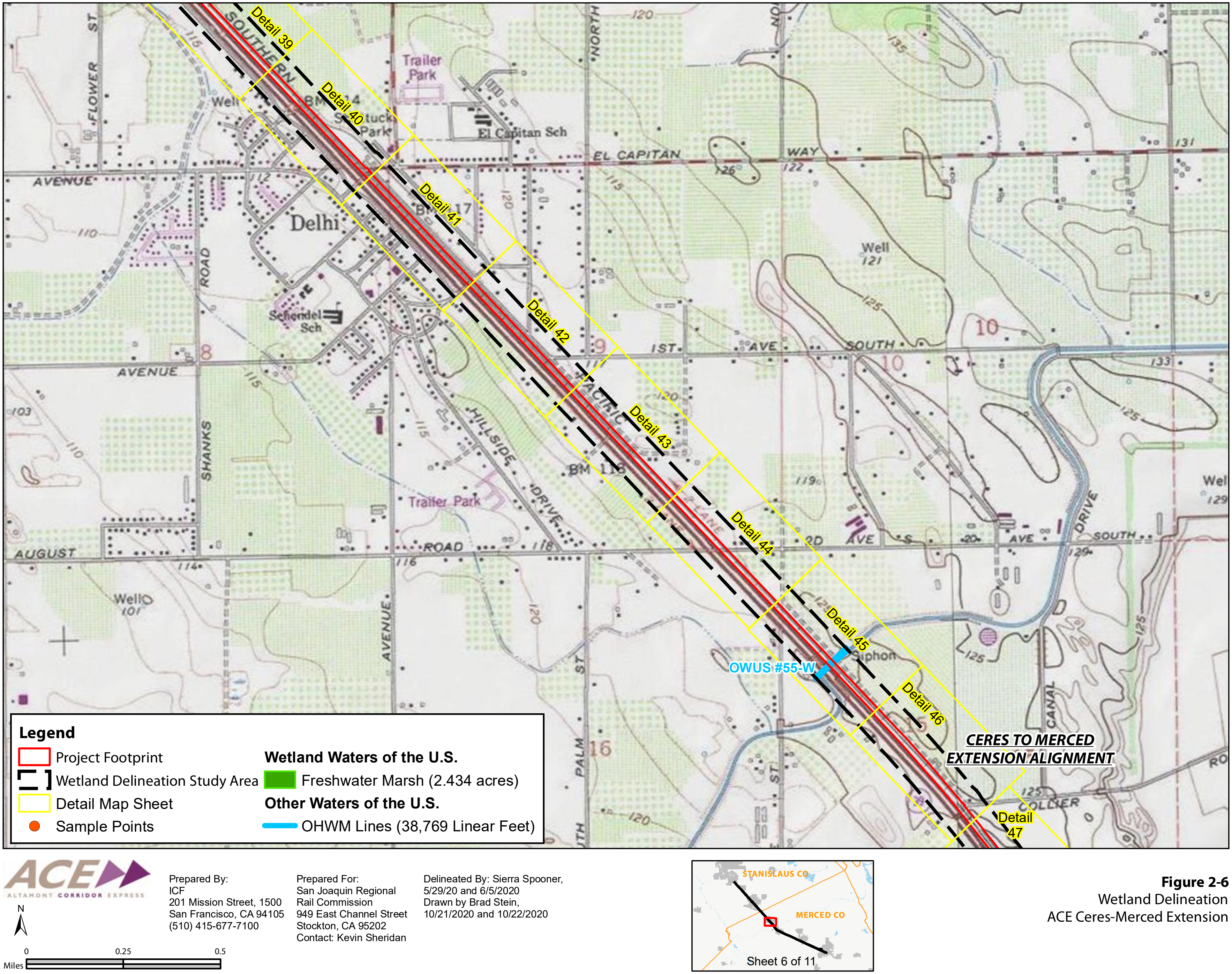

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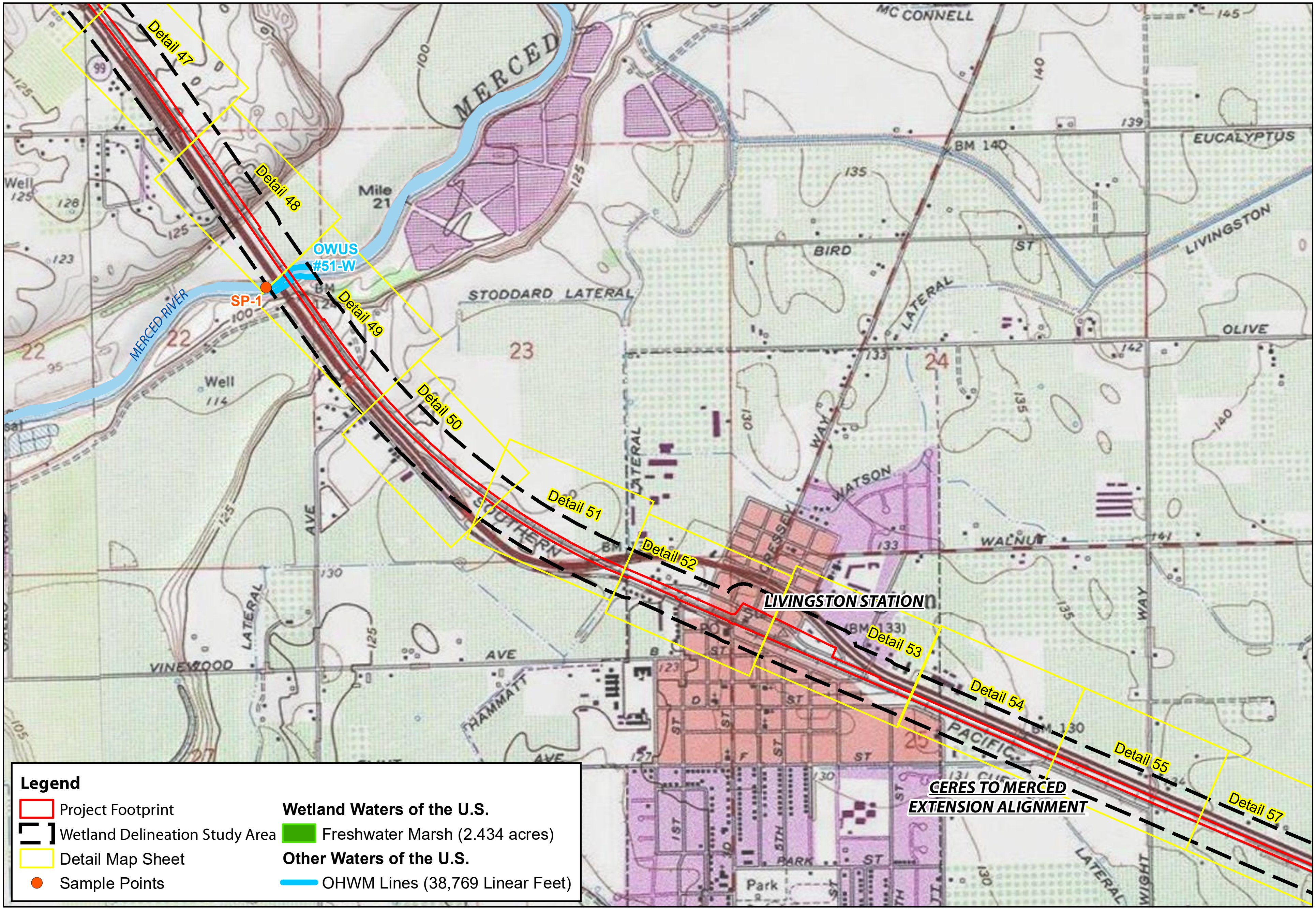
Figure 2-6
Wetland Delineation
ACE Ceres-Merced Extension



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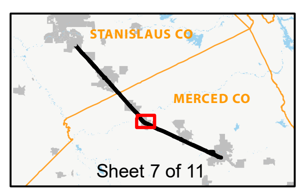
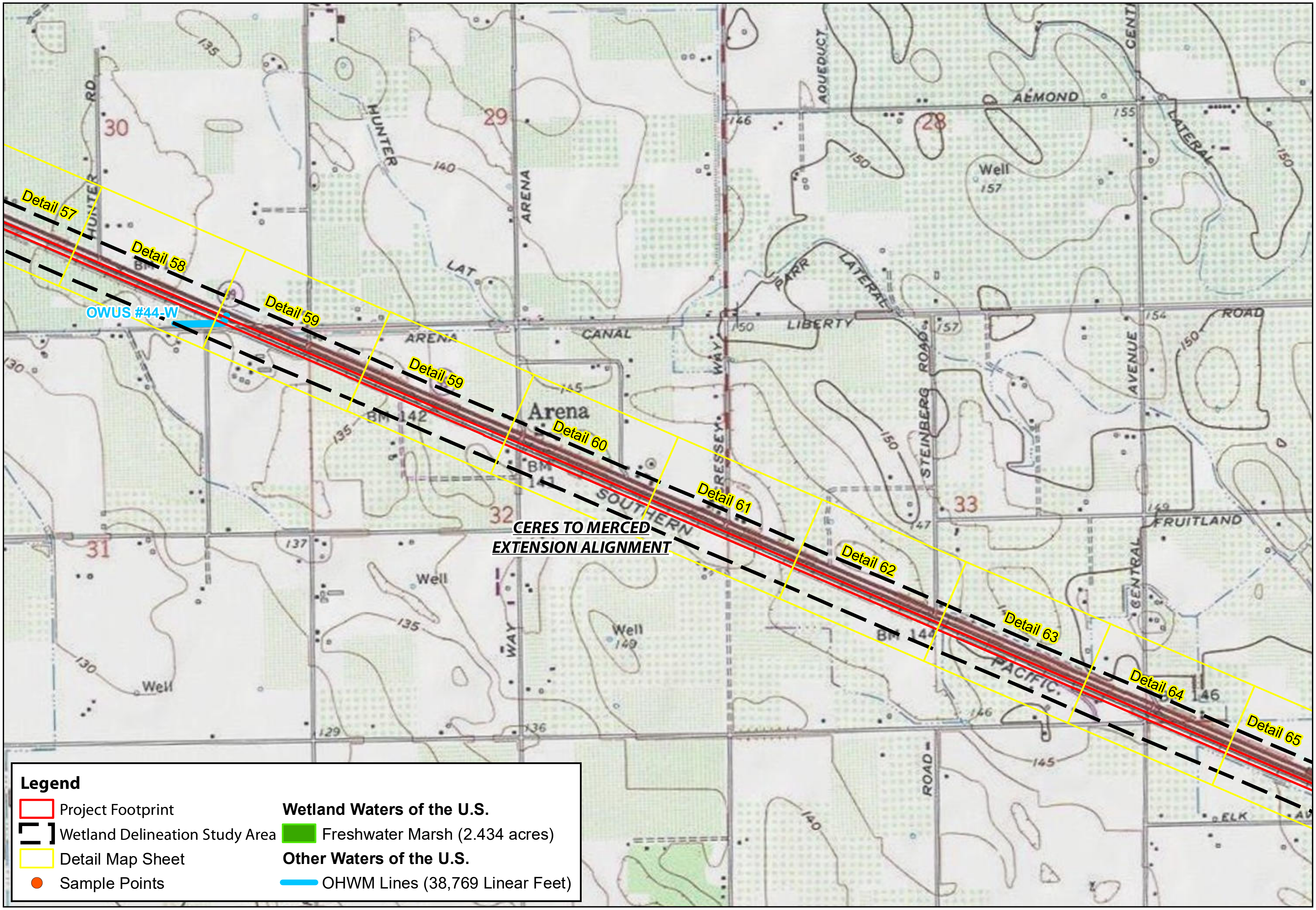


Figure 2-7
Wetland Delineation
ACE Ceres-Merced Extension



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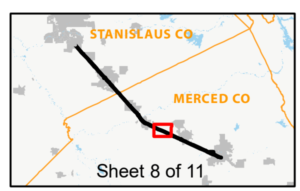
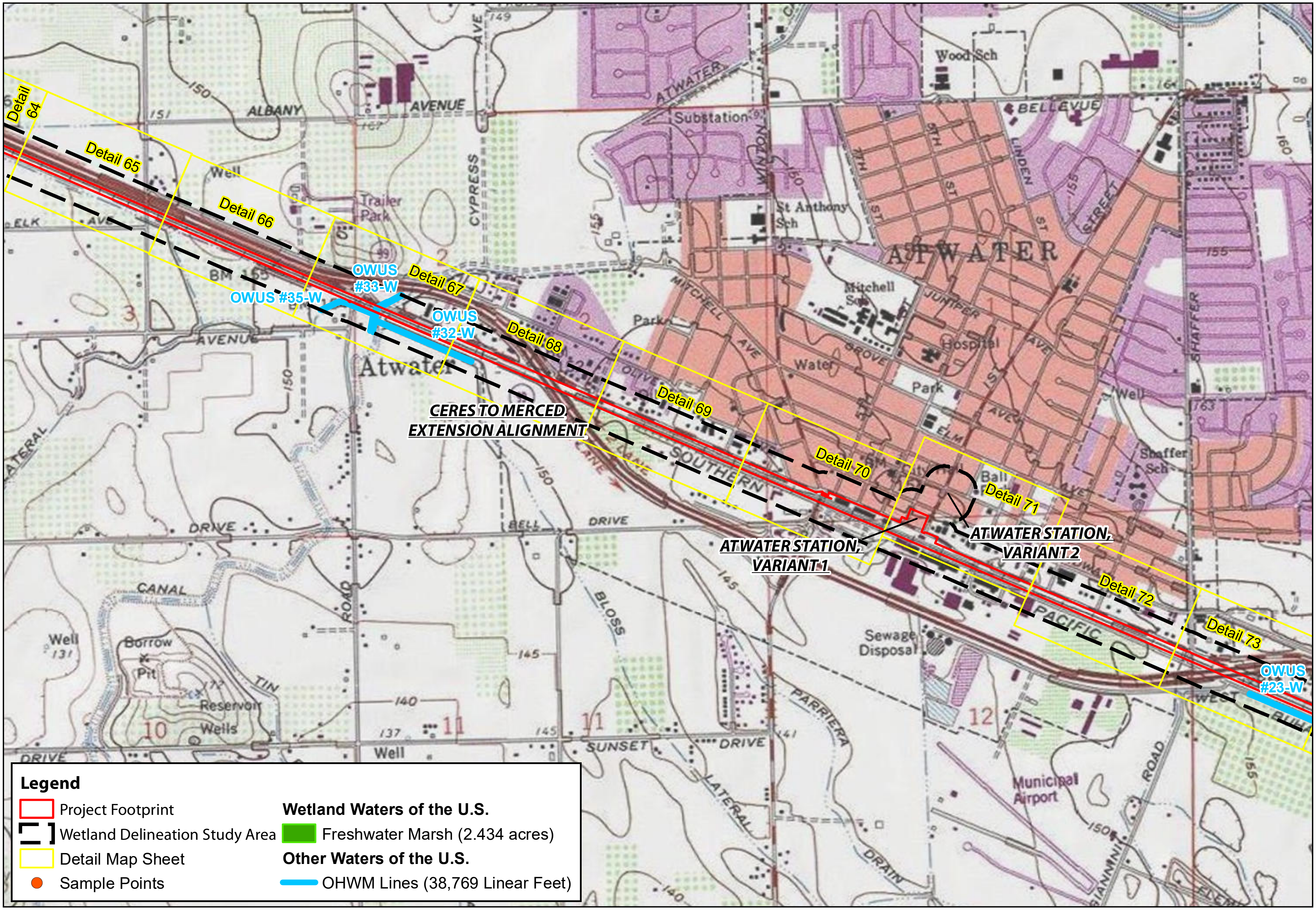


Figure 2-8
Wetland Delineation
ACE Ceres-Merced Extension



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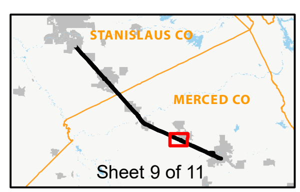
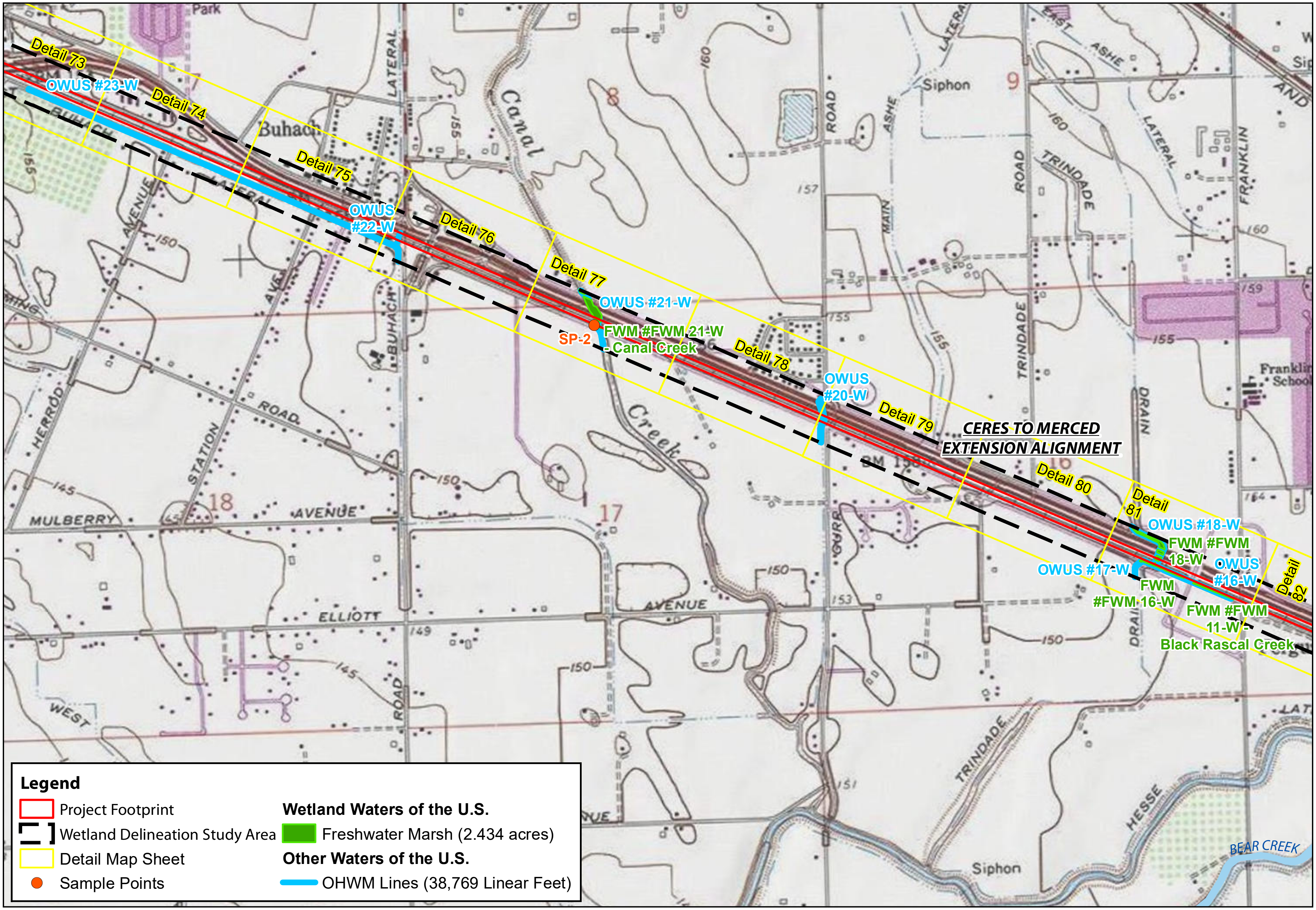


Figure 2-9
Wetland Delineation
ACE Ceres-Merced Extension



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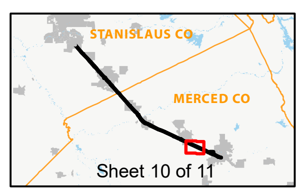

Figure 2-10
Wetland Delineation
ACE Ceres-Merced Extension

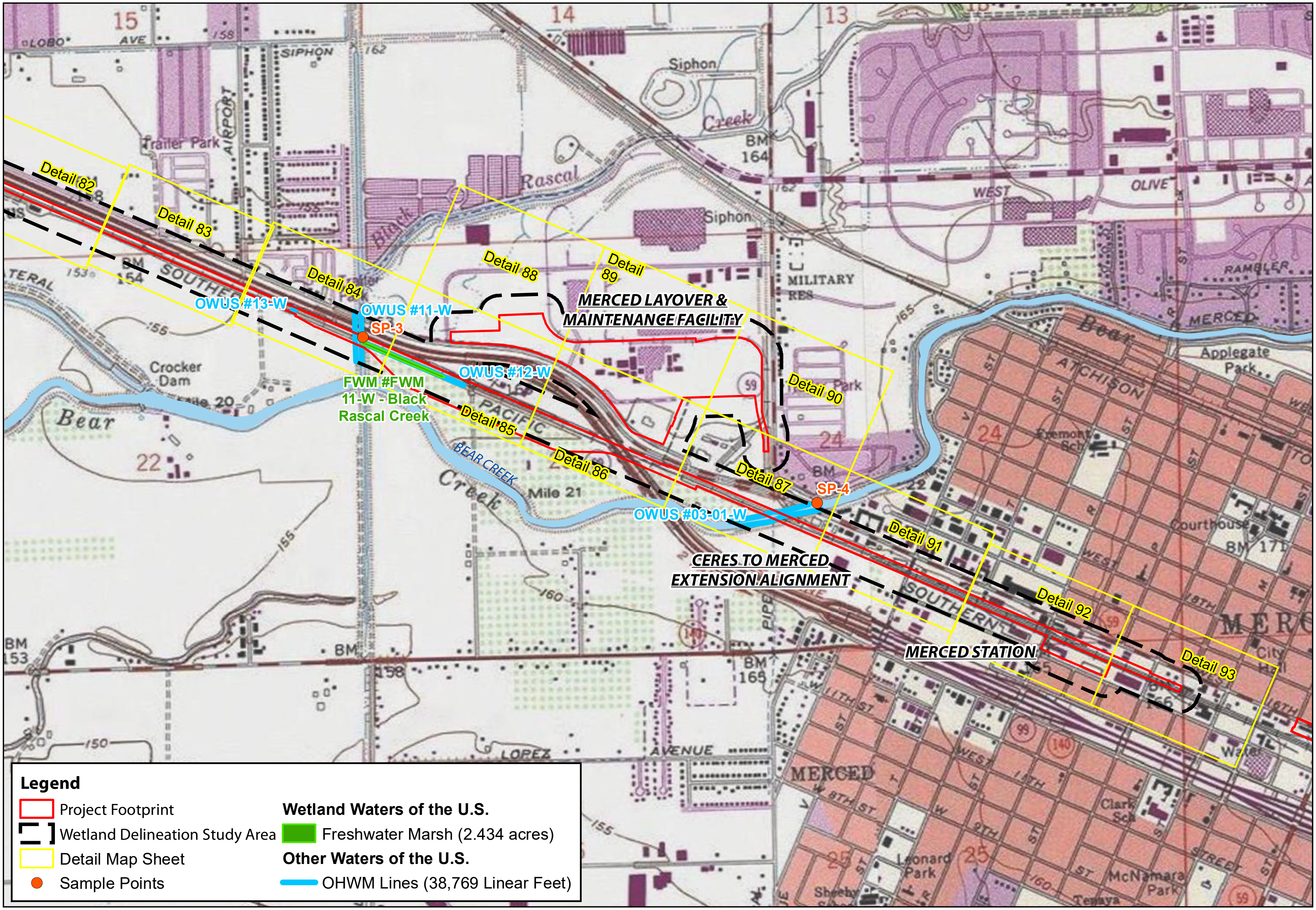

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Figure 2-11
Wetland Delineation
ACE Ceres-Merced Extension

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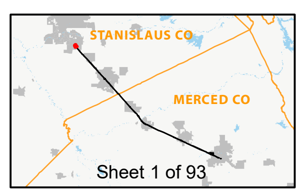

Figure 3-1
Wetland Delineation Detail
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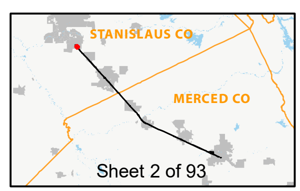

Figure 3-2
Wetland Delineation Detail
ACE Ceres-Merced Extension

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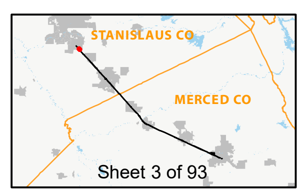

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Feet

Figure 3-3
Wetland Delineation Detail
ACE Ceres-Merced Extension

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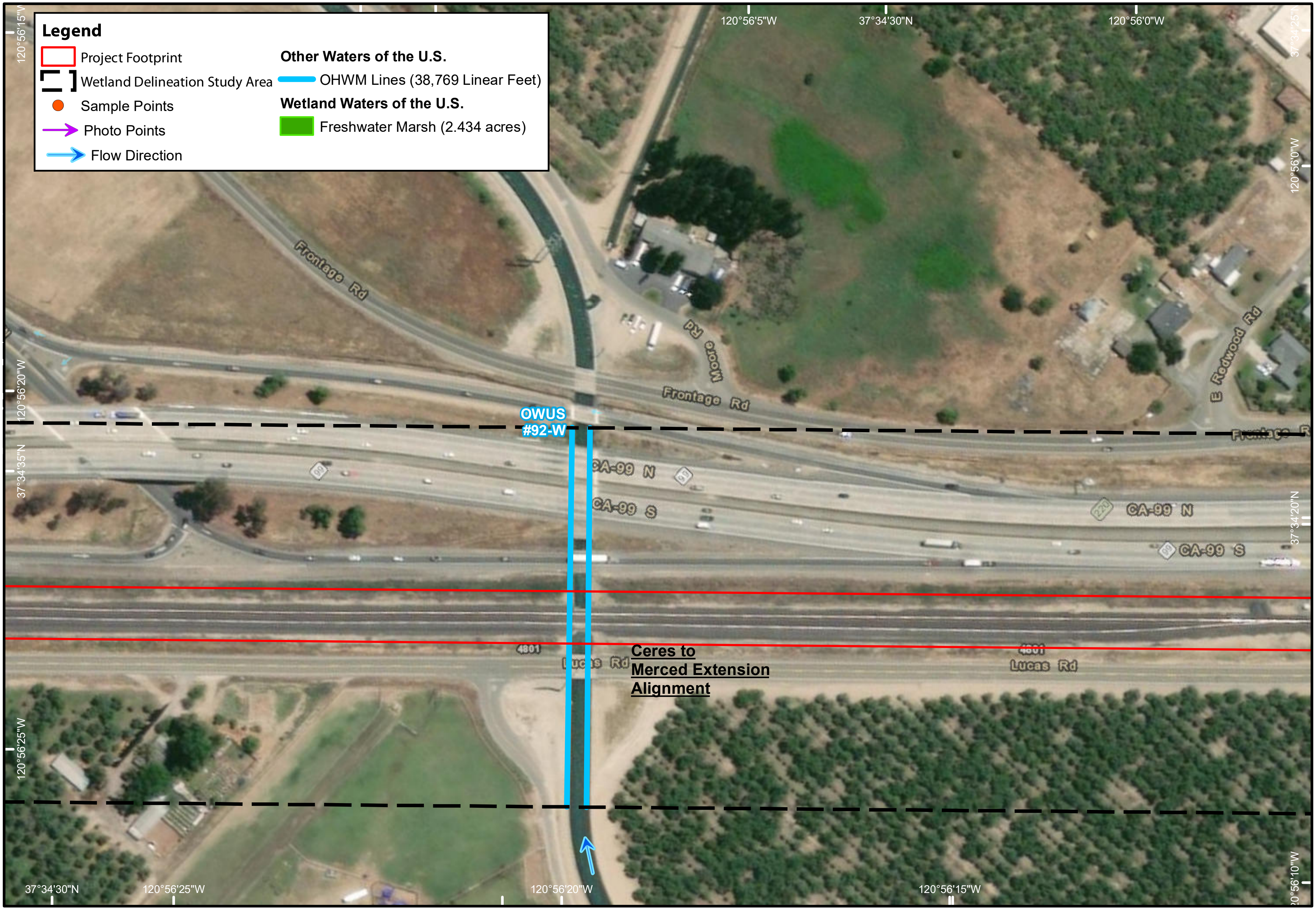
Figure 3-4
Wetland Delineation Detail
ACE Ceres-Merced Extension



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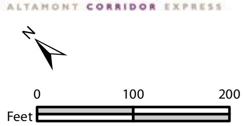

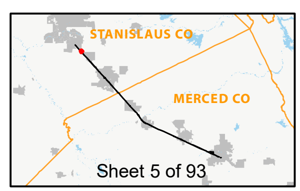

Figure 3-5
Wetland Delineation Detail
ACE Ceres-Merced Extension

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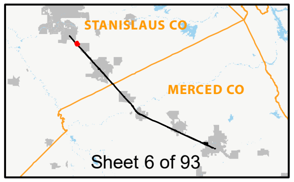

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Figure 3-6
Wetland Delineation Detail
ACE Ceres-Merced Extension

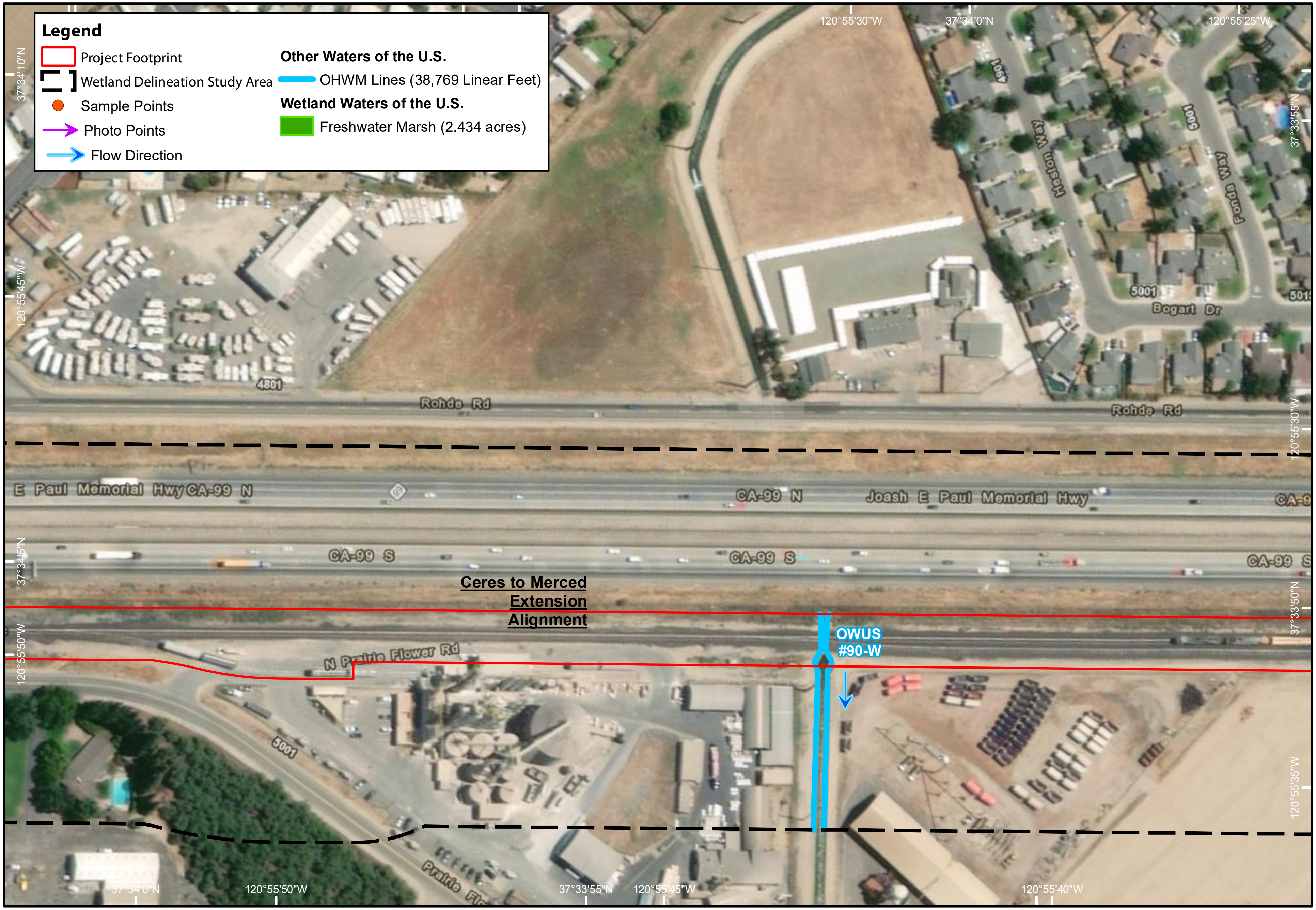

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Figure 3-7
Wetland Delineation Detail
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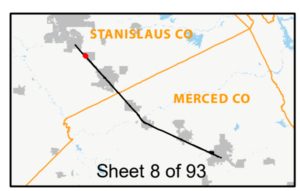

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Figure 3-8
Wetland Delineation Detail
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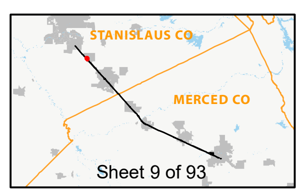

Figure 3-9
Wetland Delineation Detail
ACE Ceres-Merced Extension

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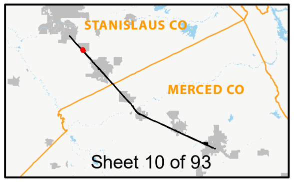

Figure 3-10
Wetland Delineation Detail
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Figure 3-11
Wetland Delineation Detail
ACE Ceres-Merced Extension

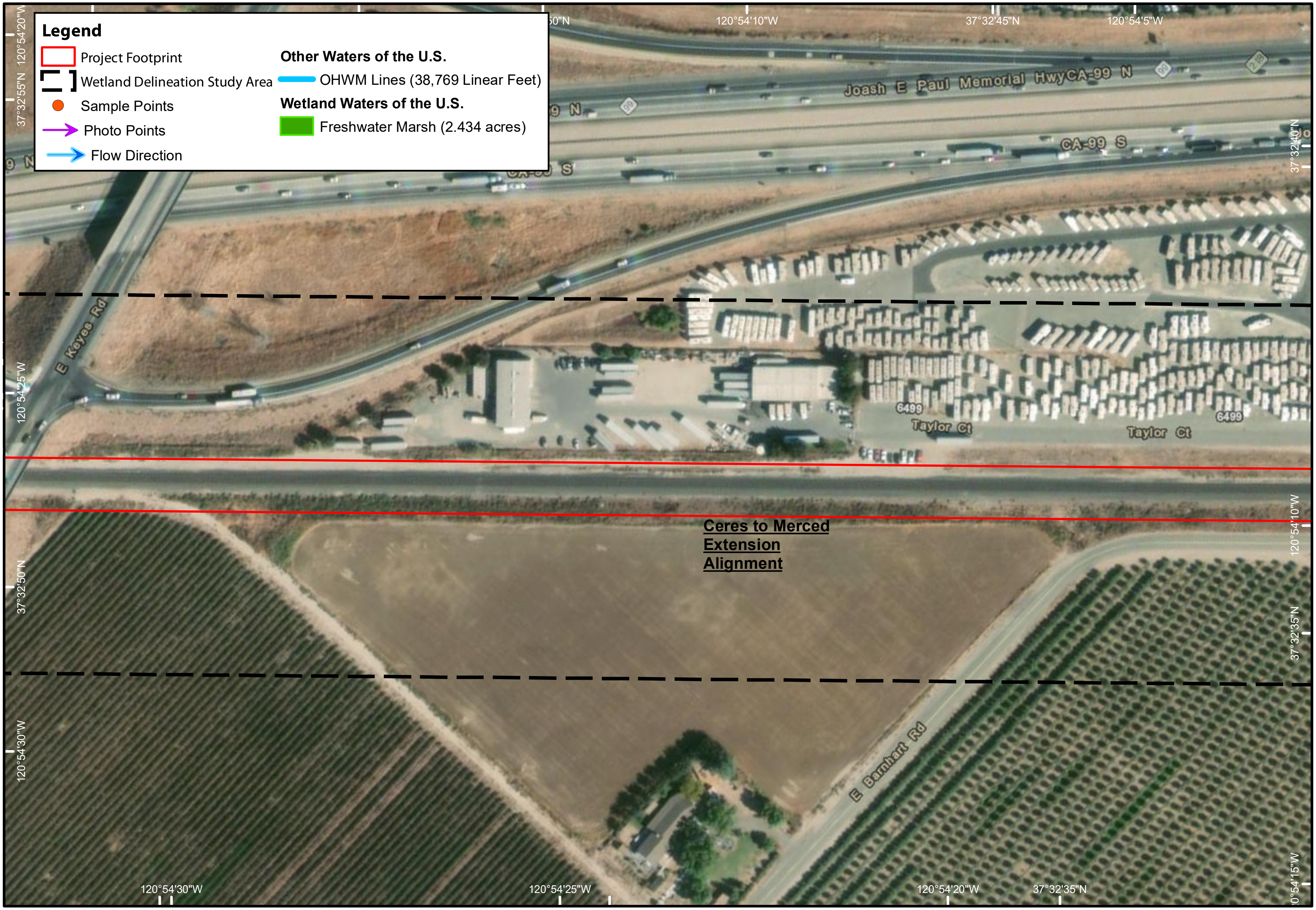

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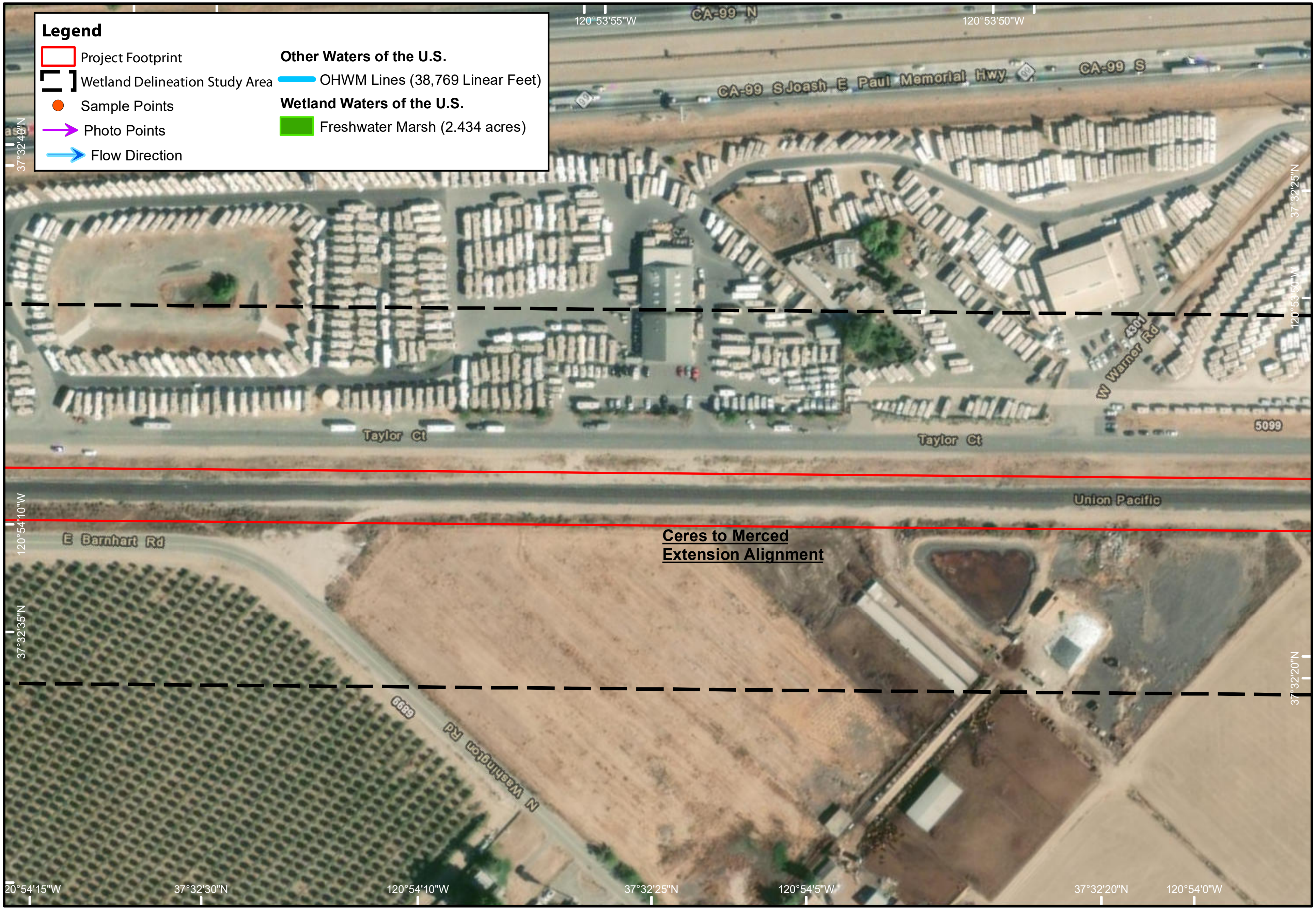
Figure 3-12
Wetland Delineation Detail
ACE Ceres-Merced Extension



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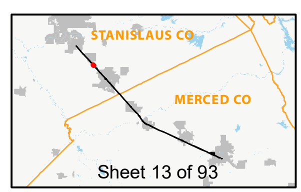

Figure 3-13
Wetland Delineation Detail
ACE Ceres-Merced Extension

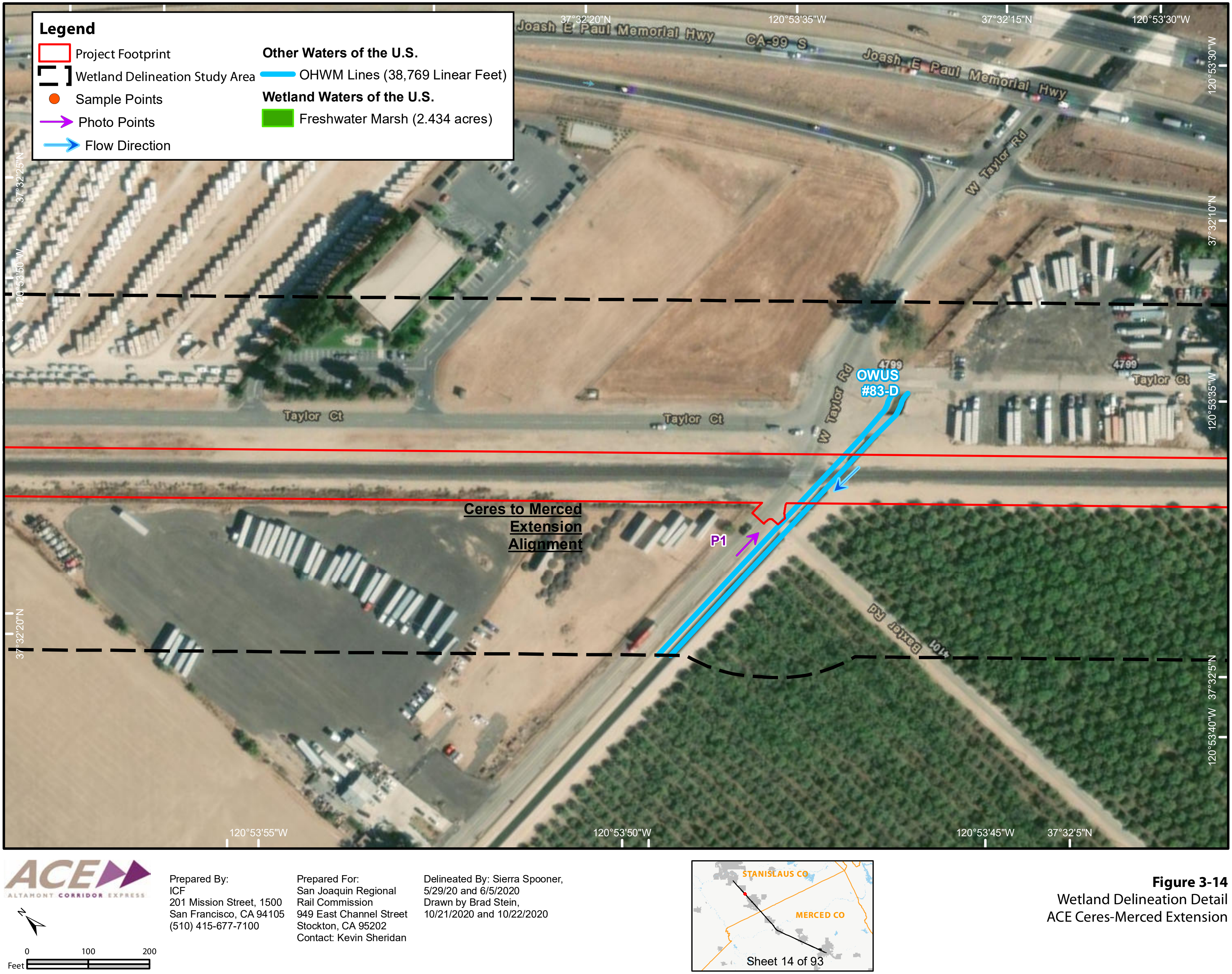

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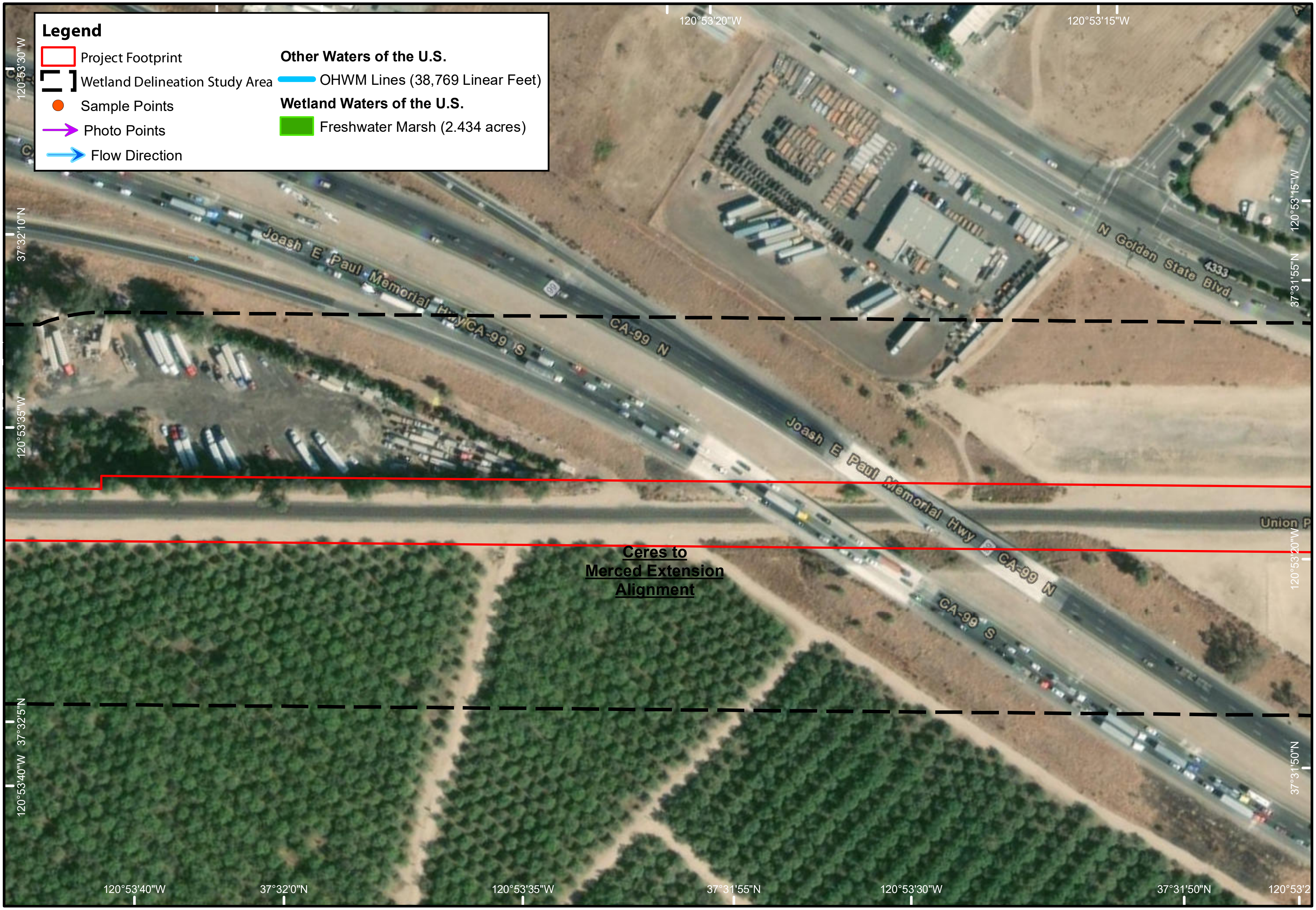
Figure 3-14
Wetland Delineation Detail
ACE Ceres-Merced Extension



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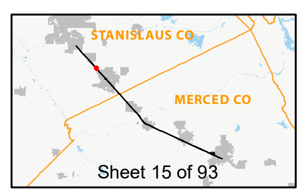

Figure 3-15
Wetland Delineation Detail
ACE Ceres-Merced Extension

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Feet 0 100 200

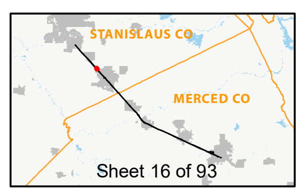

Figure 3-16
Wetland Delineation Detail
ACE Ceres-Merced Extension

ACE ALTAMONT CORRIDOR EXPRESS

0 100 200
Feet

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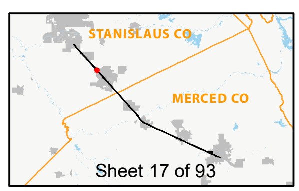
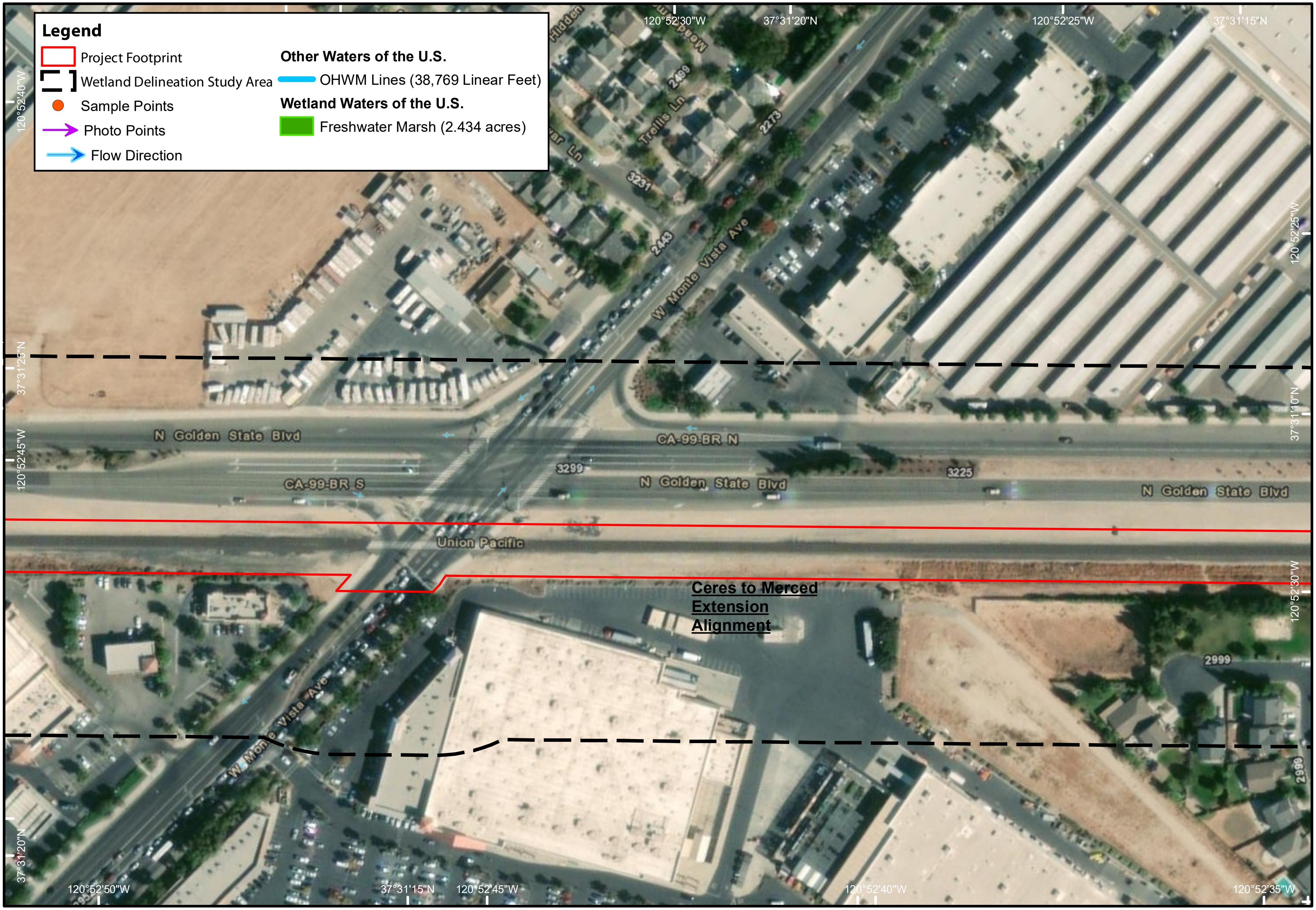


Figure 3-17
Wetland Delineation Detail
ACE Ceres-Merced Extension



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0 100 200
Feet

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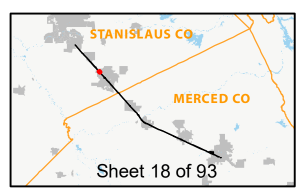

Figure 3-18
Wetland Delineation Detail
ACE Ceres-Merced Extension

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Figure 3-19
Wetland Delineation Detail
ACE Ceres-Merced Extension

ACE ALTAMONT CORRIDOR EXPRESS

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0 100 200
Feet

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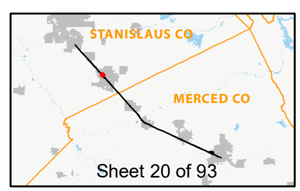

Figure 3-20
Wetland Delineation Detail
ACE Ceres-Merced Extension

ALTAMONT CORRIDOR EXPRESS

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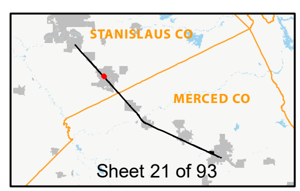

Figure 3-21
Wetland Delineation Detail
ACE Ceres-Merced Extension

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Feet

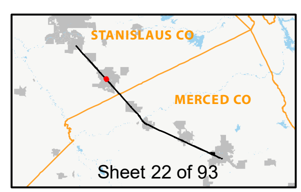

Figure 3-22
Wetland Delineation Detail
ACE Ceres-Merced Extension

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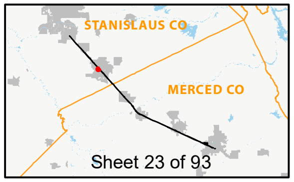

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Feet

Figure 3-23
Wetland Delineation Detail
ACE Ceres-Merced Extension

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Feet

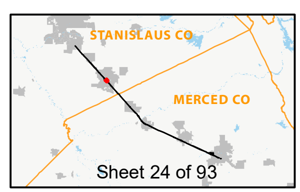
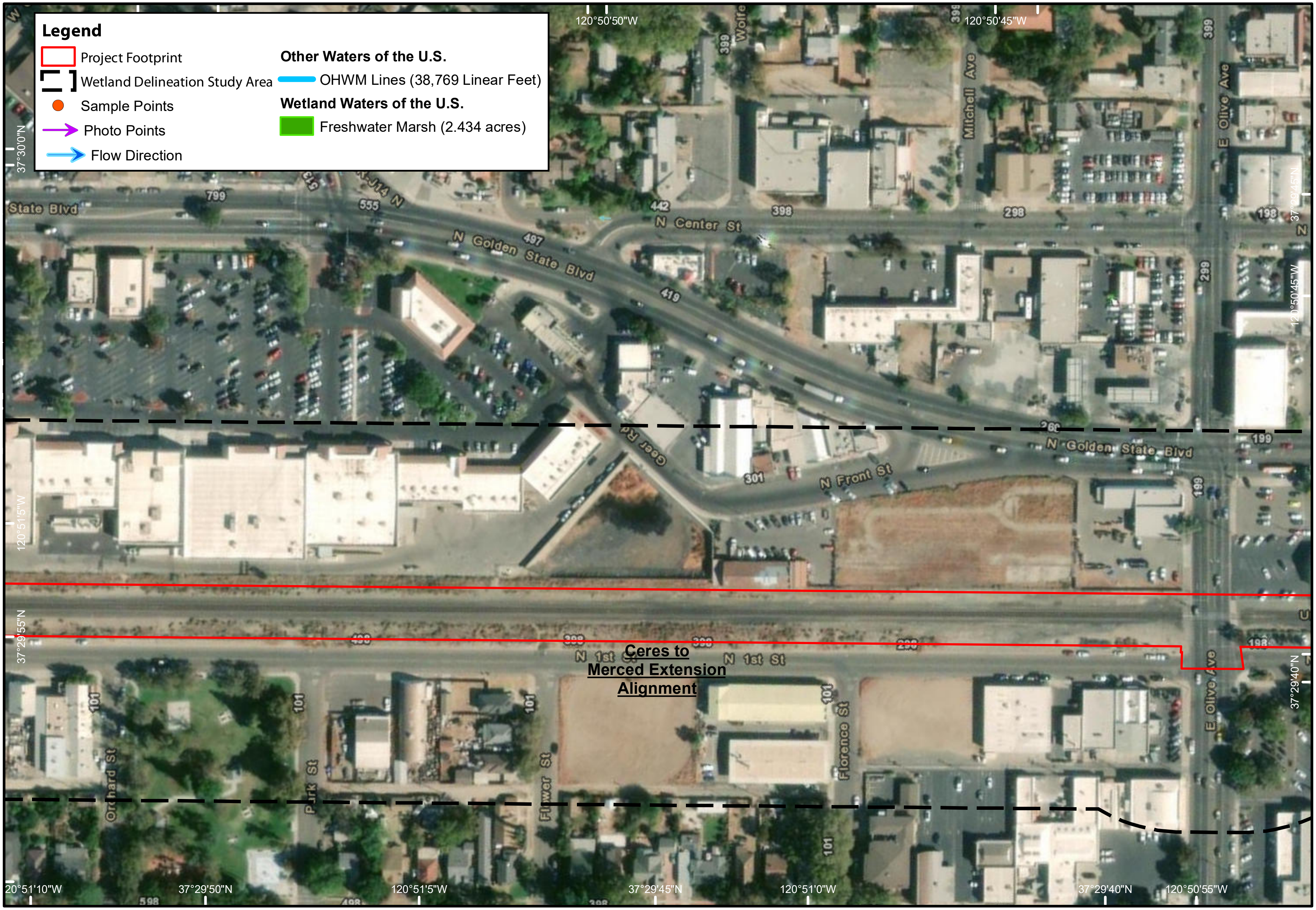


Figure 3-24
Wetland Delineation Detail
ACE Ceres-Merced Extension



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Feet

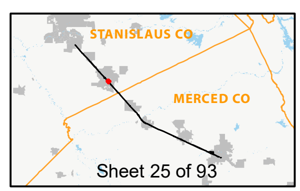

Figure 3-25
Wetland Delineation Detail
ACE Ceres-Merced Extension

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0 100 200
Feet

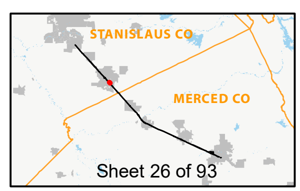
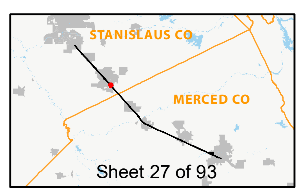


Figure 3-26
Wetland Delineation Detail
ACE Ceres-Merced Extension



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0 100 200
Feet

Figure 3-27
Wetland Delineation Detail
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0 100 200
Feet

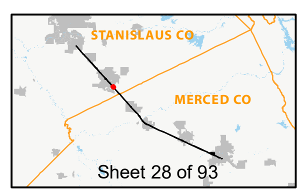

Figure 3-28
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0 100 200
Feet

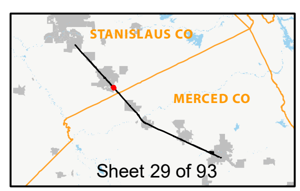

Figure 3-29
Wetland Delineation Detail
ACE Ceres-Merced Extension

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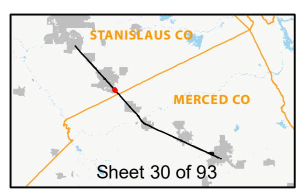

Figure 3-30
Wetland Delineation Detail
ACE Ceres-Merced Extension

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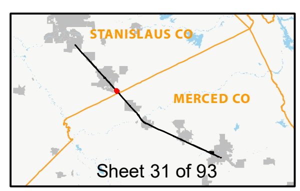

Figure 3-31
Wetland Delineation Detail
ACE Ceres-Merced Extension

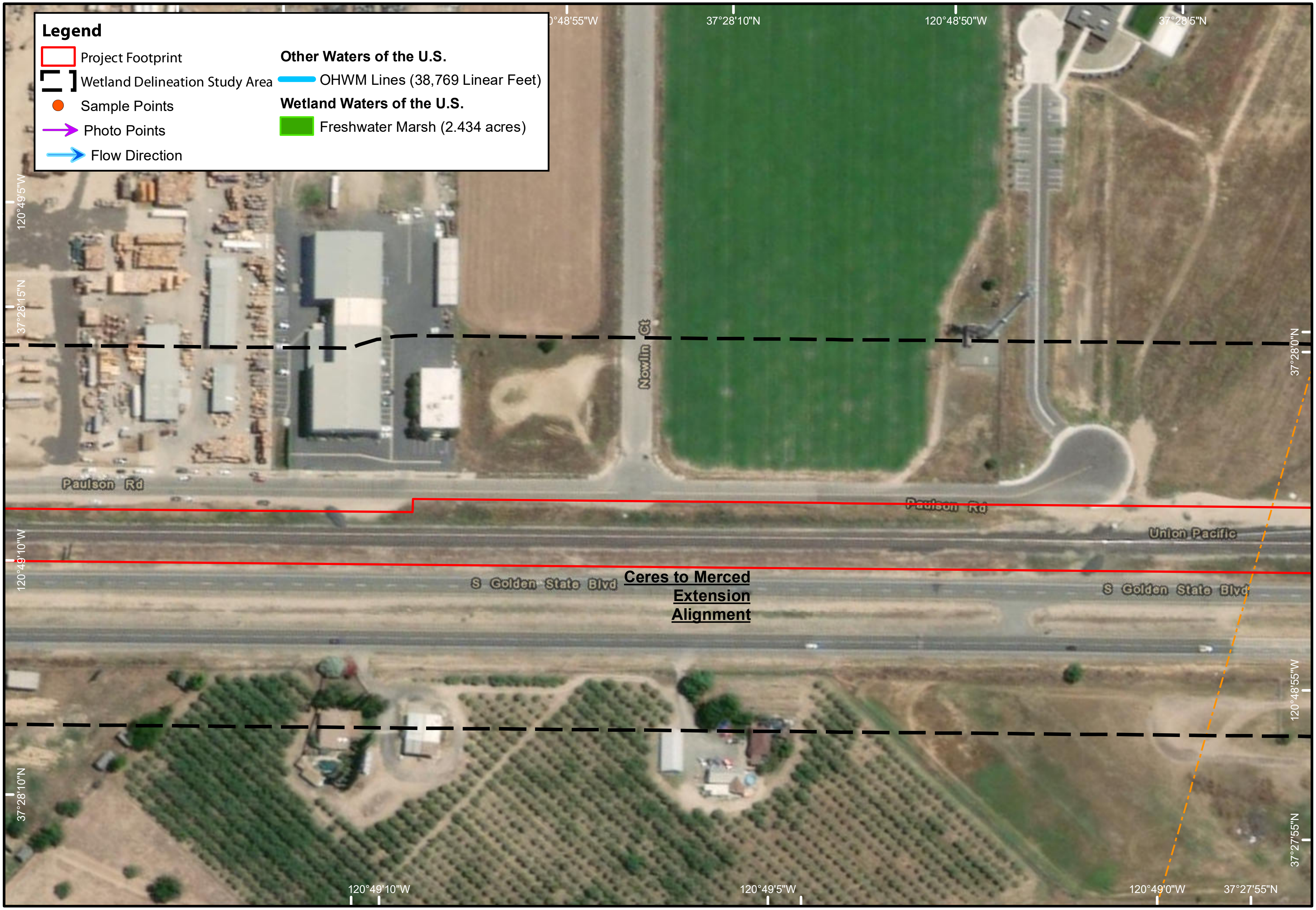

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Figure 3-32
Wetland Delineation Detail
ACE Ceres-Merced Extension

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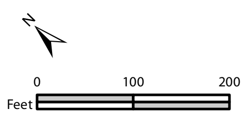

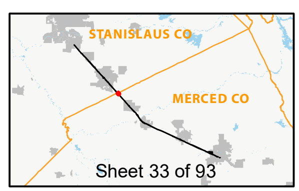

Figure 3-33
Wetland Delineation Detail
ACE Ceres-Merced Extension

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Feet

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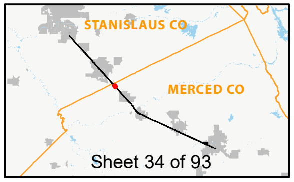

Figure 3-34
Wetland Delineation Detail
ACE Ceres-Merced Extension

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Figure 3-35
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ACE Ceres-Merced Extension

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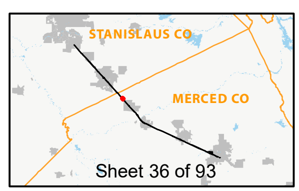

Figure 3-36
Wetland Delineation Detail
ACE Ceres-Merced Extension

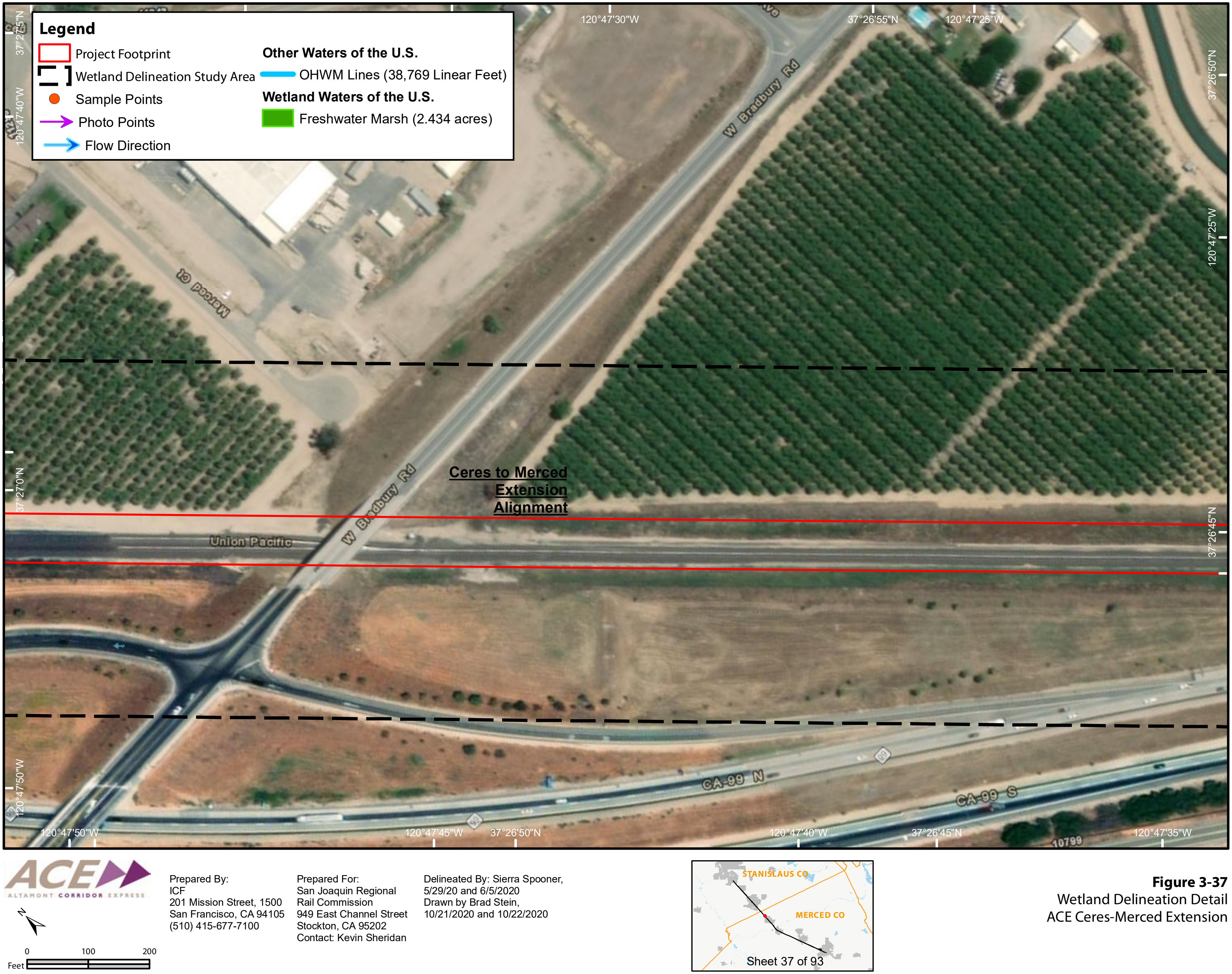

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Figure 3-37
Wetland Delineation Detail
ACE Ceres-Merced Extension

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Feet

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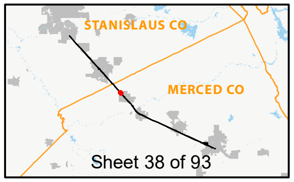

Figure 3-38
Wetland Delineation Detail
ACE Ceres-Merced Extension

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Feet

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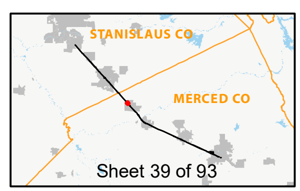

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Figure 3-39
Wetland Delineation Detail
ACE Ceres-Merced Extension

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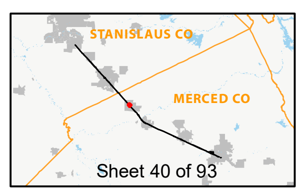

Figure 3-40
Wetland Delineation Detail
ACE Ceres-Merced Extension

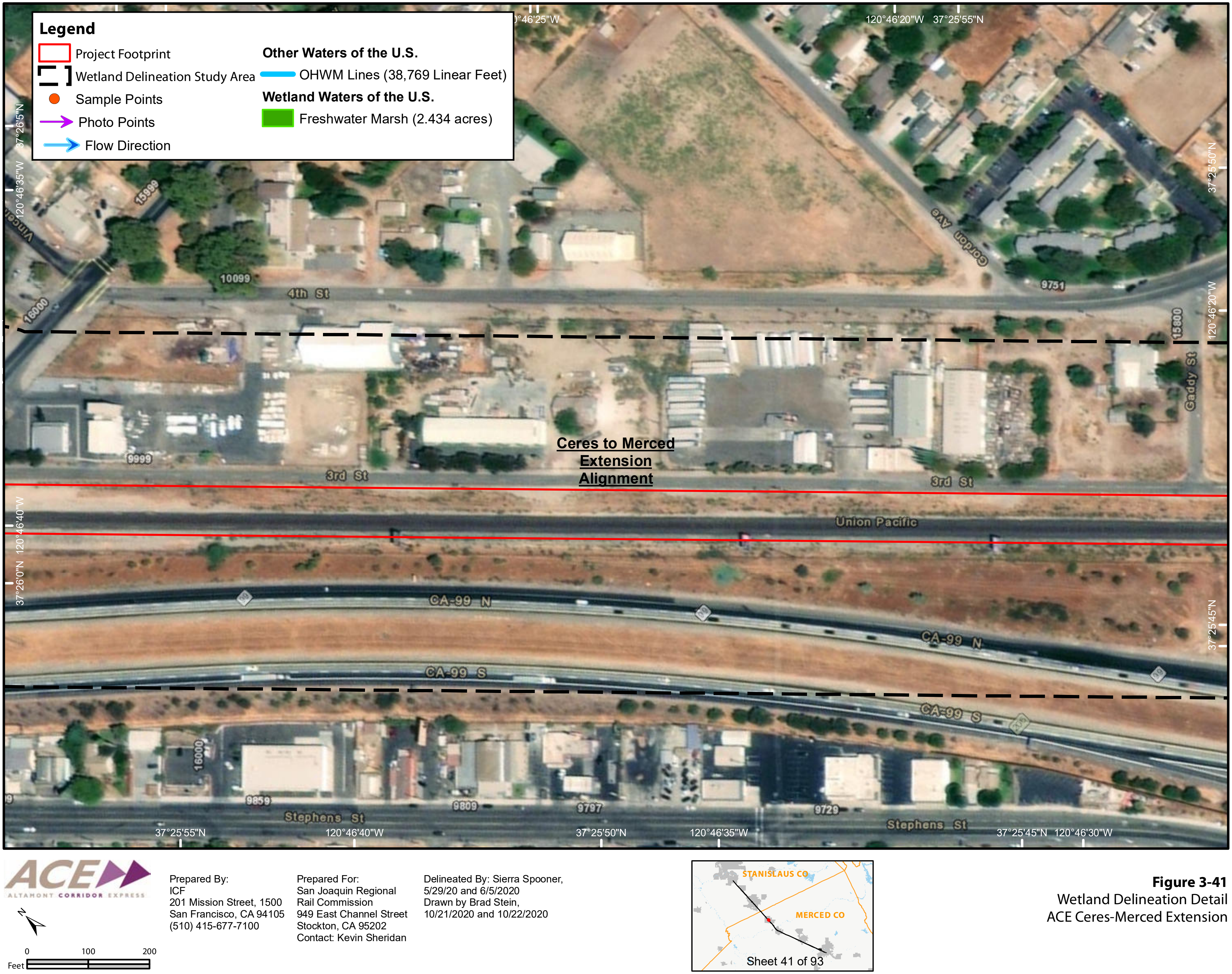

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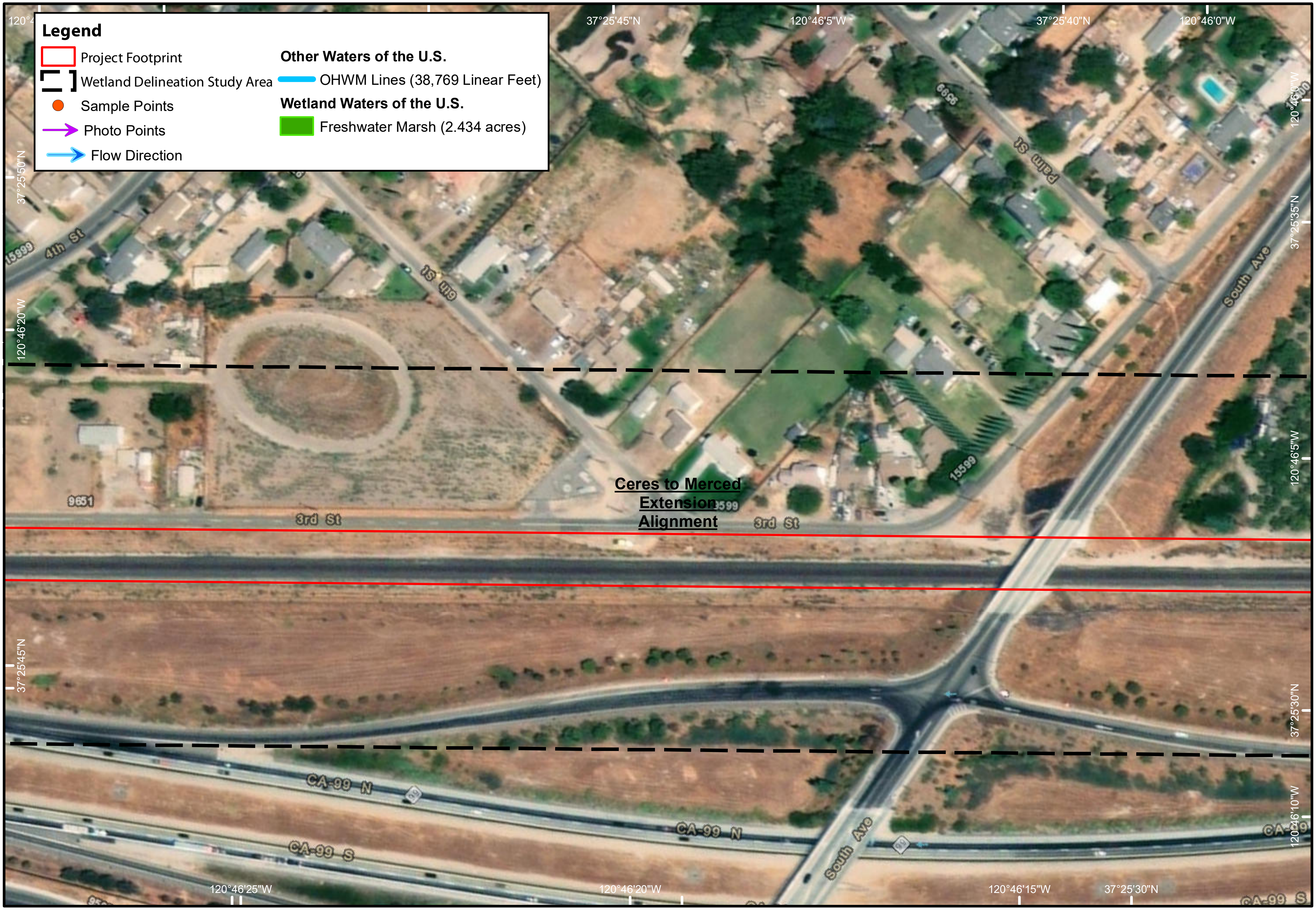
Figure 3-41
Wetland Delineation Detail
ACE Ceres-Merced Extension



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Feet 0 100 200

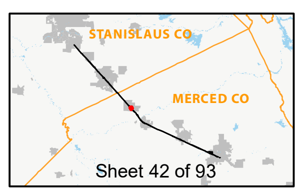
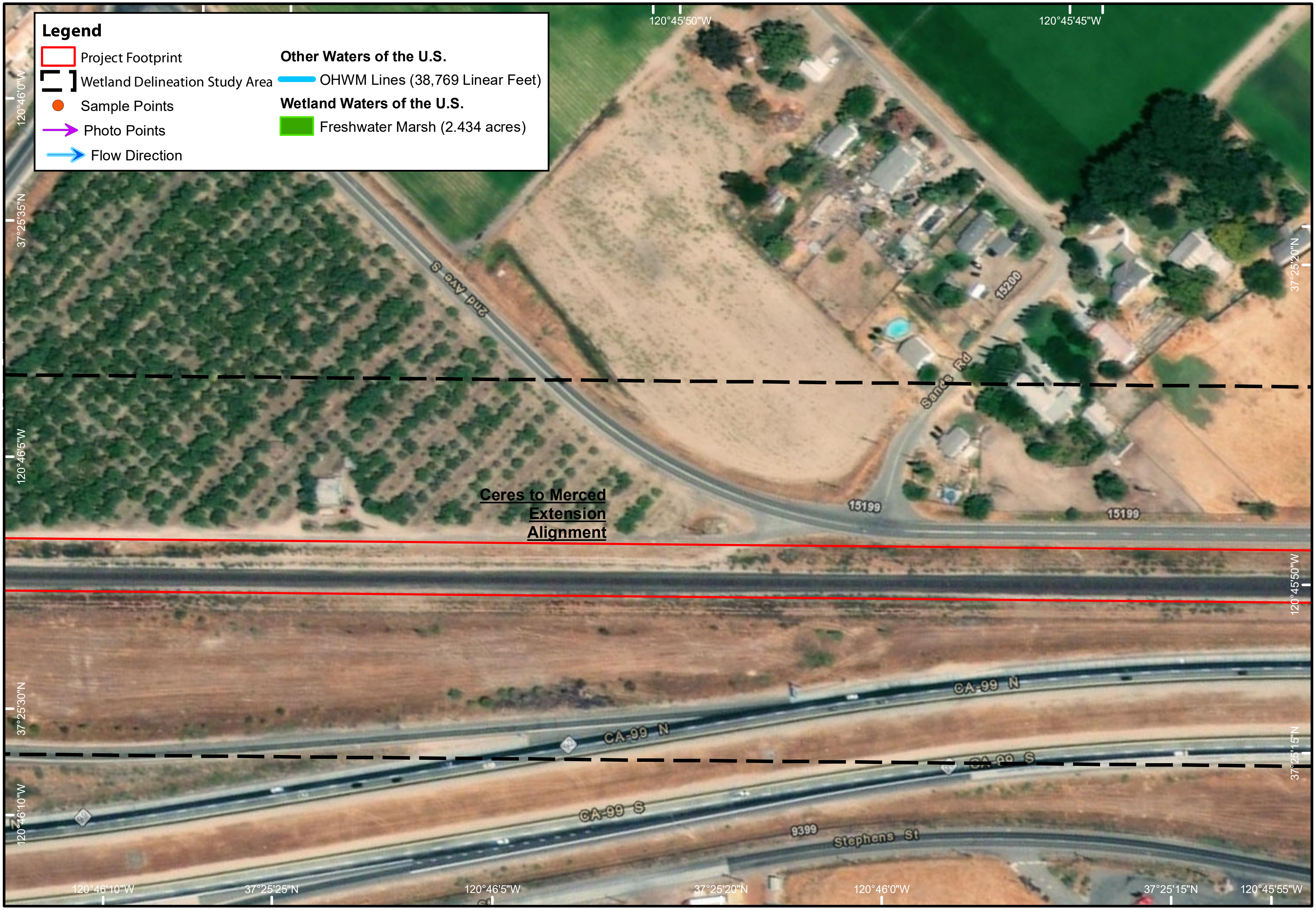


Figure 3-42
Wetland Delineation Detail
ACE Ceres-Merced Extension



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Feet

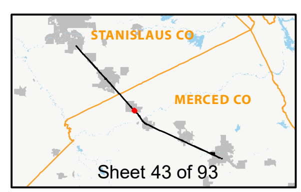

Figure 3-43
Wetland Delineation Detail
ACE Ceres-Merced Extension

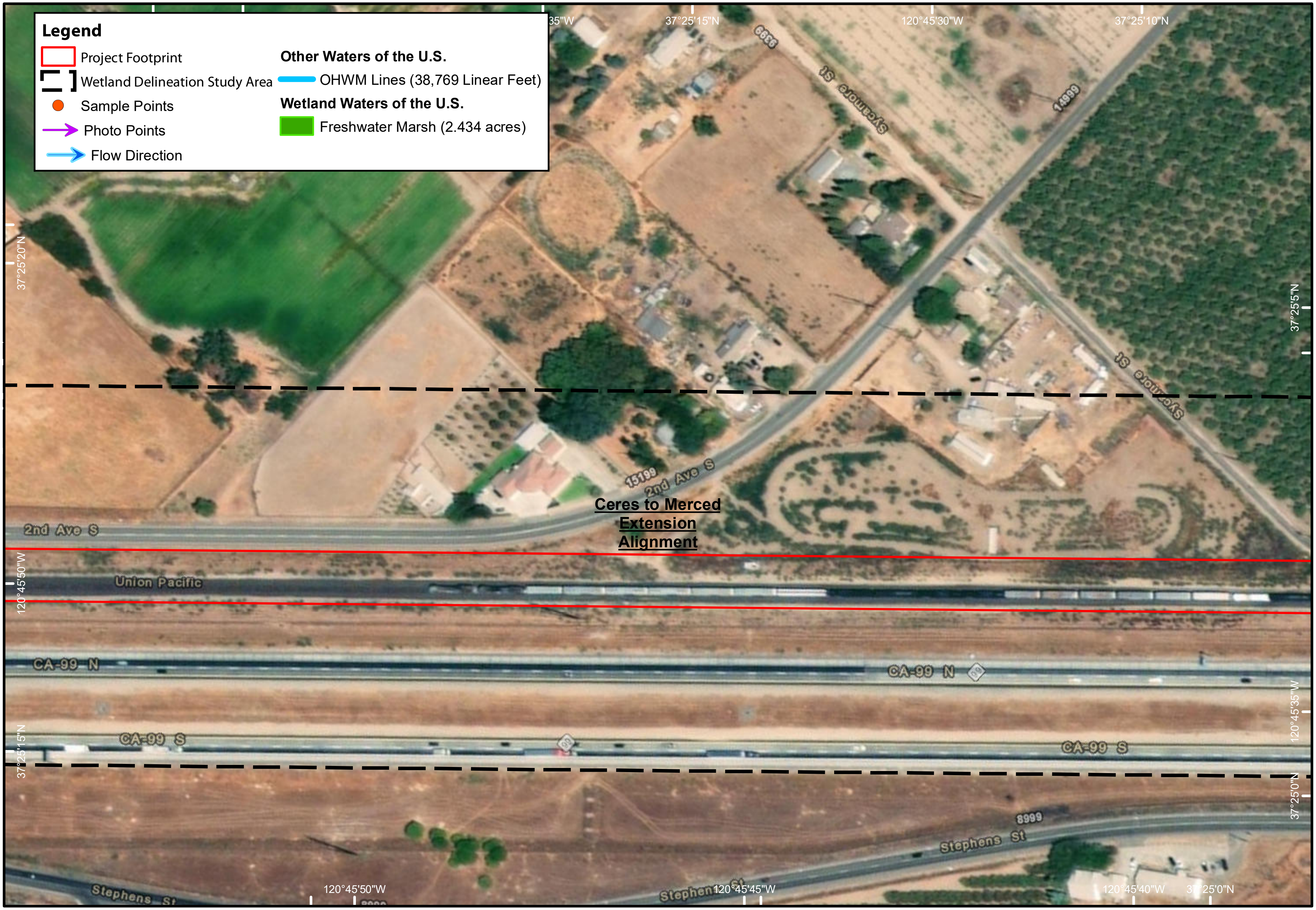

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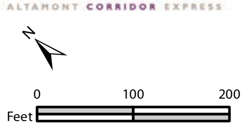
Figure 3-44
Wetland Delineation Detail
ACE Ceres-Merced Extension



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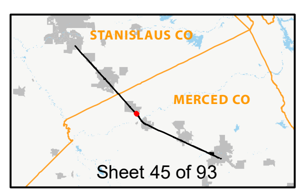

Figure 3-45
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ACE Ceres-Merced Extension

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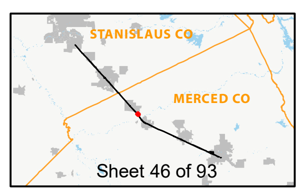

0 100 200
Feet

Figure 3-46
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Figure 3-47
Wetland Delineation Detail
ACE Ceres-Merced Extension

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Figure 3-48
Wetland Delineation Detail
ACE Ceres-Merced Extension

ACE ALTAMONT CORRIDOR EXPRESS

0 100 200 Feet

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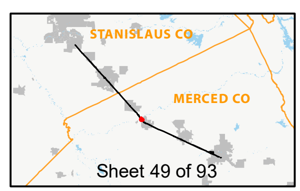

Figure 3-49
Wetland Delineation Detail
ACE Ceres-Merced Extension

ALTAMONT CORRIDOR EXPRESS

0 100 200
Feet

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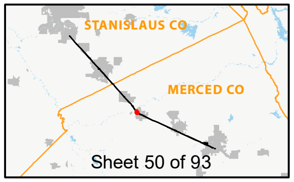

Figure 3-50
Wetland Delineation Detail
ACE Ceres-Merced Extension

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0 100 200
Feet

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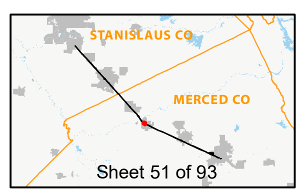
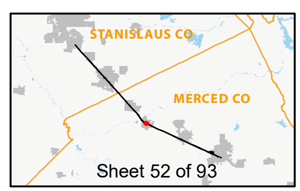


Figure 3-51
Wetland Delineation Detail
ACE Ceres-Merced Extension



ACE ALTAMONT CORRIDOR EXPRESS

Feet 0 100 200

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Figure 3-52
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Feet 0 100 200

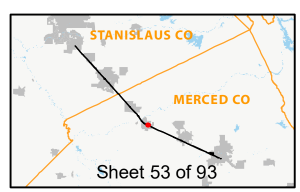

Figure 3-53
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ACE Ceres-Merced Extension

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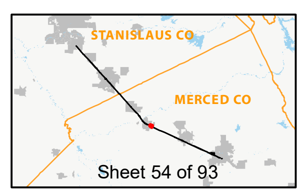
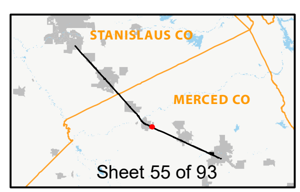


Figure 3-54
Wetland Delineation Detail
ACE Ceres-Merced Extension

0 100 200
Feet



0 100 200
Feet

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Figure 3-55
Wetland Delineation Detail
ACE Ceres-Merced Extension

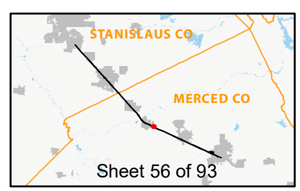

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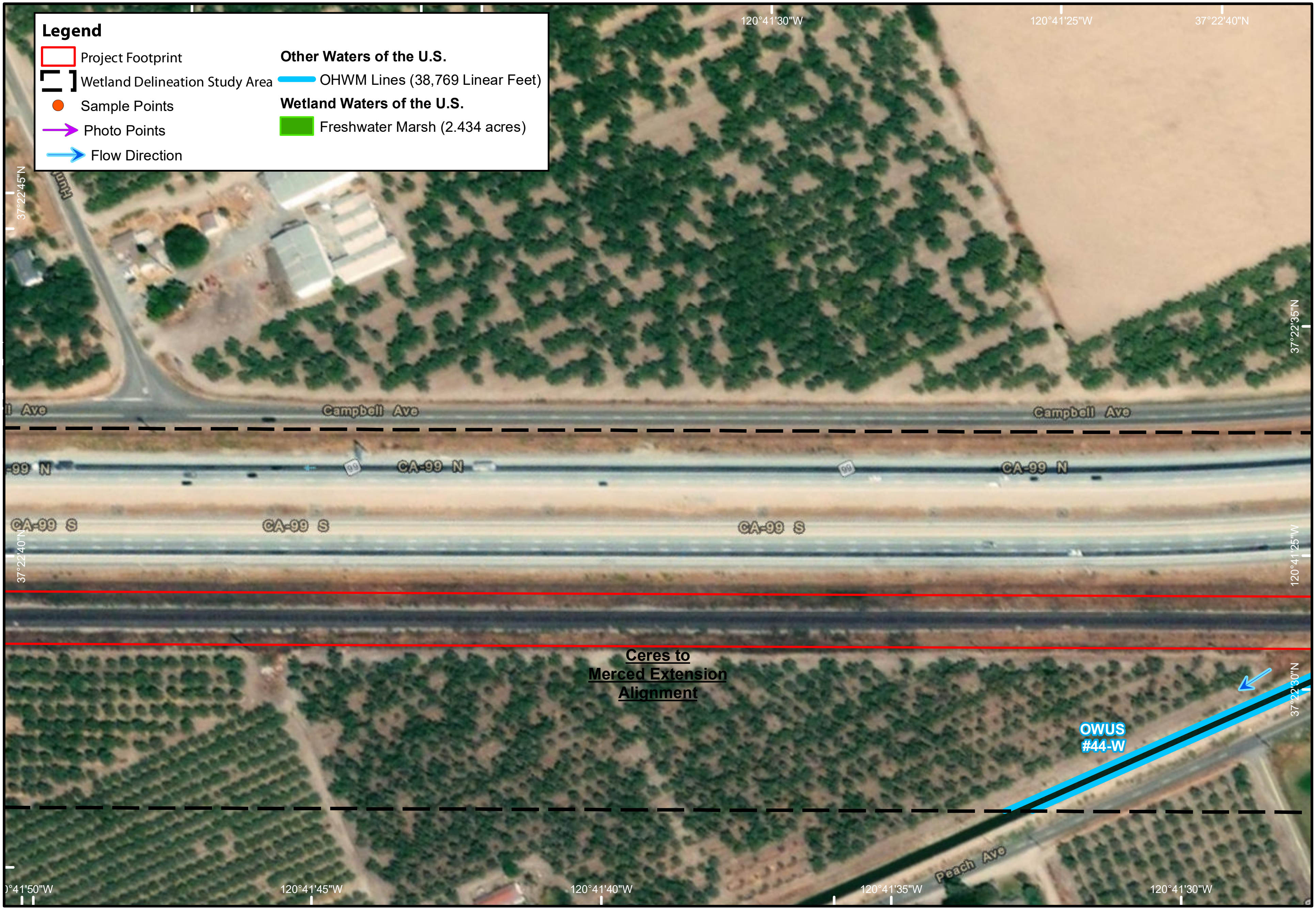
Figure 3-57
Wetland Delineation Detail
ACE Ceres-Merced Extension



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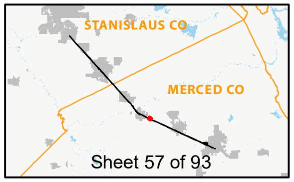
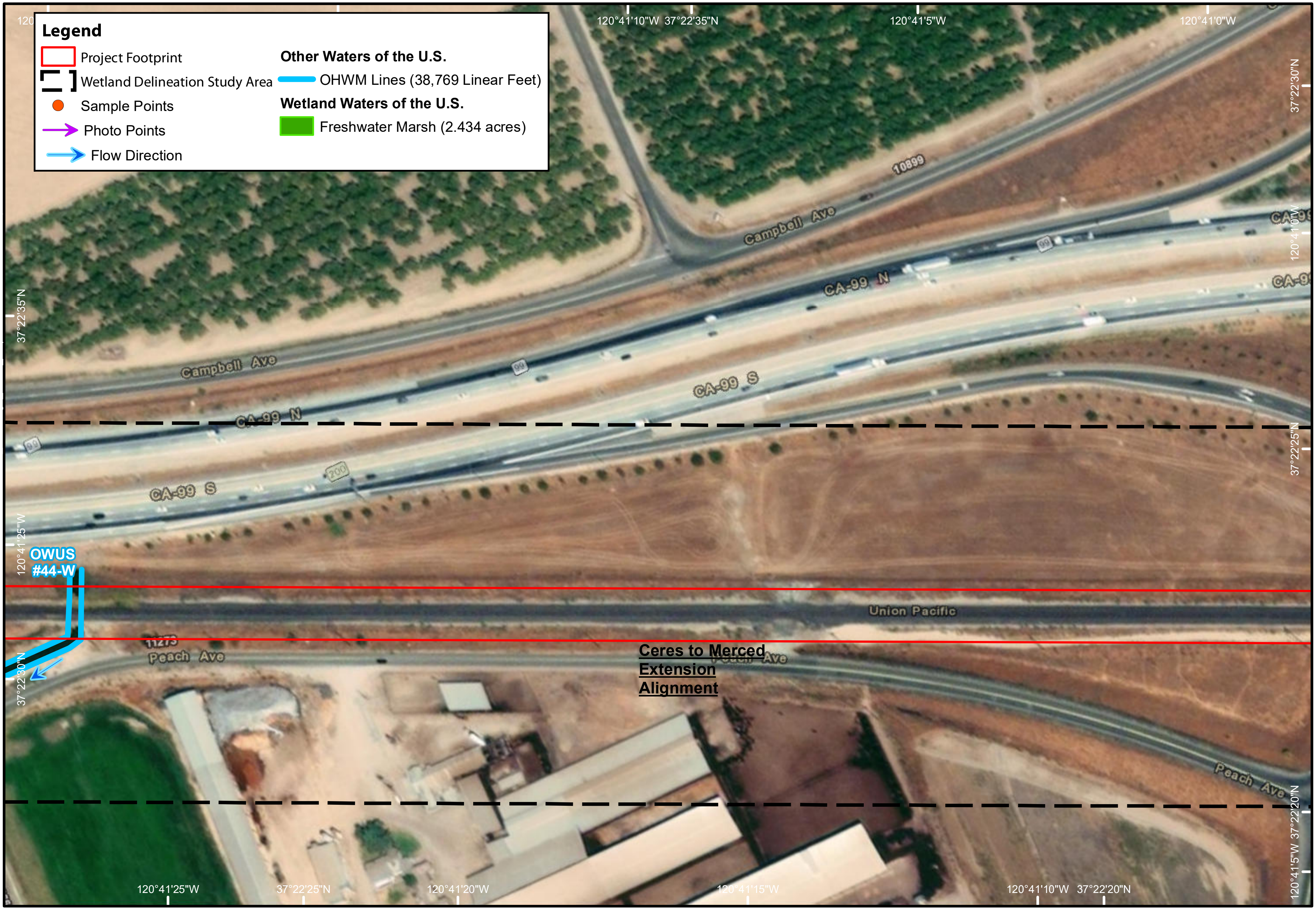


Figure 3-58
Wetland Delineation Detail
ACE Ceres-Merced Extension



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0 100 200
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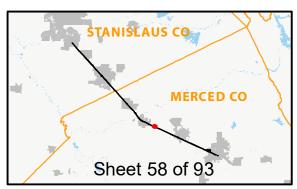

Figure 3-59
Wetland Delineation Detail
ACE Ceres-Merced Extension

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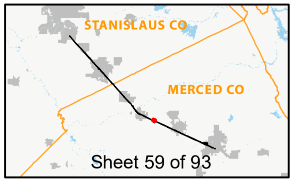

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Feet

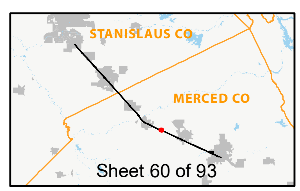

Figure 3-60
Wetland Delineation Detail
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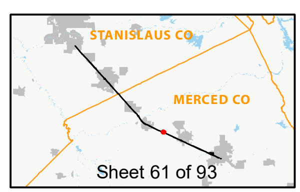

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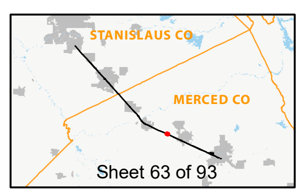

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ACE Ceres-Merced Extension

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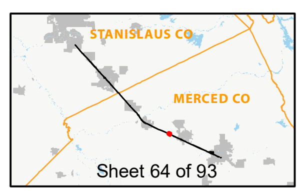

Figure 3-64
Wetland Delineation Detail
ACE Ceres-Merced Extension

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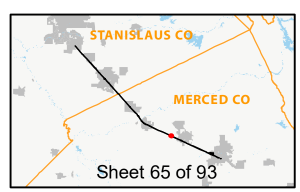

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Feet

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Wetland Delineation Detail
ACE Ceres-Merced Extension

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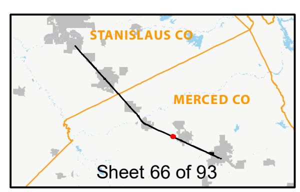

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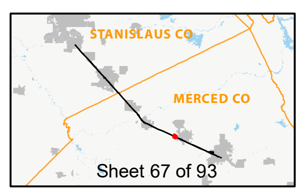

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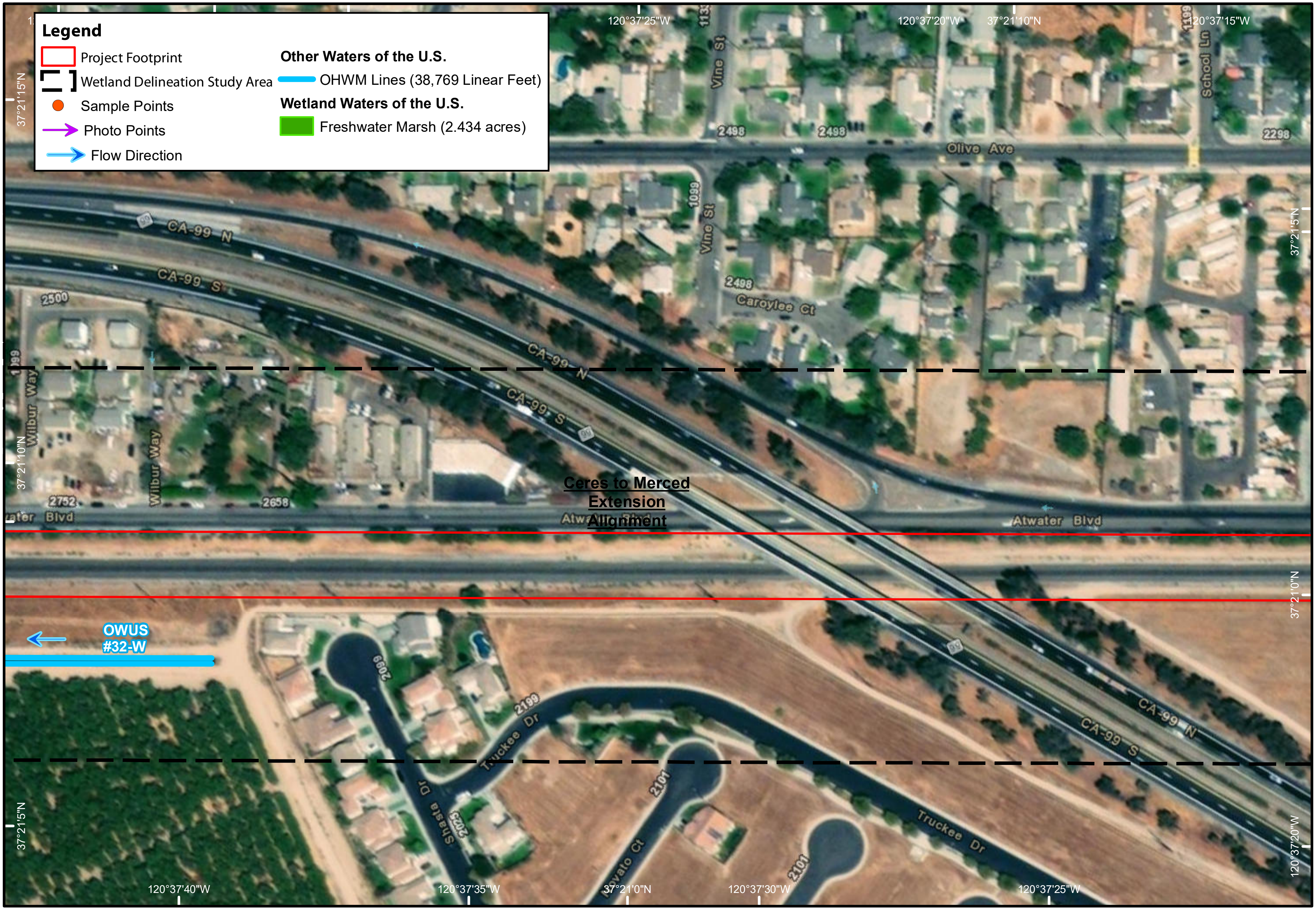
Feet

Figure 3-67
Wetland Delineation Detail
ACE Ceres-Merced Extension



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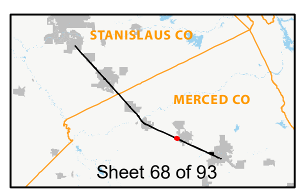

Figure 3-68
Wetland Delineation Detail
ACE Ceres-Merced Extension

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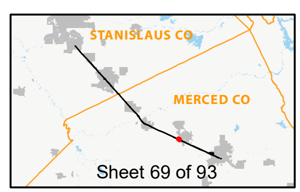

Figure 3-69
Wetland Delineation Detail
ACE Ceres-Merced Extension

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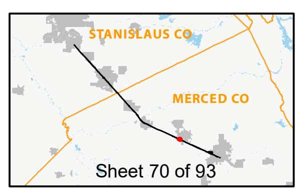
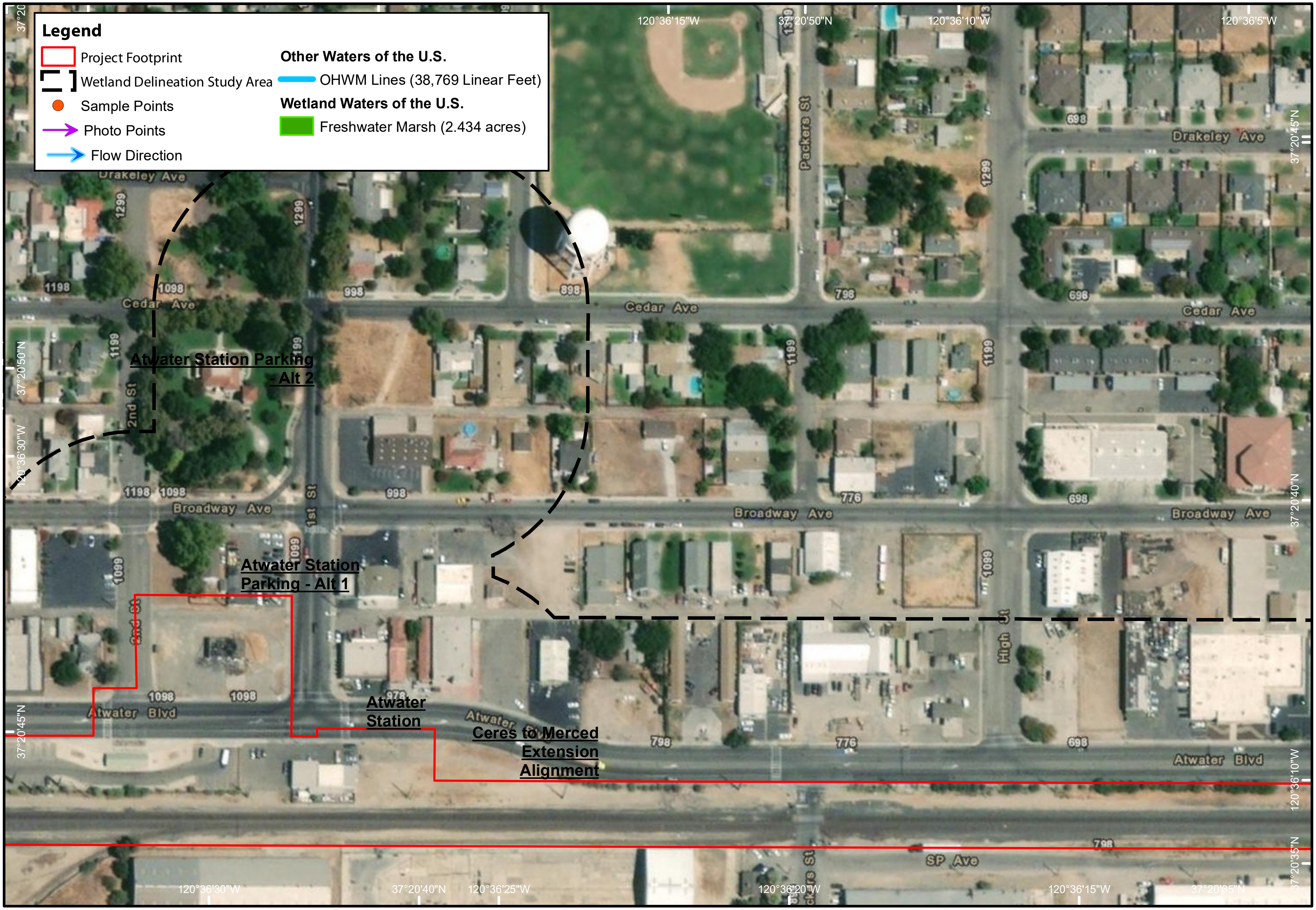


Figure 3-70
Wetland Delineation Detail
ACE Ceres-Merced Extension



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0 100 200
Feet

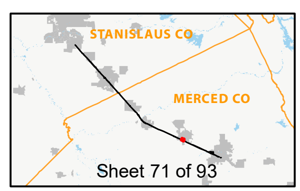

Figure 3-71
Wetland Delineation Detail
ACE Ceres-Merced Extension

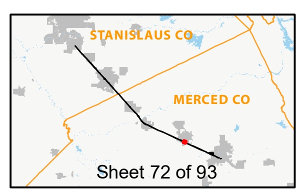

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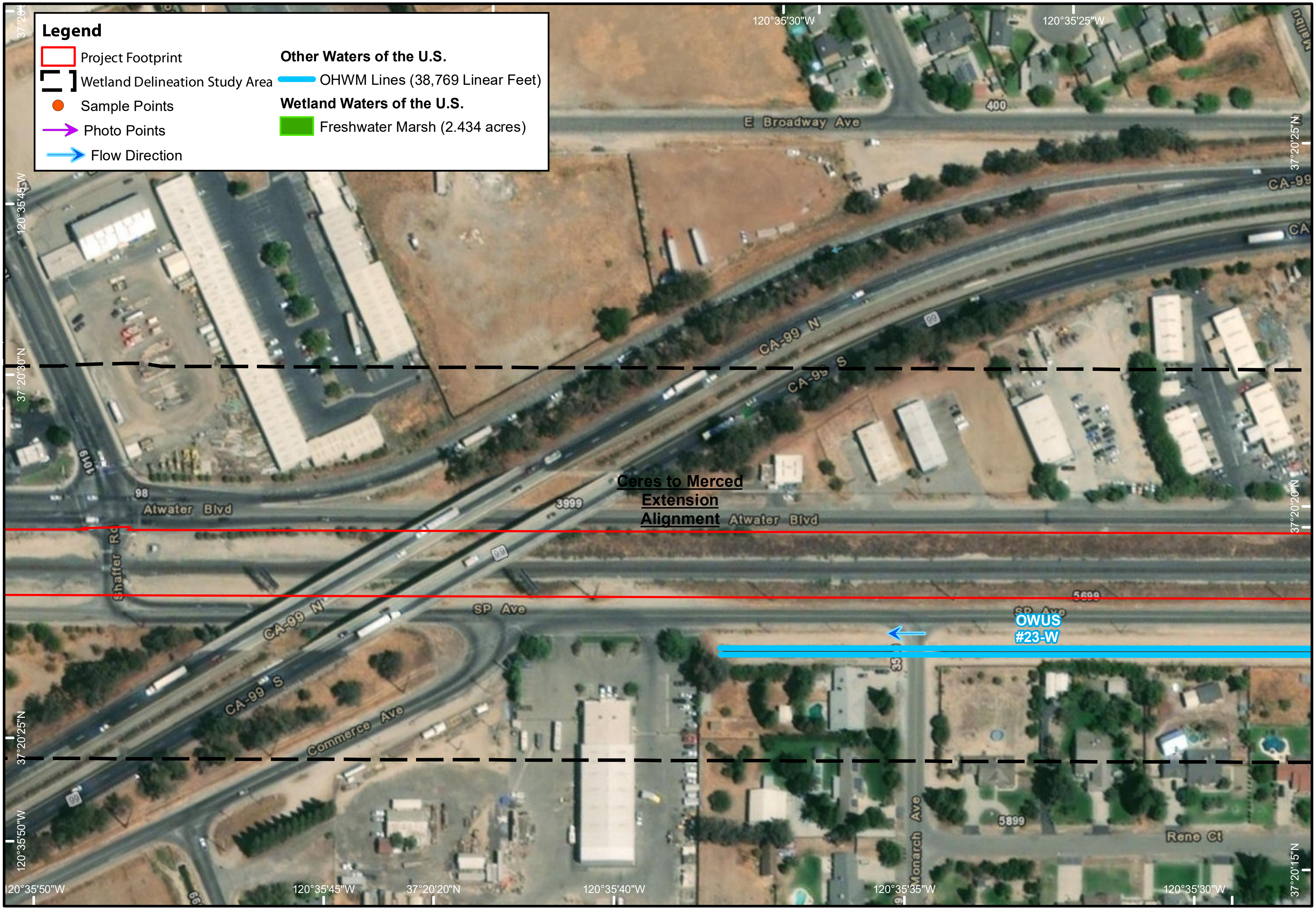
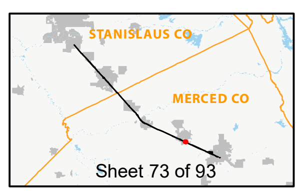
Figure 3-72
Wetland Delineation Detail
ACE Ceres-Merced Extension





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0 100 200
Feet

Figure 3-73
Wetland Delineation Detail
ACE Ceres-Merced Extension

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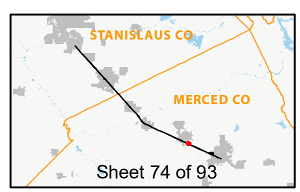

Figure 3-74
Wetland Delineation Detail
ACE Ceres-Merced Extension

Prepared By:
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Prepared For:
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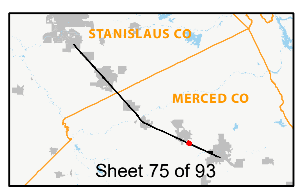
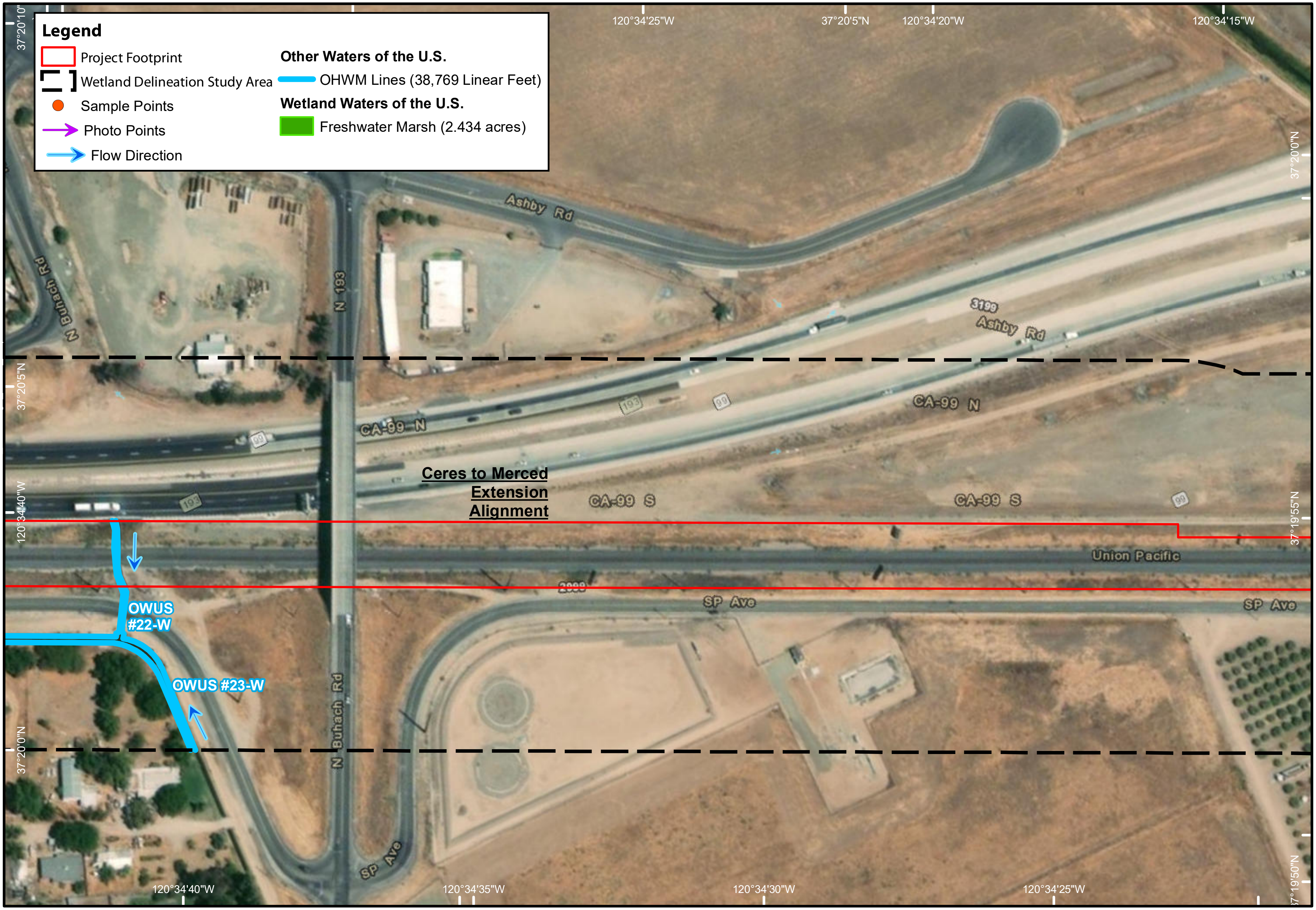
Rail Commission
949 East Channel Street
Stockton, CA 95202
Contact: Kevin Sheridan

Delineated By: Sierra Spooner,
5/29/20 and 6/5/2020
Drawn by Brad Stein,
10/21/2020 and 10/22/2020



0 100 200
Feet

Figure 3-75
Wetland Delineation Detail
ACE Ceres-Merced Extension



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Contact: Kevin Sheridan

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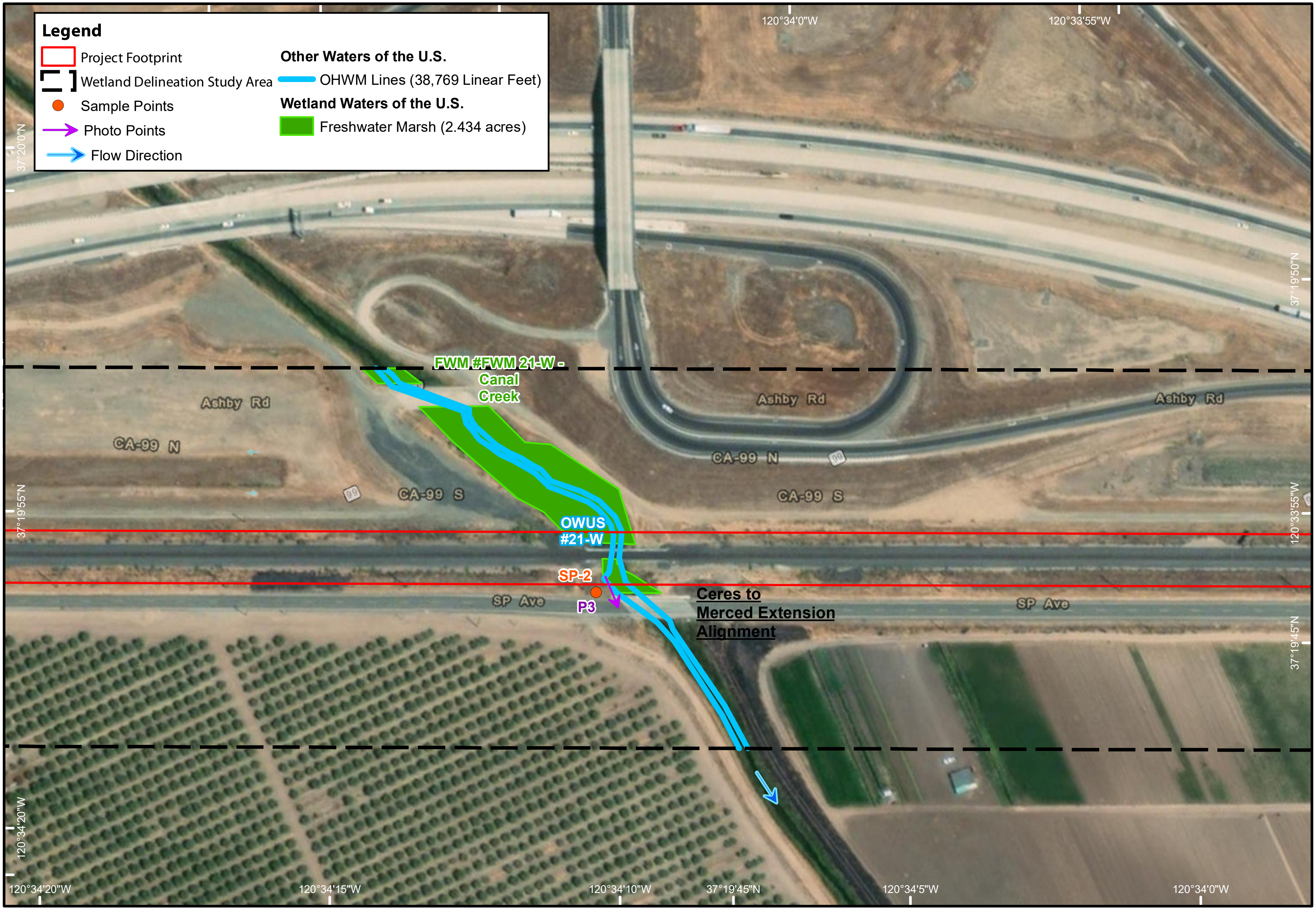
Figure 3-76
Wetland Delineation Detail
ACE Ceres-Merced Extension



ALTAMONT CORRIDOR EXPRESS

0 100 200
Feet

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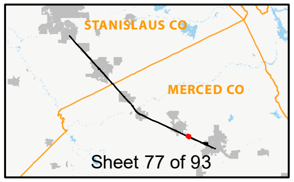
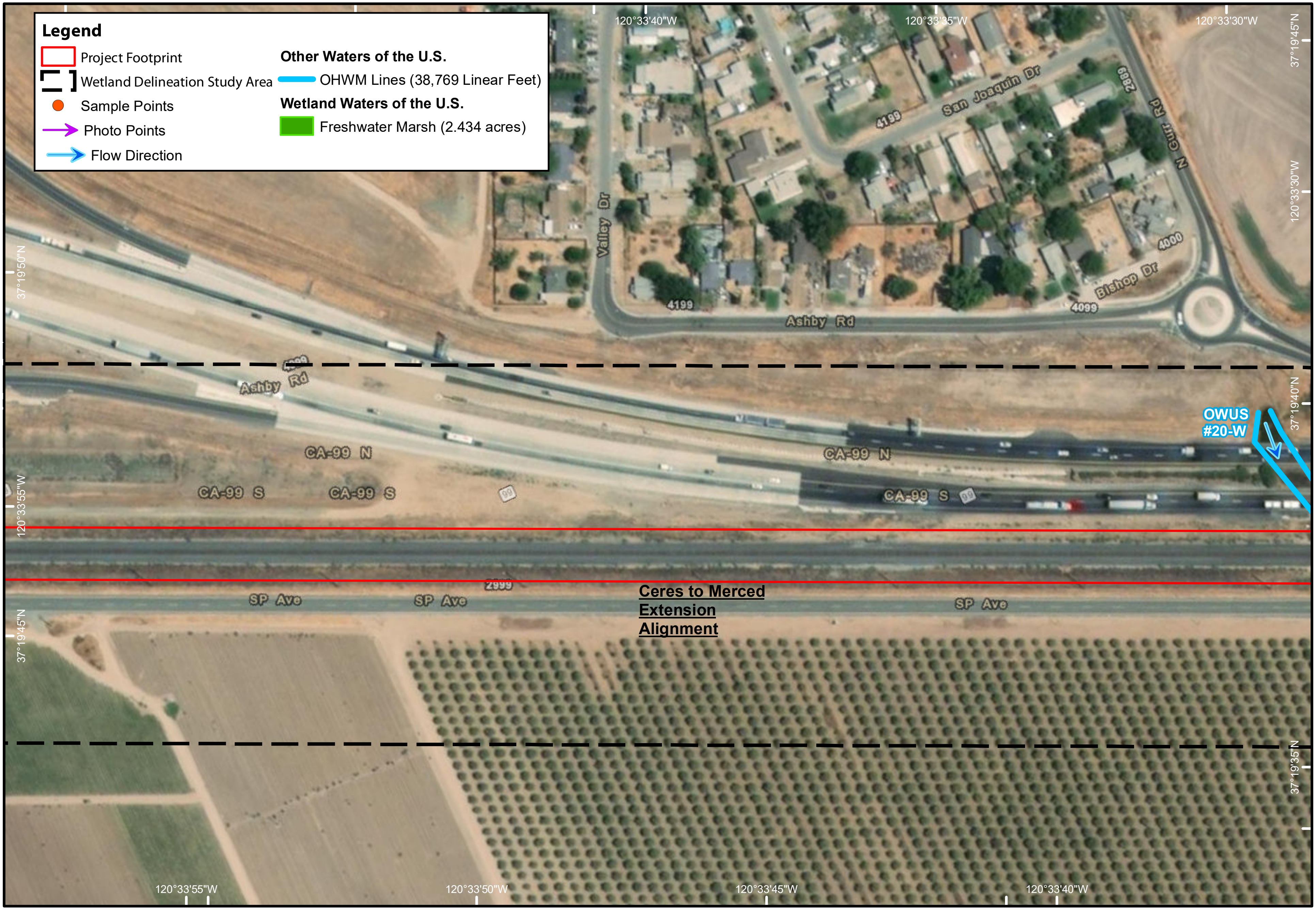


Figure 3-77
Wetland Delineation Detail
ACE Ceres-Merced Extension



ACE ALTAMONT CORRIDOR EXPRESS

N

0 100 200
Feet

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MERCED CO
Sheet 78 of 93

Figure 3-78
Wetland Delineation Detail
ACE Ceres-Merced Extension

ACE ALTAMONT CORRIDOR EXPRESS

0 100 200
Feet

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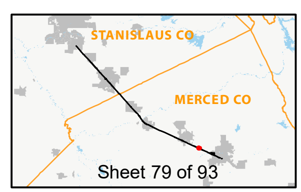

Figure 3-79
Wetland Delineation Detail
ACE Ceres-Merced Extension

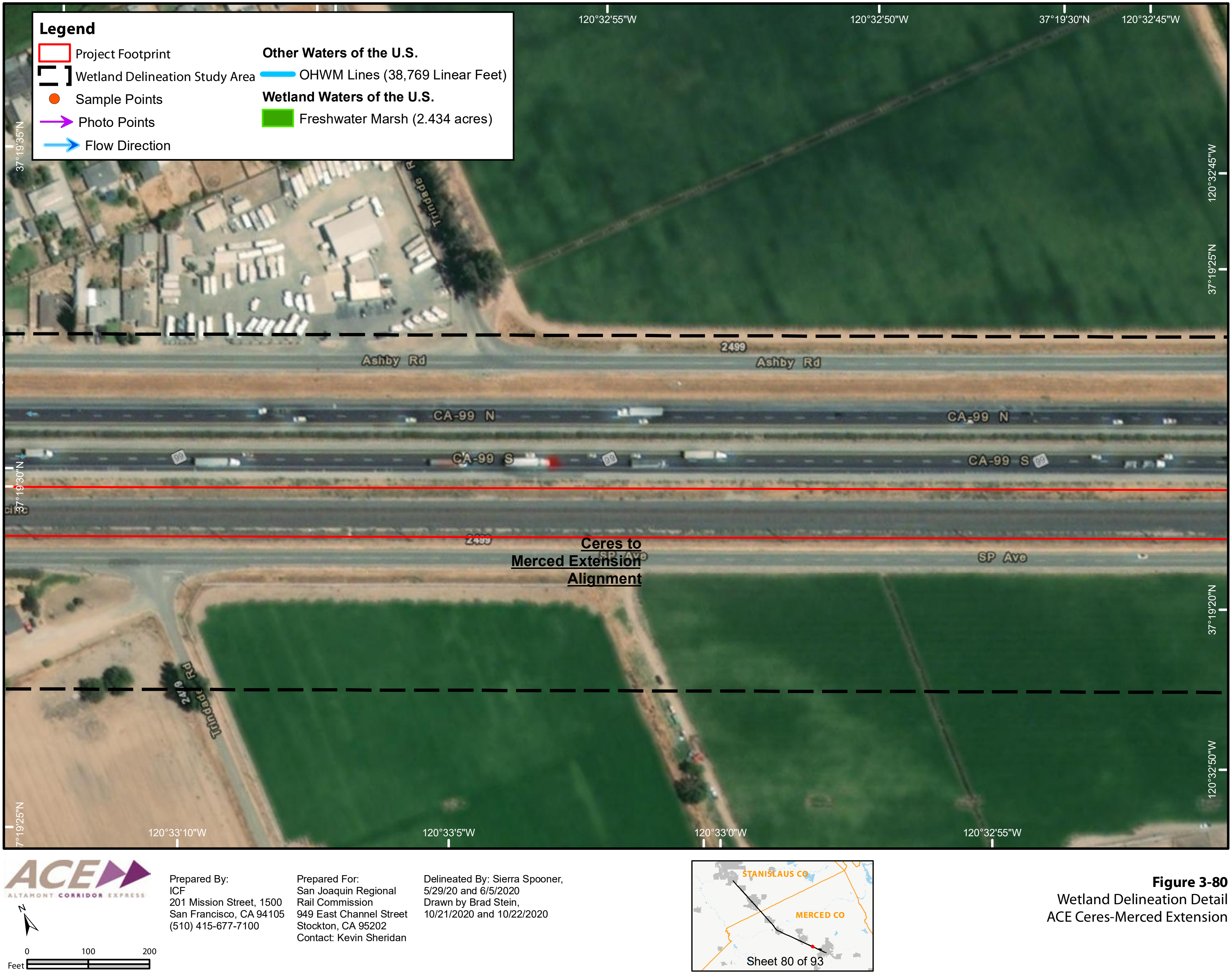

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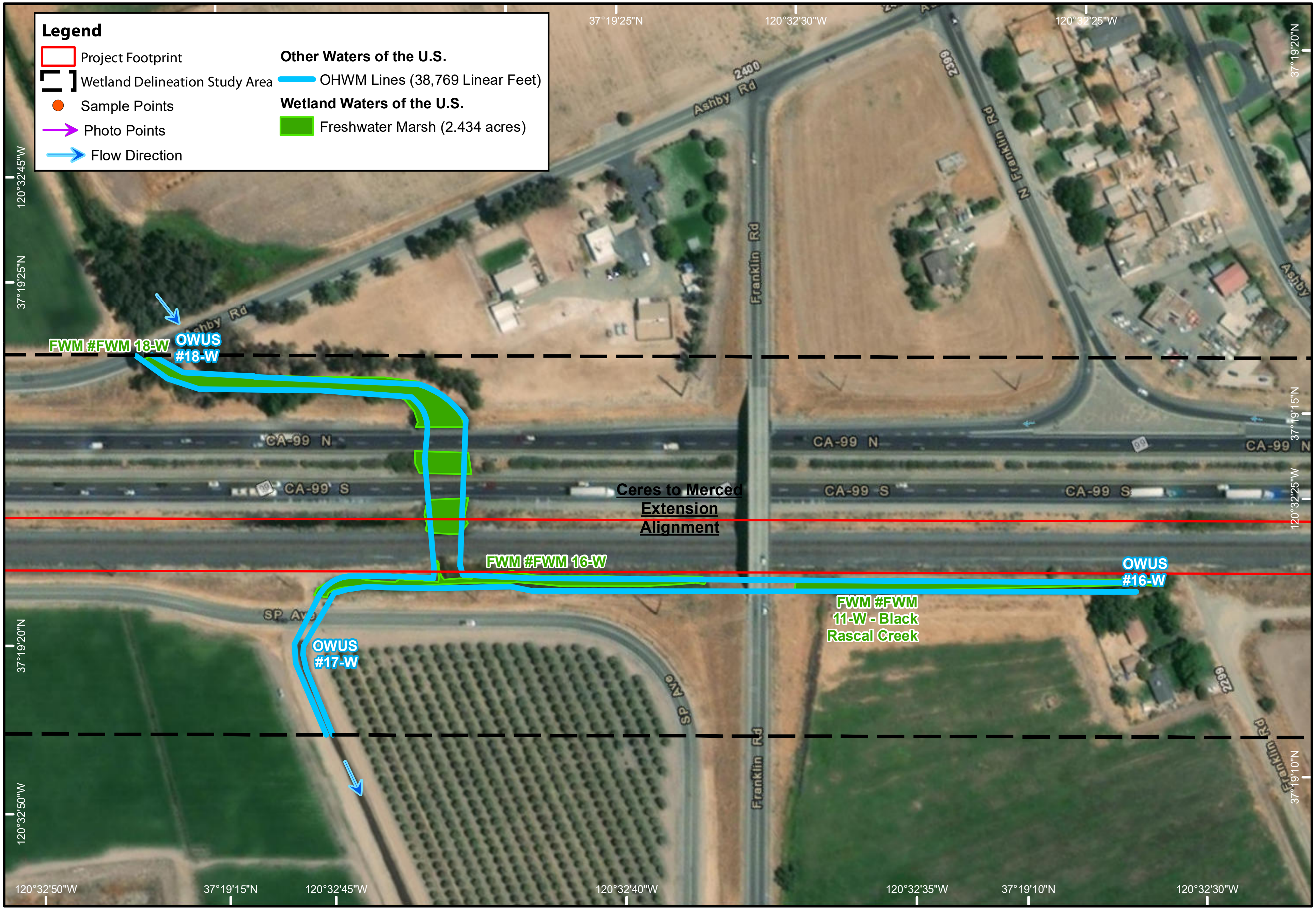
Figure 3-80
Wetland Delineation Detail
ACE Ceres-Merced Extension



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N

0 100 200
Feet

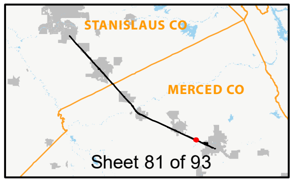

Figure 3-81
Wetland Delineation Detail
ACE Ceres-Merced Extension

ALTAMONT CORRIDOR EXPRESS

N

0 100 200
Feet

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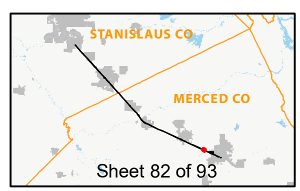

Figure 3-82
Wetland Delineation Detail
ACE Ceres-Merced Extension

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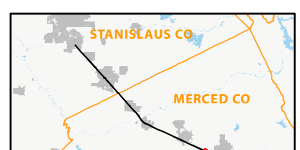
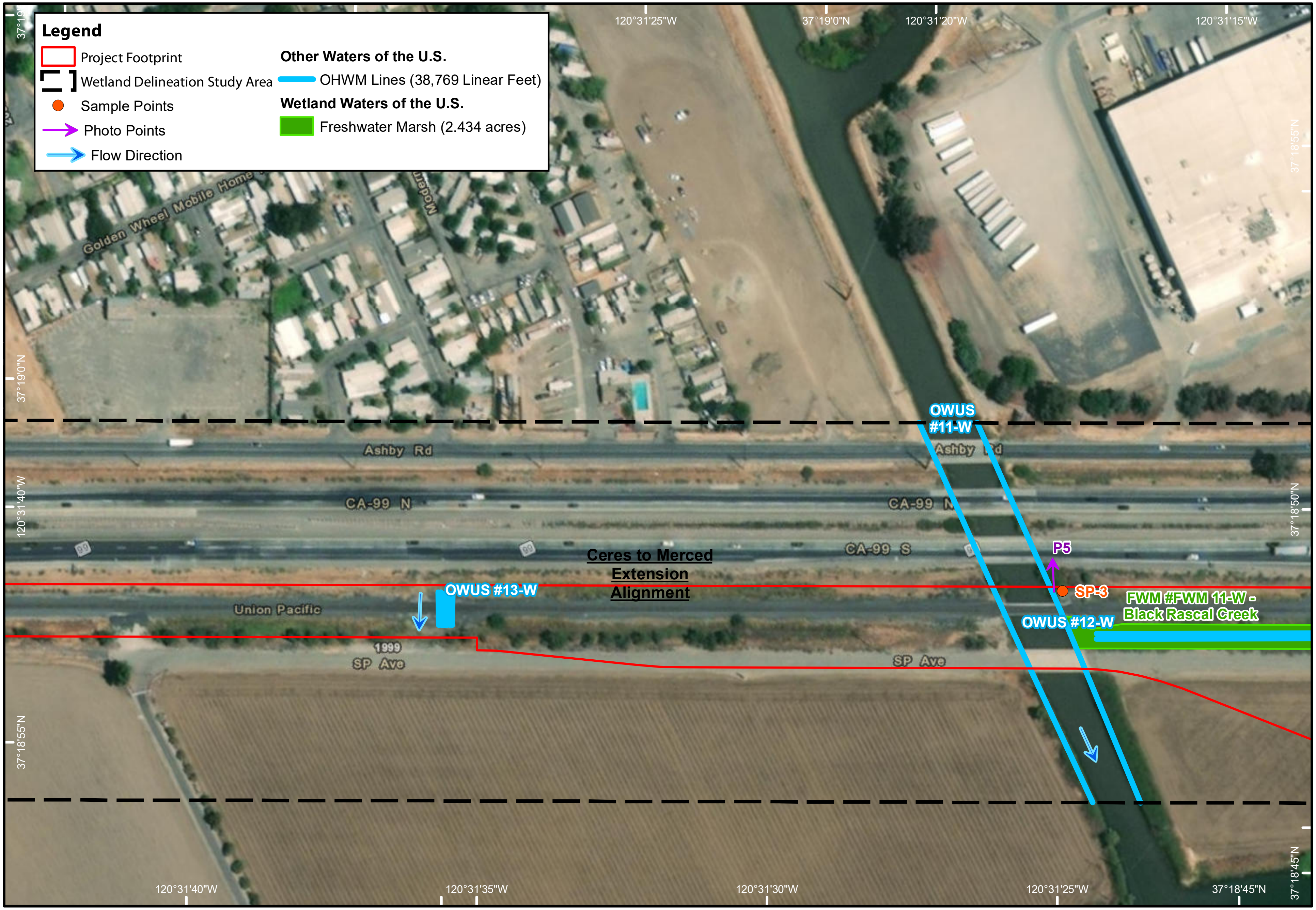


Sheet 83 of 93

N

0 100 200
Feet

Figure 3-83
Wetland Delineation Detail
ACE Ceres-Merced Extension



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N

0 100 200
Feet

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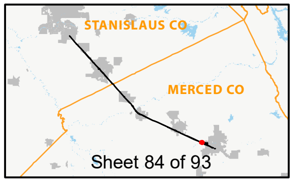
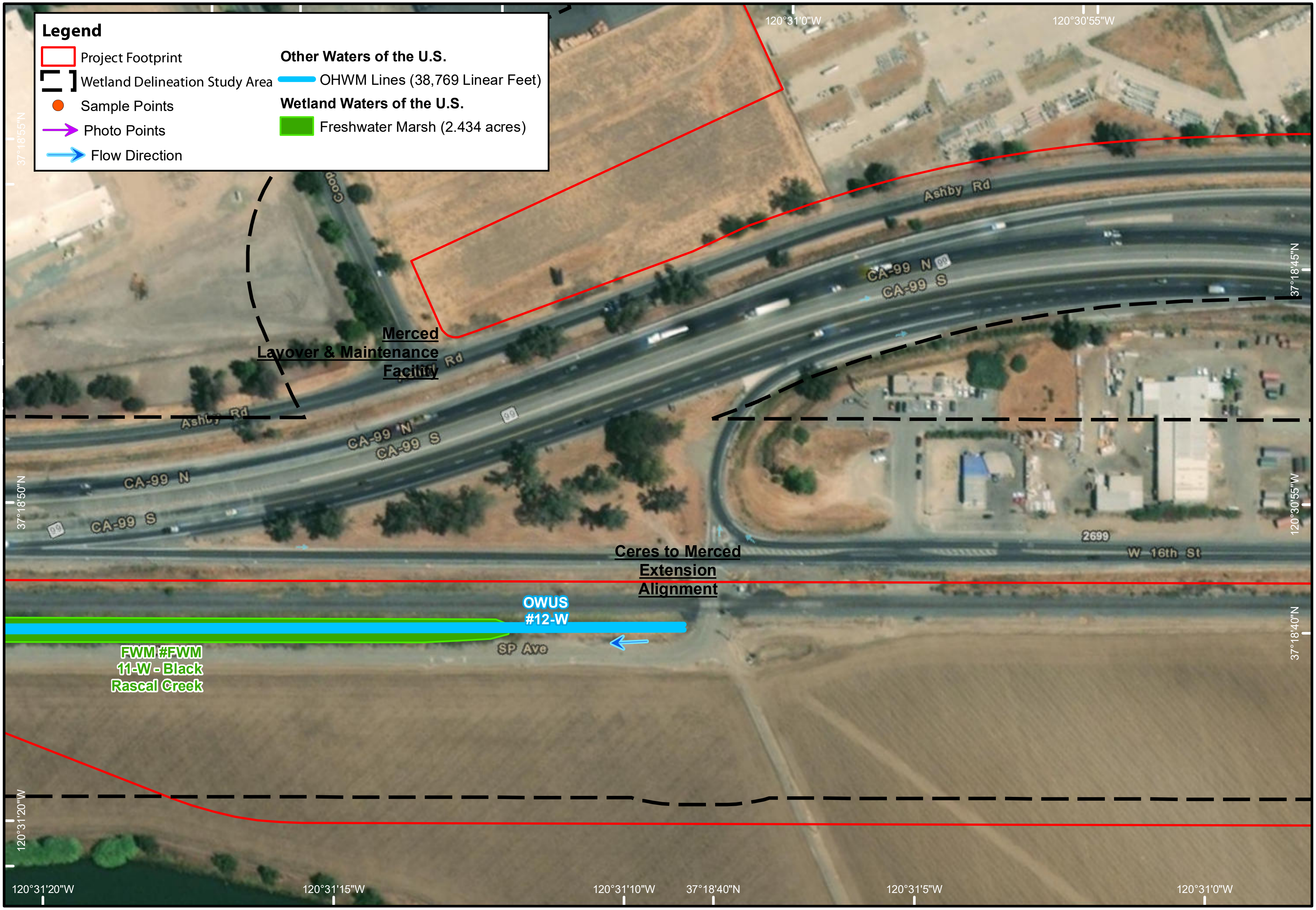


Figure 3-84
Wetland Delineation Detail
ACE Ceres-Merced Extension



ACE ALTAMONT CORRIDOR EXPRESS

N

0 100 200
Feet

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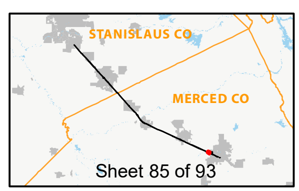

Figure 3-85
Wetland Delineation Detail
ACE Ceres-Merced Extension

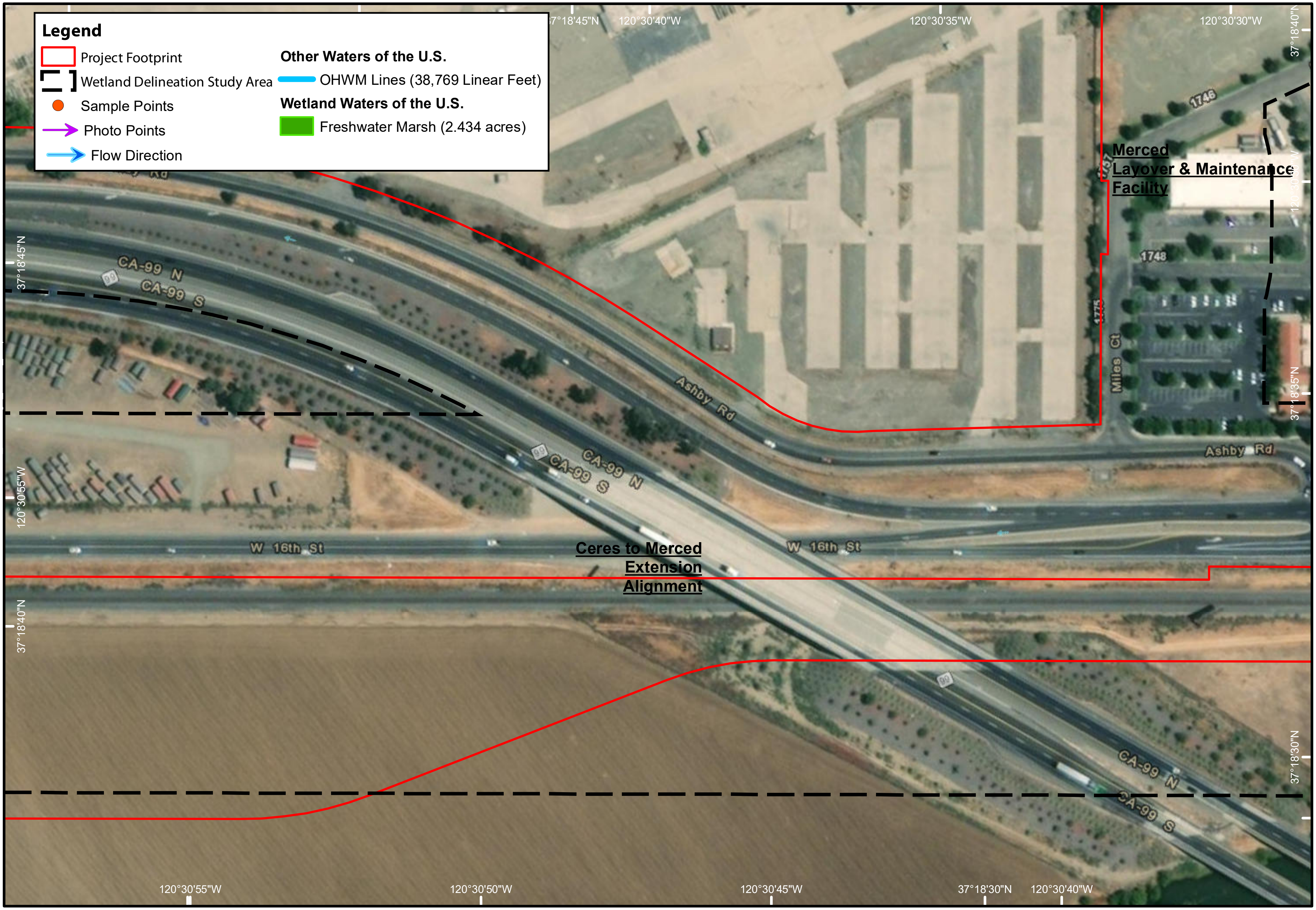

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Figure 3-86
Wetland Delineation Detail
ACE Ceres-Merced Extension

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Drawn by Brad Stein, 10/21/2020 and 10/22/2020

Figure 3-87
Wetland Delineation Detail
ACE Ceres-Merced Extension

ALTAMONT CORRIDOR EXPRESS

N

Feet 0 100 200

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5/29/20 and 6/5/2020
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10/21/2020 and 10/22/2020

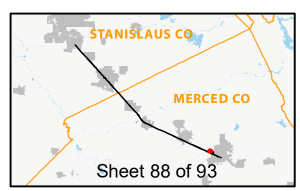

Figure 3-88
Wetland Delineation Detail
ACE Ceres-Merced Extension

ACE ALTAMONT CORRIDOR EXPRESS

N

0 100 200
Feet

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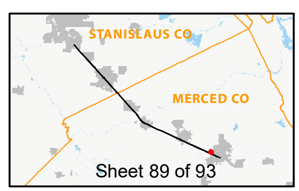

Figure 3-89
Wetland Delineation Detail
ACE Ceres-Merced Extension

ALTAMONT CORRIDOR EXPRESS

Feet 0 100 200

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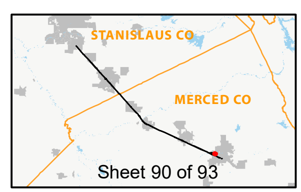

Figure 3-90
Wetland Delineation Detail
ACE Ceres-Merced Extension

ACE ALTAMONT CORRIDOR EXPRESS

0 100 200
Feet

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5/29/20 and 6/5/2020
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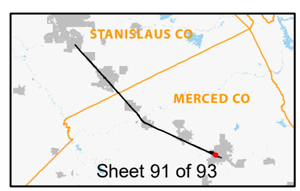

Figure 3-91
Wetland Delineation Detail
ACE Ceres-Merced Extension

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Drawn by Brad Stein,
10/21/2020 and 10/22/2020

0 100 200
Feet

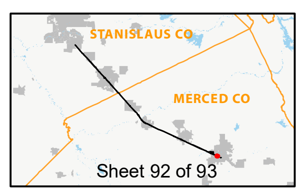

Figure 3-92
Wetland Delineation Detail
ACE Ceres-Merced Extension

ALTAMONT CORRIDOR EXPRESS

0 100 200
Feet

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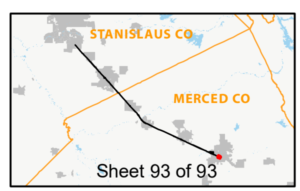


Figure 3-93
Wetland Delineation Detail
ACE Ceres-Merced Extension

Attachment A

Soil Map and WETS Table

Station Information

Station name:	MERCED MUNICIPAL AP
State:	CA
County:	(FIPS 06047)
Station ids:	23257 (WBAN)MCE (FAA)KMCE (ICAO)USW00023257 (GHCN)
Latitude:	37.2847 degrees
Longitude:	-120.5128 degrees
Elevation:	152 feet
Available date ranges:	Max Temperature 1998-08-01 - 2020-10-19 Min Temperature 1998-08-01 - 2020-10-19 Precipitation 1998-08-01 - 2020-10-19 Snowfall 2008-11-17 - 2020-10-19 Snow Depth 1998-08-14 - 2020-10-19

WETS Table

WETS Station: MERCED MUNICIPAL AP, CA								
Requested years: 1971 - 2020								
Month	Avg Max Temp	Avg Min Temp	Avg Mean Temp	Avg Precip	30% chance precip less than	30% chance precip more than	Avg number days precip 0.10 or more	Avg Snowfall
Jan	55.5	37.2	46.3	1.98	0.87	2.42	5	-
Feb	61.4	38.8	50.1	1.87	1.07	2.25	5	-
Mar	67.5	42.4	55.0	1.60	0.81	1.95	4	-
Apr	73.5	45.9	59.7	1.19	0.43	1.38	3	-
May	82.8	52.4	67.6	0.43	0.14	0.49	1	-
Jun	91.3	58.4	74.8	0.09	0.00	0.05	0	-
Jul	96.3	62.5	79.4	0.00	0.00	0.00	0	-
Aug	94.8	61.0	77.9	0.00	0.00	0.00	0	-
Sep	90.1	56.8	73.4	0.05	0.00	0.05	0	-
Oct	78.7	49.1	63.9	0.70	0.19	0.68	1	-
Nov	65.3	41.2	53.3	1.06	0.59	1.29	3	-
Dec	55.8	36.5	46.2	1.79	0.72	2.17	5	-
Annual:					8.82	12.48		
Average	76.1	48.5	62.3	-	-	-	-	-
Total	-	-	-	10.75			27	-

GROWING SEASON DATES			
Years with missing data:	24 deg = 28	28 deg = 29	32 deg = 29
Years with no occurrence:	24 deg = 21	28 deg = 0	32 deg = 0
Data years used:	24 deg = 22	28 deg = 21	32 deg = 21
Probability	24 F or higher	28 F or higher	32 F or higher
50 percent *	No occurrence	1/24 to 12/13: 323 days	2/24 to 11/26: 275 days
70 percent *	No occurrence	1/17 to 12/21: 338 days	2/16 to 12/4: 291 days
* Percent chance of the growing season occurring between the Beginning and Ending dates.			

STATS TABLE - total precipitation (inches)													
Yr	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annl
1998								0.00	0.02	0.76	1.11	0.69	2.58
1999	2.00	2.59	1.13	1.18	0.19	T	0.00	M0.00	T	0.01	0.99	0.27	8.36
2000	3.02	4.95	0.95	2.06	0.79	M0.18	M0.00	T	M0.10	3.53	0.15	0.16	15.89
2001	3.26	2.19	1.40	1.70	0.00	T	MT	MT	M0.14	0.44	0.94	2.60	12.67
2002	1.05	0.89	1.48	0.15	0.47	T	0.00	0.00	T	0.00	1.88	3.72	9.64
2003	0.80	1.04	0.92	1.28	0.94	0.00	T	T	0.02	T	0.84	3.09	8.93
2004	0.93	3.78	M0.78	T	0.19	0.00	0.00	0.00	0.12	2.94	1.24	3.22	13.20
2005	4.19	2.54	2.93	1.18	1.11	0.02	0.00	T	0.22	0.12	0.15	0.55	13.01

2006	M0.99	1.03	3.37	2.47	1.07	T	T	T	0.00	0.23	0.74	1.79	11.69
2007	0.48	1.93	0.31	0.75	0.01	0.00	0.01	0.00	0.25	0.77	0.26	1.23	6.00
2008	3.92	1.90	0.06	0.01	0.07	0.00	0.00	0.00	T	0.12	0.87	1.31	8.26
2009	1.88	2.17	1.02	0.45	0.46	0.13	T	0.00	0.17	1.71	0.17	2.77	10.93
2010	2.78	2.94	1.09	3.36	0.46	T	T	0.00	0.00	0.83	2.05	3.41	16.92
2011	1.71	1.94	4.14	0.20	0.77	1.16	0.00	0.00	T	0.95	0.88	0.06	11.81
2012	0.73	M0.69	2.02	1.69	0.01	0.37	0.02	T	0.02	0.23	1.60	2.96	10.34
2013	1.04	0.38	0.74	0.43	0.10	0.09	T	T	T	0.10	0.62	0.29	3.79
2014	0.31	1.65	1.41	0.53	0.06	T	T	T	T	0.66	0.70	3.39	8.71
2015	0.02	1.05	0.19	1.09	0.74	0.00	T	T	T	0.38	1.72	1.62	6.81
2016	4.49	0.40	2.39	3.59	0.11	0.00	0.00	0.00	0.00	1.43	0.89	1.91	15.21
2017	5.61	3.51	1.29	1.15	0.19	0.05	0.00	0.00	0.02	0.15	0.88	0.08	12.93
2018	1.31	0.29	3.08	M1.25	0.15	0.00	0.00	0.00	0.00	T	M2.36	1.51	9.95
2019	2.34	3.33	2.28	0.05	1.40	0.00	0.00	0.00	T	0.00	M2.18	2.78	14.36
2020	0.73	T	2.11	1.54	0.20	0.00	0.00	0.00	0.00	M0.00			4.58
Notes: Data missing in any month have an "M" flag. A "T" indicates a trace of precipitation.													
Data missing for all days in a month or year is blank.													
Creation date: 2016-07-22													

Station Information

Station name:	TURLOCK #2
State:	CA
County:	(FIPS 06099)
Climate Division:	(CA05)
Station ids:	049073 (Coop)USC00049073 (GHCN)TURC1 (NWS LI)
Latitude:	37.5019 degrees
Longitude:	-120.8457 degrees
Elevation:	103 feet
Available date ranges:	Max Temperature 1894-01-01 - 2020-09-30 Min Temperature 1894-01-01 - 2020-09-30 Precipitation 1893-01-01 - 2020-09-30 Snowfall 1894-09-01 - 2020-09-30 Snow Depth 1893-01-15 - 2020-09-30

WETS Table

WETS Station: TURLOCK #2, CA

Requested years: 1971 - 2020

Month	Avg Max Temp	Avg Min Temp	Avg Mean Temp	Avg Precip	30% chance precip less than	30% chance precip more than	Avg number days precip 0.10 or more	Avg Snowfall
Jan	55.2	40.1	47.6	2.30	0.98	2.80	5	0.0
Feb	61.6	43.4	52.5	2.15	1.06	2.60	5	0.0
Mar	67.4	46.6	57.0	2.02	0.88	2.46	5	0.0
Apr	73.0	50.0	61.5	0.94	0.35	1.11	3	0.0
May	80.6	55.2	67.9	0.46	0.10	0.39	1	0.0
Jun	88.3	60.2	74.3	0.09	0.00	0.05	0	0.0
Jul	93.6	63.7	78.6	0.02	0.00	0.00	0	0.0
Aug	92.3	62.7	77.5	0.02	0.00	0.00	0	0.0
Sep	87.7	59.8	73.7	0.18	0.00	0.05	0	0.0
Oct	77.8	53.4	65.6	0.67	0.22	0.72	1	0.0
Nov	64.6	44.9	54.7	1.30	0.61	1.55	3	0.0
Dec	54.6	39.3	47.0	2.00	0.98	2.42	5	0.0
Annual:					9.58	14.24		
Average	74.7	51.6	63.2	-	-	-	-	-
Total	-	-	-	12.15			30	0.0

GROWING SEASON DATES

Years with missing data:	24 deg = 25	28 deg = 29	32 deg = 25
Years with no occurrence:	24 deg = 25	28 deg = 18	32 deg = 5
Data years used:	24 deg = 25	28 deg = 21	32 deg = 25
Probability	24 F or higher	28 F or higher	32 F or higher
50 percent *	No occurrence	No occurrence	1/19 to 12/17: 332 days
70 percent *	No occurrence	No occurrence	1/5 to 12/31: 360 days

* Percent chance of the growing season occurring between the Beginning and Ending dates.

STATS TABLE - total precipitation (inches)

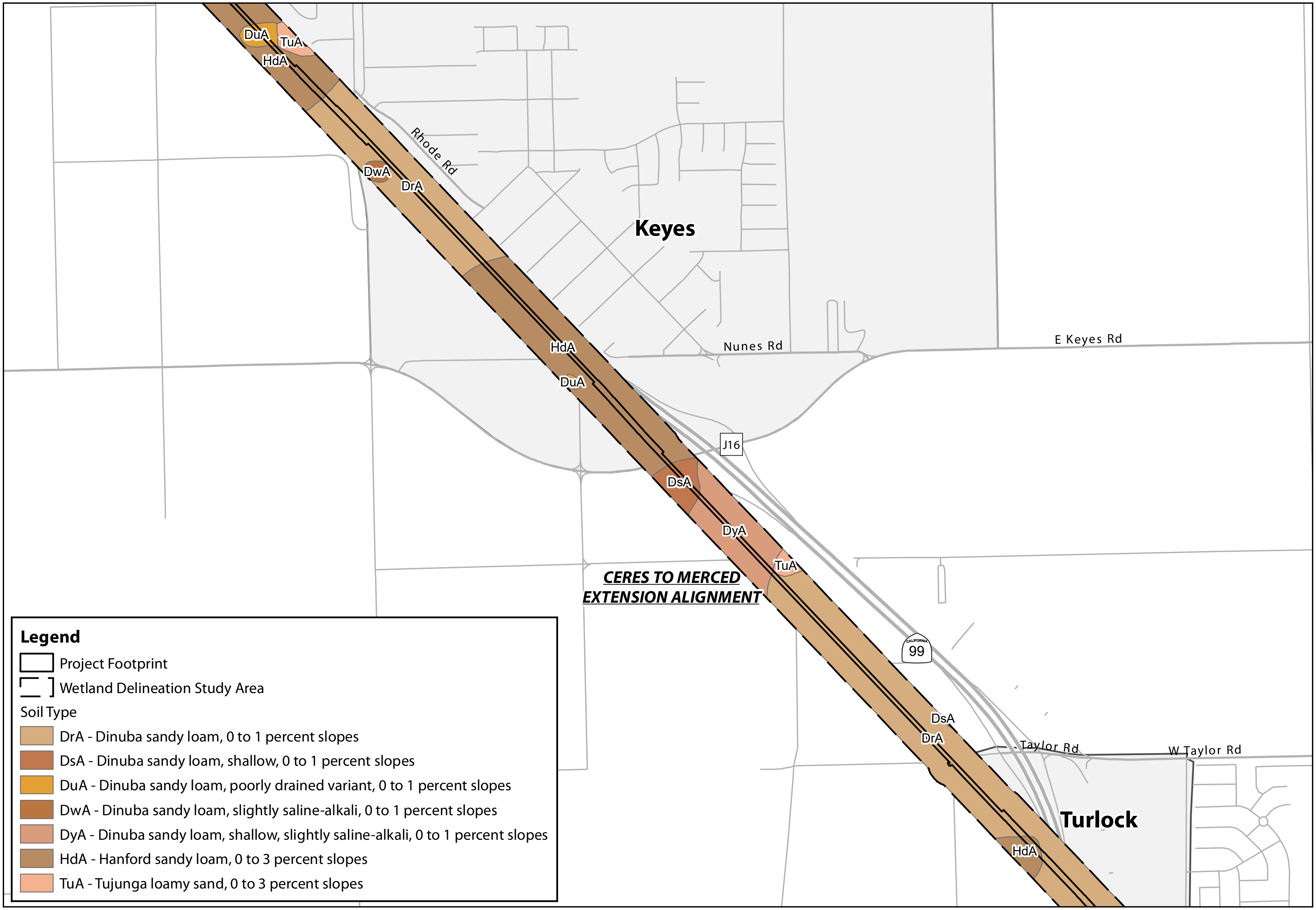
Yr	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annl
1893	1.52	1.89	2.73	0.25	0.20	0.00	0.00	0.00	M0.17	T	0.80	1.36	8.92
1894	2.82	2.17	0.20	0.16	1.70	1.15	MT	0.04	0.89	0.63	0.36	5.38	15.50
1895	3.66	1.25	2.11	1.07	0.39	0.00	T		0.13	0.21	0.82	0.84	10.48
1896	3.96	0.08	1.42	2.40	0.72	0.00	0.06	T	T	1.68	1.92	1.41	13.65
1897	1.93	2.07	1.93	0.06	0.00	0.09		T	T				6.08
1898	0.56	0.69		0.08	0.94	0.00	0.00	0.00	0.66	0.51	0.16	1.20	4.80
1899													
1900													
1901													
1902													

1903													
1904													
1905													
1906			6.14	1.33	1.03	M0.12			MT		M0.49	5.85	14.96
1907	M3.15	M1.76	M3.92	MT	0.35	0.66						2.57	12.41
1908	2.82			0.10	M0.10				0.23	0.15	1.18	0.67	5.25
1909	M4.84	M2.56	1.08										8.48
1910	3.39		2.72						M0.18		0.37		6.66
1911													
1912						M0.21							0.21
1913					M1.10							1.98	3.08
1914													
1915	M1.14	M0.91	M0.66	M0.35	M0.78				MT			M1.90	5.74
1916	M1.02	M0.82	M1.76	M0.27	MT				M0.39	M0.70	M0.50	M0.71	6.17
1917	M0.74	M0.72	M0.56		MT				MT				2.02
1918		M3.75											3.75
1919													
1920											2.23	3.53	5.76
1921	4.03	0.85	1.69	0.24	0.91				0.19	0.07	0.95	4.75	13.68
1922	M2.58	3.85	2.42	0.35	0.54	0.01	MT			0.54	2.48	5.02	17.79
1923	2.00	0.87	0.10	3.26	0.51	MT			0.51	0.37	0.57	0.70	8.89
1924	1.65	0.33	1.60	0.20			MT		0.00	1.20	1.02	2.79	8.79
1925	1.18	2.03	1.01	2.81	1.67	T	T			0.08	0.70	1.67	11.15
1926	1.23	2.26	0.42	3.14	0.01		0.00	0.00		0.15	2.68	0.76	10.65
1927	2.15	3.89	1.26	0.81	0.25	0.17	0.00	0.00	T	1.92	1.24	1.88	13.57
1928	0.55	2.42	1.97	1.02	T	0.00	0.00	0.00	0.00	0.00	2.64	1.99	10.59
1929	1.28	1.04	0.59	0.96	0.14	0.93	0.00	0.00	0.00	0.12	0.00	0.96	6.02
1930	2.77	1.42	2.71	1.17	0.50	0.00	0.00	0.00	0.03	0.59	1.06	0.00	10.25
1931	3.37	1.32	0.50	0.27	1.09	0.12	0.00	0.00	0.00	0.02	1.62	5.79	14.10
1932	1.10	3.01	0.32	0.41	1.24	0.00	0.00	0.00	0.00	0.00	0.13	1.74	7.95
1933	3.26	0.49	0.81	0.10	0.74	0.00	0.00	0.00	0.00	0.37	0.00	3.78	9.55
1934	1.05	2.99	0.00	0.00	0.49	0.36	0.00	0.00	0.03	0.49	2.04	2.39	9.84
1935	3.03	0.61	3.50	3.11	0.00	0.00	0.00	0.00	0.00	1.23	1.21	1.42	14.11
1936	1.84	4.64	1.30	0.94	0.66	0.08	0.00	0.00	0.00	1.02	0.00	2.53	13.01
1937	2.56	2.55	4.05	1.27	0.00	0.00	0.00	0.00	0.00	0.24	0.84	2.64	14.15
1938	2.63	5.56	6.07	1.60	0.18	0.00	0.01	0.00	0.21	1.22	0.07	1.95	19.50
1939	2.14	1.77	1.72	0.33	0.32	0.00	0.00	0.00	1.40	0.21	0.10	0.79	8.78
1940	4.30	4.03	2.47	0.87	0.01	0.00	0.00	0.00	0.00	0.36	0.00	5.18	17.22

1941	2.84	3.91	3.01	2.65	0.00	0.00	0.00	0.00	0.00	0.73	1.06	2.97	17.17
1942	1.77	2.09	1.12	2.86	0.96	0.00	0.00	0.00	0.00	0.26	1.27	1.00	11.33
1943	2.68	0.85	4.11	1.17	0.00	0.00	0.00	0.00	0.00	0.30	0.26	0.80	10.17
1944	2.23	3.59	0.40	1.46	0.44	0.10	0.00	0.00	0.06	M0.85	2.35	1.45	12.93
1945	0.15	2.54	1.54	0.24	0.31	0.00	0.00	0.00	0.06	2.68	1.75	2.95	12.22
1946	0.67	1.59	0.59	0.59	1.09	0.00	0.01	0.00	0.00	0.70	2.16	1.68	9.08
1947	0.49	0.67	1.02	0.32	0.11	0.17	0.00	0.00	0.02	0.76	1.16	1.46	6.18
1948	0.46	1.02	4.02	2.40	1.31	0.00	0.00	0.00	T	0.51	0.05	1.90	11.67
1949	1.20	1.04	3.61	0.00	0.38	0.00	T	T	0.00	MT	0.58	1.55	8.36
1950	3.29	0.87	M1.76	M0.91	0.06	0.00	0.07	0.00	0.23	1.41	2.08	3.37	14.05
1951	1.97	1.77	0.92	0.94	0.14	0.00	0.00	0.00	T	M0.66	1.75	3.98	12.13
1952	3.61	0.68	3.28	2.11	0.10	0.01	0.05	0.00	0.47	T	M1.64	3.60	15.55
1953	0.81	0.00	0.50	1.55	0.13	0.27	0.00	0.00	0.00	0.21	1.16	0.69	5.32
1954	1.62	M0.90	3.06	0.91	0.26	0.27	0.00	0.00	0.00	M0.00	1.14	2.22	10.38
1955	3.98	0.96	0.32	1.11	0.63	M0.00	0.00	0.00	0.17	0.03	1.03	M5.73	13.96
1956	4.15	0.66	0.02	1.69	0.46	0.00	0.00	0.00	0.10	0.67	0.00	0.45	8.20
1957	2.60	1.87	M1.54	0.95	1.25	0.05	MT	0.00	0.14	0.61	0.37	M1.59	10.97
1958	3.07	4.34	5.68	3.48	0.62	T	0.02	0.00	0.10	0.01	0.08	0.34	17.74
1959	3.09	3.93	0.22	0.88	0.02	0.00	T	0.04	1.38	0.00	0.00	0.48	10.04
1960	1.94	2.38	0.39	1.06	T	0.00	0.00	0.00	0.01	T	2.30	0.53	8.61
1961	2.26	M0.81	0.98	0.39	0.48	T	M0.01	0.05	T	0.01	2.14	0.76	7.89
1962	0.93	5.34	0.91	0.01	T	T	0.00	0.00	T	0.20	0.27	1.49	9.15
1963	1.35	3.69	2.25	3.27	0.32	0.02	0.00	T	0.23	1.45	1.81	0.08	14.47
1964	1.91	0.07	1.13	0.86	0.34	0.32	T	T	0.17	1.55	1.95	2.64	10.94
1965	1.75	0.64	1.14	1.98	T	0.00	T	0.52	T	0.09	4.87	2.67	13.66
1966	1.57	0.94	0.35	0.46	0.28	T	0.09	0.00	0.01	0.00	1.73	2.20	7.63
1967	3.67	0.26	1.87	3.94	0.20	0.30	0.00	0.00	T	0.15	0.85	0.83	12.07
1968	1.56	1.28	1.94	0.65	0.03	0.00	0.00	0.02	0.00	0.83		2.93	9.24
1969	5.96	5.55	0.74	1.33	0.00	T	T	0.00	0.51	0.78	1.22	1.22	17.31
1970	3.20	0.76	1.59	0.23	T	0.07	0.00	0.00	T	0.36	4.87	2.49	13.57
1971	0.63	0.24	1.32	0.89	0.56	0.00	0.00	T	0.01	0.31	1.44	3.26	8.66
1972	0.41	0.39	0.01	0.68	T	T	0.00	0.00	T	0.53	3.97	1.31	7.30
1973	3.20	5.28		0.12	T	0.03	0.00	0.00	T	2.22	1.18	3.22	15.25
1974	1.49	0.40	2.23	1.10	0.00	0.15	0.60	0.00	0.00	1.01	0.68	2.34	10.00

1975	0.56	2.67	3.28	1.04	0.00	0.00	T	0.55	0.01	1.16	0.28	0.10	9.65
1976	0.15	1.07	1.01	0.65	T	0.03	T	0.35	0.49	0.07	0.84	0.87	5.53
1977	0.85	0.41	0.92	0.03	1.29	0.06	0.00	0.00	0.04	0.10	0.52	1.87	6.09
1978	4.39	3.09	4.35	3.96	0.00	0.00	T	0.00	0.69	0.00	2.27	0.66	19.41
1979	3.37	3.51	1.75	0.36	0.08	T	0.09	T	T	0.96	1.09	2.13	13.34
1980	3.45	3.94	1.10	0.53	0.62	T	0.05	0.00	0.00	0.06	T	1.08	10.83
1981	4.31	0.73	3.51	0.58	0.02		T	0.00	T	1.14	3.74	0.90	14.93
1982	1.95	1.80	3.89	2.54	M0.02	0.11	T	0.00	1.20	1.11	2.73	1.67	17.02
1983	4.82	3.36	5.03	2.44	0.24	0.00	0.00	T	2.68	0.53	4.03	3.48	26.61
1984	0.18	1.12	0.65	0.24	T	0.04	T	0.00	0.00	1.13	2.78	1.71	7.85
1985	0.42	0.54	1.54	0.19	0.00	0.14	T	T	0.23	0.76	2.81	1.29	7.92
1986	1.27	3.10	3.14	0.56	0.01	0.00	T	T	1.02	0.01	0.03	0.68	9.82
1987	1.68	2.07	3.71	0.10	T	0.00	0.00	0.00	0.00	1.31	1.13	2.35	12.35
1988	1.95	0.56	0.08	2.06	0.24	0.05	0.00	0.00	0.00	0.00	1.65	2.27	8.86
1989	0.48	1.13	1.50	0.03	0.00	0.00	0.00	T	1.64	1.04	0.70	0.00	6.52
1990	2.19	1.64	1.20	0.29	1.99	0.00	0.00	0.00	T	0.11	0.22	0.70	8.34
1991	0.17	2.06	4.59	0.48	0.03	0.31	0.00	0.01	T	1.16	0.26	1.21	10.28
1992	1.12	5.56	1.97	0.02	0.00	0.08	0.05	T	0.00	0.54	0.10	2.87	12.31
1993	5.33	3.32	2.72	0.20	0.97	0.29	0.00	0.00	0.00	0.37	0.83	1.10	15.13
1994	2.15	2.11	0.39	1.28	1.15	0.00	T	0.00	0.01	0.16	1.56	0.88	9.69
1995	7.22	0.65	6.46	1.32	1.52	0.16	0.00	0.00	0.00	0.00	0.00	4.03	21.36
1996	3.15	3.54	1.06	0.99	1.69	0.02	0.00	T	T	1.65	1.88	4.87	18.85
1997	5.68	0.18	0.09	0.30	0.04	0.09	0.00	0.00	0.01	0.08	2.78	1.91	11.16
1998	4.03	8.47	2.07	1.33	2.65	0.20	0.00	0.00	0.01	1.12	1.26	0.85	21.99
1999	2.54	2.39	1.07	0.74	0.20	0.00	0.00	0.00	0.00	0.00	0.94	0.21	8.09
2000	3.30	4.88	0.72	1.52	0.72	0.09	0.00	0.21	0.01	2.23	0.24	0.36	14.28
2001	3.95	2.58	2.00	1.43	0.00	0.01	0.07	0.00	0.23	0.09	1.87	3.92	16.15
2002	1.57	0.81	1.32	0.03	0.08	0.00	0.00	0.00	0.00	0.00	2.24	3.61	9.66
2003	0.71	0.70	1.39	1.19	0.34	0.00	0.00	0.04	0.00	0.08	0.63	3.05	8.13
2004	1.06	3.18	0.30	0.06	0.17	0.00	0.00	0.00	0.00	1.53	1.08	3.43	10.81
2005		2.66		1.01	0.96	0.08	0.00	0.01	0.20	0.09	0.35	2.59	7.95
2006	2.64	0.68	3.88	1.78	0.97	0.00	0.00	0.00	0.00	0.17	0.79	2.43	13.34
2007	0.36	1.64	0.70	0.57	0.16	0.00	0.00		0.15	0.73	0.37	1.20	5.88
2008	0.41	1.77		0.00	0.02	0.00	0.00	0.00	0.00	0.41	0.59	1.44	4.64

Appendix A--1
Soil Types
ACE Ceres-Merced Extension



ACE ALTAMONT CORRIDOR EXPRESS

N

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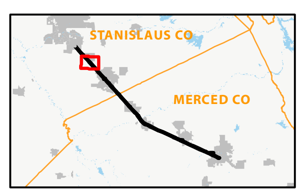
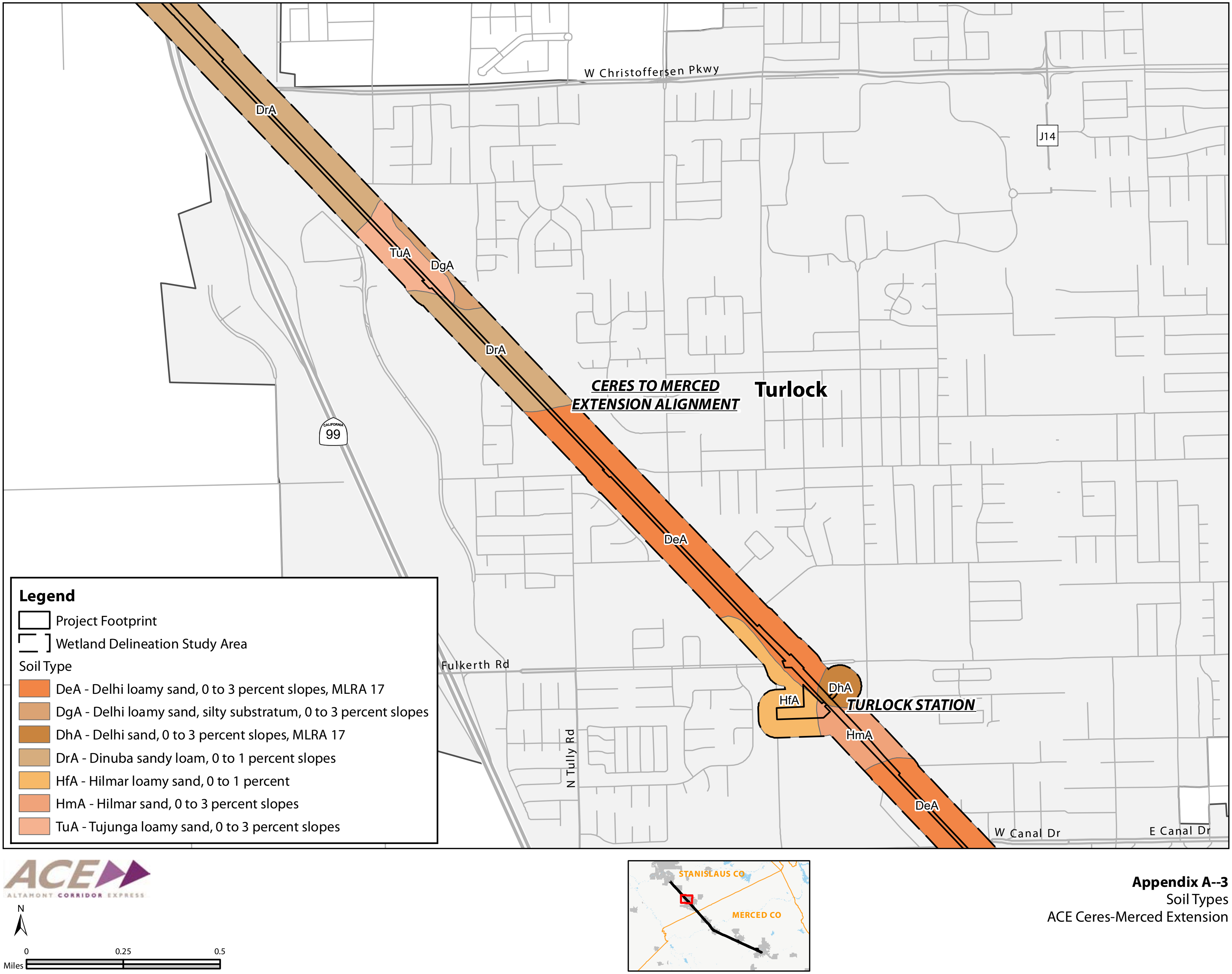
Miles

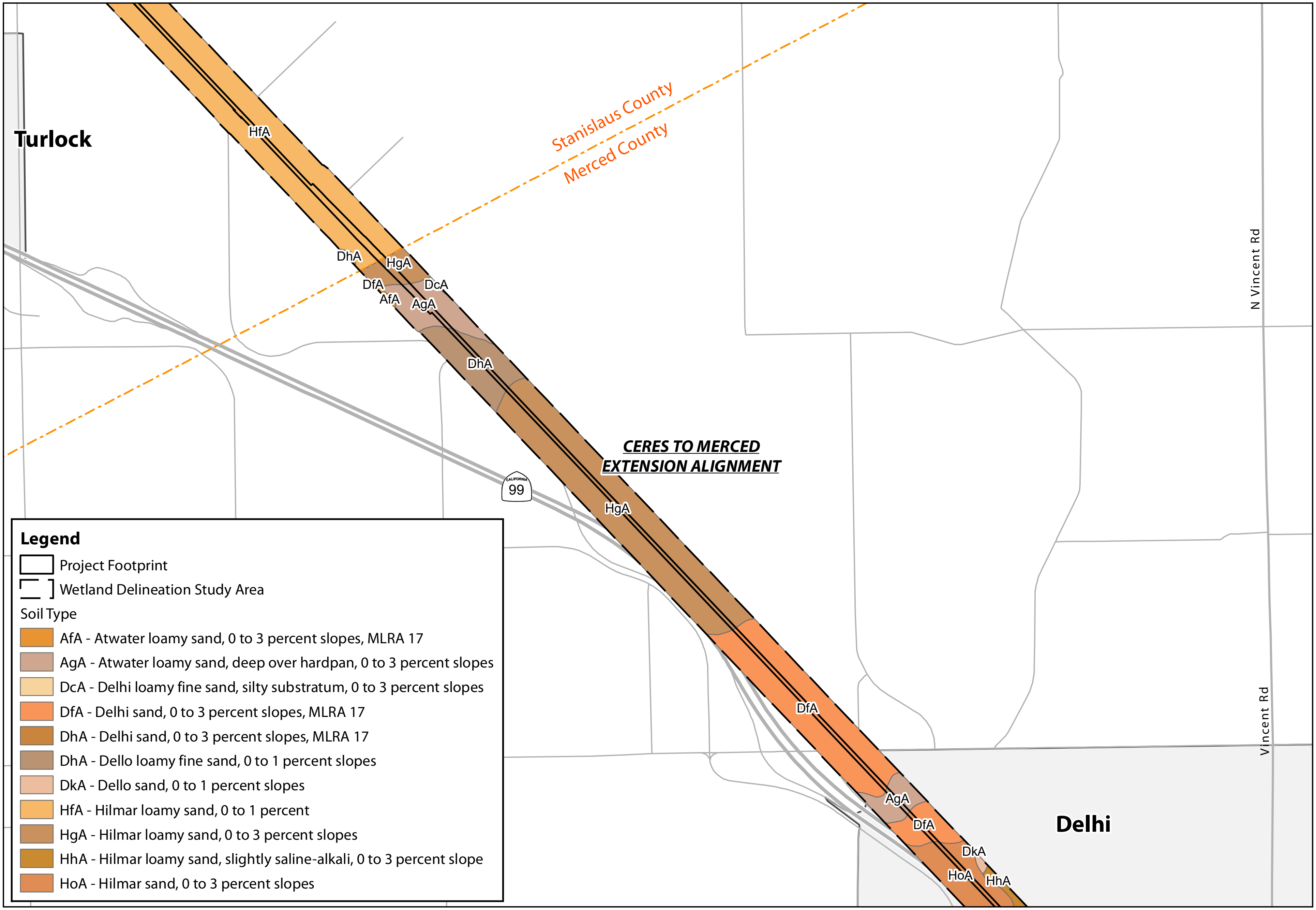


Appendix A--2
Soil Types
ACE Ceres-Merced Extension

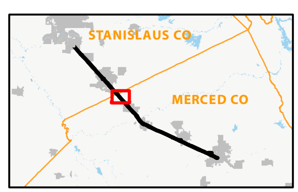


Appendix A--3
Soil Types
ACE Ceres-Merced Extension

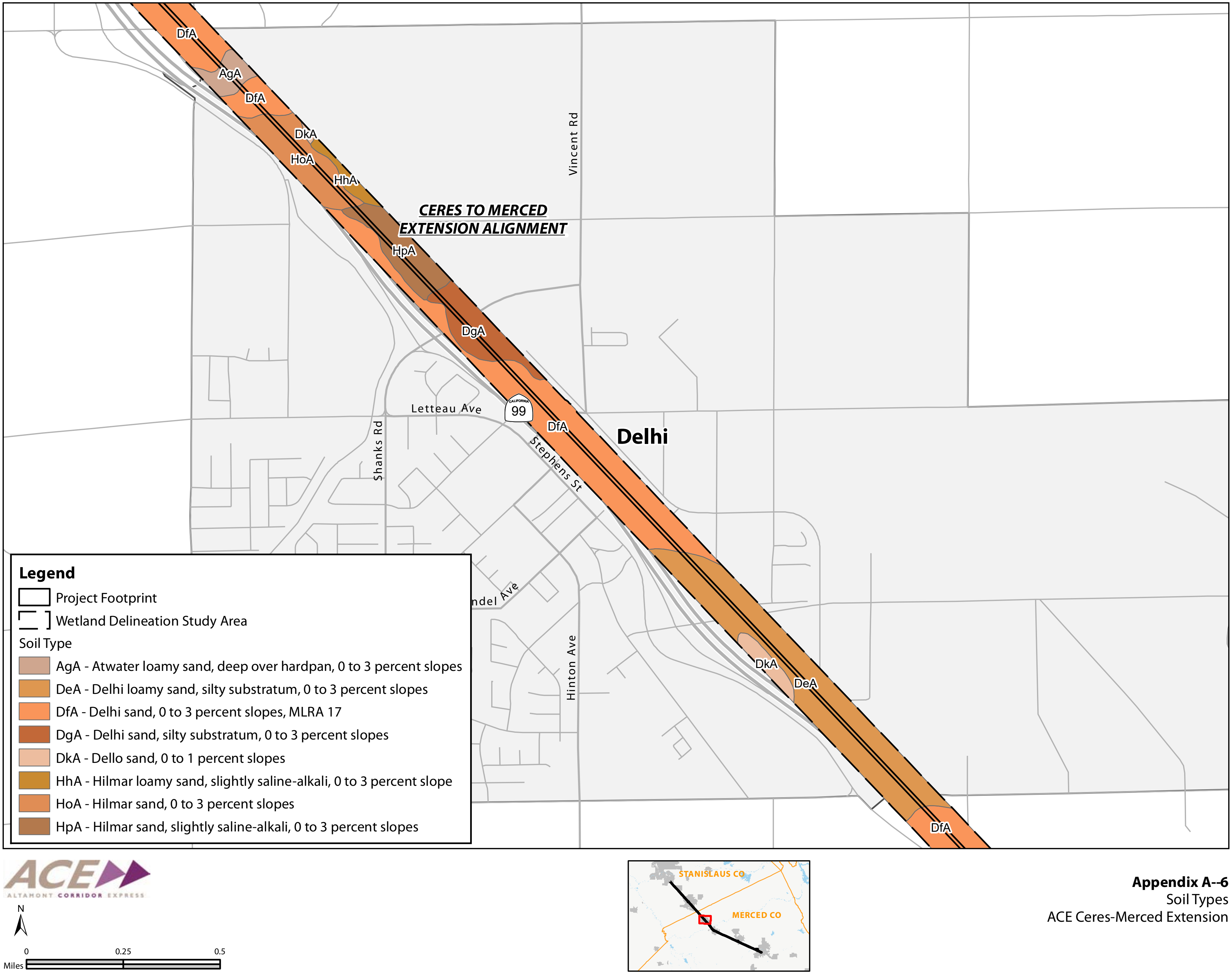
Appendix A-4
Soil Types
ACE Ceres-Merced Extension



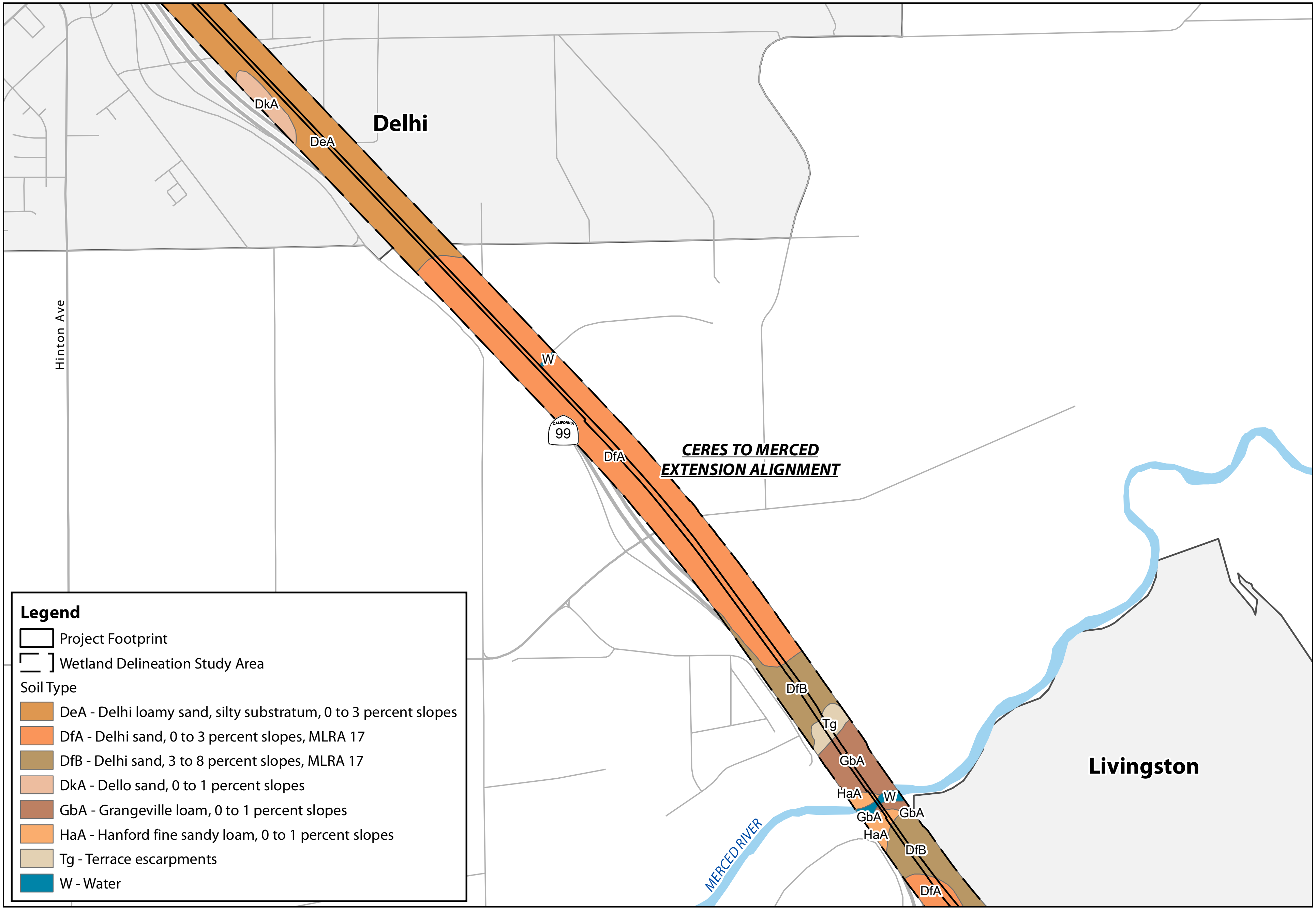
ACE ALTAMONT CORRIDOR EXPRESS



Appendix A--5
Soil Types
ACE Ceres-Merced Extension



Appendix A-‐6
Soil Types
ACE Ceres-Merced Extension



ACE ALTAMONT CORRIDOR EXPRESS

N

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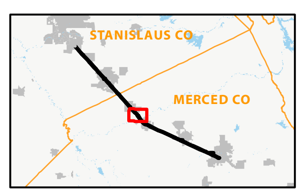
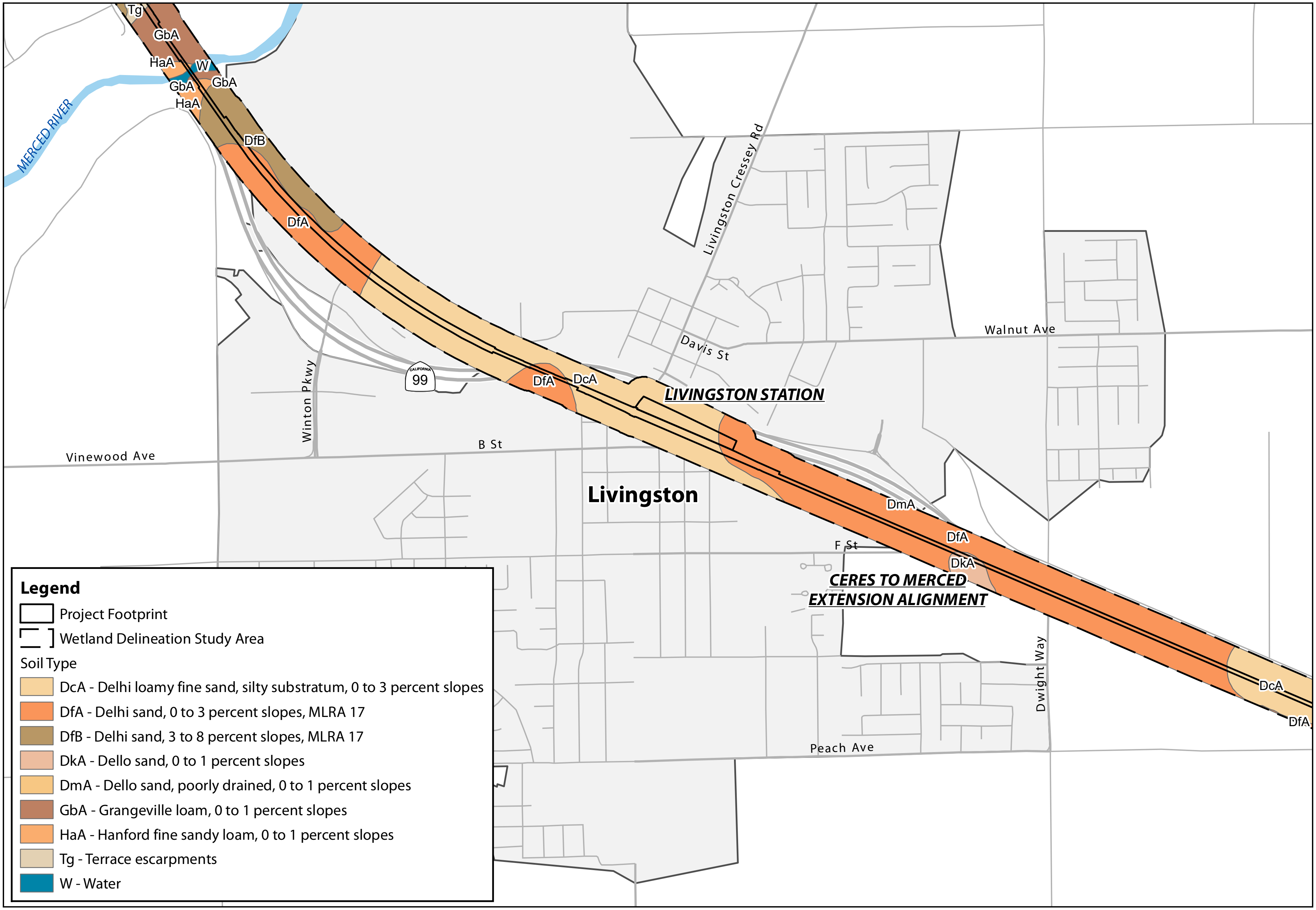
Miles



Appendix A--7
Soil Types
ACE Ceres-Merced Extension



Legend

- Project Footprint
- Wetland Delineation Study Area

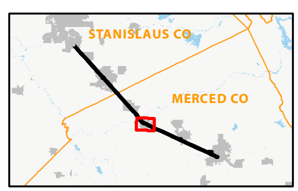
Soil Type

- DcA - Delhi loamy fine sand, silty substratum, 0 to 3 percent slopes
- DfA - Delhi sand, 0 to 3 percent slopes, MLRA 17
- DfB - Delhi sand, 3 to 8 percent slopes, MLRA 17
- DkA - Dello sand, 0 to 1 percent slopes
- DmA - Dello sand, poorly drained, 0 to 1 percent slopes
- GbA - Grangeville loam, 0 to 1 percent slopes
- HaA - Hanford fine sandy loam, 0 to 1 percent slopes
- Tg - Terrace escarpments
- W - Water

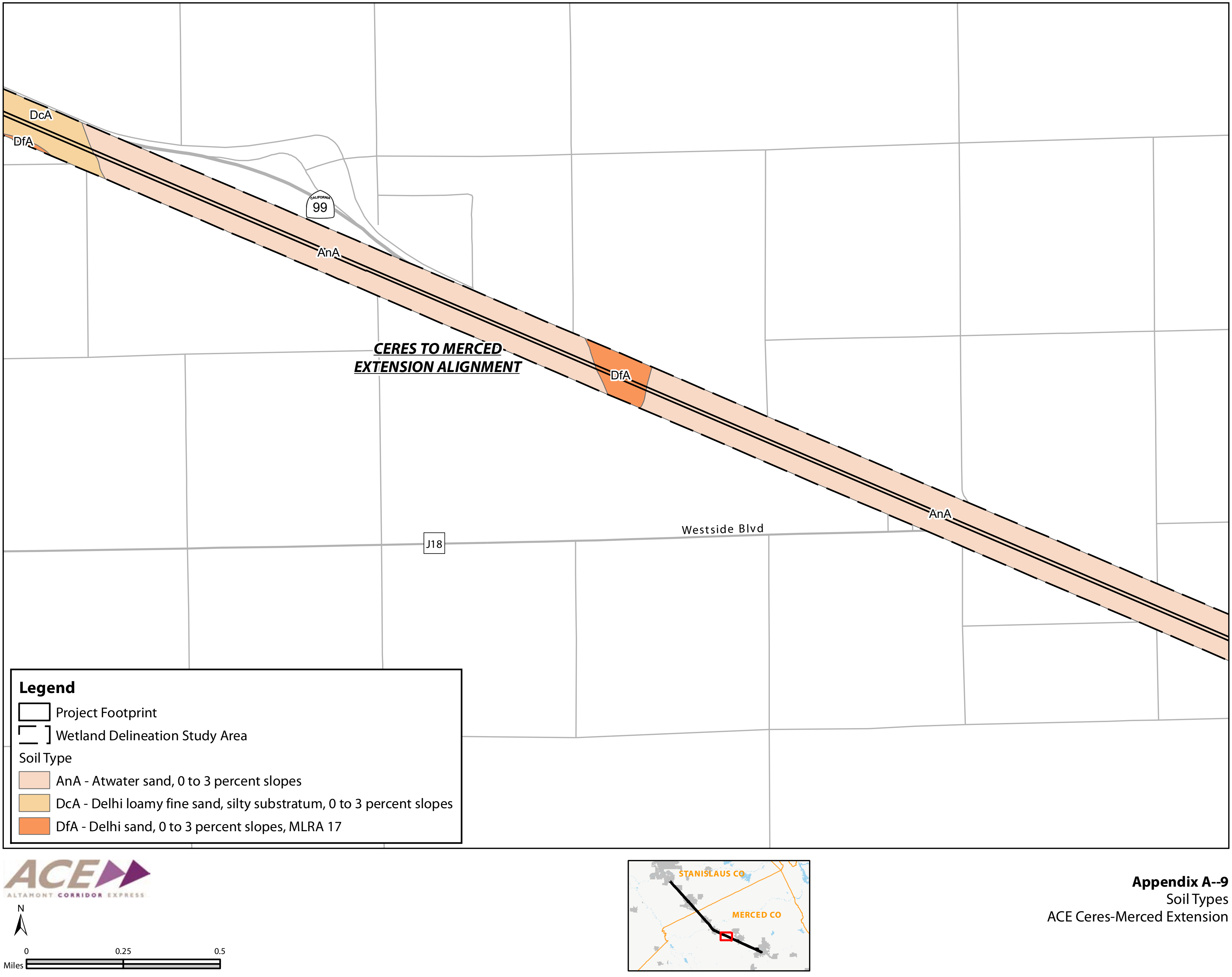
ACE ALTAMONT CORRIDOR EXPRESS

N

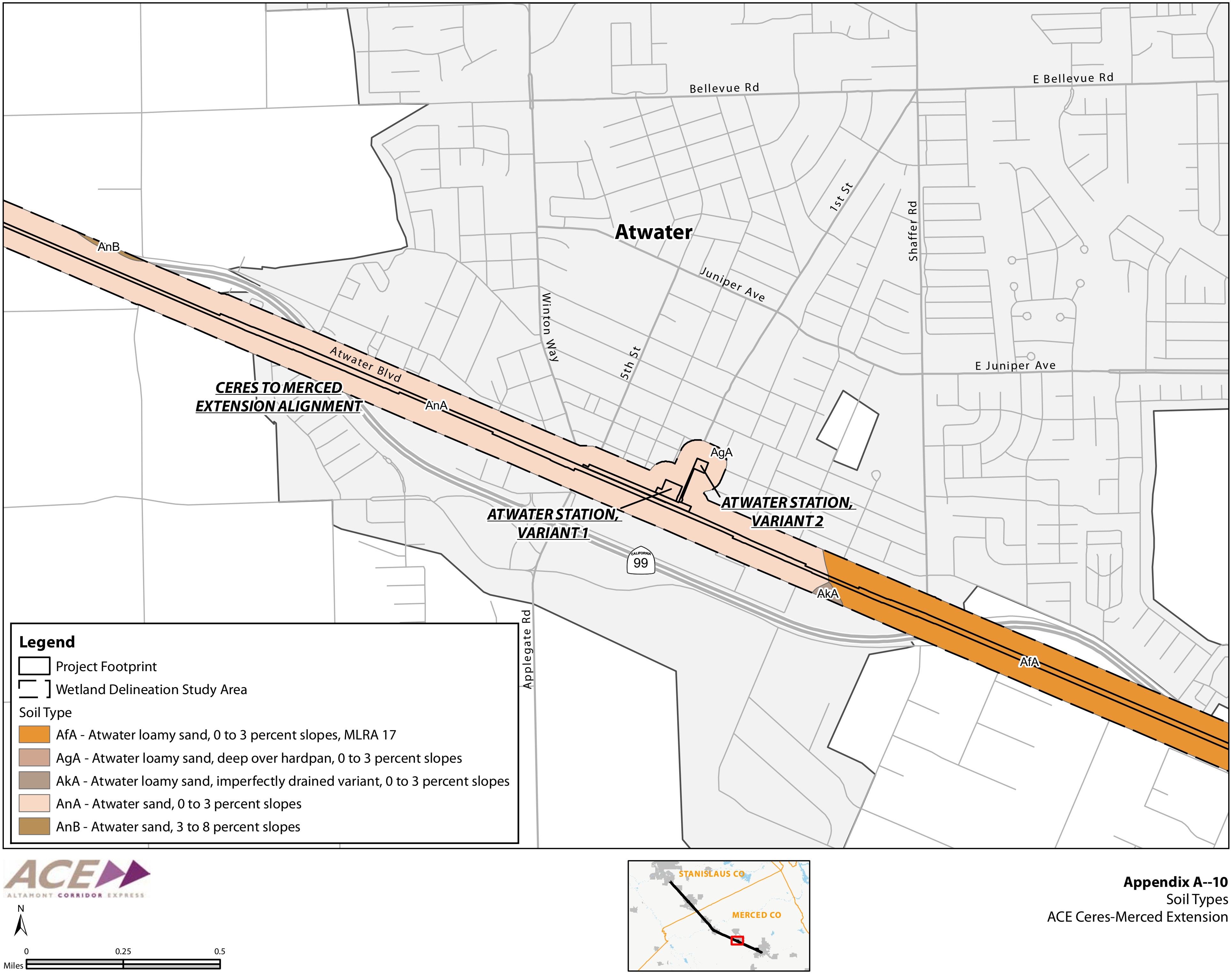
0 0.25 0.5
Miles



Appendix A--8
Soil Types
ACE Ceres-Merced Extension

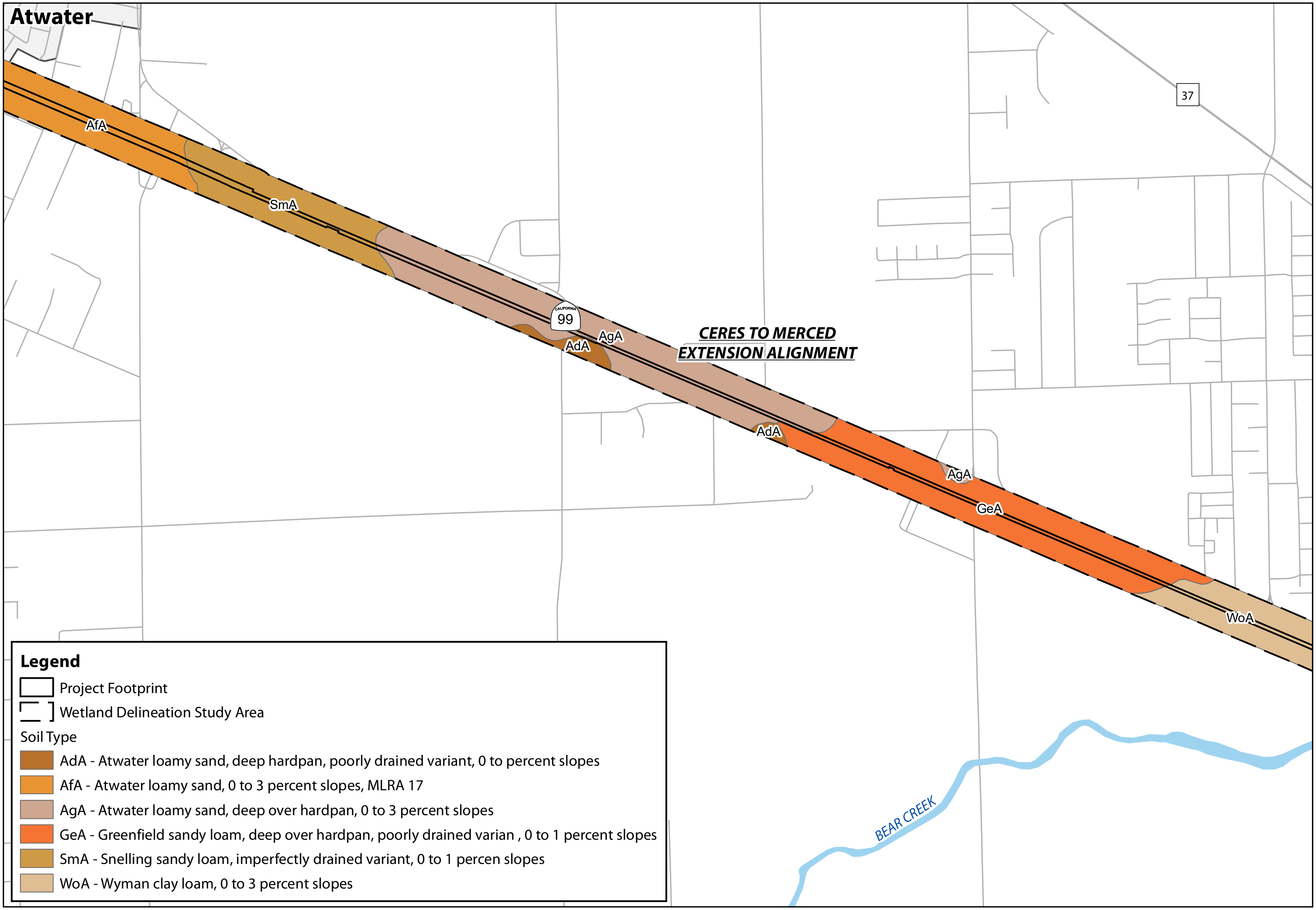


Appendix A--9
Soil Types
ACE Ceres-Merced Extension



ACE ALTAMONT CORRIDOR EXPRESS

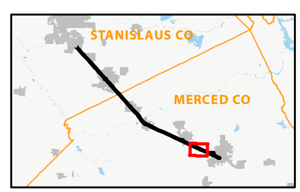
Appendix A--10
Soil Types
ACE Ceres-Merced Extension



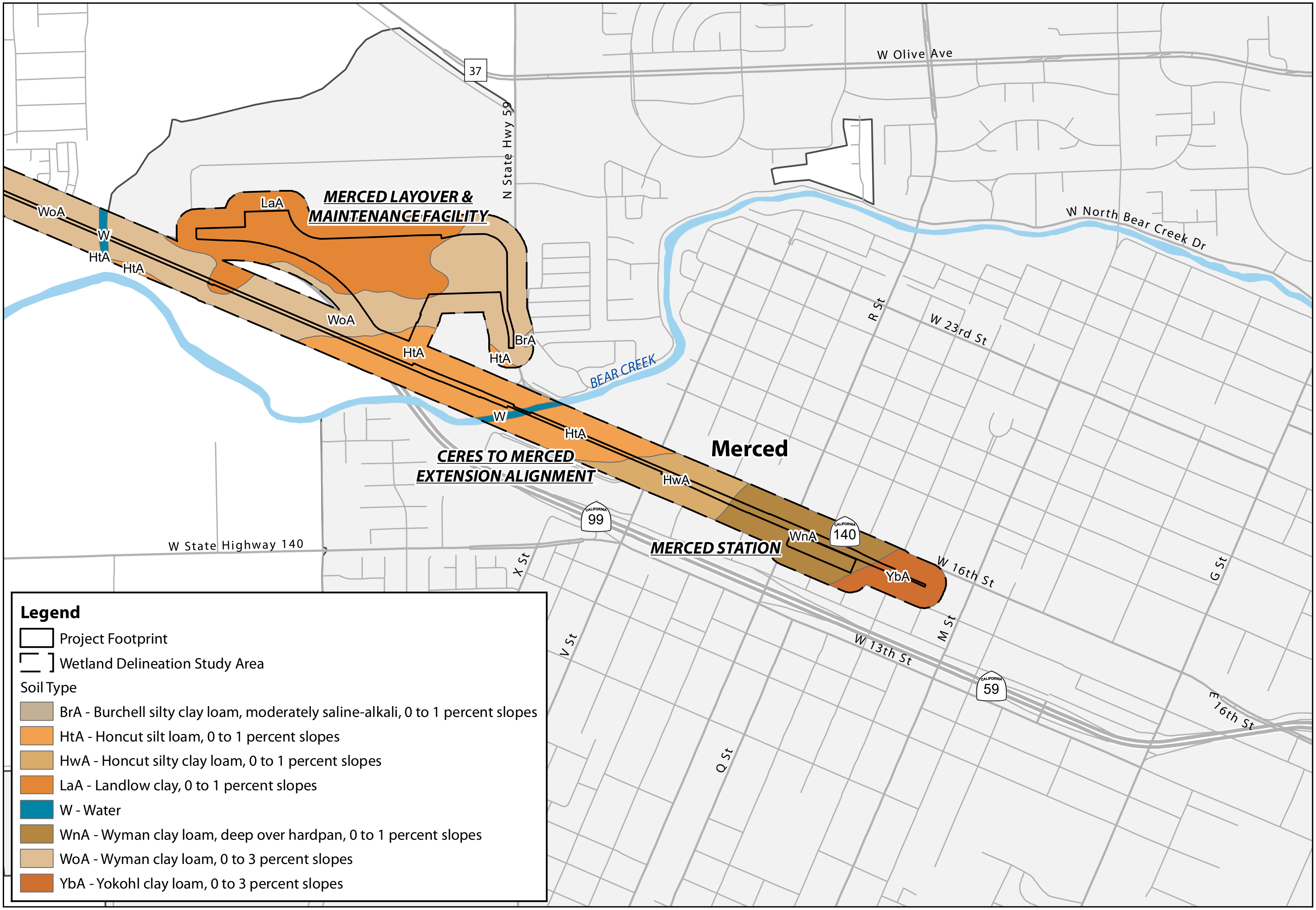
ACE ALTAMONT CORRIDOR EXPRESS

N

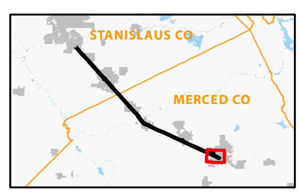
0 0.25 0.5
Miles



Appendix A--11
Soil Types
ACE Ceres-Merced Extension



ACE ALTAMONT CORRIDOR EXPRESS



Appendix A--12
Soil Types
ACE Ceres-Merced Extension

United States Department of Agriculture

NRCS

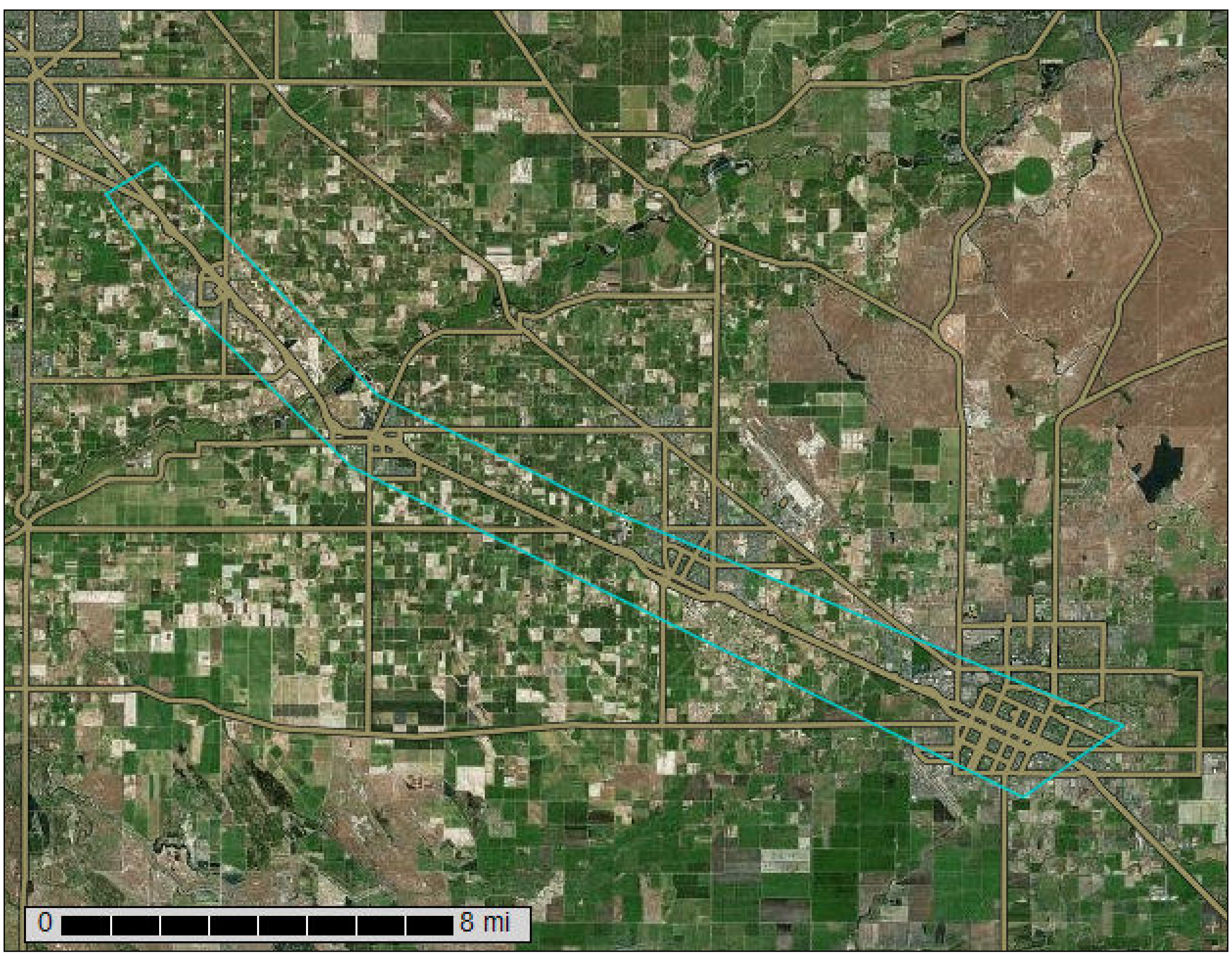
Natural Resources Conservation Service

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

Custom Soil Resource Report for

Merced Area, California

Turlock to Merced Soils



October 20, 2020

Preface

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

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

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

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

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

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

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Contents

How Soil Surveys Are Made

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

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

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

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

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

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

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

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

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

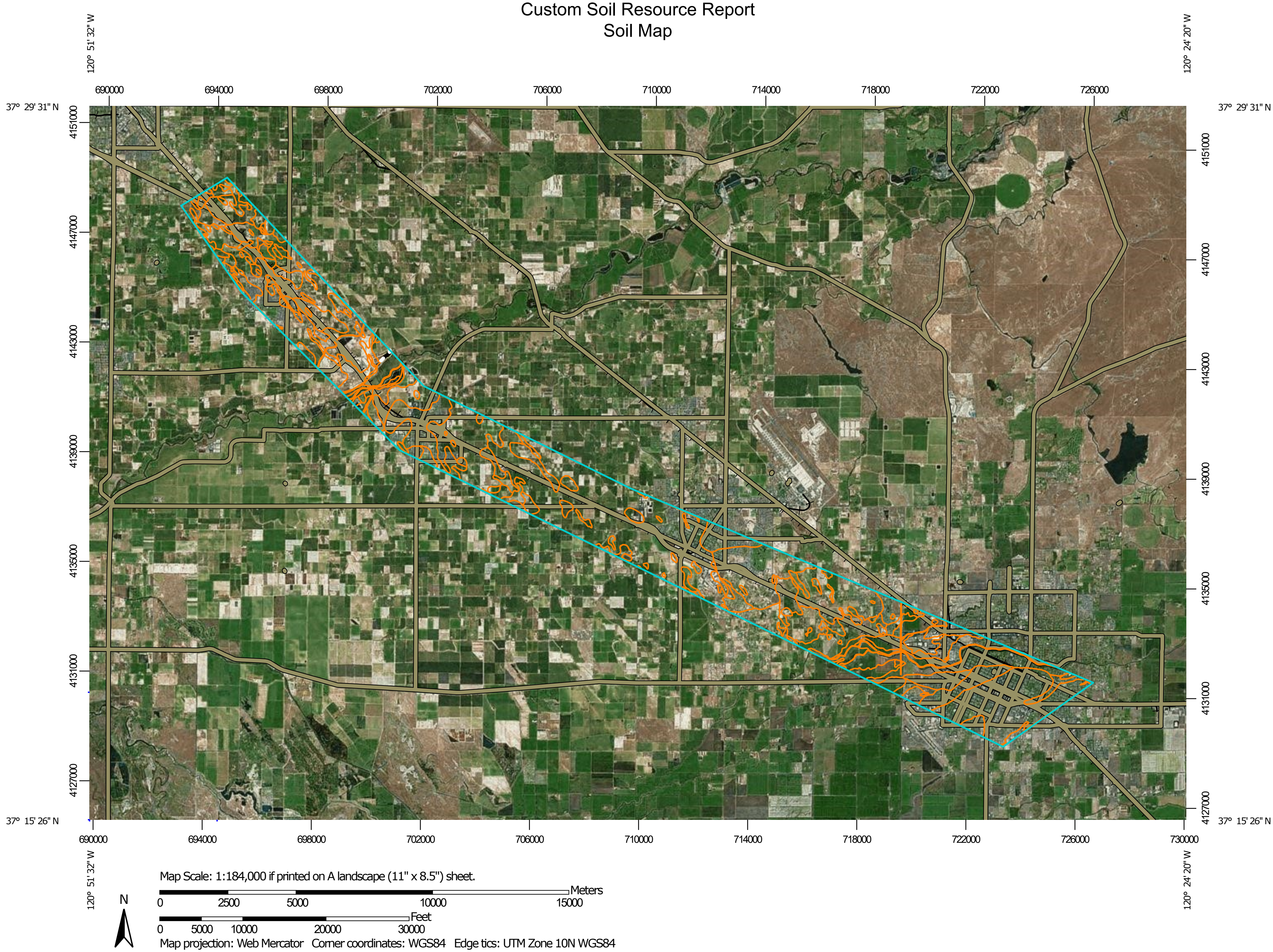
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree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

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

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

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Merced Area, California
Survey Area Data: Version 15, May 29, 2020

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

Date(s) aerial images were photographed: Jan 1, 1999—Dec 31, 2003

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AaA	Alamo clay, 0 to 1 percent slopes	5.4	0.0%
AdA	Atwater loamy sand, deep hardpan, poorly drained variant, 0 to percent slopes	495.1	2.0%
AfA	Atwater loamy sand, 0 to 3 percent slopes, MLRA 17	1,229.2	5.0%
AfB	Atwater loamy sand, 3 to 8 percent slopes, MLRA 17	64.2	0.3%
AgA	Atwater loamy sand, deep over hardpan, 0 to 3 percent slopes	1,406.5	5.8%
AkA	Atwater loamy sand, imperfectly drained variant, 0 to 3 percent slopes	415.6	1.7%
AnA	Atwater sand, 0 to 3 percent slopes	4,624.7	19.0%
AnB	Atwater sand, 3 to 8 percent slopes	252.5	1.0%
BkA	Burchell silt loam, slightly saline-alkali, 0 to 1 percent slopes	1.9	0.0%
BnA	Burchell silty clay loam, 0 to 1 percent slopes	3.1	0.0%
BpA	Burchell silty clay loam, slightly saline-alkali, 0 to 1 percen slopes	12.0	0.0%
BrA	Burchell silty clay loam, moderately saline-alkali, 0 to 1 percent slopes	2.0	0.0%
CaA	Columbia fine sandy loam, moderately deep and deep, 0 to 1 percent slopes	8.5	0.0%
DcA	Delhi loamy fine sand, silty substratum, 0 to 3 percent slopes	1,238.1	5.1%
DeA	Delhi loamy sand, silty substratum, 0 to 3 percent slopes	380.0	1.6%
DfA	Delhi sand, 0 to 3 percent slopes, MLRA 17	4,733.5	19.4%
DfB	Delhi sand, 3 to 8 percent slopes, MLRA 17	599.8	2.5%
DfC	Delhi sand, 8 to 15 percent slopes	17.2	0.1%
DgA	Delhi sand, silty substratum, 0 to 3 percent slopes	229.3	0.9%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
DgB	Delhi sand, silty substratum, 3 to 8 percent slopes	17.3	0.1%
DhA	Dello loamy fine sand, 0 to 1 percent slopes	30.7	0.1%
DkA	Dello sand, 0 to 1 percent slopes	203.2	0.8%
DmA	Dello sand, poorly drained, 0 to 1 percent slopes	13.8	0.1%
DnA	Dello sand, poorly drained, slightly saline-alkali, 0 to 1 percent slopes	26.0	0.1%
DpA	Dinuba sandy loam, 0 to 1 percent slopes	28.8	0.1%
DuB	Dune land, 3 to 8 percent slopes	21.5	0.1%
FdA	Foster fine sandy loam, slightly saline-alkali, 0 to 1 percent slopes	22.9	0.1%
GbA	Grangeville loam, 0 to 1 percent slopes	257.4	1.1%
GeA	Greenfield sandy loam, deep over hardpan, poorly drained varian , 0 to 1 percent slopes	564.1	2.3%
GfA	Greenfield sandy loam, deep over hardpan, 0 to 3 percent slopes	35.4	0.1%
HaA	Hanford fine sandy loam, 0 to 1 percent slopes	70.0	0.3%
HgA	Hilmar loamy sand, 0 to 3 percent slopes	542.5	2.2%
HhA	Hilmar loamy sand, slightly saline-alkali, 0 to 3 percent slope	149.7	0.6%
HkA	Hilmar sand, poorly drained, 0 to 1 percent slopes	11.9	0.0%
HoA	Hilmar sand, 0 to 3 percent slopes	163.5	0.7%
HpA	Hilmar sand, slightly saline-alkali, 0 to 3 percent slopes	75.4	0.3%
HtA	Honcut silt loam, 0 to 1 percent slopes	1,344.5	5.5%
HwA	Honcut silty clay loam, 0 to 1 percent slopes	370.6	1.5%
LaA	Landlow clay, 0 to 1 percent slopes	383.2	1.6%
LeA	Landlow silty clay loam, 0 to 1 percent slopes	94.9	0.4%
LfA	Landlow silty clay loam, slightly saline-alkali, 0 to 1 percent slopes	51.5	0.2%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
SbA	San Joaquin loam, 0 to 3 percent slopes	207.8	0.9%
SbB	San Joaquin loam, 3 to 8 percent slopes	6.8	0.0%
SdA	San Joaquin-Alamo complex, 0 to 3 percent slopes	8.5	0.0%
SmA	Snelling sandy loam, imperfectly drained variant, 0 to 1 percen slopes	274.6	1.1%
SnA	Snelling sandy loam, 0 to 3 percent slopes	34.8	0.1%
Tg	Terrace escarpments	41.9	0.2%
TtA	Tujunga loamy sand, 0 to 3 percent slopes	82.5	0.3%
W	Water	123.2	0.5%
WnA	Wyman clay loam, deep over hardpan, 0 to 1 percent slopes	672.0	2.8%
WoA	Wyman clay loam, 0 to 3 percent slopes	613.3	2.5%
WrA	Wyman loam, 0 to 3 percent slopes	195.8	0.8%
YbA	Yokohl clay loam, 0 to 3 percent slopes	1,942.6	8.0%
Totals for Area of Interest		**24,401.1**	**100.0%**

Map Unit Descriptions

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

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

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

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

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

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

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

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

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

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

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

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

Merced Area, California

AaA—Alamo clay, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: hjqz
Elevation: 50 to 500 feet
Mean annual precipitation: 10 to 22 inches
Mean annual air temperature: 61 degrees F
Frost-free period: 250 to 275 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Alamo

Setting

Landform: Fan remnants
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey alluvium derived from igneous, metamorphic and sedimentary rock

Typical profile

H1 - 0 to 8 inches: clay
H2 - 8 to 20 inches: clay
H3 - 20 to 25 inches: indurated

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: 12 to 24 inches to duripan
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: OccasionalNone
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: D
Hydric soil rating: Yes

Minor Components

San joaquin

Percent of map unit: 10 percent

Hydric soil rating: No

Madera

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

AdA—Atwater loamy sand, deep hardpan, poorly drained variant, 0 to percent slopes

Map Unit Setting

National map unit symbol: hjr4
Elevation: 500 feet
Mean annual precipitation: 15 inches
Mean annual air temperature: 61 degrees F
Frost-free period: 250 to 280 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Atwater Variant

Setting

Landform: Fan remnants
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy alluvium derived from granite

Typical profile

H1 - 0 to 20 inches: loamy sand
H2 - 20 to 42 inches: sandy loam
H3 - 42 to 60 inches: cemented

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: 40 to 60 inches to duripan
Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): 4w

Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Hydric soil rating: Yes

Minor Components

Rocklin

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

San joaquin

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

Delhi

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

AfA—Atwater loamy sand, 0 to 3 percent slopes, MLRA 17

Map Unit Setting

National map unit symbol: 2vnd0
Elevation: 110 to 430 feet
Mean annual precipitation: 11 to 14 inches
Mean annual air temperature: 62 to 64 degrees F
Frost-free period: 240 to 300 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Atwater

Setting

Landform: Dunes
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian deposits derived from alluvium derived from granite

Typical profile

Ap - 0 to 24 inches: loamy sand
Bt - 24 to 55 inches: sandy loam
C - 55 to 73 inches: loamy sand
2Bq - 73 to 79 inches: cemented loamy sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 60 to 79 inches to cemented horizon
Drainage class: Well drained

Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.02 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Sodium adsorption ratio, maximum: 3.0
Available water capacity: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): 2s
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Delhi

Percent of map unit: 5 percent
Landform: Dunes
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Rocklin

Percent of map unit: 4 percent
Landform: Terraces, fan remnants
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

San joaquin

Percent of map unit: 4 percent
Landform: Terraces, fan remnants
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Whitney

Percent of map unit: 2 percent
Landform: Terraces, fan remnants
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

AfB—Atwater loamy sand, 3 to 8 percent slopes, MLRA 17

Map Unit Setting

National map unit symbol: 2vnd4
Elevation: 120 to 460 feet
Mean annual precipitation: 11 to 14 inches
Mean annual air temperature: 62 to 64 degrees F
Frost-free period: 240 to 280 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Atwater

Setting

Landform: Dunes
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian deposits derived from alluvium derived from granite

Typical profile

Ap - 0 to 24 inches: loamy sand
Bt - 24 to 39 inches: sandy loam
C - 39 to 73 inches: sandy loam
2Bq - 73 to 79 inches: loamy sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 60 to 79 inches to cemented horizon
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.02 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Sodium adsorption ratio, maximum: 3.0
Available water capacity: Low (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Delhi

Percent of map unit: 5 percent
Landform: Dunes
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

San joaquin

Percent of map unit: 4 percent
Landform: Terraces, fan remnants
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Rocklin

Percent of map unit: 4 percent
Landform: Terraces, fan remnants
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Whitney

Percent of map unit: 2 percent
Landform: Terraces, fan remnants
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

AgA—Atwater loamy sand, deep over hardpan, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: hjr7
Elevation: 500 feet
Mean annual precipitation: 15 inches
Mean annual air temperature: 61 degrees F
Frost-free period: 250 to 280 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Atwater

Setting

Landform: Dunes
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy alluvium derived from granite

Typical profile

H1 - 0 to 20 inches: loamy sand
H2 - 20 to 42 inches: sandy loam
H3 - 42 to 60 inches: cemented

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 40 to 60 inches to duripan
Drainage class: Well drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Delhi

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

Rocklin

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

San joaquin

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

AkA—Atwater loamy sand, imperfectly drained variant, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: hjr9
Elevation: 500 feet
Mean annual precipitation: 15 inches
Mean annual air temperature: 61 degrees F
Frost-free period: 250 to 280 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Atwater Variant

Setting

Landform: Fan remnants
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy alluvium derived from granite

Typical profile

H1 - 0 to 20 inches: loamy sand
H2 - 20 to 32 inches: sandy loam
H3 - 32 to 60 inches: sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.8 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A/D
Hydric soil rating: Yes

Minor Components

San joaquin

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

Rocklin

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

Delhi

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

AnA—Atwater sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: hjrb
Elevation: 500 feet
Mean annual precipitation: 15 inches
Mean annual air temperature: 61 degrees F
Frost-free period: 250 to 280 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Atwater

Setting

Landform: Dunes
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy alluvium derived from granite

Typical profile

H1 - 0 to 20 inches: sand
H2 - 20 to 32 inches: sandy loam
H3 - 32 to 60 inches: sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.6 inches)

Interpretive groups
Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

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

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

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

AnB—Atwater sand, 3 to 8 percent slopes

Map Unit Setting
National map unit symbol: hjrc
Elevation: 500 feet
Mean annual precipitation: 15 inches
Mean annual air temperature: 61 degrees F
Frost-free period: 250 to 280 days
Farmland classification: Prime farmland if irrigated

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

Description of Atwater

Setting
Landform: Dunes
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy alluvium derived from granite

Typical profile
H1 - 0 to 20 inches: sand

H2 - 20 to 32 inches: sandy loam
H3 - 32 to 60 inches: sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Delhi

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

Rocklin

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

San joaquin

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

BkA—Burchell silt loam, slightly saline-alkali, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: hjrn
Elevation: 10 to 50 feet
Mean annual precipitation: 13 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 255 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Burchell

Setting

Landform: Fan remnants
Landform position (two-dimensional): Toeslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from igneous and sedimentary rock

Typical profile

H1 - 0 to 20 inches: silt loam
H2 - 20 to 45 inches: silty clay loam
H3 - 45 to 60 inches: stratified fine sandy loam to silt loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to moderately saline (0.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0
Available water capacity: High (about 10.3 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Minor Components

Landlow

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

Lewis

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

Yokohl

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

BnA—Burchell silty clay loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: hjrq
Elevation: 10 to 50 feet
Mean annual precipitation: 13 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 255 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Burchell

Setting

Landform: Fan remnants
Landform position (two-dimensional): Toeslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from igneous and sedimentary rock

Typical profile

H1 - 0 to 20 inches: silty clay loam
H2 - 20 to 45 inches: silty clay loam
H3 - 45 to 60 inches: stratified fine sandy loam to silt loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: High (about 10.5 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Minor Components

Yokohl

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

Lewis

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

Landlow

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

BpA—Burchell silty clay loam, slightly saline-alkali, 0 to 1 percen slopes

Map Unit Setting

National map unit symbol: hjrr
Elevation: 10 to 50 feet
Mean annual precipitation: 13 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 255 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Burchell

Setting

Landform: Fan remnants
Landform position (two-dimensional): Toeslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from igneous and sedimentary rock

Typical profile

H1 - 0 to 20 inches: silty clay loam
H2 - 20 to 45 inches: silty clay loam
H3 - 45 to 60 inches: stratified fine sandy loam to silt loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 0 inches

Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0
Available water capacity: High (about 10.5 inches)

Interpretive groups
Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Minor Components

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

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

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

BrA—Burchell silty clay loam, moderately saline-alkali, 0 to 1 percent slopes

Map Unit Setting
National map unit symbol: hjrs
Elevation: 10 to 50 feet
Mean annual precipitation: 13 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 255 days
Farmland classification: Farmland of statewide importance

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

Description of Burchell

Setting
Landform: Fan remnants
Landform position (two-dimensional): Toeslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from igneous and sedimentary rock

Typical profile

H1 - 0 to 20 inches: silty clay loam
H2 - 20 to 45 inches: silty clay loam
H3 - 45 to 60 inches: stratified fine sandy loam to silt loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Moderately saline to strongly saline (8.0 to 16.0 mmhos/cm)
Sodium adsorption ratio, maximum: 10.0
Available water capacity: High (about 9.3 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Minor Components

Yokohl

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

Landlow

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

Lewis

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

CaA—Columbia fine sandy loam, moderately deep and deep, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: hjrt
Elevation: 150 feet
Mean annual precipitation: 12 to 25 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 230 to 340 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Columbia

Setting

Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-loamy alluvium derived from igneous, metamorphic and sedimentary rock

Typical profile

H1 - 0 to 20 inches: fine sandy loam
H2 - 20 to 40 inches: stratified sand to silt loam
H3 - 40 to 60 inches: clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: OccasionalNone
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Moderate (about 7.2 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Hydric soil rating: Yes

Minor Components

Temple

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

Merced

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

Hanford

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

DcA—Delhi loamy fine sand, silty substratum, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: hjsd
Elevation: 200 to 1,400 feet
Mean annual precipitation: 13 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 225 to 310 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Delhi

Setting

Landform: Sand sheets
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Wind modified sandy alluvium derived from granite

Typical profile

H1 - 0 to 12 inches: loamy fine sand
H2 - 12 to 30 inches: sand
H3 - 30 to 60 inches: fine sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 6.4 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Hanford

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

Tujunga

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

Grangeville

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

DeA—Delhi loamy sand, silty substratum, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: hjsh
Elevation: 200 to 1,400 feet
Mean annual precipitation: 13 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 225 to 310 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Delhi

Setting

Landform: Sand sheets
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Wind modified sandy alluvium derived from granite

Typical profile

H1 - 0 to 12 inches: loamy sand
H2 - 12 to 30 inches: sand
H3 - 30 to 60 inches: fine sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 6.4 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Tujunga

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

Grangeville

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

Hanford

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

DfA—Delhi sand, 0 to 3 percent slopes, MLRA 17

Map Unit Setting

National map unit symbol: 2ss8n
Elevation: 30 to 1,400 feet
Mean annual precipitation: 9 to 16 inches
Mean annual air temperature: 59 to 64 degrees F
Frost-free period: 225 to 310 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Delhi

Setting

Landform: Dunes on valleys
Landform position (two-dimensional): Toeslope, backslope
Landform position (three-dimensional): Rise
Microfeatures of landform position: Hummocks
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Parent material: Wind modified sandy alluvium derived from granitoid

Typical profile

Ap - 0 to 8 inches: sand
C1 - 8 to 40 inches: sand
C2 - 40 to 60 inches: sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.0 mmhos/cm)
Available water capacity: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Hanford

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

Grangeville

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

Dello

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

Tujunga

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

DfB—Delhi sand, 3 to 8 percent slopes, MLRA 17

Map Unit Setting

National map unit symbol: 2ss9x
Elevation: 30 to 1,400 feet
Mean annual precipitation: 10 to 16 inches
Mean annual air temperature: 59 to 64 degrees F
Frost-free period: 225 to 310 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Delhi

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Wind modified sandy alluvium derived from granite

Typical profile

H1 - 0 to 12 inches: sand
H2 - 12 to 44 inches: sand
H3 - 44 to 68 inches: loamy fine sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Tujunga

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

Hanford

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

Grangeville

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

DfC—Delhi sand, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: hjsl
Elevation: 30 to 1,400 feet
Mean annual precipitation: 10 to 16 inches
Mean annual air temperature: 59 to 64 degrees F
Frost-free period: 225 to 310 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Delhi

Setting

Landform: Sand sheets
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Wind modified sandy alluvium derived from granite

Typical profile

H1 - 0 to 12 inches: sand
H2 - 12 to 44 inches: sand
H3 - 44 to 68 inches: sand

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Tujunga

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

Grangeville

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

Hanford

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

DgA—Delhi sand, silty substratum, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: hjsm
Elevation: 200 to 1,400 feet
Mean annual precipitation: 13 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 225 to 310 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Delhi

Setting

Landform: Sand sheets
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Wind modified sandy alluvium derived from granite

Typical profile

H1 - 0 to 12 inches: sand
H2 - 12 to 30 inches: sand
H3 - 30 to 60 inches: fine sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 6.3 inches)

Interpretive groups
Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

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

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

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

DgB—Delhi sand, silty substratum, 3 to 8 percent slopes

Map Unit Setting
National map unit symbol: hjsn
Elevation: 200 to 1,400 feet
Mean annual precipitation: 13 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 225 to 310 days
Farmland classification: Prime farmland if irrigated

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

Description of Delhi

Setting
Landform: Sand sheets
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Wind modified sandy alluvium derived from granite

Typical profile
H1 - 0 to 12 inches: sand

H2 - 12 to 30 inches: sand
H3 - 30 to 60 inches: fine sandy loam

Properties and qualities
Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 6.3 inches)

Interpretive groups
Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

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

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

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

DhA—Dello loamy fine sand, 0 to 1 percent slopes

Map Unit Setting
National map unit symbol: hjsp
Elevation: 10 feet
Mean annual precipitation: 8 to 15 inches
Mean annual air temperature: 61 to 63 degrees F
Frost-free period: 240 to 260 days
Farmland classification: Farmland of statewide importance

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

Description of Dello

Setting

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

Typical profile

H1 - 0 to 6 inches: loamy fine sand
H2 - 6 to 60 inches: sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Rare
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Hydric soil rating: Yes

Minor Components

Grangeville

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

Delhi

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

Foster

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

DkA—Dello sand, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: hjsq
Elevation: 10 feet
Mean annual precipitation: 8 to 15 inches
Mean annual air temperature: 61 to 63 degrees F
Frost-free period: 240 to 260 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Dello

Setting

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

Typical profile

H1 - 0 to 6 inches: sand
H2 - 6 to 60 inches: sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Rare
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Hydric soil rating: Yes

Minor Components

Delhi

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

Foster

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

Grangeville

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

DmA—Dello sand, poorly drained, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: hjsr
Elevation: 10 feet
Mean annual precipitation: 8 to 15 inches
Mean annual air temperature: 61 to 63 degrees F
Frost-free period: 240 to 260 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Dello

Setting

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

Typical profile

H1 - 0 to 6 inches: sand
H2 - 6 to 60 inches: sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)

Depth to water table: About 0 inches
Frequency of flooding: Rare
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Low (about 4.2 inches)

Interpretive groups
Land capability classification (irrigated): 4w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Hydric soil rating: Yes

Minor Components

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

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

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

DnA—Dello sand, poorly drained, slightly saline-alkali, 0 to 1 percent slopes

Map Unit Setting
National map unit symbol: hjss
Elevation: 10 feet
Mean annual precipitation: 8 to 15 inches
Mean annual air temperature: 61 to 63 degrees F
Frost-free period: 240 to 260 days
Farmland classification: Not prime farmland

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

Description of Dello

Setting
Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear

Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 6 inches: sand
H2 - 6 to 60 inches: sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Rare
Frequency of ponding: None
Maximum salinity: Slightly saline to moderately saline (4.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0
Available water capacity: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): 4w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Hydric soil rating: Yes

Minor Components

Grangeville

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

Delhi

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

Foster

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

DpA—Dinuba sandy loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: hjsv
Elevation: 100 to 500 feet
Mean annual precipitation: 12 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 250 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Dinuba

Setting

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

Typical profile

H1 - 0 to 18 inches: sandy loam
H2 - 18 to 24 inches: sandy loam
H3 - 24 to 60 inches: stratified very fine sand to silt loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water capacity: Moderate (about 7.2 inches)

Interpretive groups

Land capability classification (irrigated): 2s
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Hanford

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

Fresno

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

Delhi

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

DuB—Dune land, 3 to 8 percent slopes

Map Unit Composition

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

Description of Dune Land

Setting

Landform: Alluvial fans
Parent material: Eolian deposits

Typical profile

H1 - 0 to 6 inches: fine sand
H2 - 6 to 60 inches: sand

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

FdA—Foster fine sandy loam, slightly saline-alkali, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: hjt5
Elevation: 50 to 500 feet
Mean annual precipitation: 14 inches
Mean annual air temperature: 61 degrees F
Frost-free period: 225 to 275 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Foster

Setting

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

Typical profile

H1 - 0 to 19 inches: fine sandy loam

H2 - 19 to 30 inches: sandy loam
H3 - 30 to 60 inches: stratified sand to silt loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Rare
Frequency of ponding: None
Maximum salinity: Slightly saline to moderately saline (4.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0
Available water capacity: Moderate (about 7.0 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

Minor Components

Grangeville

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

Temple

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

Hanford

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

GbA—Grangeville loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: hjtk
Elevation: 10 to 1,800 feet
Mean annual precipitation: 8 to 16 inches
Mean annual air temperature: 61 to 64 degrees F
Frost-free period: 200 to 300 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Grangeville and similar soils: 85 percent
Minor components: 15 percent

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

Description of Grangeville

Setting

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

Typical profile

H1 - 0 to 12 inches: loam
H2 - 12 to 60 inches: sandy loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: OccasionalNone
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Moderate (about 8.6 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

Minor Components

Foster

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

Hanford

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

Traver

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

GeA—Greenfield sandy loam, deep over hardpan, poorly drained varian , 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: hjtn
Elevation: 300 to 700 feet
Mean annual precipitation: 7 to 15 inches
Mean annual air temperature: 64 degrees F
Frost-free period: 250 to 300 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Greenfield Variant

Setting

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

Typical profile

H1 - 0 to 10 inches: sandy loam
H2 - 10 to 40 inches: sandy loam
H3 - 40 to 48 inches: indurated
H4 - 48 to 60 inches: stratified sandy loam to silt loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: 40 to 60 inches to duripan
Drainage class: Poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Moderate (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Minor Components

Snelling

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

Madera

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

Borden

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

GfA—Greenfield sandy loam, deep over hardpan, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: hjtp
Elevation: 300 to 700 feet
Mean annual precipitation: 7 to 15 inches
Mean annual air temperature: 64 degrees F
Frost-free period: 250 to 300 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Greenfield

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from igneous, metamorphic and sedimentary rock

Typical profile

H1 - 0 to 10 inches: sandy loam
H2 - 10 to 40 inches: sandy loam
H3 - 40 to 48 inches: indurated
H4 - 48 to 60 inches: stratified sandy loam to silt loam

Properties and qualities

Slope: 0 percent
Depth to restrictive feature: 40 to 60 inches to duripan
Drainage class: Well drained
Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Moderate (about 6.3 inches)

Interpretive groups

Land capability classification (irrigated): 2s
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Snelling

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

Madera

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

Borden

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

HaA—Hanford fine sandy loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: hjts
Elevation: 2,600 to 4,200 feet
Mean annual precipitation: 9 to 12 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 200 to 250 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Hanford

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear

Parent material: Alluvium derived from igneous rock

Typical profile

H1 - 0 to 12 inches: fine sandy loam
H2 - 12 to 60 inches: fine sandy loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Available water capacity: Moderate (about 7.8 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 4c
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Grangeville

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

Dinuba

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

Tujunga

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

HgA—Hilmar loamy sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: hjtz
Elevation: 300 to 900 feet
Mean annual precipitation: 11 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 230 to 300 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Hilmar

Setting

Landform: Fan skirts
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Wind modified sandy alluvium derived from granite over silty alluvium derived from granite

Typical profile

H1 - 0 to 23 inches: loamy sand
H2 - 23 to 60 inches: stratified very fine sandy loam to silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Very slightly saline to slightly saline (2.0 to 4.0 mmhos/cm)
Available water capacity: Moderate (about 7.7 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C
Hydric soil rating: Yes

Minor Components

Dello

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

Tujunga

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

Delhi

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

HhA—Hilmar loamy sand, slightly saline-alkali, 0 to 3 percent slope

Map Unit Setting

National map unit symbol: hjv0
Elevation: 300 to 900 feet
Mean annual precipitation: 11 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 230 to 300 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Hilmar

Setting

Landform: Fan skirts
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Wind modified sandy alluvium derived from granite over silty alluvium derived from granite

Typical profile

H1 - 0 to 23 inches: loamy sand
H2 - 23 to 60 inches: stratified very fine sandy loam to silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Slightly saline to moderately saline (4.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0
Available water capacity: Moderate (about 7.7 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C
Hydric soil rating: Yes

Minor Components

Tujunga

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

Dello

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

Delhi

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

HkA—Hilmar sand, poorly drained, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: hjv1
Elevation: 300 to 900 feet
Mean annual precipitation: 11 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 230 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Hilmar

Setting

Landform: Fan skirts
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Wind modified sandy alluvium derived from granite over silty alluvium derived from granite

Typical profile

H1 - 0 to 23 inches: sand
H2 - 23 to 60 inches: stratified very fine sandy loam to silt loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Very slightly saline to slightly saline (2.0 to 4.0 mmhos/cm)
Available water capacity: Moderate (about 7.3 inches)

Interpretive groups
Land capability classification (irrigated): 4w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Minor Components

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

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

Dello
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

HoA—Hilmar sand, 0 to 3 percent slopes

Map Unit Setting
National map unit symbol: hjv4
Elevation: 300 to 900 feet
Mean annual precipitation: 11 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 230 to 300 days
Farmland classification: Farmland of statewide importance

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

Description of Hilmar

Setting
Landform: Fan skirts
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf

Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Wind modified sandy alluvium derived from granite over silty alluvium derived from granite

Typical profile

H1 - 0 to 23 inches: sand
H2 - 23 to 60 inches: stratified very fine sandy loam to silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Very slightly saline to slightly saline (2.0 to 4.0 mmhos/cm)
Available water capacity: Moderate (about 7.3 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Minor Components

Delhi

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

Dello

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

Tujunga

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

HpA—Hilmar sand, slightly saline-alkali, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: hjv5
Elevation: 300 to 900 feet
Mean annual precipitation: 11 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 230 to 300 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Hilmar

Setting

Landform: Fan skirts
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Wind modified sandy alluvium derived from granite over silty alluvium derived from granite

Typical profile

H1 - 0 to 23 inches: sand
H2 - 23 to 60 inches: stratified very fine sandy loam to silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Slightly saline to moderately saline (4.0 to 8.0 mmhos/cm)
Available water capacity: Moderate (about 7.3 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Minor Components

Delhi

Percent of map unit: 5 percent

Dello

Percent of map unit: 5 percent

Tujunga

Percent of map unit: 5 percent

HtA—Honcut silt loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: hjv8
Elevation: 2,000 feet
Mean annual precipitation: 12 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 200 to 280 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Honcut

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from igneous and metamorphic rock

Typical profile

H1 - 0 to 20 inches: silt loam
H2 - 20 to 60 inches: stratified loam to silt loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.6 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 4c
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Ryer

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

Yokohl

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

Wyman

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

HwA—Honcut silty clay loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: hjvb
Elevation: 2,000 feet
Mean annual precipitation: 12 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 200 to 280 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Honcut

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from igneous and metamorphic rock

Typical profile

H1 - 0 to 18 inches: silty clay loam
H2 - 18 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches

Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 4c
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Wyman

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

Yokohl

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

Ryer

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

LaA—Landlow clay, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: hjvl
Elevation: 200 feet
Mean annual precipitation: 15 inches
Mean annual air temperature: 61 degrees F
Frost-free period: 230 to 290 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Landlow

Setting

Landform: Basin floors
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from igneous, metamorphic and sedimentary rock

Typical profile

H1 - 0 to 12 inches: clay

H2 - 12 to 46 inches: clay
H3 - 46 to 60 inches: clay

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water capacity: Moderate (about 8.8 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Lewis

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

Yokohl

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

Burchell

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

Unnamed

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

LeA—Landlow silty clay loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: hjvq
Elevation: 200 feet
Mean annual precipitation: 15 inches
Mean annual air temperature: 61 degrees F
Frost-free period: 230 to 290 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Landlow

Setting

Landform: Basin floors
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from igneous, metamorphic and sedimentary rock

Typical profile

H1 - 0 to 12 inches: silty clay loam
H2 - 12 to 46 inches: clay
H3 - 46 to 60 inches: clay

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water capacity: High (about 9.1 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Yokohl

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

Lewis

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

Burchell

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

Unnamed

Percent of map unit: 1 percent

Landform: Depressions
Hydric soil rating: Yes

LfA—Landlow silty clay loam, slightly saline-alkali, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: hjvr
Elevation: 30 to 150 feet
Mean annual precipitation: 12 to 18 inches
Mean annual air temperature: 61 to 63 degrees F
Frost-free period: 230 to 290 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Landlow

Setting

Landform: Basin floors
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from igneous, metamorphic and sedimentary rock

Typical profile

H1 - 0 to 12 inches: silty clay loam
H2 - 12 to 46 inches: clay
H3 - 46 to 60 inches: clay

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Slightly saline to moderately saline (4.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0
Available water capacity: Moderate (about 7.5 inches)

Interpretive groups

Land capability classification (irrigated): 2w

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

Minor Components

Yokohl

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

Lewis

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

Burchell

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

Unnamed

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

SbA—San Joaquin loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: hjyg
Elevation: 20 to 500 feet
Mean annual precipitation: 10 to 22 inches
Mean annual air temperature: 61 to 63 degrees F
Frost-free period: 250 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of San Joaquin

Setting

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

Typical profile

H1 - 0 to 9 inches: loam
H2 - 9 to 15 inches: sandy clay loam
H3 - 15 to 21 inches: clay loam

H4 - 21 to 37 inches: indurated
H5 - 37 to 60 inches: stratified sandy loam to loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches; 20 to 40 inches to duripan
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Snelling

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

Montpellier

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

Alamo

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

SbB—San Joaquin loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: hjyh
Elevation: 20 to 500 feet
Mean annual precipitation: 10 to 22 inches
Mean annual air temperature: 61 to 63 degrees F
Frost-free period: 250 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of San Joaquin

Setting

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

Typical profile

H1 - 0 to 9 inches: loam
H2 - 9 to 15 inches: sandy clay loam
H3 - 15 to 21 inches: clay loam
H4 - 21 to 37 inches: indurated
H5 - 37 to 60 inches: stratified sandy loam to loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches; 20 to 40 inches to duripan
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Alamo

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

Montpellier

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

Snelling

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

SdA—San Joaquin-Alamo complex, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: hjyl
Elevation: 20 to 500 feet
Mean annual precipitation: 10 to 22 inches
Mean annual air temperature: 61 to 63 degrees F
Frost-free period: 250 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

San joaquin and similar soils: 50 percent
Alamo and similar soils: 30 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of San Joaquin

Setting

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

Typical profile

H1 - 0 to 9 inches: sandy loam
H2 - 9 to 15 inches: sandy clay loam
H3 - 15 to 21 inches: clay loam
H4 - 21 to 37 inches: indurated
H5 - 37 to 60 inches: stratified sandy loam to loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches; 20 to 40 inches to duripan
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.1 inches)

Interpretive groups

Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: D
Hydric soil rating: No

Description of Alamo

Setting

Landform: Fan remnants
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey alluvium derived from igneous, metamorphic and sedimentary rock

Typical profile

H1 - 0 to 8 inches: clay
H2 - 8 to 20 inches: clay
H3 - 20 to 25 inches: indurated

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 12 to 24 inches to duripan
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: OccasionalNone
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Very low (about 2.9 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: D
Hydric soil rating: Yes

Minor Components

Montpellier

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

Snelling

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

SmA—Snelling sandy loam, imperfectly drained variant, 0 to 1 percen slopes

Map Unit Setting

National map unit symbol: hjyv
Elevation: 300 to 700 feet
Mean annual precipitation: 7 to 15 inches
Mean annual air temperature: 64 degrees F
Frost-free period: 250 to 300 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Snelling Variant

Setting

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

Typical profile

H1 - 0 to 22 inches: sandy loam
H2 - 22 to 40 inches: sandy clay loam
H3 - 40 to 60 inches: indurated

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: 40 to 60 inches to duripan
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Available water capacity: Low (about 5.5 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Greenfield

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

Montpellier

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

Peters

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

SnA—Snelling sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: hjyw
Elevation: 150 to 2,000 feet
Mean annual precipitation: 12 to 20 inches
Mean annual air temperature: 59 to 63 degrees F
Frost-free period: 250 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Snelling

Setting

Landform: Fan remnants
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Concave
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 22 inches: sandy loam
H2 - 22 to 50 inches: sandy clay loam
H3 - 50 to 60 inches: sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Moderate (about 8.4 inches)

Interpretive groups
Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 4c
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

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

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

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

Tg—Terrace escarpments

Map Unit Setting
National map unit symbol: hjz9
Mean annual precipitation: 14 inches
Mean annual air temperature: 61 degrees F
Farmland classification: Not prime farmland

Map Unit Composition
Terrace escarpments: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Terrace Escarpments

Setting
Landform: Terraces
Parent material: Alluvium

Typical profile
H1 - 0 to 60 inches: variable

Interpretive groups
Land capability classification (irrigated): 8
Land capability classification (nonirrigated): 8
Hydric soil rating: No

TtA—Tujunga loamy sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: hjzl
Elevation: 10 to 1,500 feet
Mean annual precipitation: 10 to 25 inches
Mean annual air temperature: 59 to 64 degrees F
Frost-free period: 250 to 350 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Tujunga

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy alluvium derived from granite

Typical profile

H1 - 0 to 48 inches: loamy sand
H2 - 48 to 60 inches: stratified gravelly sand to gravelly loamy sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: OccasionalNone
Frequency of ponding: None
Available water capacity: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Greenfield

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

Hanford

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

Grangeville

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

W—Water

Map Unit Composition

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

WnA—Wyman clay loam, deep over hardpan, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: hk0f
Elevation: 50 to 600 feet
Mean annual precipitation: 10 inches
Mean annual air temperature: 61 degrees F
Frost-free period: 270 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Wyman

Setting

Landform: Terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from volcanic rock

Typical profile

H1 - 0 to 14 inches: clay loam
H2 - 14 to 40 inches: clay loam
H3 - 40 to 60 inches: cemented

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: 40 to 60 inches to duripan
Drainage class: Well drained
Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 6.8 inches)

Interpretive groups

Land capability classification (irrigated): 2s
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Porterville

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

Yokohl

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

San joaquin

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

WoA—Wyman clay loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: hk0g
Elevation: 30 to 600 feet
Mean annual precipitation: 10 to 12 inches
Mean annual air temperature: 59 to 63 degrees F
Frost-free period: 260 to 280 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Wyman

Setting

Landform: Terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from volcanic rock

Typical profile

H1 - 0 to 14 inches: clay loam
H2 - 14 to 41 inches: clay loam
H3 - 41 to 60 inches: stratified silt loam to clay loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: High (about 10.0 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 4c
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Porterville

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

Yokohl

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

San joaquin

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

WrA—Wyman loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: hk0j
Elevation: 300 to 2,500 feet
Mean annual precipitation: 9 to 25 inches
Mean annual air temperature: 59 to 63 degrees F
Frost-free period: 200 to 300 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Wyman and similar soils: 85 percent
Minor components: 15 percent

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

Description of Wyman

Setting

Landform: Terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from volcanic rock

Typical profile

H1 - 0 to 14 inches: loam
H2 - 14 to 41 inches: clay loam
H3 - 41 to 60 inches: stratified silt loam to clay loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: High (about 9.8 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 4c
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Porterville

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

Yokohl

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

San joaquin

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

YbA—Yokohl clay loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: hk0n
Elevation: 500 feet
Mean annual precipitation: 10 to 15 inches
Mean annual air temperature: 61 to 64 degrees F
Frost-free period: 260 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Yokohl

Setting

Landform: Fan remnants
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Concave
Parent material: Alluvium derived from igneous rock

Typical profile

H1 - 0 to 10 inches: clay loam
H2 - 10 to 19 inches: clay
H3 - 19 to 48 inches: indurated
H4 - 48 to 60 inches: stratified sandy loam to gravelly loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 10 to 20 inches to duripan
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Very low (about 2.1 inches)

Interpretive groups

Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Wyman

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

Porterville

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

Honcut

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

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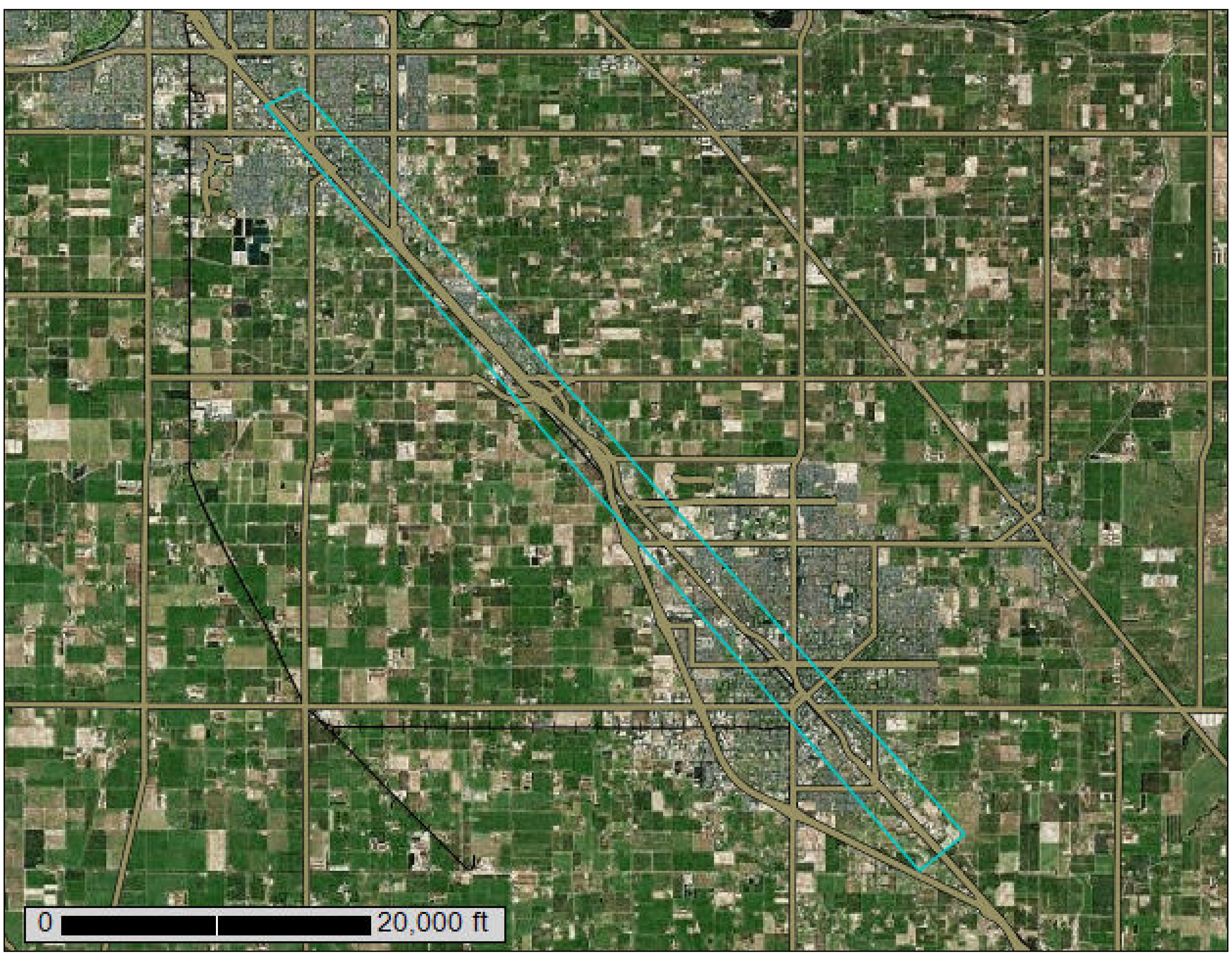
United States Department of Agriculture

Natural Resources Conservation Service

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

Custom Soil Resource Report for Eastern Stanislaus Area, California, and Merced Area, California

Ceres to Turlock Soils



October 20, 2020

Preface

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

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

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

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

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

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

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Contents

How Soil Surveys Are Made

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

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

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

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

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

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

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

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

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

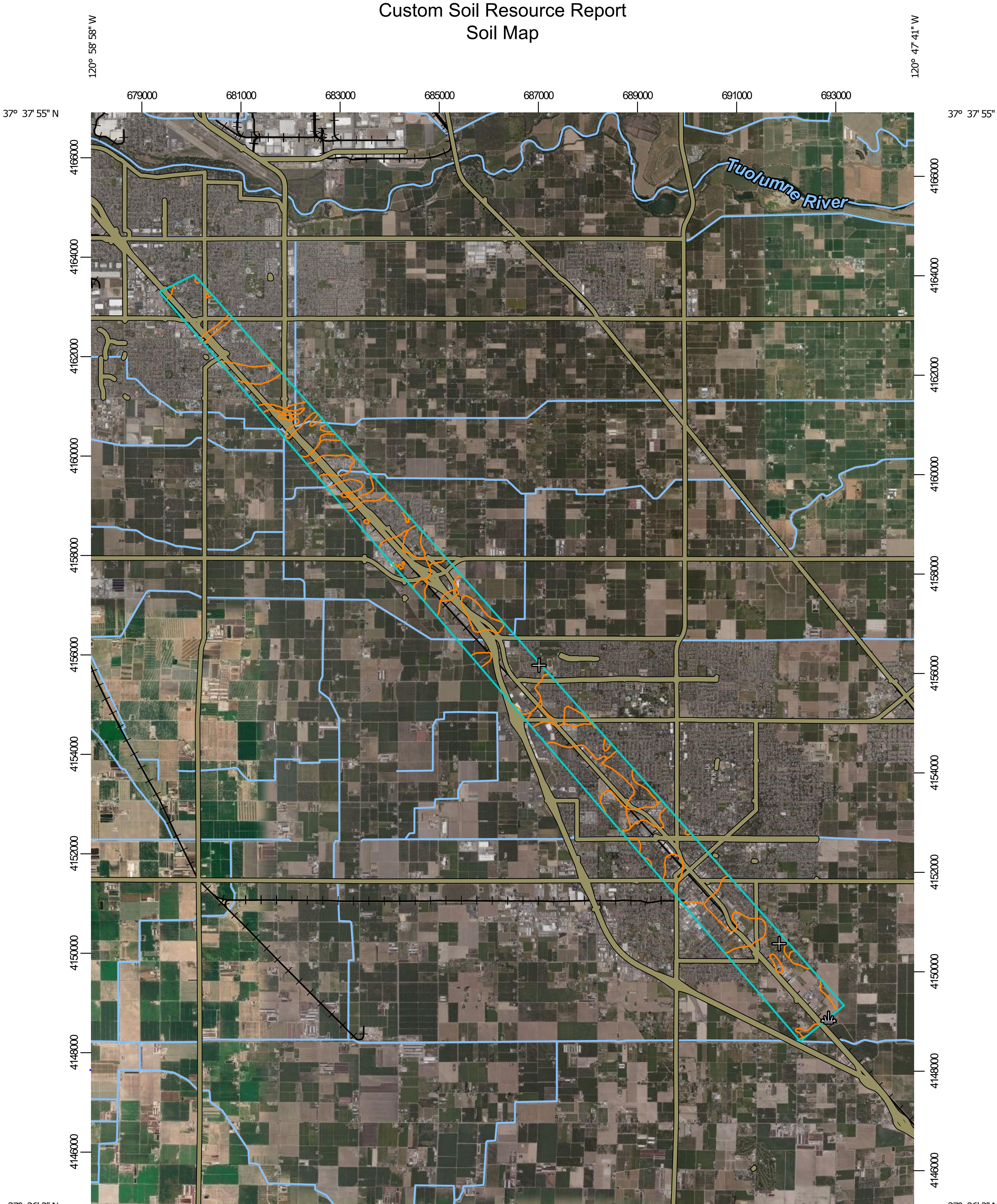
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree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

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

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

Soil Map



Map Scale: 1:107,000 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 1500, 3000, 6000, 9000

Feet: 0, 5000, 10000, 20000, 30000

N

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

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at scales ranging from 1:20,000 to 1:24,000.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Eastern Stanislaus Area, California
Survey Area Data: Version 14, May 29, 2020

Soil Survey Area: Merced Area, California
Survey Area Data: Version 15, May 29, 2020

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

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

Date(s) aerial images were photographed: Jun 19, 2015—Apr 25, 2020

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

MAP LEGEND	MAP INFORMATION
	imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
DeA	Delhi loamy sand, 0 to 3 percent slopes, MLRA 17	698.8	15.0%
DgA	Delhi loamy sand, silty substratum, 0 to 3 percent slopes	119.6	2.6%
DhA	Delhi sand, 0 to 3 percent slopes, MLRA 17	142.3	3.1%
DkA	Dello loamy sand, 0 to 1 percent slopes	10.7	0.2%
DmA	Dinuba fine sandy loam, 0 to 1 percent slopes, MLRA 17	185.7	4.0%
DrA	Dinuba sandy loam, 0 to 1 percent slopes	915.2	19.7%
DsA	Dinuba sandy loam, shallow, 0 to 1 percent slopes	92.8	2.0%
DuA	Dinuba sandy loam, poorly drained variant, 0 to 1 percent slopes	9.6	0.2%
DwA	Dinuba sandy loam, slightly saline-alkali, 0 to 1 percent slopes	7.0	0.2%
DyA	Dinuba sandy loam, shallow, slightly saline-alkali, 0 to 1 percent slopes	112.9	2.4%
DzA	Dinuba sandy loam, very poorly drained variant, slightly saline- alkali, 0 to 1 percent slopes	4.8	0.1%
FtA	Fresno sandy loam, slightly saline-alkali, 0 to 1 percent slopes	1.9	0.0%
HdA	Hanford sandy loam, 0 to 3 percent slopes	684.1	14.7%
HdpA	Hanford sandy loam, moderately deep over silt, 0 to 1 percent slopes	442.4	9.5%
HfA	Hilmar loamy sand, 0 to 1 percent	831.1	17.9%
HkbA	Hilmar loamy sand, slightly saline-alkali, 0 to 1 percent slopes	22.0	0.5%
HmA	Hilmar sand, 0 to 3 percent slopes	59.9	1.3%
TuA	Tujunga loamy sand, 0 to 3 percent slopes	301.8	6.5%
Subtotals for Soil Survey Area		**4,642.5**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Totals for Area of Interest		**4,643.7**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AfA	Atwater loamy sand, 0 to 3 percent slopes, MLRA 17	0.9	0.0%
DfA	Delhi sand, 0 to 3 percent slopes, MLRA 17	0.4	0.0%
Subtotals for Soil Survey Area		**1.3**	**0.0%**
Totals for Area of Interest		**4,643.7**	**100.0%**

Map Unit Descriptions

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

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

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

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

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

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

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

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

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

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

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

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

Eastern Stanislaus Area, California

DeA—Delhi loamy sand, 0 to 3 percent slopes, MLRA 17

Map Unit Setting

National map unit symbol: 2ss8r
Elevation: 30 to 430 feet
Mean annual precipitation: 9 to 16 inches
Mean annual air temperature: 59 to 64 degrees F
Frost-free period: 225 to 310 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Delhi

Setting

Landform: Dunes on fan remnants
Landform position (two-dimensional): Toeslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian deposits derived from sandy alluvium derived from granite

Typical profile

A - 0 to 7 inches: loamy sand
C1 - 7 to 25 inches: loamy sand
C2 - 25 to 60 inches: loamy sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.0 mmhos/cm)
Available water capacity: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Dello

Percent of map unit: 6 percent
Landform: Depressions on fan remnants

Hydric soil rating: Yes

Hanford

Percent of map unit: 6 percent
Landform: Depressions on fan remnants
Hydric soil rating: No

Hilmar

Percent of map unit: 1 percent
Hydric soil rating: No

Dinuba

Percent of map unit: 1 percent
Hydric soil rating: No

Grangeville

Percent of map unit: 1 percent
Hydric soil rating: No

DgA—Delhi loamy sand, silty substratum, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: hjb9
Elevation: 200 to 1,400 feet
Mean annual precipitation: 13 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 225 to 310 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Delhi

Setting

Landform: Sand sheets
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Wind modified sandy alluvium derived from granite

Typical profile

H1 - 0 to 10 inches: loamy sand
H2 - 10 to 40 inches: loamy sand
H3 - 40 to 60 inches: very fine sand, silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat excessively drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Dinuba

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

Hilmar

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

DhA—Delhi sand, 0 to 3 percent slopes, MLRA 17

Map Unit Setting

National map unit symbol: 2ss8n
Elevation: 30 to 1,400 feet
Mean annual precipitation: 9 to 16 inches
Mean annual air temperature: 59 to 64 degrees F
Frost-free period: 225 to 310 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Delhi

Setting

Landform: Dunes on valleys
Landform position (two-dimensional): Toeslope, backslope
Landform position (three-dimensional): Rise
Microfeatures of landform position: Hummocks
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Parent material: Wind modified sandy alluvium derived from granitoid

Typical profile

Ap - 0 to 8 inches: sand
C1 - 8 to 40 inches: sand
C2 - 40 to 60 inches: sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.0 mmhos/cm)
Available water capacity: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Hanford

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

Grangeville

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

Dello

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

Tujunga

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

DkA—Dello loamy sand, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: hjbd
Elevation: 10 feet
Mean annual precipitation: 8 to 15 inches
Mean annual air temperature: 61 to 63 degrees F
Frost-free period: 240 to 260 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Dello

Setting

Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Wind modified sandy alluvium derived from granite

Typical profile

H1 - 0 to 10 inches: loamy sand
H2 - 10 to 60 inches: sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: RareNone
Frequency of ponding: None
Available water capacity: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Hydric soil rating: Yes

Minor Components

Delhi

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

Hilmar

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

DmA—Dinuba fine sandy loam, 0 to 1 percent slopes, MLRA 17

Map Unit Setting

National map unit symbol: 2ty1l
Elevation: 30 to 260 feet
Mean annual precipitation: 9 to 16 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 225 to 300 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Dinuba

Setting

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

Typical profile

A1 - 0 to 10 inches: fine sandy loam
Btk1 - 10 to 13 inches: sandy loam
Btk2 - 13 to 24 inches: sandy loam
2Bk3 - 24 to 36 inches: silt loam
2Bk4 - 36 to 60 inches: stratified very fine sand to silt loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 4 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water capacity: Moderate (about 7.2 inches)

Interpretive groups

Land capability classification (irrigated): 2s
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: C

Hydric soil rating: No

Minor Components

Fresno

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

Hilmar

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

Hanford

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

El peco

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

DrA—Dinuba sandy loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: hjbl
Elevation: 100 to 500 feet
Mean annual precipitation: 12 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 250 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Dinuba

Setting

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

Typical profile

H1 - 0 to 10 inches: sandy loam
H2 - 10 to 30 inches: sandy loam
H3 - 30 to 60 inches: very fine sand, silt loam

Properties and qualities

Slope: 0 to 1 percent

Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water capacity: Moderate (about 7.2 inches)

Interpretive groups
Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

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

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

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

DsA—Dinuba sandy loam, shallow, 0 to 1 percent slopes

Map Unit Setting
National map unit symbol: hjbm
Elevation: 100 to 500 feet
Mean annual precipitation: 12 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 250 days
Farmland classification: Not prime farmland

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

Description of Dinuba

Setting
Landform: Alluvial fans
Landform position (two-dimensional): Toeslope

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

Typical profile

H1 - 0 to 10 inches: sandy loam
H2 - 10 to 19 inches: sandy loam
H3 - 19 to 60 inches: very fine sand, silt loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water capacity: Moderate (about 7.2 inches)

Interpretive groups

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

Minor Components

Hanford

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

Fresno

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

Hilmar

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

DuA—Dinuba sandy loam, poorly drained variant, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: hjbp
Elevation: 100 to 500 feet
Mean annual precipitation: 12 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 250 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Dinuba Variant

Setting

Landform: Depressions
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 10 inches: sandy loam
H2 - 10 to 30 inches: sandy loam
H3 - 30 to 60 inches: very fine sand, silt loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Slightly saline to moderately saline (4.0 to 8.0 mmhos/cm)
Available water capacity: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C
Hydric soil rating: Yes

Minor Components

Hilmar

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

Hanford

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

Fresno

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

DwA—Dinuba sandy loam, slightly saline-alkali, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: hjbq
Elevation: 100 to 500 feet
Mean annual precipitation: 12 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 250 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Dinuba

Setting

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

Typical profile

H1 - 0 to 10 inches: sandy loam
H2 - 10 to 30 inches: sandy loam
H3 - 30 to 60 inches: very fine sand, silt loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Slightly saline to moderately saline (4.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0
Available water capacity: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Hanford

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

Hilmar

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

Fresno

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

DyA—Dinuba sandy loam, shallow, slightly saline-alkali, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: hjbs
Elevation: 100 to 500 feet
Mean annual precipitation: 12 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 250 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Dinuba

Setting

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

Typical profile

H1 - 0 to 10 inches: sandy loam
H2 - 10 to 19 inches: sandy loam
H3 - 19 to 60 inches: very fine sand, silt loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: High

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Slightly saline to moderately saline (4.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0
Available water capacity: Moderate (about 7.2 inches)

Interpretive groups
Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

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

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

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

DzA—Dinuba sandy loam, very poorly drained variant, slightly saline-alkali, 0 to 1 percent slopes

Map Unit Setting
National map unit symbol: hjbt
Elevation: 100 to 500 feet
Mean annual precipitation: 12 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 250 days
Farmland classification: Not prime farmland

Map Unit Composition
Dinuba variant and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dinuba Variant

Setting
Landform: Depressions
Down-slope shape: Linear
Across-slope shape: Linear

Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 10 inches: sandy loam
H2 - 10 to 30 inches: sandy loam
H3 - 30 to 60 inches: very fine sand, silt loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Slightly saline to moderately saline (4.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0
Available water capacity: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C
Hydric soil rating: Yes

Minor Components

Hilmar

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

Hanford

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

Fresno

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

FtA—Fresno sandy loam, slightly saline-alkali, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: hjc3
Elevation: 0 to 250 feet
Mean annual precipitation: 8 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 250 days
Farmland classification: Not prime farmland

2009	1.70	2.53	0.55	0.50	0.70	0.06	0.00	0.00	0.17	1.90	0.21	1.86	10.18
2010	3.80	2.74	0.91	2.28	0.63	0.04	0.00	0.00	0.00	0.98	1.61	3.87	16.86
2011	1.58	2.26	3.85	0.16	0.72	2.04		0.00	0.02	1.27	0.48	0.10	12.48
2012	0.80	0.78	2.14	1.64	0.13	0.00	0.00	0.00	0.00				5.49
2013									0.04				0.04
2014		2.28	1.75	1.03	0.00	0.00	0.00	0.00	0.12	0.71	1.24	5.51	12.64
2015	0.06	2.13	0.18	0.70	0.24	0.00	0.00	0.00	0.01	0.35	2.38	1.93	7.98
2016	4.88	0.37	3.43	1.73	0.30	0.00	0.00	0.00	0.00	2.42	1.22	2.21	16.56
2017	5.95	3.64	1.61	1.30	0.20	0.00	0.00	0.00	0.01	0.06	0.91	0.05	13.73
2018	2.90	0.36	2.92	1.72	0.25	0.00	0.00	0.00	0.00	0.05	2.43	1.85	12.48
2019	2.45	4.13	2.11	0.51	2.43	0.00	0.00	0.00	0.00	0.00	0.78	4.95	17.36
2020	0.64	0.00	2.62	1.65	0.03	0.00	0.00	0.01	0.00				4.95
Notes: Data missing in any month have an "M" flag. A "T" indicates a trace of precipitation.													
Data missing for all days in a month or year is blank.													
Creation date: 2016-07-22													

Map Unit Composition

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

Description of Fresno

Setting

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

Typical profile

H1 - 0 to 5 inches: fine sandy loam
H2 - 5 to 18 inches: sandy clay loam
H3 - 18 to 38 inches: silt loam
H4 - 38 to 40 inches: cemented
H5 - 40 to 60 inches: sandy loam, loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: 24 to 40 inches to duripan
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Slightly saline to strongly saline (4.0 to 16.0 mmhos/cm)
Sodium adsorption ratio, maximum: 20.0
Available water capacity: Low (about 3.7 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Unnamed

Percent of map unit: 10 percent
Landform: Depressions
Hydric soil rating: Yes

Traver

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

HdA—Hanford sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: hjct
Elevation: 150 to 900 feet
Mean annual precipitation: 10 to 20 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 250 to 280 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Hanford

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from igneous rock

Typical profile

H1 - 0 to 12 inches: sandy loam
H2 - 12 to 60 inches: sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 4c
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

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

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

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

HdpA—Hanford sandy loam, moderately deep over silt, 0 to 1 percent slopes

Map Unit Setting
National map unit symbol: hjd0
Elevation: 900 feet
Mean annual precipitation: 12 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 250 to 280 days
Farmland classification: Prime farmland if irrigated

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

Description of Hanford

Setting
Landform: Alluvial fans
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from igneous rock

Typical profile
H1 - 0 to 12 inches: sandy loam
H2 - 12 to 36 inches: sandy loam
H3 - 36 to 60 inches: silt loam

Properties and qualities
Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.9 inches)

Interpretive groups

Land capability classification (irrigated): 2s
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Grangeville

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

Dinuba

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

Tujunga

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

HfA—Hilmar loamy sand, 0 to 1 percent

Map Unit Setting

National map unit symbol: hjd3
Elevation: 300 to 900 feet
Mean annual precipitation: 11 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 230 to 300 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Hilmar

Setting

Landform: Fan skirts
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear

Parent material: Wind modified sandy alluvium derived from granite over silty alluvium derived from granite

Typical profile

H1 - 0 to 7 inches: loamy sand
H2 - 7 to 21 inches: sand
H3 - 21 to 29 inches: sandy loam
H4 - 29 to 60 inches: very fine sandy loam, silt loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Very slightly saline to moderately saline (2.0 to 8.0 mmhos/cm)
Available water capacity: Moderate (about 7.2 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Dinuba

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

Delhi

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

HkbA—Hilmar loamy sand, slightly saline-alkali, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: hjd7
Elevation: 300 to 900 feet
Mean annual precipitation: 11 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 230 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Hilmar and similar soils: 85 percent

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

Description of Hilmar

Setting

Landform: Fan skirts
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Wind modified sandy alluvium derived from granite over silty alluvium derived from granite

Typical profile

H1 - 0 to 7 inches: loamy sand
H2 - 7 to 21 inches: sand
H3 - 21 to 29 inches: sandy loam
H4 - 29 to 60 inches: very fine sandy loam, silt loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Slightly saline to moderately saline (4.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0
Available water capacity: Moderate (about 7.2 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Dinuba

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

Delhi

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

HmA—Hilmar sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: hjd8
Elevation: 300 to 900 feet
Mean annual precipitation: 11 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 230 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Hilmar

Setting

Landform: Fan skirts
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Wind modified sandy alluvium derived from granite over silty alluvium derived from granite

Typical profile

H1 - 0 to 7 inches: sand
H2 - 7 to 21 inches: sand
H3 - 21 to 29 inches: sandy loam
H4 - 29 to 60 inches: very fine sandy loam, silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Very slightly saline to moderately saline (2.0 to 8.0 mmhos/cm)
Available water capacity: Moderate (about 6.7 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: C

Hydric soil rating: No

Minor Components

Dinuba

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

Delhi

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

TuA—Tujunga loamy sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: hjhj
Elevation: 10 to 2,500 feet
Mean annual precipitation: 10 to 25 inches
Mean annual air temperature: 59 to 64 degrees F
Frost-free period: 280 to 350 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Tujunga

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy alluvium derived from granite

Typical profile

H1 - 0 to 10 inches: loamy sand
H2 - 10 to 60 inches: loamy sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Available water capacity: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Hanford

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

Grangeville

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

Foster

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

Merced Area, California

AfA—Atwater loamy sand, 0 to 3 percent slopes, MLRA 17

Map Unit Setting

National map unit symbol: 2vnd0
Elevation: 110 to 430 feet
Mean annual precipitation: 11 to 14 inches
Mean annual air temperature: 62 to 64 degrees F
Frost-free period: 240 to 300 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Atwater

Setting

Landform: Dunes
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian deposits derived from alluvium derived from granite

Typical profile

Ap - 0 to 24 inches: loamy sand
Bt - 24 to 55 inches: sandy loam
C - 55 to 73 inches: loamy sand
2Bq - 73 to 79 inches: cemented loamy sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 60 to 79 inches to cemented horizon
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.02 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Sodium adsorption ratio, maximum: 3.0
Available water capacity: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): 2s
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Delhi

Percent of map unit: 5 percent
Landform: Dunes

Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Rocklin

Percent of map unit: 4 percent
Landform: Terraces, fan remnants
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

San joaquin

Percent of map unit: 4 percent
Landform: Terraces, fan remnants
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Whitney

Percent of map unit: 2 percent
Landform: Terraces, fan remnants
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

DfA—Delhi sand, 0 to 3 percent slopes, MLRA 17

Map Unit Setting

National map unit symbol: 2ss8n
Elevation: 30 to 1,400 feet
Mean annual precipitation: 9 to 16 inches
Mean annual air temperature: 59 to 64 degrees F
Frost-free period: 225 to 310 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Delhi

Setting

Landform: Dunes on valleys
Landform position (two-dimensional): Toeslope, backslope
Landform position (three-dimensional): Rise
Microfeatures of landform position: Hummocks

Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Parent material: Wind modified sandy alluvium derived from granitoid

Typical profile
Ap - 0 to 8 inches: sand
C1 - 8 to 40 inches: sand
C2 - 40 to 60 inches: sand

Properties and qualities
Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.0 mmhos/cm)
Available water capacity: Low (about 4.2 inches)

Interpretive groups
Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

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

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

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

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

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Attachment B

Plant Species Observed in the Delineation Study Area

Plant Species Observed in the Delineation Study Area

Scientific Name	**Common Name**	**Non-native?**
Acer negundo	box elder	
Acer sp.	ornamental maple	Y
Acmispon americanus	Spanish clover	
Ailanthus altissima	tree of heaven	Y
Amaranthus hybridus	slim amaranth	Y
Amsinckia sp.	fiddleneck	
Artemisia douglasiana	California mugwort	
Arundo donax	giant reed	Y
Atriplex serenana var. *serenana*	bract scale	
Avena barbata	wild oat	Y
Avena fatua	wild oat	Y
Brassica nigra	black mustard	Y
Bromus diandrus	rip-gut brome	Y
Bromus madritensis	compact brome	Y
Carex barbarae	Santa Barbara sedge	
Carex sp.	sedge	
Cedrus deodara	Deodar cedar	Y
Celtis australis	hackberry	Y
Centaurea solstitialis	yellow star thistle	Y
Centromadia pungens	common tarweed	
Cephalanthus occidentalis	common buttonbush	
Chenopodium desiccatum	aridland goosefoot	
Citrullus lanatus var. *citroides*	watermellon	Y
Convolvulus arvensis	bindweed	Y
Croton setiger	doveweed	
Cuscuta californica	dodder	
Cyclospermum leptophyllum	marsh parsley	Y
Cynodon dactylon	Bermuda grass	Y
Cyperus eragrostis	tall flatsedge	
Datura wrightii	jimsonweed	Y
Distichlis spicata	saltgrass	
Dittrichia graveolens	stinkwort	Y
Epilobium brachycarpum	tall annual willowherb	
Erigeron bonariensis	flax leaved horseweed	Y
Erigeron canadensis	horseweed	
Erodium botrys	long filaree	Y
Erodium cicutaruim	red stem filaree	Y
Eucalyptus camaldulensis	red gum eucalyptus	Y
Euphorbia maculata	spotted spurge	Y
Festuca arundinacea	tall fescue	Y

Scientific Name	**Common Name**	**Non-native?**
Festuca perennis	Italian ryegrass	Y
Fraxinus angustifolia	narrow leafed ash	Y
Gastridium phleoides	Nit grass	Y
Gnaphalium palustre	western marsh cudweed	
Grindelia camporum	gumweed	
Helianthus annuus	common sunflower	
Heterotheca grandiflora	telegraph weed	
Holcus lanatus	purple velvet grass	Y
Hordeum marinum	seaside barley	Y
Hordeum murinum	wall barley	Y
Juglans californica	black walnut	
Jugland hindsii	California black walnut	
Juncus effusus	soft rush	
Juncus xiphioides.	iris leaf rush	
Lactuca serriola	prickly lettuce	Y
Lagerstroemia indica	crepe myrtle	Y
Liquidambar styraciflua	American sweetgum	Y
Lythrum hyssopifolia	hyssop loosestrife	Y
Malva nicaeensis	French mallow	Y
Malva parviflora	cheeseweed	Y
Medicago sativa	alfalfa	Y
Modiola caroliniana	Carolina bristle-mallow	Y
Morus alba	mulberry	Y
Nerium oleander	oleander	Y
Nicotiana glauca	tree tobacco	Y
Oenothera laciniata	cutleaf evening primrose	Y
Olea europaea	Olive	Y
Panicum capillare	witchgrass	
Paspalum dilatatum	Dallas grass	Y
Persicaria lapathifolia	pale smartweed	Y
Pinus contorta	lodgepole pine	
Pistacia chinensis	Chinese pistache	Y
Platanus occidentalis	American sycamore	Y
Platanus racemosa	Western sycamore	
Polygonum argyrocoleon	silversheath knotweed	Y
Polygonum aviculare	prostrate knotweed	Y
Populus fremontii	Fremont cottonwood	
Portulaca oleracea	common purslane	Y
Prunus dulcis	almond	Y
Pyracantha koidzumii	firethorn	Y
Pyrus calleryana	callery pear	Y
Quercus douglasii	blue oak	

Scientific Name	Common Name	Non-native?
Quercus lobata	valley oak	
Quercus wislizenii	interior live oak	
Raphanus raphanistrum	jointed charlock	Y
Robinia pseudoacacia	black locust	Y
Rubus armeniacus	Himalayan blackberry	Y
Rumex crispus	curly dock	Y
Salix exigua	sandbar willow	
Salix laevigata	red willow	
Salsola tragus	Russian thistle	Y
Sambucus nigra ssp. caerulea	blue elderberry	
Schoenoplectus acutus	hard-stem bulrush	
Secale cereale	cereal rye	Y
Setaria parviflora	marsh bristlegrass	
Sequoia sempervirens	coast redwood	
Silybum marianum	milk thistle	Y
Solanum sp.	nightshade	
Sonchus oleraceus	sow thistle	Y
Sorghum halepense	Johnson grass	Y
Spergularia sp.	sand spurry	
Stipa miliacea	smilo grass	Y
Toxicodendron diversilobum	poison oak	
Tribulus terrestris	Caltrops	Y
Typha latifolia	Broad-leaf cattail	
Veronica anagallis-aquatica	water speedwell	Y
Vicia villosa	winter vetch	Y
Washingtonia robusta	Mexican fan palm	Y
Xanthium strumarium	cockleburr	

Attachment C

Routine Wetland Determination Data Forms

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Ace Ceres to Merced Extension City/County: Livingston, Merced County Sampling Date: 5/29/2020

Applicant/Owner: AECOM State: CA Sampling Point: 1

Investigator(s): Sierra Spooner Section, Township, Range: none - private land grants

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

Subregion (LRR): C - Mediterranean California Lat: 37.399215 Long: -120.743393 Datum: WGS 84

Soil Map Unit Name: Hanford fine sandy loam, 0 to 1 percent slopes NWI classification: R2UBH

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

Are Vegetation ☐ Soil ☐ or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes (●) 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.

	Yes	No
Hydrophytic Vegetation Present?	( )	(●)
Hydric Soil Present?	( )	(●)
Wetland Hydrology Present?	(●)	( )

Is the Sampled Area within a Wetland? Yes ( ) No (●)

Remarks: Bank of the Merced River just north of Livingston, California.

The vegetation is not hydric at the edge of the active channel. While some of the tree and shrub strata are FACW or FACU species, the herb strata is consistently composed of upland grasses.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Quercus lobata*	20	Yes	FACU
2. *Salix laevigata*	35	Yes	FACW
3.			
4.			
Total Cover:	55 %		
Sapling/Shrub Stratum			
1. *Sambucus nigra ssp. cerulea*	30	Yes	FACU
2. *Acer negundo*	5	No	FACW
3.			
4.			
5.			
Total Cover:	35 %		
Herb Stratum			
1. *Bromus diandrus*	5	No	Not Listed
2.			
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	5 %		
Woody Vine Stratum			
1. *N/A*			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 25 % % Cover of Biotic Crust 0 %

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:	33.3 %	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species	40	x 2 =	80
FAC species		x 3 =	0
FACU species	50	x 4 =	200
UPL species	5	x 5 =	25
Column Totals:	95 (A)		305 (B)

Prevalence Index = B/A = 3.21

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.

Hydrophytic Vegetation Present? Yes ( ) No (●)

Remarks: The vegetation is not hydric.
Plot size is 5' by 10' following the edge of the active channel.

SOIL

Sampling Point: 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 Features %	Type[1]	Loc[2]	Texture	Remarks

[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.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? **Yes** ○ **No** ◉

Remarks: Soil pit was not dug due to access constraints, however with a well defined bed/bank and lack of hydric vegetation at the edge of the active channel, it is assumed that hydric soil conditions at this sample point are unlikely.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ 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 Plowed 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):
Water Table Present?	Yes ○	No ◉	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):

Wetland Hydrology Present? **Yes** ◉ **No** ○

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

Remarks: Based on secondary indicators of drift deposits and saturation in aerial imagery, wetland hydrology is present within the OHWM of the river bank.

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: ACE Ceres to Merced Extension | City/County: Merced County | Sampling Date: 5/29/2020

Applicant/Owner: AECOM | State: CA | Sampling Point: 2

Investigator(s): Sierra Spooner | Section, Township, Range: none - private land grants

Landform (hillslope, terrace, etc.): terrace | Local relief (concave, convex, none): slope | Slope (%): 0

Subregion (LRR): C - Mediterranean California | Lat: 37.330582 | Long: -120.568825 | Datum: WGS 84

Soil Map Unit Name: Snelling sandy loam, imperfectly drained variant, 0 to 1 % slopes | NWI classification: R4SBCx

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

Are Vegetation [X] Soil [X] or Hydrology [X] significantly disturbed? Are "Normal Circumstances" present? Yes (●) 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: Canal Creek and associated freshwater marsh. The wetland boundary corresponds to the OHWM. A soil pit was not dug due to access constraints, however the clear shift in plant species from obligate to upland within less than three feet was used as the wetland boundary.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. *N/A*			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1. *N/A*			
2.			
3.			
4.			
5.			
Total Cover:	%		
Herb Stratum			
1. *Schoenoplectus acutus*	60	Yes	OBL
2. *Artemisia douglasiana*	15	No	FAC
3. *Sorghum halepense*	15	No	FACU
4. *Typha latifolia*	10	No	OBL
5.			
6.			
7.			
8.			
Total Cover:	100 %		
Woody Vine Stratum			
1. *N/A*			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 25 % | % Cover of Biotic Crust 0 %

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:	100.0 %	(A/B)

Prevalence Index worksheet:

Total % Cover of:			Multiply by:
OBL species	70	x 1 =	70
FACW species		x 2 =	0
FAC species	15	x 3 =	45
FACU species	15	x 4 =	60
UPL species		x 5 =	0
Column Totals:	100 (A)		175 (B)

Prevalence Index = B/A = 1.75

Hydrophytic Vegetation Indicators:

- [X] Dominance Test is >50%
- [X] 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.

Hydrophytic Vegetation Present? Yes (●) No ( )

Remarks: Dominance of FACW and OBL test, and prevalence index is 2.20
Plot size is 10' by 10'

SOIL

Sampling Point: 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 Features %	Type[1]	Loc[2]	Texture	Remarks

[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.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? **Yes** (●) **No** ( )

Remarks: Soil pit was not dug due to access constraints but hydric soils are assumed to be present. This is a freshwater marsh associated with a channelized creek. The wetland boundary corresponds to the OHWM.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- [x] Surface Water (A1)
- [x] High Water Table (A2)
- [x] 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 Plowed 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**)
- [x] Drainage Patterns (B10)
- [ ] Dry-Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [x] Saturation Visible on Aerial Imagery (C9)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes (●)	No ( )	Depth (inches): 0
Water Table Present?	Yes (●)	No ( )	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes (●)	No ( )	Depth (inches): 0

Wetland Hydrology Present? **Yes** (●) **No** ( )

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

Remarks: Wetland hydrology indicators present including surface water.

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: ACE Ceres to Merced Extension | City/County: Merced, Merced County | Sampling Date: 6/5/2020

Applicant/Owner: AECOM | State: CA | Sampling Point: 3

Investigator(s): Sierra Spooner | Section, Township, Range: none - private land grants

Landform (hillslope, terrace, etc.): Terrace | Local relief (concave, convex, none): None | Slope (%): 0

Subregion (LRR): C - Mediterranean California | Lat: 37.313755 | Long: -120.522925 | Datum: WGS 84

Soil Map Unit Name: Wyman clay loam, 0 to 3 percent slope | NWI classification: E1UBL

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

Are Vegetation [X] Soil [X] or Hydrology [X] significantly disturbed? Are "Normal Circumstances" present? Yes (●) 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: Channelized creek intersecting with irrigation canals. Irrigation canals are filled in with wetland plant species.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. *N/A*			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1. *Salix exigua*	5	Yes	FACW
2. *Cephalanthus occidentalis*	5	Yes	OBL
3.			
4.			
5.			
Total Cover:	10 %		
Herb Stratum			
1. *Sorghum halepense*	60	Yes	FACU
2. *Silybum marianum*	5	No	Not Listed
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	65 %		
Woody Vine Stratum			
1. *Rubus armeniacus*			FAC
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum 25 % | % Cover of Biotic Crust 0 %

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: 66.7 % (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	5	x 1 =	5
FACW species	5	x 2 =	10
FAC species		x 3 =	0
FACU species	60	x 4 =	240
UPL species	5	x 5 =	25
Column Totals:	75 (A)		280 (B)

Prevalence Index = B/A = 3.73

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.

Hydrophytic Vegetation Present? Yes (●) No ( )

Remarks: Dominance of FACW and OBL plants
Plot size is 5' by 10'

SOIL

Sampling Point: 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 Features %	Type[1]	Loc[2]	Texture	Remarks

[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.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ◉ No ○

Remarks: Soil pit not dug due to access constraints but hydric soils are assumed to be present within the OHWM where wetland vegetation is present.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☒ 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 Plowed 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): 0
Water Table Present?	Yes ◉	No ○	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches): 0

Wetland Hydrology Present? **Yes** ◉ **No** ○

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

Remarks: Wetland hydrology indicators present include surface water.

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: ACE Ceres to Merced Extension | City/County: Merced, Merced County | Sampling Date: 6/5/2020

Applicant/Owner: AECOM | State: CA | Sampling Point: 4

Investigator(s): Sierra Spooner | Section, Township, Range: none - private land grants

Landform (hillslope, terrace, etc.): Terrace | Local relief (concave, convex, none): none | Slope (%): 2

Subregion (LRR): C - Mediterranean California | Lat: 37.307902 | Long: -120.503291 | Datum: WGS 84

Soil Map Unit Name: Honcut Silt Loam, 0-2% slopes | NWI classification: R2UBHx

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

Are Vegetation [X] Soil [X] or Hydrology [X] significantly disturbed? Are "Normal Circumstances" present? Yes (●) 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.

	Yes	No
Hydrophytic Vegetation Present?	( )	(●)
Hydric Soil Present?	(●)	( )
Wetland Hydrology Present?	(●)	( )

Is the Sampled Area within a Wetland? Yes ( ) No (●)

Remarks: Creek with well defined, partially armored 40' bed and 60' banks passing through mixed industrial / residential area.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Populus fremontii*	5	Yes	Not Listed
2. *Robinia pseudoacacia*	5	Yes	FACU
3.			
4.			
Total Cover:	10 %		
Sapling/Shrub Stratum			
1. *Arundo donax*	25	Yes	FACW*
2. *Narium oleander*	1	No	Not Listed
3.			
4.			
5.			
Total Cover:	26 %		
Herb Stratum			
1. *Bromus diandrus*	20	Yes	NI
2. *Festuca arundinacea*	15	Yes	FACU
3. *Brassica nigra*	5	No	Not Listed
4. *Bromus madritensis*	20	Yes	UPL
5. *Silybum marianum*	5	No	Not Listed
6. *Lactuca serriola*	5	No	FACU
7.			
8.			
Total Cover:	70 %		
Woody Vine Stratum			
1. *Rubus armeniacus*	5	Yes	FAC
2.			
Total Cover:	5 %		

% Bare Ground in Herb Stratum 25 % | % Cover of Biotic Crust 0 %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	2	(A)
Total Number of Dominant Species Across All Strata:	7	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	28.6 %	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species	25	x 2 =	50
FAC species	5	x 3 =	15
FACU species	25	x 4 =	100
UPL species	56	x 5 =	280
Column Totals:	111 (A)		445 (B)

Prevalence Index = B/A = 4.01

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.

Hydrophytic Vegetation Present? Yes ( ) No (●)

Remarks: Tree plot size is 5' wide by 50' long, following bank due to rapid vegetation shift away from the river. all other strata plot size is 5' x 5'

SOIL

Sampling Point: 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

[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.

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? Yes ◉ No ○

Remarks: Soils were not sampled due to access constraints, however with the presence of some hydric vegetation and a clear OHWM and wetland hydrology indicators, hydric soil conditions are assumed to be present along the banks of Bear Creek.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ 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 Plowed 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):
Water Table Present?	Yes ○	No ◉	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):

Wetland Hydrology Present? **Yes** ◉ **No** ○

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

Remarks: Clear bed and bank defines feature boundary. Riverine secondary indicators of drainage patterns, drift deposits, and water marks show OHWM of creek.

Attachment D

Representative Photographs

Representative Photographs and Photo Point Locations

1) View of a lined irrigation canal where it passes through the study area north of Turlock, California (*Feature ID: 83-D*). No adjacent wetlands were observed. Photograph taken from West Taylor Road looking east. May 29, 2020. (*Photo Point Location 1: 37.536717, - 120.895583*)

2) View of the Merced River where it passes through the study area between Livingston and Delhi, California (*Feature ID: 51-W*). No adjacent wetlands were observed. Photograph taken near Sample Point #1 from the north bank looking south. May 29, 2020. (*Photo Point Location 2: 37.399215, -120.743393*)

3) View of Canal Creek with adjacent freshwater marsh vegetation habitat where it passes through the study area between Atwater and Merced, California (*Feature ID: 21-W*). Photograph taken near Sample Point #2 facing south. May 29, 2020. (*Photo Point Location 3: 37.330582, -120.568825*)

4) View of an unlined irrigation canal (*Feature ID: 20-W*) where it passes through the study area between of Atwater and Merced, California. No adjacent wetlands were observed. Photograph taken from the north bank facing south. June 5, 2020. (*Photo Point Location 4: 37.32683, -120.559035*).

5) View of Black Rascal Creek and adjacent freshwater marsh vegetation (*Feature ID:11-W*) within the study area north of Merced, California. Photograph taken near Sample Point #3 from the south bank facing north. June 5, 2020. (*Photo Point Location 5: 37.313755, -120.522925*)

6) View of Bear Creek where it passes through the study area north of Merced, California (*Feature ID:03-01-W*). No adjacent wetlands were observed. Photograph taken near Sample Point #4 from the north bank facing south. June 5, 2020. (*Photo Point Location 6: 37.307902, -120.503291*)

Attachment E

ORM Table

Waters	State	Cowar	HGM_Code	Meas_	Amour	Units	Waters_Type	Latitude	Longitude	Local_Waterway
03-01-	CALIFORNIA	R1UB	RIVERINE	Area	2.087	ACRE	DELINEATE	37.3079	-120.50329	San Joaquin River
11-W	CALIFORNIA	R1UB	RIVERINE	Area	0.251	ACRE	DELINEATE	37.31376	-120.52293	San Joaquin River
12-W	CALIFORNIA	R1UB	RIVERINE	Area	0.013	ACRE	DELINEATE	37.31374	-120.52264	San Joaquin River
13-W	CALIFORNIA	R1UB	RIVERINE	Area	0.48	ACRE	DELINEATE	37.31501	-120.52612	San Joaquin River
16-W	CALIFORNIA	R1UB	RIVERINE	Area	0.32	ACRE	DELINEATE	37.32159	-120.54445	San Joaquin River
17-W	CALIFORNIA	R1UB	RIVERINE	Area	0.222	ACRE	DELINEATE	37.32175	-120.54542	San Joaquin River
18-W	CALIFORNIA	R1UB	RIVERINE	Area	0.02	ACRE	DELINEATE	37.32266	-120.5451	San Joaquin River
20-W	CALIFORNIA	R1UB	RIVERINE	Area	1.098	ACRE	DELINEATE	37.32683	-120.55904	San Joaquin River
21-W	CALIFORNIA	R1UB	RIVERINE	Area	0.271	ACRE	DELINEATE	37.33058	-120.56883	San Joaquin River
22-W	CALIFORNIA	R1UB	RIVERINE	Area	0.427	ACRE	DELINEATE	37.33362	-120.5775	San Joaquin River
23-W	CALIFORNIA	R1UB	RIVERINE	Area	0.174	ACRE	DELINEATE	37.33368	-120.5777	San Joaquin River
32-W	CALIFORNIA	R1UB	RIVERINE	Area	0.287	ACRE	DELINEATE	37.35316	-120.63124	San Joaquin River
33-W	CALIFORNIA	R1UB	RIVERINE	Area	1.371	ACRE	DELINEATE	37.35373	-120.63097	San Joaquin River
35-W	CALIFORNIA	R1UB	RIVERINE	Area	0.336	ACRE	DELINEATE	37.35373	-120.63237	San Joaquin River
44-W	CALIFORNIA	R1UB	RIVERINE	Area	0.277	ACRE	DELINEATE	37.37499	-120.69018	San Joaquin River
51-W	CALIFORNIA	R1UB	RIVERINE	Area	0.304	ACRE	DELINEATE	37.39922	-120.74339	San Joaquin River
55-W	CALIFORNIA	R1UB	RIVERINE	Area	0.207	ACRE	DELINEATE	37.41515	-120.75667	San Joaquin River
59-W	CALIFORNIA	R1UB	RIVERINE	Area	0.111	ACRE	DELINEATE	37.44291	-120.79011	San Joaquin River
61-W	CALIFORNIA	R1UB	RIVERINE	Area	0.382	ACRE	DELINEATE	37.46398	-120.81201	San Joaquin River
83-D	CALIFORNIA	R1UB	RIVERINE	Area	1.126	ACRE	DELINEATE	37.53672	-120.89558	San Joaquin River
90-W	CALIFORNIA	R1UB	RIVERINE	Area	0.137	ACRE	DELINEATE	37.56515	-120.92771	San Joaquin River
92-W	CALIFORNIA	R1UB	RIVERINE	Area	0.391	ACRE	DELINEATE	37.57406	-120.9382	San Joaquin River