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Data Response Set 2 (Responses to Data Requests A9 to A20)

Submitted to
California Energy Commission

Prepared by
Sutter CCUS, LLC

With assistance from
Jacobs

Sutter Decarbonization Project
(97-AFC-02C)
March 2025

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Introduction

Attached are Sutter CCUS LLC's¹ (Applicant) responses to the California Energy Commission (CEC) Staff's *Data Requests Set 2, A9 through A20* regarding the *Petition for Post-Certification Modification: Sutter Decarbonization Project* filed for the Sutter Energy Center (97-AFC-02)

The responses are grouped by individual discipline or topic area. Within each discipline area, the responses are presented in the same order as presented in CEC Staff's *Data Requests Set 2, A9 through A20* and are keyed to the Data Request numbers.

¹ An indirect, wholly owned subsidiary of Calpine Corporation (Calpine).

1. Biological Resources (DR A9-A20)

Background: Project Area

Staff has reviewed the Petition for Modification (Petition) (TN250246), including Appendix B Biological Resources (May 2023), and the Biological Resources Technical Memorandum Special-Status Species Habitat Assessment (BRTM) from November 2023 (TN257582); for the Sutter Decarbonization Project. There are differences between the project Biological Study Area (BSA) in the Petition and the BRTM. Specifically, the BRTM shows a Horizontal Directional Drilling (HDD) String (Figure 2, Map 1 of 6) and nine well pad locations (Figure 2, Map 5 of 6). The Petition states there would be three Class VI injection wells located on three well pads.

The BRTM states the carbon capture facility would be located at the site of the decommissioned Greenleaf 1 Cogeneration facility adjacent to the existing Sutter Energy Center. The location of the carbon capture facility is not provided on any of the figures in the BRTM or the Petition. Similarly, the location of the turbine performance improvements is not provided.

The BRTM discusses directionally drilling the pipeline under the Sutter Bypass to avoid disturbance to habitats for various special-status species. Figure 2 Maps 1-6 of the BRTM list pipeline and construction elements in the legend, including "Trenchless Pipeline Construction Area" and "Pipeline." The Petition states that the pipeline is expected to be underground for the majority of the pipeline route until it reaches the injection well location but does not provide details on the pipeline installation methods or staging areas.

Data Requests:

A9. Please explain the discrepancies in the project area between the Petition and the BRTM and provide additional information on the Project. Specifically, please provide the location of the carbon capture facility, the turbine improvements, and any staging or temporary laydown. Also, please provide additional background on the location of the HDD String and the location of the Class VI injection wells, including how many and type of wells are proposed for the project. Please provide clarification on the "Trenchless Pipeline Construction Area" shown in Figure 2 Maps 1-6 of the BRTM and whether this corresponds to areas where the pipeline will be directionally drilled underground. Lastly, please provide pipeline installation details for areas labeled as "Pipeline" in Figure 2 Maps 1-6 of the BRTM.

Response: The carbon capture facility will be located within the fence line of the decommissioned Greenleaf 1 Cogeneration facility. The perimeter fence line is outlined in the *Biological Resources Technical Memorandum Special-Status Species Habitat Assessment (BRTM)* from November 2023 (TN257582). The steam turbine improvements will take place within the existing Sutter Energy Center steam turbine. Laydown for the facility will be on the property directly to the north of the Sutter Energy Center on land controlled by the Project Owner.

Locations of the three proposed injection wells and associated monitoring wells are included in the Class VI application submitted to EPA Region IX in 2023. Final locations of the injection wells and the final number and location of monitoring wells will be determined using core data obtained from the stratigraphic well to be drilled in Q2 of 2025. The stratigraphic test well will provide core data that will be used to validate the locations for placement of injection wells.

The reference to "Trenchless Pipeline Construction Area" shown in Figure 2 Maps 1-6 of the *BRTM* from November 2023 (TN257582) corresponds to areas where the pipeline will be directionally drilled underground. Pipeline installation activities for areas labeled as "Pipeline" in Figure 2 Maps 1-6 of the *BRTM* from November 2023 (TN257582) will be determined by the construction contractor but are

expected to be typical for open trench pipeline installation. Pipeline installation activities may include site preparation, pipe stringing, excavation or trenching, placement of the pipeline components, backfilling, testing, and site restoration.

Background: Biological Resources Technical Memorandum

In the BRTM, it states that appropriate avoidance and minimization measures for special-status fish and wildlife species will be developed through Endangered Species Act (ESA) consultation with the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) in coordination with state permitting agencies, as appropriate. Many species discussed in the BRTM are either state listed or California Department of Fish and Wildlife (CDFW) Species of Special Concern. As such, appropriate avoidance and minimization measures will need to be included in the Staff Assessment as required by the California Environmental Quality Act (CEQA). In coordination with the resource agencies, staff may recommend additional conservation measures be incorporated in the staff assessment.

Appendix B Biological Resources of the Petition stated that an aquatic resources jurisdictional delineation was not performed but would be completed to determine the extent of wetlands that are potentially jurisdictional. The BRTR did not discuss the status of the jurisdictional delineation, the location of aquatic features, or potential impacts to aquatic features.

Appendix B Biological Resources of the Petition stated that the CDFW VegCAMP program for the Great Valley Ecoregion was reviewed to determine potential habitat occurrence within the BSA; and during the reconnaissance field survey, the data was further refined to better characterize habitat on-site. However, the BRTR did not discuss whether there were any vegetation and land use changes or refinements identified during the subsequent biological survey. Although general species habitat was identified on Figure 2 of the BRTR, vegetation types and land cover identified were not shown on the figures provided in Appendix B of the Petition or the BRTM.

*The project is located within the historic and current range for Crotch's bumble bee (*Bombus crotchii*), which is currently a candidate species for listing under CESA. Under CESA, a candidate species for which notice has been given under Fish and Game Code, section 2074.4 is afforded the same protections as a threatened or endangered species (Fish & G. Code, § 2085), including the prohibition on take without appropriate authorization. Crotch's bumble bee was listed in Table 3-1 of the Petition but was not discussed in the BRTR. The Petition does not assess impacts to Crotch's bumble bee or request take coverage for this species. The closest Bumble Bee Watch observation is over 15 miles to the east and a 2007 CNDDDB record occurs approximately 9 miles to the west. Crotch's bumble bee is a relatively new candidate for state listing and there is limited historical data. This does not preclude the potential for Crotch's bumble bee to occur in the area. Natural areas of the project layout may provide floral resources that could support Crotch's bumble bee. Project-related impacts to Crotch's bumble bee may require incidental take coverage or implementation of avoidance measures.*

Data Requests:

A10. Please clarify whether coordination or consultation with state and federal agencies has been conducted, and whether any recommended avoidance and minimization measures were provided for federal, or state listed, special-status species.

Response: Preliminary discussions with the USFWS, CDFW and NMFS took place in 2023. Summaries of these discussions were provided to the CPM on September 9, 2023, and are included in this response as **Attachment A**. At this time, resource agencies have not provided any recommended avoidance and minimization measures. The Project Owner anticipates that ESA section 7 consultations with USFWS will be initiated by the DOE once the third party NEPA contractor has been selected.



A11. Please provide recommended avoidance and minimization measures for federal or state listed, or special-status species that are discussed in the biological reports.

Response: A biological assessment is currently being prepared. Avoidance and minimization measures for biological resources will be developed in parallel with the biological assessment.

A12. Please provide an aquatic resources jurisdictional delineation report for the project, including potential impacts from the project, the jurisdiction of aquatic features identified, restoration implementation for areas temporarily impacted, and mitigation approach for areas permanently impacted.

Response: An aquatic resources delineation was conducted for the Project by Jacobs in 2023-2024. The final Aquatic Resources Delineation Report is included as **Appendix C**. If any aquatic resources are temporarily impacted, they will be restored to pre-disturbance condition. No permanent impacts to aquatic resources are anticipated and therefore no mitigation is proposed. In the unlikely circumstance that permanent impacts cannot be avoided, mitigation would be provided through purchase of credits from the National Fish and Wildlife Foundation's Sacramento District California In-Lieu Fee Program..

A13. Please discuss vegetation and land use cover identified during the September 2023 focused surveys, and if the focused surveys resulted in any changes or refinements to the vegetation types described in the Petition. In addition, please provide a map showing the location of the vegetation types identified in the BSA during the desktop review and subsequent surveys.

Response: Vegetation and land cover types in the Project footprint and surrounding area are consistent with descriptions provided previously to CEC. The September 2023 focused assessments did not identify any new vegetation communities/ habitat types within the Biological Study Area (BSA). **Attachment C** provides a map of the vegetation and land cover types in the BSA. The BSA is dominated by agriculture and other modified vegetation and land cover types. Approximately 50% of the land cover in the BSA is rice fields. Other major land cover types in the BSA include non-native grasslands, ruderal and sparsely vegetated areas, riparian habitat, Himalayan blackberry scrub blackberry thickets, and agricultural ditches (**Attachment C**).

A14. Please provide a habitat assessment evaluating the likelihood of bumble bees occurring within and adjacent to the project area. More information on the appropriate Crotch's bumble bee habitat assessment and survey protocol can be found in the Survey Considerations for California Endangered Species Act (CESA) Candidate Bumble Bee Species document located on the CDFW website at <https://wildlife.ca.gov/Conservation/CESA>. If the habitat assessment determines potential habitat is present, include a detailed impacts analysis for Crotch's bumble bee and recent results of a protocol-level survey. If this additional information for Crotch's bumble bee indicates that the project or activities proposed as part of the Petition may cause take of Crotch's bumble bee, staff recommends that the applicant revise the petition to request take coverage for this species. This additional request for take coverage must include all information that would be required in an Incidental Take Permit (ITP) application for CESA-listed or candidate species, including an impacts analysis and proposed mitigation measures (Cal. Code of Regs., tit.14, § 783.2).

Response: A habitat assessment for Crotch's bumble bee is provided in **Attachment D**. While Crotch's bumble bee was historically widespread in the Central Valley, modifications to the landscape, particularly agriculture, have extirpated this species from much of its historic range in California. Overall, the Project footprint and surrounding area offer marginal nesting and foraging opportunities for Crotch's bumble bee, and the presence of dispersal barriers between occurrences of this species and the Project footprint make it highly unlikely individual bees would occupy the Project footprint. Therefore, this species is unlikely to be present within the Project footprint during construction.

Background: Carbon Dioxide Transport and Storage

It is not clear how the carbon dioxide (CO₂) would be transported between the termination of the CO₂ Transport Pipeline Route and the location of the Class VI Injection Wells. In the BRTM, the closest distance between the termination of the pipeline and the nearest well pad is approximately 0.5 miles, and the farthest distance is approximately 2.5 miles.

Inadvertent drilling fluid release (i.e., a “frac-out”) is discussed in the Petition and the BRTM as having the potential to damage individual plants and impact listed fish species. A frac-out could also potentially impact aquatic habitat and other species that utilize aquatic habitat. The project owner states the project does not intend to alter the bed, bank, or channel of existing aquatic features and would directionally drill the pipeline under potential habitat, which makes the potential for a frac-out to harm special status species unlikely. Though unlikely, the potential still exists for a frac-out to impact aquatic habitat.

The Petition states that the pipeline would be equipped with state-of-the-art fiber optic monitoring and automatic shutoff systems to ensure safe operations. Extensive details are provided on the monitoring for the Class VI Injection Wells, but only minimal information is provided for the 15.7-mile CO₂ pipeline. There is a concern regarding the potential for pipeline failures and ruptures that could result in CO₂ leakage and poisoning. Excessive CO₂, which displaces oxygen in the air, can be highly toxic to humans and wildlife. CEC staff acknowledges that Public Resources Code, section 71465 prohibits pipelines from being utilized to transport carbon dioxide to or from a carbon dioxide capture, removal, or sequestration projects until the federal Pipeline and Hazardous Materials Safety Administration has concluded the rulemaking (RIN 2137-AF60) regarding minimum federal safety standards for transportation of carbon dioxide by pipeline (Parts 190 to 199, inclusive, of Title 49 of the Code of Federal Regulations).

The project owner is required to demonstrate that the pipeline meets those standards. Currently, the Pipeline and Hazardous Materials Safety Administration has not initiated the proposed rulemaking (RIN 2137-AF60) regarding minimum federal safety standards. However additional information is needed for CEC staff to evaluate how CO₂ will be transported in pipelines.

The Petition states the pipeline would be operated at temperatures ranging from 60 to 120 degrees Fahrenheit at a depth of less than eight feet. It is unclear whether the pipeline would be insulated to reduce the exposure of the surrounding soil to high temperatures or whether the high temperatures would have an impact on surface resources.

The Petition states the geological storage complex for the SEC project is located approximately 10 miles southwest within an approximately 42 square-mile area and is currently used for saltwater disposal. The description does not elaborate on the storage capacity of this area or the expected lifespan of the injection wells and pipeline.

Data Requests:

A15. A15. Please provide details on how CO₂ would be transported from the pipeline termination to the proposed well pads.

Response: The CO₂ will be pressurized at the carbon capture facility. The CO₂ will be transported via the pipeline and injected to the wellheads at 2200 psi.

A16. Please provide details on the boring methodology for the pipeline. For instance, would a tracking wire be used? Would a vacuum truck be on-site during HDD operations? Would the bore be sleeved? How would searches for inadvertent release be conducted? Would a jack and bore be used or other method, and what are the noise or vibration impacts on sensitive biological resources? What is the duration of boring activities (i.e., 24 hours a day)? If boring is anticipated at night, what would the impacts of night-lighting be on sensitive biological resources?



Response: The bore will be completed using Horizontal Direction Drill methods. This method consists of placing an HDD machine at the entry location and boring under the crossing area from the surface. A wired tracking system will be used for guiding the bore, which will consist of placing tracking wires along the bore path to allow for accurate tracking.

After placement of the bore machine and tracking system, the bore machine will push a drilling head with bore pipe to complete a pilot hole to establish the trajectory. Drill fluid consisting of bentonite mud and water will be added during the pilot hole to provide hole stabilization and lubrication during the boring process. After completion of the pilot hole is complete, a follow-up ream/ swab pass will be completed to open and condition the hole to the proper size for the proposed carrier pipe.

The bore is not proposed to be sleeved since it is expected that soil conditions will not require it. A jack and bore is not proposed for any crossings since an HDD is considered less impactful and more efficient in these conditions. The noise level for the HDD equipment is considered typical of non-impact construction equipment. Other noise generating equipment includes the use of diesel engines and hydraulic components. Typically, vibrations on an HDD are the results of the bore pipe encountering hard soil conditions or obstructions. Given the alluvial nature of the soil in this area and lack of development, hard soil and obstructions are not expected to be encountered. The impact from noise and vibration to sensitive biological resources is expected to be minimal.

The duration of HDD operations will depend on the pipeline contractor's assessment of the soil conditions and difficulty of the drill. For all but the Sutter Bypass crossing, 24-hour operation or boring at night is highly unlikely. For the longer Sutter Bypass HDD, 24-hour operation or boring at night will depend on the contractor's assessment of the actual soil conditions and the stage of construction. For example, it is likely that during short but critical phases of the project, the contractor will go to 24-hour operations until the work is complete. There are no residences or sensitive receptors in the Sutter Bypass or the immediate area where this work would occur.

Avoidance and minimization measures addressing adverse effects of night-lighting on sensitive resources will be developed should night operation or construction be required.

A17. Please provide a Frac-Out Contingency Plan that establishes operating procedures and responsibilities for prevention, containment, clean-up, and disposal of drilling fluid if a frac-out were to occur; including specific measures if a frac-out were to occur in aquatic or another sensitive habitat.

Response: A conceptual horizontal directional drilling (HDD) inadvertent release protection and contingency plan for a sensitive water crossing is provided as **Attachment E**. A final plan will be provided by the pipeline contractor after selection and following detailed design.

A18. Please provide details on the steps that would be taken to monitor and avoid a rupture along the CO2 pipeline during operations. Please also provide a contingency plan if a rupture is detected along the pipeline or within the Class VI Injection Wells.

Response: A preliminary Emergency Response Plan was created during an initial Front End Engineering Design. A project specific, final ERP will be developed and include rupture scenarios. The basic steps that will be taken to monitor and avoid rupture during operations include the following:

1. Development of required operating and contingency plans.
2. Proper and continuous training of operations and maintenance personnel on the operation, and maintenance of the CO2 pipeline with emphasis on the special considerations for transporting CO2.
3. Installation and maintenance of pipeline control and safety equipment such as control valves, isolation/ shutoff valves, pressure relief valves, and pressure/ temperature monitoring instrumentation to ensure that the pipeline operates within the design parameters of the pipeline during all phases of operation including start-up and other abnormal conditions.



4. A SCADA system will monitor operating conditions during normal and abnormal operation allowing Calpine operators to safely monitor and operate the pipeline. Instrumentation will be installed to monitor pipeline pressure, temperature, valve positions, and other critical parameters.
5. A leak detection system will be installed to monitor for leaks and ruptures and be connected to an automatic shut off system in the event a leak is detected.
6. External CO₂ monitoring devices along sensitive areas of the pipeline will be installed in compliance with newly developed regulations.
7. To protect against mechanical strike from agricultural equipment, the pipeline will be installed with additional cover than required by regulation
8. The pipeline will be installed with warning tape over the pipeline as an additional warning when excavating near the pipeline.
9. The pipeline will be installed via Horizontal Directional Drill with extra depth under irrigation canals and the Sutter Bypass levees to allow for maintenance of these areas without the risk of damaging the pipeline.
10. Operations personnel will conduct visual inspection along the pipeline route to identify any unauthorized excavation or activities near pipeline facilities and to monitor for any geophysical impacts.
11. The pipeline will be installed with external coating and cathodic protection to provide long term protection from external corrosion.
12. Operations personnel will complete regular internal inspections with smart pigs to assess internal and external corrosion and shall complete cathodic protection surveys to monitor the integrity of the coating system.

A19. Please provide details regarding the 60 to 120-degree temperatures of the pipeline during operations, if there are any potential impacts to the surrounding soils or surface resources, and if there are any design measures to monitor, insulate, or alleviate those temperatures.

Response: The 60-degree temperature represents a winter operating condition and the 120-degree temperature represents a summer operating condition. There are expected to be no impacts to the surrounding soil or surface resources at these operating temperatures. Many existing liquid and gas pipelines operate within these ranges and because they are buried, the ground provides sufficient insulation so that there is no impact to surrounding resources or need for insulation. There will be temperature monitoring equipment at the metering facilities to properly operate and monitor the pipeline and for the operation of the leak detection system.

A20. Please provide details on the storage capacity of the geological storage complex and the expected lifespan of the pipeline and injection wells. For cumulative impacts, please provide information on other storage.

Response:

The geological storage area will be capable of storing at least 30 years of injection capacity in the Starkey Clean Sands. The initial design and modeling were conducted for a total of 16.28 metric tons for the initial 12 years injected into 3 Class VI injection wells. The geological storage location will be dedicated to the Sutter Decarbonization Project with no other planned injection sources. After the analytical data for the stratigraphic test well is available a final design of the well locations will be submitted to EPA Region IX for final action on the Class VI permit.

Properly designed pipelines are protected from both internal and external corrosion and can have an indefinite lifespan. For dense phase CO₂, the biggest contributor to corrosion is the presence of free water in the fluid stream. The water content of the proposed fluid stream will be very low and typically soluble within the CO₂ stream and continuously monitored, therefore internal corrosion is not expected to be a factor. The pipeline will be protected from external corrosion via the external coating and cathodic protection system. The coating system that will be applied is highly inert to the surrounding soil and would

typically have negligible levels of degradation while the cathodic protection will ensure that there is minimal wall loss over time. Finally, regular internal inspections via smart pigs will confirm both internal and external corrosion rates over time

.



Attachment A. Coordination and Consultation with State and Federal Agencies (DRA10)



Nadira Basdeo

From: Nadira Basdeo
Sent: Wednesday, August 16, 2023 10:51 AM
To: ryan.mckenzie@noaa.gov
Cc: Parker, Karen; Lindemann, Scott; Madams, Sarah; Barbara McBride; Fisher, Kevin
Subject: RE: Species of Concern - Sutter Energy Center, Calpine, Discussion with NMFS

Hi Ryan-

Thanks for meeting with the team last month to discuss the Sutter Decarbonization Project. We learned a lot and wanted to follow up and propose next steps.

- To recap, our call focused on impacts to the Sutter Bypass and Snake River which are mapped as critical habitat Central Valley Spring-run Chinook Salmon, Central Valley Steelhead, and Southern DPS Green Sturgeon. We discussed the importance of minimizing impacts up to the Ordinary High Water Mark (OHWM). During construction, site specific BMP's for containing spills and erosion as well as a frac-out plan are recommended. Further the BMPs should address maintaining a proper work distance from water (typically a 100-foot buffer).

Per NMFS NOAA this area is considered an Essential Fish Habitat (EFH) for chinook salmon. Any stream that has had historic connection to the Bypass could be considered an EFH (there are no maps of EFH) and will need to be addressed within an Aquatic Resources Delineation Report (ARDR) for this Project. If Horizontal Directional Drilling is used and the Project stays outside of impact areas, an informal consultation can be made to obtain a Letter of Concurrence. A BO will only be needed if there are impacts.

Via separate email received July 6, 2023, NMFS NOAA provided an example concurrence letter, and an example BO for use as a starting point. This example BO includes a suggested work window of July 31 – Oct 31. The email also included a list of species potentially in the Project area:

- Sacramento Winter-run Chinook Salmon- presence
- Central Valley Spring-run Chinook Salmon- presence and designated critical habitat
- Central Valley Steelhead- presence and designated critical habitat
- Southern DPS Green Sturgeon- presence and designated critical habitat
- Chinook Salmon Essential Fish Habitat- presence

Based on the call, we propose the following:

- Determine if there is a programmatic permit for these listed fish species in Sutter County and work window for Project area.
- As HDD will be used and the Project will stay outside of impact areas, Calpine will Initiate an informal Consultation to obtain a Letter of Concurrence
- Conduct wetlands surveys during late summer/early fall and prepare an Aquatic Resources Delineation Report (ARDR)

Please let us know if any of this summary is not accurate and if NMFS concurs with the proposed next steps.

Thanks,

Nadira Basdeo, PMP | EHS Program Manager

p: (646) 533-5661 | nadira.basdeo@calpine.com



Nadira Basdeo

From: Nadira Basdeo
Sent: Wednesday, August 16, 2023 11:13 AM
To: alexander.funk@wildlife.ca.gov
Cc: Parker, Karen; Madams, Sarah; Lindemann, Scott; Barbara McBride; Fisher, Kevin
Subject: RE: Species of Concern - Sutter Energy Center, Calpine

Hi Alex-

Thanks for meeting with the team last month to discuss the Sutter Decarbonization Project (SDP). We learned a lot and wanted to follow up and propose next steps.

To recap, our discussion focused on multiple species including to the Western pond turtle, Tricolored blackbird, Swainson's hawk (SWHA), and rare plants. As discussed, completing all surveys within the required survey windows are critical. Where possible CDFW confirmed that multiple protocol level surveys could be completed simultaneously for birds as long as surveys are completed within the appropriate survey window for each species, conducted within the required days prior to performing ground disturbing activities are met (preconstruction surveys), and adequate resources are available to complete the surveys.

Regarding specific species, surveys for the Western pond turtle were not necessary as there is presumed presence. However, when determining BMP measures during construction, the Western pond turtle will require species specific BMPs. In addition, SWHA surveys that were previously conducted by Jacobs in May 2023 can be provided as supplemental data and may count towards the SWHA protocol requirements, however the protocol shall be reviewed to determine if this is acceptable. Additionally there was discussion regarding presuming presence of SWHA.

CDFW concurs with USFWS that it is safe to presume presence of GGS.

Finally, CDFW will require a Rare Plant Survey to be completed. The survey report will specifically list or call out Rare Plants (which may include but is not limited to Hartweg's golden sunburst, Wright's trichocoronis, and Woolly rose mallow) within the report that are historically known to the area.

CDFW also mentioned there may be a need for a Streambed Alteration Agreement (SAA).

Based on our discussion, we propose the following next steps:

- Calpine team to conduct a habitat assessment to determine where appropriate habitat for special status species is located within project boundaries.
- Due to known SWHA populations in the area, preconstruction protocol surveys will be conducted prior to construction.
- Rare plant surveys will be conducted as identified in the attached.
- Our team will further evaluate the need for a SAA.

Please let us know if any of this summary is not accurate and if CDFW concurs with the proposed next steps.

Thanks,

Nadira Basdeo, PMP | EHS Program Manager

p: (646) 533-5661 | nadira.basdeo@calpine.com



Nadira Basdeo

From: Nadira Basdeo
Sent: Wednesday, August 16, 2023 10:51 AM
To: lily_douglas@fws.gov
Cc: Parker, Karen; Lindemann, Scott; Madams, Sarah; Barbara McBride; Fisher, Kevin
Subject: RE: Species of Concern - Sutter Energy Center, Calpine

Hi Lily-

Thanks for meeting with the team last month to discuss the Sutter Decarbonization Project (SDP). We learned a lot and wanted to follow up and propose next steps.

To recap, we discussed an overview of the project and the three species under USFWS jurisdiction, the Western yellow-billed cuckoo, Giant garter snake (GGS), and Valley Elderberry Longhorn Beetle.

Key takeaways from our discussion

- A joint NEPA/CEQA document will be prepared for the Project; CEC will be the lead CEQA agency, however, it is unknown at this time which agency will be the Federal lead agency.
- The western yellow-billed cuckoo requires a minimum of 30 acres of suitable habitat for breeding. Riparian stands are sparse in the Project area. If habitat structure is not available, construction and operation of the Project will not adversely affect the cuckoo. This species requires 4 protocol level surveys conducted between June and August.
- We can presume GGS presence without the need for protocol level surveys. There is a preference for work outside of GGS dormant seasons.
- Given that Federal agency action will be involved, Calpine expects to address the potential take of endangered species through a Section 7 consultation, which can be completed within 135 days.

Moving forward, Calpine will:

- Conduct a habitat assessment for the project in late summer/early fall 2023.
- If potentially suitable breeding habitat for the western yellow-billed cuckoo is present, then the project will propose avoidance and minimization measures to reduce the potential for adverse effects. These measures may include avoiding impacts to suitable habitat, avoiding construction during the of the breeding season (June 1- August 31) near suitable breeding habitat, and/or protocol surveys prior to construction if work will occur near suitable habitat during the breeding season.

Please let us know if any of this summary is not accurate and if USFWS concurs with the proposed next steps.

Thanks,

Nadira Basdeo, PMP | EHS Program Manager
p: (646) 533-5661 | nadira.basdeo@calpine.com



-----Original Appointment-----

From: Hughes, Chris <Chris.Hughes@jacobs.com>
Sent: Friday, June 30, 2023 12:29 PM
To: Hughes, Chris; Barbara McBride; Nadira Basdeo; lily_douglas@fws.gov
Cc: Parker, Karen; Lindemann, Scott; Madams, Sarah

Attachment B. Aquatic Resources Delineation Report (DR A12)



Aquatic Resources Delineation Report

CCFC Sutter Energy, LLC

Sutter Decarbonization Project
June 7, 2024





Aquatic Resources Delineation Report

Client name: CCFC Sutter Energy, LLC

Project name: Sutter Decarbonization Project

Client reference: Barbara McBride

Project no: D3623900

Document no: 240226084420_e83455aa

Project manager: Sarah Madams

Version: 2

Prepared by: Kevin Fisher

Date: June 7, 2024

File name: SEC_CCUS_ARDR_Final

Document status: Final

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Summary

CCFC Sutter Energy, LLC is planning to construct a carbon capture and storage project for the Sutter Energy Center (SEC) in Sutter County, California. The Project consists of the following:

- Turbine performance improvements at the SEC
- Installation of a carbon capture facility at SEC
- An approximately 15.7-mile carbon dioxide (CO₂) pipeline
- Up to 11 well sites including one test well, three wells to inject the CO₂ for permanent sequestration in a geological storage location, and seven monitoring wells

This report presents the methods and results of an aquatic resources delineation for a 693-acre study area that encompasses the Project site and all ancillary features. This delineation was conducted in accordance with the *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987), the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)* (USACE 2008), and *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (Lichvar and McColley 2008). The study area contained 59.64 acres of non-wetland waters and no wetlands.

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Acronyms and Abbreviations

°F	degree(s) Fahrenheit
AOI	area of interest
CO ₂	carbon dioxide
HUC	Hydrologic Unit Code
NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
OHWM	ordinary high water mark
Project	Sutter Carbon Capture and Storage Project
SEC	Sutter Energy Center
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey

1. Introduction

CCFC Sutter Energy, LLC is planning to construct a carbon capture and storage project for the Sutter Energy Center (SEC) in Sutter County, California (Figure 1). The Sutter Decarbonization Project (Project) will capture carbon dioxide (CO₂) emissions from the SEC and transport it, via a pipeline, to a permanent underground storage location.

This report presents the methods and results of an aquatic resource delineation conducted for a 693-acre aquatic resource study area (study area) (Figure 1). The study area includes areas where Project infrastructure may be located and where construction may occur, as well as a buffer around these areas to accommodate minor changes in design and execution. An overview of the Project is provided in this chapter. The environmental setting is provided in Chapter 2. Survey methods and results are provided in Chapters 3 and 4, respectively. References are provided in Chapter 5.

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1.1 Project Location

Location information for the study area is shown in Table 1.

Table 1. Location Information

Main Waterbodies	Sutter Bypass, Snake River
Tributary to and Downstream Waterbody	Sacramento River
Watershed HUC and Name	Gilsizer Slough-Snake River (180201590400), McGriff Lakes-Sutter Basin (180201041102)
Central Latitude and Longitude (DD)	38.9924, -121.7468
Township, Range, Section	Township 14N, Range 2E, Sections 13, 23, 24, 25, 26, 27, 33, 34, 35

Table 1. Location Information

	Township 13N, Range 2E, Sections 4, 5, 8, 17, 19, 20, 27, 28, 29, 30, 31, 32, 33 Township 12N, Range 2E, Sections 3, 4, 5, 6, 7, 8, 9, 10
USGS Quadrangles	Gilsizer Slough, Kirkville, Sutter Causeway & Tisdale Weir
County Assessor Parcel Numbers	21-230-004, 21-230-009, 21-230-011, 21-230-019, 21-230-023, 21-230-024, 21-230-026, 21-230-037, 21-230-038, 21-240-005, 21-240-007, 21-240-011, 21-240-012, 21-240-013, 21-240-016, 21-240-017, 21-240-019, 21-240-020, 21-240-039, 21-240-040, 21-240-043, 21-240-049, 21-240-050, 21-300-003, 21-300-004, 21-310-023, 21-310-043, 21-310-047, 21-310-048, 21-310-050, 21-310-052, 21-310-056, 21-310-057, 21-310-058, 24-080-002, 24-080-004, 24-080-011, 24-080-012, 24-090-009, 24-090-010, 24-090-011, 24-090-012, 24-090-013, 24-090-015, 24-090-016, 24-100-003, 24-100-009, 24-100-011, 24-150-004, 24-150-005, 24-160-002, 24-160-004, 24-160-005, 24-200-002, 24-200-004, 24-200-005, 24-210-003, 24-210-004, 24-210-008, 24-220-003, 24-220-007, 24-220-008, 24-220-009, 24-230-002, 24-230-016, 24-250-011, 24-250-017, 24-250-019, 29-040-004, 29-040-005, 29-040-006, 29-040-008, 29-040-010, 29-040-011, 29-040-014, 29-040-015, 29-040-018, 29-040-032, 29-040-040, 29-040-041, 29-040-042, 29-050-002, 29-050-025, 29-050-046, 29-050-056, 29-260-017, 24-100-010, 21-240-009, 21-240-027
Street Address	Sutter Energy Center 5029 S Township Rd Yuba City, CA 95993
Directions	From the USACE Sacramento District office, take CA-99 northbound for approximately 32 miles. Take Obanion Road west to S Township Road. Turn north on S Township Road and travel 2 miles to the SEC. Access to the site is controlled. Please contact SEC for access.

HUC = Hydrologic Unit Code

USACE = U.S. Army Corps of Engineers

USGS = U.S. Geological Survey

1.2 Project Overview

The SEC is a natural gas-fired power plant that began operation in 2001. The Project will construct new infrastructure at the SEC to capture CO₂ emissions from the existing power plant. The new carbon capture facility will capture CO₂ with an amine-based solvent and compress the CO₂ to a critical fluid. The fluid will be transported via a new pipeline to the geological storage complex, which is located approximately 10 miles southwest of the SEC. The storage complex area of interest (AOI) is approximately 6 miles by 7 miles (42 square miles). Up to 11 well sites—including one test well, three wells to inject the CO₂ for permanent sequestration in a geological storage location, and seven monitoring wells—will be developed in the AOI.

2. Environmental Setting

2.1 Regional Setting

The study area is within the Great Valley ecological section of California (262A) containing alluvial plains associated with the Sacramento River Valley (Miles and Goudey 1997). The study area spans the River Alluvium (262Af), and Butte Sink/ Sutter Basin (262Ac) subsections of the Great Valley section. Both subsections are characterized by recent alluvium on gentle slopes on the river floodplain and basin floor. Fluvial erosion and deposition are the main geomorphic drivers in these subsections, but these processes have been disrupted by the construction of artificial levees and irrigation diversion for agriculture.

2.2 Study Area Setting

The following sections describe the topography, climate, hydrology, soils, and habitat types associated with the study area.

2.2.1 Topography

The study area as a whole is mostly flat with a gentle, natural gradient sloping downward from northeast to southwest. Elevations in the study area range from approximately 56.5 feet¹ at the top of levees along the Sutter Bypass in the central portion of the study area to approximately 16 feet at the bottom of ditches in the southern portion of the study area.

2.2.2 Climate

Climate within the study area is characterized by moderately cool winters and hot dry summers with average high temperatures of up to 95 degrees Fahrenheit (°F) in July, to as low as 37°F in December. Average annual temperatures range from a minimum of 47.6°F to 75°F (WRCC 2023). Annual precipitation within this area of the Sacramento Valley includes an average of 16.22 inches, peaking in January.

2.2.3 Hydrology

The study area is located within the Gilsizer Slough-Snake River (HUC 180201590400) and McGriff Lakes-Sutter Basin (HUC 180201041102) sub-basins within the larger Sutter Basin watershed, bounded on the east by the Sutter Bypass/East Side Canal, on the west by the Sacramento River, and on the north by the Tisdale Weir (USGS 2024a). Regionally, major surface water features include the Sacramento River and the Sutter Bypass. Aquatic features within the Sutter Basin were previously associated with large floodplains prior to construction of the Sutter

¹ Elevations in this report are referenced to North American Vertical Datum 1988 (NAVD 88).

Bypass and Tisdale Weir for the Lower Sacramento Valley Flood-Control System in the early 1900s (James and Singer 2008, USGS 2024). Humanmade flood control levees and excavated canals were constructed to aid in drainage on flood prone parcels, and control seasonal flooding from the Sacramento River (James and Singer 2008). Excavated irrigation ditches were created for intensive water-use agricultural practices such as rice field and orchard irrigation.

Named surface water features in the study area include the Sutter Bypass and the Snake River, which is just east of the bypass. The study area also includes an intricate network of irrigation canals and ditches that border agricultural parcels. The hydrology of aquatic resources in the study area is primarily influenced by wet season precipitation and runoff and irrigation. Flows in the Sutter Bypass are highly variably interannually. In wet years, the bypass may be completely flooded during the winter and early spring; in normal and dry years, the bypass does not flood extensively. Irrigation flows in canals and flood irrigated fields is less variable.

Field work for the aquatic resource delineation was conducted from September 19 through 21, 2023, January 5, 2024, and April 12, 2024. The September 2023 surveys dates focused on the pipeline alignment and well pad portions of the study area; the January and April 2024 surveys focused on the SEC. USACE's Antecedent Precipitation Tool (2024) was used to define precipitation conditions over the time period preceding the survey. Precipitation conditions in the months preceding the field surveys are summarized in Table 2. The complete results of the Antecedent Precipitation Tool queries are provided in Appendix A. The wetness condition in the months preceding the September 2023 surveys was "normal" or "wetter than normal". The wetness condition in the months preceding the January 2024 survey was "drier than normal" (Table 2). The wetness condition in the months preceding the April 2024 survey was "normal" (Table 2).

Table 2. Antecedent Precipitation Conditions

Survey Date	Reference Location	Antecedent Precipitation Conditions
September 19, 2023	39.047035, -121.699742	Wetter than normal
September 20, 2023	39.022763, -121.739217	Normal
September 21, 2023	38.901747, -121.745767	Normal
January 05, 2024	39.052517, -121.694901	Drier than normal
April 12, 2024	39.051280, -121.693056	Normal

Source: USACE 2024

2.2.4 Soils

Soils in the study area have been mapped by the Natural Resources Conservation Service (NRCS) and are described in the Soil Survey of Sutter County, California (SCS 1988, NRCS 2024a). Soil series mapped within the study area are summarized in Table 3 and shown on Figure 2.

Table 3. Soil Series Mapped Within the Study Area

Type/ Series	Texture	Landscape Position and Parent Material	Drainage and Permeability	NRCS Hydric Rating
Byington	Silt loam	On flood plains in areas between natural river levees and basins. Formed in alluvium from mixed sources.	Poorly drained; very slow runoff; moderate permeability.	Yes
Capay	Silty clay	On flood basins, alluvial fans, interfan basins.	Moderately well and somewhat poorly drained; negligible to high runoff, slow to very slow permeability.	Yes
Clear Lake	Clay	In flood basins, floodplains, and in swales of drainageways.	Poorly drained; negligible to high runoff (if assumed concave runoff is always negligible); slow to very slow permeability,	Yes
Columbia	Fine sandy loam	On floodplains with bar and channel topography in some natural areas or are on natural levees. Formed in alluvium from mixed sources.	Moderately well drained; negligible to medium runoff; moderately rapid permeability	Yes
Conejo-Tisdale complex	Clay loam	Conejo: On alluvial fans and stream terraces at elevations of 30 to 2,000 feet, (9 to 610 meters). Slopes range from 0 to 9%. The soil formed in alluvium from basic igneous and sedimentary rocks. Tisdale: refer to series description that follows in this table.	Conejo: Well drained; slow to medium runoff, moderately slow saturated hydraulic conductivity in the A and upper Bw horizons and moderately slow to moderately rapid in the lower Bw horizon. Tisdale: refer to series description that follows in this table.	Yes
Gridley	Clay loam	On low terraces and basin rims. Slopes are 0 to 1%. The soils formed in alluvium from mixed sources deposited over unrelated siltstone.	Moderately well drained; slow runoff; slow permeability.	Yes
Oswald	Clay	Basins and on basin rims with slopes of less than 2%. They formed in alluvium from mixed sources deposited over unrelated siltstone	Poorly drained; very slow runoff; slow permeability.	Yes

Table 3. Soil Series Mapped Within the Study Area

Type/ Series	Texture	Landscape Position and Parent Material	Drainage and Permeability	NRCS Hydric Rating
Shanghai	Fine sandy loam/Silt loam	On flood plains with slopes of 0 to 2%. Formed in alluvium from mixed sources.	Somewhat poorly drained; runoff is very slow; permeability is moderate.	Yes
Subaco	Clay	On basin rims and in basins with slopes of 0 to 2%. They formed in alluvium from mixed sources deposited over unrelated siltstone.	Somewhat poorly drained; very slow runoff; slow permeability.	Yes
Tisdale	Clay loam	On low terraces. Slopes are 0 to 2%. The soils formed in alluvium from mixed sources deposited over unrelated siltstone.	Well drained; very slow runoff; moderately slow permeability.	Yes

Sources: NRCS 2024a, 2024b

2.2.5 National Wetlands Inventory

Figure 3 shows aquatic resources in the study area identified by the National Wetlands Inventory (NWI) (USFWS 2024) and the National Hydrography Dataset (USGS 2024a). The NWI identifies channels in the Sutter Bypass and the Snake River as Riverine, Lower Perennial, Unconsolidated Bottom, Permanently Flooded, Excavated (R2UBHx). There are wetlands in the Sutter Bypass mapped as Palustrine, Forested, Broad-Leaved Deciduous, Temporarily Flooded (PFO1A). Irrigation canals ditches throughout the study area are identified as R2UBHx and Riverine, Intermittent, Streambed, Seasonally Flooded, Excavated (R4SBCx).

2.2.6 Land Cover/Vegetation Communities

Land cover in the study area is predominantly rice fields with some orchards and row crops. An extensive network of irrigation canals and ditches supports the agricultural production. Other land cover types in the study area include transportation, flood control facilities, and energy production. Habitat conditions and vegetation communities associated with these land cover types are described in the following sections.

2.2.6.1 Aquatic and Riparian Communities

Riverine

Riverine habitat is present in the Sutter Bypass, Snake River, and irrigation canals and ditches. The Sutter Bypass and Snake River are low-gradient, perennial channels with soft bottom

sediments. The irrigation canals are wide, shallow constructed waterways with a relatively uniform trapezoidal cross-section. The canals have earthen bed and banks. Vegetation along the canals is generally sparse, but some canals support vegetation in the bed and on the banks. Irrigation ditches are constructed features that are smaller than the canals and tend to have steeper banks. Some of the ditches are sparsely vegetated whereas others are densely vegetated with hydrophytes such as cattail (*Typha* spp.) and bulrushes (*Schoenoplectus* spp.).

Himalayan Blackberry Scrub

Himalayan blackberry (*Rubus armeniacus*) scrub is present along the banks of many of the irrigation ditches in the study area. These areas are characterized by a dense monoculture of Himalayan blackberry; trees and forbs may be present at low cover.

Goodding's Willow Woodland and Forest (Riparian)

Within the study area, this vegetation community was observed along the eastern side of the Sutter Bypass. Goodding's willow or other willow species are dominant or co-dominant in the tree or shrub canopy with other riparian tree species including alder (*Alnus* sp.), and box elder (*Acer negundo*). Commonly associated shrubs include mulefat (*Baccharis salicifolia*), dogwood (*Cornus sericea*), and California rose (*Rosa californica*).

Fremont Cottonwood Forest and Woodland (Riparian)

This vegetation community was observed along the western side of the Sutter Bypass. Fremont cottonwood (*Populus fremontii*) is dominant or co-dominant in the tree canopy with other riparian tree species such as box elder, alder, Oregon ash (*Fraxinus latifolia*), black walnut (*Juglans hindsii*), and willow (*Salix* spp.). The understory and mid-story is dominated by California grape (*Vitis californica*).

2.2.6.2 Terrestrial Communities

Agriculture

As mentioned previously, most of agricultural land in the study area is rice production. Some fields, particularly in the southwestern portion of the study area, are planted with tomatoes or corn. Crop production in agricultural fields may vary from year to year.

Non-native Grasslands

Within the study area, non-native grasslands occur at the SEC, along disturbed road shoulders, and other areas associated with high levels of human activity. Non-native grasses such as wild oat (*Avena* sp.), Bermuda grass (*Cynodon dactylon*), rattlesnake grass (*Briza maxima*), bromes (*Bromus* spp.), and Italian wildrye (*Festuca perennis*) are common in the herbaceous layer. Trees and shrubs may be present at low cover.

3. Methods

A routine aquatic resources delineation was conducted in accordance with the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987), the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)* (USACE 2008), and *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (Lichvar and McColley 2008).

3.1 Desktop Review

Resources relevant to site conditions and aquatic resources were collected and reviewed as part of the delineation. The following materials were included in this data review:

- NRCS soil maps and descriptions (NRCS 2024a)
- National Hydrography Dataset maps (USGS 2024a)
- NWI maps (USFWS 2024)
- Topographic data (OCM Partners 2024)
- USGS topographic maps from multiple years (USGS 2024b)

3.2 Field Data Collection

The field data collection was conducted from September 19 through 21, 2023, January 5, 2024, and April 12, 2024. The September 2023 surveys dates focused on the pipeline alignment and well pad portions of the study area; the January and April 2024 surveys focused on the SEC parcel. Kevin Fisher, a Principal Wetland Scientist with Jacobs, led all surveys. Scott Lindemann and Samuel Wentworth (Jacobs) participated in the September 2023 surveys.

Riverine aquatic resources in the study area were delineated based on guidance from *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (Lichvar and McColley 2008).

The study area was surveyed for locations where hydrophytic vegetation was dominant; evidence of inundation or saturation; or the landform indicated the potential for aquatic resources to occur. Wetland sample points were established in representative locations. At sample points, vegetation species within a 1-meter radius of the sample point were identified by stratum. Wetland indicator statuses for plants were taken from The National Wetland Plant List, version 3.5 (USACE 2020). The soil profile was examined to a depth of approximately 12 inches. Soils were characterized by evaluating texture and color within each distinct layer of the profile. Soil color was described using a Munsell Soil Color Chart (Munsell 2009). The vicinity of each sampling location was examined for evidence of wetland hydrology.

The locations of sample points and representative boundaries of aquatic resources were mapped in ArcGIS Field Maps using an Apple iOS device paired with a Trimble DA2 receiver using the Trimble Catalyst global navigation satellite system positioning service that provided 30-centimeter horizontal accuracy or better.

3.3 Desktop Analysis

Field data were imported into ESRI ArcGIS software for developing aquatic resource maps. High-resolution aerial photographs and topographic data were used to refine the boundaries of aquatic resources in conjunction with the field-collected data.

3.4 Limitations to Survey Accuracy

The hydrology of the ditches in the study area is dependent on several factors including irrigation flows, field drainage, groundwater elevations, and precipitation. This makes it challenging to assign a hydrologic regime (e.g., perennial, intermittent) to each feature. The delineation of ditches in the pipeline alignment portion of the study area was conducted during the dry season. None of the ditches appeared to have an ephemeral flow regime, thus all features were assigned a classification of intermittent or perennial based on the dry season observations and analysis of aerial imagery (Google Earth 2024).

4. Results

The results of the aquatic resource delineation are presented in this chapter. Figure 4, Maps 1 through 34 shows the aquatic resource delineated in the study area, and Table 4 lists the aquatic resource. Delineation data forms are provided in Appendix B. Representative photographs are provided in Appendix C.

Table 4. Aquatic Resources in the Study Area

Aquatic Resource ID	Cowardin Code ^[a]	Latitude	Longitude	Area (Acres)	Length (Linear Feet)
Other Waters					
<i>Canal</i>					
C-1	R2UB	39.0221837	-121.7422752	0.36	611
<i>Ditches</i>					
D-1	R4SB	39.05287098	-121.6948039	0.10	732
D-2	R2UB	39.05177909	-121.6974186	1.99	10,108
D-3	R4SB	39.05243772	-121.6985373	0.48	3,190
D-4	R4SB	39.0471364	-121.6991122	0.02	168
D-5	R4SB	39.04671011	-121.6991033	0.05	350
D-6	R2UB	39.04671565	-121.6992125	0.09	385
D-7	R4SB	39.04704723	-121.7038784	1.11	5,092
D-8	R4SB	39.04669426	-121.7084185	0.07	393
D-9	R4SB	39.04714361	-121.7085445	0.03	151
D-10	R4SB	39.04669469	-121.7085565	0.08	396
D-11	R4SB	39.04719185	-121.7154815	0.51	2,741
D-12	R4SB	39.04366809	-121.7177152	0.91	5,049
D-13	R2UB	39.04650344	-121.7178871	0.07	1,069
D-14	R2UB	39.04298222	-121.7178971	0.20	3,879
D-15	R4SB	39.03994996	-121.7174017	0.10	571
D-16	R4SB	39.03392664	-121.7177378	2.14	7,702
D-17	R2UB	39.02619474	-121.7150997	2.12	7,864
D-18	R2UB	39.02509103	-121.6941069	0.12	489
D-19	R2UB	39.02508614	-121.701211	2.31	7,800
D-20	R4SB	39.02538687	-121.6991202	0.06	286
D-21	R4SB	39.02493797	-121.6992119	0.01	82

Table 4. Aquatic Resources in the Study Area

Aquatic Resource ID	Cowardin Code^[a]	Latitude	Longitude	Area (Acres)	Length (Linear Feet)
D-22	R4SB	39.02529417	-121.7040173	1.10	5,314
D-23	R4SB	39.02547453	-121.7085759	0.02	133
D-24	R2UB	39.02510321	-121.7101613	0.54	2,046
D-25	R4SB	39.02498553	-121.7105954	0.26	2,422
D-26	R4SB	39.0251445	-121.7126906	0.18	800
D-27	R4SB	39.02501631	-121.7130388	0.01	89
D-28	R4SB	39.025221	-121.7133071	0.01	90
D-29	R2UB	39.02527008	-121.7167849	1.29	3,808
D-30	R4SB	39.02568982	-121.7263253	0.13	302
D-31	R4SB	39.02518477	-121.7261487	0.02	109
D-32	R4SB	39.0228672	-121.7391697	0.05	489
D-33	R2UB	39.02130664	-121.7458155	0.19	1,185
D-34	R4SB	39.02108761	-121.7468489	0.02	146
D-35	R2UB	39.0161405	-121.7515044	2.09	7964
D-36	R4SB	39.01110238	-121.7498136	0.04	377
D-37	R2UB	39.0083145	-121.7493329	1.96	8,399
D-38	R2UB	39.00705153	-121.7485252	1.96	6,092
D-39	R4SB	39.00444732	-121.7479234	0.06	507
D-40	R4SB	39.00400331	-121.7473394	0.01	74
D-41	R4SB	39.00400028	-121.7475577	0.00	62
D-42	R4SB	39.00400862	-121.7477967	0.01	111
D-43	R2UB	39.00409392	-121.7513152	1.11	3,833
D-44	R2UB	39.00411868	-121.7573703	1.13	3,179
D-45	R2UB	39.00400967	-121.7642751	1.32	5,109
D-46	R4SB	39.004312	-121.7685893	0.09	462
D-47	R4SB	39.0042586	-121.7687607	0.15	559
D-48	R4SB	39.00404163	-121.7709145	0.62	2,874
D-49	R4SB	39.00450294	-121.7733429	0.08	306
D-50	R4SB	39.00406896	-121.7738002	0.14	638
D-51	R4SB	39.00438427	-121.7749546	0.19	583

Table 4. Aquatic Resources in the Study Area

Aquatic Resource ID	Cowardin Code^[a]	Latitude	Longitude	Area (Acres)	Length (Linear Feet)
D-52	R2UB	38.99980489	-121.7732445	3.47	6,128
D-53	R4SB	38.99657391	-121.7712043	0.13	580
D-54	R4SB	38.99506686	-121.7782553	0.77	2,588
D-55	R4SB	38.993398	-121.7777577	0.08	393
D-56	R4SB	38.9932595	-121.7776003	0.06	298
D-57	R4SB	38.9932665	-121.7780696	0.03	150
D-58	R4SB	38.99327287	-121.7783415	0.01	82
D-59	R4SB	38.98620426	-121.7783266	1.06	5,396
D-60	R4SB	38.98252847	-121.7781287	0.05	244
D-61	R4SB	38.98252663	-121.7786701	0.14	652
D-62	R4SB	38.98240492	-121.7788816	0.12	504
D-63	R4SB	38.98208191	-121.7783146	0.07	335
D-64	R4SB	38.9746989	-121.7784419	1.82	9,466
D-65	R4SB	38.96677311	-121.7782958	0.94	3,555
D-66	R4SB	38.96418702	-121.7780945	0.01	66
D-67	R4SB	38.96418751	-121.7806225	0.85	2,604
D-68	R4SB	38.96465011	-121.7834554	0.17	691
D-69	R4SB	38.96431239	-121.782991	0.07	276
D-70	R4SB	38.96432216	-121.7834633	0.28	1,084
D-71	R4SB	38.96388636	-121.7830134	0.02	123
D-72	R4SB	38.96088585	-121.7828168	0.56	4,025
D-73	R4SB	38.95821358	-121.7829354	1.92	7,629
D-74	R2UB	38.95310407	-121.7826634	0.01	78
D-75	R2UB	38.95310425	-121.7832255	0.12	511
D-76	R2UB	38.95287325	-121.7827318	0.01	96
D-77	R2UB	38.95287624	-121.7832868	0.13	433
D-78	R4SB	38.94965676	-121.7827514	0.20	4,934
D-79	R2UB	38.94588378	-121.782894	2.53	10,109
D-80	R4SB	38.93868471	-121.783389	0.07	364
D-81	R4SB	38.93854465	-121.783434	0.05	315

Table 4. Aquatic Resources in the Study Area

Aquatic Resource ID	Cowardin Code^[a]	Latitude	Longitude	Area (Acres)	Length (Linear Feet)
D-82	R2UB	38.93128147	-121.782983	3.69	10,785
D-83	R4SB	38.93130658	-121.7834439	0.06	337
D-84	R2UB	38.92411766	-121.7834965	0.11	379
D-85	R2UB	38.92409257	-121.7828134	0.01	89
D-86	R4SB	38.91974327	-121.7829516	1.20	6,713
D-87	R4SB	38.91525877	-121.7829283	0.02	164
D-88	R4SB	38.91465501	-121.7833173	0.24	1,191
D-89	R4SB	38.91478084	-121.7826193	0.07	439
D-90	R4SB	38.9122707	-121.7739405	0.96	3,677
D-91	R4SB	38.90968468	-121.7737149	0.03	138
D-92	R4SB	38.90971229	-121.7739141	0.02	109
D-93	R4SB	38.90970406	-121.7743454	0.07	324
D-94	R4SB	38.9071573	-121.7739136	0.75	3,216
D-95	R4SB	38.94649358	-121.7458724	0.29	933
D-96	R4SB	38.9457488	-121.7454614	0.05	725
D-97	R2UB	38.93844381	-121.753963	0.32	1,045
D-98	R4SB	38.93825927	-121.7539612	0.24	1,090
D-99	R4SB	38.93251015	-121.7736679	0.31	1,051
D-100	R4SB	38.93251484	-121.773819	0.13	1,017
D-101	R4SB	38.91658648	-121.7498548	0.12	945
D-102	R4SB	38.91670518	-121.76805	0.25	1,032
D-103	R4SB	38.90206507	-121.7453541	0.10	657
D-104	R4SB	38.90202948	-121.7461325	0.01	95
D-105	R4SB	38.90190753	-121.7452764	0.16	779
D-106	R4SB	38.90123524	-121.7458902	0.16	789
D-107	R4SB	38.90136164	-121.7461585	0.20	850
D-108	R4SB	38.90230727	-121.7629196	0.17	999
D-109	R4SB	38.90217122	-121.7629721	0.29	1,043
D-110	R2UB	38.9047865	-121.7830052	0.24	1,032
D-111	R4SB	38.90477016	-121.7831608	0.18	1,021

Table 4. Aquatic Resources in the Study Area

Aquatic Resource ID	Cowardin Code^[a]	Latitude	Longitude	Area (Acres)	Length (Linear Feet)
Total Ditches				53.55	222,932
<i>Ponds</i>					
P-1	PUB	39.05178655	-121.6935107	0.31	NA
P-2	PUB	39.05160068	-121.6934918	0.29	NA
P-3	PUB	39.05143407	-121.6935043	0.29	NA
P-4	PUB	39.05124321	-121.6935033	0.33	NA
P-5	PUB	39.05105461	-121.693515	0.28	NA
P-6	PUB	39.0508824	-121.6934938	0.25	NA
P-7	PUB	39.05177216	-121.6944321	0.13	NA
P-8	PUB	39.0515998	-121.6944283	0.14	NA
P-9	PUB	39.05142609	-121.6944263	0.12	NA
P-10	PUB	39.05123208	-121.6944273	0.11	NA
P-11	PUB	39.051064	-121.6943892	0.11	NA
P-12	PUB	39.050879	-121.6943619	0.12	NA
Total Ponds				2.48	NA
<i>Rivers/Streams</i>					
R-1	R2UB	39.02562063	-121.7231693	1.70	3,589
R-2	R2UB	39.02532278	-121.7274095	0.80	797
R-3	R2UB	39.02242525	-121.7411433	0.50	669
R-4	R2UB	38.91509229	-121.7833417	0.24	662
Total Rivers/Streams				3.25	5,717

^[a] Cowardin et al. 1979

4.1 Other Waters

4.1.1 Canal (C)

One canal, feature C-1, was delineated just west of the Sutter Bypass (Figure 4, Map 22). This irrigation canal is a large, constructed feature with minimal vegetation on the bed and banks. A total of 0.36 acre of other waters were delineated in the canal (Table 4). The Cowardin classification assigned to these waters is Riverine, Lower Perennial, Unconsolidated Bottom (R2UB) (Cowardin et al. 1979).

4.1.2 Ditches (D)

One hundred and eleven ditches, features D-1 through D-111, were delineated in the study area (Figure 4). These ditches are linear features that were constructed to convey irrigation water or provide drainage. Cover by hydrophytic vegetation in the ditches ranged from sparse to extremely dense. Soils along the banks of ditches were investigated for hydric indicators (e.g., sample points SP-1, SP-2), but none were found. The ditches were delineated as other waters based on indicators of an OHWM such as change in vegetation species cover and break in slope. A total of 53.55 acres of other waters were delineated in the ditches (Table 4). The Cowardin classifications assigned to these waters are R2UB and Riverine, Intermittent, Streambed (R4SB) (Cowardin et al. 1979).

4.1.3 Ponds (P)

Twelve ponds, features P-1 through P-12, were delineated within the SEC parcel (Figure 4, Map 1). These ponds were constructed as part of a power plant process water treatment system that is no longer in use. Hydrophytic vegetation has established in some ponds and ranged from sparse to moderately dense. Soils in the ponds were investigated in representative locations for hydric indicators, but none were found (sample points SEC-4, SEC-6). The ponds were delineated as other waters based on indicators of an OHWM such as change in vegetation species composition and break in slope. A total of 2.48 acres of other waters were delineated in the ponds (Table 4). The Cowardin classification assigned to these waters is Palustrine, Unconsolidated Bottom (PUB) (Cowardin et al. 1979).

4.1.4 Rivers/Streams (R)

Four river or stream features were delineated in the study area. Feature R-1, just east of the Sutter Bypass, is identified as the Snake River on topographic maps (Figure 1). This section of the Snake River is highly modified and appears to convey irrigation flows and/or field drainage. An OHWM transect was established just south of the Obanion Road crossing (Figure 4, Map 8, OHWM-1). Indicators of OHWM included a break in bank slope and change in vegetation cover (Appendix B).

Features R-2 and R-3 are the east and west channels within the Sutter Bypass, respectively. An OHWM transect was established at the east channel where the pipeline alignment crosses the channel (Figure 4, Map 8, OHWM-2). Indicators of OHWM included a break in bank slope and mature trees rooted at the OHWM (Appendix B). The same indicators were used for delineating the OHWM at the west channel.

Feature R-4 is located in the southern portion of the study area near pipeline station 767+50 (Figure 4, Map 22). This feature has natural (sinuous) planform but has been highly modified for irrigation. It is not named on topographic maps. An OHWM transect was established where the pipeline alignment crosses the channel (Figure 4, Map 22, OHWM-3). Indicators of OHWM included change in vegetation cover and composition (Appendix B).

A total of 3.25 acres of other waters were delineated as river/stream features (Table 4). The Cowardin classification assigned to these waters is R2UB (Cowardin et al. 1979).

4.2 Other Areas Investigated

Other areas investigated that were determined not to be aquatic resources included the following:

- Sample Point SP-3 was established in the Sutter Bypass in an area identified in the NWI as forested wetlands (Figures 3 and 4). This location was selected because it is representative of riparian habitat in the Sutter Bypass. The sample point had wetland hydrology and hydrophytic vegetation but lacked hydric soils. Indicators of wetland hydrology were due to high-flow events in the preceding wet season. No aquatic resources were delineated in this location.
- Sample Point SP-4 was established on the margins of a rice field in the southern portion of the study area. This sample point had wetland hydrology and hydrophytic vegetation but lacked hydric soils. Wetland hydrology was associated with seasonal flood irrigation. No aquatic resources were delineated in this location. This point is representative of the rice fields that cover much of the study area. These areas are flood irrigated and would revert to dryland in the absence of irrigation. There was no indication that wetlands would persist in these fields in the absence of irrigation. Thus, no irrigated or farmed wetlands were delineated in the rice fields.

5. References

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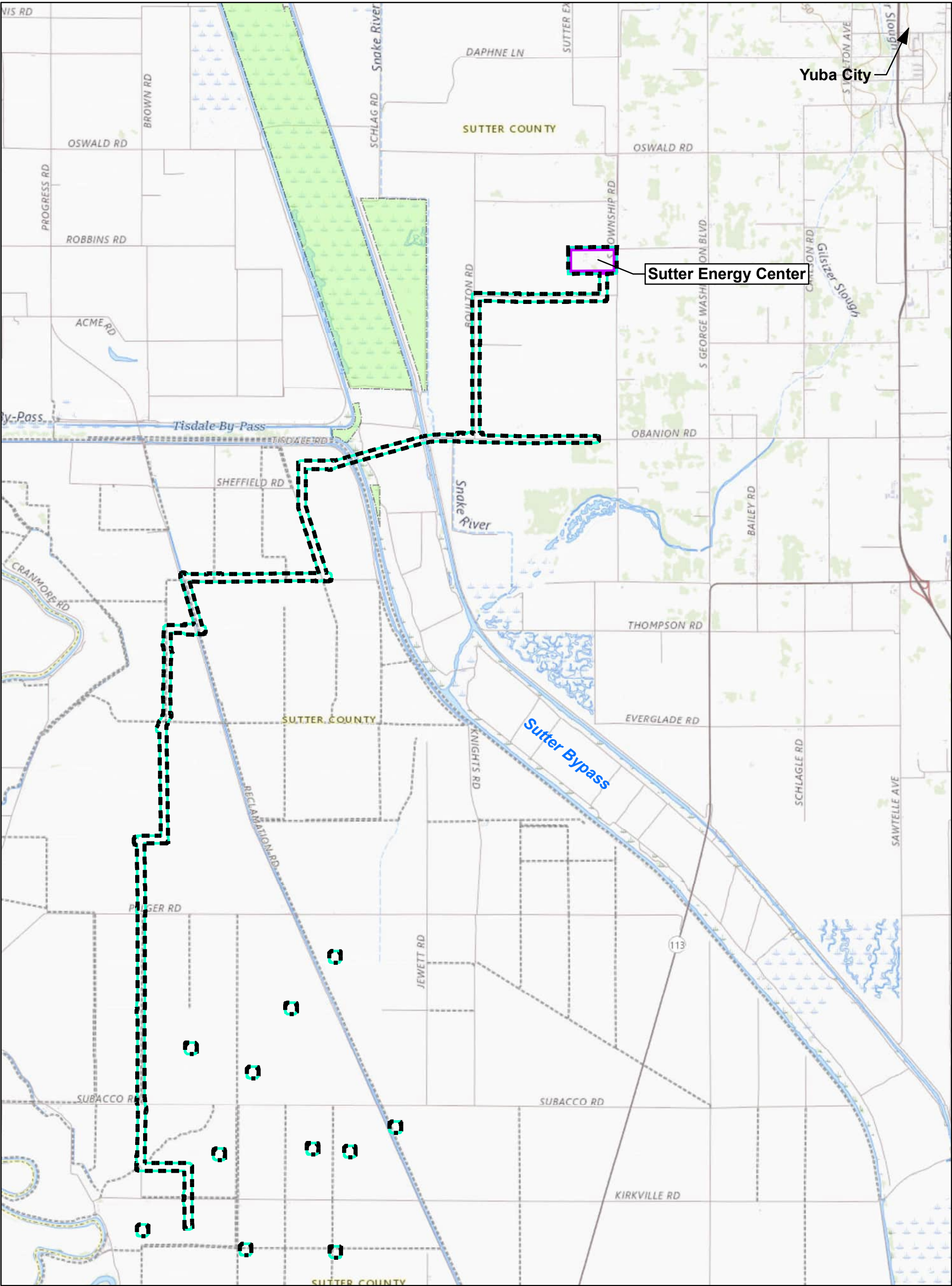
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Figures



- Legend**
- Aquatic Resource Delineation Study Area (693 AC)
 - Sutter Energy Center
 - Sutter National Wildlife Refuge

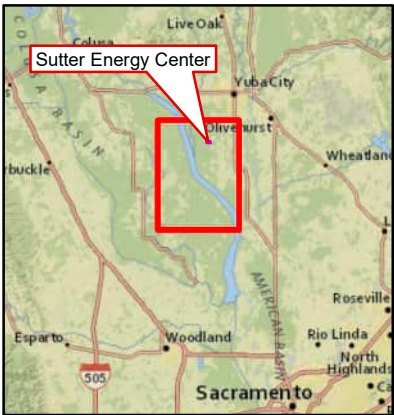
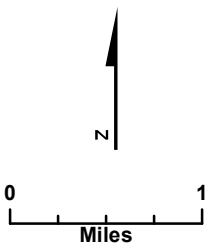
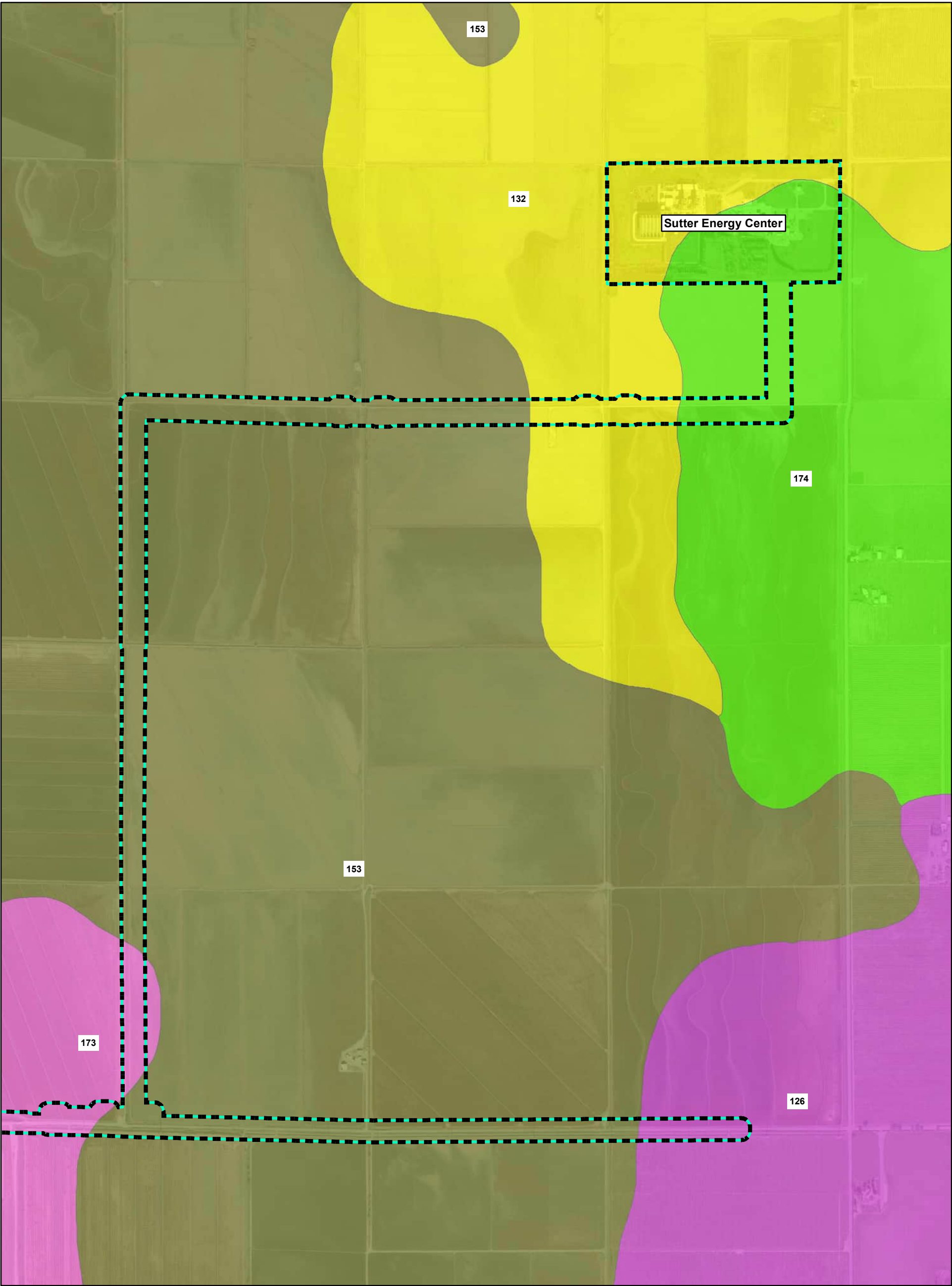


Figure 1
Vicinity Map
Sutter Decarbonization Project
Sutter County, CA



- Legend**
-  Aquatic Resource Delineation Study Area (693 AC)
- NRCS Soils**
-  126 - Conejo-Tisdale complex, 0 percent slopes, MLRA 17
 -  132 - Gridley clay loam, 0 to 1 percent slopes
 -  153 - Oswald clay, 0 to 2 percent slopes
 -  173 - Subaco clay, 0 to 2 percent slopes
 -  174 - Tisdale clay loam, 0 to 2 percent slopes

Note:
AC = acres

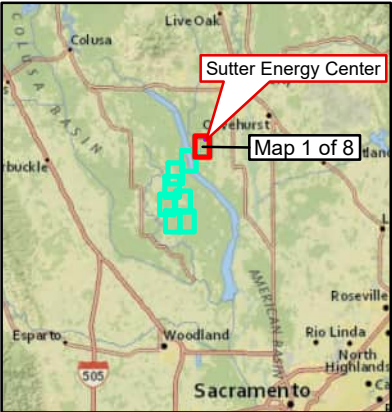
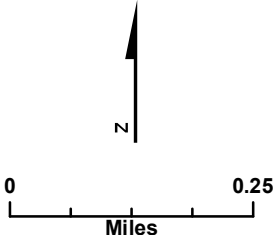
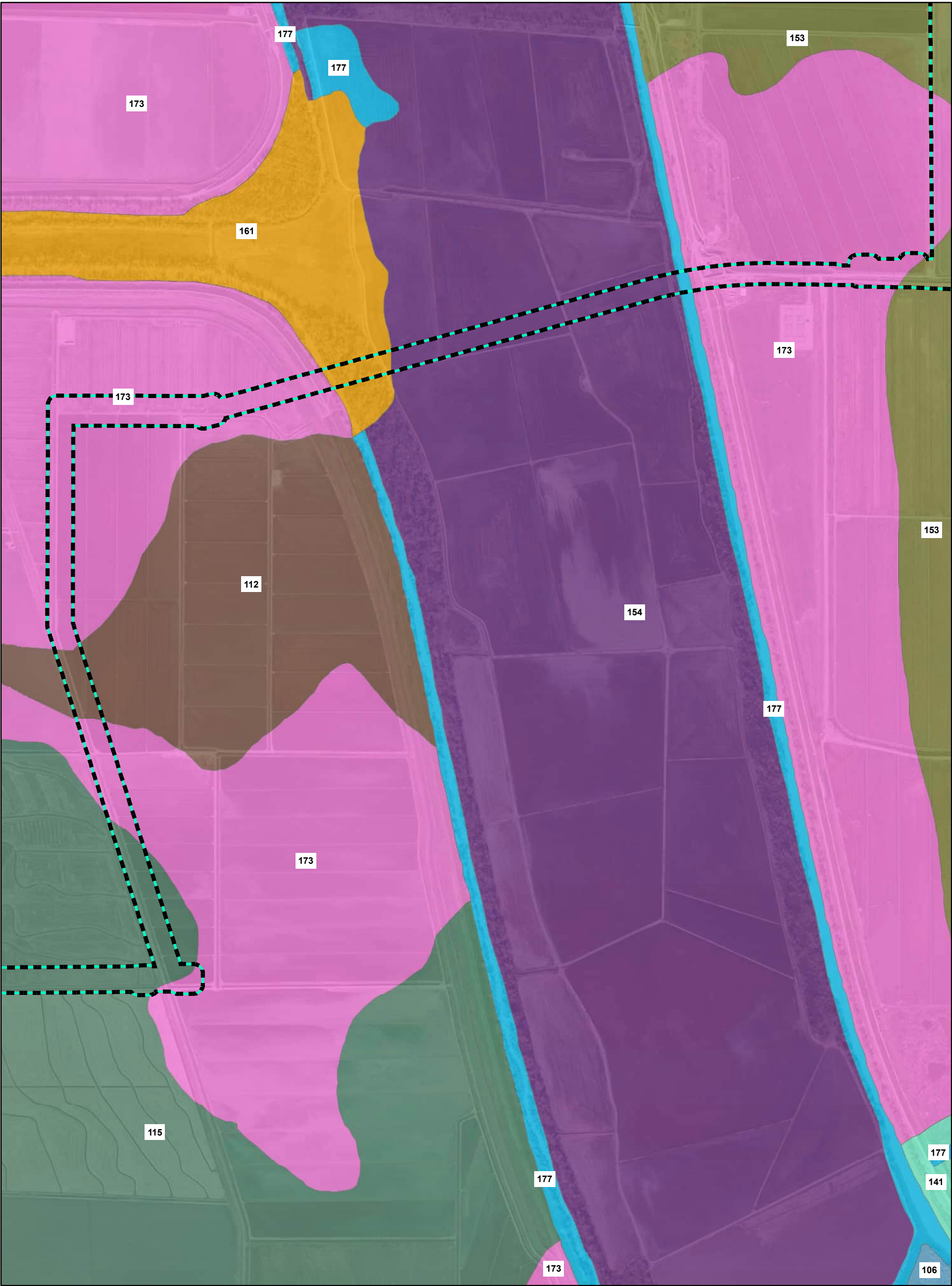


Figure 2
Map 1 of 8
Soils Map
Sutter Decarbonization Project
Sutter County, CA



Legend

 Aquatic Resource Delineation Study Area (693 AC)

NRCS Soils

-  106 - Capay silty clay, 0 percent slopes, frequently flooded, flood control, MLRA 17
-  112 - Clear Lake clay, 0 to 1 percent slopes, MLRA 17
-  115 - Clear Lake clay, siltstone substratum, 0 to 2 percent slopes
-  141 - Marcum clay loam, siltstone substratum, 0 to 1 percent slopes
-  153 - Oswald clay, 0 to 2 percent slopes
-  154 - Oswald clay, frequently flooded, 0 to 2 percent slopes
-  161 - Shanghai fine sandy loam, channeled, 0 to 2 percent slopes
-  173 - Subaco clay, 0 to 2 percent slopes
-  177 - Water

Note:
AC = acres

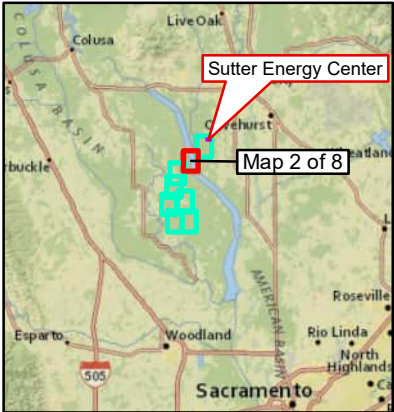
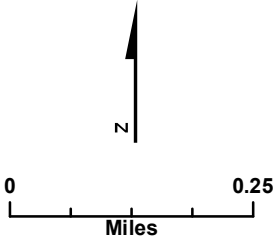
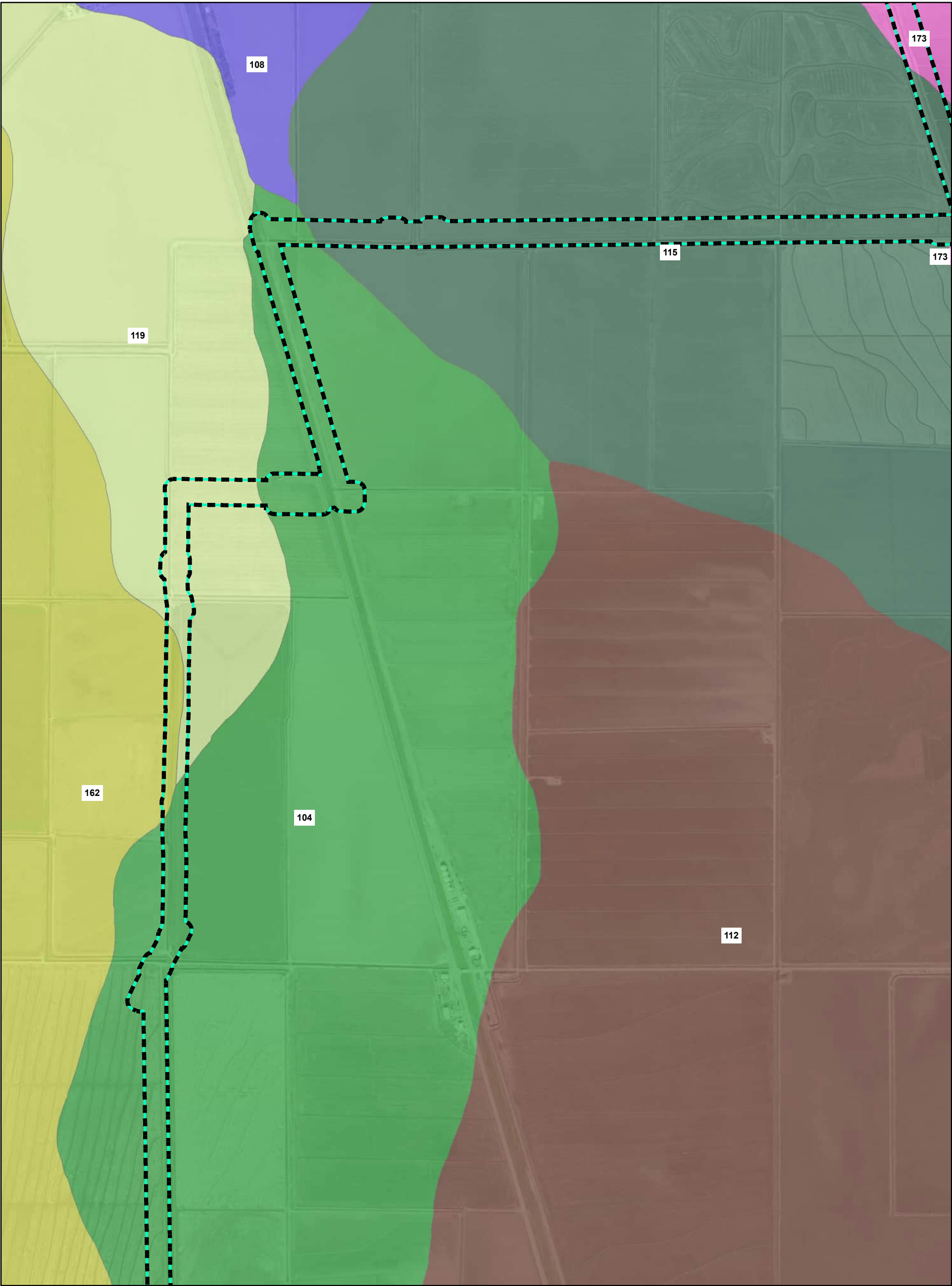


Figure 2
Map 2 of 8
Soils Map
Sutter Decarbonization Project
Sutter County, CA



Legend

 Aquatic Resource Delineation Study Area (693 AC)

NRCS Soils

 104 - Capay silty clay, 0 to 2 percent slopes

 108 - Capay silty clay, wet 0 to 2 percent

 112 - Clear Lake clay, 0 to 1 percent slopes, MLRA 17

 115 - Clear Lake clay, siltstone substratum, 0 to 2 percent slopes

 119 - Columbia fine sandy loam, clay substratum, 0 to 2 percent slopes

 162 - Shanghai silt loam, 0 to 2 percent slopes

 173 - Subaco clay, 0 to 2 percent slopes

Note:
AC = acres

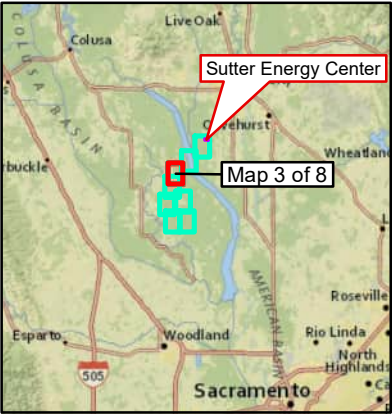
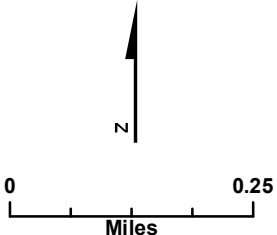
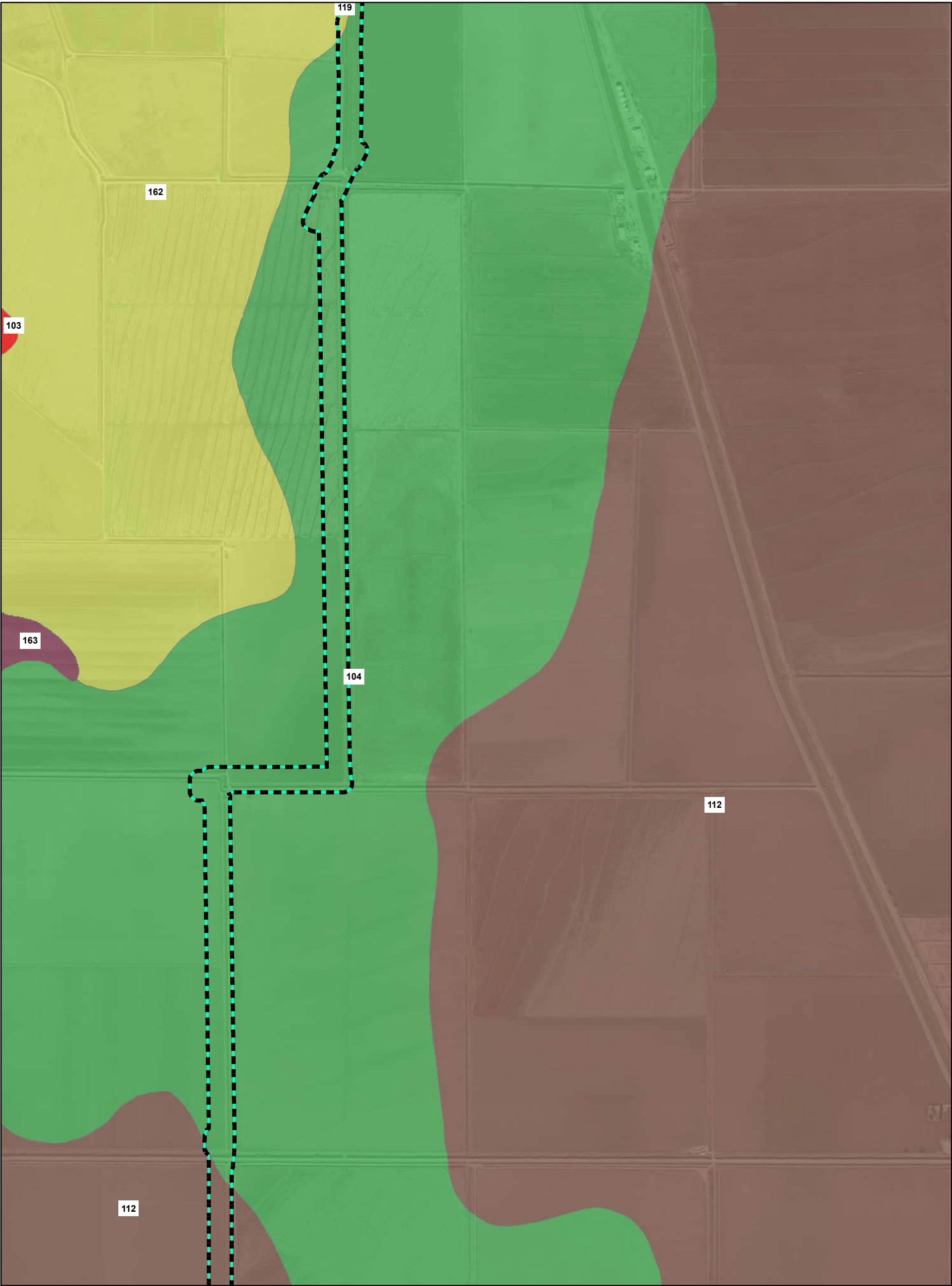


Figure 2
Map 3 of 8
Soils Map
Sutter Decarbonization Project
Sutter County, CA



- Legend**
-  Aquatic Resource Delineation Study Area (693 AC)
- NRCS Soils**
-  103 - Byington silt loam, 0 to 2 percent slopes
 -  104 - Capay silty clay, 0 to 2 percent slopes
 -  112 - Clear Lake clay, 0 to 1 percent slopes, MLRA 17
 -  119 - Columbia fine sandy loam, clay substratum, 0 to 2 percent slopes
 -  162 - Shanghai silt loam, 0 to 2 percent slopes
 -  163 - Shanghai silt loam, clay substratum, 0 to 2 percent slopes

Note:
AC = acres

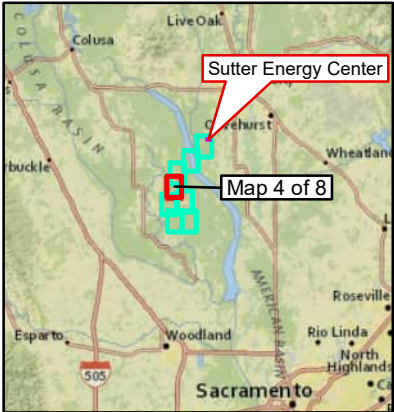
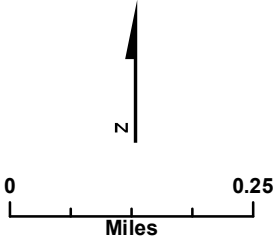
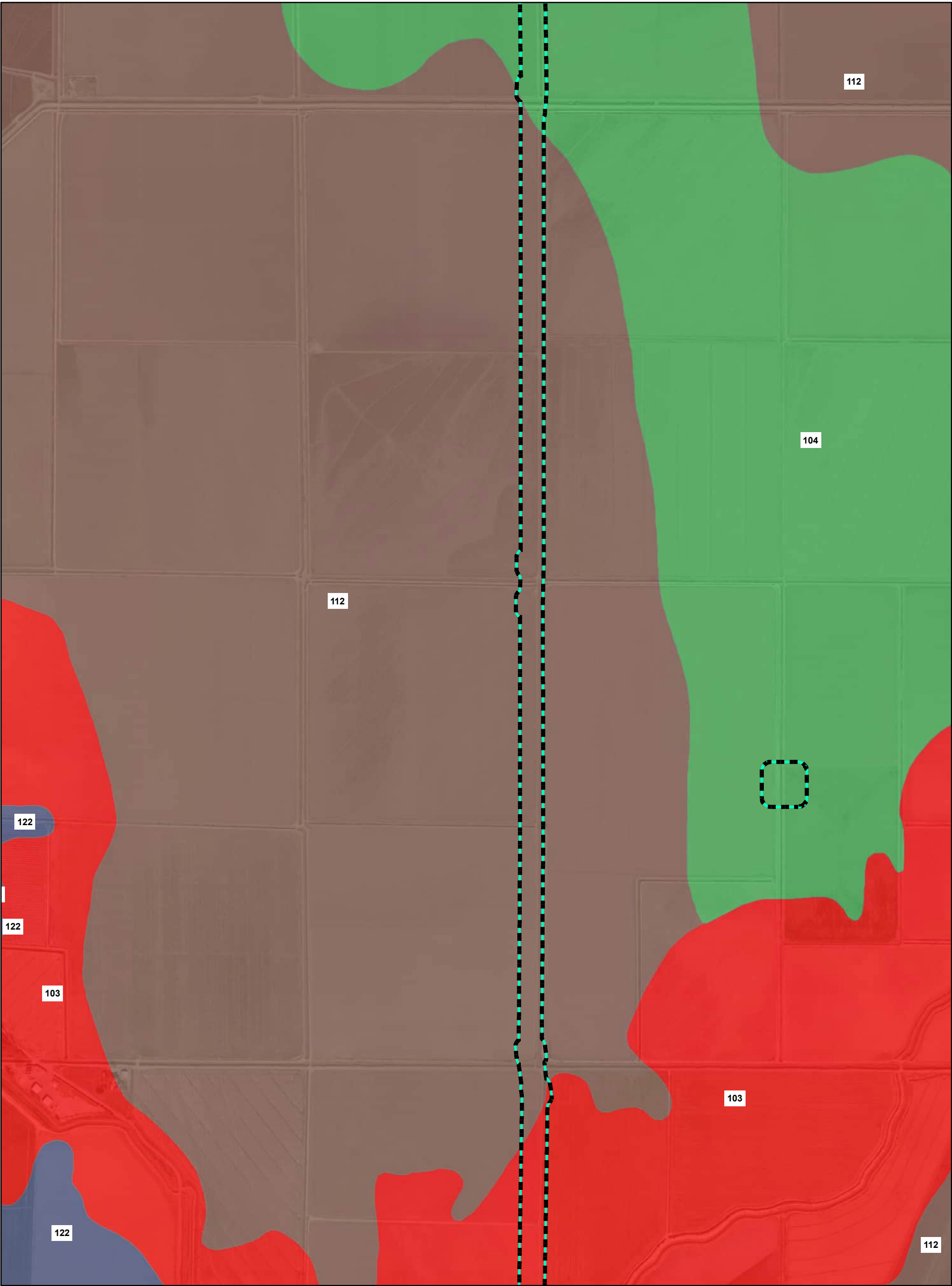


Figure 2
Map 4 of 8
Soils Map
Sutter Decarbonization Project
Sutter County, CA



Legend

Aquatic Resource Delineation Study Area (693 AC)

NRCS Soils

- 103 - Byington silt loam, 0 to 2 percent slopes
- 104 - Capay silty clay, 0 to 2 percent slopes
- 112 - Clear Lake clay, 0 to 1 percent slopes, MLRA 17
- 122 - Columbia loam, 0 to 2 percent slopes

Note:
AC = acres

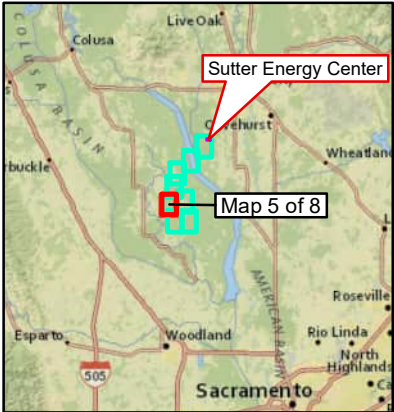
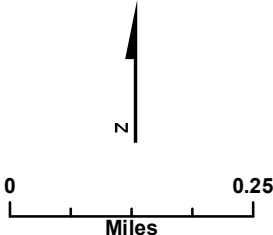
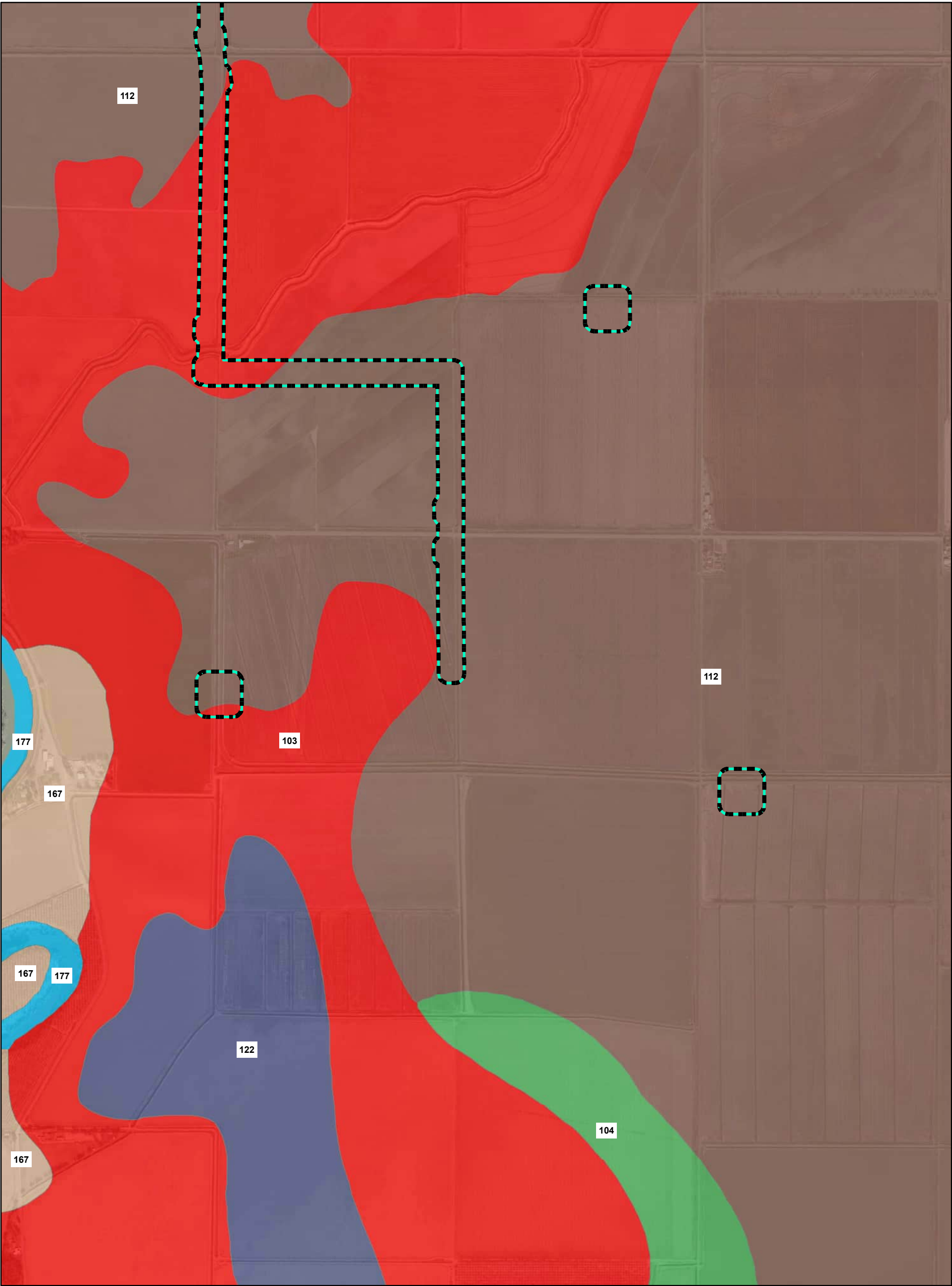


Figure 2
Map 5 of 8
Soils Map
Sutter Decarbonization Project
Sutter County, CA



Legend

Aquatic Resource Delineation Study Area (693 AC)

NRCS Soils

- 103 - Byington silt loam, 0 to 2 percent slopes
- 104 - Capay silty clay, 0 to 2 percent slopes
- 112 - Clear Lake clay, 0 to 1 percent slopes, MLRA 17
- 122 - Columbia loam, 0 to 2 percent slopes
- 167 - Shanghai silty clay loam, 0 to 2 percent slopes
- 177 - Water

Note:
AC = acres

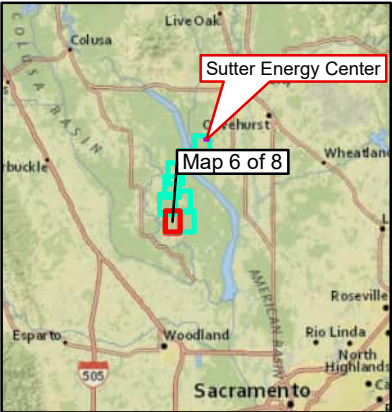
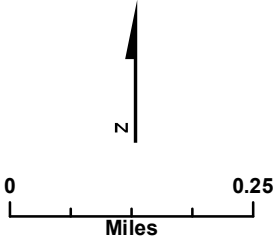
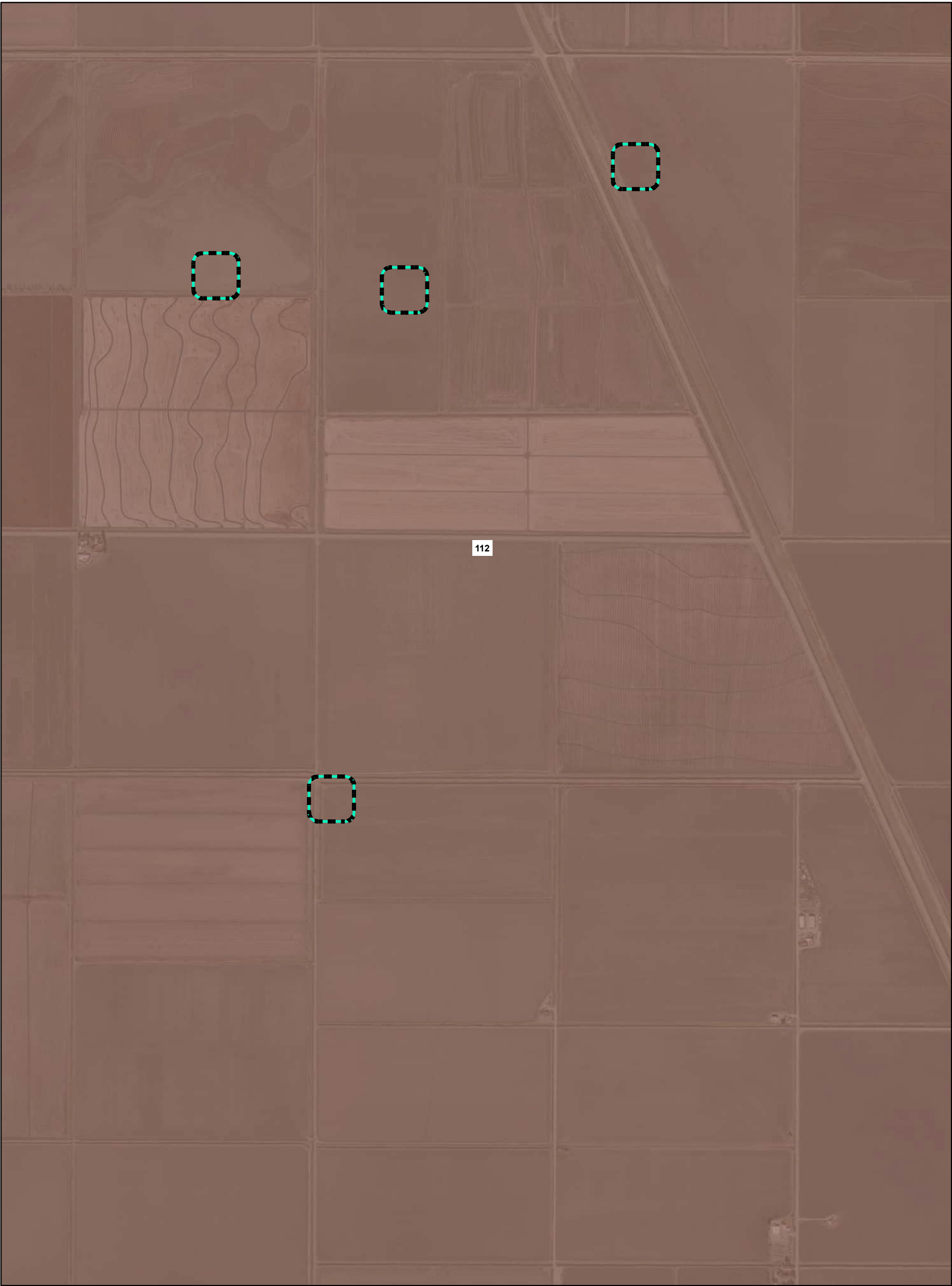


Figure 2
Map 6 of 8
Soils Map
Sutter Decarbonization Project
Sutter County, CA



Legend
 Aquatic Resource Delineation Study Area (693 AC)
NRCS Soils
 112 - Clear Lake clay, 0 to 1 percent slopes, MLRA 17

Note:
AC = acres

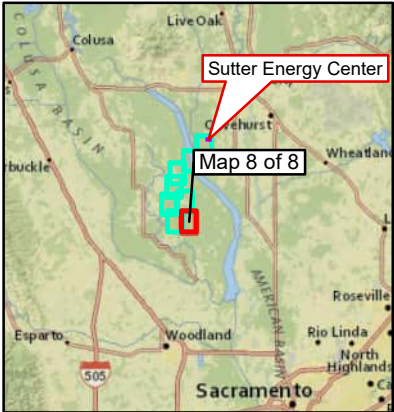
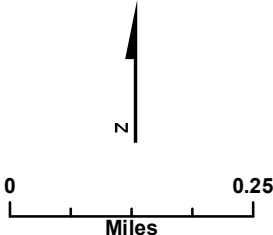
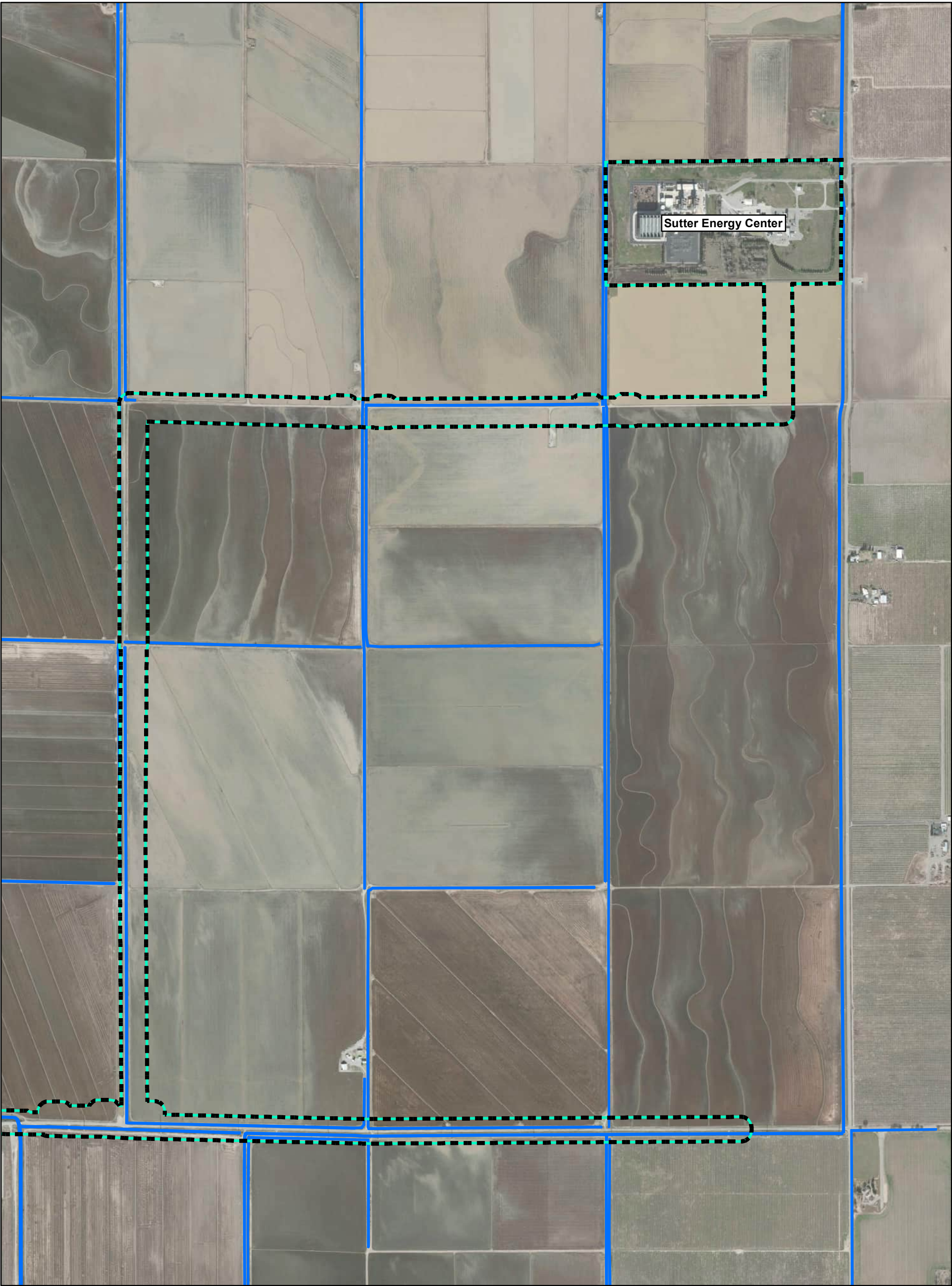


Figure 2
Map 8 of 8
Soils Map
Sutter Decarbonization Project
Sutter County, CA



Legend
Aquatic Resource Delineation Study Area (693 AC)
National Wetlands Inventory
Riverine

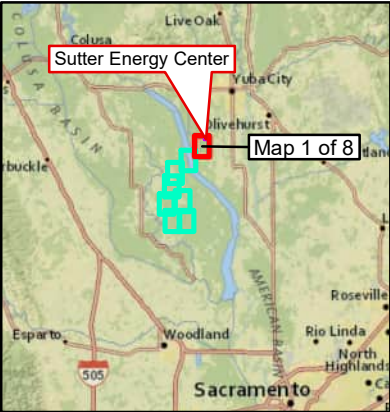
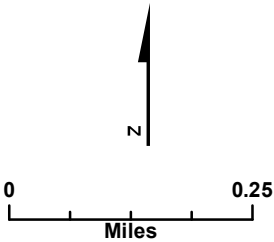
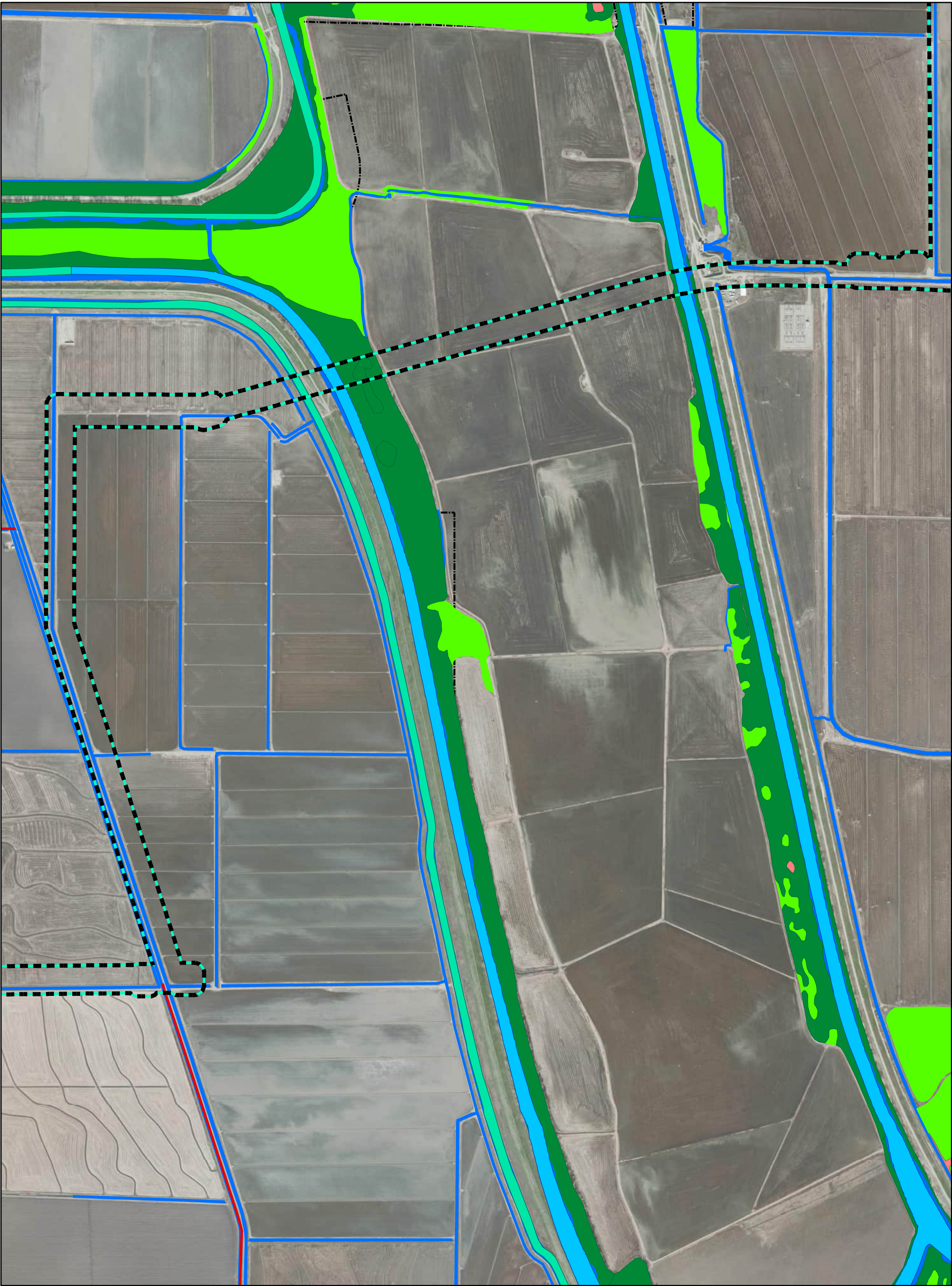


Figure 3
Map 1 of 8
National Hydrography Dataset and
National Wetlands Inventory Map
Sutter Decarbonization Project
Sutter County, CA



- Legend**
- Aquatic Resource Delineation Study Area (693 AC)
 - National Hydrography Dataset**
 - Canal/Ditch
 - Canal/Ditch
 - Stream/River
 - National Wetlands Inventory**
 - Freshwater Emergent Wetland
 - Freshwater Forested/Shrub Wetland
 - Freshwater Pond
 - Riverine

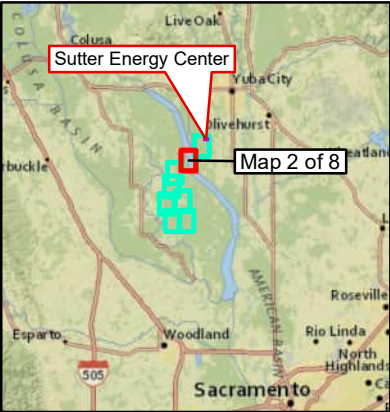
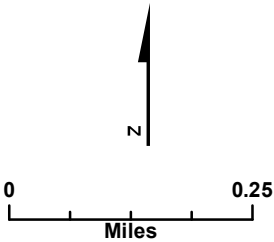
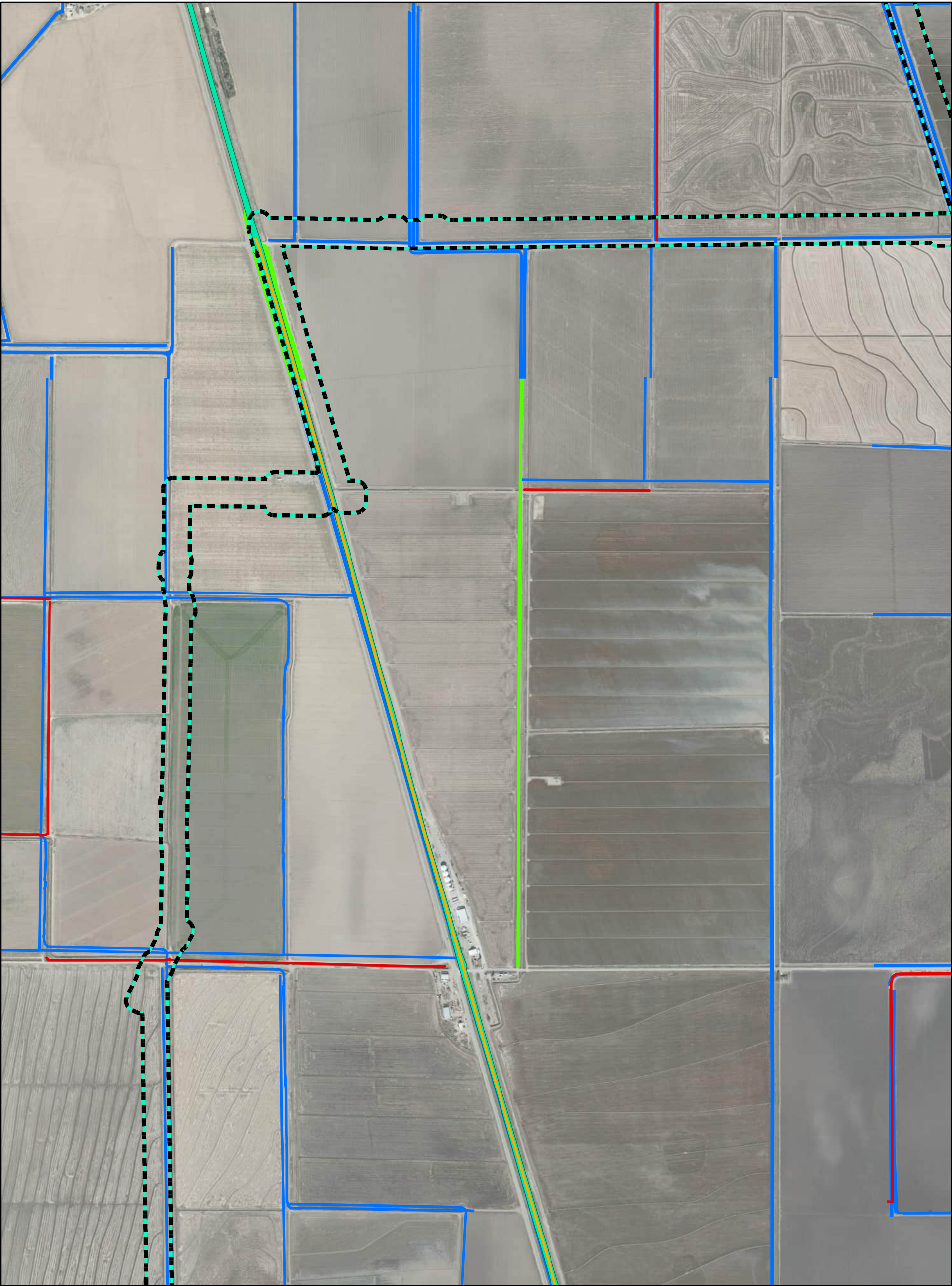


Figure 3
Map 2 of 8
National Hydrography Dataset and
National Wetlands Inventory Map
Sutter Decarbonization Project
Sutter County, CA



- Legend**
- Aquatic Resource Delineation Study Area (693 AC)
 - National Hydrography Dataset**
 - Artificial Path
 - Canal/Ditch
 - Canal/Ditch
 - National Wetlands Inventory**
 - Freshwater Emergent Wetland
 - Riverine

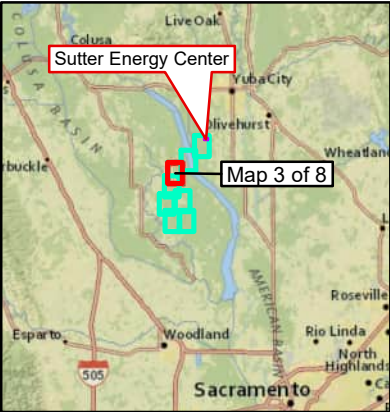
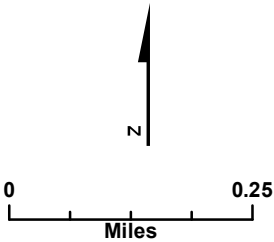
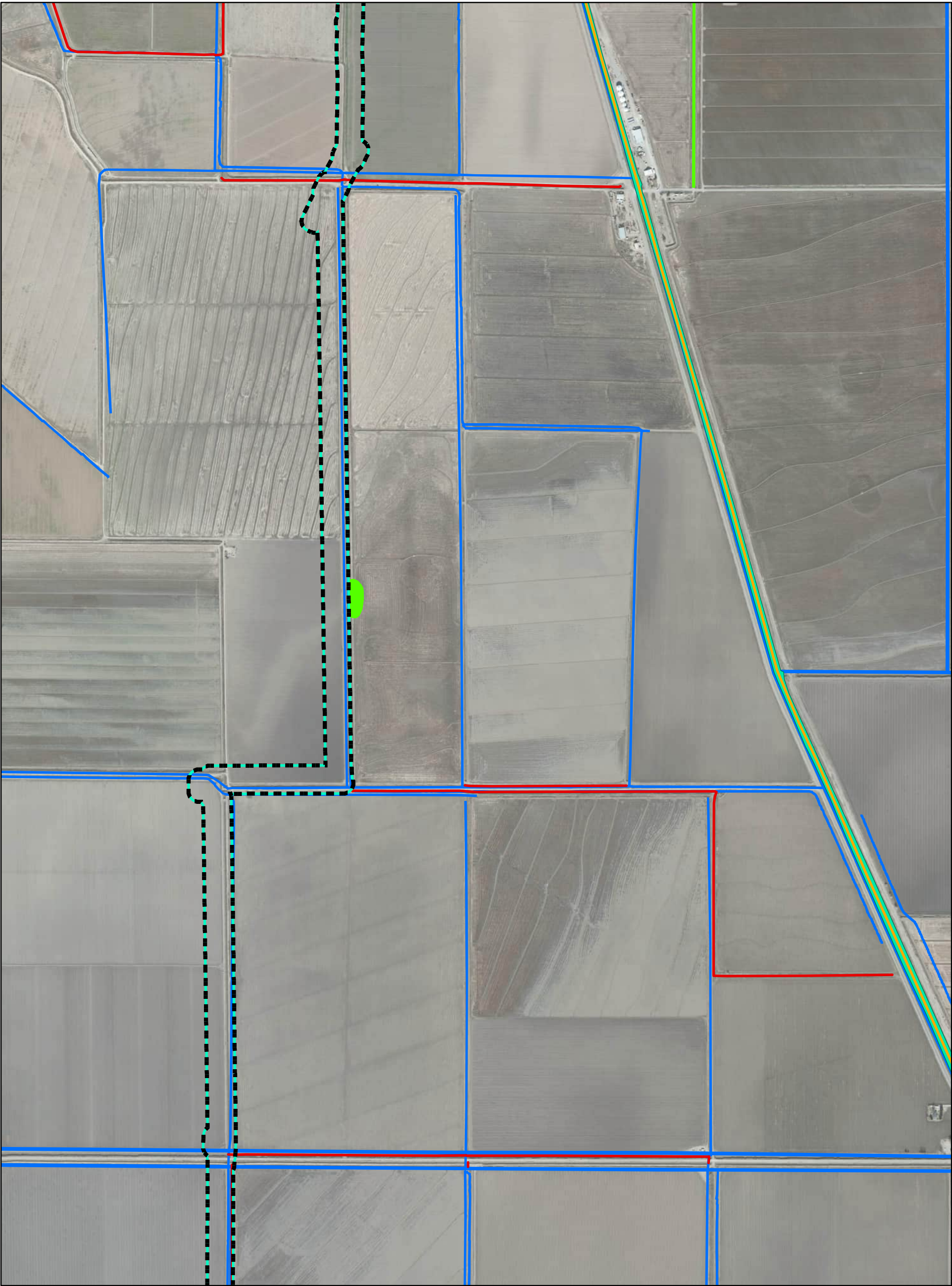


Figure 3
Map 3 of 8
National Hydrography Dataset and
National Wetlands Inventory Map
Sutter Decarbonization Project
Sutter County, CA



- Legend**
- Aquatic Resource Delineation Study Area (693 AC)
 - National Hydrography Dataset**
 - Artificial Path
 - Canal/Ditch
 - Canal/Ditch
 - National Wetlands Inventory**
 - Freshwater Emergent Wetland
 - Riverine

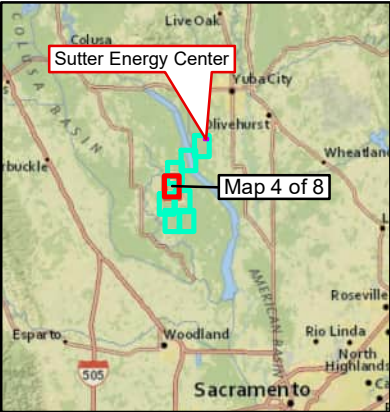
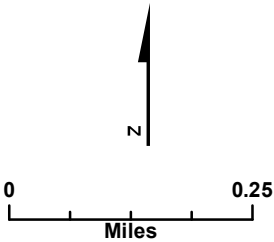
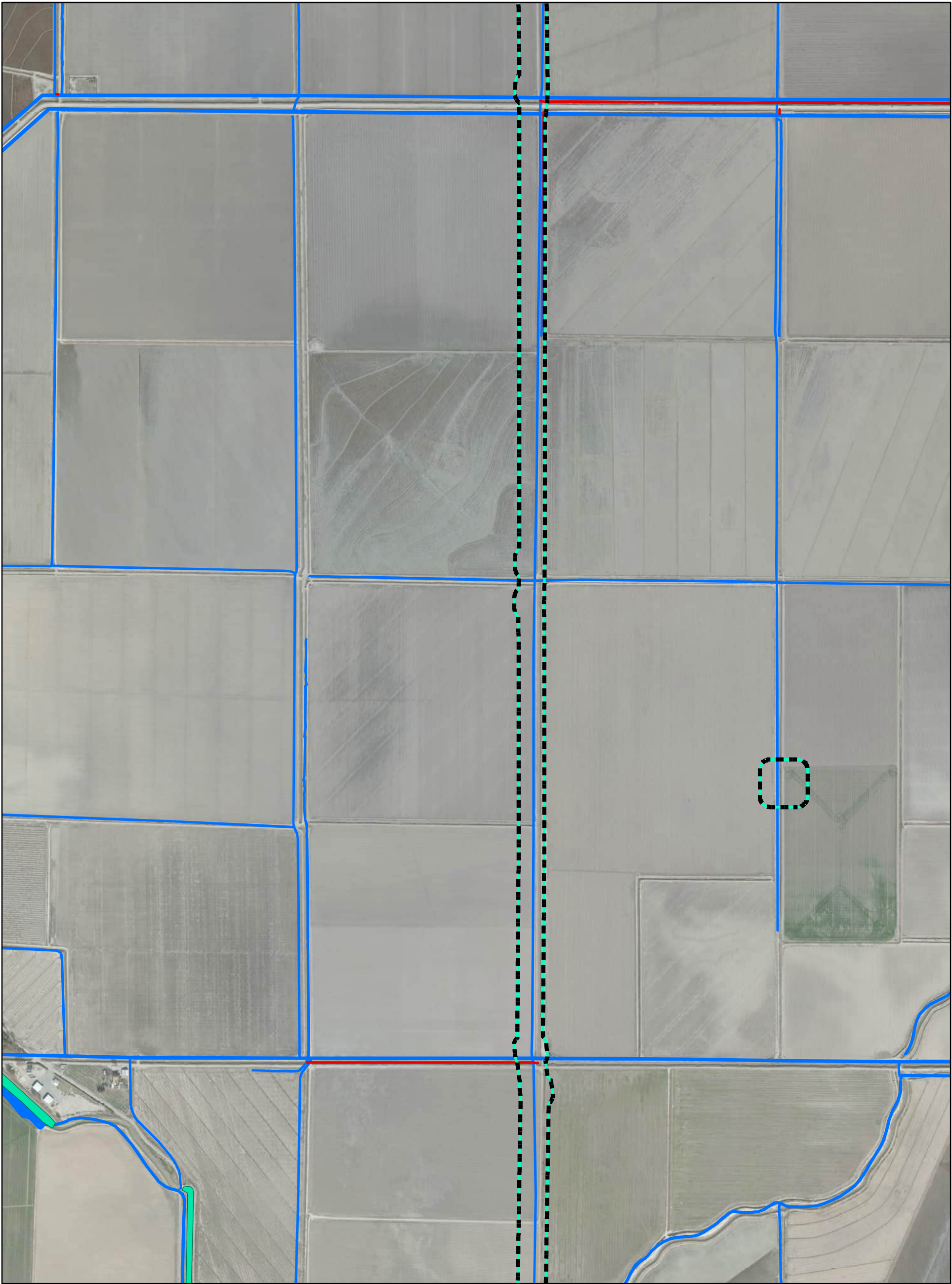


Figure 3
Map 4 of 8
National Hydrography Dataset and National Wetlands Inventory Map
Sutter Decarbonization Project
Sutter County, CA



- Legend**
- Aquatic Resource Delineation Study Area (693 AC)
 - National Hydrography Dataset**
 - Canal/Ditch
 - Canal/Ditch
 - National Wetlands Inventory**
 - Riverine

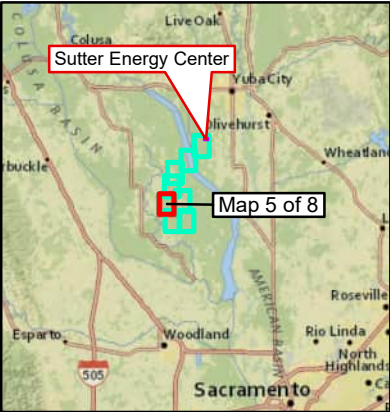
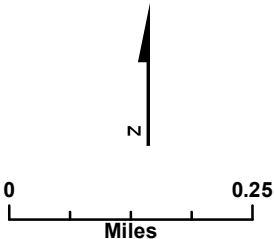
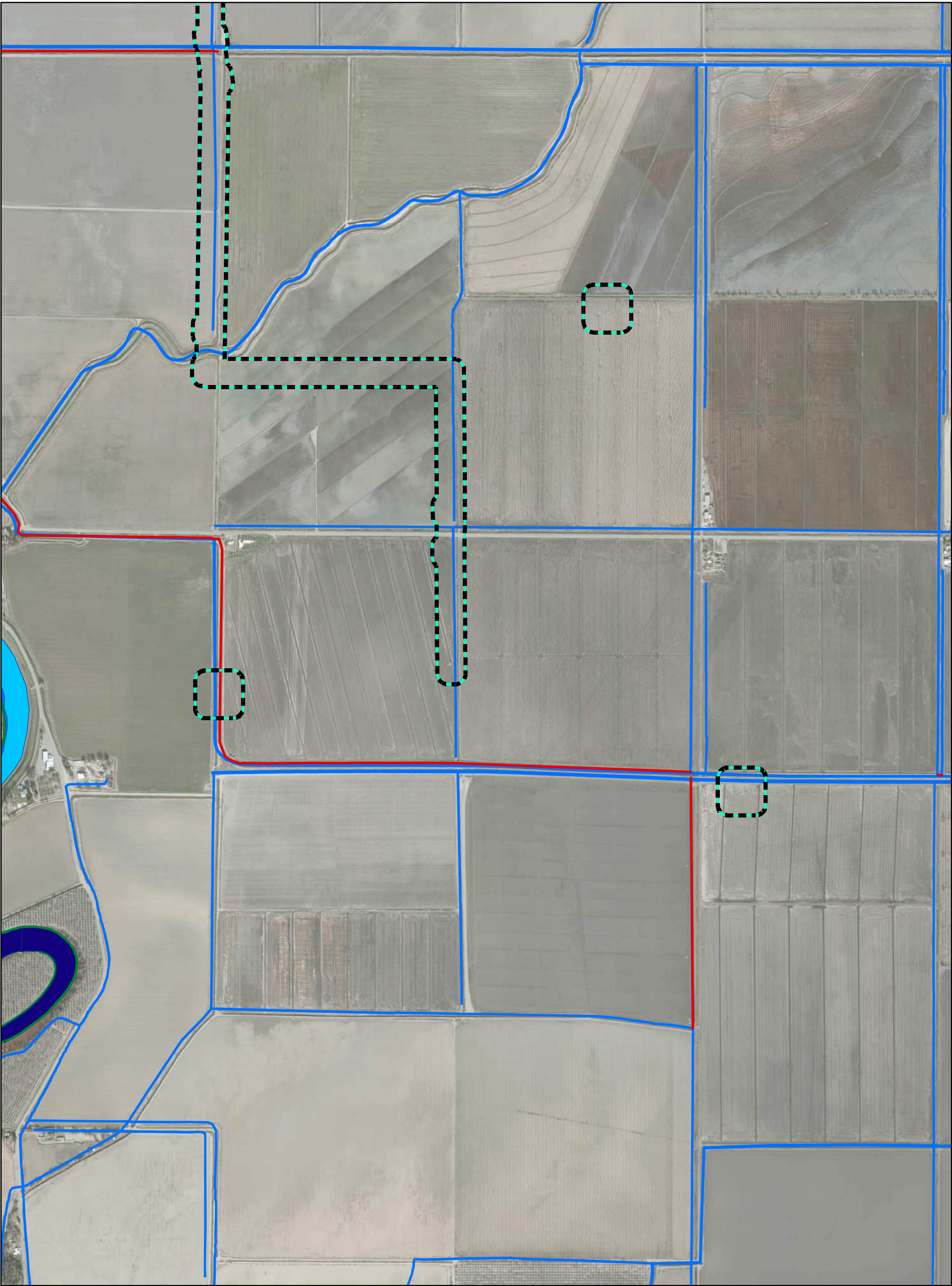


Figure 3
Map 5 of 8
National Hydrography Dataset and
National Wetlands Inventory Map
Sutter Decarbonization Project
Sutter County, CA



- Legend**
-  Aquatic Resource Delineation Study Area (693 AC)
 - National Hydrography Dataset**
 -  Canal/Ditch
 -  Stream/River
 - National Wetlands Inventory**
 -  Freshwater Forested/Shrub Wetland
 -  Lake
 -  Riverine

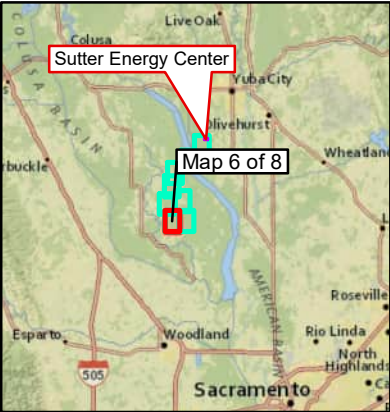
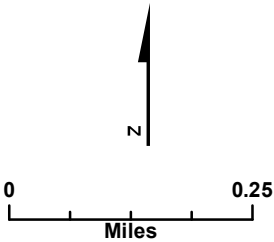
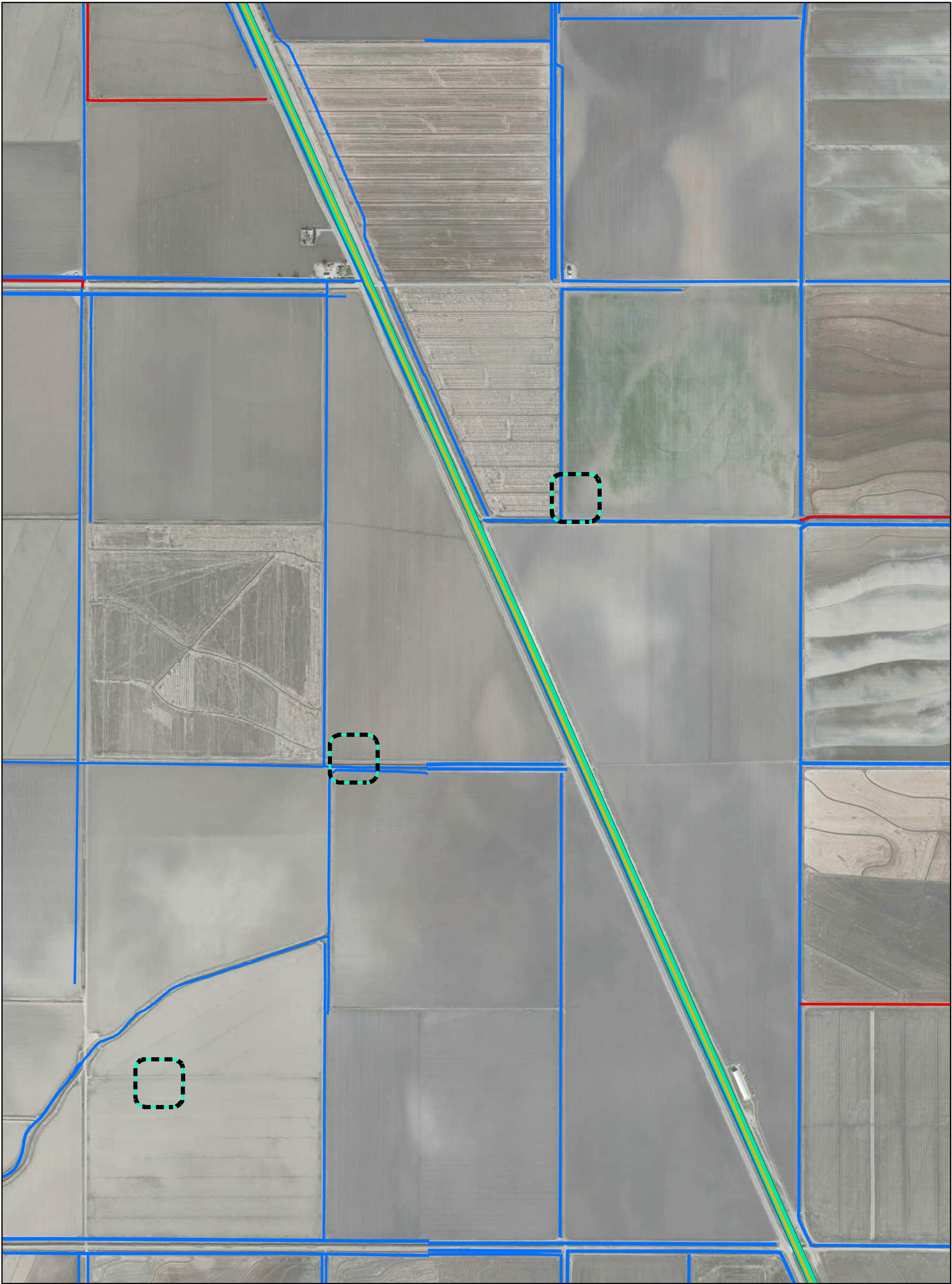


Figure 3
Map 6 of 8
National Hydrography Dataset and
National Wetlands Inventory Map
Sutter Decarbonization Project
Sutter County, CA



- Legend**
- Aquatic Resource Delineation Study Area (693 AC)
 - National Hydrography Dataset**
 - Artificial Path
 - Canal/Ditch
 - Canal/Ditch
 - National Wetlands Inventory**
 - Riverine

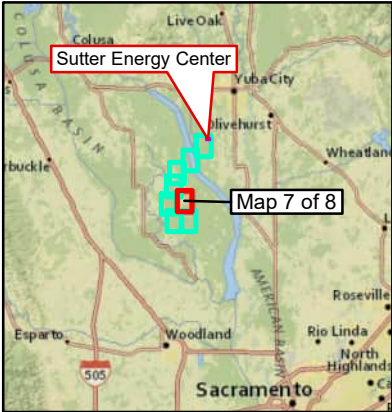
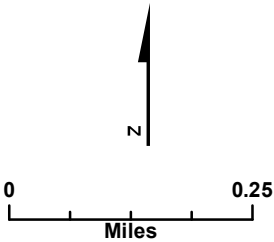
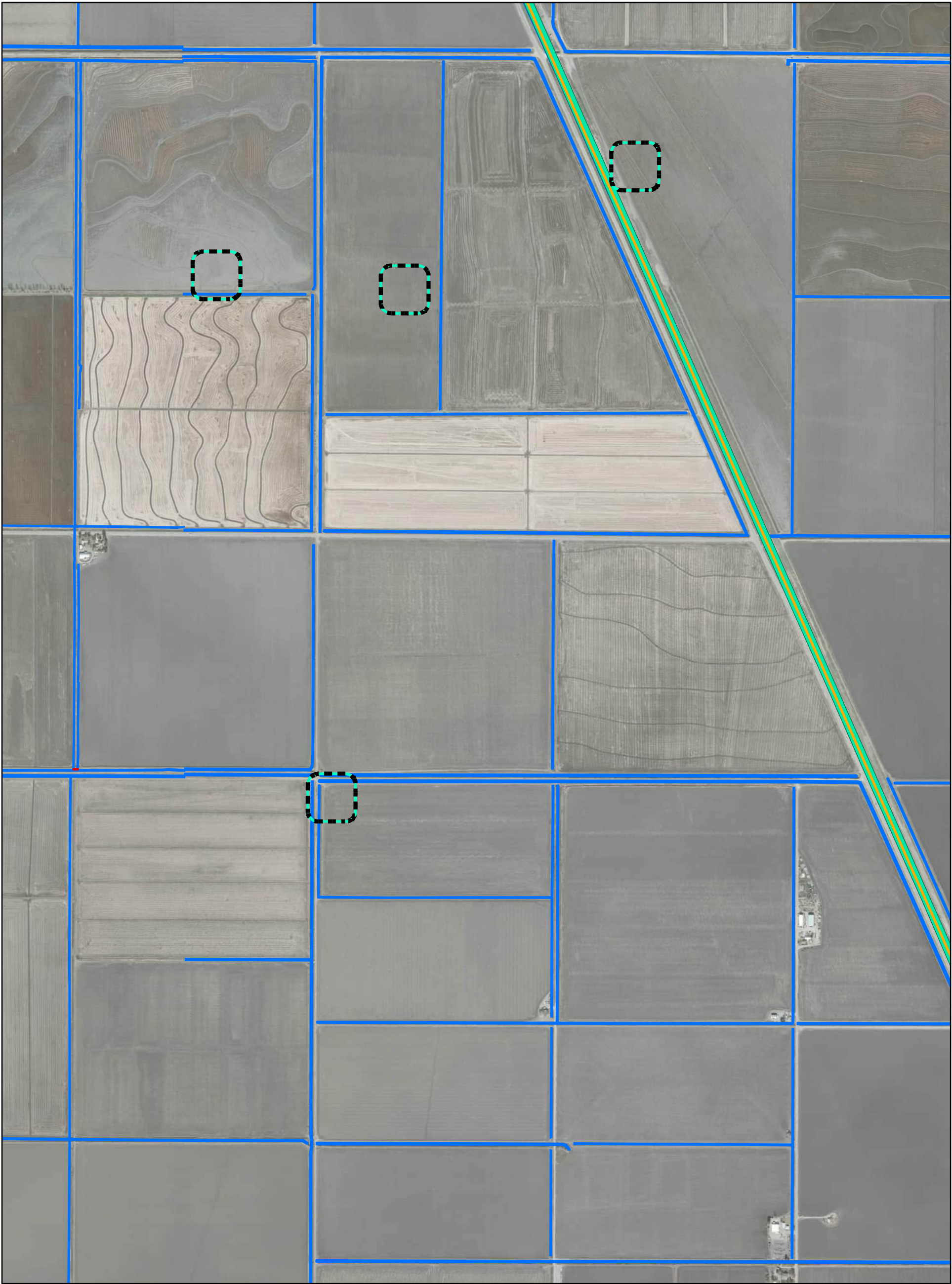


Figure 3
Map 7 of 8
National Hydrography Dataset and
National Wetlands Inventory Map
Sutter Decarbonization Project
Sutter County, CA



- Legend**
- Aquatic Resource Delineation Study Area (693 AC)
 - National Hydrography Dataset**
 - Artificial Path
 - Canal/Ditch
 - Canal/Ditch
 - National Wetlands Inventory**
 - Riverine

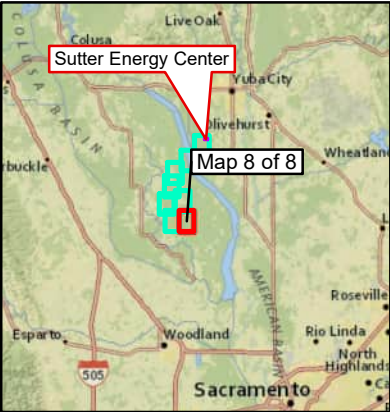
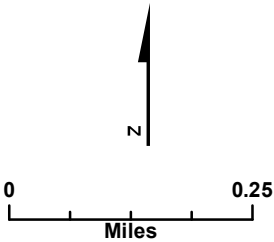
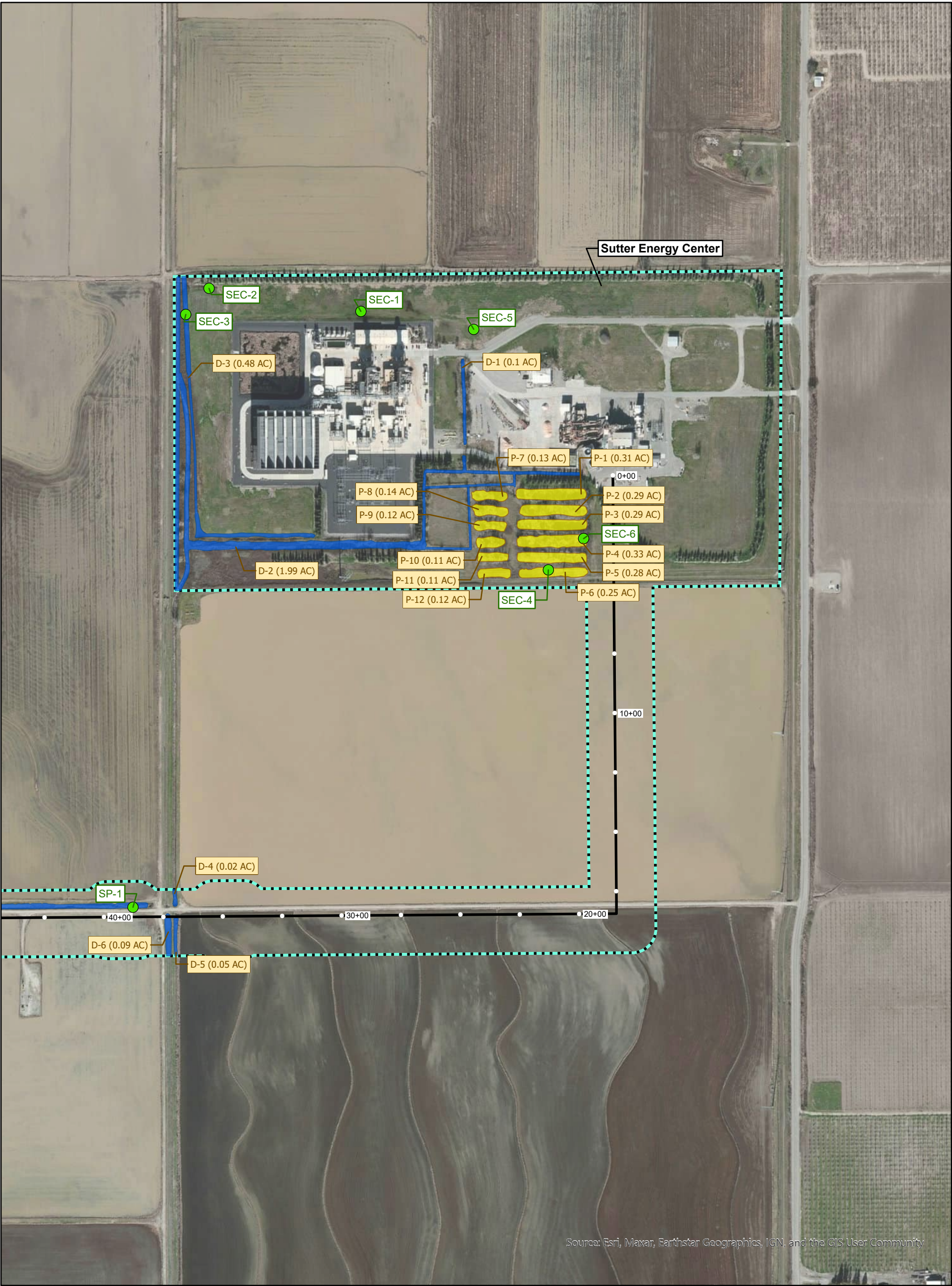


Figure 3
Map 8 of 8
National Hydrography Dataset and
National Wetlands Inventory Map
Sutter Decarbonization Project
Sutter County, CA



Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

Legend

- Aquatic Resource Delineation Study Area (693 AC)
- Proposed Pipeline with Stationing (Approximate)
- Wetland Sample Point
- OHWM Transect

Aquatic Resources

Other Waters

- Ditch (D) (53.55 AC)
- Pond (P) (2.48 AC)

Note:
AC = acres

Delineation survey personnel and dates:
K. Fisher, S. Lindemann, S. Wentworth
09/19-21/2023, 01/05/24, 04/12/24

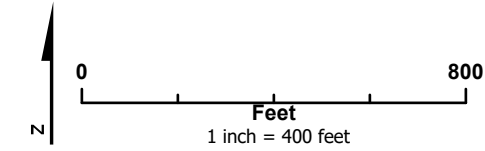
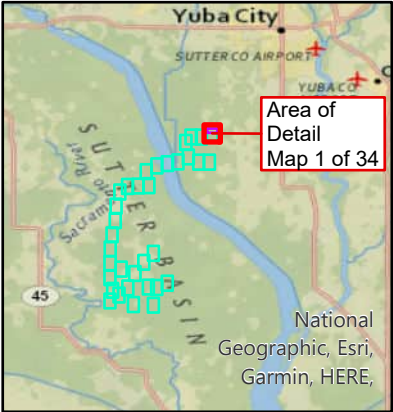
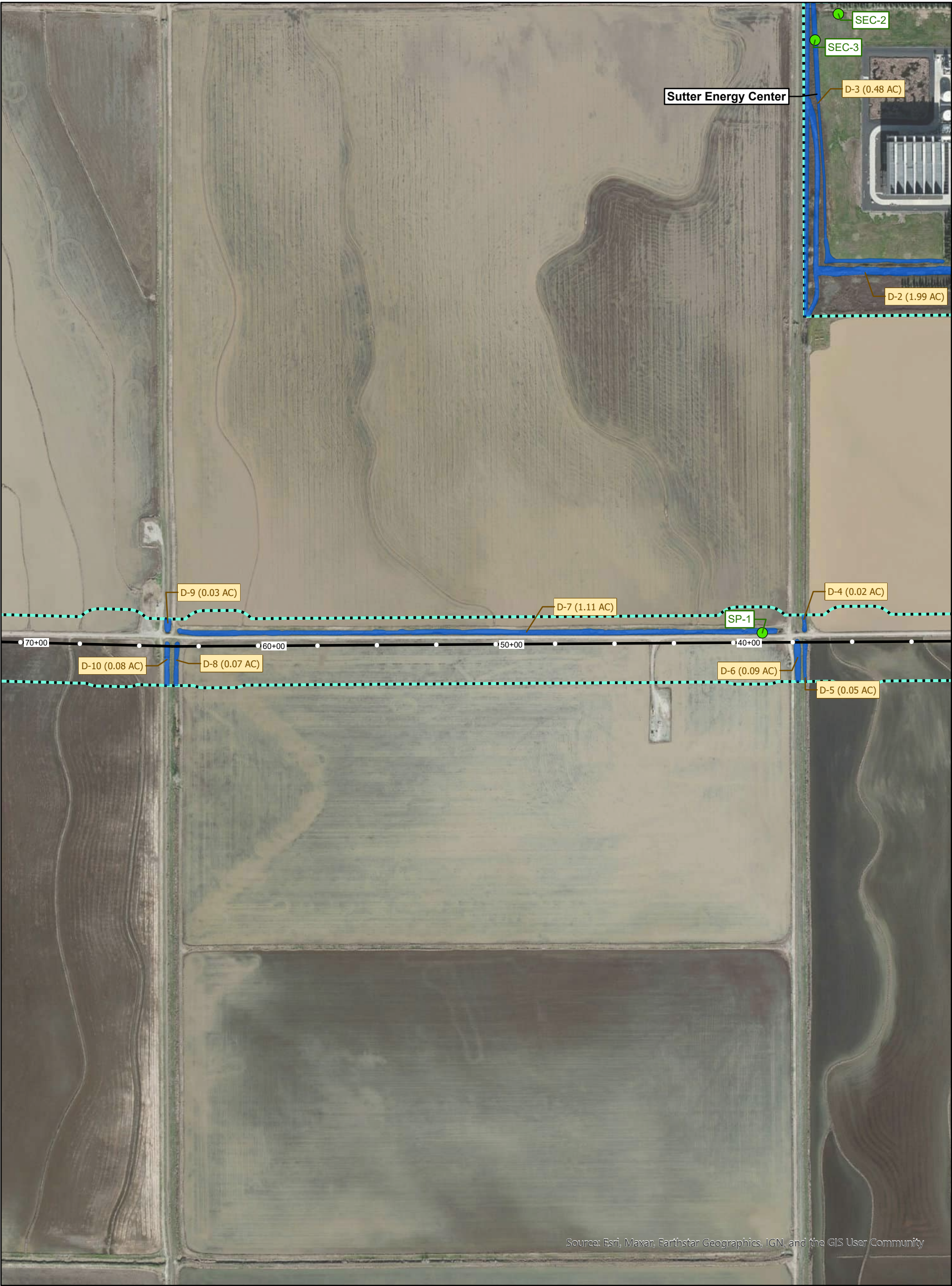


Figure 4
Map 1 of 34
Aquatic Resources
Delineation Map
Sutter Decarbonization Project
Sutter County, CA



Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

Legend

- Aquatic Resource Delineation Study Area (693 AC)
- Proposed Pipeline with Stationing (Approximate)
- Wetland Sample Point
- OHWM Transect

Aquatic Resources

- Ditch (D) (53.55 AC)

Note:
AC = acres

Delineation survey personnel and dates:
K. Fisher, S. Lindemann, S. Wentworth
09/19-21/2023, 01/05/24, 04/12/24

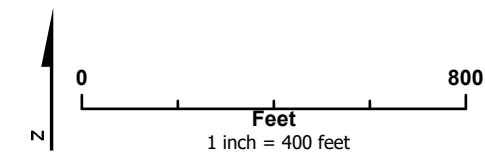
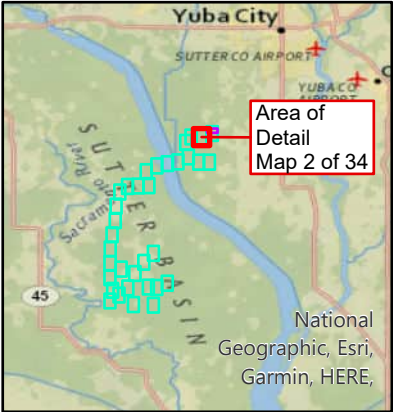


Figure 4
Map 2 of 34
Aquatic Resources
Delineation Map
Sutter Decarbonization Project
Sutter County, CA



Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

Legend

- Aquatic Resource Delineation Study Area (693 AC)
- Proposed Pipeline with Stationing (Approximate)
- OHWM Transect

Aquatic Resources

Other Waters

- Ditch (D) (53.55 AC)

Note:
AC = acres

Delineation survey personnel and dates:
K. Fisher, S. Lindemann, S. Wentworth
09/19-21/2023, 01/05/24, 04/12/24

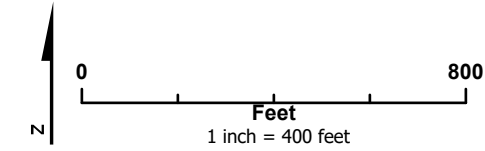
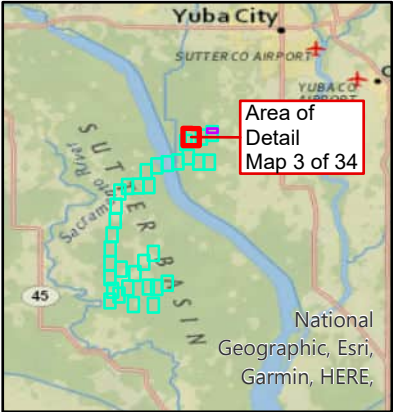


Figure 4
Map 3 of 34
Aquatic Resources
Delineation Map
Sutter Decarbonization Project
Sutter County, CA



Legend

- Aquatic Resource Delineation Study Area (693 AC)
- Proposed Pipeline with Stationing (Approximate)
- OHWM Transect

Aquatic Resources

Other Waters

- Ditch (D) (53.55 AC)

Note:
AC = acres

Delineation survey personnel and dates:
K. Fisher, S. Lindemann, S. Wentworth
09/19-21/2023, 01/05/24, 04/12/24

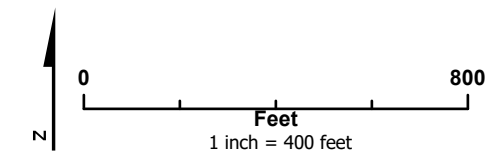
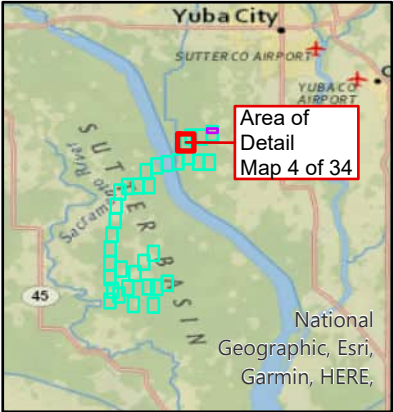
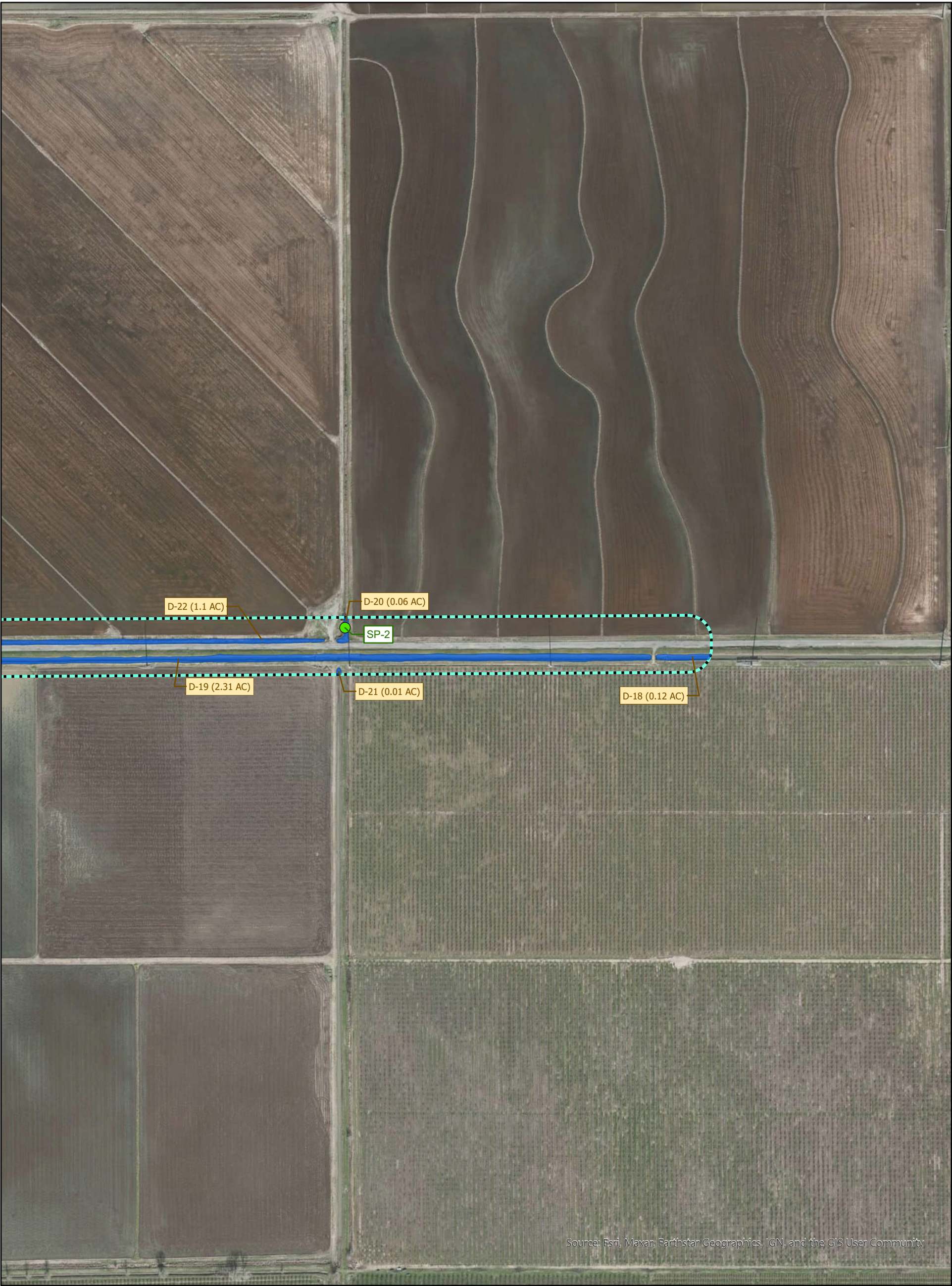


Figure 4
Map 4 of 34
Aquatic Resources
Delineation Map
Sutter Decarbonization Project
Sutter County, CA



Legend

- Aquatic Resource Delineation Study Area (693 AC)
- Wetland Sample Point
- OHWM Transect

Aquatic Resources

Other Waters

- Ditch (D) (53.55 AC)

Note:
AC = acres

Delineation survey personnel and dates:
K. Fisher, S. Lindemann, S. Wentworth
09/19-21/2023, 01/05/24, 04/12/24

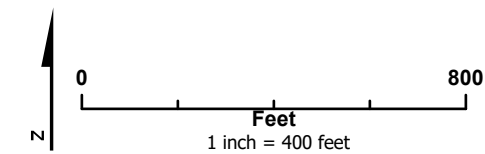
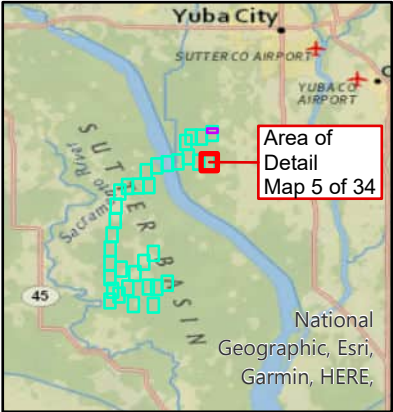


Figure 4
Map 5 of 34
Aquatic Resources
Delineation Map
Sutter Decarbonization Project
Sutter County, CA



Legend

- Aquatic Resource Delineation Study Area (693 AC)
- OHWM Transect

Aquatic Resources

Other Waters

- Ditch (D) (53.55 AC)

Note:
AC = acres

Delineation survey personnel and dates:
K. Fisher, S. Lindemann, S. Wentworth
09/19-21/2023, 01/05/24, 04/12/24

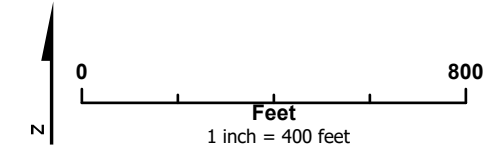
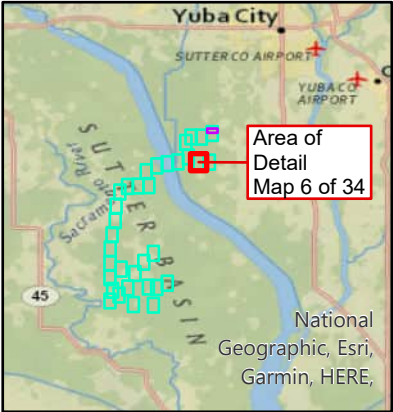


Figure 4
Map 6 of 34
Aquatic Resources
Delineation Map
Sutter Decarbonization Project
Sutter County, CA



Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

Legend

- Aquatic Resource Delineation Study Area (693 AC)
- Proposed Pipeline with Stationing (Approximate)
- OHWM Transect

Aquatic Resources

Other Waters

- Ditch (D) (53.55 AC)
- River/Stream (R) (3.25 AC)

Note:
AC = acres

Delineation survey personnel and dates:
K. Fisher, S. Lindemann, S. Wentworth
09/19-21/2023, 01/05/24, 04/12/24

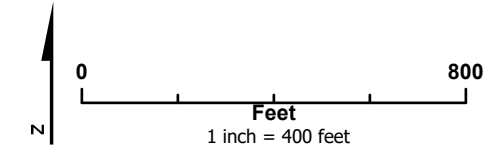
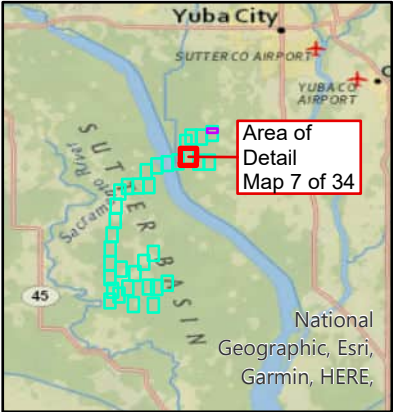
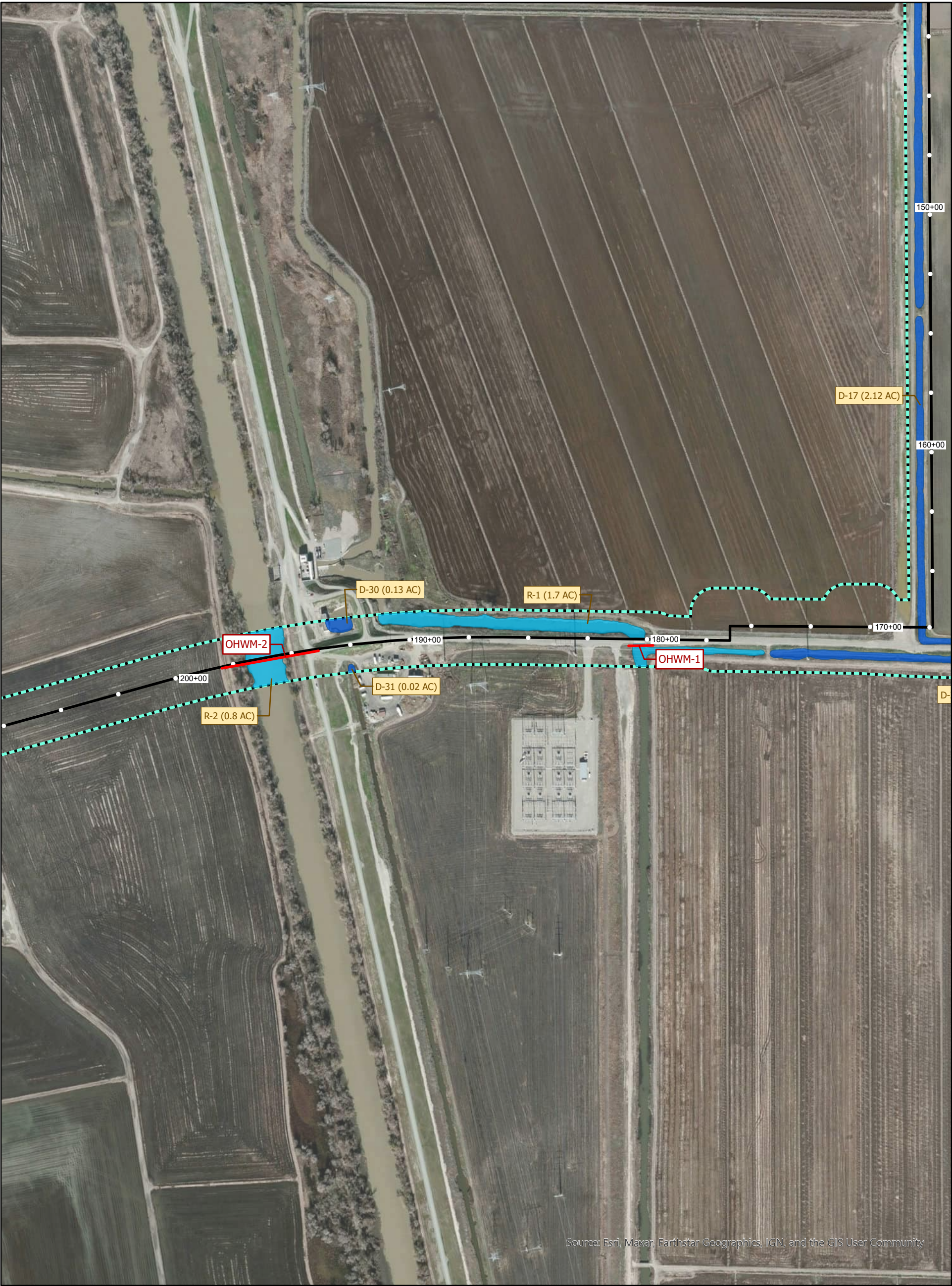


Figure 4
Map 7 of 34
Aquatic Resources
Delineation Map
Sutter Decarbonization Project
Sutter County, CA



Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

Legend

- Aquatic Resource Delineation Study Area (693 AC)
- Proposed Pipeline with Stationing (Approximate)
- OHWM Transect

Aquatic Resources

Other Waters

- Ditch (D) (53.55 AC)
- River/Stream (R) (3.25 AC)

Note:
AC = acres

Delineation survey personnel and dates:
K. Fisher, S. Lindemann, S. Wentworth
09/19-21/2023, 01/05/24, 04/12/24

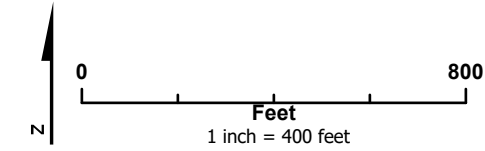
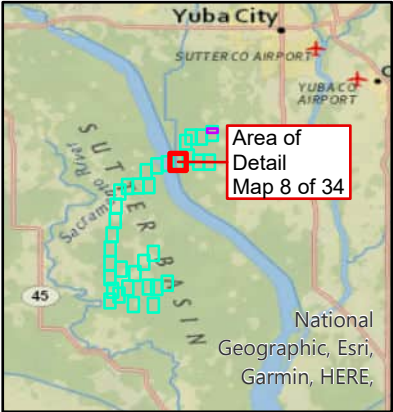
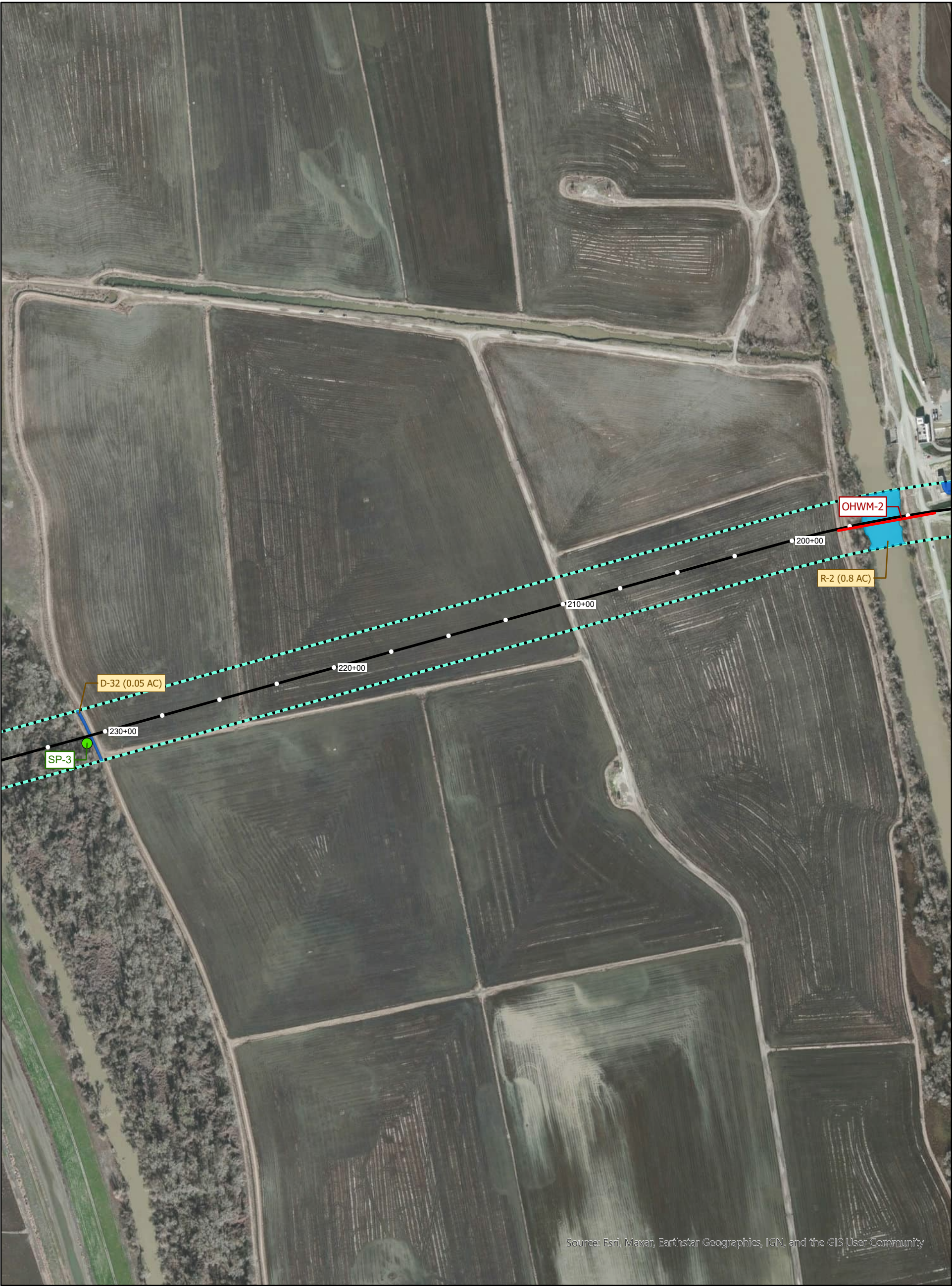


Figure 4
Map 8 of 34
Aquatic Resources
Delineation Map
Sutter Decarbonization Project
Sutter County, CA



Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

Legend

- Aquatic Resource Delineation Study Area (693 AC)
- Proposed Pipeline with Stationing (Approximate)
- Wetland Sample Point
- OHWM Transect

Aquatic Resources

Other Waters

- Ditch (D) (53.55 AC)
- River/Stream (R) (3.25 AC)

Note:
AC = acres

Delineation survey personnel and dates:
K. Fisher, S. Lindemann, S. Wentworth
09/19-21/2023, 01/05/24, 04/12/24

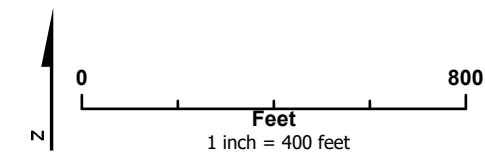
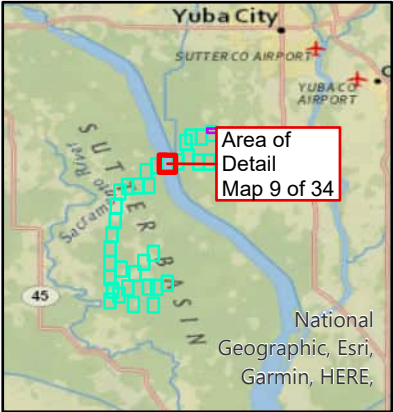


Figure 4
Map 9 of 34
Aquatic Resources
Delineation Map
Sutter Decarbonization Project
Sutter County, CA



Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

Legend

- Aquatic Resource Delineation Study Area (693 AC)
- Proposed Pipeline with Stationing (Approximate)
- Wetland Sample Point
- OHWM Transect

Aquatic Resources

Other Waters

- Canal (C) (0.36 AC)
- Ditch (D) (53.55 AC)
- River/Stream (R) (3.25 AC)

Note:
AC = acres

Delineation survey personnel and dates:
K. Fisher, S. Lindemann, S. Wentworth
09/19-21/2023, 01/05/24, 04/12/24

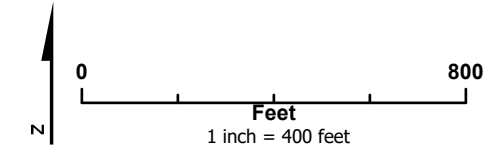
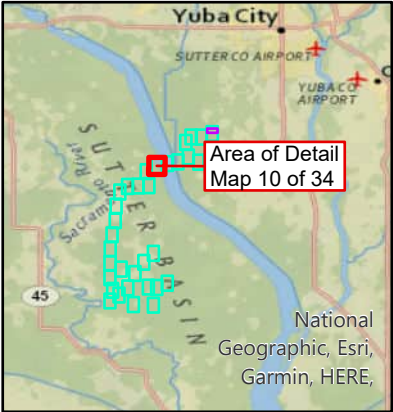


Figure 4
Map 10 of 34
Aquatic Resources
Delineation Map
Sutter Decarbonization Project
Sutter County, CA



Legend

- Aquatic Resource Delineation Study Area (693 AC)
- Proposed Pipeline with Stationing (Approximate)
- OHWM Transect

Aquatic Resources

Other Waters

- Ditch (D) (53.55 AC)

Note:
AC = acres

Delineation survey personnel and dates:
K. Fisher, S. Lindemann, S. Wentworth
09/19-21/2023, 01/05/24, 04/12/24

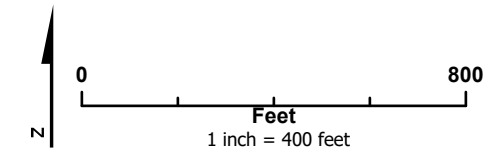
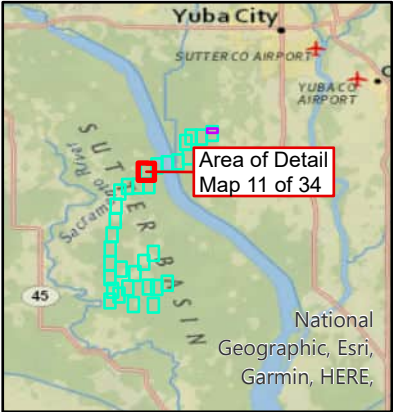


Figure 4
Map 11 of 34
Aquatic Resources
Delineation Map
Sutter Decarbonization Project
Sutter County, CA



Legend

- Aquatic Resource Delineation Study Area (693 AC)
- Proposed Pipeline with Stationing (Approximate)
- OHWM Transect

Aquatic Resources

Other Waters

- Ditch (D) (53.55 AC)

Note:
AC = acres

Delineation survey personnel and dates:
K. Fisher, S. Lindemann, S. Wentworth
09/19-21/2023, 01/05/24, 04/12/24

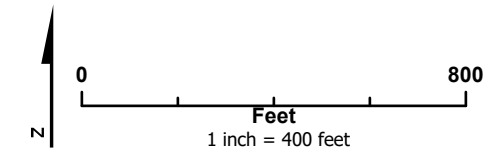
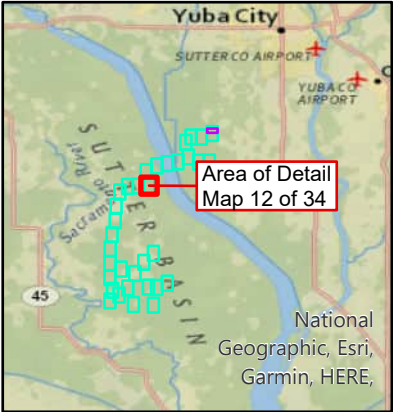


Figure 4
Map 12 of 34
Aquatic Resources
Delineation Map
Sutter Decarbonization Project
Sutter County, CA



Legend

- Aquatic Resource Delineation Study Area (693 AC)
- Proposed Pipeline with Stationing (Approximate)
- OHWM Transect

Aquatic Resources

Other Waters

- Ditch (D) (53.55 AC)

Note:
AC = acres

Delineation survey personnel and dates:
K. Fisher, S. Lindemann, S. Wentworth
09/19-21/2023, 01/05/24, 04/12/24

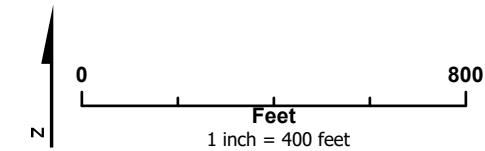
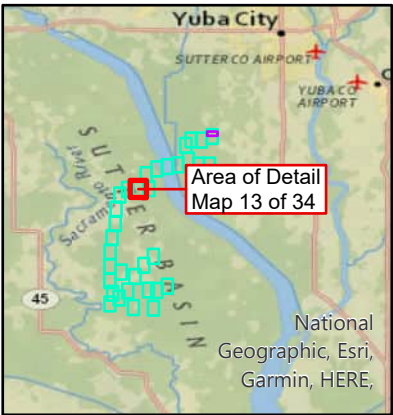
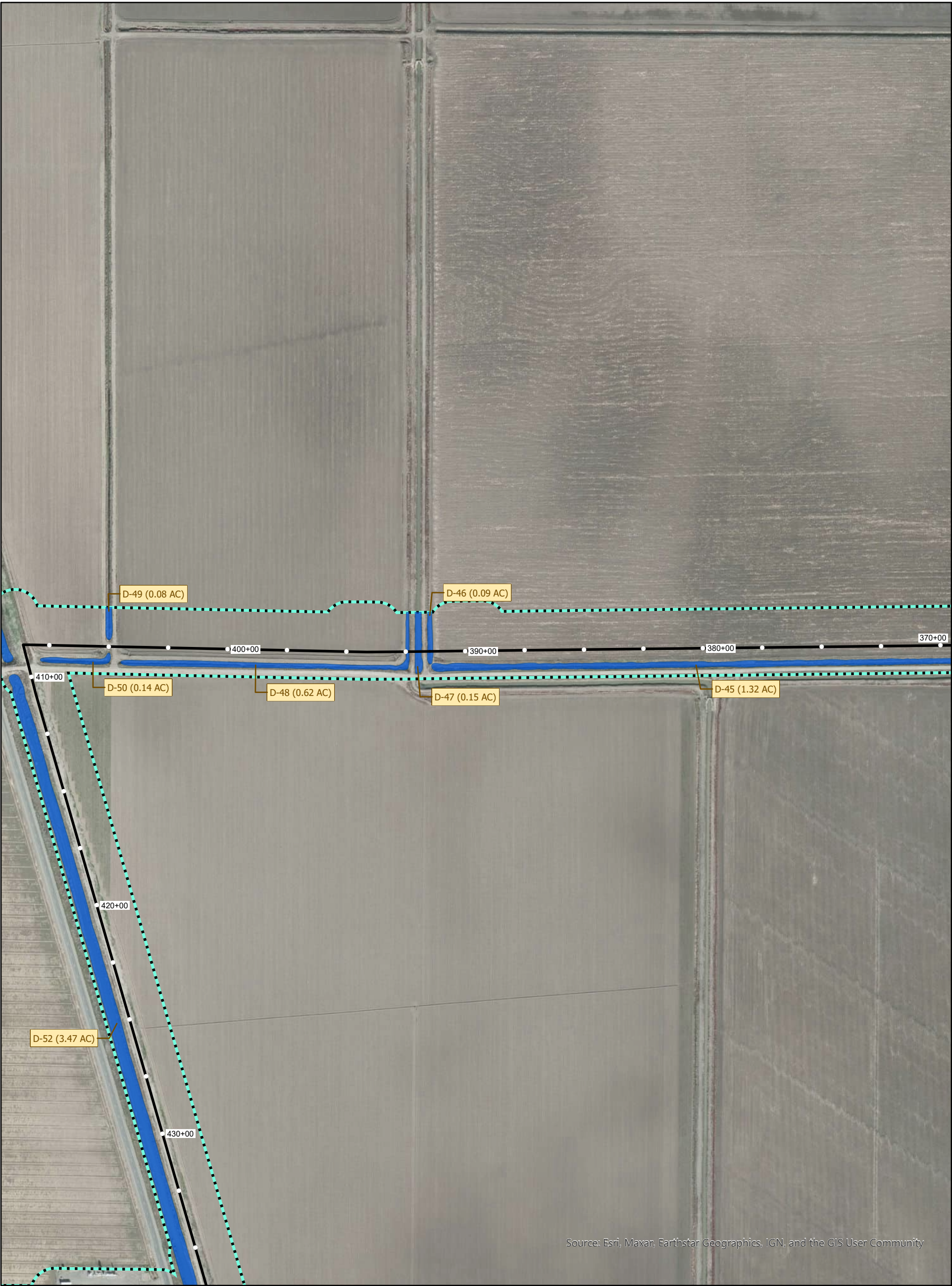


Figure 4
Map 13 of 34
Aquatic Resources
Delineation Map
Sutter Decarbonization Project
Sutter County, CA



Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

Legend

- Aquatic Resource Delineation Study Area (693 AC)
- Proposed Pipeline with Stationing (Approximate)
- OHWM Transect

Aquatic Resources

Other Waters

- Ditch (D) (53.55 AC)

Note:
AC = acres

Delineation survey personnel and dates:
K. Fisher, S. Lindemann, S. Wentworth
09/19-21/2023, 01/05/24, 04/12/24

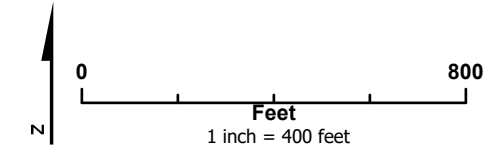
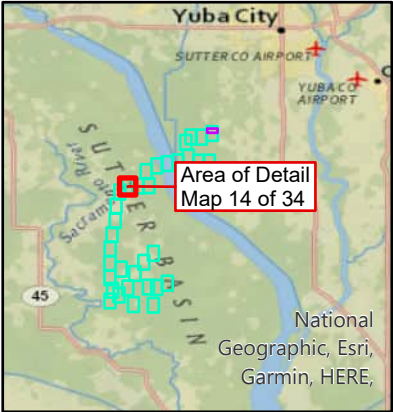
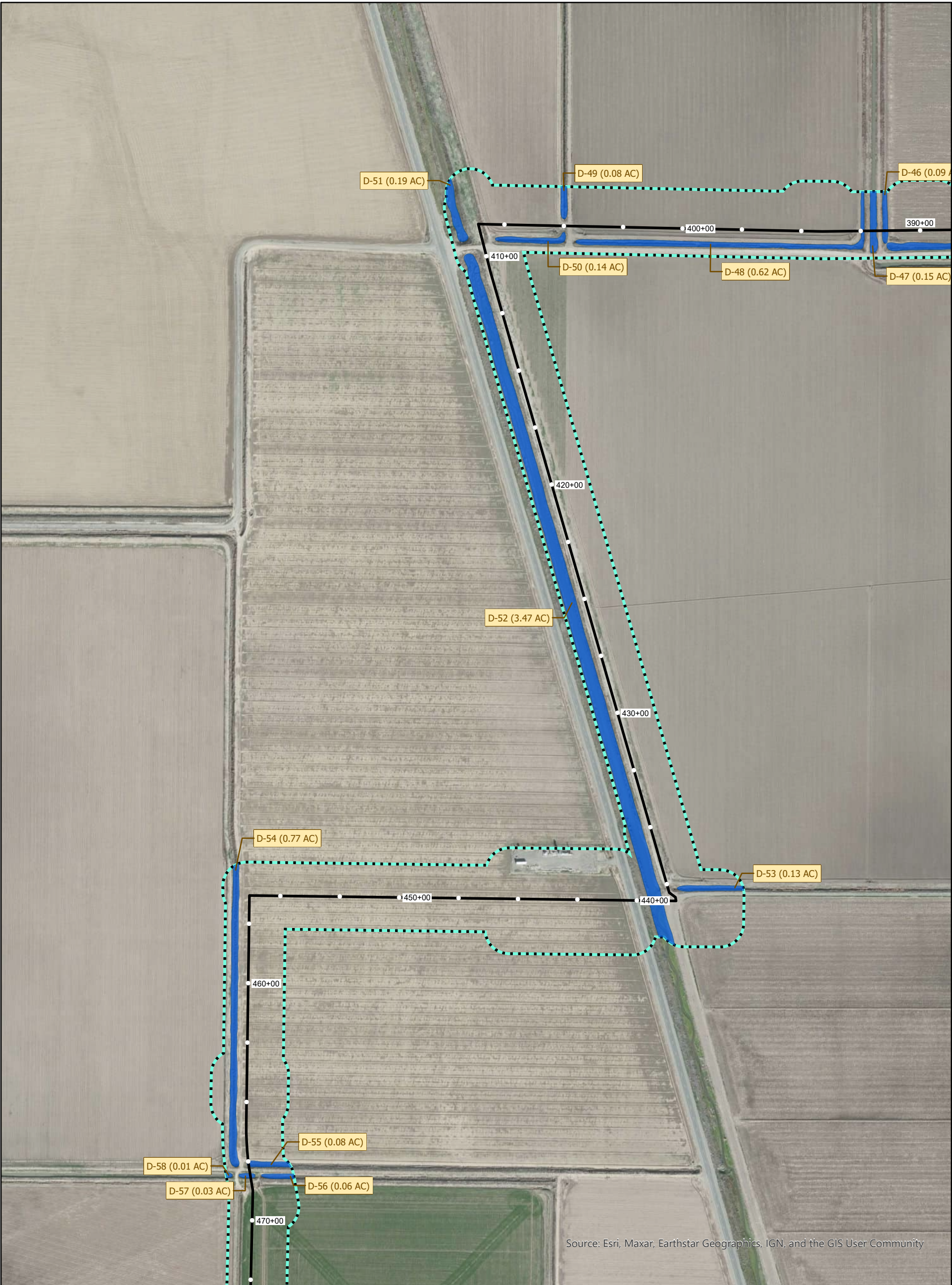


Figure 4
Map 14 of 34
Aquatic Resources
Delineation Map
Sutter Decarbonization Project
Sutter County, CA



Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

Legend

- Aquatic Resource Delineation Study Area (693 AC)
- Proposed Pipeline with Stationing (Approximate)
- OHWM Transect

Aquatic Resources

Other Waters

- Ditch (D) (53.55 AC)

Note:
AC = acres

Delineation survey personnel and dates:
K. Fisher, S. Lindemann, S. Wentworth
09/19-21/2023, 01/05/24, 04/12/24

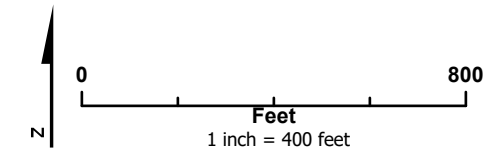
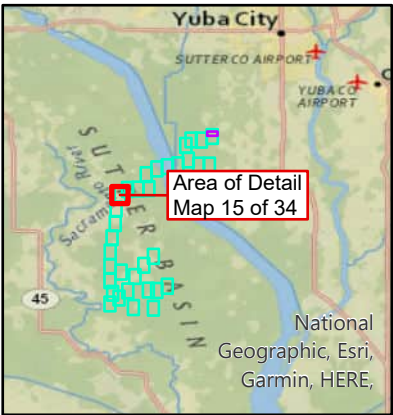
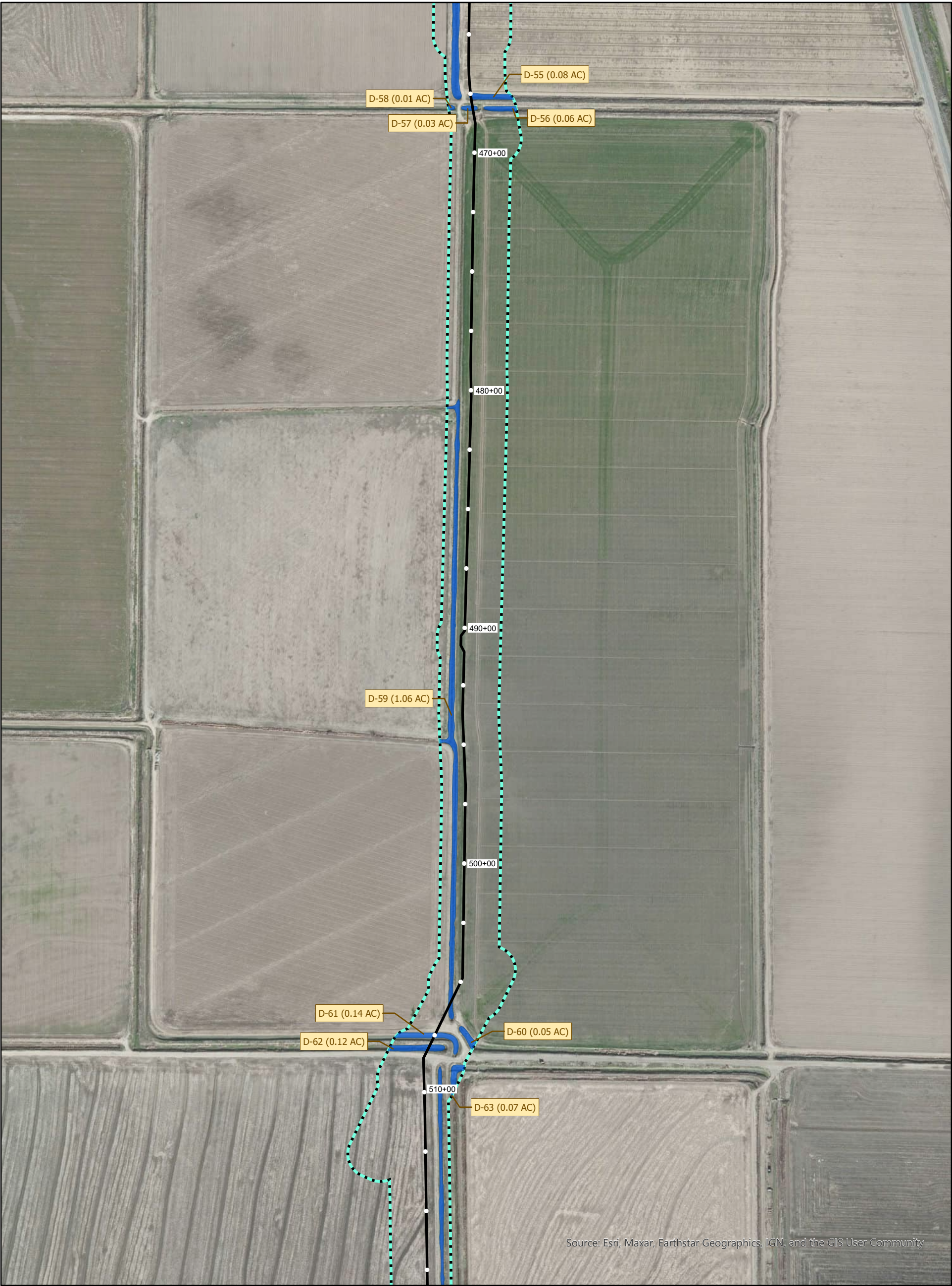


Figure 4
Map 15 of 34
Aquatic Resources
Delineation Map
Sutter Decarbonization Project
Sutter County, CA



Legend

- Aquatic Resource Delineation Study Area (693 AC)
- Proposed Pipeline with Stationing (Approximate)
- OHWM Transect

Aquatic Resources

Other Waters

- Ditch (D) (53.55 AC)

Note:
AC = acres

Delineation survey personnel and dates:
K. Fisher, S. Lindemann, S. Wentworth
09/19-21/2023, 01/05/24, 04/12/24

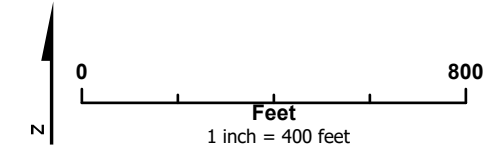
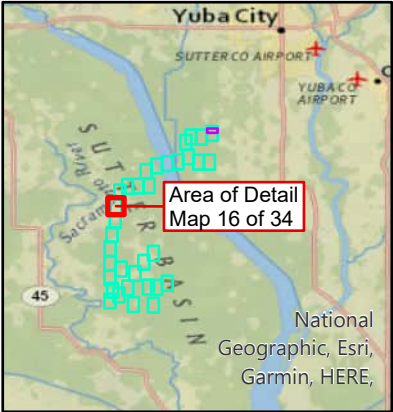


Figure 4
Map 16 of 34
Aquatic Resources
Delineation Map
Sutter Decarbonization Project
Sutter County, CA



Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

Legend

- Aquatic Resource Delineation Study Area (693 AC)
- Proposed Pipeline with Stationing (Approximate)
- OHWM Transect

Aquatic Resources

Other Waters

- Ditch (D) (53.55 AC)

Note:
AC = acres

Delineation survey personnel and dates:
K. Fisher, S. Lindemann, S. Wentworth
09/19-21/2023, 01/05/24, 04/12/24

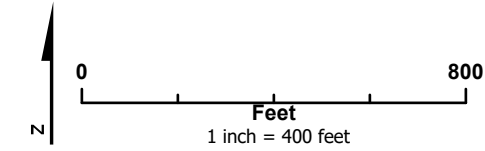
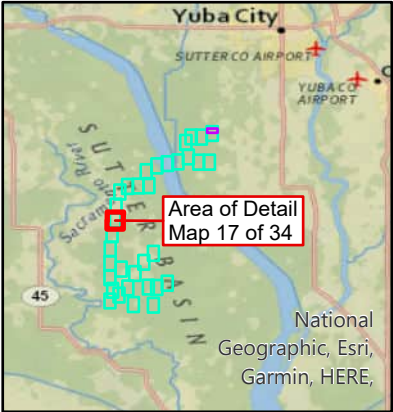


Figure 4
Map 17 of 34
Aquatic Resources
Delineation Map
Sutter Decarbonization Project
Sutter County, CA



Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

Legend

- Aquatic Resource Delineation Study Area (693 AC)
- Proposed Pipeline with Stationing (Approximate)
- OHWM Transect

Aquatic Resources

Other Waters

- Ditch (D) (53.55 AC)

Note:
AC = acres

Delineation survey personnel and dates:
K. Fisher, S. Lindemann, S. Wentworth
09/19-21/2023, 01/05/24, 04/12/24

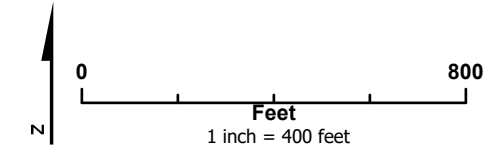
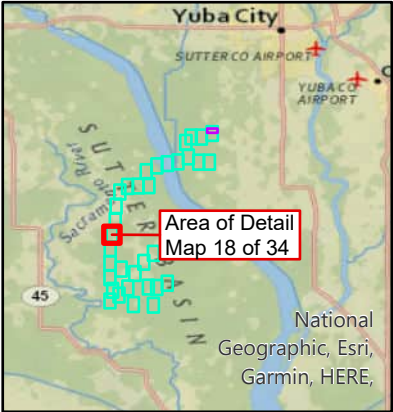


Figure 4
Map 18 of 34
Aquatic Resources
Delineation Map
Sutter Decarbonization Project
Sutter County, CA



Legend

- Aquatic Resource Delineation Study Area (693 AC)
- Proposed Pipeline with Stationing (Approximate)
- OHWM Transect

Aquatic Resources

Other Waters

- Ditch (D) (53.55 AC)

Note:
AC = acres

Delineation survey personnel and dates:
K. Fisher, S. Lindemann, S. Wentworth
09/19-21/2023, 01/05/24, 04/12/24

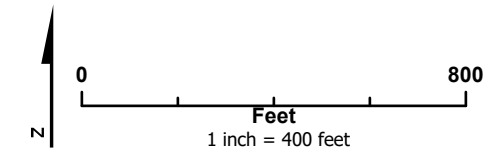
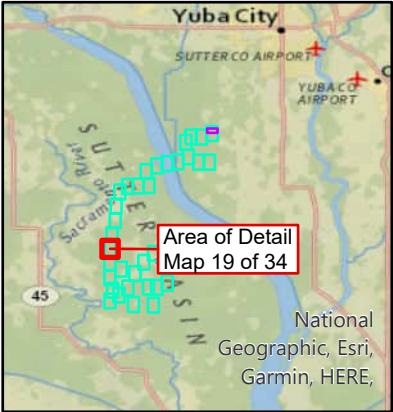


Figure 4
Map 19 of 34
Aquatic Resources
Delineation Map
Sutter Decarbonization Project
Sutter County, CA



Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

Legend

- Aquatic Resource Delineation Study Area (693 AC)
- Proposed Pipeline with Stationing (Approximate)
- OHWM Transect

Aquatic Resources

Other Waters

- Ditch (D) (53.55 AC)

Note:
AC = acres

Delineation survey personnel and dates:
K. Fisher, S. Lindemann, S. Wentworth
09/19-21/2023, 01/05/24, 04/12/24

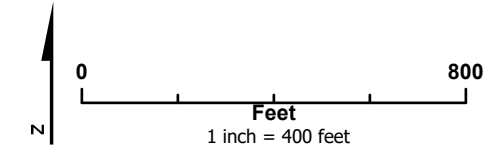
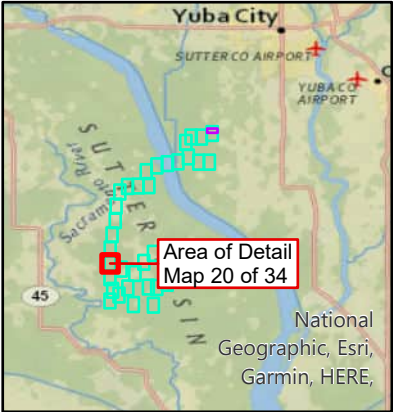


Figure 4
Map 20 of 34
Aquatic Resources
Delineation Map
Sutter Decarbonization Project
Sutter County, CA



Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

Legend

- Aquatic Resource Delineation Study Area (693 AC)
- Proposed Pipeline with Stationing (Approximate)
- OHWM Transect

Aquatic Resources

Other Waters

- Ditch (D) (53.55 AC)

Note:
AC = acres

Delineation survey personnel and dates:
K. Fisher, S. Lindemann, S. Wentworth
09/19-21/2023, 01/05/24, 04/12/24

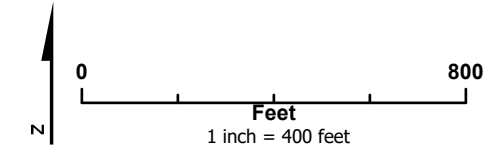
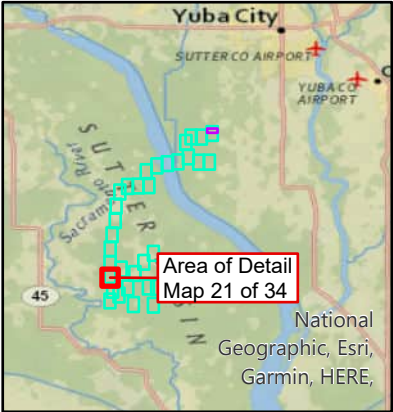
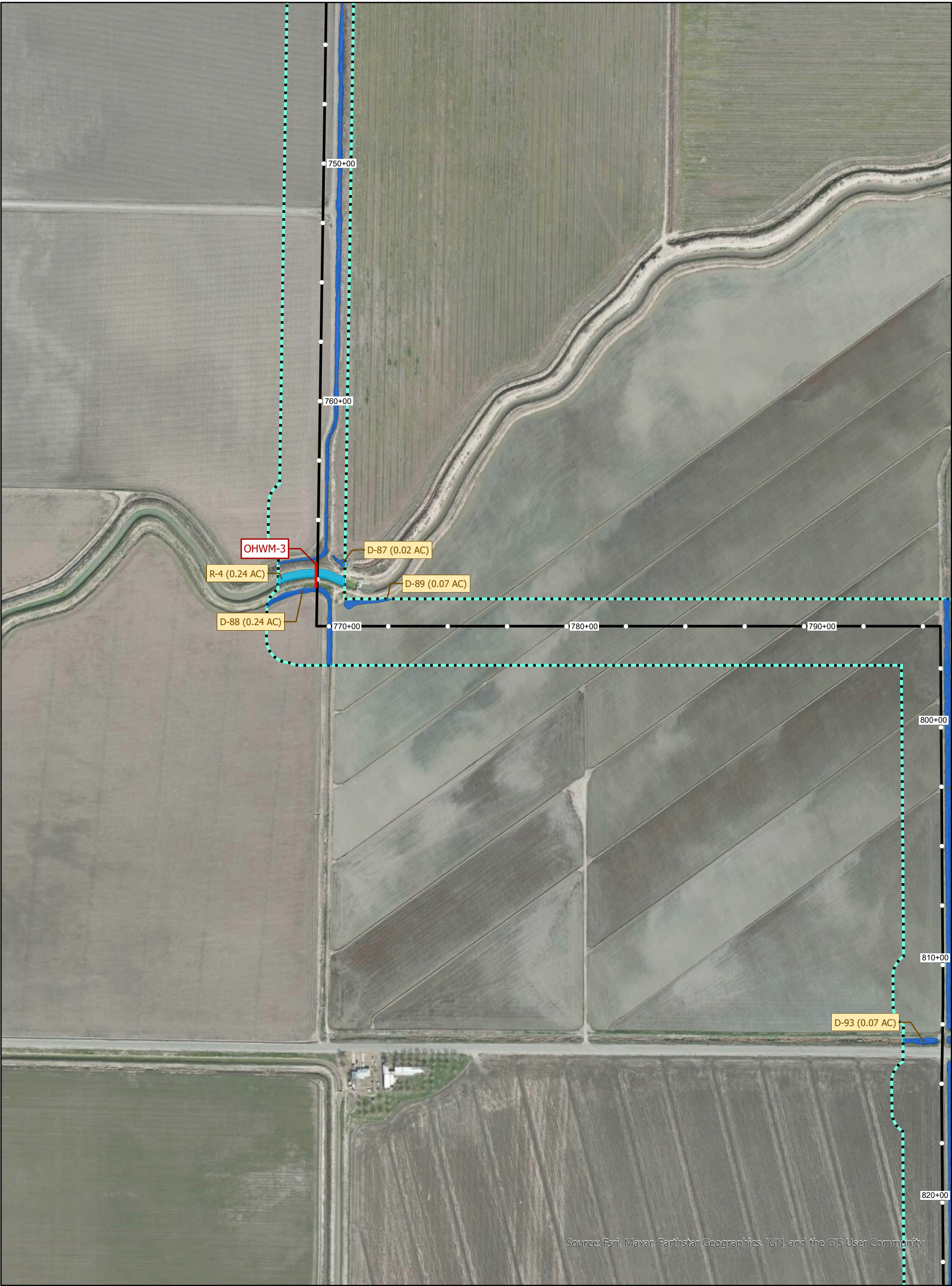


Figure 4
Map 21 of 34
Aquatic Resources
Delineation Map
Sutter Decarbonization Project
Sutter County, CA



Legend

- Aquatic Resource Delineation Study Area (693 AC)
- Proposed Pipeline with Stationing (Approximate)
- OHWM Transect

Aquatic Resources

Other Waters

- Ditch (D) (53.55 AC)
- River/Stream (R) (3.25 AC)

Note:
AC = acres

Delineation survey personnel and dates:
K. Fisher, S. Lindemann, S. Wentworth
09/19-21/2023, 01/05/24, 04/12/24

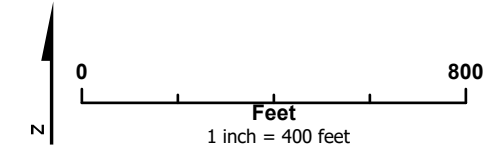
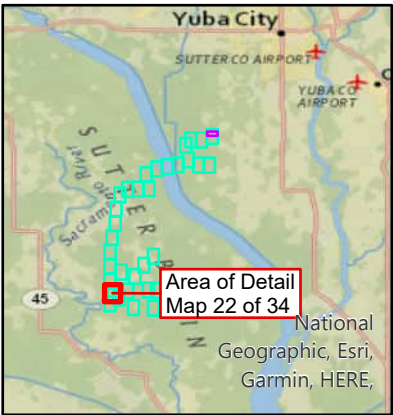


Figure 4
Map 22 of 34
Aquatic Resources
Delineation Map
Sutter Decarbonization Project
Sutter County, CA



Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

Legend

- Aquatic Resource Delineation Study Area (693 AC)
- Proposed Pipeline with Stationing (Approximate)
- OHWM Transect

Aquatic Resources

Other Waters

- Ditch (D) (53.55 AC)

Note:
AC = acres

Delineation survey personnel and dates:
K. Fisher, S. Lindemann, S. Wentworth
09/19-21/2023, 01/05/24, 04/12/24

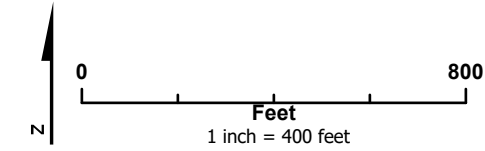
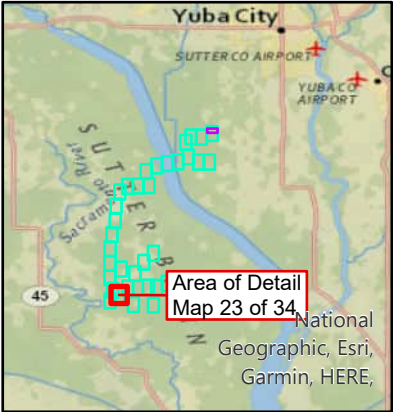


Figure 4
Map 23 of 34
Aquatic Resources
Delineation Map
Sutter Decarbonization Project
Sutter County, CA



Legend

- Aquatic Resource Delineation Study Area (693 AC)
- Proposed Well (Location Approximate)
- OHWM Transect

Aquatic Resources

Other Waters

- Ditch (D) (53.55 AC)

Note:
AC = acres

Delineation survey personnel and dates:
K. Fisher, S. Lindemann, S. Wentworth
09/19-21/2023, 01/05/24, 04/12/24

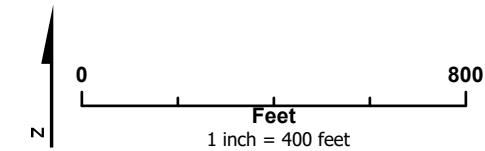
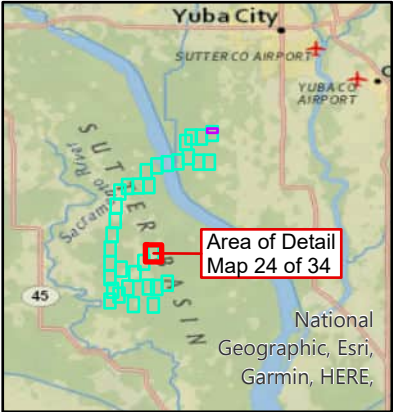
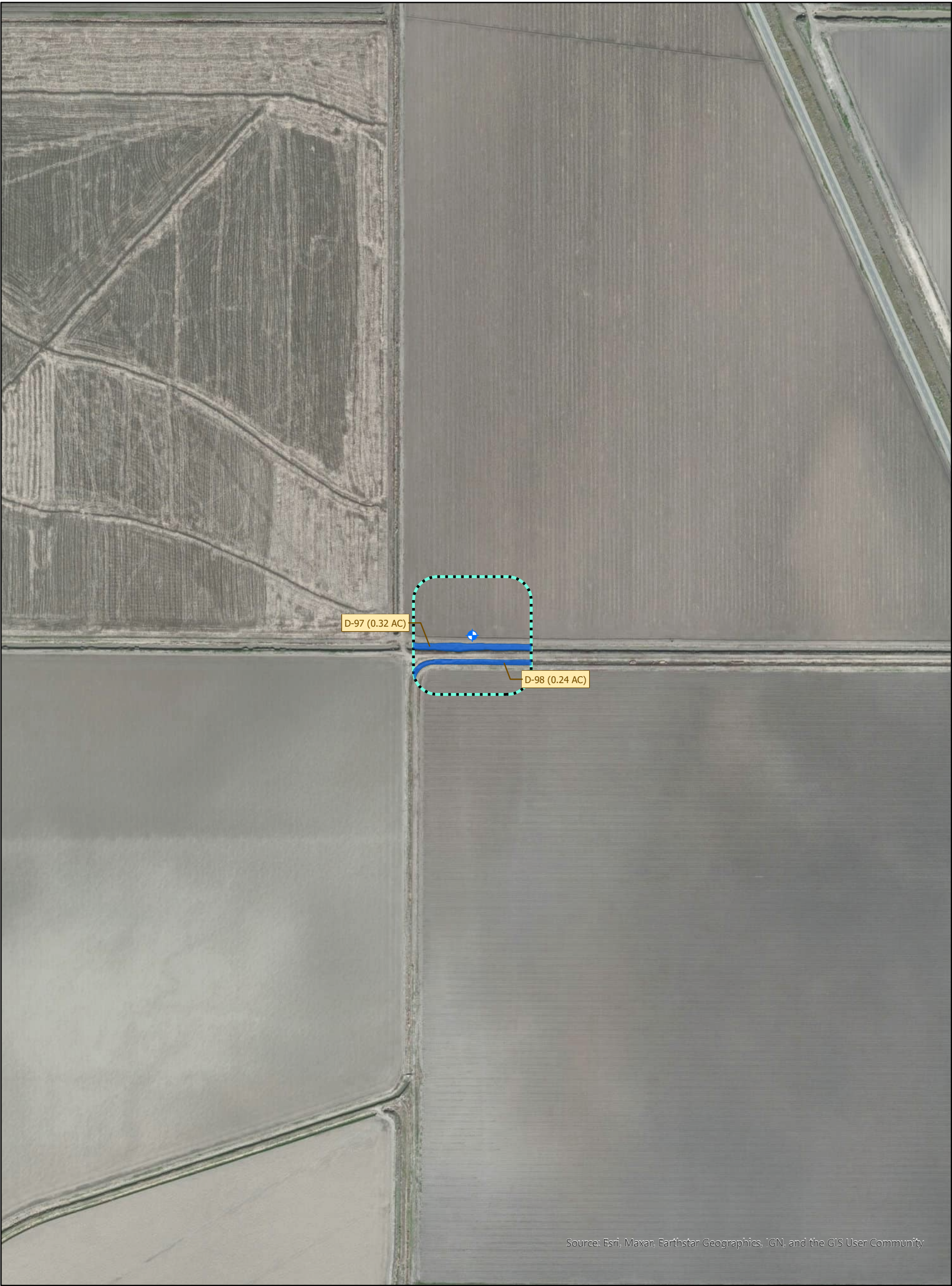


Figure 4
Map 24 of 34
Aquatic Resources
Delineation Map
Sutter Decarbonization Project
Sutter County, CA



Legend

- Aquatic Resource Delineation Study Area (693 AC)
- Proposed Well (Location Approximate)
- OHWM Transect

Aquatic Resources

Other Waters

- Ditch (D) (53.55 AC)

Note:
AC = acres

Delineation survey personnel and dates:
K. Fisher, S. Lindemann, S. Wentworth
09/19-21/2023, 01/05/24, 04/12/24

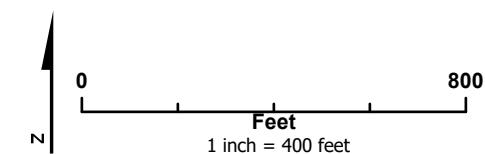
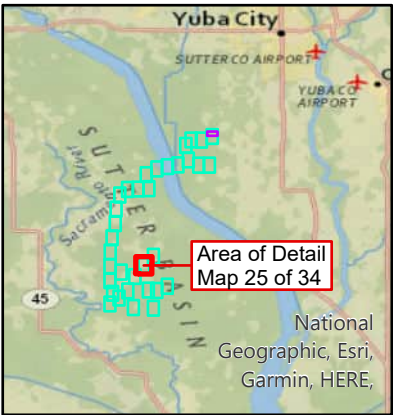


Figure 4
Map 25 of 34
Aquatic Resources
Delineation Map
Sutter Decarbonization Project
Sutter County, CA



Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

Legend

- Aquatic Resource Delineation Study Area (693 AC)
- Proposed Well (Location Approximate)
- OHWM Transect

Aquatic Resources

Other Waters

- Ditch (D) (53.55 AC)

Note:
AC = acres

Delineation survey personnel and dates:
K. Fisher, S. Lindemann, S. Wentworth
09/19-21/2023, 01/05/24, 04/12/24

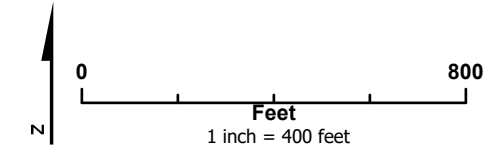
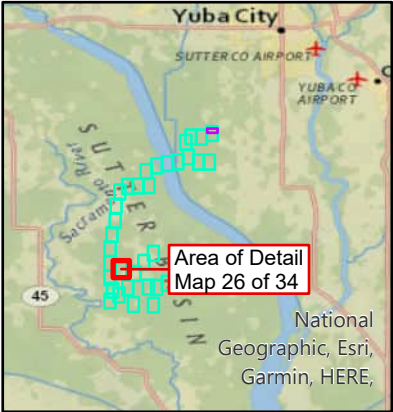


Figure 4
Map 26 of 34
Aquatic Resources
Delineation Map
Sutter Decarbonization Project
Sutter County, CA



Legend



Aquatic Resource Delineation Study Area (693 AC)



Proposed Well (Location Approximate)



OHWM Transect

Note:
AC = acres

Delineation survey personnel and dates:
K. Fisher, S. Lindemann, S. Wentworth
09/19-21/2023, 01/05/24, 04/12/24

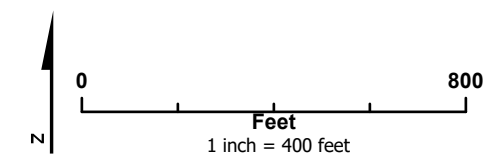
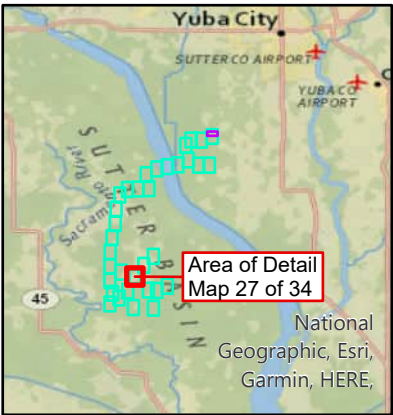
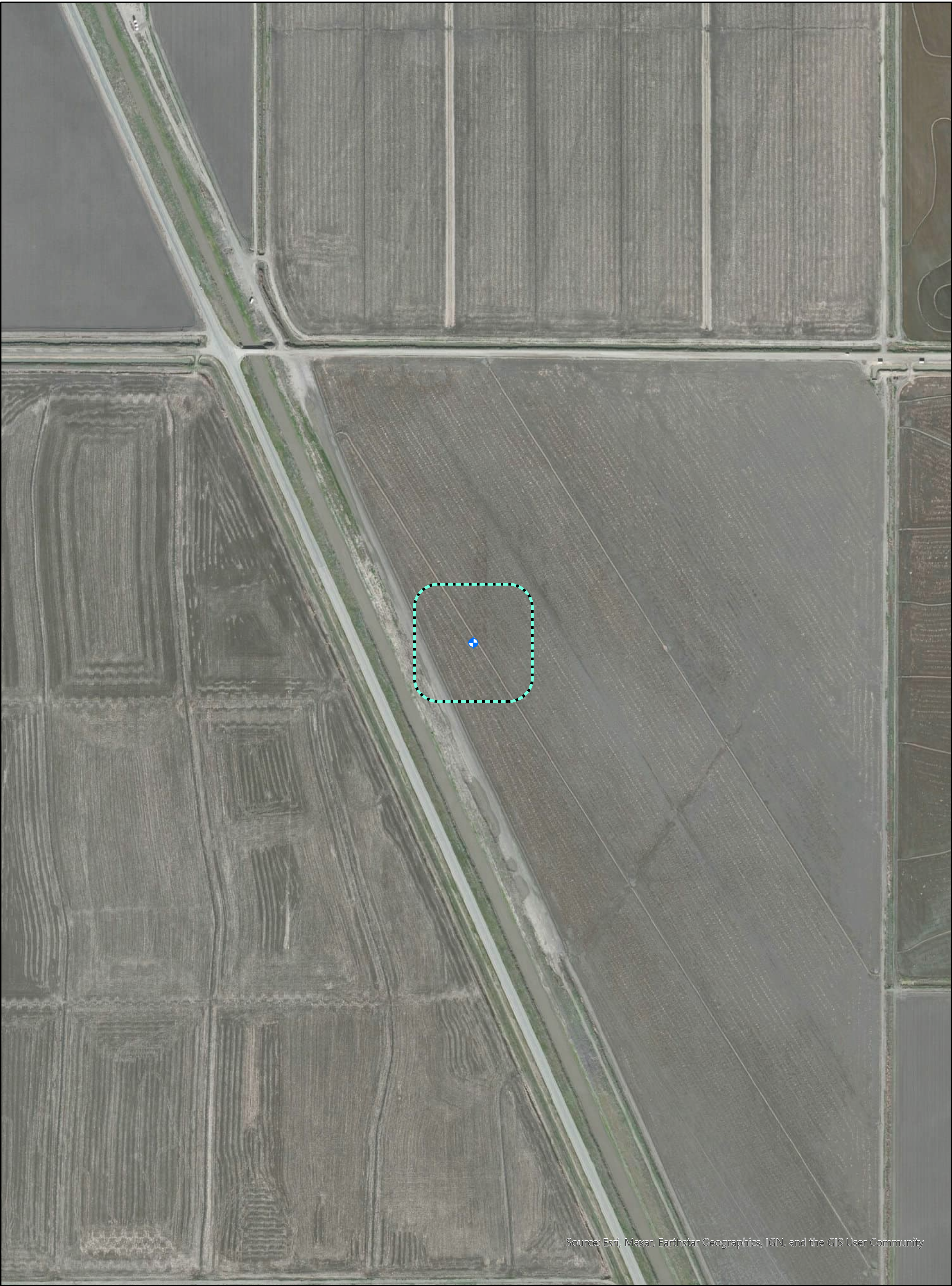


Figure 4
Map 27 of 34
Aquatic Resources
Delineation Map
Sutter Decarbonization Project
Sutter County, CA



Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

Legend

Aquatic Resource Delineation Study Area (693 AC)

Proposed Well (Location Approximate)

OHWM Transect

Note:
AC = acres

Delineation survey personnel and dates:
K. Fisher, S. Lindemann, S. Wentworth
09/19-21/2023, 01/05/24, 04/12/24

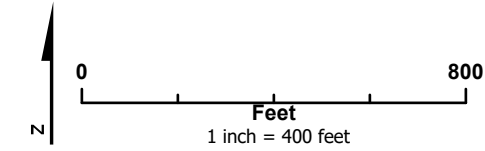
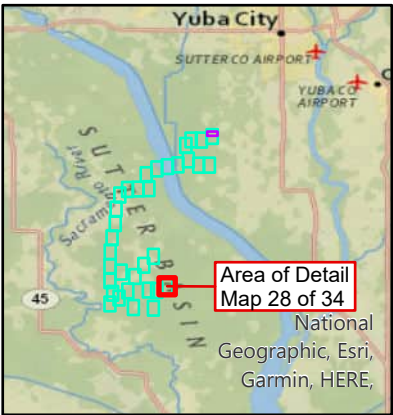


Figure 4
Map 28 of 34
Aquatic Resources
Delineation Map
Sutter Decarbonization Project
Sutter County, CA



Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

Legend

- Aquatic Resource Delineation Study Area (693 AC)
- Proposed Well (Location Approximate)
- OHWM Transect

Aquatic Resources

Other Waters

- Ditch (D) (53.55 AC)

Note:
AC = acres

Delineation survey personnel and dates:
K. Fisher, S. Lindemann, S. Wentworth
09/19-21/2023, 01/05/24, 04/12/24

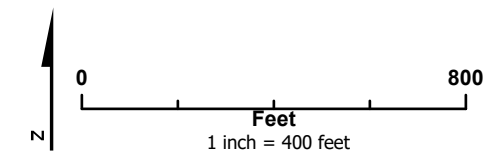
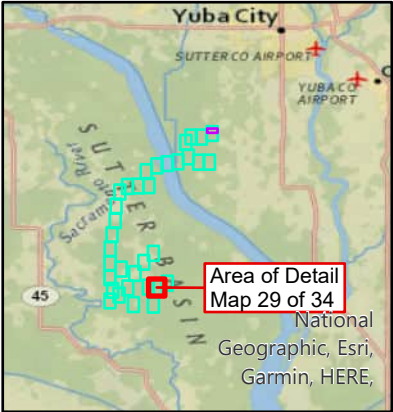


Figure 4
Map 29 of 34
Aquatic Resources
Delineation Map
Sutter Decarbonization Project
Sutter County, CA



Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

Legend

- Aquatic Resource Delineation Study Area (693 AC)
- Proposed Well (Location Approximate)
- OHWM Transect

Aquatic Resources

Other Waters

- Ditch (D) (53.55 AC)

Note:
AC = acres

Delineation survey personnel and dates:
K. Fisher, S. Lindemann, S. Wentworth
09/19-21/2023, 01/05/24, 04/12/24

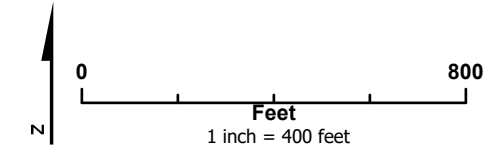
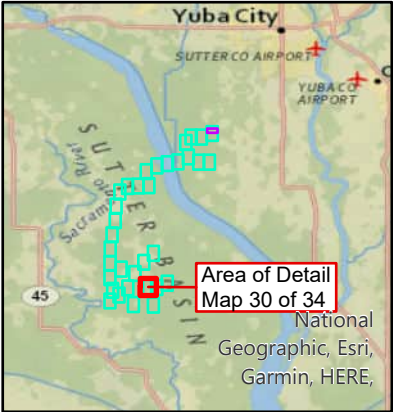


Figure 4
Map 30 of 34
Aquatic Resources
Delineation Map
Sutter Decarbonization Project
Sutter County, CA



Legend

- Aquatic Resource Delineation Study Area (693 AC)
- Proposed Pipeline with Stationing (Approximate)
- Proposed Well (Location Approximate)
- OHWM Transect

Aquatic Resources

Other Waters

- Ditch (D) (53.55 AC)

Note:
AC = acres

Delineation survey personnel and dates:
K. Fisher, S. Lindemann, S. Wentworth
09/19-21/2023, 01/05/24, 04/12/24

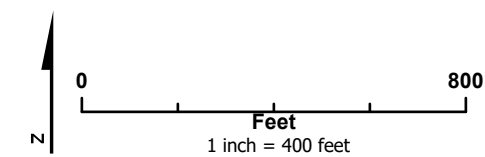
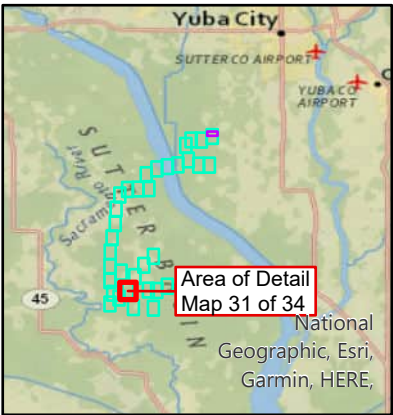
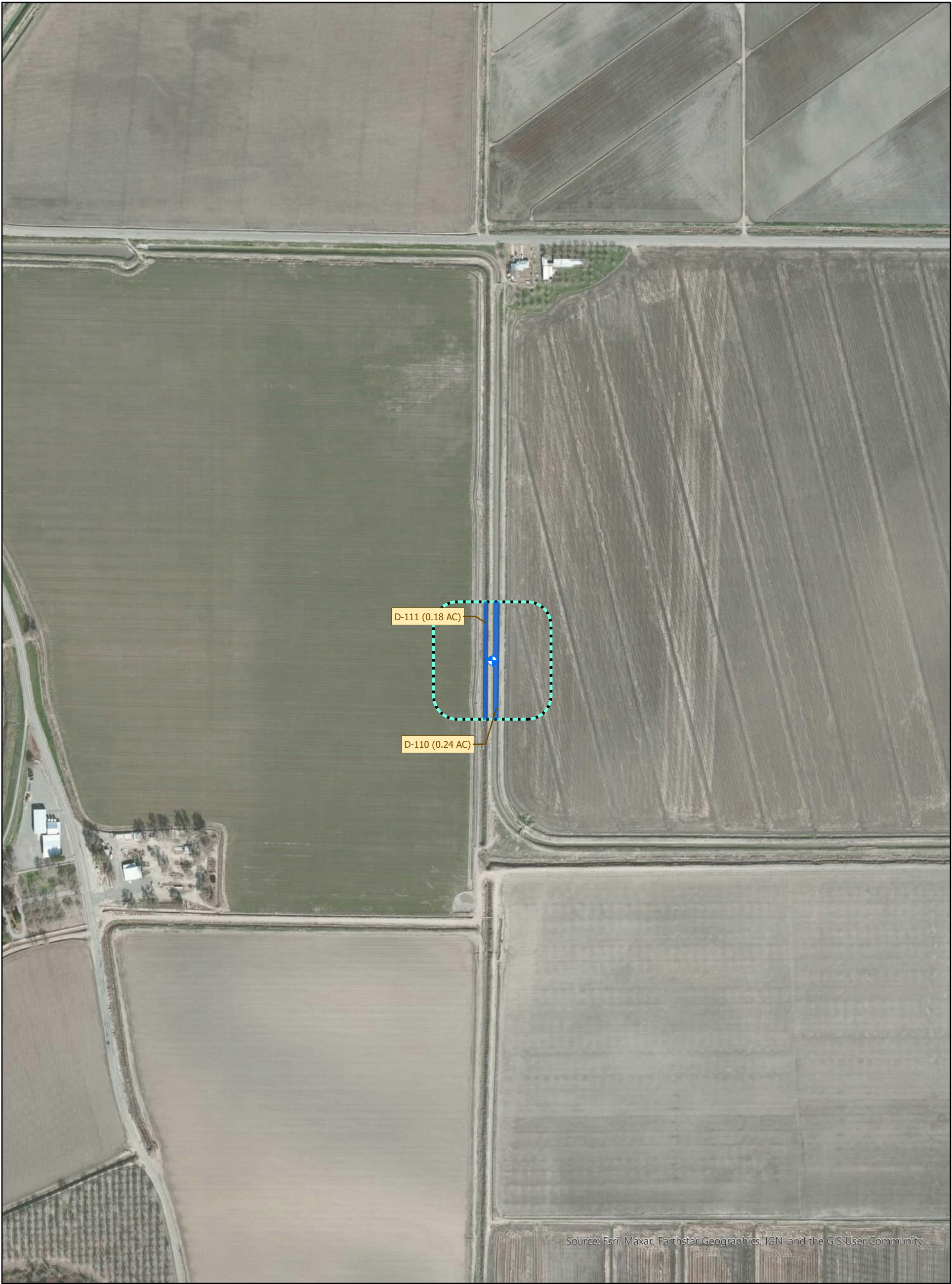


Figure 4
Map 31 of 34
Aquatic Resources
Delineation Map
Sutter Decarbonization Project
Sutter County, CA



Legend

- Aquatic Resource Delineation Study Area (693 AC)
- Proposed Well (Location Approximate)
- OHWM Transect

Aquatic Resources

Other Waters

- Ditch (D) (53.55 AC)

Note:
AC = acres

Delineation survey personnel and dates:
K. Fisher, S. Lindemann, S. Wentworth
09/19-21/2023, 01/05/24, 04/12/24

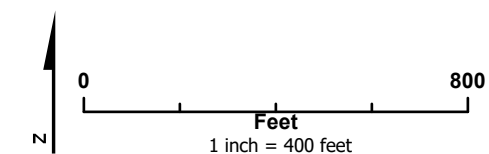
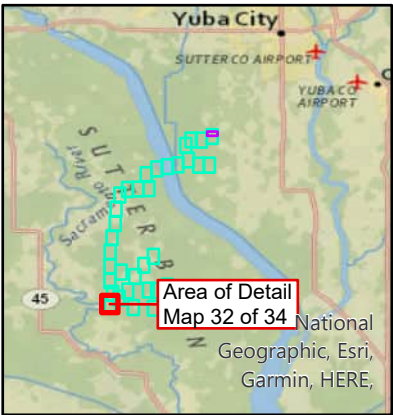


Figure 4
Map 32 of 34
Aquatic Resources
Delineation Map
Sutter Decarbonization Project
Sutter County, CA



Legend

- Aquatic Resource Delineation Study Area (693 AC)
- Proposed Well (Location Approximate)
- Wetland Sample Point
- OHWM Transect

Aquatic Resources

Other Waters

- Ditch (D) (53.55 AC)

Note:
AC = acres

Delineation survey personnel and dates:
K. Fisher, S. Lindemann, S. Wentworth
09/19-21/2023, 01/05/24, 04/12/24

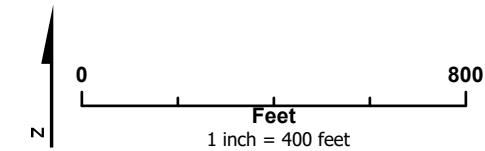
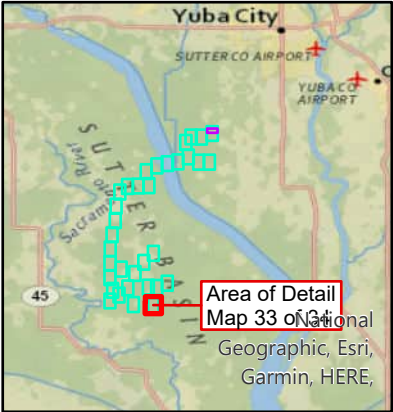


Figure 4
Map 33 of 34
Aquatic Resources
Delineation Map
Sutter Decarbonization Project
Sutter County, CA



Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

Legend

- Aquatic Resource Delineation Study Area (693 AC)
- Proposed Well (Location Approximate)
- OHWM Transect

Aquatic Resources

Other Waters

- Ditch (D) (53.55 AC)

Note:
AC = acres

Delineation survey personnel and dates:
K. Fisher, S. Lindemann, S. Wentworth
09/19-21/2023, 01/05/24, 04/12/24

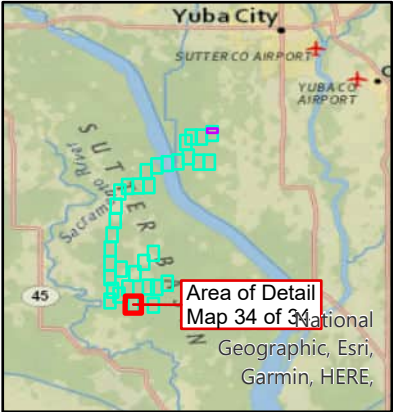
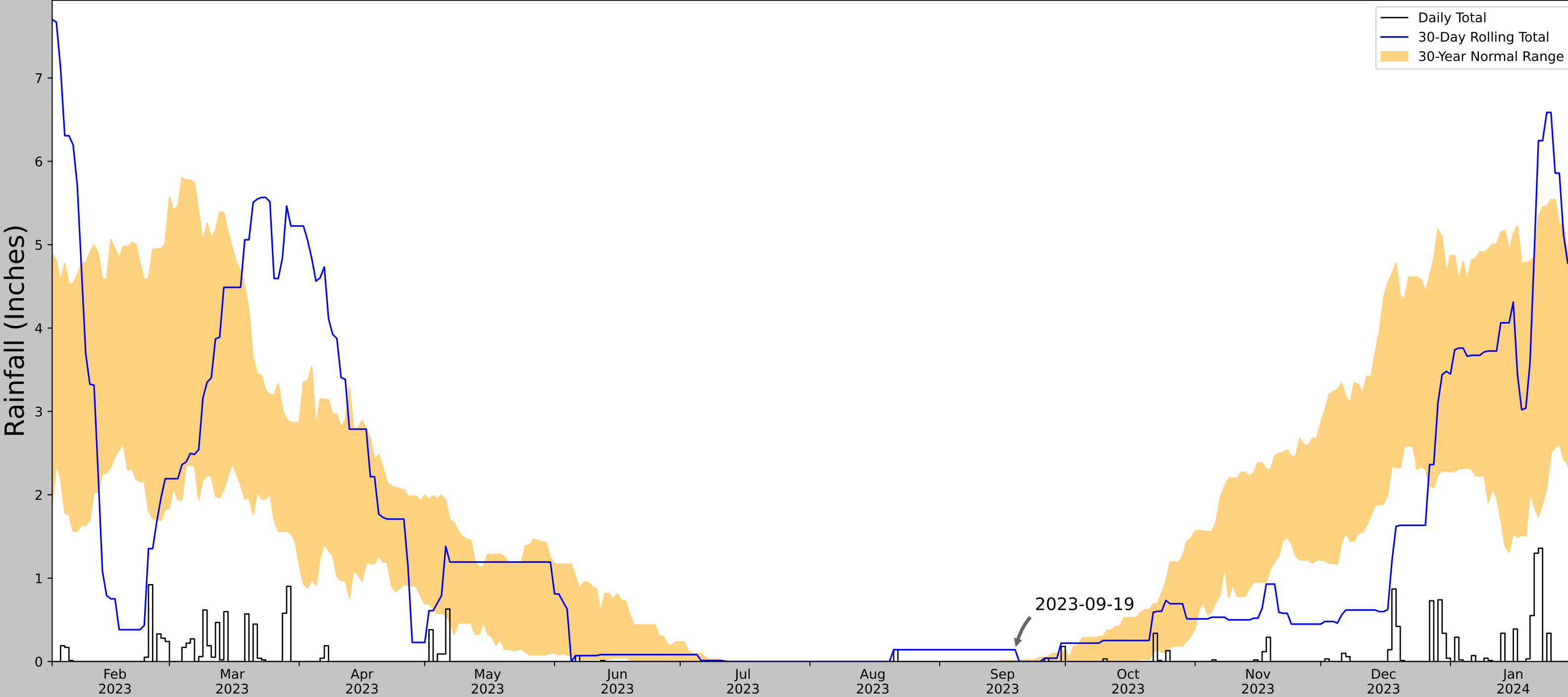


Figure 4
Map 34 of 34
Aquatic Resources
Delineation Map
Sutter Decarbonization Project
Sutter County, CA

Appendix A

Antecedent Precipitation Tool Results

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	39.047035, -121.699742
Observation Date	2023-09-19
Elevation (ft)	40.087
Drought Index (PDSI)	Incipient wetness
WebWIMP H ₂ O Balance	Dry Season

30 Days Ending	30 th %ile (in)	70 th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2023-09-19	0.0	0.011811	0.141732	Wet	3	3	9
2023-08-20	0.0	0.0	0.0	Normal	2	2	4
2023-07-21	0.0	0.0	0.0	Normal	2	1	2
Result							Wetter than Normal - 15

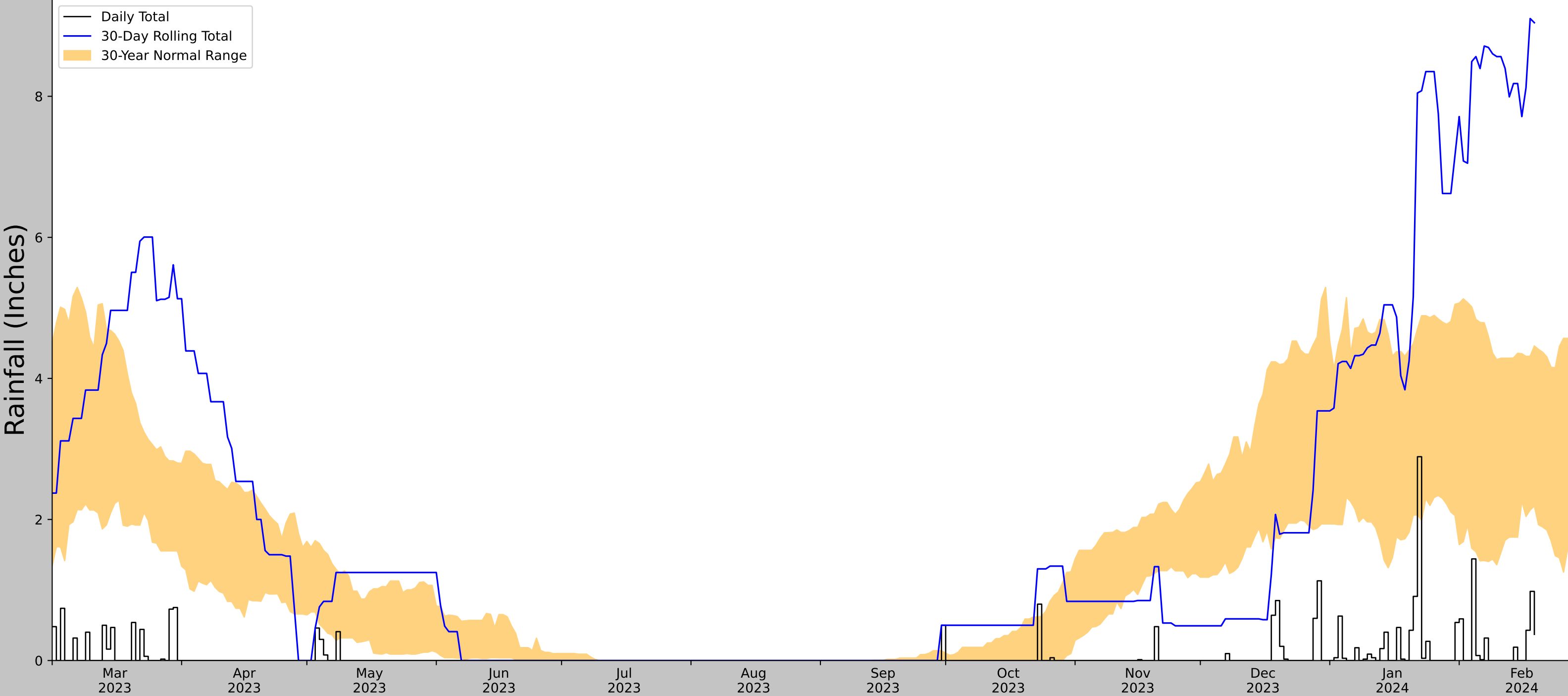


Figure and tables made by the
Antecedent Precipitation Tool
Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
MARYSVILLE AP (ASOS)	39.1019, -121.5689	62.008	7.977	21.921	3.764	8017	90
MARYSVILLE	39.1458, -121.5853	57.087	3.158	4.921	1.437	3138	0
MARYSVILLE 5.0 N	39.2241, -121.594	73.163	8.55	11.155	3.943	8	0
NICOLAUS #2	38.9261, -121.5447	42.979	12.216	19.029	5.73	190	0

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	39.022763, -121.739217
Observation Date	2023-09-20
Elevation (ft)	41.338
Drought Index (PDSI)	Incipient wetness
WebWIMP H ₂ O Balance	Dry Season

30 Days Ending	30 th %ile (in)	70 th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2023-09-20	0.0	0.035039	0.0	Normal	2	3	6
2023-08-21	0.0	0.0	0.0	Normal	2	2	4
2023-07-22	0.0	0.0	0.0	Normal	2	1	2
Result							Normal Conditions - 12

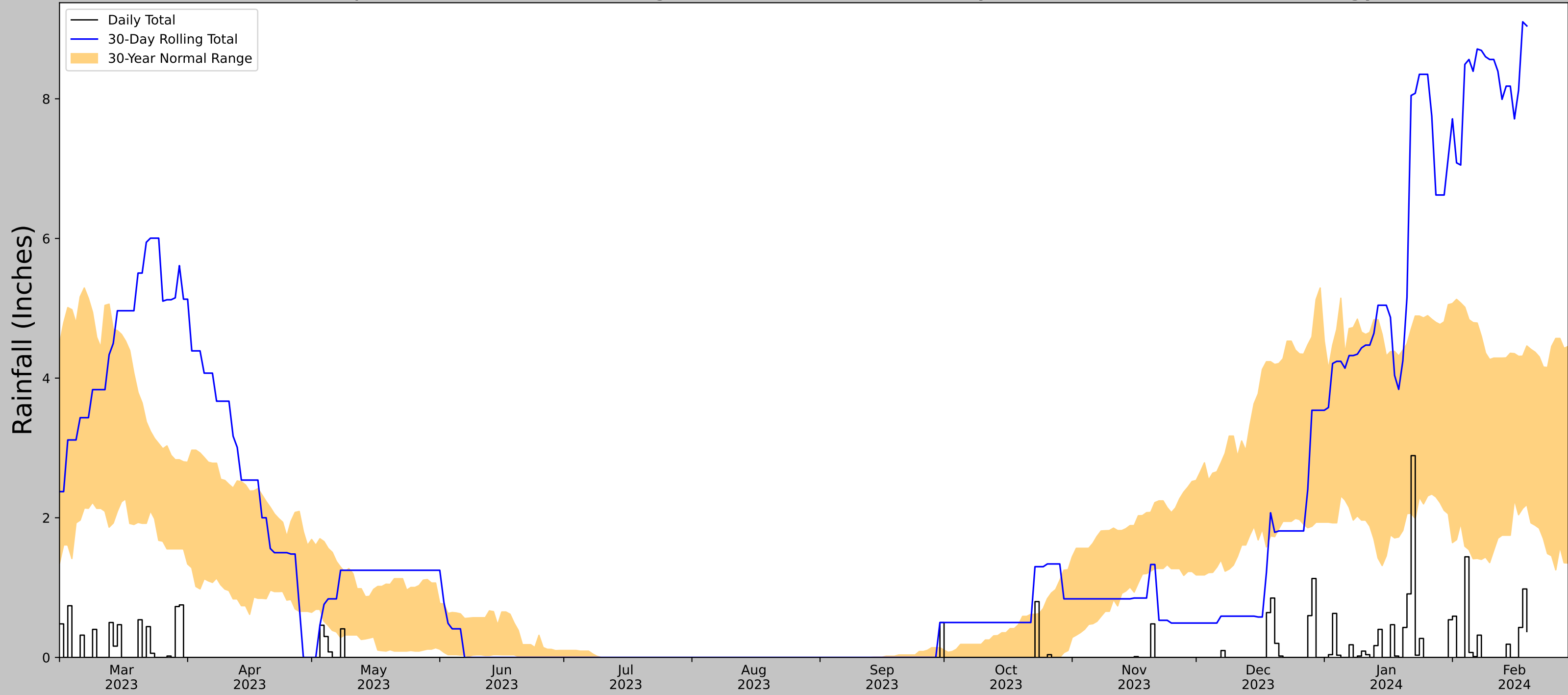


Figure and tables made by the
Antecedent Precipitation Tool
Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
NICOLAUS #2	38.9261, -121.5447	42.979	12.401	1.641	5.601	10821	90
WHEATLAND 0.1 ENE	39.0135, -121.4243	84.974	8.849	41.995	4.354	145	0
MARYSVILLE AP (ASOS)	39.1019, -121.5689	62.008	12.216	19.029	5.73	298	0
MARYSVILLE	39.1458, -121.5853	57.087	15.335	14.108	7.117	89	0

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	38.901747, -121.745767
Observation Date	2023-09-21
Elevation (ft)	21.021
Drought Index (PDSI)	Incipient wetness
WebWIMP H ₂ O Balance	Dry Season

30 Days Ending	30 th %ile (in)	70 th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2023-09-21	0.0	0.035039	0.0	Normal	2	3	6
2023-08-22	0.0	0.0	0.0	Normal	2	2	4
2023-07-23	0.0	0.0	0.0	Normal	2	1	2
Result							Normal Conditions - 12

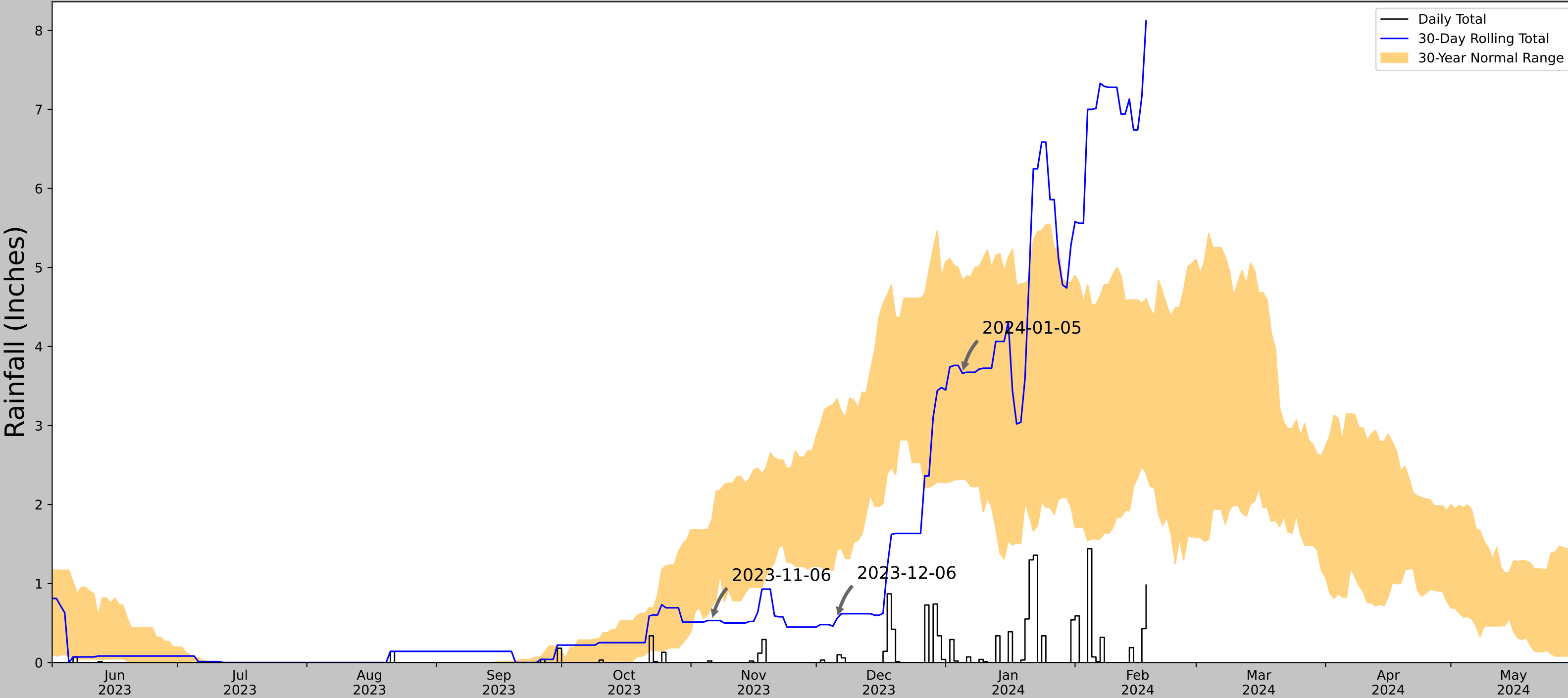


Figure and tables made by the
Antecedent Precipitation Tool
Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
NICOLAUS #2	38.9261, -121.5447	42.979	10.94	21.958	5.163	10821	90
WHEATLAND 0.1 ENE	39.0135, -121.4243	84.974	8.849	41.995	4.354	145	0
MARYSVILLE AP (ASOS)	39.1019, -121.5689	62.008	12.216	19.029	5.73	298	0
MARYSVILLE	39.1458, -121.5853	57.087	15.335	14.108	7.117	89	0

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	39.052517, -121.694901
Observation Date	2024-01-05
Elevation (ft)	41.261
Drought Index (PDSI)	Normal
WebWIMP H ₂ O Balance	Wet Season

30 Days Ending	30 th %ile (in)	70 th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2024-01-05	2.322835	4.834646	3.661417	Normal	2	3	6
2023-12-06	1.428347	3.337402	0.559055	Dry	1	2	2
2023-11-06	0.711417	1.807087	0.531496	Dry	1	1	1
Result							Drier than Normal - 9

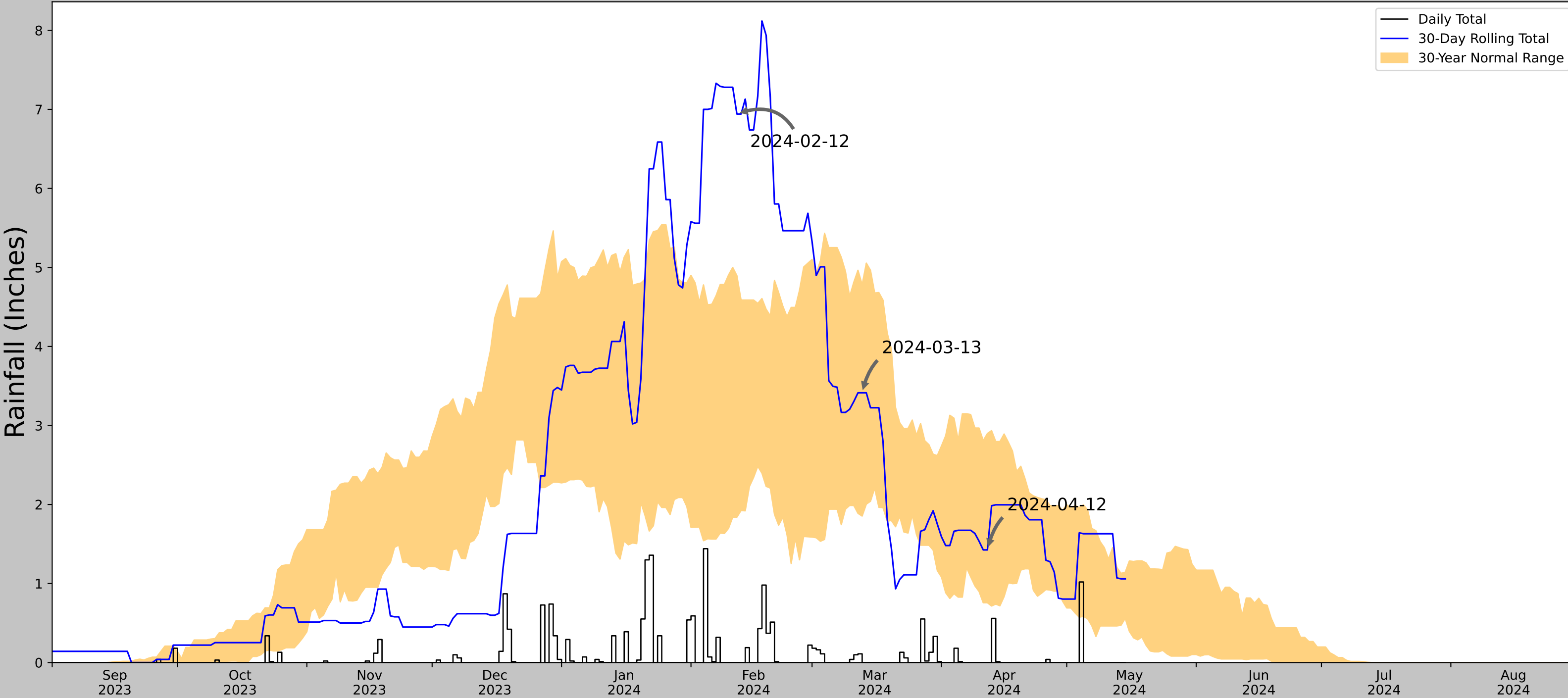


Figure and tables made by the
Antecedent Precipitation Tool
Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
MARYSVILLE AP (ASOS)	39.1019, -121.5689	62.008	7.571	20.747	3.564	8381	90
MARYSVILLE	39.1458, -121.5853	57.087	3.158	4.921	1.437	2803	0
MARYSVILLE 5.0 N	39.2241, -121.594	73.163	8.55	11.155	3.943	9	0
NICOLAUS #2	38.9261, -121.5447	42.979	12.216	19.029	5.73	159	0

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	39.05128, -121.693056
Observation Date	2024-04-12
Elevation (ft)	39.474
Drought Index (PDSI)	Incipient wetness
WebWIMP H ₂ O Balance	Dry Season

30 Days Ending	30 th %ile (in)	70 th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2024-04-12	0.756299	2.898425	1.425197	Normal	2	3	6
2024-03-13	1.85315	4.78189	3.413386	Normal	2	2	4
2024-02-12	1.83937	4.896063	6.940945	Wet	3	1	3
Result							Normal Conditions - 13



**US Army Corps
of Engineers®**

Figures and tables made by the
Antecedent Precipitation Tool
Version 2.0

Developed by:
U.S. Army Corps of Engineers and
U.S. Army Engineer Research and
Development Center



ERDC
ENGINEER RESEARCH & DEVELOPMENT CENTER

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
MARYSVILLE AP (ASOS)	39.1019, -121.5689	62.008	7.522	22.534	3.554	8381	90
MARYSVILLE	39.1458, -121.5853	57.087	3.158	4.921	1.437	2803	0
MARYSVILLE 5.0 N	39.2241, -121.594	73.163	8.55	11.155	3.943	9	0
NICOLAUS #2	38.9261, -121.5447	42.979	12.216	19.029	5.73	159	0

Appendix B

Delineation Data Forms

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Sutter Decarbonization Project City/County: Sutter County Sampling Date: 1/05/2024
 Applicant/Owner: Calpine State: CA Sampling Point: SEC-1
 Investigator(s): Kevin Fisher Section, Township, Range: 24, 14N, 2E
 Landform (hillslope, terrace, etc.): Valley Local relief (concave, convex, none): none Slope (%): <1
 Subregion (LRR): C Lat: 39.053923 Long: -121.696372 Datum: WGS84
 Soil Map Unit Name: Gridley NWI classification: None

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.

Hydrophytic Vegetation Present?	Yes ☒ No ☐	Is the Sampled Area within a Wetland?	Yes ☐ No ☒
Hydric Soil Present?	Yes ☐ No ☒		
Wetland Hydrology Present?	Yes ☒ No ☐		
Remarks:			

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>1</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100%</u> (A/B)
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
Sapling/Shrub Stratum (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	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)
5. _____	_____	_____	_____	
_____ = Total Cover				
Herb Stratum (Plot size: <u>1m</u>)				
1. <u>Hordeum sp.</u>	<u>90</u>	<u>Y</u>	<u>FAC</u>	
2. <u>Plantago lanceolata</u>	<u>10</u>	<u>N</u>	<u>FAC</u>	¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	Hydrophytic Vegetation Present? Yes ☒ No ☐
8. _____	_____	_____	_____	
_____ = Total Cover				
Woody Vine Stratum (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
_____ = Total Cover				
% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____				

Remarks:

Hordeum too early to identify to species level. Assumed FAC.

SOIL

Sampling Point: SEC-1

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

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-12	10 YR 3/2	100	-	-	-	-	CL	-

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ²Location: 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 Soils³:

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

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

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ☒ Surface Water (A1)
- ☐ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)

- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

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

Field Observations:

Surface Water Present? Yes ☒ No _____ Depth (inches): 1

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

Saturation Present? Yes ☒ No _____ Depth (inches): 0-3
(includes capillary fringe)

Wetland Hydrology Present? Yes ☒ No _____

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

Remarks:

Shallow surface water ponding and saturation near the surface, but not below 3 inches.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Sutter Decarbonization Project City/County: Sutter County Sampling Date: 1/05/2024
 Applicant/Owner: Calpine State: CA Sampling Point: SEC-2
 Investigator(s): Kevin Fisher Section, Township, Range: 24, 14N, 2E
 Landform (hillslope, terrace, etc.): Valley Local relief (concave, convex, none): none Slope (%): <1
 Subregion (LRR): C Lat: 39.054239 Long: -121.698583 Datum: WGS 84
 Soil Map Unit Name: Gridley NWI classification: None

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.

Hydrophytic Vegetation Present? Yes ☐ No ☒	Is the Sampled Area within a Wetland? Yes ☐ No ☒
Hydric Soil Present? Yes ☐ No ☒	
Wetland Hydrology Present? Yes ☒ No ☐	
Remarks: Sample point established in swale with surface ponding/saturation	

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A) Total Number of Dominant Species Across All Strata: <u>1</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>0%</u> (A/B)
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
Sapling/Shrub Stratum (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
_____ = Total Cover				Hydrophytic Vegetation Indicators: ___ Dominance Test is >50% ___ Prevalence Index is ≤3.0 ¹ ___ Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) ___ Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
Herb Stratum (Plot size: <u>1m</u>)				
1. <u>Cynodon dactylon</u>	<u>100</u>	<u>Y</u>	<u>FACU</u>	
2. <u>Avena sp.</u>	<u>1</u>	<u>N</u>	<u>NL</u>	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
_____ = Total Cover				
Woody Vine Stratum (Plot size: _____)				Hydrophytic Vegetation Present? Yes ☐ No ☒
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
_____ = Total Cover				
% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____				
Remarks:				

SOIL

Sampling Point: SEC-2

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

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-12	10 YR 3/2	100	-	-	-	-	-	-

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ²Location: 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 Soils³:

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

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

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ☒ Surface Water (A1)
- ☐ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)

- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

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

Field Observations:

Surface Water Present? Yes _____ No ☒ Depth (inches): 3

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

Saturation Present? Yes ☒ No _____ Depth (inches): 0
(includes capillary fringe)

Wetland Hydrology Present? Yes ☒ No _____

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

Remarks:

Shallow ponding immediately adjacent to sample point

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Sutter Decarbonization Project City/County: Sutter County Sampling Date: 1/05/2024
 Applicant/Owner: Calpine State: CA Sampling Point: SEC-3
 Investigator(s): Kevin Fisher Section, Township, Range: 24, 14N, 2E
 Landform (hillslope, terrace, etc.): Valley Local relief (concave, convex, none): none Slope (%): <1
 Subregion (LRR): C Lat: 39.05388 Long: -121.698928 Datum: WGS 84
 Soil Map Unit Name: Gridley NWI classification: None

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.

Hydrophytic Vegetation Present? Yes ☐ No ☒	Is the Sampled Area within a Wetland? Yes ☐ No ☒
Hydric Soil Present? Yes ☐ No ☒	
Wetland Hydrology Present? Yes ☒ No ☐	
Remarks: Sample point established in shallow ditch with surface ponding/saturation	

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A) Total Number of Dominant Species Across All Strata: <u>1</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>0%</u> (A/B)
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
Sapling/Shrub Stratum (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
_____ = Total Cover				Hydrophytic Vegetation Indicators: ___ Dominance Test is >50% ___ Prevalence Index is ≤3.0 ¹ ___ Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) ___ Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Hydrophytic Vegetation Present? Yes ☐ No ☒
Herb Stratum (Plot size: <u>1m</u>)				
1. <u>Cynodon dactylon</u>	<u>85</u>	<u>Y</u>	<u>FACU</u>	
2. <u>Cyperus eragrostis</u>	<u>15</u>	<u>N</u>	<u>FACW</u>	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
_____ = Total Cover				
Woody Vine Stratum (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
_____ = Total Cover				
% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____				
Remarks:				

SOIL

Sampling Point: SEC-3

[illegible]

HYDROLOGY

Wetland Hydrology Indicators:		
Primary Indicators (minimum of one required; check all that apply)		Secondary Indicators (2 or more required)
☐ Surface Water (A1)	☐ Salt Crust (B11)	☐ Water Marks (B1) (Riverine)
☒ High Water Table (A2)	☐ Biotic Crust (B12)	☐ Sediment Deposits (B2) (Riverine)
☒ Saturation (A3)	☐ Aquatic Invertebrates (B13)	☐ Drift Deposits (B3) (Riverine)
☐ Water Marks (B1) (Nonriverine)	☐ Hydrogen Sulfide Odor (C1)	☐ Drainage Patterns (B10)
☐ Sediment Deposits (B2) (Nonriverine)	☐ Oxidized Rhizospheres along Living Roots (C3)	☐ Dry-Season Water Table (C2)
☐ Drift Deposits (B3) (Nonriverine)	☐ Presence of Reduced Iron (C4)	☐ Crayfish Burrows (C8)
☐ Surface Soil Cracks (B6)	☐ Recent Iron Reduction in Tilled Soils (C6)	☐ Saturation Visible on Aerial Imagery (C9)
☐ Inundation Visible on Aerial Imagery (B7)	☐ Thin Muck Surface (C7)	☐ Shallow Aquitard (D3)
☐ Water-Stained Leaves (B9)	☐ Other (Explain in Remarks)	☐ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes ☐ No ☒ Depth (inches): _____ Water Table Present? Yes ☒ No ☐ Depth (inches): <u>2</u> Saturation Present? Yes ☒ No ☐ Depth (inches): <u>0</u> (includes capillary fringe)		Wetland Hydrology Present? Yes ☒ No ☐
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		
Remarks:		
Shallow ponding immediately adjacent to sample point.		

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Sutter Decarbonization Project City/County: Sutter County Sampling Date: 1/05/2024
 Applicant/Owner: Calpine State: CA Sampling Point: SEC-4
 Investigator(s): Kevin Fisher Section, Township, Range: 24, 14N, 2E
 Landform (hillslope, terrace, etc.): Valley Local relief (concave, convex, none): concave Slope (%): <1
 Subregion (LRR): C Lat: 39.050920 Long: -121.693564 Datum: WGS 84
 Soil Map Unit Name: Tisdale NWI classification: None

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.

Hydrophytic Vegetation Present? Yes ☒ No ☐	Hydic Soil Present? Yes ☐ No ☒	Is the Sampled Area within a Wetland? Yes ☐ No ☒
Wetland Hydrology Present? Yes ☒ No ☐		
Remarks: Sample point established in abandoned process water treatment pond. Soil had been excavated in the past, but did not appear significantly disturbed.		

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100%</u> (A/B)
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
Sapling/Shrub Stratum (Plot size: <u>1m</u>)				
1. <u>Salix exigua</u>	<u>FACW</u>	<u>Y</u>	<u>20</u>	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	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)
5. _____	_____	_____	_____	
_____ = Total Cover				
Herb Stratum (Plot size: <u>1m</u>)				
1. <u>Rumex</u>	<u>40</u>	<u>Y</u>	<u>FAC</u>	
2. _____	_____	_____	_____	¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	Hydrophytic Vegetation Present? Yes ☒ No ☐
8. _____	_____	_____	_____	
_____ = Total Cover				
Woody Vine Stratum (Plot size: <u>1m</u>)				
1. <u>Rubus armeniacus</u>	<u>20</u>	<u>Y</u>	<u>FAC</u>	
2. _____	_____	_____	_____	
_____ = Total Cover				
% Bare Ground in Herb Stratum <u>60</u> % Cover of Biotic Crust <u>-</u>				

Remarks:

SOIL

Sampling Point: SEC-4

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

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-12	10 YR 3/2	100	-	-	-	-	CL	-

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ²Location: 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 Soils³:

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

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

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ☐ Surface Water (A1)
- ☒ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)

- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

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

Field Observations:

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

Water Table Present? Yes ☒ No _____ Depth (inches): 8.5

Saturation Present? Yes ☒ No _____ Depth (inches): 8
(includes capillary fringe)

Wetland Hydrology Present? Yes ☒ No _____

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

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Sutter Decarbonization Project City/County: Sutter County Sampling Date: 1/05/2024
 Applicant/Owner: Calpine State: CA Sampling Point: SEC-5
 Investigator(s): Kevin Fisher Section, Township, Range: 24, 14N, 2E
 Landform (hillslope, terrace, etc.): Valley Local relief (concave, convex, none): concave Slope (%): <1
 Subregion (LRR): C Lat: 39.053707 Long: -121.694669 Datum: WGS 84
 Soil Map Unit Name: Gridley NWI classification: None

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.

Hydrophytic Vegetation Present? Yes ☐ No ☒	Is the Sampled Area within a Wetland? Yes ☐ No ☒
Hydric Soil Present? Yes ☐ No ☒	
Wetland Hydrology Present? Yes ☒ No ☐	
Remarks: Sample point established in swale with surface ponding/saturation	

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>50%</u> (A/B)
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species <u>25</u> x 3 = <u>75</u> FACU species <u>75</u> x 4 = <u>300</u> UPL species _____ x 5 = _____ Column Totals: <u>100</u> (A) <u>375</u> (B) Prevalence Index = B/A = <u>3.75</u>
Sapling/Shrub Stratum (Plot size: _____)	_____	_____	_____	
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
_____ = Total Cover				Hydrophytic Vegetation Indicators: ___ Dominance Test is >50% ___ Prevalence Index is ≤3.0 ¹ ___ Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) ___ Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Hydrophytic Vegetation Present? Yes ☐ No ☒
Herb Stratum (Plot size: <u>1m</u>)	_____	_____	_____	
1. <u>Cynodon dactylon</u>	<u>75</u>	<u>Y</u>	<u>FACU</u>	
2. <u>Hordeum sp.</u>	<u>25</u>	<u>Y</u>	<u>FAC</u>	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
_____ = Total Cover				
Woody Vine Stratum (Plot size: _____)	_____	_____	_____	
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
_____ = Total Cover				
% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____				

Remarks:

Hordeum not identifiable to species level. Assumed FAC.

SOIL

Sampling Point: SEC-5

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

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-12	10 YR 3/2	100	-	-	-	-	CL	-

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ²Location: 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 Soils³:

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

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

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)

- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

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

Field Observations:

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

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

Saturation Present? Yes ☒ No _____ Depth (inches): 9
(includes capillary fringe)

Wetland Hydrology Present? Yes ☒ No _____

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

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Sutter Decarbonization Project City/County: Sutter County Sampling Date: 4/12/2024
Applicant/Owner: Calpine State: CA Sampling Point: SEC-6
Investigator(s): Kevin Fisher Section, Township, Range: 24, 14N, 2E
Landform (hillslope, terrace, etc.): Excavated pond/depression Local relief (concave, convex, none): concave Slope (%): <1
Subregion (LRR): C Lat: 39.051302 Long: -121693029 Datum: WGS 84
Soil Map Unit Name: Tisdale NWI classification: None

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.

Hydrophytic Vegetation Present? Yes ☒ No ☐	Hydic Soil Present? Yes ☐ No ☒	Wetland Hydrology Present? Yes ☒ No ☐	Is the Sampled Area within a Wetland? Yes ☐ No ☒
Remarks: Sample point established in abandoned process water treatment pond. Soil had been excavated in the past, but did not appear significantly disturbed.			

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: <u>5m</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100%</u> (A/B)
1. <u>Salix sp.</u>	<u>30</u>	<u>y</u>		
2. <u>Populus fremontii</u>	<u>40</u>	<u>y</u>		
3. _____				
4. _____				
<u> </u> = Total Cover				Prevalence Index worksheet: <u> </u> Total % Cover of: <u> </u> Multiply by: <u> </u> OBL species <u> </u> x 1 = <u> </u> FACW species <u> </u> x 2 = <u> </u> FAC species <u> </u> x 3 = <u> </u> FACU species <u> </u> x 4 = <u> </u> UPL species <u> </u> x 5 = <u> </u> Column Totals: <u> </u> (A) <u> </u> (B) Prevalence Index = B/A = <u> </u>
Sapling/Shrub Stratum (Plot size: <u> </u>)				
1. _____				
2. _____				
3. _____				
4. _____				
5. _____				
<u> </u> = Total Cover				Hydrophytic Vegetation Indicators: <u> </u> Dominance Test is >50% <u> </u> Prevalence Index is ≤3.0 ¹ <u> </u> Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <u> </u> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
Herb Stratum (Plot size: <u>1m</u>)				
1. <u>unknown herb</u>	<u>2</u>			
2. _____				
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
8. _____				
<u> </u> = Total Cover				Hydrophytic Vegetation Present? Yes ☒ No ☐
Woody Vine Stratum (Plot size: <u> </u>)				
1. _____				
2. _____				
<u> </u> = Total Cover				
% Bare Ground in Herb Stratum <u>98</u> % Cover of Biotic Crust <u>-</u>				

Remarks:

SOIL

Sampling Point: SEC-6

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

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-12	10 YR 3/2	100	-	-	-	-	CL	-

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ²Location: 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 Soils³:

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

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

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ☒ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☒ Water-Stained Leaves (B9)

- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

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

Field Observations:

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

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

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

Wetland Hydrology Present? Yes ☒ No _____

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

Remarks:

Surface water observed in January 2024

Water-stained leaves observed in April 2024

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Sutter Decarbonization Project City/County: Sutter County Sampling Date: 9/19/2023
 Applicant/Owner: Calpine State: CA Sampling Point: SP-1
 Investigator(s): Kevin Fisher, Sam Wentworth Section, Township, Range: 24, 14N, 2E
 Landform (hillslope, terrace, etc.): Ditch Local relief (concave, convex, none): none Slope (%): 5-10
 Subregion (LRR): C Lat: 39.047035 Long: -121.699742 Datum: WGS 84
 Soil Map Unit Name: Gridley 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 ☐, 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.

Hydrophytic Vegetation Present? Yes ☒ No ☐	Is the Sampled Area within a Wetland? Yes ☐ No ☒
Hydric Soil Present? Yes ☐ No ☒	
Wetland Hydrology Present? Yes ☒ No ☐	
Remarks: Irrigation ditch with emergent vegetation.	

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: <u>1m</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100%</u> (A/B)
1. <u>Salix exigua</u>	<u>10</u>	<u>Y</u>	<u>FACW</u>	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
<u>10</u> = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
Sapling/Shrub Stratum (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
_____ = Total Cover				
Herb Stratum (Plot size: <u>1m</u>)				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. <u>Typha angustifolia</u>	<u>95</u>	<u>Y</u>	<u>OBL</u>	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				
Woody Vine Stratum (Plot size: <u>1m</u>)				¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1. <u>Rubus armeniacus</u>	<u>10</u>	<u>Y</u>	<u>FAC</u>	
2. _____	_____	_____	_____	
_____ = Total Cover				
% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____				
Hydrophytic Vegetation Present? Yes ☒ No ☐				
Remarks:				

SOIL

Sampling Point: SP-1

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

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-12	10 YR 2/1	100	-	-	-	-	-	-

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ²Location: 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 Soils³:

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

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

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ☒ Surface Water (A1)
- ☐ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)

- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

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

Field Observations:

Surface Water Present? Yes ☒ No _____ Depth (inches): 5

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

Saturation Present? Yes ☒ No _____ Depth (inches): 0
(includes capillary fringe)

Wetland Hydrology Present? Yes ☒ No _____

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

Remarks:

Saturation at sample point. Surface water present adjacent to sample point.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Sutter Decarbonization Project City/County: Sutter County Sampling Date: 9/19/2023
 Applicant/Owner: Calpine State: CA Sampling Point: SP-2
 Investigator(s): Kevin Fisher, Sam Wentworth Section, Township, Range: 36, 14N, 2E
 Landform (hillslope, terrace, etc.): Ditch Local relief (concave, convex, none): None Slope (%): 1
 Subregion (LRR): C Lat: 39.025451 Long: -121.699122 Datum: WGS 84
 Soil Map Unit Name: Oswald 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 ☐, 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.

Hydrophytic Vegetation Present? Yes ☒ No ☐	Is the Sampled Area within a Wetland? Yes ☐ No ☒
Hydric Soil Present? Yes ☐ No ☒	
Wetland Hydrology Present? Yes ☒ No ☐	
Remarks:	

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: <u>1m</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>50%</u> (A/B)
1. <u>Quercus lobata</u>	<u>95</u>	<u>Y</u>	<u>FACU</u>	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
<u>95</u> = Total Cover				
Sapling/Shrub Stratum (Plot size: _____)				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species <u>60</u> x 1 = <u>60</u> FACW species <u>0</u> x 2 = _____ FAC species <u>10</u> x 3 = <u>30</u> FACU species <u>95</u> x 4 = <u>380</u> UPL species _____ x 5 = _____ Column Totals: <u>165</u> (A) <u>470</u> (B) Prevalence Index = B/A = <u>2.85</u>
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
_____ = Total Cover				
Herb Stratum (Plot size: <u>1m</u>)				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. <u>Typha angustifolia</u>	<u>60</u>	<u>Y</u>	<u>OBL</u>	
2. <u>Verbena hastata</u>	<u>10</u>	<u>N</u>	<u>FAC</u>	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
<u>70</u> = Total Cover				
Woody Vine Stratum (Plot size: _____)				Hydrophytic Vegetation Present? Yes ☒ No ☐ ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
_____ = Total Cover				
% Bare Ground in Herb Stratum <u>30</u> % Cover of Biotic Crust <u>-</u>				

Remarks:

Emergent vegetation in ditch. Open water present as "bare ground" and overstory consisting of valley oak rooted above the channel.

SOIL

Sampling Point: SP-2

[illegible]

HYDROLOGY

Wetland Hydrology Indicators:		
Primary Indicators (minimum of one required; check all that apply)		Secondary Indicators (2 or more required)
☒ Surface Water (A1)	☐ Salt Crust (B11)	☐ Water Marks (B1) (Riverine)
☐ High Water Table (A2)	☐ Biotic Crust (B12)	☐ Sediment Deposits (B2) (Riverine)
☐ Saturation (A3)	☐ Aquatic Invertebrates (B13)	☐ Drift Deposits (B3) (Riverine)
☐ Water Marks (B1) (Nonriverine)	☐ Hydrogen Sulfide Odor (C1)	☐ Drainage Patterns (B10)
☐ Sediment Deposits (B2) (Nonriverine)	☐ Oxidized Rhizospheres along Living Roots (C3)	☐ Dry-Season Water Table (C2)
☐ Drift Deposits (B3) (Nonriverine)	☐ Presence of Reduced Iron (C4)	☐ Crayfish Burrows (C8)
☐ Surface Soil Cracks (B6)	☐ Recent Iron Reduction in Tilled Soils (C6)	☐ Saturation Visible on Aerial Imagery (C9)
☐ Inundation Visible on Aerial Imagery (B7)	☐ Thin Muck Surface (C7)	☐ Shallow Aquitard (D3)
☐ Water-Stained Leaves (B9)	☐ Other (Explain in Remarks)	☐ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes ☒ No ☐ Depth (inches): 6 Water Table Present? Yes ☐ No ☐ Depth (inches): Saturation Present? Yes ☐ No ☐ Depth (inches): (includes capillary fringe)		Wetland Hydrology Present? Yes ☒ No ☐
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		
Remarks:		
Surface water present in ditch adjacent to sample point		

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Sutter Decarbonization Project City/County: Sutter County Sampling Date: 9/20/2023
 Applicant/Owner: Calpine State: CA Sampling Point: SP-3
 Investigator(s): Kevin Fisher, Sam Wentworth Section, Township, Range: 34, 14N, 2E
 Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Convex Slope (%): <1
 Subregion (LRR): C Lat: 39.022763 Long: -121.739217 Datum: WGS 84
 Soil Map Unit Name: Shanghai NWI classification: PFO1A

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.

Hydrophytic Vegetation Present? Yes ☒ No ☐	Is the Sampled Area within a Wetland? Yes ☐ No ☒
Hydric Soil Present? Yes ☐ No ☒	
Wetland Hydrology Present? Yes ☒ No ☐	
Remarks: Floodplain/riparian corridor.	

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>66%</u> (A/B)
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
Sapling/Shrub Stratum (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
_____ = Total Cover				
Herb Stratum (Plot size: <u>1m</u>)				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. <u>Lepidium latifolium</u>	<u>5</u>	<u>Y</u>	<u>FAC</u>	
2. <u>Rumex crispus</u>	<u>5</u>	<u>Y</u>	<u>FAC</u>	
3. <u>Xanthium strumarium</u>	<u>2</u>	<u>N</u>	<u>FAC</u>	
4. _____	_____	_____	_____	
_____ = Total Cover				Hydrophytic Vegetation Present? Yes ☒ No ☐ ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
Woody Vine Stratum (Plot size: <u>1m</u>)				
1. <u>Vitis californica</u>	<u>100</u>	<u>Y</u>	<u>FACU</u>	
2. _____	_____	_____	_____	
_____ = Total Cover				
% Bare Ground in Herb Stratum <u>78</u> % Cover of Biotic Crust <u>-</u>				
Remarks: Dense cover of Vitis over emergent herbs.				

SOIL

Sampling Point: SP-3

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

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-12	10YR 3/3	100	-	-	-	-	Silty loam	-

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ²Location: 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 Soils³:

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

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

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☒ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)

- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

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

Field Observations:

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

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

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

Wetland Hydrology Present? Yes ☒ No _____

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

Remarks:

Area was flooded during 2023 high flow events. The area is subject to infrequent flooding.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Sutter Decarbonization Project City/County: Sutter County Sampling Date: 9/20/2023
 Applicant/Owner: Calpine State: CA Sampling Point: SP-4
 Investigator(s): Kevin Fisher, Sam Wentworth Section, Township, Range: 10, 12N, 2E
 Landform (hillslope, terrace, etc.): Valley Local relief (concave, convex, none): flat Slope (%): 1
 Subregion (LRR): C Lat: 38.901747 Long: -121.745767 Datum: WGS 84
 Soil Map Unit Name: Clear Lake NWI classification: None

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.

Hydrophytic Vegetation Present? Yes ☒ No ☐	Hydic Soil Present? Yes ☐ No ☒	Is the Sampled Area within a Wetland? Yes ☐ No ☒
Wetland Hydrology Present? Yes ☒ No ☐		
Remarks: Corner area of a rice field adjacent to irrigation ditches. Area is artificially flooded and regularly tilled.		

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>50%</u> (A/B)
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species <u>10</u> x 1 = <u>10</u> FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species <u>5</u> x 4 = <u>20</u> UPL species _____ x 5 = _____ Column Totals: <u>15</u> (A) <u>30</u> (B) Prevalence Index = B/A = <u>2</u>
Sapling/Shrub Stratum (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
_____ = Total Cover				Hydrophytic Vegetation Indicators: ___ Dominance Test is >50% ☒ Prevalence Index is ≤3.0 ¹ ___ Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) ___ Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
Herb Stratum (Plot size: <u>1m</u>)				
1. <u>Oryza sativa</u>	<u>10</u>	<u>Y</u>	<u>OBL</u>	
2. <u>Sorghum bicolor</u>	<u>5</u>	<u>Y</u>	<u>FACU</u>	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
_____ = Total Cover				
Woody Vine Stratum (Plot size: _____)				Hydrophytic Vegetation Present? Yes ☒ No ☐
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
_____ = Total Cover				
% Bare Ground in Herb Stratum <u>70</u> % Cover of Biotic Crust <u>15</u>				

Remarks:
 Corner of a flooded rice field, salt crust and dried algae present at field margins. Area regularly tilled and planted.

SOIL

Sampling Point: SP-4

[illegible]

HYDROLOGY

Wetland Hydrology Indicators:		
Primary Indicators (minimum of one required; check all that apply)		Secondary Indicators (2 or more required)
☐ Surface Water (A1)	☒ Salt Crust (B11)	☐ Water Marks (B1) (Riverine)
☐ High Water Table (A2)	☒ Biotic Crust (B12)	☐ Sediment Deposits (B2) (Riverine)
☐ Saturation (A3)	☐ Aquatic Invertebrates (B13)	☐ Drift Deposits (B3) (Riverine)
☐ Water Marks (B1) (Nonriverine)	☐ Hydrogen Sulfide Odor (C1)	☐ Drainage Patterns (B10)
☐ Sediment Deposits (B2) (Nonriverine)	☐ Oxidized Rhizospheres along Living Roots (C3)	☐ Dry-Season Water Table (C2)
☐ Drift Deposits (B3) (Nonriverine)	☐ Presence of Reduced Iron (C4)	☐ Crayfish Burrows (C8)
☒ Surface Soil Cracks (B6)	☐ Recent Iron Reduction in Tilled Soils (C6)	☐ Saturation Visible on Aerial Imagery (C9)
☐ Inundation Visible on Aerial Imagery (B7)	☐ Thin Muck Surface (C7)	☐ Shallow Aquitard (D3)
☐ Water-Stained Leaves (B9)	☐ Other (Explain in Remarks)	☐ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes ☐ No ☒ Depth (inches): _____ Water Table Present? Yes ☐ No ☒ Depth (inches): _____ Saturation Present? Yes ☐ No ☒ Depth (inches): _____ (includes capillary fringe)		Wetland Hydrology Present? Yes ☒ No ☐
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		
Remarks:		
Bare ground adjacent to a flooded rice field. Cracking and salt/ biotic crust observed along the field margins.		

Project: Sutter Energy CenterDate: 9/19/23Location: Snake River at Obanion RdInvestigator(s): Kevin Fisher, Scott Lind, Sam**Project Description:**

Proposed pipeline alignment to transport captured CO₂ for Carbon Sequestration.

Describe the river or stream's condition (disturbances, in-stream structures, etc.):

Obanion Rd crosses the Snake river via a small free span two lane bridge. Snake River connects to various constructed irrigation canals that irrigate nearby rice fields.

Off-site Information

Remotely sensed image(s) acquired? ☒ Yes ☐ No [If yes, attach image(s) to datasheet(s) and indicate approx. locations of transects, OHWM, and any other features of interest on the image(s); describe below] Description:

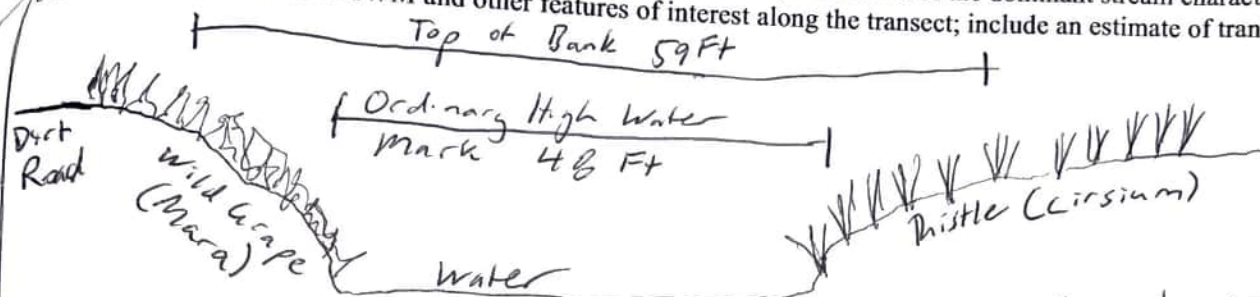
Aerial imagery used via ESRI Field Maps + ArcGIS desktop.

Hydrologic/hydraulic information acquired? ☐ Yes ☐ No [If yes, attach information to datasheet(s) and describe below.] Description:

List and describe any other supporting information received/acquired:

Instructions: Complete one cover sheet and one or more datasheets for each project site. Each datasheet should capture the dominant characteristics of the OHWM along some length of a given stream. Complete enough datasheets to adequately document up- and/or downstream variability in OHWM indicators, stream conditions, etc. Transect locations can be marked on a recent aerial image or their GPS coordinates noted on the datasheet.

Transect (cross-section) drawing: (choose a location that is representative of the dominant stream characteristics over some distance; label the OHWM and other features of interest along the transect; include an estimate of transect length)



OHWM transect
taken @ Obanion Rd

Facing North (Downstream)

Break in Slope at OHWM: ☐ Sharp ($> 60^\circ$) | ☒ Moderate ($30-60^\circ$) | ☐ Gentle ($< 30^\circ$) | ☐ None

Notes/Description:

Break in slope used to define OHWM.

Sediment Texture: Estimate percentages to describe the general sediment texture above and below the OHWM

	Clay/Silt <0.05mm	Sand 0.05 - 2mm	Gravel 2mm - 1cm	Cobbles 1 - 10cm	Boulders >10cm	Developed Soil Horizons (Y/N)
Above OHWM	80	15	5			
Below OHWM	80	20				

Notes/Description:

Change in vegetation cover used to define OHWM.

Vegetation: Estimate absolute percent cover to describe general vegetation characteristics above and below the OHWM

	Tree (%)	Shrub (%)	Herb (%)	Bare (%)
Above OHWM	0	0	80	20
Below OHWM	0	0	0	100

Notes/Description: Herb strata includes thistle on east bank + wild grape on west bank.

Other Evidence: List/describe any additional field evidence and/or lines of reasoning used to support your delineation

Project: Sutter Energy Center Date: 9/19/23
Location: Sutter Bypass at Obanion Rd Investigator(s): Kevin F., Scott C., Sam W.

Project Description:**Describe the river or stream's condition (disturbances, in-stream structures, etc.):**

Sutter Bypass is a constructed/channelized river carrying regionally significant water flows & agricultural water deliveries

Off-site Information

Remotely sensed image(s) acquired? ☒ Yes ☐ No [If yes, attach image(s) to datasheet(s) and indicate approx. locations of transects, OHWM, and any other features of interest on the image(s); describe below] Description:

Aerial & historical aerial imagery used via Google Earth, ESRI Field Maps, & ESRI ArcGIS

Hydrologic/hydraulic information acquired? ☒ Yes ☐ No [If yes, attach information to datasheet(s) and describe below.] Description:

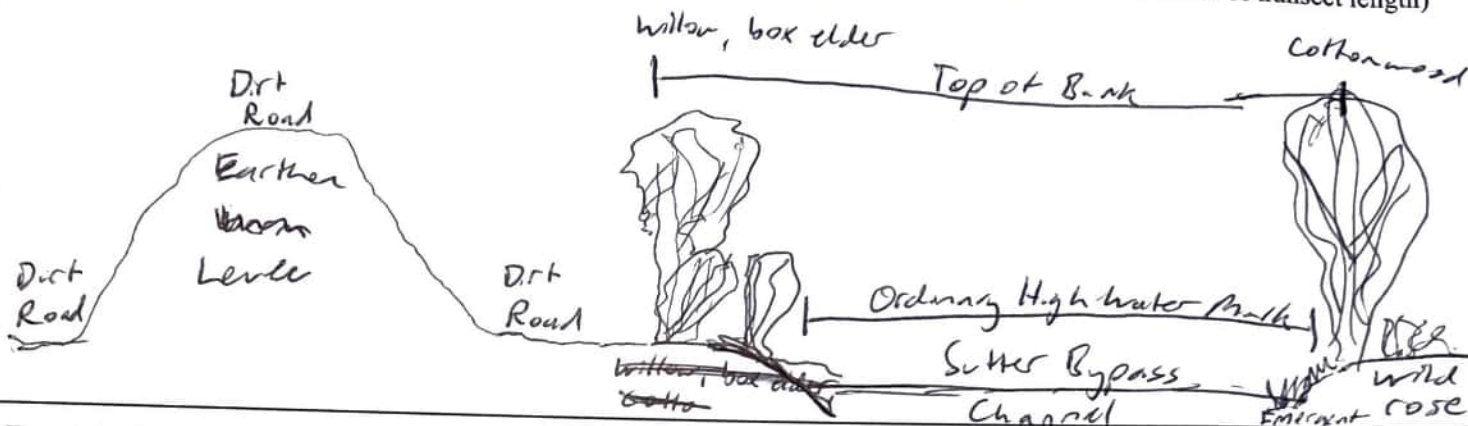
Flood gauge data consulted.

List and describe any other supporting information received/acquired:

Visited Sutter Bypass during flooding from heavy rain falls in 2022/2023 winter.

Instructions: Complete one cover sheet and one or more datasheets for each project site. Each datasheet should capture the dominant characteristics of the OHWM along some length of a given stream. Complete enough datasheets to adequately document up- and/or downstream variability in OHWM indicators, stream conditions, etc. Transect locations can be marked on a recent aerial image or their GPS coordinates noted on the datasheet.

Transect (cross-section) drawing: (choose a location that is representative of the dominant stream characteristics over some distance; label the OHWM and other features of interest along the transect; include an estimate of transect length)



Break in Slope at OHWM: ☐ Sharp ($> 60^\circ$) | ☒ Moderate ($30-60^\circ$) | ☐ Gentle ($< 30^\circ$) | ☐ None

Notes/Description:

Break in slope used to define top of bank & OHWM

Sediment Texture: Estimate percentages to describe the general sediment texture above and below the OHWM

	Clay/Silt <0.05mm	Sand 0.05 - 2mm	Gravel 2mm - 1cm	Cobbles 1 - 10cm	Boulders >10cm	Developed Soil Horizons (Y/N)
Above OHWM	90	10	5			
Below OHWM	90	10				

Notes/Description:

Earthen banks with some gravel

Vegetation: Estimate absolute percent cover to describe general vegetation characteristics above and below the OHWM

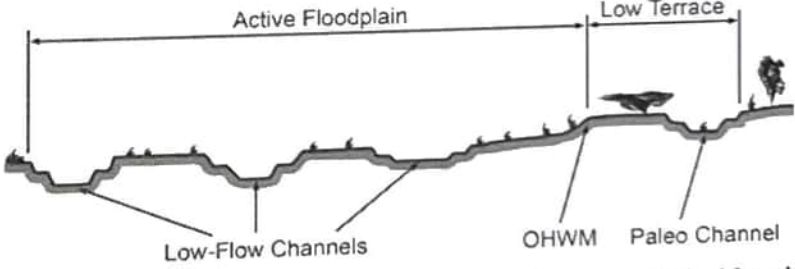
	Tree (%)	Shrub (%)	Herb (%)	Bare (%)
Above OHWM	40	40	80	5
Below OHWM	40	40	20	80

Notes/Description:

Mature trees rooted at + above OHWM.

Other Evidence: List/describe any additional field evidence and/or lines of reasoning used to support your delineation

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: <i>Summer Energy Center</i> Project Number: Stream: Investigator(s): <i>Kevin F., Sam W., Scott C.</i>	Date: <i>9/20/23</i> Town: <i>Yuba City</i> Photo begin file#: Time: <i>16:38</i> State: <i>CA</i> Photo end file#:		
Y ☐ / N ☐ Do normal circumstances exist on the site? Y ☐ / N ☐ Is the site significantly disturbed?	Location Details: Projection: Datum: Coordinates:		
Potential anthropogenic influences on the channel system: <i>Perennial irrigation canal, flow control device ~ 40 ft downstream (east) of OHWM</i>			
Brief site description: <i>Agricultural site, rice paddies.</i>			
Checklist of resources (if available): <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> ☒ Aerial photography Dates: ☒ Topographic maps ☐ Geologic maps ☒ Vegetation maps ☒ Soils maps ☐ Rainfall/precipitation maps ☐ Existing delineation(s) for site ☒ Global positioning system (GPS) ☐ Other studies </td> <td style="width: 50%; vertical-align: top;"> ☐ Stream gage data Gage number: Period of record: ☐ History of recent effective discharges ☐ Results of flood frequency analysis ☐ Most recent shift-adjusted rating ☐ Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event </td> </tr> </table>		☒ Aerial photography Dates: ☒ Topographic maps ☐ Geologic maps ☒ Vegetation maps ☒ Soils maps ☐ Rainfall/precipitation maps ☐ Existing delineation(s) for site ☒ Global positioning system (GPS) ☐ Other studies	☐ Stream gage data Gage number: Period of record: ☐ History of recent effective discharges ☐ Results of flood frequency analysis ☐ Most recent shift-adjusted rating ☐ Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event
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Hydrogeomorphic Floodplain Units 			
Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM: 1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site. 2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units. 3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units. a) Record the floodplain unit and GPS position. b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit. c) Identify any indicators present at the location. 4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section. 5. Identify the OHWM and record the indicators. Record the OHWM position via: <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;"> ☒ Mapping on aerial photograph ☐ Digitized on computer </td> <td style="width: 50%;"> ☒ GPS ☐ Other: </td> </tr> </table>		☒ Mapping on aerial photograph ☐ Digitized on computer	☒ GPS ☐ Other:
☒ Mapping on aerial photograph ☐ Digitized on computer	☒ GPS ☐ Other:		

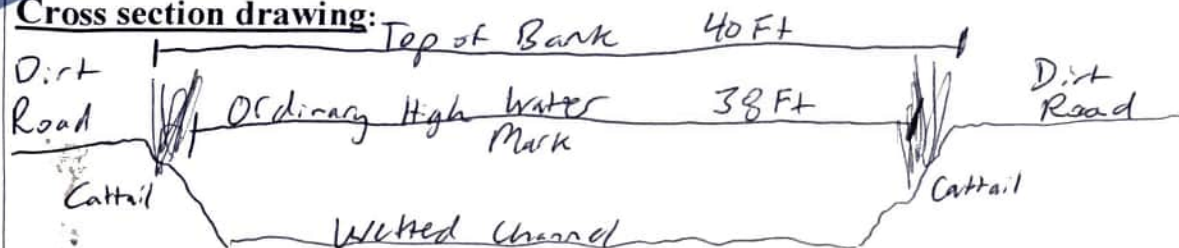
Project ID:

Cross section ID:

OHWM-3

Date:

Time:

Cross section drawing:**OHWM**

GPS point: 30.91512, -121.78311

Indicators:

- ☒ Change in average sediment texture
- ☒ Change in vegetation species
- ☒ Change in vegetation cover

- ☒ Break in bank slope
- ☐ Other: _____
- ☐ Other: _____

Comments:

Top of bank defined by break in slope.

OHWM defined by presence of Cattails

Floodplain unit:☐ Low-Flow Channel☐ Active Floodplain☐ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: _____

Total veg cover: _____% Tree: _____% Shrub: _____% Herb: _____%

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)

- ☐ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches

- ☐ Soil development
- ☐ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments:

Appendix C

Representative Photographs

Photo ID: 1	Date: January 5, 2024	
Location: Sutter Energy Center		
Description: View of sample point SEC-1. This area had shallow ponding at the time of survey but lacked hydric soils. No aquatic resources were delineated in this location. Photo taken facing west.		
Photo ID: 2	Date: January 5, 2024	
Location: Sutter Energy Center		
Description: View of sample point SEC-2 located in a swale on the western side of the Sutter Energy Center. This swale had shallow ponding at the time of survey but lacked hydric soils and hydrophytic vegetation. No aquatic resources were delineated in this location. Photo taken facing east.		

Photo ID: 3	Date: January 5, 2024	
Location: Sutter Energy Center		
Description: View of sample point SEC-3 located in a shallow ditch on the western side of the Sutter Energy Center. This ditch had shallow ponding at the time of survey but lacked hydric soils and hydrophytic vegetation. The ditch was delineated as non-wetland waters based on indicators of an ordinary high water mark (OHWM). Photo taken facing northwest.		
Photo ID: 4	Date: January 5, 2024	
Location: Sutter Energy Center		
Description: View of sample point SEC-4 located in a shallow, abandoned process water treatment pond. The pond had wetland hydrology and was dominated by hydrophytes but lacked hydric soils. The pond was delineated as non-wetland waters based on indicators of an OHWM. Photo taken facing north.		

Photo ID: 5	Date: April 12, 2024	
Location: Sutter Energy Center		
Description: View of sample point SEC-6 in abandoned process water treatment pond. The pond was inundated in January 2024. The wetland sample point established in April 2024 lacked hydric soil indicators. The pond was delineated as non-wetland waters based on indicators of an OHWM. Photo taken facing southwest.		
Photo ID: 6	Date: January 5, 2024	
Location: Sutter Energy Center		
Description: View of sample point SEC-5. This area had wetland hydrology at the time of survey but lacked hydric soils and hydrophytic vegetation. No aquatic resources were delineated in this location. Photo taken facing north.		

Appendix C. Representative Photographs

Photo ID: 7	Date: September 19, 2023	
Location: Pipeline station 36+90		
Description: View of sample point SP-1. The sample point was established in the ditch to the right of the shovel. The sample point had wetland hydrology and hydrophytic vegetation but lacked hydric soils. The ditch was delineated as non-wetland waters based on indicators of an OHWM. Photo taken facing northwest.		
Photo ID: 8	Date: September 19, 2023	
Location: Horizontal directional drill (HDD) string area east of pipeline station 170+00		
Description: View of sample point SP-2. The sample point was established in the ditch behind the shovel. The sample point had wetland hydrology and hydrophytic vegetation but lacked hydric soils. The ditch was delineated as non-wetland waters based on indicators of an OHWM. Photo taken facing southeast.		

Photo ID: 9	Date: September 19, 2023	
Location: Snake River, Pipeline station 180+00		
Description: View of the Snake River at the Obanion Road crossing and the location of the OHWM-1 transect. This riverine feature is highly modified and appears to primarily convey irrigation water. Photo taken facing south.		

Photo ID: 10	Date: September 19, 2023	
Location: Sutter Bypass, Pipeline station 195+00		
Description: View of the channel on the east side of the Sutter Bypass and the location of the OHWM-2 transect. The OHWM was delineated based on a break in slope the elevation of mature trees. Photo taken facing west.		

Photo ID: 11	Date: September 20, 2023	
Location: Sutter Bypass, Pipeline station 231+00	Description: View of sample point SP-3. The sample point was established in riparian habitat on the west side of the Sutter Bypass. The sample point had wetland hydrology and hydrophytic vegetation but lacked hydric soils. Indicators of wetland hydrology were due to high flow events in the preceding wet season. No aquatic resources were delineated in this location. Photo taken facing west.	
Photo ID: 12	Date: September 20, 2023	
Location: Intersection of Tudor Road and Reclamation Road, Pipeline station 410+00	Description: View of irrigation canal at the intersection of Tudor Road and Reclamation Road. Photo taken facing south.	

Photo ID: 13	Date: September 20, 2023	
Location: Pipeline station 767+50		
Description: View of feature R-3. This feature appears to be a remanent of a natural channel that is now used to manage irrigation water. Photo taken facing southwest.		
Photo ID: 14	Date: September 20, 2023	
Location: Vicinity of potential well pad (38.901747, -121.745767).		
Description: View of sample point SP-4 located on the margins of a rice field. This sample point had wetland hydrology and hydrophytic vegetation but lacked hydric soils. Wetland hydrology was associated with seasonal flood irrigation. No aquatic resources were delineated in this location. Photo taken facing southeast.		

Attachment C. Vegetation and Land Cover Types (DR A13)



Attachment D. Crotch's Bumble Bee Habitat Assessment (DR A14)



Crotch's Bumble Bee Habitat Assessment

Date: February 19, 2025
Project Name: Sutter Decarbonization Project
Project No.: D3854300
Company: CCFC Sutter Energy, LLC
Prepared By: Kyle Brown, Sean O'Neil
Document No.: 250218111820_18160eb0

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1. Introduction

CCFC Sutter Energy, LLC proposes the Sutter Energy Center (SEC) Decarbonization Project (Project) in Sutter County, California. The Project consists of the following:

- Turbine performance improvements
- Installation of a carbon capture facility at SEC
- An approximately 16-mile carbon dioxide (CO₂) pipeline
- Class VI injection wells to sequester the CO₂ in a geological storage location

Details regarding the Project description are provided in the Petition for Modification submitted to the California Energy Commission (CEC) in May 2023 (CCFC Sutter Energy 2023), as amended.

On January 21, 2025, CCFC Sutter Energy, LLC received a data request A14 from CEC regarding the potential for Crotch's bumble bee (*Bombus crotchii*) and its associated habitat to be impacted by the Project (CEC 2025). The full text of data request A14 is presented as follows:

"Please provide a habitat assessment evaluating the likelihood of bumble bees occurring within and adjacent to the project area. More information on the appropriate Crotch's bumble bee habitat assessment and survey protocol can be found in the Survey Considerations for California Endangered Species Act (CESA) Candidate Bumble Bee Species document located on the CDFW website at <https://wildlife.ca.gov/Conservation/CESA>. If the habitat assessment determines potential habitat is present, include a detailed impacts analysis for Crotch's bumble bee and recent results of a protocol-level survey. If this additional information for Crotch's bumble bee indicates that the project or activities proposed as part of the Petition may cause take of Crotch's bumble bee, staff recommends that the applicant revise the petition to request take coverage for this species. This additional request for take coverage must include all information that would be required in an Incidental Take Permit (ITP) application for CESA-listed or candidate species, including an impacts analysis and proposed mitigation measures (Cal. Code of Regs., tit.14, § 783.2)."

This memorandum addresses data request A14 from the CEC. The following sections present information on the life history, habitat requirements, survey methods, and habitat suitability for Crotch's bumble bee within the Project footprint.

2. Species Overview

2.1 Legal Status and Distribution

Crotch's bumble bee is a candidate species under the California Endangered Species Act (CDFW 2025a). The historical range of Crotch's bumble bee extends from central California south to Mexico and includes coastal areas east to the edges of the deserts and the Central Valley but typically excludes mountainous areas of California (Thorp et al. 1983, Williams et al. 2014).

2.2 Life History and Habitat Characteristics

Crotch's bumble bees are social insects with a colonial hierarchy consisting of a queen, workers (females), and drones (males). Nest sites are often underground in cavities or abandoned mammal burrows within dry grassland and scrub habitats. Worker bumble bees are often generalist foragers and are not restricted to specific floral hosts during foraging bouts, but individuals forage frequently at sages (*Salvia* spp.), lupines (*Lupinus* spp.), medics (*Medicago* spp.), phacelias (*Phacelia* spp.), and milkweeds (*Asclepias* spp.) (Williams et al. 2014).

In California, queens of the Crotch's bumble bee typically emerge in February or March and with an initial peak emergence in April and a second in July. Workers and drones typically emerge in early March with a peak emergence in July. Mating season occurs in late summer to early fall.

2.3 Population Threats

Populations of Crotch's bumble bee have shown a sharp decline in relative abundance and persistence over the past 10 years. Intensive agricultural development and rapid urbanization in the Central Valley have contributed to declining populations by reducing preferred nesting substrate and available floral resources (Xerces et al. 2018). Negative atypical behavior of workers (such as leaving the colony or joining foreign colonies) results from inbreeding caused by a drastic reduction of geographic range.

3. Methods

The following desktop resources were queried for occurrences of Crotch's bumble bee within 20 miles of the Project footprint:

- California Department of Fish and Wildlife California Natural Diversity Database (CNDDB)
- The Xerxes Society for Invertebrate Conservation's Bumble Bee Watch Dataset

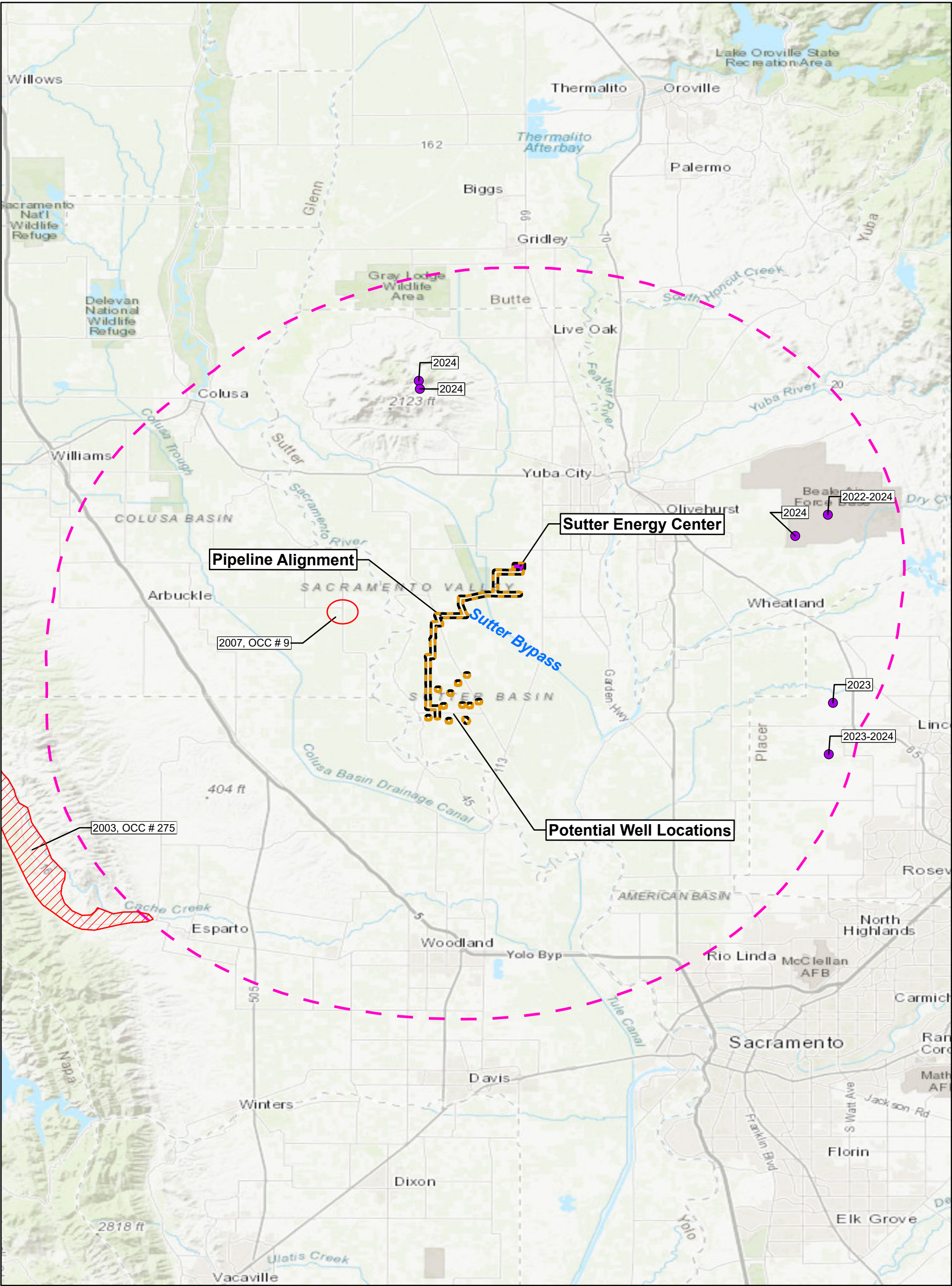
In support of the Petition for Modification, Jacobs biologists completed a review of biological conditions in the Project area. While a focused field survey for Crotch's bumble bee habitat suitability was not conducted in support of this habitat assessment, previous biological resource surveys that documented vegetation, floral resources, and general habitat conditions onsite across all seasons were used in support of this habitat assessment. Biological resource surveys conducted for this Project include reconnaissance habitat assessments, an aquatic resource delineation, and protocol-level Swainson's hawk surveys, conducted between May 2023 and April 2024.

4. Results

This section presents the results of the review, including the desktop assessment and habitat suitability.

4.1 Desktop Assessment

As referenced in the CEC's data request, there are documented occurrences of Crotch's bumble bee 15 miles east of the Project and 9 miles west of the Project (Figure 1). The record of Crotch's bumble bee



LEGEND

- Sutter Energy Center
- Project Area (1,408 acres)
- 20 miles from Project Area
- Crotch's Bumble Bee Observations**
 - Bumble Bee Watch
- California Natural Diversity Database (CNDDDB)**
 - Animal (non-specific)
 - Animal (circular)

Observation are annotated with the year observed.
CNDDDB observation annotations include the CNDDDB occurrence number.

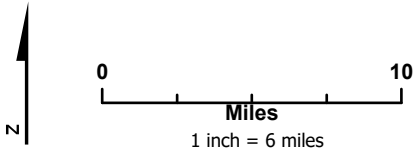
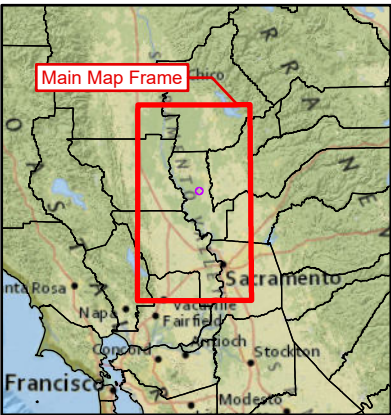


Figure 1
Crotch's Bumble Bee Observations
Sutter Decarbonization Project
Sutter County, CA

east of the Project is associated with multiple observations between June 2022 and June 2024 of male and female bees foraging on woollypod milkweed (*Asclepias eriocarpa*) at two locations on Beale Air Force Base east of Yuba City (Xerxes 2025). Beale Air Force Base supports thousands of acres of grassland and scrubland habitat on the western Sierra foothills, which are highly suitable for Crotch's bumble bee. Significant dispersal barriers separate these occurrences and habitats from the Project, including the Feather River, urban development associated with Yuba City, and large tracts of agricultural lands.

The western occurrence is from 2007, documented in the CNDDDB, and is roughly mapped to the general vicinity of the Pacific Gas & Electric Company Wilkins Slough Substation. There are few details associated with this occurrence aside from a collection being made on May 27, 2007 (CDFW 2025b). Because of the difficulty in identifying bees to the species level, the lack of specificity in the occurrence location, and minimal details associated with this occurrence, this occurrence may not be a reliable of Crotch's bumble bee presence in the region. Habitats in the vicinity of this occurrence are largely dominated by agricultural lands (rice fields) and ruderal grasses along irrigation canals, which offer marginal habitat quality for Crotch's bumble bees.

Two additional observations of Crotch's bumble bee have also been documented on the north side of Sutter Butte, 14 miles north of the Project footprint. These observations document a queen as well as seven individuals foraging on *Phacelia* spp. during the spring and late summer of 2024 (Xerxes 2025). Two more occurrences are located west of the city of Lincoln, 18 miles southeast of the Project footprint and are associated with 2023 to 2024 observations of male and female bees foraging on woollypod milkweed in grassland meadows (Xerxes 2025). One 2003 CNDDDB occurrence is mapped roughly around the town of Guinda in the Capay Valley, 20 miles southwest of the Project footprint. This occurrence mentions that Crotch's bumble bees were infrequent visitors of the sunflower fields during ground-nesting bee surveys conducted in the summer of 2003 (CDFW 2025b). All of these occurrences are separated from the Project footprint by significant dispersal barriers, including large tracts of agricultural land and major waterways, including the Sutter Bypass, Yuba River, and Sacramento River.

4.2 Habitat Suitability

Terrestrial habitat in the Project footprint is primarily dominated by agriculture, specifically rice production. Some fields in the southwestern portion of the Project footprint are planted with tomatoes or corn, but crop production in agricultural fields may vary from year to year. The remaining terrestrial habitat consists of barren areas, ruderal, and non-native grasslands, which occur at the SEC, along disturbed road shoulders, and other areas associated with high levels of human activity. Non-native grasses such as wild oat (*Avena* sp.), Bermuda grass (*Cynodon dactylon*), rattlesnake grass (*Briza maxima*), bromes (*Bromus* spp.), and Italian wildrye (*Festuca perennis*) are common in the herbaceous layer. Trees and shrubs are present in sparse pockets at low cover.

The habitats within the proposed pipeline alignment and wells pads are dominated by intensive agriculture, which reduces the quality of habitat for species that Crotch's bumble bee rely on for nesting substrates in the form of burrows. Additionally, frequent flooding of agricultural fields, particularly for rice production, exclude the possibility of bees nesting within these portions of the Project footprint (Appendix A; Photos 2, 5, and 6). Similarly, riparian areas within the Project footprint, including those within the SEC site and those associated with the Sutter Bypass, are considered unsuitable nesting areas because of the lack of suitable nesting substrate. While ruderal and barren areas along the proposed pipeline alignment and within the SEC facility may contain potentially suitable burrows for nesting, because of vehicle traffic, routine mowing, proximity to irrigation canals with variable seasonally water levels, and proximity to disturbance associated with agricultural operations, it is highly unlikely Crotch's bumble bee would select nest sites in these small, narrow strips of potentially suitable habitat (Appendix A; Photos 1 and 3).

As specified previously, Crotch's bumble bee is a generalist forager and uses a wide variety of floral resources but frequents sages, lupines, medics, phacelias, and milkweeds. Floral resources within the Project footprint are largely limited to ruderal forbs, such as mustard (*Brassicaceae* spp.), along the boundaries of agricultural roads and fields, small patches of wild sunflower (*Helianthus annuus*) around the riparian corridor of the Sutter Bypass (Photo 4), and field bindweed (*Convolvulus arvensis*) within the SEC

facility. While mustards, sunflowers, and bindweed provide marginal foraging opportunities for Crotch's bumble bees, these plants are not preferred and are widespread in the region. Crotch's bumble bees are much more likely to forage in areas with abundant floral resources, particularly areas with the preferred flowering species mentioned previously. The lack of abundant floral resources within the Project footprint further reduces the potential for nesting.

5. Conclusion

While Crotch's bumble bee was historically widespread in the Central Valley, modifications to the landscape, particularly agriculture, have extirpated this species from much of its historic range in California. Reliable occurrence data in the region shows this species is largely limited to the eastern and western peripheries of the Central Valley, where the landscape has not been subjected to heavy disturbance associated with agriculture. Overall, the Project footprint and surrounding area offer marginal nesting and foraging opportunities for Crotch's bumble bee, and the presence of dispersal barriers between occurrences of this species and the Project footprint make it highly unlikely individual bees would occupy the Project footprint. Therefore, this species is unlikely to be present within the Project footprint during construction.

6. References

California Department of Fish and Wildlife (CDFW). 2025a. Special Animals List. January.

California Department of Fish and Wildlife (CDFW). 2025b. California Natural Diversity Database, Biogeographic Data Branch. Sacramento, California. January 2025 dataset.

California Energy Commission (CEC). 2025. Petition for Post-Certification Modification for Sutter Energy Center (97-AFC-02C) Decarbonization Capture Project Staff's Data Request Set 2, A9 through A20. Sacramento, California. January 21.

CCFC Sutter Energy, LLC. 2023. Petition for Modification - Sutter Decarbonization Project. Submitted to California Energy Commission. May 19.

Thorp, R.W., D.S. Horning, and L.L. Dunning. 1983. "Bumble Bees and Cuckoo Bumble Bees of California (Hymenoptera: Apidae)." *Bulletin of the California Insect Survey*. Volume 23.

Williams, P. H., R. W. Thorp, L. L. Richardson, and S. R. Colla. 2014. Bumble Bees of North America: An Identification Guide. Princeton University Press.

Xerces Society for Invertebrate Conservation (Xerxes), Defenders of Wildlife, and Center for Food Safety. 2018. A Petition to the State of California Fish and Game Commission to List the Crotch bumble bee (*Bombus crotchii*), Franklin's bumble bee (*Bombus franklini*), Suckley cuckoo bumble bee (*Bombus suckleyi*), and western bumble bee (*Bombus occidentalis occidentalis*) as Endangered under the California Endangered Species Act. October 16. <https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=161902&inline>.

Xerxes Society for Invertebrate Conservation (Xerxes), Wildlife Preservation Canada, York University, University of Ottawa, The Montreal Insectarium, The London Natural History Museum, BeeSpotter. 2025. Bumble Bee Watch. Accessed January 28, 2025. <http://www.bumblebeewatch.org/app/#/bees/lists>.

Attachment A. Representative Photographs



Photo 1. Non-native grasslands within the SEC facility following routine mowing. This area lacks suitable nesting substrate and has marginal foraging opportunities for Crotch's bumble bee in the form of bindweed (*Convolvulus arvensis*). September 2023.



Photo 2. Rice fields and agricultural road southwest of SEC facility in the proposed pipeline alignment. Areas such as these lack foraging and nesting opportunities for Crotch's bumble bee. September 2023.



Photo 3. Ruderal and barren habitats along levee road by Sutter Bypass (left side of photograph). Marginally suitable nesting habitat on levee slope but burrows not observed. Riparian habitats on the right are unsuitable for nesting. September 2023.



Photo 4. Wild sunflower growing in the riparian corridor of Sutter Bypass. The sunflowers are not preferred foraging plants for Crotch's bumble bee and ground disturbance would be avoided in this area by using trenchless construction methods. September 2023.



Photo 5. Irrigation canal and agricultural roads within Project footprint. These habitats are unlikely to support Crotch's bumble bee nesting because of limited burrows and high disturbance. September 2023.



Photo 6. Barren and ruderal habitat along a berm between canal and rice fields. There are limited burrows and foraging resources along the berm itself. Seasonal inundation on either side of the berm likely excludes Crotch's bumblebee from nesting. September 2023.

Attachment E Conceptual Horizontal Directional Drilling (HDD) Inadvertent Release Protection and Contingency (DR A17)





HDD Inadvertent Release Prevention and Contingency Plan

Prepared by:
SPEC Services, Inc.

REV.	DESCRIPTION	BY	DATE	REVIEWED	DATE	APPROVED	DATE
JOB NO.: 8506							
DRAWING / CALCULATION NO.:						REV.	
						0	

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1. INTRODUCTION

COMPANY is proposing to install a new 12-inch pipeline in Sutter County, California. As part of the pipeline installation, various crossings will be completed via Horizontal Directional Drilling (HDD). Directional drilling operations have a potential to release drilling fluids into the surface environment through inadvertent releases that can be a concern to sensitive terrestrial habitats, waterways, and areas of biological resources. The HDD procedure uses bentonite slurry, a fine clay material used as a drilling lubricant that is non-toxic and commonly used in farming practices. However, aquatic plants and species can be smothered by the fine particles of bentonite if it were to discharge into sensitive environmental areas.

The purpose of this plan is to:

- Minimize the potential for an inadvertent release associated with an HDD
- Provide timely detection of an inadvertent releases
- Protect environmentally sensitive area
- Ensure an organized and timely response time in the event of an inadvertent release
- Ensure all appropriate representatives and regulatory agencies are notified with 24 hours in the event of an inadvertent release
- Design protocols to implement for the protection of sensitive cultural and biological resources
- Design protocols to require a geotechnical engineer or qualified geologist to make recommendations regarding the suitability of the formations to be bored

2. DESCRIPTION OF WORK

Prior to construction, sensitive cultural and biological resources will be protected by implementing the following measures:

- Entry and exit points must be at least ____ feet from marsh vegetation along the waterway;
- Entry and exit points will receive full-time cultural monitoring during excavation;
- Clearly mark and flag sensitive cultural and biological resource areas where present to avoid construction limits; and,
- Provide barriers such as straw bales or fences between bore site and nearby sensitive resource areas.

Drilling operations will be halted upon detection of a drop in drill pressure or other evidence of an inadvertent release. Management, Site Supervisor and the Safety Department are to be notified and clean-up of any spills shall begin immediately. A spill kit, vacuum truck and containment materials shall be present on-site prior to and during drilling operations. In the event of an inadvertent release, the on-site Supervisor and Foreman will conduct an evaluation of the situation and determine appropriate mitigation actions required for clean-up and continuing operations.

3. RESPONSIBILITIES

Site Supervisors shall be familiar with all aspects of drilling operations as well as the contents of this Inadvertent Release Plan prior to the work activity that is permitted to take place. The Site Supervisor has the overall responsibility for implementing this Inadvertent Release Plan and shall ensure that all employees are properly trained and familiarized with the necessary procedures for response to an inadvertent release prior to drilling activities beginning. The Site Supervisor has the responsibility to immediately notify the Safety Department, coordinating personnel, and regulatory agencies of any spills in a timely manner.

4. TRAINING

All crew members shall receive training prior to construction on the following:

- The provisions of the Inadvertent Release Plan
- Ensure that all field personnel understand their responsibility for timely reporting of inadvertent releases
- Equipment maintenance
- Site specific permit and monitoring requirements
- Inspection procedures for release prevention and containment equipment and materials
- Contractor/crew obligation to stop drilling operation upon evidence of an inadvertent release
- Immediately report any inadvertent releases
- Protocols for clean-up

5. WORKPLACE REQUIREMENTS

5.1 Access

Designated access points will be clearly marked with signs or flagging to ensure that crews only use approved access routes. Access points may be monitored for excessive erosion, dust and soil tracked onto roadway.

5.2 Clearing and Grading

Workspace for the HDD will require minor clearing and grading to establish work areas for the entry and exit sites. All work areas will need to be relatively free of brush and debris so that equipment and the construction crew can move safely around the site.

5.3 Equipment and Containment Material

A sufficient supply of containment material will be stockpiled on site to quickly react to an inadvertent release event. At a minimum, the following materials will be stored at either the entry or exit side of the drill for the duration of the drilling operation:

- All equipment and vehicles are checked and maintained daily to prevent leaks and hazardous materials
- Spill kits and spill containment materials are available on-site at all times
- All equipment shall be checked to be in good working order
- Absorbent pads and plastic sheeting are required if equipment are to be operated near a waterbody
- Vacuum truck
- Mud storage tanks
- Mud pumps and additional hose
- Sediment barriers
- Shovels and buckets

If the previously mentioned materials are not effective in containing an inadvertent release, the following materials and measures shall be employed to contain the drilling mud:

- sand bags where silt fence or straw bales are not effective
- floating booms or silt curtains
- plywood
- small backhoe to dig a sump so that mud can be pumped out
- Corrugated pipe to be installed over an in-stream point source to minimize release and facilitate clean up

6. CONSTRUCTION MONITORING

6.1. HDD Monitoring

Pipeline construction personnel and COMPANY on-site representative will monitor HDD activities during construction to ensure compliance with the applicable plans and permits. The following procedures shall be followed each day prior to the start of work. The Site Supervisor shall ensure that the Inadvertent Release Plan is available on-site at all time during construction. A brief meeting with crew members shall be held at the start of each day of construction.

Drilling pressures shall be closely monitored so they do not exceed pressures needed to penetrate the formation. Pressure levels shall be set at a minimum level to prevent inadvertent releases. During the pilot bore, maintain the drilled annulus. Cutters and reamers will be pulled back into previously-drilled sections after each new joint of pipe is added.

Exit and entry pits shall be enclosed by silt fences and straw. A spill kit shall be on-site and a vacuum truck shall be readily available prior to and during drilling operations. Containment materials such as straw, silt fencing, sand bags, and spill kits shall be staged at a location for easy access and mobilization during an event of a spill. If necessary, barriers between bore site and the edge of a waterbody shall be constructed prior to drilling. Barriers shall be constructed from sandbags.

Operator shall stop work whenever the pressure in the drill rig drops, or there is a lack of return in the entrance pit. The drill rig operator and Site Supervisor shall coordinate to verify a potential inadvertent release in its likely location. Notes of the conditions shall be made and the location of the inadvertent release shall be recorded.

Water containing mud, silt, bentonite, or other pollutants from equipment washing or other activities shall not be allowed to enter a lake, flowing stream or any other water source. Bentonite used in the drilling process shall be either disposed of at an approved disposal facility or recycled in an approved manner. Other construction materials and wastes shall be recycled or properly disposed.

The COMPANY representative will have the authority to halt work if an inadvertent release has the potential to impact a sensitive resource. Key project personnel are listed in **Error! Reference source not found..**

Table 1: Key Project Personnel

Role	Name	Organization	Phone Number
COMPANY Project Manager		COMPANY	
COMPANY Permitting		COMPANY	
COMPANY Right-of-Way		COMPANY	
COMPANY Area Manager		COMPANY	
COMPANY Line Rider		COMPANY	
COMPANY Field PIC (Inspector)		COMPANY	
Contractor Foreman		Contractor	
Environmental Lead		Contractor	
Design and Engineering Lead		Contractor	

6.2. Ground Surface Monitoring

Pipeline construction personnel shall be required to monitor the ground surface during construction for ground settlement and heaving. To assess this, monitoring points shall be established along the proposed pipeline trajectory.

On the entry side of the waterway, the survey monitoring points shall be established at 100 ft. intervals from the HDD entry point to the bank of the waterway. A monitoring point shall be placed at the base and centerline of the levee (if applicable).

On the exit side, monitoring points shall be established at 100 ft. intervals from the HDD exit point to the south bank of the waterway.

The contractor shall complete an elevation survey of monitoring points during the following stages of construction:

- Baseline survey prior to start of construction.
- Survey after completion of HDD pilot hole.
- Survey after completion of the final ream pass.
- Final Survey 1 week after completion of pullback.

Survey results shall be provided to COMPANY for final review. Vertical deviation exceeding 1 inch from the baseline survey shall be evaluated for potential subsidence and heaving by COMPANY and the geotechnical engineer of record. Review will determine whether this is an indication of short-term or long-term subsidence, surface heaving or potential inadvertent release point. After determination is made, drill contractor will make adjustments to drilling pressure and drilling mud composition.

6.3. Additional Construction Monitoring

As a precaution, monitoring of the waterway level shall be completed at the end of each work shift by COMPANY's environmental monitor. High water levels shall be monitored daily so that the waterway level does not infringe on the HDD work space. If possible, construction will be scheduled to correspond to seasonal low water levels for the waterway.

6.4. Notification

A COMPANY representative shall immediately notify the Levee District Manager for any construction issues related to the levee. Jurisdictional agencies and their contact information are listed in Table 2: Jurisdictional Agency Contact List.

7. SOIL CONDITIONS

7.1. Geotechnical Report

A project specific soils report has been completed by . The drilling contractor shall use this report as the basis for selection of drilling and mud handling equipment, drilling materials and drilling methods. The drilling report is indicative of the soil types but cannot predict all of the soil types that may be encountered during the drill.

(Update to include description of expected soil conditions after completion of geotechnical bores.)

7.2. Contingency Plan

The HDD contractor shall have equipment appropriate for completion of the HDD for the soil conditions indicated in the project geotechnical report. Soil conditions detrimental to HDD installation include cobble, boulders and significant loose soil deposits. These soil types, if encountered, may require re-evaluation of the HDD drilling methods and/or trajectory during construction. The contractor shall implement the following contingency plan for adverse soil conditions.

- HDD contractor shall assess the extent of adverse soil layer and potential for non-completion of the HDD due to the adverse soil deposit.
- If HDD drill contractor can complete the drill without significant risk of inadvertent returns, bore hole collapse or damage to the carrier pipe, drill shall be completed and carrier pipe and coating evaluated after pullback.
- For soil conditions that would allow completion of the HDD, but may cause damage to the outer coating of the carrier pipe, Contractor shall propose methods to mitigate risk to carrier pipe including application of abrasion resistant coating on the carrier pipe or completion of additional reaming and swab passes to condition the hole.
- If HDD contractor concludes that drill cannot be successfully completed, the drill string will be retracted from the bore hole and conditions assessed by the contractor, engineering team and COMPANY personnel. Contractor shall propose methods for mitigating the adverse soil condition including soil improvement methods, use of temporary casing pipe, or proposed adjustments to the drill path to reduce exposure to the adverse soil type.

8. INADVERTANT RETURNS

8.1. Inadvertent Release Identification

The drilling operator has the primary responsibility of identifying an inadvertent release or the potential for an inadvertent release and communicating with the COMPANY representative in the field. The drill operator will immediately notify the COMPANY representative of any of the following:

- loss of drilling fluid
- loss of circulation

- unexpected change in pressure

Monitoring frequency will increase if any of the previously mentioned events occur.

8.2. Inadvertent Release Response

In the event of an inadvertent release, the release will be assessed to determine the amount of drilling mud released and potential for the release to reach a waterway or other sensitive resource. Surfaced drilling mud will be accessed based on the location and size of the inadvertent release and according to resource agency recommendations. Similarly, response measures will vary based on the location of the inadvertent release, as described further in the following subsections.

The following steps will be taken if an inadvertent release is identified:

1. Initiate immediate suspension of drilling operation.
2. Determine the location and extent of the inadvertent release.
3. A cultural resources monitor shall monitor all activities. Notify the environmental agencies in Table 2 of the inadvertent release.
4. Contain inadvertent release with berms, straw bales, or fencing as appropriate and in consultation with the COMPANY Inspector and contacted agencies.
5. Verify that drilling fluid will not enter a waterway.
6. Notify COMPANY representatives.
7. Evaluate the release to determine if containment structures will effectively contain the release.
8. Clean up the inadvertent release material if it is *in non-sensitive areas*, such as disturbed uplands, in accordance with the procedures outlined in Section 8.4 Clean Up and in consultation with the COMPANY representative.

A COMPANY representative will review the containment structure and determine if additional measures are needed to prevent the spread of surfaced drilling mud. Drilling may resume upon approval from the COMPANY representative. If borehole abandonment and a new HDD location is required, authorization from the (agency name) must be obtained prior to drilling.

Table 2: Jurisdictional Agency Contact List

Agency	Contact Name	Address	Phone Number
Agency 1			
Agency 2			
Agency 3			
Agency 4			
Agency 5			

Waterbody

In the event of an inadvertent release is aquatic (underwater), the following steps will be taken to prevent or minimize the further release of drilling mud:

1. Initiate immediate suspension of drilling operations.
2. Monitor inadvertent release for 4 hours to determine if the drilling mud congeals (bentonite will usually harden, effectively sealing the inadvertent release location).
3. Notify COMPANY representatives, who will then notify applicable stakeholders including Agency 1, Agency 2, etc. at the contact numbers listed in Table 2:
 - a. If the drilling mud congeals, take no other action that would potentially suspend sediments in the water column.
 - b. If the drilling mud does not congeal, isolate the surrounding area. Spill booms or silt curtains will be deployed on the water by small boats from the shore surrounding the spill area.
 - c. If the release becomes excessively large, a spill response team would be called in to contain and clean up excess drilling mud in the water. Phone numbers of spill response must be on site.
4. Document the location and estimated volume of the inadvertent release and corrective measures taken to contain the inadvertent release. In addition, document preventive measures taken to reduce the likelihood of future inadvertent releases.
5. With direction from resource agency personnel, initiate clean-up procedures outlined in Section 8.4 Clean Up.

In general, containment is not feasible for in-stream releases. In-stream releases include a release in a water body where the flowing current would wash the drilling mud away. In the event of an in-stream release:

1. Initiate immediate suspension of drilling operations.
2. Notify COMPANY representatives, who will make notifications to agencies listed in Table 2: Jurisdictional Agency Contact List. Section 8.3 Notification provides details concerning agency notification.
3. In consultation with resource agency representatives, assess conditions to determine whether hand-placed containment, recovery, or other measures, such as silt curtains, will be effective and beneficial at the specific release. Refer to Section 5.3 Inadvertent Release Response for additional containment measures that may be suitable depending on the location and volume of the inadvertent release.
4. If containment is not a viable solution to an in-stream inadvertent release, increase the drill angle in an attempt to move below the problem area or reduce the amount of drilling fluid reaching the surface.
5. Document the location and estimated volume of the inadvertent release and corrective measures taken to contain the inadvertent release. In addition, document preventive measures taken to reduce the likelihood of future inadvertent releases.

Drilling will resume once the inadvertent release is contained and controlled. The Contractor will obtain permission to resume from a COMPANY representative. COMPANY will determine that

the affected area is under control and make proper notifications. Notification procedures are described in more detail in Section 7.3 Notification.

8.3. Notification

For all drilling mud releases during HDD crossings, the Contractor will notify the drilling foreman to temporarily halt drilling activities. The drilling foreman will immediately notify the appropriate COMPANY representative. A COMPANY representative will assess the severity of the release and make agency notifications.

Agencies in Table 2 shall be notified including Agency 1, Agency 2, etc. Upon project completion, details of inadvertent release events shall be documented in a post construction report that includes, but is not limited to:

- A map that shows the inadvertent release location(s).
- Date and time of inadvertent release event(s).
- Details of clean-up procedures, equipment, and containment implemented.
- “Before” and “After” photographs confirming the clean-up.

In general, if an inadvertent release occurs in an upland area and there is no threat of drilling mud entering a sensitive resource area, the inadvertent release will be contained and the COMPANY representative shall make agency notifications described in section 8.2. If an inadvertent release occurs in a waterbody or other sensitive resource area, COMPANY will notify all agencies with jurisdiction over the resource area by telephone within 24 hours of the containment efforts being implemented. Written notification describing the location of the inadvertent release, estimated size of the affected area, and actions taken to reduce or eliminate the release of drilling mud will be provided to each jurisdictional agency following the verbal notification. A COMPANY representative or their designee will complete all agency notifications. Jurisdictional agencies and their contact information are listed in Table 2: Jurisdictional Agency Contact List.

8.4. Clean Up

The Contractor will work with COMPANY on-site representative and resource agency representatives to determine the timing of clean up. The following measures will be implemented to remove drilling mud from previously undisturbed areas:

- Drilling mud will be cleaned up using methods that do not cause extensive ancillary damage to existing vegetation. This will include the use of hand tools, such as shovels, buckets and brooms. If approved by the COMPANY representative, fresh water washes can also be used to dilute drilling fluid if deemed beneficial and feasible.
- Containment structures will be pumped out and the ground surface scraped to bare topsoil without causing undue loss of topsoil or ancillary damage to existing and adjacent vegetation.
- Material will be pumped out by a vacuum truck and collected in containers for temporary storage prior to removal from the site.

- Potential for secondary impacts from the clean-up process will be evaluated. A COMPANY representative, in consultation with resources agencies, will determine if clean-up activities are to continue if physical damage to the site will exceed the benefits of the removal activities.
- Clean-up measures will be initiated for in-stream releases where feasible, in consultation with jurisdictional agencies. If site-specific conditions are such that containment and clean-up may be feasible and beneficial, fresh water washes or other low-impact steps may be employed without undue disturbance to the stream banks and bed.

9. HDD ABANDONMENT

9.1. Abandonment Contingency

If the directional drill experiences a failure due to soil conditions, unknown obstructions or equipment failure, a contingency plan will be implemented to properly abandon the bore hole. Prior to implementation of any plans, Contractor and COMPANY shall make notifications to all regulatory stakeholders including the California State Lands Commission. Though the process for abandonment shall depend on the failure scenario, the bore hole shall be properly abandoned to prevent any potential seepage, subsidence or erosion. A detailed abandonment plan shall be developed by the contractor for approval by COMPANY and regulatory agencies. The plan shall include a description of the process, equipment and material that will be used for abandonment. All material, such as abandonment grout, shall be pre-approved by COMPANY and regulatory agencies to ensure material meets or exceeds applicable specifications. Potential abandonment scenarios and contingencies include the following:

- Adverse soil conditions causing borehole collapse may require abandonment of the bore hole. If possible, the drill string will be retracted from the bore hole and conditions assessed by the contractor and COMPANY personnel. If possible the contractor will attempt to recover the bore hole by modifying the drilling fluid composition, drilling pressures and tooling.
- If drill string or tooling fails or is lost in the hole, the contractor will attempt to recover the drill string and tooling. If successful, the contractor will remove the drill string from hole, inspect to determine nature of failure and replace. For re-entry the contractor shall make adjustments to rotational speed, penetration rate, pumping rate.
- If recovery of the borehole is not possible during drilling operations, the contractor will pull back and remove the drill string from the bore hole and choose a new alignment after consultation between contractor, COMPANY, and jurisdictional agencies to determine when operations can restart. The bore hole would be abandoned by pumping grout from one side of the drill and pushing the bentonite mud to holding tanks for disposal. The grout shall be a cellular concrete fill (Cell-Crete) with minimum compressive strength of ____ psi.
- If the failure of the HDD occurs during pullback of the 12-inch pipeline, the contractor will attempt to remove the pipe from hole, inspect failure to determine cause (inadequate preparation of reamed bore path, welding workmanship or pipe design deficiency). Based on result, the contractor would coordinate with COMPANY to determine appropriate modifications to drilling or pipe and potential to re-use the bore hole or follow new alignment.

- If the failure of the HDD occurs during pullback of the 12-inch pipeline and the contractor cannot remove the 12-inch pipe, the contractor would abandon the pipe in the borehole and inspect failure to determine cause (inadequate preparation of reamed bore path, welding workmanship or pipe design deficiency). Based on result, the contractor would coordinate with COMPANY to determine appropriate modifications to drilling or pipe and potential to re-use the bore hole or follow new alignment. The pipe abandoned in the bore hole would be filled with abandonment grout and capped underground with the location surveyed for future reference.
- A plot plan depicting the location of the new entry pit, new exit hole, where equipment and materials will be stored, and where refueling of equipment will be performed.

10. RESTORATION

Temporary erosion and sediment control structures will remain in place during Project activities in accordance with the Stormwater Pollution Prevention Plan (SWPPP) or as determined by the COMPANY representative. Silt fence, straw bales, or other erosion and sediment control devices that are no longer functional or needed will be removed from the site. All temporary Project construction-related materials shall be removed upon Project completion unless a jurisdictional agency has provided specific instruction.

10.1. Restoration of Areas Inadvertently Affected by Releases During Clean-Up

If an inadvertent release occurs, affected areas would be restored to their pre-spill conditions either before or during other Project restoration activities. This would be accomplished by first excavating the affected area and properly disposing of the affected material. Once this is completed, the affected area would be backfilled and compacted with clean native material. The original grade would then be restored to its pre-existing condition and topsoil (if any) also restored. If the affected area must be reseeded, the activity would be undertaken in consultation with the project biologist and applicable state or federal agencies (e.g., California Department of Fish and Wildlife, State Lands Commission, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, Etc.) and if required, in accordance with a restoration plan prepared by a certified landscape ecologist. In addition, an approved native seed mix (or if required, native plant container material), suitable for the area and based upon the existing native plant communities present, would be used and locally obtained (if available). Applicable erosion protection as detailed in the SWPPP would be used during restoration activities. If a restoration plan is required then monitoring would occur once restoration activities are complete duration, test pressure, maximum allowable operating pressure, test acceptance criteria, etc.

Although the details of the monitoring plan will be outlined in a Restoration Monitoring Plan, these activities will generally entail the following: (1) biologists will perform quarterly site monitoring and collect photo-points (quarters one through four) and conduct additional focused site monitoring events to evaluate weed conditions and determine if the erosion control measures are effective; (2) each quarter, for up to ten days, biologists will collect photographs at established

photo-points and inspect each site and fill out a detailed restoration site monitoring form. The quarterly data collection will document visual estimates of plant cover, the presence of new weed and native species, and other relevant site conditions. During these quarterly visits, the biologists will also visually evaluate and document erosion and sediment control under the remote supervision of a Qualified SWPPP Developer (QSD)/Qualified SWPPP Practitioner (QSP); and (3) site assessment forms and photographs will be used to document the progress of restoration at the site.