

INITIAL STUDY/MITIGATED NEGATIVE DECLARATION

SACRAMENTO AREA SEWER DISTRICT CREEK CROSSING PROJECT
SACRAMENTO COUNTY, CA

JULY 2022

LEAD AGENCY:
Sacramento Area Sewer District
10060 Goethe Road
Sacramento, CA 95827
(916) 876-6000

PREPARED BY:
Montrose Environmental
1801 7th Street, Suite 100
Sacramento, CA 95811
(916) 447-3479
www.analyticalcorp.com

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1 INTRODUCTION

1.1 PROJECT SUMMARY/ENVIRONMENTAL CHECKLIST FORM

Project Title:	Sacramento Area Sewer District Creek Crossing Project
Lead Agency Name and Address:	Sacramento Area Sewer District (SASD) 10060 Goethe Road Sacramento, CA 95827
Contact Person and Phone Number:	Linda Peters, P.E., Associate Civil Engineer, SASD (916) 876-6443
Project Location:	The Project Area is located within Sacramento County (County), California, within the City of Citrus Heights, the unincorporated areas of Carmichael, and Fair Oaks.
Project Sponsor's Name and Address:	Linda Peters, P.E., Associate Civil Engineer, SASD 10060 Goethe Road Sacramento, CA 95827 (916) 876-6443
General Plan Designation:	Various
Zoning:	Various
Description of the Project:	The Proposed Project involves realigning, replacing, and/or rehabilitating 12 sewer mainline segments throughout Sacramento County at 10 distinct Project Sites. The 12 pipeline crossings were identified by SASD as part of their Sewer System Management Plan (2021) for improvement due to degrading site conditions such as structural failure and support failure due to erosion, undermining, or exposure. A detailed description of the Proposed Project is included in **Section 2.4**.
Existing and Surrounding Land Uses:	The Project Area encompasses 12 sewer mainline segments located within the City of Citrus Heights and the unincorporated areas of Carmichael, and Fair Oaks, within Sacramento County. The segments fall under various City and County zoning and land use classifications. The majority of the crossings are located near residential uses.

Other Public Agencies Whose Approval may be Required:	Central Valley Regional Water Quality Control Board (CVRWQCB), U.S. Army Corps of Engineers (USACE), and California Department of Fish and Wildlife (CDFW)
Consultation with California Native American Tribes	On April 14, 2022, Sacramento County sent consultation letters in accordance with Assembly Bill (AB) 52 to relevant tribes. The letter requested that the tribes notify the County within 30 days to request engagement in formal consultation regarding possible significant effects that the Proposed Project may have on tribal cultural resources. A response letter was received from Wilton Rancheria, requesting further consultation and copies of culture surveys. Wilton Rancheria indicated that they request monitors be present at the Project Sites. Additionally, the United Auburn Indian Community (UAIC) provided suggested mitigation language and requested a tribal monitor be present at some of the Project Sites. These requests have been addressed by the County/SASD and relevant mitigation measures have been included in this Initial Study (IS). Therefore, the requirements of Public Resources Code (PRC) § 21080.3.1 have been satisfied. Refer to the discussion in **Section 3.6** regarding outreach to Native American Tribes identified by the Native American Heritage Commission (NAHC).

1.2 PURPOSE OF STUDY

Montrose has prepared this IS on behalf of SASD (the Lead Agency) for the Sacramento Area Sewer District Creek Crossing Project (Proposed Project) in accordance with the California Environmental Quality Act (CEQA) of 1970 (as amended), codified in California PRC § 21000 et seq., and the CEQA *Guidelines* in the Code of Regulations, Title 14, Division 6, Chapter 3. Pursuant to these regulations, this IS is intended to inform SASD decision makers, responsible agencies, interested parties, and the general public of the Proposed Project and its potential environmental effects. This IS is also intended to provide the CEQA-required environmental documents for all county, city, local, and state approvals or permits that might be required to implement the Proposed Project. This IS supports a Mitigated Negative Declaration (MND) as defined under CEQA *Guidelines* § 15070.

1.3 DOCUMENTS INCORPORATED BY REFERENCE

On November 9, 2011, the Sacramento County Board of Supervisors adopted an updated General Plan. The planning horizon of the County's previous General Plan was 1990 to 2010; the updated General Plan's planning horizon looks out to 2030. The Final General Plan Environmental Impact Report (EIR) was completed in April 2010. The General Plan and EIR analyzed full implementation of the County of Sacramento General Plan and identified measures to mitigate the significant adverse project and cumulative impacts associated with the General Plan. Pursuant to CEQA *Guidelines* § 15150(a), the

County of Sacramento General Plan and EIR are incorporated by reference. Both documents are available at the County of Sacramento, 827 7th Street, Rm 225, Sacramento, CA 95814. The impact discussions for each section of this IS/MND are in part based on information in the County of Sacramento General Plan and associated EIR.

1.4 ORGANIZATION OF THE INITIAL STUDY

This document is organized into the following sections:

Section 1.0 – Introduction: Describes the purpose, contents, and organization of the document and provides a project summary. Includes the significance determination, which identifies the determination of whether impacts associated with development of the Proposed Project are significant, and what, if any, additional environmental documentation may be required.

Section 2.0 – Project Description: Includes a detailed description of the Proposed Project.

Section 3.0 – Environmental Analysis: Contains the Environmental Checklist from Appendix G of the CEQA *Guidelines* with a discussion of potential environmental effects associated with the Proposed Project. Mitigation measures, if necessary, are noted following each impact discussion.

Section 4.0 – List of Preparers

Section 5.0 – References

Appendices – Contains information to supplement sections within the IS.

1.5 ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED

The environmental factors checked below would be potentially affected by the Proposed Project, involving at least one impact requiring mitigation to reduce the impact to a less-than-significant level. Impacts to these resources are evaluated using the checklist included in **Section 3.0**. The Proposed Project was determined to have a less-than-significant impact or no impact without mitigation on unchecked resource areas.

☐ Aesthetics	☐ Agriculture and Forest Resources	☑ Air Quality
☑ Biological Resources	☑ Cultural Resources	☐ Energy
☑ Geology and Soils	☐ Greenhouse Gas Emissions	☑ Hazards and Hazardous Materials
☑ Hydrology and Water Quality	☐ Land Use and Planning	☐ Mineral Resources
☑ Noise	☐ Population and Housing	☐ Public Services
☐ Recreation	☐ Transportation	☑ Tribal Cultural Resources
☐ Utilities and Service Systems	☐ Wildfire	☑ Mandatory Findings of Significance

1.6 CEQA Environmental Determination (To be completed by the lead agency)

On the basis of this initial evaluation:

☐ I find that the Proposed Project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☒ I find that although the Proposed Project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the Proposed Project have been made by or agreed to by the Proposed Project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

☐ I find that the Proposed Project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that the Proposed Project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the Proposed Project could have a significant effect on the environment, because all potentially significant effects 1) have been analyzed adequately in an earlier ENVIRONMENTAL IMPACT REPORT or NEGATIVE DECLARATION pursuant to applicable standards, and 2) have been avoided or mitigated pursuant to that earlier ENVIRONMENTAL IMPACT REPORT or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

[Original Signature on File]

Signature

8/11/22

Date

2 PROJECT DESCRIPTION

2.1 PROJECT SUMMARY

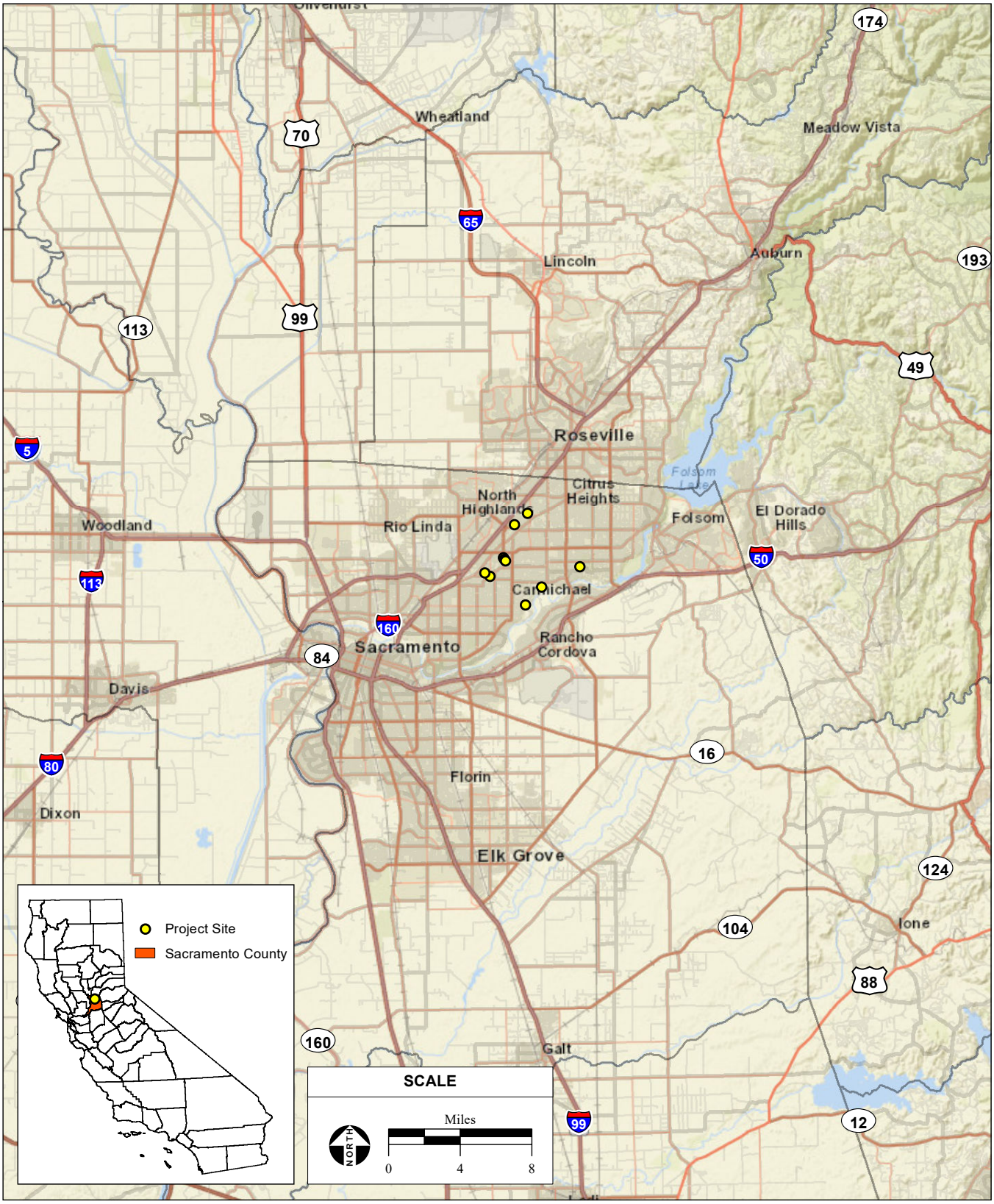
The Proposed Project involves realigning, replacing, and/or rehabilitating 12 sewer mainline segments throughout the County at 10 distinct Project Sites. The 12 pipeline crossings were identified by SASD as part of their Sewer System Management Plan (2021) for improvement due to degrading site conditions such as structural failure and support failure due to erosion, undermining, or exposure. The Proposed Project location and components are described in detail below.

2.2 PROJECT LOCATION AND SETTING

The 12 sewer mainline segments occur with 10 defined Project Site boundaries, as 2 of the Project Sites encompass 2 distinct segments per site. The10 Project Sites are located within the City of Citrus Heights, the unincorporated areas of Carmichael, and Fair Oaks, within Sacramento County, California (Project Area). The Project Area totals approximately 11 acres. **Table 2-1** below includes detailed location information for each Project Site. The Project Site locations are displayed on **Figures 1** and **2**. Detailed aerial images of the Project Site boundaries and sewer mainline segment locations are included in **Figures 3a** through **3j**. The creek crossing location associated with each sewer mainline segment is numbered and identified in **Table 2-1** and shown on **Figures 3a** through **3j**. Land uses surrounding each pipeline segment vary, with the majority of the Project Sites located adjacent to residential areas, with some occurring near parks and roadsides.

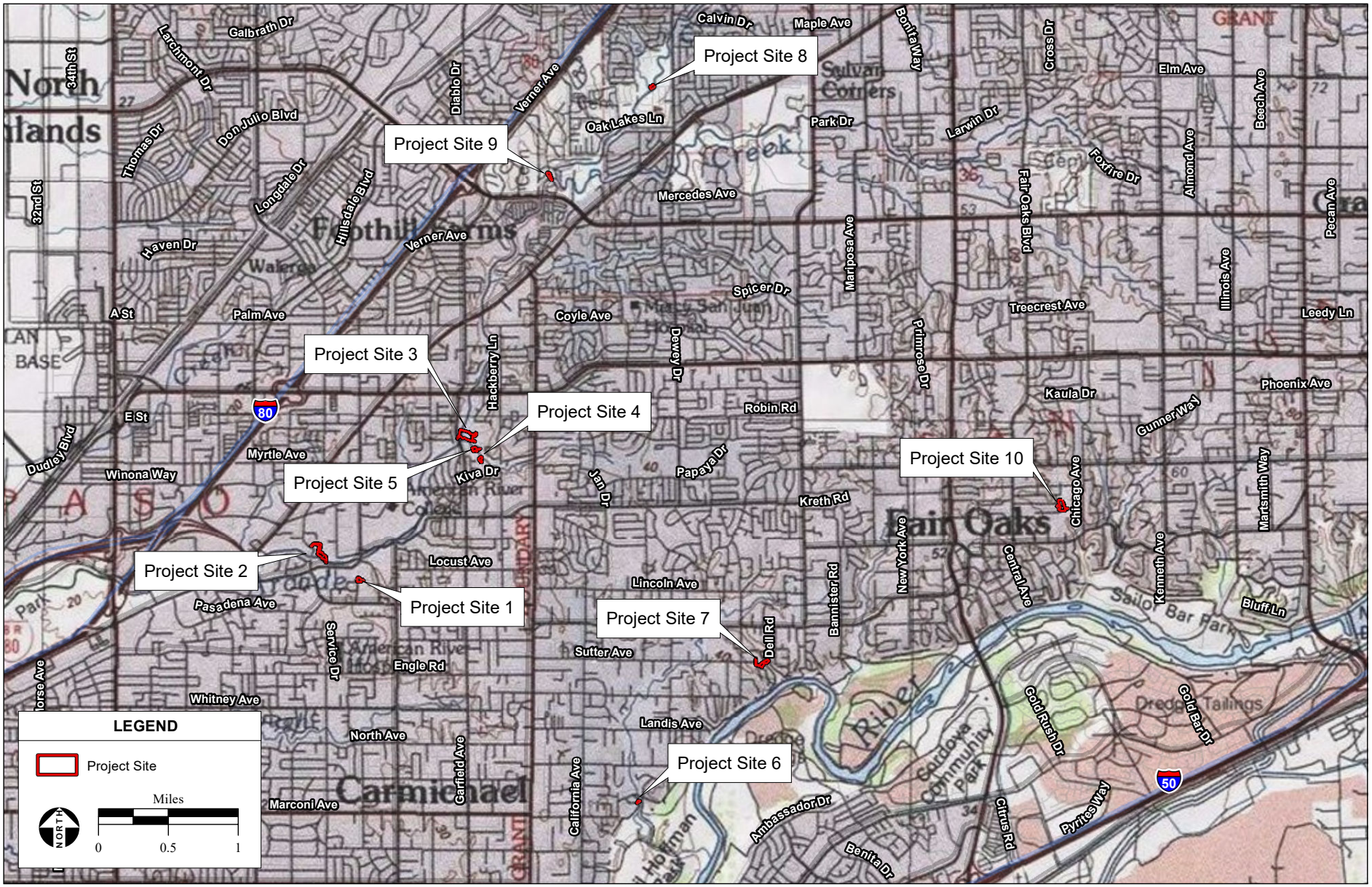
TABLE 2-1. PIPELINE CREEK CROSSING LOCATIONS

PROJECT SITE	PIPELINE SEGMENT CROSSING #	SASD PIPE SEGMENT #(S)	NEAREST CROSSROAD	APPROXIMATE PROJECT SITE ACREAGE	FIGURE NUMBER
1	1	59646	Hope Ln.	0.61	3a
2	2	48368	Winding Way	2.05	3b
3	3 and 4	49894 and 41018	Arcade Creek/ Garfield Ave. and Thousand Oaks Ct.	3.59	3c
4	5	44237	Concho Ct.	0.43	3d
5	6	50528	Gina Ct.	0.54	3e
6	7	170877	San Lorenzo Way	0.17	3f
7	8	78865	Sutter Ave.	1.04	3g
8	9	36529	Campfire Way	0.39	3h
9	10	78531	Indian River Dr.	0.47	3i
10	11 and 12	68559 and 239693	Hegseth Ct./Dietz Way	1.79	3j



SOURCE: ESRI, 2022; Montrose, 5/18/2022

Figure 1
Regional Location



SOURCE: "Sacramento, CA" USGS 100k Topographic Quadrangle, T10N R6E, T9N R6E, Unsectioned Area of Carmichael and Citrus Heights; ESRI 2021; AES, 7/8/2022

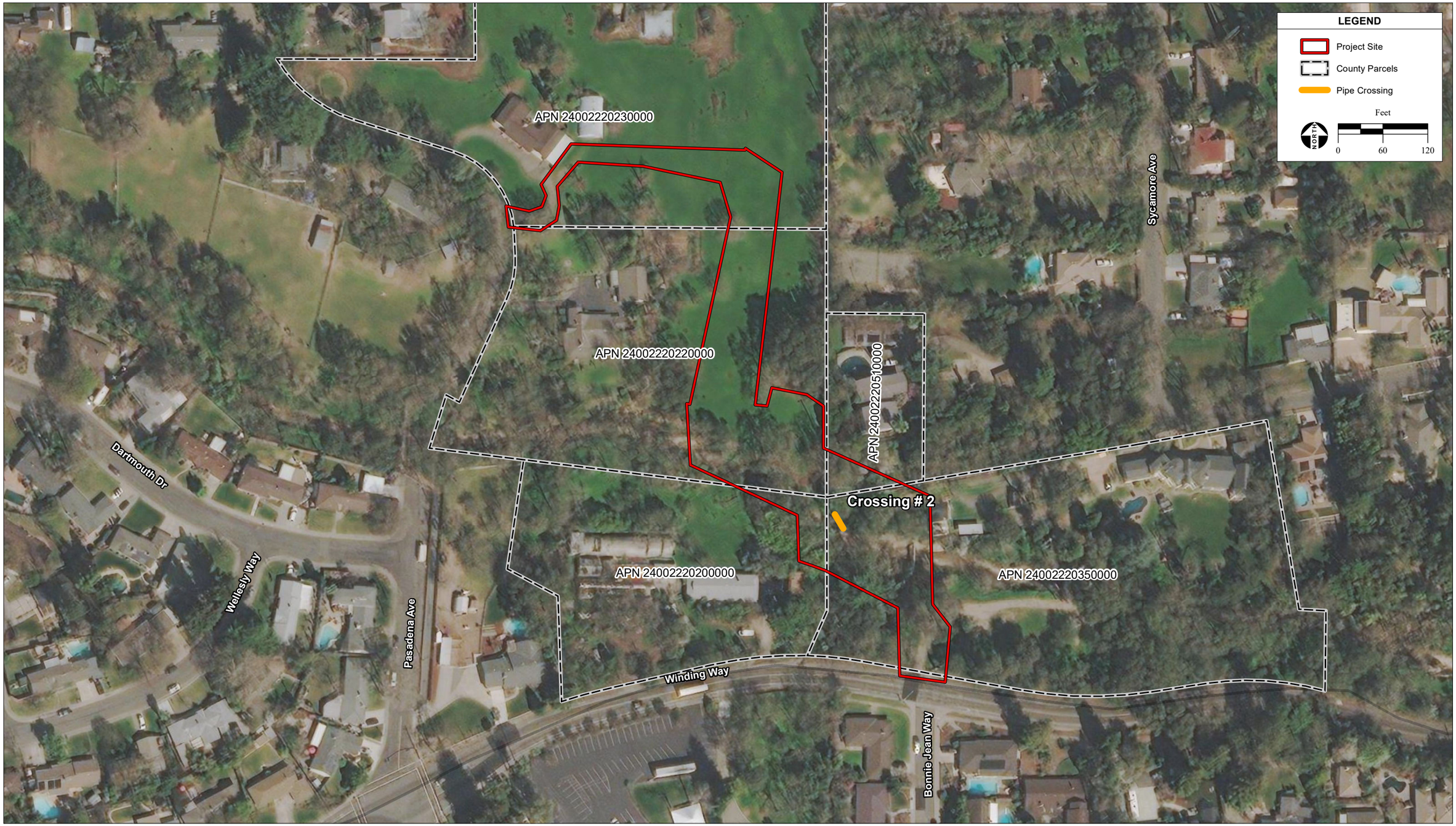
Figure 2
Site and Vicinity



SOURCE: Metro aerial photography, 3/4/2021; ESRI 2021; Montrose, 5/18/2022

Figure 3a

Project Site 1 / Crossing #1 / Hope Ln / Asset #59646



SOURCE: Metro aerial photography, 3/4/2021; ESRI 2021; Montrose, 5/18/2022

Figure 3b

Project Site 2 / Crossing #2 / Winding Way / Asset #48368



SOURCE: Metro aerial photography, 3/4/2021; ESRI 2021; Montrose, 5/18/2022

Figure 3c

Project Site 3 / Crossing #3 / Arcade Creek / Asset #49894
Crossing #4 / Garfield Ave & Thousand Oaks Ct / Asset #44327



SOURCE: Metro aerial photography, 3/4/2021; ESRI 2021; Montrose, 5/18/2022

Figure 3d

Project Site 4 / Crossing #5 / Concho Ct / Asset #41018



SOURCE: Metro aerial photography, 3/4/2021; ESRI 2021; Montrose, 5/18/2022

Figure 3e
Project Site 5 / Crossing #6 / Gina Ct / Asset #50528



SOURCE: Metro aerial photography, 3/4/2021; ESRI 2021; Montrose, 5/18/2022

Figure 3f

Project Site 6 / Crossing #7 / San Lorenzo Way / Asset #170877



SOURCE: Metro aerial photography, 3/4/2021; ESRI 2021; Montrose, 5/18/2022

Figure 3g

Project Site 7 / Crossing #8 / Sutter Ave / Asset #78865



SOURCE: Metro aerial photography, 3/4/2021; ESRI 2021; Montrose, 5/18/2022

Figure 3h

Project Site 8 / Crossing #9 / Campfire Way / Asset #36529



SOURCE: Metro aerial photography, 3/4/2021; ESRI 2021; Montrose, 5/18/2022

Figure 3i

Project Site 9 / Crossing #10 / Indian River Drive / Asset #78531



SOURCE: Metro aerial photography, 3/4/2021; ESRI 2021; Montrose, 5/18/2022

Figure 3j

Project Site 10 / Crossing #11 / Hegseth Ct / Asset #68559
Crossing #12 / Dietz Way / Asset #239693

2.3 PROJECT BACKGROUND

2.3.1 SASD Sewer System Management Plan

SASD provides wastewater collection services to approximately 270 square miles of the greater Sacramento area. In 2021, a Sewer System Management Plan was developed to provide SASD a system-wide living management plan for the operation, maintenance, expansion, repair, and replacement of the SASD sewer collection system. The Sewer System Management Plan meets the requirements of the Statewide General Waste Discharge Requirements (WDR), Water Quality Order No. 2006-0003 (Sanitary Sewer Order) approved on May 2, 2006, Provisions D 13 (D13) (SASD, 2021).

As a part of their Sewer System Management Plan guidelines, SASD performs annual and post two-year recurrence interval storm inspections of creek crossings to assess conditions of critical sites. As a result of these inspections, 12 pipeline crossings were identified by SASD for improvement. These crossings pose an unacceptable risk of a sanitary sewer overflow due to degrading site conditions and require a mitigation action to reduce that risk; therefore, the Proposed Project includes realigning, replacing, and/or rehabilitating these 12 sewer mainline segments.

2.3.2 Preliminary Design Report and Field Surveys

Water Systems Consulting, Inc. (WSC) developed a Preliminary Design Report (PDR; **Appendix A**) to provide the preliminary design for rehabilitation or replacement of the 12 sewer mainline segment creek crossings for SASD. As a precursor to the PDR, WSC prepared the Creek Crossing Project's Alternatives Analysis Report (dated August 27th, 2021), which identifies site-specific project alternatives and preferred solutions for replacement or rehabilitation. The PDR provides additional details for each of the preferred solutions and includes the design criteria and basis of design, site descriptions and backgrounds, preliminary design descriptions and drawings, capital cost estimates, as well as construction, site access, and easement considerations for each of the 12 segments.

Initial field investigations at the 12 sites were completed by WSC and a team of specialty subconsultants on May 19, 2021 and May 20, 2021. The field investigations included geotechnical, geomorphology, environmental, structural, civil, and mechanical assessment of the sites. Based on the field findings and background document review, conceptual alternatives for each site were developed and presented for input at a Creek Crossing Alternatives Workshop on July 15, 2021. Feedback from the workshop was included in the alternatives for each site and the final recommended alternatives were presented in the Alternative Analysis Report submitted August 27, 2021. The recommended alternatives for each site were presented at the Project Approval Committee (PAC) meeting on October 20, 2021 and approved for continuation to the preliminary design phase. The PDR advances the alternatives chosen in the Alternatives Analysis Report and approved by the PAC to a 30% design stage (last updated January 2022).

In support of the CEQA review, biological and cultural field surveys were completed from June 7–10, 2021 by Analytical Environmental Services (AES), with a follow up survey on December 21, 2021. Additionally, a noise analysis was completed on March 16, 2022 by Saxelby Acoustics and a geotechnical exploration program was conducted by Fugro USA Land from December 14, 2021–February 24, 2022. These site visits informed the following technical studies:

- Geotechnical Report (**Appendix C**)
- Arborist Report (**Appendix D**)
- Biological Resources Assessment (**Appendix E**)
- Jurisdictional Delineation (**Appendix F**)
- Construction Noise Assessment (**Appendix G**)
- Cultural Resources Study (**Confidential Appendix H**)

2.4 PROJECT DESCRIPTION

The Proposed Project involves realigning, replacing, and/or rehabilitating 12 sewer mainline segments throughout the County at 10 distinct Project Site locations. The following sections detail the project description for each of the 12 sewer mainline segments, to include repair details, deviations from SASD standards, site access, bypassing requirements, tree removal, and further construction and maintenance details.

2.4.1 Sewer Mainline Segments – Individual Project Descriptions

Pipeline Segment 1 – Hope Lane

Project Description

This pipeline segment is located in the backyard of the private residence of 4915 Hope Lane in a residential neighborhood in unincorporated Sacramento County. The existing crossing is a concrete encased 6-inch diameter cast iron pipe (CIP). The crossing encasement is exposed in the creek. The upstream and downstream soil supporting the encasement is eroding with signs of incision in the channel. SASD has installed cobble around the exposed casing to provide temporary support. The crossing impedes low flows in the creek and causes minimal upstream pooling. The pipeline segment is located in a small unnamed tributary of Arcade Creek. Upstream and downstream of the crossing, the waterway is incised but with a stable channel bed. The creek was found to have a sandy clay bed with low potential for further incision and scouring.

The crossing pipe would be replaced with a new ductile iron pipe (DIP) pipe with a new concrete encasement. To protect the new pipe, encasement, and waterway from erosion, riprap and turf reinforced mats (TRM) would be installed upstream and downstream of the crossing. Riprap and TRM would extend upstream and downstream of the crossing 10-feet minimum to provide long-term protection and to extend beyond crossing-related bank scour. Details on the extents and locations of these described improvements can be found in Sheet C-010 of **Appendix A**.

The design criteria used for the Hope Lane crossing follows SASD standards except for the deviations outlined in Table 3.1-4 of **Appendix A**. For each deviation, a business case evaluation to justify the deviation is provided. This Project Site is expected to require an encroachment permit for staging in the right of way and a general permit for dewatering in the trench excavation.

Construction Description

Construction for the Hope Lane crossing is expected to take from two to four weeks to replace the crossing pipe, install a new encasement, and install riprap protection around the new crossing. Work hours are expected to be between 8 a.m. and 5 p.m., Monday through Friday, in consideration of nearby

neighbors. Work would be completed in the dry weather when there is minimal flow in the creek at the crossing site. A temporary construction easement is expected to be required, as detailed in Table 3.1-5 of **Appendix A**. The site would be accessed from the road to the west of 4915 Hope Lane. The fence separating the road from the site would be temporarily removed during construction (one post would need to be removed and replaced). Equipment would be staged at the end of the road and carried to the site. Replacement of the homeowner's landscaping would be included for areas damaged by construction. An overview of the site access route and the anticipated staging area are provided in Appendix A: Sheet C-010 of **Appendix A**.

Sanitary sewer bypassing would be required at this crossing for the duration of the pipe replacement time. The contractor would trench and expose the existing pipe and prepare the new pipe for installation, limiting bypass time. Two existing manholes straddle each side of the 4915 Hope Lane property; sewer services from 4915 and 4920 Hope Lane connect to the system between these two manholes. The bypass system would connect to the existing sewer main downstream of the 4915 Hope Lane lateral and be pumped using a temporary highline force main across the 4915 Hope Lane property to a manhole located on the west side of Hope Lane. As explained in **Section 2.2.2** below, the existing sanitary sewer system and all other utilities within the limits of the Proposed Project would remain in service at all times during construction. Temporary bypassing of sewer lines would be required at this location to ensure that sewer service is not disrupted during construction activities. The shutdown duration to establish bypassing at this location is not expected to exceed four hours. SASD would coordinate temporary shutdowns in advance with the affected homeowners.

No trees would need to be removed at the Hope Lane site. Redwood branches would be trimmed up to 8 feet, if necessary, under the observation of a certified arborist.

Pipeline Segment 2 – Winding Way

Project Description

This pipeline segment is located on the private property of 4647 Winding Way in a residential neighborhood in unincorporated Sacramento County. The existing crossing is an 8-inch welded aluminum pipe with no encasement. The crossing is aerial with buried concrete pier supports installed in the creek banks. The existing slope protection has failed on both banks around the aerial crossing. The aluminum pipe is attached to the concrete supports with galvanized pipe straps. The two welded aluminum pipe joints are exposed but in good condition. The upstream manhole is located near the north bank.

The pipeline segment is located in Arcade Creek. Immediately upstream of the crossing, there is deep channel incision and scouring occurring with water collecting in eroded areas of the creek bed. A sand bar is forming from sediment buildup upstream of the crossing. At the time of the initial field investigation, significant debris was observed at the aerial crossing. Downstream of the crossing there was also incision and scour with debris collection in the channel. The banks of the channel on both sides are steep and large tree roots are now exposed on the south bank. The creek bed is defined as poorly graded fine to medium sand with some pebbles. The area contains riparian vegetation with oaks, willows, and redwoods near the crossing.

The pipeline segment would be repaired by installing new concrete piers, installing a new DIP pipe with a welded steel casing, smoothing out the banks and grading to a 1:1 slope, building back the slopes with an

engineered bank stabilization system, and placing TRMs over the disturbed slopes. The existing slope protection, crossing pipe, and piers would be removed or abandoned per SASD standards. Further information on the improvements can be found in Appendix A: Sheet C-021 of **Appendix A**. Concrete piers require installation by a specialized drilling subcontractor. The existing alignment is directly beneath Sacramento Municipal Utilities District (SMUD) overhead 12 kilovolt (kV) power lines. The Occupational Safety and Health Administration (OSHA) Standard 1926.1408(h) requires a minimum clearance of 10 feet for power lines up to 50 kV. Drilling subcontractors may have more stringent clearance requirements based on their specific safety programs and liability. Additional coordination would be required with SMUD to verify safety of their utilities and confirm safe working conditions.

The design criteria used for the Winding Way crossing would follow SASD standards except for the deviations outlined in Table 3.2-5 of **Appendix A**. For each deviation, a business case evaluation to justify the deviation is provided. This Project Site is expected to require an encroachment permit for staging in the right of way, a tree removal permit, and a general permit for dewatering in the trench excavation.

Construction Description

Construction for the Winding Way crossing is expected to take from eight to ten weeks to demolish the existing piers, install new piers, install a new carrier and casing pipes, regrade slopes, and install slope protection measures. Work hours are expected to be between 8 a.m. and 5 p.m., Monday through Friday, in consideration of nearby neighbors. Work would be completed in the dry weather when there is minimal flow in the creek at the crossing site. Multiple temporary construction easements are expected to be required as detailed in Table 3.2-6 of **Appendix A**. The site would be accessed via 4750 Pasadena Avenue and the backyard of 4740 Pasadena Avenue. Protection of the homeowners' driveway would be required. Grass reseeding along the access route could occur. A secondary access from 4349 Sycamore Avenue would be included from Winding Way to provide access to the south bank work area. An overview of the site access route is provided in Appendix A: Sheet C-020 of **Appendix A**.

Bypassing would be required at this crossing for the duration of the pier installation and pipe replacement. The pier replacement and pipe replacement are expected to take approximately five weeks. A temporary bypass system is required due to the duration of shutdowns and flow rates through the crossing. For temporary bypassing, flows would be routed from the manhole immediately upstream of the crossing to the nearby Mission Trunk manhole on the same side of the creek. The location of this connection manhole is shown on Sheet C-020 of **Appendix A**.

Tree removal would be required. One oak and two heritage oaks on the south bank terrace of the creek would be removed. Table 3.2-7 of **Appendix A** as well as the Arborist Report (**Appendix D**) provides further details about tree removal.

Pipeline Segment 3 – Arcade Creek

Project Description

This pipeline segment is located in Arcade Creek Park at 5613 Omni Drive (belonging to Arcade Creek Recreation and Park District) in a residential neighborhood in unincorporated Sacramento County. This crossing can be accessed through the park's parking lot. A SMUD facility is located adjacent to the

crossing. The existing crossing is a 48-inch reinforced concrete pipe (RCP) pipe with no encasement. The crossing, including two bell and spigot joints, is exposed with approximately half the pipe buried in the creek bed. The joints have some chips with exposed aggregate on the bells but, overall, are in good condition. Cobbles were placed around and under the pipe, and extend downstream to the nearby pedestrian footbridge footing for slope protection and bed erosion prevention. The majority of these cobbles washed away during large rainfall events in December 2021. The existing crossing is also being lined with a structural Cured-in-Place Pipe (CIPP) liner. This lining work would be completed prior to the recommended improvements at the site.

The pipeline segment is located in Verde Cruz Creek. The crossing is located at a bend in the creek with upstream cobble and sand deposits on the creek bed. Downstream, scour is occurring on the west bank and is moving toward the pedestrian footbridge footings downstream of the crossing. The banks on either side are steep with greater erosion on the downstream side. The creek bed is classified as poorly graded medium grain sand with some pebbles. There are some landscaping trees located near the crossing including oaks and redwoods.

Repairs include building back the downstream slope on the southern side of the creek, protecting the banks with TRMs, and installing riprap in the creek bed to protect the existing pipe. SASD would install a CIPP liner as part of a separate contract prior to this work. Further information on the improvements can be found in Appendix A: Sheet C-031 of **Appendix A**.

The design criteria used for the Arcade Creek site follow SASD standards except for the deviations outlined in Table 3.3-4 of **Appendix A**. For each deviation, a business case evaluation to justify the deviation is provided.

Construction Description

Construction for the Arcade Creek crossing is expected to take from three to five weeks to restore the creek banks, install riprap protection around the crossing, and install slope protection at the site. Work hours are expected to be between 8 a.m. and 5 p.m., Monday through Friday, in consideration of nearby neighbors and the park. Work would be completed in the dry weather when there is no flow in the creek at the crossing site. Multiple temporary construction easements are expected to be required, as detailed in Table 3.3-5 of **Appendix A**. The site would be accessed via the Arcade Creek Park entrance on Omni Drive and continue through the parking area, park access roads, and open areas. Equipment would be driven into the site. Protection of and/or restoration of the park grass, sidewalks, parking area, and access roads would be considered. An overview of the site access route and possible staging areas are provided in Appendix A: Sheet C-030 of **Appendix A**.

No replacement of the pipe would be required as part of the selected repair and no bypassing would be required. However, two fan palm trees found on the creek banks would be removed.

Pipeline Segment 4 – Garfield Ave. and Thousand Oaks Ct.

Project Description

This pipeline segment is located in Arcade Creek Park at 5613 Omni Drive belonging to Arcade Creek Recreation and Park District in a residential neighborhood in unincorporated Sacramento County. This site can be accessed through the park's parking lot. A SMUD facility is located adjacent to the crossing.

The existing crossing is a 24-inch vitrified clay pipe (VCP) with no encasement exposed in the creek. The pipe was originally constructed 12 inches below grade but the crossing now rests on the creek bed with temporary downstream supports. Five VCP bell and spigot joints are now exposed in the crossing. There are some chips in the bells and several of the joints are now offset, however, no breaks or leaks have occurred.

The pipeline segment is located in Verde Cruz Creek upstream of the Arcade Creek crossing. Upstream of the crossing there is a tree stump with debris and sediment accumulating around it. Downstream there are sand deposits accumulating in the channel. The channel banks are steep, nearing vertical. The pipe crosses the creek at a steep angle that is exacerbating erosion around the crossing. The channel bed is characterized by poorly graded medium grain sand with some pebbles with hard pan clay underneath. There are several trees located near the crossing including oaks and redwoods.

Repairs include removing this crossing from the creek and rerouting it through Arcade Creek Park connecting with the Mission Trunk pipeline further up gradient. The existing crossing location would be restored and anchored with turf reinforced mats installed to protect banks as necessary. Further information on the improvements can be found in Appendix A: Sheet C-032-034 of **Appendix A**. There are no structural improvements at the Arcade Creek crossing site. There are no deviations from SASD standards for the Garfield Thousand Oaks site. This Project Site is expected to require a tree removal permit, and a general permit for dewatering in the trench excavation.

Construction Description

Construction for the Garfield Thousand Oaks crossing is expected to take from three to five weeks to install the new alignment, tie into the existing collection system, remove the existing crossing pipe, and restore the creek. Work hours are expected to be between 8 a.m. and 5 p.m., Monday through Friday, in consideration of nearby neighbors. Work would be completed in the dry weather when there is no flow in the creek at the crossing site. Multiple temporary construction easements are expected to be required as detailed in Table 3.4-3 of **Appendix A**.

The Garfield Thousand Oaks crossing would be accessed via the main Arcade Creek Park entrance on Omni Drive and continue through the parking area, park access road, and open grass area. Equipment would be driven into the site. Protection of the park grass, sidewalks, parking area, and access roads would be considered. It should be noted that an overview of the site access route and staging areas depicted in Sheet C-030 of **Appendix A** associated with the 30% design plans will be amended in the 90% design plans to relocate to the staging area from the south side of the parking lot to the north. However, this does not affect the environmental analysis within this IS.

Bypassing would be required at this crossing for short durations during sewer connections. These activities are expected to require shutdowns of up to 6 hours. Temporary bypass pumping from the manhole upstream of the Garfield Thousand Oaks connection in Arcade Creek Park to a Mission Trunk or new Garfield Thousand Oaks manhole would be required unless the existing sewer system can be plugged and hold flows for the short duration required for the sewer connections.

In order to complete the required rehabilitation, one heritage oak tree in the southeast portion of the site would be removed as part of re-routed sewer pipe installation. Table 3.4-4 of **Appendix A,** as well as the Arborist Report (**Appendix D**), provides further details about tree removal.

Pipeline Segment 5 – Concho Court

Project Description

This pipeline segment is located in the backyard of the private residences of 4820 and 4821 Concho Court and 5665 Rolling Oak Drive in a residential neighborhood in unincorporated Sacramento County. The existing crossing is a 6-inch VCP encased in concrete. The encasement is exposed in the creek bed and is at risk of undermining if not addressed. The pipeline segment is located in Verde Cruz Creek upstream of the Gina Court pipeline crossing. Upstream of the crossing the channel is lined with gunite with minimal signs of erosion. Downstream of the crossing is an unlined, stable channel with minimal debris or erosion. The banks on both sides are steep. The creek bed is characterized as fine sandy silt with coarse gravel and cobble. The area is considered a closed riparian canopy with many nearby trees including oaks and redwoods.

Repairs include installation of TRMs on the banks and creek bed both upstream and downstream of the existing encasement. An engineered creek bed stabilization system would be placed in the creek bed on either side of the existing crossing. Further information on the improvements can be found in Appendix A: Sheet C-051 of **Appendix A**.

The design criteria used for the Concho Court site follow SASD standards except for the deviations outlined in Table 3.5-4 of **Appendix A**. For each deviation, a business case evaluation to justify the deviation is provided. This site is expected to require an encroachment permit for staging in the right of way.

Construction Description

Construction for the Concho Court crossing is expected to take from two to four weeks to remove the existing cobbles, install bank protection, and install an engineered creek bed stabilization system in the creek bed around the crossing. Work hours are expected to be between 8 a.m. and 5 p.m., Monday through Friday, in consideration of nearby neighbors. Work would be completed in the dry weather when there is minimal flow in the creek at the crossing site. Multiple temporary construction easements are expected to be required, as detailed in Table 3.5-5 of **Appendix A**. The site would be accessed via 4820 Concho Court through the side yard and backyard areas. Equipment and materials would be required to be hand carried only to the site across a private footpath and grass area. Protection of the homeowner's footpath, grass, and concrete driveway would be considered. Grass reseeding along the access route could occur. An overview of the site access route and possible staging areas are provided in Appendix A: Sheet C-050 of **Appendix A.**

Bypassing would not be required at this crossing as the pipeline would not be replaced. No tree removal would be required.

Pipeline Segment 6 – Gina Court

Project Description

This pipeline segment spans the backyard of the private residences located at 5510 and 5508 Oak River Court and 5667 and 5671 Rolling Oak Drive in a residential neighborhood in unincorporated Sacramento County. The existing crossing is a 6-inch VCP with a concrete encasement. Although once buried, the encasement is now exposed in the creek bed. The encasement is in good condition with some exposed aggregate; no exposed pipe or cracking has been observed. The upstream manhole near the top of the creek bank is partially exposed due to creek bank erosion.

The pipeline segment is located in Verde Cruz Creek downstream of the Concho Court site. Upstream of the crossing there is heavy vegetation with minimal erosion on both banks. Downstream, the channel widens where a gradual bend in the creek occurs. The bank is steep on the downstream bank outside of the curve with signs of active erosion and a lack of stabilizing vegetation. The creek bed material is defined as hard pan coarse grain sand with pebbles and gravel. The crossing is covered by an oak canopy with some redwoods; some roots are exposed on the creek banks.

Repairs to the segment include removing existing cobble, installing TRMs on the slopes for stabilization and protection of the manhole in the creek bank, and installing riprap on the creek bed upstream and downstream of the existing encasement. Further information on the improvements can be found in Appendix A: Sheet C-061 of **Appendix A**.

The design criteria used for the Gina Court site follow SASD standards except for the deviations outlined in Table 3.6-4 of **Appendix A**. For each deviation, a business case evaluation to justify the deviation is provided. This crossing would require an encroachment permit for staging in the right of way and a tree removal permit.

Construction Description

Construction for the Gina Court crossing is expected to take from two to four weeks to remove the existing cobbles, install bank protection, and install rip rap protection in the creek bed around the crossing. Work hours are expected to be between 8 a.m. and 5 p.m., Monday through Friday, in consideration of nearby neighbors. Work would be completed in the dry weather when there is minimal flow in the creek at the crossing site. Multiple temporary construction easements are expected to be required, as detailed in Table 3.6-5 of **Appendix A**. The site would be accessed via the private gate and driveway of 5667 Rolling Oak Drive. Equipment would be hand carried to the site via the existing driveway and the use of rubber-wheeled vehicles on the driveway would be minimized. Protection of the homeowner's grass and concrete driveway would be considered in the design requirements. An overview of the site access route and possible staging areas are provided in Appendix A: Sheet C-060 of **Appendix A**.

Bypassing would not be required at this crossing as the pipeline would not be replaced.

In order to complete the required rehabilitation, two small privet trees would require removal on the banks adjacent to the existing pipe crossing. Table 3.6-6 of **Appendix A,** as well as the Arborist Report (**Appendix D**), provides further details about tree removal.

Pipeline Segment 7 – San Lorenzo Way

Project Description

This pipeline segment is located along San Lorenzo Way in a Sacramento County Regional Parks parcel and a residential neighborhood in unincorporated Sacramento County. The crossing can be accessed directly from San Lorenzo Way. The crossing is also immediately north of Ancil Hoffman Park. The aerial crossing is a 6-inch CIP with a CIPP liner. The pipe is not inside a casing or concrete encasement. The pipe transitions from CIP to VCP near the creek crossing at the bank. Cobble has been installed on the banks to minimize further bank erosion. The exterior of the pipe is in good condition with some minor surface corrosion near the creek banks.

The pipeline segment is located in Carmichael Creek, a tributary to the American River. The crossing is located near a bend in the creek with a straight section upstream. There are signs of incision upstream although the incision is not active except at the bottom toe. Additionally, there is a sand deposit on the creek bed upstream of the crossing. Downstream of the crossing, the creek bend is causing scour. A gravel bar located downstream has created pooling. The banks on both sides of the creek are not steep and appear to be stable. The creek bed is defined as clayey silt with evidence of hard pan underneath. The vegetation is characterized as ruderal with an oak canopy.

The recommended repair design includes installing a new 48-inch sewer manhole, replacing and lowering the existing crossing with 6-inch VCP, installing a concrete encasement around the new pipeline, and installing erosion protection measures over the disturbed areas. Further information on the improvements can be found in Appendix A: Sheet C-071 of **Appendix A**.

The design criteria used for the San Lorenzo Way site follow SASD standards except for the deviations outlined in Table 3.7-3 of **Appendix A**. For each deviation, a business case evaluation to justify the deviation is provided. This site is expected to require an encroachment permit from Regional Parks for staging in the right of way and a general permit for dewatering in the trench excavation. A tree removal permit was originally expected, as the Arborist Report (**Appendix D**) had identified removal of a dead California buckeye from this site (Tree # 7522). However, since completion of the Arborist Report, this tree has fallen and will no longer require a permit for removal.

Construction Description

Construction for the San Lorenzo Way crossing is expected to take from three to five weeks to install a new manhole, replace the crossing pipe, and install a new encasement. Work hours are expected to be between 8 a.m. and 5 p.m., Monday through Friday, in consideration of nearby neighbors. Work would be completed in the dry weather when there is minimal flow in the creek at the crossing site. Multiple temporary construction easements are expected to be required, as detailed in Table 3.7-4 of **Appendix A**. The site would be accessed via the west shoulder of San Lorenzo Way. Equipment and materials would be moved directly to the site from the road given the close proximity. Protection of the existing roadway pavement would be considered. An overview of the site access route is provided in Appendix A: Sheet C-070 of **Appendix A**.

Bypassing would be required at this crossing for the duration of the pipe demolition, manhole installation, and pipe replacement, which is expected to take two to three weeks. Two existing manholes straddle

each side of the San Lorenzo Crossing. If temporary bypassing is required, a temporary manhole or sump would need to be installed on the west bank and pumped using a temporary highline force main across the creek to the manhole located on the east side of San Lorenzo Way.

In order to complete the required rehabilitation, the removal of two trees, one small dead California buckeye and one structurally damaged heritage oak, would be required. Table 3.7-5 of **Appendix A,** as well as the Arborist Report (**Appendix D**), provides further details about tree removal.

Pipeline Segment 8 – Sutter Avenue

Project Description

This pipeline segment is located in the backyard of the private properties of 7156 Sutter Avenue and 3751 Dell Road in a residential neighborhood in unincorporated Sacramento County. The crossing is a 6-inch welded aluminum aerial pipe which crosses above the high-water line of the creek. The aluminum pipe is not encased and two exposed welded joints exist. These joints and the exposed pipe are in good condition. The pipe is supported by two concrete piers with metal straps. While the concrete is in good condition, the metal straps show minor signs of corrosion. Additionally, the soil below the east bank concrete pier supports has eroded away.

The pipeline segment is located in an unnamed creek, a tributary to the American River. The crossing is located in a steep valley area above the incised creek channel. Upstream of the crossing, the banks are vegetated by grasses and oak trees and the downstream vegetation also includes blackberries and other vines. The channel is incised although erosion is limited to the toe of the banks from lower creek flows. The banks are stable and further erosion is expected to be minimal. The bed is characterized as alluvium with fine sandy silt. The vegetation is classified as a grassland or ruderal system with a blackberry and grapevines and a riparian canopy with many nearby oak trees.

The recommended repair design includes installing new concrete piers on either bank, installing a new pipeline and casing, and hydroseeding the disturbed slope areas. Further information on the improvements can be found in Appendix A: Sheet C-080 of **Appendix A**.

The design criteria used for the Sutter Avenue site follow SASD standards except for the deviations outlined in Table 3.8-4 of **Appendix A**. For each deviation, a business case evaluation to justify the deviation is provided. This site is expected to require a general permit for dewatering in the trench excavation.

Construction Description

Construction for the Sutter Avenue crossing is expected to take from four to six weeks to demolish existing pipe and piers, replace the crossing pipe, install new piers, and install slope protection. Work hours are expected to be between 8 a.m. and 5 p.m., Monday through Friday in consideration of nearby neighbors. Work would be completed in the dry weather when there is no flow in the creek at the crossing site. A temporary pad would be graded in the creek to provide a working platform for construction equipment. Multiple temporary construction easements are expected to be required, as detailed in Table 3.8-5 of **Appendix A**. The site would be accessed via the private property located at 7156 Sutter Avenue. A crane or track-mounted equipment may need to be used for larger materials. Equipment would be track-mounted through the backyard to the property fence. Grass reseeding along the access route

may occur. Protection of the homeowner's grass would be considered. An overview of the site access route and possible staging areas are provided in Appendix A: Sheet C-080 of **Appendix A**.

Bypassing would be required at this crossing for the duration of the pipe removal and replacement time. New concrete supports would be installed prior to the removal of the existing pipe and the pipe replacement and casing pipe installation is expected to take up to one week. A temporary bypass system is required to complete the work at this crossing. Two existing manholes straddle each side of the creek. If temporary bypassing is required, the manhole on the east side of the creek would be plugged and pumped using a temporary highline force main across the channel to the next downstream manhole that is in the driveway of 7156 Sutter Ave. This bypass pipe could be routed within the existing sewer easement to this manhole.

One small dead oak would be removed at this location for work access. This tree is found on the high southwest bank of the creek crossing.

Pipeline Segment 9 – Campfire Way

Project Description

This pipeline segment is located off of Campfire Way in the Oak Lakes Lane public right of way open space parcel in a residential neighborhood in unincorporated Sacramento County. The existing crossing is a concrete encased 36-inch RCP. The concrete encasement was installed with a top dimension that is wider than record drawings indicate. Deep cracks in the concrete encasement are located near the south bank. Creek bed erosion has led to undermining of the encasement on both the upstream and downstream side of the encasement. As a temporary protection measure, sandbags were placed on the downstream side of the encasement near the southern bank to shore up a scour hole where the existing encasement has deep cracks.

The pipeline segment is located in Cripple Creek. Upstream of the crossing, there is significant channel and bank scouring and some pooling. Additionally, upstream there are some sand and coarse gravel deposits and debris accumulation. Downstream of the crossing a large scour hole has formed, and bedrock is exposed in some areas. Also, the channel is widening downstream with significant loss of bank material into the channel. The banks are gradual and stable and vegetated outside of the active erosion zones which are immediately around the crossing. The creek bed is composed of weakly concentrated silty sand and some clay. The area is dominated by ruderal vegetation and grasslands with a riparian canopy and some small oaks and elderberry trees. No elderberry trees are located within the site vicinity, thus eliminating permitting issues.

The recommended repair design includes cutting down the existing concrete encasement and repairing the concrete encasement cracks, installing riprap on the creek bed upstream and downstream of the crossing, and installing engineered slope protection at toe of slopes and TRMs on the creek banks. Further information on the improvements can be found in Appendix A: Sheet C-091 of **Appendix A**. No structural improvements would be performed at the Campfire Way site; however, this crossing would be CIPP lined by SASD prior to initiation of the Proposed Project.

The design criteria used for the Campfire Way site follow SASD standards except for the deviations outlined in Table 3.9-4 of **Appendix A**. For each deviation, a business case evaluation to justify the

deviation is provided. This site is expected to require an encroachment permit for staging in the right of way and a tree removal permit.

Construction Description

Construction for the Campfire Way crossing is expected to take from three to five weeks to remove excess concrete, repair the concrete encasement, install riprap in the creek bed, and restore and protect the creek banks. Work hours are expected to be between 8 a.m. and 5 p.m., Monday through Friday, in consideration of nearby neighbors. Work would be completed in the dry weather when there is minimal flow in the creek at the crossing site. A temporary construction easement is expected to be required, as detailed in Table 3.9-5 of **Appendix A**. The site would be accessed via Campfire Way. Equipment and materials would be moved directly to the site from the road given the close proximity. Protection of the existing roadway pavement would be considered. An overview of the site access route and possible staging areas are provided in Appendix A: Sheet C-090 of **Appendix A.**

No bypassing would be required for improvements at the Campfire Way site. One heritage oak and one small oak would need to be removed at the Campfire Way site.

Pipeline Segment 10 – Indian River Drive

Project Description

This pipeline segment is located to the east of Indian River Drive in the 6430 Indian River Drive public right of way open space parcel owned by Sunrise Recreation and Park District within a residential neighborhood in unincorporated Sacramento County. The existing crossing is a 10-inch CIP aerial crossing with two concrete pier supports that are located in the creek flow path. Undermining of the piers is occurring especially on the south pier. Cobble was installed by SASD around the base of each pier to protect against further erosion. Two restrained joints (bell and spigot with a custom restraint harness) are exposed in the creek. Small deflections at the joints were noted. The pipe exterior has undergone some wear and pitting of the bitumastic exterior coating.

The pipeline segment is located in Arcade Creek. The crossing is east of the Indian River Drive bridge that crosses Arcade Creek. Upstream of the crossing coarse gravel is depositing while downstream sand and alluvium deposits dominate. Some pooling is also occurring downstream. The banks are eroding near the crossing. Most significantly, the north bank at the crossing has significantly eroded in the last few years and is now nearly vertical. The exposed non-cohesive trench backfill around the pipe is contributing to this accelerated erosion. The creek bed is characterized by a mix of coarse sand, gravel, and cobble with some fine sand deposits. The area is classified as a grassland with ruderal foliage and a riparian canopy. Blackberry and grape vines are also located nearby.

The recommended repair design includes installing new concrete piers outside of the creek banks, replacing the crossing pipe and adding a casing pipe, and protecting the creek banks with TRMs. Further information on the improvements can be found in Appendix A: Sheet C-101 of **Appendix A**. There are no deviations from SASD standards for the Indian River site. This site is expected to require an encroachment permit for staging in the right of way and a general permit for dewatering in the trench excavation.

Construction Description

Construction for the Indian River Drive crossing is expected to take from six to eight weeks to demolish the existing pipe and piers, install new piers, replace the crossing pipe, and install side slope protection around the new crossing. Work hours are expected to be between 8 a.m. and 5 p.m., Monday through Friday, in consideration of nearby neighbors. Work would be completed in the dry weather when there is minimal flow in the creek at the crossing site. A temporary construction easement is expected to be required, as detailed in Table 3.10-5 of **Appendix A**. The site would be accessed via the open space parcel on Indian River Drive. Equipment and materials would be moved directly to the site from the road given the close proximity. Protection of the open space trees, road barriers, and the roadway would be considered. Some of the road barriers would require removal and replacement to facilitate access from Indian River Drive. An overview of the site access route and possible staging areas are provided in Appendix A: Sheet C-100 of **Appendix A**.

Bypassing would be required at this crossing for the duration of the pipe replacement and pier installation time which is expected to take up to three weeks. Provided the length of time required to complete this work, a temporary bypass system is recommended. A temporary manhole or sump would be required on the upstream side (north bank) to divert flows into the bypass system. Temporary force main piping would be installed across the creek channel or laid across the adjacent bridge across the creek and would connect with the existing sewer pipe on the downstream (south bank).

No trees would necessitate removal at the Indian River Drive site.

Pipeline Segment 11 – Hegseth Court

Project Description

This pipeline segment is located on the private property of 8201 Hegseth Court in a residential neighborhood in unincorporated Sacramento County. The existing crossing is an 8-inch VCP that is exposed and not encased. It is supported by a manhole in the creek, sandbags, and the creek bed. The downstream manhole is half exposed in the creek on the west bank with the transition from the crossing to the manhole also exposed. The grouted pipe transition to the manhole on the west bank is in good condition. However, the rubber clamp coupling on the east bank has a minor offset and is currently being supported by sandbags. The pipeline segment is located in a small unnamed creek which is a tributary to the American River. The crossing is located in an incised section of the stream floodplain near a bend in the route. Upstream of the creek there is significant vegetation cover over the waterway including trees, shrubs, grass, and blackberry vines as well as algae growth in the creek. The banks are shallow on the western side and steeper on the eastern side. The creek bed contains mixed sand and gravel with some cobbles. The creek flows into bedrock on the eastern bank.

The crossing pipe would be replaced with a new buried polyvinyl chloride pipe, protecting the nearby manhole with an engineered bank stabilization system to prevent it from moving or leaning into the creek, protecting the creek banks with TRMs, and protecting the new pipe and creek bed with an engineered creek bed stabilization system in the creek bed. Further information on the improvements can be found in Appendix A: Sheet C-111 of **Appendix A**. No structural improvements would be performed at the Hegseth Court site.

The design criteria used for the Hegseth Court site follow SASD standards except for the deviations outlined in Table 3.11-4 of **Appendix A**. For each deviation, a business case evaluation to justify the deviation is provided. This site is expected to require an encroachment permit for staging in the right of way and a general permit for dewatering in the trench excavation.

Construction Description

Construction for the Hegseth Court crossing is expected to take from three to five weeks to replace the crossing pipe, reinforce the existing manhole, install a new encasement, install an engineered bank stabilization system, install an engineered creek bed stabilization system around the new crossing, and install slope protection. Work hours are expected to be between 8 a.m. and 5 p.m., Monday through Friday, in consideration of nearby neighbors. Work would be completed in the dry weather when there is minimal flow in the creek at the crossing site. Multiple temporary construction easements are expected to be required, as detailed in Table 3.11-5 of **Appendix A**. The site would be accessed via 8201 Hegseth Court. Equipment and materials would be hand carried to the site via the existing driveway and yard. Protection of the homeowner's landscaping and concrete driveway would be considered. Protection and restoration of landscaping along the access route could occur. An overview of the site access route and possible staging areas are provided in Appendix A: Sheet C-110 of **Appendix A**.

Bypassing would be required at this crossing for the duration of the pipe replacement time. The pipe replacement time is expected to take three days. However, due to low flows, there is also an option to plug the route and use a pumper truck to remove flows during the construction period. The nearest upstream manhole is located in Hegseth Court, which would require plugging. Records show at least two laterals connect downstream of the manhole and are likely associated with 8200 and 8201 Hegseth Court. As explained in **Section 2.2.2** below, the existing sanitary sewer system and all other utilities within the limits of the Proposed Project would remain in service at all times during construction. Temporary bypassing of sewer lines would be required at this location to ensure that sewer service is not disrupted during construction activities. The shutdown duration to establish bypassing at this location is not expected to exceed six hours. SASD would coordinate temporary shutdowns in advance with the affected homeowners.

No trees would necessitate removal at the Hegseth Court site.

Pipeline Segment 12 – Dietz Way

Project Description

This pipeline segment is located on the private property of 4510 Dietz Way in a residential neighborhood in unincorporated Sacramento County. The aerial crossing is a 4-inch acrylonitrile butadiene styrene and ferrous metal pipe (CIP or DIP) tape wrapped with no encasement. There are two pipe joints exposed in the creek; one of which is at a clamp style transition joint on the northern bank with an offset which has been temporarily reinforced by SASD by bracing it with steel stakes and installing tape wrap. Additionally, SASD has placed cobble on either side of the bank around the pipe for slope protection. The pipeline segment is located in an unnamed creek which is a tributary to the American River. Immediately upstream of the crossing is a private footbridge. The pipe crosses at a slight bend in the creek but the channel straightens downstream. The creek banks have minimal erosion with a steeper slope on the east bank and a shallower slope on the west bank. The creek bed is composed of silt, sand, and coarse gravel with

some cobble. Scouring of the bed is minimal due to the coarse nature of the materials. The vegetation is described as a riparian canopy with oaks, maples, and some other landscaping trees.

Repairs include replacing the existing pipe, installing concrete supports on either bank, and supporting the creek banks with TRMs. Further information on the improvements can be found in Appendix A: Sheet C-121 of **Appendix A**.

The design criteria used for the Dietz Way site follow SASD standards except for the deviations outlined in Table 3.12-5 of **Appendix A**. For each deviation, a business case evaluation to justify the deviation is provided. This site is expected to require an encroachment permit for staging in the right of way and a general permit for dewatering in the trench excavation.

Construction Description

Construction for the Dietz Way crossing is expected to take from three to five weeks to replace the crossing pipe, install a new pipe crossing and concrete supports, and install slope protection around the new crossing. Work hours are expected to be between 8 a.m. and 5 p.m., Monday through Friday, in consideration of nearby neighbors. Work would be completed in the dry weather when there is no or minimal flow in the creek at the crossing site. Multiple temporary construction easements are expected to be required, as detailed in Table 3.12-6 of **Appendix A**.

The site would be accessed via a shared private driveway associated with the properties located at 4510 and 4500 Dietz Way. The site would be further accessed via footpaths and the backyard of 4510 Dietz Way. Equipment and materials would be hand carried to the site via the existing driveway and yard. Protection of the homeowner's driveway and footpaths would be considered. An allowance for protection and restoration of landscaping along the access route is included in the costs for this crossing. An overview of the site access route and possible staging areas are provided in Appendix A: Sheet C-120 of **Appendix A**.

Bypassing would be required at this crossing. The pipe replacement time is expected to be three days. As explained in **Section 2.2.2** below, the existing sanitary sewer system and all other utilities within the limits of the Proposed Project would remain in service at all times during construction. Temporary bypassing of sewer lines would be required at this location to ensure that sewer service is not disrupted during construction activities. The shutdown duration to establish bypassing at this location is not expected to exceed six hours. SASD would coordinate temporary shutdowns in advance with the affected homeowners.

No trees would necessitate removal at the Dietz Way site.

2.4.2 Geotechnical Studies

Geotechnical field work for the Proposed Project was completed in late December 2021, with the exception of the Winding Way crossing site which was inaccessible to drilling equipment due to heavy rains. A second geotechnical report (**Appendix C**) for the 12 crossing sites was completed in the spring of 2022, upon completion of investigations at Winding Way, to allow for the geotechnical findings to be incorporated during the final design phase of the Proposed Project. The geotechnical report was prepared to identify the key geologic and geotechnical aspects of the Project Sites and provide geotechnical

recommendations for design and construction of the Proposed Project. The geotechnical report concluded that the Proposed Project is feasible from a geotechnical and geological engineering standpoint, provided that the conclusions and recommendations presented in the report are incorporated into the project design and specifications. Recommendations within the geotechnical report, such as structural criteria for soil loading, soil stabilization measures, and maximum slopes are considered to be components of the Proposed Project, were included in project design, and would be adhered to.

2.4.3 Design Standards

The Proposed Project would adhere to SASD design standards related to creek crossing improvements (refer to Table 2.1-1 of **Appendix A**). The repair recommendation for each creek crossing incorporated these design standards except where the configuration and/or condition of the creek crossing does not allow for compliance with the design standards. Deviation requests from some of the standards would be necessary to implement some of the repairs. Project Sites that require deviations are noted in **Section 2.4** above and are further detailed in **Appendix A**. Special Provisions and Technical Specifications (**Appendix B**) were developed for the Proposed Project. The Standard Specifications include the SASD Standards and Specifications dated November 30, 2021 and Sections 1–10 of the Sacramento County Standard Construction Specifications revised February 2017. These guidelines include best management practices (BMP) related to noise, construction, material selection, site restoration, erosion, and more that would be adhered to and are considered components of the Proposed Project.

2.4.4 Construction Approach

Waste Disposal

Pipeline segments would be removed and disposed of, and replaced with new pipe materials, as described in **Section 2.4.1**. Significant amounts of solid waste are not anticipated. However, any surplus concrete, removed pipe material, rubble, asphalt, or other waste from construction would be taken to an appropriate disposal site or landfill and would not be deposited into the creeks.

Staging Areas

Staging areas would be utilized in areas near construction sites to store pipe and other materials, construction equipment, and other necessary items. Short-term temporary easements for staging areas may be required and would be negotiated by contractors prior to construction. Staging areas would be located within the defined boundaries or in paved/disturbed areas arranged by the Contractor for each Project Site where sensitive biological resources are not present. The contractor would obtain necessary permits from the County/respective city, and impacted property owners as required. As described in **Section 2.4.1**, details on staging areas for each creek crossing are provided in Appendix A of **Appendix A**.

Temporary Bypassing

As detailed in **Appendix B**, Special Provision SP-19, the existing sanitary sewer system and all other utilities within the limits of the Proposed Project would remain in service at all times during construction. Temporary bypassing of sewer lines would be required at three pipeline segment crossings (Crossing 1, 11, and 12) to ensure that sewer service is not disrupted during construction activities. The maximum

shutdown duration to accomplish bypassing would be six hours. The contractor would be required to submit a Bypass Pumping Plan (BPP) for approval prior to construction in accordance with Section 302.2 of the SASD Standards and Specifications. The BPP would include lateral outage durations, monitoring and control plans for the bypassing system, and environment protection plans and responses plans so that sewage remains properly contained within the system. The contractor would be required to undertake safe plugging and sewer flow control measures to insure uninterrupted trunk sewer flows and flows from all collector sewers and laterals at all times.

Construction Workers and Equipment

Between 4 and 10 construction workers could be present on a Project Site at a time. Energy efficient construction equipment would be utilized to the extent feasible. The following equipment may be utilized during construction of the Proposed Project:

- Pickup trucks
- Water trucks
- Electric hand tools
- Gas/diesel-powered hand tools
- Gas/diesel-powered generators
- Stand-on-skid-steers
- Concrete/dump trucks
- Temporary diesel-powered bypass pumps
- Drill rigs
- Cranes
- Mini Excavator

2.4.5 Utility Locating and Potholing

Existing utilities would be protected in place. The contractor would be required to pothole all existing utilities to verify location and elevation a minimum of one week prior to work, and prior to ordering or purchasing equipment or materials for the construction of new facilities, to allow for potential redesign if necessary. Potholing would include all existing SASD facilities at proposed connection locations to confirm the location of the pipe, the location of the nearest joint, and depth. Potholing would include all utilities crossing the proposed alignment of any new facilities, or within 10 feet horizontally of the proposed alignment or work area. Any existing underground utility lines and foundations would be verified prior to any excavation or grading work.

2.4.6 Operation and Maintenance Activities

Periodic maintenance of mainline sewer segments would be required after the Proposed Project is operational. SASD staff would inspect components of the Proposed Project regularly and would replace equipment that reaches the end of its lifetime or fails during use.

2.4.7 Schedule

The precise schedule for implementing the Proposed Project is unknown at this time. However, it is anticipated that all work would be completed on or before October 1, 2024. All work would be performed

during dry weather months (May through October) and all work located within the backyards of residences would be completed within 10 weeks of mobilization to the site to minimize the impacts to homeowners. While exact construction timing and approach would be decided by the eventual contractor, it is expected that Project Sites be worked on one or two at a time. Site work would be expected to be completed (tested and returned to service) before moving to the next Project Site. The anticipated construction timeline for each crossing is detailed in **Section 2.4.1**; construction durations per crossing site range from 2 to 10 weeks. Construction would occur Monday through Friday, excluding legal holidays, between the hours of 7 a.m. to 6 p.m.; work within private residential property would occur between the hours of 8 am to 6pm.

2.5 PROJECT REVIEW AND APPROVAL

2.5.1 Lead Agency

In accordance with CEQA *Guidelines* §§ 15050 and 15367, SASD is the 'Lead Agency' for the Proposed Project, which is defined as the "public agency which has the principal responsibility for carrying out or disapproving a project."

The following discretionary actions would be taken by SASD in order to approve the Proposed Project:

- Approval of pipeline replacement, repairs, and ongoing use would be subject to SASD's review and approval of engineering reports, plans, and annual reports prepared and submitted.
- Approval of access permits.

2.5.2 CEQA Actions

Prior to approving the Proposed Project, SASD Board of Directors must undertake CEQA review including:

- Adoption of the MND – pursuant to CEQA and the CEQA *Guidelines*; and
- Mitigation Monitoring – Adoption of a Mitigation Monitoring and Reporting Program to reflect the measures required to mitigate significant impacts, if any, of the Proposed Project.

The IS and MND are intended to provide the CEQA documentation that is required for approval of the Proposed Project.

2.5.3 Other Agency Actions

The IS/MND prepared for the Proposed Project would be used by Responsible Agencies and Trustee Agencies that may have some approval authority of the Proposed Project. SASD would obtain all permits required by law. The following agencies, which may be considered Responsible Agencies, have discretionary authority over approval of certain project elements, or alternatively, may serve in a ministerial capacity:

- County
    - Erosion and Sediment Control Plan

  - Encroachment permits and or temporary easements for pipeline construction and staging areas within County right of ways
  - Tree removal permit
- City of Citrus Heights
  - Tree removal permit
  - Encroachment permits and or temporary easements for pipeline construction and staging areas within City right of ways.
- Central Valley Regional Water Quality Control Board
  - Construction General Permit Order 2012-00006-DWQ
  - Regional Water Quality Control Board 401 Clean Water Act (CWA) Section 401 Water Quality Certification
- USACE
  - CWA Section 404E Nationwide Permit 3, Maintenance
- CDFW
  - CDFW 1602 Streambed Alteration Agreement

3 ENVIRONMENTAL ANALYSIS (CHECKLIST)

3.1 EVALUATION OF ENVIRONMENTAL IMPACTS

Pursuant to CEQA *Guidelines* § 15063, an IS should provide the lead agency with sufficient information to determine whether to prepare an EIR or Negative Declaration for a proposed project. The CEQA *Guidelines* state that an IS may identify environmental impacts by use of a checklist, matrix, or other method, provided that conclusions are briefly explained and supported by relevant evidence.

If it is determined that a particular physical impact to the environment could occur, then the checklist must indicate whether the impact is Potentially Significant, Less Than Significant with Mitigation, or Less Than Significant. Findings of No Impact for issues that can be demonstrated not to apply to a proposed project do not require further discussion.

3.1.1 Evaluation Terminology

The following sections contain the environmental checklist form presented in Appendix G of the CEQA *Guidelines*. The checklist form is used to describe the impacts of a proposed project. For this checklist, the following designations are used:

- **Potentially Significant Impact**: An impact that could be significant, and for which no mitigation has been identified. If any potentially significant impacts are identified and no mitigation is available to reduce the impact to a less-than-significant level, an EIR must be prepared.
- **Less-than-Significant Impact with Mitigation Incorporated**: Impacts that would be reduced to a less-than-significant level by feasible mitigation measures identified in this checklist.
- **Less-than-Significant Impact**: Any impact that would not be considered significant under CEQA relative to existing standards.
- **No Impact**: The proposed project would have no impact.

3.1.2 Cumulative Impact Analysis

As defined in Section 15355 of the CEQA *Guidelines*, a cumulative impact consists of an impact that is created as a result of the combination of a proposed project together with other closely related past, present, and reasonably foreseeable future projects that cause related impacts. As noted in CEQA *Guidelines* § 15064(h)(4), the mere existence of significant cumulative impacts caused by other projects alone shall not constitute substantial evidence that the proposed project's incremental effects are cumulatively considerable. Further, Section 15130(b) of the CEQA *Guidelines* states:

> *The discussion of cumulative impacts shall reflect the severity of the impacts and their likelihood of occurrence, but the discussion need not provide as great detail as*

is provided for the effects attributable to the project alone. The discussion should be guided by the standards of practicality and reasonableness, and should focus on the cumulative impact to which the identified other projects contribute rather than the attributes of other projects which do not contribute to the cumulative impact.

Growth associated with build-out projections in the County's and relevant City's General Plans were considered in determining whether the impacts of the Proposed Project would be cumulatively considerable in accordance with Section 15064(h) of the CEQA *Guidelines*. The Proposed Project is anticipated to be within planning projections as it is based on recommendations within the SASD 2021 Sewer System Management Plan, which identified the need for the Proposed Project due to degrading site conditions such as structural failure and support failure due to erosion, undermining, or exposure.

3.2 AESTHETICS

3.2.1 Environmental Checklist

AESTHETICS	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
Except as provided in PRC § 21099, would the project:				
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☒	☐
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☒	☐
c) In nonurbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	☐	☐	☒	☐
d) Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?	☐	☐	☐	☒

3.2.2 Setting

Regulatory Context

California Scenic Highway Program

The California Scenic Highway Program, administered by the California Department of Transportation (Caltrans), intends to preserve and protect scenic highway corridors from change that would diminish the aesthetic value of lands adjacent to scenic highways. The State Scenic Highway System includes a list of highways that are either eligible for designation as scenic highways or have been designated. Cities and counties can nominate eligible scenic highways for official designation by identifying and defining the scenic corridor of the highway. The municipality must also adopt ordinances to preserve the scenic quality of the corridor or document such regulations that already exist in various portions of local codes.

Environmental Setting

The individual sewer mainline segments are generally located in residential areas, with some occurring near parks and roadsides. There are no state scenic highways within or in the vicinity of the Project Area

(Caltrans, 2018). The Proposed Project does not involve new components that would be visible once operational and the repair of sewer segments would lead to an improved aesthetic.

Scenic Resources

There is no comprehensive list of specific features that automatically qualify as scenic resources; however, certain characteristics can be identified which contribute to the determination. The following is a partial list of visual qualities and conditions that if present, may indicate the presence of a scenic resource:

- A tree that displays outstanding features of form or age,
- A landmark tree or a group of distinctive trees accented in a setting as a focus of attention,
- An unusual planting that has historical value,
- A unique, massive rock formation,
- A historic building that is a rare example of its period, style, or design, or which has special architectural features and details of importance,
- A feature specifically identified in applicable planning documents as having a special scenic value,
- A unique focus or a feature integrated with its surroundings or overlapping other scenic elements to form a panorama, and
- A vegetative or structural feature that has local, regional, or statewide importance.

3.2.3 Discussion of Impacts

Question A

Would the project: Have a substantial adverse effect on a scenic vista?

Less than Significant. The Proposed Project involves improving 12 sewer mainline segments across the County. Sewer segments are located both above and below ground. However, aboveground segments are not readily visible to the public, as segments are located within creek channels. There are no direct views of scenic resources that would potentially be blocked due to construction of the Proposed Project. Construction activities could potentially impair public views; however, this would be temporary. Impacts would be less than significant.

Question B

Would the project: Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

Less than Significant. There are no state scenic highways within or in the vicinity of the Project Area (Caltrans, 2018). To construct the Proposed Project, 12 trees would be removed. However, the removal of 12 trees (7 of which are oaks) would not substantially damage scenic resources, as the Project Sites are not in areas readily visited or viewable by the public. Impacts to protected oaks would be mitigated through the County's tree removal permit application process which allows for mitigation fees to be paid

to support oak replanting; this process would offset the removal of the seven protected oak trees that would be removed as part of the Proposed Project. Trees prescribed for removal are detailed in **Appendix D**. Impacts would be less than significant.

Question C

Would the project: In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?

Less than Significant. The Project Area is located in a generally urbanized area. The Proposed Project would not degrade the existing visual character or quality of public views compared to current conditions, as only repair/replacement of existing infrastructure is proposed. Rather, as many sewer segments are in disrepair, improvements may improve the aesthetic of some of the Project Sites. Construction of the Proposed Project could result in a reduction of the visual character of Project Sites; however, this would be temporary and Project Sites would be returned to pre-construction conditions. Impacts would be less than significant.

Question D

Would the project: Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?

No Impact. The Proposed Project does not involve any permanent new sources of light or glare. Construction activities may introduce lights sources; however, this would include lighting for construction visibility and safety, and would be temporary in nature and not substantial. As described in **Section 3.14.2**, construction would occur Monday through Friday between 7 a.m. and 6 p.m., with work in residential property occurring between the hours of 8 a.m. and 6 p.m. Therefore, lighting during nighttime conditions would be limited. No impact would occur.

Cumulative Impacts

No Impact. The Proposed Project would not have permanent significant impacts on aesthetics; therefore, the Proposed Project would not contribute to cumulative impacts to aesthetics.

3.2.4 Mitigation Measures

No mitigation measures would be required.

3.3 AGRICULTURE/FORESTRY RESOURCES

3.3.1 Environmental Checklist

AGRICULTURE/FORESTRY RESOURCES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)), timberland (as defined by Public Resources Code Section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?	☐	☐	☐	☒
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒

3.3.2 Setting

Regulatory Context

Federal

Farmland Protection Policy Act

The Farmland Protection Policy Act is intended to minimize the impact federal programs have on the unnecessary and irreversible conversion of farmland to nonagricultural uses. It assures that federal programs are administered in a matter that is compatible with state and local units of government, and private programs and policies to protect farmland (7 U.S. Code [USC] § 4201).

State

California Farmland Mapping and Monitoring Program

The Farmland Mapping and Monitoring Program (FMMP), which monitors the conversion of the State's farmland to and from agricultural use, was established by the California Department of Conservation (DOC), under the Division of Land Resource Protection. The program maintains an inventory of State agricultural land and updates its "Important Farmland Series Maps" every two years.

Williamson Act

The Williamson Act is a State program that was implemented to preserve agricultural land. Under the provisions of the Williamson Act (California Land Conservation Act 1965 § 51200), landowners contract with the appropriate county to maintain agricultural or open space use of their lands in return for reduced property tax assessments (DOC, 2020a).

Forestry Resources

Forestry Resources are defined in the California PRC § 12220(g) as “land that can support 10% native tree cover of a species, including hardwoods, under natural conditions, and that allows for management of one or more forest resources, including timber, aesthetics, fish and wildlife, biodiversity, water quality, recreation, and other public benefits.” California Government Code § 51104(g) defines “timberland” as “privately owned land, or land acquired for State forest purposes, which is devoted to and used for growing and harvesting timber, or for growing and harvesting timber and compatible uses, and which is capable of growing an average annual volume of wood fiber of at least 15 cubic feet per acre.”

Environmental Setting

According to the FMMP, the Project Area is classified as “Urban and Built-Up Land” (DOC, 2020b). No Prime Farmland, Unique Farmland, or Farmland of Statewide Importance exists on or in the vicinity of the Project Sites. Furthermore, the Project Sites are not under a Williamson Act contract and are not classified as forest land. The Project Sites includes zoning designations of Residential, Recreation, Recreation, Parkway Corridor, Neighborhood Preservation Area, and Special Planning Area.

3.3.3 Discussion of Impacts

Question A

Would the project: Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?

No Impact. The Project Area is classified by the FMMP as "Urban Built-Up Land" and does not contain Prime Farmland, Unique Farmland, or Farmland of Statewide Importance. The Proposed Project involves improvements to existing sewer mainline segments and does not involve conversion of land. Therefore, the Proposed Project would not result in the conversion of farmland to a non-agricultural use. The Proposed Project would have no impact on agricultural resources.

Question B

Would the project: Conflict with existing zoning for agricultural use or a Williamson Act contract?

No Impact. The Project Sites are not zoned for agricultural use and are not under a Williamson Act contract. Therefore, the Proposed Project would have no impact on existing zoning for agricultural use.

Question C

Would the project: Conflict with existing zoning for, or cause rezoning of, forest land (as defined in PRC § 12220(g)), timberland (as defined by PRC § 4526), or timberland zoned Timberland Production (as defined by Government Code § 51104(g))?

No Impact. The Project Sites are not zoned Forest Land, Timberland, or Timberland Production. Therefore, the Proposed Project would not cause rezoning of forest land or timberland. The Proposed Project would have no impact on zoning.

Question D

Would the project: Result in the loss of forest land or conversion of forest land to non-forest use?

No Impact. The Project Sites are not zoned Forest Land, Timberland, or Timberland Production. The Proposed Project does not involve conversion of land or the loss of forest land. The Proposed Project would have no impacts on forestry resources.

Question E

Would the project: Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?

No Impact. The Project Sites do not contain land classified as farmland or forest land and the Proposed Project does not involve the conversion of land. Therefore, the Proposed Project would not convert farmland to a non-agricultural use or convert forest land to a non-forest use.

Cumulative Impacts

No Impact. The Proposed Project would not result in the conversion of agriculture or forest land; therefore, it would not contribute to cumulative impacts to agricultural resources.

3.3.4 Mitigation Measures

No mitigation measures would be required.

3.4 AIR QUALITY

3.4.1 Environmental Checklist

AIR QUALITY	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
Where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied upon to make the following determinations. Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☒	☐	☐
b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?	☐	☒	☐	☐
c) Expose sensitive receptors to substantial pollutant concentrations?	☐	☒	☐	☐
d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	☐	☐	☒	☐

3.4.2 Setting

Environmental Setting

Sacramento County is located in the Sacramento Valley Air Basin (SVAB) and is under the jurisdiction of the Sacramento Metropolitan Air Quality Management District (SMAQMD). The SVAB is bound by the North Coast Ranges to the west and Northern Sierra Nevada Mountains to the east. Hot dry summers and mild rainy winters characterize the Mediterranean climate of the SVAB. During the year, the temperature may range from 20 to 115 degrees Fahrenheit, with summer highs usually in the 90s and winter lows occasionally below freezing. Average annual rainfall is approximately 20 inches, and the rainy season generally occurs from November through March. The prevailing winds are moderate in strength and vary from moist clean breezes from the south to dry land flows from the north. The mountains surrounding the SVAB create a barrier to airflow, which can trap air pollutants under certain meteorological conditions. The highest frequency of air stagnation occurs in the autumn and early winter when large high-pressure cells cover the Sacramento Valley. The ozone season in the SVAB (May through October) is characterized by stagnant morning air or light winds with the Delta sea breeze

arriving from the southwest in the afternoon. Usually the evening breeze transports the airborne pollutants to the north out of the SVAB (County, 2010).

Sensitive Receptors

Schools, hospitals, and convalescent homes are considered to be relatively sensitive to poor air quality because children, elderly people, and the infirmed are more susceptible to respiratory distress and other air quality related health problems. Residential areas are considered sensitive to poor air quality, because people usually stay home for extended periods of time increasing the potential exposure to ambient air quality. Recreational uses are also considered sensitive due to the greater exposure to ambient air quality conditions because vigorous exercise associated with recreation places a high demand on the human respiratory system.

As described in **Section 2.2**, the majority of pipeline improvements would take place adjacent to residential areas, with some occurring near parks and roadsides.

Regulatory Context

Ambient Air Quality Standards

The U.S. Environmental Protection Agency (USEPA), under the Clean Air Act (CAA) establishes maximum ambient concentrations for the six criteria air pollutants (CAP), known as the National Ambient Air Quality Standards (NAAQS). The six CAPs are ozone (O_3), nitrogen dioxide, sulfur dioxide, carbon monoxide (CO), lead, and particulate matter 10 and 2.5 microns in size and smaller (PM_{10} and $PM_{2.5}$, respectively).

The California CAA (CCAA) establishes maximum concentrations for the six CAPs, as well as four additional air pollutants in California (visibility reducing particles, sulfates, hydrogen sulfide, and vinyl chloride). These maximum concentrations for the State are known as the California Ambient Air Quality Standards (CAAQS). Concentrations above these time-averaged limits are anticipated to cause adverse health effects to sensitive receptors.

The California Air Resources Board (CARB), a part of the California Environmental Protection Agency with jurisdiction over local air districts, has established their own standards and violation criteria for each CAP under the CAAQS. Refer to **Table 3-1** for the standards and violation criteria for the various averaging times for criteria pollutants of concern in the SMAQMD under the NAAQS and CAAQS.

NAAQS and CAAQS Attainment Designations

As shown in **Table 3-2**, the SMAQMD has been designated nonattainment under the federal and State O_3 standards. The SMAQMD has also been designated nonattainment under State PM_{10} and federal $PM_{2.5}$ standards. The SMAQMD either meets the federal and California standards or is unclassifiable for all other CAPs.

California State Implementation Plan

California's State Implementation Plan (SIP) is comprised of the State's overall air quality attainment plans to meet the NAAQS, as well as the individual air quality attainment plans of each Air Quality Management District (AQMD) and Air Pollution Control District (APCD). The items included in the

TABLE 3-1. NATIONAL AND CALIFORNIA AMBIENT AIR QUALITY STANDARDS AND VIOLATION CRITERIA

POLLUTANT	AVERAGING TIME	STANDARD (PARTS PER MILLION)		STANDARD (MICROGRAM PER CUBIC METER)		VIOLATION CRITERIA	
		CAAQS	NAAQS	CAAQS	NAAQS	CAAQS	NAAQS
Ozone (O_3)	1 hour	0.09	N/A	180	N/A	If exceeded	N/A
	8 hours	0.070	0.070	137	137	N/A	If exceeded on more than 3 days in 3 years
Carbon Monoxide (CO)	8 hours	9	9	10,000	10,000	If exceeded	If exceeded on more than 1 day per year
	1 hour	20	35	23,000	40,000	If exceeded	If exceeded on more than 1 day per year
Nitrogen Dioxide (NO_2)	Annual arithmetic mean	0.030	0.053	57	100	N/A	If exceeded
	1 hour	0.18	0.100	470	188	If exceeded	N/A
Sulfur Dioxide (SO_2)	Annual arithmetic mean	N/A	0.030	N/A	N/A	N/A	If exceeded
	24 hours	0.04	0.14	105	N/A	If exceeded	If exceeded on more than 1 day per year
	1 hour (primary)	0.25	0.075	655	196	N/A	N/A
	3 hours (secondary)	N/A	0.5	N/A	N/A		If exceeded on more than 1 day per year
Respirable Particulate Matter (PM_{10})	Annual arithmetic mean	N/A	N/A	20	N/A	If exceeded	If exceeded
	24 hours	N/A	N/A	50	150	If exceeded	If exceeded on more than 1 day per year
Fine Particulate	Annual arithmetic mean (primary)	N/A	N/A	12	12	If exceeded	If exceeded

POLLUTANT	AVERAGING TIME	STANDARD (PARTS PER MILLION)		STANDARD (MICROGRAM PER CUBIC METER)		VIOLATION CRITERIA	
		CAAQS	NAAQS	CAAQS	NAAQS	CAAQS	NAAQS
Matter ($PM_{2.5}$)	Annual arithmetic mean (secondary)	N/A	N/A	N/A	15	If exceeded	If exceeded
	24 hours	N/A	N/A	N/A	35	If exceeded	If exceeded on more than 1 day per year
Lead (Pb)	30-day Average	N/A	N/A	1.5	N/A	If equaled or exceeded	N/A
	Rolling 3-month Average	N/A	N/A	N/A	0.15	N/A	If exceeded

Source: CARB, 2016

TABLE 3-2. SMAQMD ATTAINMENT STATUS

POLLUTANT	AVERAGING TIME	CAAQS	NAAQS
Ozone (O_3)	8 hour	**Nonattainment**	**Nonattainment**
	1 hour	**Nonattainment**	**Nonattainment**
Carbon Monoxide (CO)	8 hour	Attainment	Attainment
	1 hour	Attainment	Attainment
Respirable Particulate Matter (PM_{10})	Annual Arithmetic Mean	**Nonattainment**	N/A
	24 Hour	**Nonattainment**	Attainment
Fine Particulate Matter ($PM_{2.5}$)	Annual Arithmetic Mean	Attainment	Attainment
	24 Hour	N/A	**Nonattainment**
Nitrogen Dioxide (NO_2)	1 hour	Attainment	Attainment
	Annual Arithmetic Mean	Attainment	Attainment
Sulfur Dioxide (SO_2)	24 Hour	Attainment	Attainment
	1 Hour	Attainment	Attainment
Lead (Pb)	30 Day Average	Attainment	N/A
	Calendar Quarter	N/A	Attainment

Source: SMAQMD, 2022

California SIP are listed in 40 Code of Federal Regulations (CFR) Chapter I, Part 52, Subpart F § 52.220. The California SIP is a compilation of new and previously submitted plans, programs (such as monitoring, modeling, permitting, etc.), AQMD and APCD rules, State regulations, and federal controls for each air basin and California's overall air quality. Due to the nonattainment designations, SMAQMD, along with the other air districts in the SVAB region, periodically prepare and update air quality plans that provide emission reduction strategies to achieve attainment of the NAAQS, including control strategies to reduce air pollutant emissions via regulations, incentive programs, public education, and partnerships with other agencies.

Toxic Air Contaminants

In addition to the above-listed California CAPs, toxic air contaminants (TAC) are another group of pollutants regulated under the CCAA. TACs are less pervasive in the urban atmosphere than the CAPs, but are linked to short-term (acute) or long-term (chronic or carcinogenic) adverse human health effects. There are 244 chemicals listed by the State as TACs with varying degrees of toxicity.

Sources of TACs include industrial processes, commercial operations (e.g., gasoline stations and dry cleaners), grading (asbestos), and diesel motor vehicle exhaust. Public exposure to TACs can result from emissions from normal operations, as well as accidental releases. Health effects of TACs include cancer, birth defects, neurological damage, and death.

Ambient air quality standards have not been set for TACs. Instead, these pollutants are typically regulated through a technology-based approach for reducing TACs. This approach requires facilities to install Maximum Achievable Control Technology on emission sources.

Sacramento Metropolitan Air Quality Management District

Due to the nonattainment designations of the area, SMAQMD has developed plans to attain the State and federal standards for ozone and particulate matter. Adopted SMAQMD rules and regulations, as well as the thresholds of significance, have been developed with the intent to ensure continued attainment of NAAQS and CAAQS, or to work towards attainment of NAAQS and CAAQS for which the area is currently designated nonattainment, consistent with applicable air quality plans. Thus, by exceeding the SMAQMD's mass emission thresholds for operational or construction emissions of reactive organic gas (ROG), nitrogen oxide (NOx), $PM_{2.5}$, or PM_{10}, a project would be considered to conflict with or obstruct implementation of the SMAQMD's air quality planning efforts. The SMAQMD mass emission thresholds for operational and construction emissions are shown in **Table 3-3** below.

TABLE 3-3. SMAQMD CEQA THRESHOLDS OF SIGNIFICANCE

POLLUTANT	CONSTRUCTION	OPERATION
NOX	85 pounds/day	65 pounds/day
ROG	None	65 pounds/day
PM_{10}	80 pounds/day[1]	80 pounds/day[1]
$PM_{2.5}$	82 pounds/day[1]	82 pounds/day[1]

Notes: [1]If all feasible BMPs are applied.
Source: SMAQMD, 2020

3.4.3 Discussion of Impacts

Methodology

The SMAQMD's Road Construction Emissions Model, Version 9.0.0. (RCEM) was used to estimate the construction emissions for the pipeline improvements. RCEM provides default values when site-specific inputs are not available. The default values are provided in **Appendix I**. The following site-specific inputs and assumptions were used for the purposes of air quality modeling:

- Emissions from construction were calculated based on all construction related activities, including but not limited to grading, excavation, paving, use of construction equipment, material hauling, and site preparation.
- Construction would occur over a period of 16 months, starting in 2023.

The results of the RCEM modeling are discussed below and output files are provided in **Appendix I**. Resulting emission estimates are compared to applicable SMAQMD thresholds to evaluate the effects of construction activities on regional air quality.

Questions A and B

Would the project: Conflict with or obstruct implementation of the applicable air quality plan; Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard?

Construction

Less than Significant with Mitigation. As stated above, the Project Area is under the jurisdiction of the SMAQMD. Emissions generated from construction activities resulting from the Proposed Project would be short term, intermittent, and temporary in nature. Construction activities associated with the Proposed Project would result in the generation of ROG, NOx, $PM_{10,}$ and $PM_{2.5}$ emissions. PM_{10} is generally the direct result of trenching, excavation, road paving, and exhaust associated with construction equipment. PM_{10} emissions are largely dependent on the amount of ground disturbance associated with site preparation activities. Emissions of NOx and ROG are generally associated with employee vehicle trips, delivery of materials, and construction equipment exhaust. **Table 3-4** shows emissions from construction activities and compares these to SMAQMD thresholds to determine if the construction emissions of the Proposed Project would have a significant impact on regional air quality, thereby conflicting with or obstructing SMAQMD air quality plans.

TABLE 3-4. CONSTRUCTION EMISSIONS

YEAR	POLLUTANTS OF CONCERN			
	ROG	NOx	PM_{10}	$PM_{2.5}$
	(LBS/DAY)			
Maximum Daily Emissions	**1.26**	**12.15**	**0.68**	**0.57**
SMAQMD Thresholds	*N/A*	*85*	*80*	*82*
Exceeds SMAQMD Threshold?	No	No	No	No
Source: **Appendix I**				

As shown in **Table 3-4,** construction emissions of ROG, NOx, PM_{10}, and $PM_{2.5}$ would not exceed the SMAQMD significance thresholds. The SMAQMD CEQA Guide includes a list of Basic Construction Emissions Control Practices that should be implemented on all projects, regardless of size. If these practices were not to be implemented, a significant impact would occur, as air quality standards would not be followed. Accordingly, these requirements have been included below as **Mitigation Measure AQ-1**. Therefore, after mitigation, construction of the Proposed Project would not result in a cumulatively considerable net increase of any CAP for which the Proposed Project region is nonattainment under an applicable federal or State ambient air quality standard, and would not conflict with or obstruct implementation of applicable air quality plans.

Operation

Less than Significant. Periodic maintenance of sewer pipelines and appurtenant structures would be required after the Proposed Project is operational. Maintenance activities would result in a negligible increase in additional traffic, and the resulting additional trips added to the roadway network would not cause an exceedance of the SMAQMD thresholds. Therefore, ROG, NOx, and PM_{10} emissions would not increase over current levels, and operation of the Proposed Project would have a less-than-significant impact on regional air quality.

Question C

Would the project: Expose sensitive receptors to substantial pollutant concentrations?

Less than Significant with Mitigation. Diesel particulate matter (DPM) would be the main TAC of concern during construction of the Proposed Project. Construction would include grading, paving, and building activities. These activities utilize heavy equipment, which use diesel fuel and emit DPM. DPM emissions during operation would also be emitted from diesel vehicles used by employees and delivery services.

Various sensitive receptors are located in the vicinity of the Project Sites where construction activities would occur. DPM generally dissipates rapidly from its original concentration; however, due to the close distance of nearby sensitive receptors, construction of the Proposed Project has the potential to expose sensitive receptors to substantial concentrations of DPM. This would be a potentially significant impact. **Mitigation Measure AQ-1** would reduce DPM emissions from construction activities by limiting idling times for construction equipment. Further, as discussed above, CAP emissions would be well below the applicable SMAQMD thresholds. Therefore, with mitigation, construction and operation of the Proposed Project would not expose sensitive receptors to substantial pollutant concentrations.

Question D

Would the project: Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?

Less than Significant. The Proposed Project would not result in emissions adversely affecting a substantial number of people because the Proposed Project does not include any components that would result in the generation of long-term odors or similar emissions. Construction activities that have the potential to emit odors and similar emissions include: operation of diesel equipment, generation of fugitive

dust, and paving (asphalt). Odors and similar emissions from construction are intermittent and temporary, and generally would not extend beyond the construction area. Due to the temporary and intermittent nature of construction odors, impacts would be less than significant.

Cumulative Impacts

Less than Significant with Mitigation. Past, present, and future development projects contribute to a region's air quality conditions on a cumulative basis; therefore, by its very nature, air pollution is largely a cumulative impact. If a project's individual emissions contribute toward exceedance of the NAAQS or the CAAQS, then the project's cumulative impact on air quality would be significant. In developing attainment designations for criteria pollutants, the USEPA considers the region's past, present, and future emission levels. AQMDs determine suitable significance thresholds based on an area's designated nonattainment status. These thresholds provide a tool by which the districts can achieve attainment for a particular criteria pollutant that is designated as nonattainment. Therefore, the SMAQMD's significance thresholds consider the region's past, present, and future emissions levels.

Implementation of the Proposed Project combined with future development within the Project Area could lead to cumulative impacts to air quality. Construction of the Proposed Project would result in the generation of CAPs that when combined with future growth within the Project Area could lead to cumulative impacts to air quality. As discussed in detail above, emissions resulting from the Proposed Project would not exceed the SMAQMD's thresholds, and construction would be in conformance with the applicable SIP developed to address cumulative emissions of CAPs in the SVAB. Therefore, the Proposed Project would have a less-than-significant cumulative impact on local and regional air quality with implementation of mitigation measures.

3.4.4 Mitigation Measures

AQ-1 Basic Construction Emissions Control Practices

The following control measures would be implemented during construction in accordance with SMAQMD recommended Basic Construction Emissions Control Practices.

- Control of fugitive dust is required by SMAQMD Rule 403 and shall be enforced by SMAQMD staff.
- All exposed surfaces shall be watered two times per day. Exposed surfaces include, but are not limited to soil piles, graded areas, unpaved parking areas, staging areas, and access roads.
- Haul trucks transporting soil, sand, or other loose material on the site shall be covered or shall maintain at least two feet of free board space. Any haul trucks that would be traveling along freeways or major roadways shall be covered.
- Wet power vacuum street sweepers shall be used remove any visible trackout mud or dirt onto adjacent public roads at least once per day. Use of dry power sweeping is prohibited.
- Speeds for vehicles traveling on unpaved roads shall be limited to 15 miles per hour (mph).
- All roadways, driveways, sidewalks, and parking lots that will be paved shall be completed as soon as possible. In addition, building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.
- The Proposed Project shall comply with anti-idling regulations for diesel powered commercial motor vehicles (greater than 10,000 gross vehicular weight rating).

3.5 BIOLOGICAL RESOURCES

Information in this section is summarized from the Biological Resources Assessment, dated May 2022 (**Appendix E**).

3.5.1 Environmental Checklist

BIOLOGICAL RESOURCES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☒	☐	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☒	☐	☐
c) Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☒	☐	☐
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☒	☐	☐
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☒	☐	☐
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☒	☐	☐

3.5.2 Setting

Regulatory Context

Clean Water Act

USACE has primary federal responsibility for administering regulations that concern waters of the U.S. (including wetlands) under Section 404 of the CWA. Section 404 of the CWA regulates the discharge of dredged or fill material into wetlands or waters of the U.S. USACE requires that a permit be obtained if a project proposes impacts to a surface water resource that qualifies as a wetland or water of the U.S.

Projects impacting waters of the U.S. that require a CWA Section 404 permit additionally require a CWA Section 401 Water Quality Certification Permit. Authority to issue a Section 401 permit has been delegated by the USEPA to the Regional Water Quality Control Board (RWQCB). Under the CWA, beneficial uses lost due to impacts of a project must be replaced by a mitigation project of at least equal function, value, and area. In instances where a surface water resource is not identified as a water of the U.S., but is identified as a water of the State by the RWQCB, jurisdiction falls to the Porter-Cologne Act as discussed below.

Federal Endangered Species Act

The U.S. Fish & Wildlife Service (USFWS) and the National Marine Fisheries Service are tasked with implementation of the Federal Endangered Species Act (FESA) of 1973 (16 USC § 1531 et seq.).

Threatened and endangered species on the federal list (50 CFR Subsections 17.11, 17.12) are protected from “take” (direct or indirect harm) by individuals, unless a Section 10 Incidental Take Permit is granted to an individual or a Section 7 Incidental Take Permit is granted to a federal Lead Agency for potential take occurring during otherwise lawful activities. The USFWS also designates species of concern. While species of concern are not afforded legal protection under the FESA, the USFWS may still recommend specific management actions or publish guiding documents for these species. Project-related impacts to such species, either as individuals or populations, would also be considered significant and require mitigation. Under the FESA, loss of habitat for listed species is considered a significant impact.

Critical Habitat

Critical Habitat is defined under the FESA as specific geographic areas within a listed species range that contain features considered essential for the conservation of the listed species. Designated Critical Habitat for a given species supports habitat determined by the USFWS to be important for the recovery of the species.

Migratory Bird Treaty Act

Migratory birds are protected under the federal Migratory Bird Treaty Act (MBTA) of 1918 (16 USC §§ 703–712). The MBTA makes it unlawful to pursue, hunt, take, capture, kill, attempt to take, capture, or kill, possess, buy, sell, purchase, or barter any migratory bird listed under 50 CFR § 10. This includes feathers or other parts, nests, eggs, or products, except as allowed by implementing regulations (50 CFR § 21).

California Fish and Game Code

California Fish and Game Code §§ 1600–1616 regulates impacts to State waters and stream and lake beds. Section 1602 requires that parties notify CDFW before beginning any activity that may obstruct or divert the natural flow of a river, stream, or lake; change or use any material from the bed, channel, or bank of a river, stream, or lake; or deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it can pass into a river, stream, or lake. California Fish and Game Code § 1602 applies to all perennial, intermittent, and ephemeral rivers, streams, and lakes in the State.

In addition to protections for habitat, the California Fish and Game Code includes provisions that protect individuals of certain species. California Fish and Game Code §§ 2582, 3511, 4700, 5050, and 5515 include provisions against the take of any CDFW Fully Protected Species without a permit. Prior to implementation of the FESA and California Endangered Species Act (CESA), the California Department of Fish and Game (now CDFW) maintained a list of those species believed to be rare or in peril of extinction, classified as “Fully Protected.” While most species currently identified by CDFW as Fully Protected are listed under FESA and/or CESA, those species that are not formally listed, but are designated as Fully Protected, are still considered special-status species. Therefore, take of a Fully Protected Species is prohibited. CDFW additionally maintains a list of “Species of Special Concern,” which are similarly afforded protection under California Fish and Game Code and are evaluated under CEQA. Under the Code, “take” is defined as attempting to “hunt, pursue, catch, capture, or kill, or attempt” to perform such an action. California Fish and Game Code § 3503 also includes provisions against the needless destruction of eggs and nests of any bird.

California Endangered Species Act

The CDFW implements State regulations pertaining to fish and wildlife and their habitat. The CESA of 1984 (California Fish and Game Code § 2050 et seq., and California Code of Regulations [CCR] Title 14, §§ 670.2 and 670.5) prohibits the take (interpreted to mean the direct killing of a species) of species listed under CESA (California Fish and Game Code § 2080; 14 CCR §§ 670.2 and 670.5). A CESA permit (Individual Take Permit) must be obtained if a project would result in the “take” of listed species, either during construction or over the life of the project. California Fish and Game Code § 2081 allows CDFW to authorize take prohibited under Section 2080 provided that: 1) the take is incidental to an otherwise lawful activity; 2) the take will be minimized and fully mitigated; 3) the applicant ensures adequate funding for minimization and mitigation; and 4) authorization will not jeopardize continued existence of listed species (California Fish and Game Code § 2081).

Under CESA, the CDFW is responsible for maintaining a list of threatened and endangered species designated under State law (California Fish and Game Code § 2070). In addition to the list of threatened and endangered species, CDFW also maintains lists of species of special concern, which serve as “watch lists.” Pursuant to requirements of the CESA, an agency reviewing a project within its jurisdiction must determine whether any State-listed species may be present in the Project Area and determine whether the project would have a potentially significant impact upon such species.

Porter-Cologne Act

In instances where a surface water resource is not identified as a water of the U.S., the RWQCB may still classify the resource as a water of the State under the Porter-Cologne Act. Projects that impact waters of the State that do not meet the definition of waters of the U.S. general require a WDR permit from the RWQCB, or a waiver from this requirement. WDR permits are required pursuant to California Water Code § 13260 for any persons discharging or proposing to discharge waste, including dredge or fill, that could affect the quality of the waters of the State. The WDR permit is obtained through the RWQCB that has jurisdiction over the site on which the impacts would occur. The Project Sites fall within the jurisdiction of the CVRWQCB.

County of Sacramento General Plan

The conservation element of the County's General Plan establishes goals and policies to protect and enhance the natural resources within Sacramento County. The following goals are identified in the General Plan related to vegetation, wildlife, and aquatic resources and form the foundation for the City's policies and actions related to preservation and management of such resources:

Vegetation and Wildlife	Preserve and manage natural habitats and their ecological functions throughout Sacramento County.
	Preserve, enhance and restore special-status species habitat in Sacramento County to aid in the recovery of these species.
Aquatic Resources	Preserve, protect, and manage the health and integrity of aquatic resources in Sacramento County.
	Preserve, protect, and enhance natural open space functions of riparian, stream, and river corridors.
Terrestrial Resources	Sacramento County vegetative habitats preserved, protected, and enhanced.

Vegetation and wildlife goals include measures for native wildlife habitat protection, sensitive habitat protection, migratory bird habitat protection, and riparian corridor habitat protection. Aquatic resources goals include measures for erosion control and bank stabilization. Terrestrial resources goals include measures for heritage tree and native oak and other native tree protection.

Environmental Setting

Special-Status Species

For the purposes of this assessment, special-status has been defined to include those species that are:

- Listed as endangered or threatened under the FESA (or formally proposed for, or candidates for, listing),
- Listed as endangered or threatened under the CESA (or proposed for listing),
- Designated as endangered or rare, pursuant to California Fish and Game Code (§ 1901),

- Designated as fully protected, pursuant to California Fish and Game Code (§§ 3511, 4700, or 5050),
- Designated as species of concern by the CDFW (CEQA *Guidelines* § 15380), or,
- Defined as rare or endangered under CEQA.

Methodology

A Biological Resources Assessment (**Appendix E**) was developed for the Proposed Project, with surveys of the Study Area conducted on June 7–10, 2021 and December 21, 2021. The surveys were conducted by walking meandering transects throughout and around the Project Sites with focused surveys being conducted in and around drainage channels and riparian corridors given the nature of the in-channel work associated with the Proposed Project. The surveys were conducted by walking throughout the Project Sites to identify habitat types, potentially occurring wetlands and waters of the U.S and state, potentially occurring special-status species and sensitive habitat types. Sensitive habitats include those that are designated by the CDFW, considered by local experts to be communities of limited distribution, or likely to be waters of the U.S. or State by the appropriate regulatory agencies. Habitat requirements of special-status species were compared to habitats observed, which were determined based on aerial photographs, field observations, and background data review. Data was collected via a Trimble GeoXH® hand-held GPS receiver, camera, and field notes.

In addition to the surveys, the following biological information was obtained and reviewed:

- Aerial photographs of the Projects Area and surrounding area;
- USFWS Information for Planning and Conservation list, accessed February 10, 2022 (Attachment C of **Appendix E**);
- California Natural Diversity Database (CNDDB) list, accessed January 30, 2022 (Attachment C of **Appendix E**);
- California Native Plant Society (CNPS) list, accessed February 10, 2022 (Attachment C of **Appendix E**);
- National Wetlands Inventory, accessed February 10, 2022 (Attachment A of **Appendix E**);
- Critical Habitat for Threatened and Endangered Species, accessed February 10, 2022 (**Appendix E**); and
- Natural Resources Conservation Service (NRCS) soils map, accessed February 10, 2022 (Attachment A of **Appendix E**).

Habitat requirements of special-status species were compared to habitats within the Project Area. Results of the survey are included in **Appendix E**.

Habitats

The survey area includes 10 Project Sites that have the potential for biological impacts. The dominant habitat type consists of forested riparian corridors. This mixed riparian habitat encompasses nearly half of the 11-acre Project Area. Additional habitats present within the Project Area include mixed oak woodland,

annual grassland, ruderal/developed, and lawn habitats. These habitat types are summarized below in **Table 3-5** and further discussed in **Appendix E**.

TABLE 3-5. SUMMARY OF HABITAT TYPES

PROJECT SITE	PRIMARY HABITAT TYPES
1	Mixed riparian, lawn
2	Mixed riparian, annual grassland
3	Ruderal/developed, lawn
4	Mixed riparian, lawn
5	Mixed riparian, ruderal/developed
6	Mixed riparian, ruderal/developed
7	Annual grassland, mixed riparian
8	Mixed riparian
9	Mixed riparian, annual grassland
10	Mixed riparian, ruderal/developed

Special-Status Species

The Biological Resources Assessment, included as **Appendix E**, summarizes the regionally occurring special-status species identified in the USFWS, CNPS, and the CNDDB lists (Attachment C of **Appendix E**) and provides an analysis of the potential for these species based on the presence or absence of suitable habitat within the 10 Project Sites.

Data review and special-status species searches list six special-status plant species and 22 special-status wildlife species with the potential to occur in the region (Attachment C of **Appendix E**). Based on habitats observed within the 10 Project Sites and special-status species habitat requirements, the Project Sites contain suitable habitat to potentially support four special-status animal species: steelhead-Central Valley DPS (*Oncorhynchus mykiss* irideus pop. 11), Swainson's hawk (*Buteo swainsoni*), valley elderberry longhorn beetle (VELB; *Desmocerus californicus dimorphus*), and white-tailed kite (*Elanus leucurus*). Species with no potential to occur in the vicinity of the Project Sites were excluded based on lack of suitable habitat, soils, and elevation.

Critical Habitat

No USFWS designated or proposed Critical Habitat occurs within the Project Area (**Appendix E**).

3.5.3 Discussion of Impacts

Question A

Would the project: Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the CDFW or USFWS?

Nesting Migratory Birds

Less than Significant with Mitigation. Suitable habitat for nesting birds protected under both the California Fish and Game Code and the MBTA occurs on and within 500 feet of the development footprint at the surveyed Project Sites. Nesting migratory birds and raptors could be affected if vegetation removal or loud noise-producing activities associated with construction commence during the general nesting season (February 15 through September 15). Disturbance of an active nest would constitute a significant impact. **Mitigation Measure BIO-2** includes a pre-construction nesting bird survey to identify active nests should construction commence during the general nesting season, and a disturbance-free buffer around active nests during construction until a qualified biologist determines that the nest is no longer active. With implementation of **Mitigation Measure BIO-2**, impacts to nesting birds would be reduced to a less-than-significant level.

Special-Status Species

Less than Significant with Mitigation. The surveyed Project Area does not offer habitat suitable to support special-status plants and would therefore not contribute to cumulative impacts related to special-status plants. The Project Area has suitable habitat to potentially support steelhead-Central Valley DPS, Swainson's hawk, VELB, and white-tailed kite. With the implementation of **Mitigation Measures BIO-2** through **BIO-5**, impacts would be reduced to a less-than-significant level.

Question B

Would the project: Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by CDFW or the USFWS?

Less than Significant with Mitigation. Approximately 0.07 acres of a seasonal wetland is found within Project Site 2. No other wetlands were observed on the other Project Sites. Temporary impacts to the seasonal wetland resulting from disturbance from construction equipment and vehicle access routes north of the creek crossing in Project Site 2 is expected. Disturbance to the seasonal wetland would constitute a significant impact. **Mitigation Measure BIO-6** is recommended to reduce impacts to the seasonal wetland by requiring construction to occur within the dry season (May 1 - October 15), when the seasonal wetland would contain the least soil saturation, as well as the placement of temporary mats. Seven intermittent drainages likely considered waters of the U.S., two being the named Arcade and Cripple Creeks, are present within all Project Sites (Appendix B of **Appendix F**). The Proposed Project would result in permanent and temporary impacts to waters of the U.S. and the riparian corridors found around them through the installation of bank restoration, dewatering, concrete piles, and tree removal. These would constitute a significant impact. However, with the implementation of **Mitigation Measures BIO-1,**

BIO-5, and BIO-6, impacts to seasonal wetlands and waters of the US would be reduced to less than significant.

Question C

Would the project: Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

Less than Significant with Mitigation. There is one seasonal wetland located to the north of Crossing Number 2 within Project Site 2 (Appendix B, **Appendix F**). Project design incorporates a dry-season work period (May 1 - October 15) to reduce impacts to the wetland. Further, the work activity near and within the wetland is confined to a narrow access route only. **Mitigation Measure BIO-6** is recommended to reduce impacts to the seasonal wetland by requiring construction to occur within the dry season as well as the placement of temporary mats. However, construction activities, including staging and potential chemical/gasoline leakage from construction vehicles, could potentially lead to the discharge of sediment and other pollutants to this seasonal wetland and nearby water bodies detailed in **Appendix F**. This would be a potentially significant impact. **Mitigation Measures HYD-1** provides erosion and sediment control measures that would reduce potential impacts to watercourses to less than significant.

Question D

Would the project: Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

Less than Significant with Mitigation. The Project Sites predominately encompass intermittent water features and the habitat types described in **Table 3-5** and are largely found in a developed and disturbed urban setting. The area surrounding the Project Sites consists of urban development, including roadways, commercial land use, residences, greenspaces, and continuations of on-site habitats. Wildlife access to surveyed Project Sites is varied, and a prominent riparian corridor is present around a majority of Project Sites. Additionally, Project Site 10 may support special-status fish, including steelhead trout (*Oncorhynchus mykiss irideus pop. 11*), by providing suitable habitat for migration from the American River. Disturbance to this habitat would constitute a significant impact. With the implementation of **Mitigation Measures BIO-1, BIO-5, and BIO-6** impacts to migratory fish and riparian corridors would be reduced to less than significant.

Question E

Would the project: Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

Less than Significant with Mitigation. The Proposed Project would remove 12 trees. Of these 12 trees, 8 trees (one dead California buckeye and 7 native oak species) are protected by the Sacramento County General Plan's Conservation Element, Tree Preservation and Protection Code. Some of these trees are considered Heritage trees due to their diameter size classifications. Additionally, 18 trees protected by Sacramento County's Tree Preservation and Protection Code would have their critical root zones affected

by the Proposed Project. No other ordinances for protecting biological resources were identified. With the implementation of **Mitigation Measure BIO-1** the removal of protected trees would be offset through the payment of mitigation fees and impacted trees not removed would be preserved and protected through trenching techniques and supervision of tree work by a certified arborist. After implementation of **Mitigation Measure BIO-1**, impacts would be less than significant.

Question F

Would the project: Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

Less than Significant with Mitigation. Project Sites are not within the boundaries of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other conservation plan. The South Sacramento Habitat Conservation Plan boundary is located off-site and south of Highway 50 however, the Project Sites are not within the boundaries of the planning area (SSHCP, 2022). The Proposed Project does not conflict with any existing conservation plans. However, the removal of 8 locally protected tree species would conflict with both the Tree Preservation and Protection codes of both the County and City of Citrus Heights. Both of these codes aim to conserve native tree and oak woodland habitats as well as individual trees as a respective jurisdictional asset. Removal of these protected trees would constitute a significant impact. However, with implementation of **Mitigation Measures BIO-1**, which includes the payment of mitigation fees to offset the removal of protected trees, impacts would be reduced to less than significant.

Cumulative Impacts

Less than Significant with Mitigation. The context for determining cumulative impacts considers past, present, and reasonably foreseeable projects in the vicinity of the Proposed Project. Past development in the vicinity of the Project Sites is associated with the larger cities and County, including residential development, transportation infrastructure, commercial, and greenspace. Future development is guided by the County and relevant city's General Plans, which accounts for utility upgrades and maintenance associated with the Proposed Project. The Project Sites provide riparian corridors and Project Site 10 may support migratory fish habitat. With implementation of **Mitigation Measures BIO-1**, **BIO-5**, **BIO-6**, and **HYD-1**, the Proposed Project would avoid potential impacts to these resources. The Project Sites also offer habitat suitable to support steelhead-Central Valley DPS, Swainson's hawk, white-tailed kite, and the host plant for VELB. With implementation of **Mitigation Measures BIO-1** through **BIO-6** and **HYD-1**, the Proposed Project would avoid potential impacts to these resources.

With implementation of **Mitigation Measure BIO-4**, the Proposed Project would avoid potential impacts to nesting migratory bird species and special-status raptor species. Because potential impacts would be avoided, the Proposed Project would not cumulatively contribute to impacts to nesting migratory birds and raptors. Additionally, the Proposed Project would not contribute to cumulative impacts to wetlands or waters of the U.S. or State, as those habitat types would be restored and enhanced through the implementation of **Mitigation Measures BIO-1**, **BIO-5**, and **BIO-6** to offset the permanent impacts associated with the Proposed Project. Any potential impacts would be less than significant with implementation of the above mitigation measures.

Overall, the Proposed Project would not contribute a significant level of cumulative, direct, or indirect impacts to sensitive habitats, special-status species and their habitat, or migratory birds. Additionally, the Proposed Project would not conflict with local plans or policies protecting biological resources. Other cumulatively considerable projects would be required to implement measures to project biological resources consistent with federal, state, and local policies. Therefore, the Proposed Project's contribution to cumulative regional impacts associated with biological resources would be less than significant with implementation of **Mitigation Measures BIO-1** through **BIO-6** and **HYD-1**.

3.5.4 Mitigation Measures

BIO-1 Tree Permitting and Fees and Bank Restoration

- Banks and riparian habitats shall be restored to baseline conditions. A combination of measures such as invasive plant removal, bank stabilization, revegetation, and trash removal on each Project Site per disturbance and impact level shall be used.
- Prior to construction and tree removal, SASD shall obtain tree removal permits and/or conditions of permit approval from Sacramento County or City of Citrus Heights. The incorporated boundary of City of Citrus Heights encompasses solely Project Sites 8 and 9.
- SASD shall pay mitigation fees according to County specifications for removed oak trees on a price, per diameter at breast height inch, determined by the County as part of the conditions of the tree removal permit.
- Any soil disturbance (scraping, grading, trenching, and excavation) shall be avoided within the driplines of oak trees. As this type of disturbance is necessary for a majority of the Project Sites, an ISA Certified Arborist shall provide specifications for this work, including methods for root pruning during trenching, backfill techniques, and irrigation management guidelines if needed for protected tree species.
- In the instance where temporary equipment or vehicle access over the dripline of oaks is necessary, 4 inches of new mulch shall be installed and the mulch shall be covered with metal plates or ¾-inch plywood as feasible.
- Installation of high visibility fencing to denote the limits of construction work and to demarcate the corridors of access easements as feasible are recommended to reduce project related impacts to off-site trees.

BIO-2 Environmental Awareness Training

- Prior to construction commencement, all construction personnel shall participate in environmental awareness training regarding identification, descriptions, behavior, and habitat indicators for all special-status species with the potential to be found within the Project Sites. If new construction personnel are added, they must receive the mandatory training prior to initiating work. As part of the training, an environmental awareness handout shall be distributed to all personnel that describes and illustrates all special-status animal species with the potential to occur within the Project Sites. In addition, information on general measures that will be taken to protect these species as they relate to the Proposed Project, the penalties for non-compliance, and the boundaries of the Project Sites shall be included. The handout shall also list any applicable permit conditions provided by each regulatory agency. Upon completion of training, employees shall sign

a form stating that they attended the training and understand all the conservation and protection measures.

BIO-3 VELB Avoidance and Host Plant Preservation

- Activities that may damage or kill the elderberry shrub at Project Site 2 (e.g., trenching, paving, etc.) shall have a buffer of at least 6 meters (20 feet) from the drip line, depending on the type of activity. All areas to be avoided during construction activities shall be fenced and/or flagged as close to construction limits as feasible.
- To the extent feasible, all activities that could occur within 50 meters (165 feet) of the elderberry shrub shall be conducted outside of the flight season of the VELB (March–July).
- All areas to be avoided during construction activities shall be fenced and/or flagged as close to construction limits as feasible.
- A qualified biologist shall provide training for all contractors, work crews, and any on-site personnel on the status of the VELB, its host plant and habitat, the need to avoid damaging the elderberry shrubs, and the possible penalties for noncompliance.
- Mechanical weed removal within the drip-line of the shrub shall be limited to the season when adults are not active (August–February) and shall avoid damaging the elderberry. If needed, erosion control shall be implemented and the affected area shall be re-vegetated with appropriate native plants.
- Elderberry trimming and implementation of insecticides or herbicides shall not be utilized as a part of the scope of the Proposed Project.

BIO-4 Nesting Migratory Birds and Other Special-Status Bird Species Protected Under the MBTA

- Should construction activities associated with the Proposed Project occur during the general nesting season (February 1 to September 1), a pre-construction nesting bird survey shall be conducted no more than 7 days prior to the start of ground disturbing activities. Areas within 500 feet of construction shall be surveyed for active nests.
- Should an active nest be identified, an avoidance buffer shall be established based on the needs of the species identified. Avoidance buffers may vary in size depending on habitat characteristics, project-related activities, and disturbance levels.
- Construction fencing or flagging shall be applied along the outermost perimeter of the avoidance buffer. Avoidance buffers and construction fencing shall remain in place until the end of the general nesting season or upon determination that the nest has become vacant.
- Should work activity cease for 7 days or greater during the breeding season, surveys shall be repeated to ensure birds have not established nests during inactivity.

BIO-5 Fisheries Preservation Best Management Practices

- To the extent feasible, removal of the existing pipeline at Project Site 10 shall occur between September 1 and October 15, when the flows in the American River are at their lowest seasonal levels (typically between 500 and 1,500 cubic feet per second) and after Central Valley steelhead egg and fry life stages are completed; therefore, the eggs and fries would not be adversely affected by removal of the existing pipeline.

- Consultation with National Marine Fisheries Service, CDFW, and the Central Valley RWQCB shall occur to determine the BMPs required to minimize disturbance and mobilization of sediment during the abandoned pipeline removal. BMPs may include but are not limited to moveable silt or sediment containment curtains and cofferdams.
- To the extent feasible, minimal equipment shall be operated within the wetted channel. To help ensure that work in the immediate vicinity of the bank does not result in sediment discharge into the creek, coffer dams may be utilized during the pipeline and debris removal activities.
- All equipment refueling and maintenance shall occur offsite or in an approved staging area outside of the riparian zone, and an agency-approved spill prevention plan shall be implemented by the contractor.
- The pipeline removal shall be covered either under the Stormwater Pollution Prevention Plan (SWPPP) and/or Erosion and Sediment Control Plan (ESCP) prepared for the Proposed Project, and BMPs shall be implemented to minimize the potential for sediments or other pollutants to enter aquatic habitats during pipeline removal.
- The removal of the abandoned pipeline shall require permits from USACE, Central Valley RWQCB, and CDFW, and all terms of those permits shall be followed.

BIO-6 Aquatic Resource Permits and Riparian Corridor Enhancement

- Prior to construction, SASD shall obtain the following permits: CDFW Section 1602 permit, a USACE Section 404 permit, and an RWQCB Section 401 permit. All conditions within the issued permits shall be adhered to.
- All in-stream construction activities and the access path over the seasonal wetland to access Project Site 2 shall be performed and used during the dry season, defined as the timeframe between May 1 and October 15, or the first significant rainfall, whichever comes first. This period coincides with the time of year when the intermittent drainages and creeks have reduced flow or are dry and the seasonal wetland would contain the least soil saturation. Temporary mats shall be used for crossing the seasonal wetland. The required permits are anticipated to include provisions for any required in-stream work, ensuring any dewatering does not impact the stream, removal of fill within the stream, and sediment control during and immediately after the work. If the worksite needs to be temporarily dewatered by pumping, water shall be released or pumped downstream at an appropriate rate to maintain downstream flows during construction. Upon completion of construction activities, any diversion or barriers to flow shall be removed in a manner that would allow flow to resume with the least disturbance to the substrate. Alteration of the stream bed shall be minimized to the maximum extent possible; any imported material shall be removed from the stream bed upon completion of the Proposed Project.
- Before the end of construction, any work that was performed relative to the pipe crossing work within intermittent stream channels shall be restored to a condition allowing for connectivity of the ordinary high water mark and the bed and bank between the upstream and downstream sections of the pipe crossing disturbance areas. All temporarily disturbed areas shall be returned to pre-Proposed Project conditions upon completion of construction, including habitat contours. These areas shall be properly protected from washout and erosion using appropriate erosion control devices including anchoring vegetative turf, hydroseeding, and revegetation. The un-impacted areas above and below the work areas shall serve as a baseline for restoration evaluation.

- Staging areas, access routes, and construction areas shall be located outside of riparian areas to the maximum extent practicable.
- Riparian corridor enhancement is recommended to mitigate permanent and temporary impacts to waters of the U.S. Mitigation shall occur along the riparian corridors where Himalayan blackberry and other invasive plant species such as English ivy are prevalent. Invasive species are prevalent within and around the intermittent drainages within the Project Sites. Invasive species would be removed in an area at a 3:1 ratio for the area of disturbance within waters of the U.S. Areas cleared of invasive species would be replaced with native willows and other native plant covers. Proposed plantings and invasive plant removal shall be focused outside of the ordinary high water mark of the intermittent drainages and in areas where waters of the U.S. are disturbed as a result of the Proposed Project. Trash, if present within the Project Sites' intermittent drainage channels, shall be removed as well.

3.6 CULTURAL RESOURCES

Information in this section is summarized from a Cultural Resources Study prepared for the Proposed Project (**Confidential Appendix H**).

3.6.1 Environmental Checklist

CULTURAL RESOURCES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource pursuant to § 15064.5?	☐	☐	☐	☒
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to § 15064.5?	☐	☒	☐	☐
c) Disturb any human remains, including those interred outside of dedicated cemeteries?	☐	☒	☐	☐

3.6.2 Setting

Cultural Context

Prehistoric Setting

The earliest well-documented entry and spread of humans into California occurred at the beginning of the Paleo-Indian Period (10,000 to 6,000 BC). Social units are thought to have been small and highly mobile. Known sites have been identified within the contexts of ancient pluvial lake shores and coast lines evidenced by such characteristic hunting implements as fluted projectile points and chipped stone crescent forms. Prehistoric adaptations over the ensuing centuries have been identified in the archaeological record by numerous researchers working in the area since the early 1900s, as summarized by Fredrickson (1974) and Moratto (1984). Due to the plentiful resources and temperate climate described above, the Central Valley was well populated prehistorically and served as the location for some of the more substantial village sites known in California.

Lillard, Heizer, and Fenenga (1939) and others conducted numerous studies that form the core of our early understanding of upper Central Valley archaeology. Little has been found archaeologically that dates to the Paleo-Indian (10,000 to 6,000 BC) or the Lower Archaic time periods, however archaeologists have recovered a great deal of data from sites occupied by the Middle Archaic period. The lack of sites from earlier periods may be due to high sedimentation rates, leaving the earliest sites deeply

buried and inaccessible. During the Middle Archaic Period (3,000 to 1,000 BC), the broad regional patterns of foraging subsistence strategies gave way to more intensive procurement practices. Subsistence economies were more diversified, possibly including the introduction of acorn processing technology. Human populations were growing and occupying more diverse settings. Permanent villages that were occupied throughout the year were established, primarily along major waterways. The onset of status distinctions and other indicators of growing sociopolitical complexity mark the Upper Archaic Period (1,000 BC to AD 500). Exchange systems become more complex and formalized. Evidence of regular, sustained trade between groups was seen for the first time.

Several technological and social changes characterized the Emergent Period (AD 500 to 1,800). The bow and arrow were introduced, ultimately replacing the dart and atlatl. Territorial boundaries between groups became well established. It became increasingly common that distinctions in an individual's social status could be linked to acquired wealth. Exchange of goods between groups became more regularized with more goods, including raw materials, entering into the exchange networks. In the latter portion of this period (AD 1,500 to 1,800), exchange relations became highly regularized and sophisticated. The clamshell disk bead became a monetary unit for exchange, and increasing quantities of goods moved greater distances. Specialists arose to govern various aspects of production and exchange.

Three time periods were well represented in archaeological assemblages in the general vicinity of the Project Area. These assemblages are discussed in detail in Moratto (1984) and summarized here. The Windmiller Pattern (3,000 to 1,000 BC) of archaeological assemblages included an increased emphasis on acorn use as well as a continuation of hunting and fishing activities. Ground and polished charmstones, twined basketry, baked-clay artifacts, and worked shell and bone were hallmarks of Windmiller culture. Widely ranging trade patterns brought goods in from the Coast Ranges and trans-Sierran sources as well as closer trading partners. Distinctive burial practices identified with the Windmiller Pattern also appeared in the Sierra foothills, indicating possible seasonal migration into the Sierra.

The Berkeley Pattern (1,000 BC to AD 500) represented a greater reliance on acorns as a food source than was seen previously. Distinctive stone and shell artifacts distinguished it from earlier or later cultural expressions. The Berkeley Pattern appears to have developed in the Bay Area and was spread through the migration of Plains Miwok Indians.

The Augustine Pattern (AD 500 to Historic Era) may have been stimulated by the southern migration of Wintuan people from north of the Sacramento Valley. Their culture was marked by increasing populations resulting from more intensive food procurement strategies, as well as a marked change in burial practices, increased trade activities, and a well-defined ceramic technology.

Ethnographic Setting

Ethnographically, the Valley Nisenan occupied the vicinity of the Project Area. In the valley region, the triblet, consisting of a primary and a few satellite villages, served as the basic political unit (Moratto, 1984). Permanent settlements could range up to several hundred people strong, living in earthen, tule, grass, or bark structures. These settlements were concentrated on raised ground near water. Valley Nisenan territory was divided into three triblet areas each populated with several large villages (Wilson and Towne, 1978).

Valley Nisenan people followed a seasonal round of food gathering, as did most California Indians. The wide variety of food resources available was exploited year-round, but hunting and gathering activities were at their most intense in late summer and early fall. Food staples included acorns, buckeyes, pine nuts, hazelnuts, various roots, seeds, mushrooms, greens, berries, and herbs. Game (roasted, baked, or dried) included mule deer, elk, antelope, black bear, beaver, squirrels, rabbits, and other small animals and insects. Salmon, whitefish, sturgeon, and suckers, as well as freshwater shellfish were all caught and consumed (Wilson and Towne, 1978).

Euro-American contact with the Nisenan began with infrequent excursions by Spanish explorers and Hudson Bay Company trappers traveling through the Sacramento-San Joaquin Valley in the early 1800s. The malaria epidemic of 1833 decimated the Valley Nisenan population, killing an estimated 75% of the tribesmen. The influx of Europeans during the gold rush era further reduced the population due to disease and violent relations with the miners.

Historic Setting

The earliest Euro-Americans to venture into the region that the Project Area lies within included Gabriel Moraga and a group of Spanish explorers in 1806–1808 who ventured into the vicinity of Sacramento, and fur trappers and explorers associated with the Hudson's Bay Company in the 1820s. Jedediah Smith, also with Hudson's Bay Company at the time, led a group of trappers along the edge of the foothills to the American River in search of a pass over the Sierra Nevada in 1826. Kit Carson and John C. Fremont crossed the mountains near Lake Tahoe and descended to Sutter's Fort traveling along the South Fork of the American River in 1844. These expeditions, however, had little lasting impression on the landscape or the native inhabitants of the region.

The California missions began in the late 18th century as an effort to convert Native Americans to Catholicism and expand European territory. Spain was responsible for the missions; which scholars believe were attempts to colonize the Pacific coast of North America. There were 21 missions in all, lasting from 1769 until about 1833. By 1821, Mexico won its independence from Spain and passed a law that secularized and ended missions. Some of the mission lands and buildings were turned over to the Mexican government, and much of the land ended up in private hands as Mexican Land Grants. Most of the Proposed Project parcels lie within either the Rancho San Juan or Rancho Del Paso land grants.

Gold Rush Period

During the Gold Rush of 1848–1849 and the following years, local settlement and development activity skyrocketed and rich mining districts such as Folsom, Coloma, Shingle Springs, and Placerville were heavily worked, giving rise to thriving communities still in existence today. Following the discovery of gold at Coloma in January 1848, mining camps along the American River sprang up as numerous fortune seekers traversed the area between Sacramento and the Sierra Nevada foothills.

Mining in the region suffered from only a seasonal availability of enough water to work large claims and wash the placer gold from the local gravels. Although small individual operators could profitably work their claims in the area early on, large-scale mining had to wait until an extensive water-conveyance system could be built. By the mid-1850s, mining operations had expanded well beyond simple small-scale operations to placer mining on an industrial scale, continuing particularly in the Folsom region until the 1960s.

Carmichael

A portion of the Project Area is located in the community of Carmichael, CA. Carmichael was named for Daniel Carmichael, who came to California in 1885. After several years performing various jobs, he organized a real estate firm and bought portions of former Rancho lands to sell as housing lots. Carmichael was active in politics, eventually serving as the mayor of Sacramento from 1917 to 1919 (Carmichael Chamber, 2018).

Citrus Heights and Fair Oaks

Throughout most of the Spanish period in California, settlement was limited to a narrow coastal strip along El Camino Real with only a few isolated frontier outposts of civilization. One of these outposts was the estate of John Sutter, a German-Swiss immigrant, who was granted 11-square leagues of land in the Sacramento Valley under the condition that he settle 12 other families on the land. One of these Mexican land sub-grants was the Ranch Del San Juan, an approximately 20,000-acre tract of rich farm land originally granted in 1844. Included in this sub-grant is present-day Citrus Heights (Citrus Heights, 2021).

Record Search

A records search was conducted at the North Central Information Center (NCIC) of the California Historical Resources Information System by NCIC staff on May 19, 2021 (NCIC File No. SAC-21-95). The record search included a review of historic U.S. Geological Survey (USGS) maps, Government Land Office Plat maps, library sources, the National Register of Historic Places (NRHP), the California Register of Historical Resources (CRHR), California Historical Landmarks, the California Inventory of Historic Resources, archaeological site and survey records on file at the NCIC, and the Caltrans Bridge Survey.

The record search included each of the 10 Project Sites in which the 12 pipeline crossings occur, as well as a 0.25-mile buffer zone around each Project Site. The NCIC results indicated that three resources (historic and prehistoric) were located adjacent to Project Site 6 and that Project Site 7 crosses through elements of one cultural resource–the historic 1906 Deterding Ranch. However, there are no built elements within Crossing #7; the drainage at this location appears to be natural, and only happens to cross what was a historic ranch. Five previous studies have included portions of the Project Sites; however, none have included significant portions of the Project Area. Refer to **Appendix H** for more information on cultural resources. A review of the Caltrans Bridge Survey for the bridges within the Project Area indicates that none have been found eligible for listing on the NRHP.

Field Survey

From June 7–10, 2021, AES archaeologist Charlane Gross, M.A., RPA conducted a field survey of the 10 Project Sites. The only resources identified were four, 50 to 100-year-old olive trees located on Project Sites 1 and 7. The trees do not appear to contain values which would make them eligible for listing on the CRHR. Despite the lack of findings, each of the pipeline crossing locations are at natural drainage crossings, elevating the potential for historic or prehistoric resources to be uncovered during construction of the Proposed Project, and, therefore, a program of archaeological monitoring is recommended.

Regulatory Context

California Environmental Quality Act

CEQA requires that the effects that a project has on historical and unique archaeological resources be

considered (PRC § 21083.2) for projects financed by or requiring the discretionary approval of public agencies in California. Historical resources are defined as buildings, sites, structures, or objects, each of which may have historical, architectural, archaeological, cultural, or scientific importance (PRC § 5020.1). The CEQA *Guidelines* (§ 15064.5) define three cases in which a property may qualify as a historical resource for the purpose of CEQA review:

- The resource is listed in or determined eligible for listing on the CRHR.
- The resource is included in a local register of historic resources, as defined in PRC § 5020.1(k), or is identified as significant in a historical resources survey that meets the requirements of PRC § 5024.1(g) (unless the preponderance of evidence demonstrates that the resource is not historically or culturally significant).

The Lead Agency determines that the resource may be a historical resource as defined in PRC §§ 5020.1(j), 5024.1, or significant as supported by substantial evidence in light of the whole record. Section 5024.1 defines eligibility requirements and states that a resource may be eligible for inclusion in the CRHR if it:

1) Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
2) Is associated with the lives of persons important in our past;
3) Embodies the distinctive characteristics of a type, period, region, or method of construction, represents the work of an important creative individual, or possesses high artistic values; or
4) Has yielded, or may be likely to yield, information important in prehistory or history.

Resources must retain integrity to be eligible for listing on the CRHR. Resources that are listed in or eligible for listing on the NRHP are considered eligible for listing in the CRHR, and thus are significant historical resources for the purposes of CEQA (PRC § 5024.1(d)(1)).

PRC § 21083.2 governs the treatment of a unique archaeological resource, which is defined as "an archaeological artifact, object, or site about which it can be clearly demonstrated" that it meets any of the following criteria:

- It contains information needed to answer important scientific research questions, and there is a demonstrable public interest in that information.
- It has a special and particular quality such as being the oldest of its type or the best example of its type.
- It is directly associated with a scientifically recognized important prehistoric or historic event or person.

3.6.3 Discussion of Impacts

Question A

Would the project: Cause a substantial adverse change in the significance of a historical resource pursuant to § 15064.5?

No Impact. No resources were identified during background research other than the historic 1906 Deterding Ranch. However, there are no built elements within Crossing #7 (at the ranch) and construction at the Crossing #7 location would not impact any ranch resources. The only finds made during the survey consisted of four, 50 to 100-year old olive trees located on Project Sites 1 and 7. These trees are not associated with particular structures, farms, or other plantings, and recordation of the locations has completed any relevant resource recording. The olive trees are generally representative of the broad patterns of California history, but are not a significant representation of that history (CRHR Criterion 1). They are not associated with significant individuals (CRHR Criterion 2) and do not possess architectural or artistic values (CRHR Criterion 3) and are not likely to yield information important in history (CRHR Criterion 4); therefore, the olive trees are recommended not eligible for listing on the CRHR. Therefore, there would be no impact to a historical resource.

Question B

Would the project: Cause a substantial adverse change in the significance of an archaeological resource pursuant to § 15064.5?

Less than Significant with Mitigation. Based on the results of the records search, literature review, and field survey, there are no known cultural resources within the Project Sites, however the potential for unknown CRHR-eligible resources within the Project Area is considered to be moderate as each construction location is at a drainage crossing; the proximity to water is considered to be a key indicator of archaeological probability and disturbance of unidentified archeological resources would constitute a potentially significant impact. Implementation of **Mitigation Measure CR-1** presented in **Section 3.6.4** would ensure that inadvertently discovered resources that may be eligible for the CRHR would be investigated and evaluated for eligibility to the CRHR. **Mitigation Measure CR-1** would reduce potential impacts to previously unidentified archaeological resources to a less-than-significant level.

Question C

Would the project: Disturb any human remains, including those interred outside of dedicated cemeteries?

Less than Significant with Mitigation. There is always the possibility that buried human remains could be uncovered during project construction. The disturbance of human remains would constitute a potentially significant impact. Implementation of **Mitigation Measure CR-1** as presented in **Section 3.6.4** would ensure the appropriate treatment of human remains and reduce potential impacts to human remains to a less-than-significant level.

Cumulative Impacts

Less than Significant with Mitigation. Potential cumulative projects in the vicinity of the Project Area have the potential to impact cultural resources. Archaeological and historic resources are afforded special legal protections designed to reduce the cumulative effects of development. Potential cumulative projects

and the Proposed Project would be subject to the protection of cultural resources afforded by CEQA *Guidelines* § 15064.5 and related provisions of the PRC. Given the non-renewable nature of cultural resources, any impact to archaeological sites could be considered cumulatively considerable. As discussed above, no known protected archaeological or historic resources were identified within the development footprint of the Proposed Project. **Mitigation Measure CR-1** provides for the protection of reasonably predictable as well as unanticipated finds made during ground-disturbing activities. With the implementation of these mitigation measures, the Proposed Project's incremental contribution to cumulative impacts to cultural resources is considered to be less than significant.

3.6.4 Mitigation Measures

CR-1 Inadvertent Resource Discovery

All trenching and excavation down to sterile subsoils shall be monitored by a qualified professional archaeologist retained by SASD and/or the project contractor. In the event of any inadvertent discovery of archaeological, all such finds shall be subject to 36 CFR 60.4, PRC 21083.2, and CEQA *Guidelines* § 15064.5. Procedures for inadvertent discovery include the following:

- All work within a 100-foot radius of the find shall be halted, and the appropriate agency shall be notified. Workers should avoid altering the materials until a professional archaeologist can evaluate the significance of the find in accordance with CRHR criteria. The appropriate agency shall include a standard inadvertent discovery clause in every construction contract to inform contractors of this requirement.
- The qualified archeologist shall make recommendations to the Lead Agency on the measures that shall be implemented to protect the discovered resources, including but not limited to, culturally appropriate temporary and permanent treatment, which may include avoidance of cultural resources, in-place preservation, and/or re-burial on project property so the resource(s) are not subject to further disturbance in perpetuity. If avoidance is determined to be infeasible, pursuant to CEQA *Guidelines* § 15126.4(b)(3)(C), a data recovery plan, which makes provisions for adequately recovering the scientifically consequential information from and about the historical resource, shall be prepared and adopted prior to any excavation being undertaken. Such studies shall be deposited with the California Historical Resources Regional Information Center.
- If the find represents a prehistoric resource, representatives of the Native American community shall be consulted as well under the provisions of AB 52 (**Section 3.19**). Construction shall not resume in the vicinity of the find until consultation is concluded or until a reasonably good-faith effort has failed to provide a resolution to further impacts that is acceptable to the consulting parties.
- If human remains are uncovered, all Proposed Project-related ground disturbances within 100 feet of the find shall halt until the County coroner and County/ appropriate agency have been notified and compliance with Section 15064.5 (e) (1) of the CEQA *Guidelines* and Health and Safety Code Section 7050.5 shall be required. The coroner shall ask the NAHC to identify a Most Likely Descendant (MLD), who will work with the construction contractor, appropriate agency, and the archaeologist to determine an appropriate avoidance or recovery methods or other treatment plan. Proposed Project-related ground disturbance in the vicinity

of the find shall not resume until the process detailed in CEQA *Guidelines* § 15064.5 (e) has been completed.

3.7 ENERGY

3.7.1 Environmental Checklist

ENERGY	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
Would the project:				
a) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	☐	☐	☒	☐
b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☐	☐	☐	☒

3.7.2 Setting

Regulatory Context

Warren-Alquist Act

The 1974 Warren-Alquist Act (PRC § 25000 et seq.) established the California Energy Commission (CEC) and created a State policy to reduce wasteful, uneconomical, and unnecessary uses of energy by employing a range of measures. The California Legislature continues to amend the Act to address pressing energy needs and issues, and the CEC publishes an updated version of the Act each year. The 2019 edition of the Warren-Alquist Act was published in February of 2019.

State of California Integrated Energy Policy Report

Senate Bill (SB) 1389 requires the CEC to adopt an Integrated Energy Policy Report (IEPR) every two years. The IEPR contains an assessment of major energy trends and issues facing the electricity, natural gas, and transportation fuel sectors within California. The IEPR provides policy recommendations to conserve resources; protect the environment; ensure reliable, secure, and diverse energy supplies; enhance the economy of California; and protect public health and safety.

The IEPR calls for the State to assist in the transformation of the transportation system to improve air quality, reduce congestion, and increase the efficient use of fuel supplies with the least environmental and energy costs. To further this policy, the IEPR identifies a number of strategies, including assistance to public agencies and fleet operators in implementing incentive programs for Zero Emission Vehicles and their infrastructure needs, and encouragement of urban designs that reduce vehicle miles traveled (VMT) and accommodate pedestrian and bicycle access.

The Draft 2019 IEPR was submitted for public comment on November 8, 2019 and covers a broad range of topics including decarbonizing buildings, integrating renewables, energy efficiency, energy equity, electricity reliability, climate adaptation activities for the energy sector, a natural gas assessment, a transportation energy demand forecast, and the California Energy Demand Forecast. The 2019 IEPR provides the results of the CEC assessments on a variety of energy issues facing California. Many of these issues will require action if the State is to meet its climate, clean energy, air quality, and other environmental goals while maintaining reliability and controlling costs.

Assembly Bill 1007 (Pavley)-Alternative Fuel Standards

AB 1007, (Pavley, Chapter 371, Statutes of 2005) required the CEC to prepare a State plan to increase the use of alternative fuels in California; therefore, the CEC prepared the State Alternative Fuels Plan in partnership with CARB and in consultation with other local, State, and federal agencies. The final State Alternative Fuels Plan, published in December 2007, attempts to achieve an 80% reduction in greenhouse gas (GHG) emissions associated with personal transportation, even as the population of California increases.

3.7.3 Discussion of Impacts

Question A

Would the project: Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?

Construction

Less than Significant. The Proposed Project involves replacing and upgrading pipeline segments and is not anticipated to use significant amounts of electricity during the construction or operation phases. Construction of the Proposed Project would consume energy primarily via fuels consumed by construction vehicles and equipment. Fossil fuels used for construction vehicles and other equipment would be used during site clearing, grading, and paving. Fuel consumed during construction would be temporary in nature and would not represent a significant demand on available fuel. There are no unusual characteristics that would necessitate the use of construction equipment that would be less energy efficient than at comparable construction sites in the region or State.

Additionally, Proposed Project-related design features and mitigation measures would provide fuel reduction during construction. Overall, fuel reductions are difficult to quantify; however, certain air quality emission reduction measures would also reduce fuel use during construction of the Proposed Project. For example, **Mitigation Measure AQ-1** would reduce fuel consumption by requiring the contractor to minimize equipment idling time. Additionally, all diesel-fueled construction vehicles would be required to meet the latest emissions standards. These measures would further reduce fuel use during all stages of construction and avoid the wasteful, inefficient, or unnecessary consumption of fuel energy. Therefore, construction of the Proposed Project would not result in inefficient, wasteful, or unnecessary consumption of fuel energy as it would comply with relevant standards. Construction impacts would be less than significant.

Operation

Less than Significant. As described in **Section 2.4.3**, the Proposed Project would be designed and constructed to comply with the SASD Design Standards. Additionally, the Proposed Project does not include any operational components that would increase energy use above existing conditions. Accordingly, the Proposed Project would not result in the wasteful, inefficient, or unnecessary consumption of energy resources. Operational impacts would be less than significant.

Question B

Would the project: Would the project: Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

No Impact. As described above, the Proposed Project would not require significant amounts of energy and would comply with applicable State and local energy standards, such as the County Design Standards. Therefore, the Proposed Project would not conflict with a State or local plan for renewable energy or energy efficiency. No impact would occur.

Cumulative Impacts

Less than Significant. As discussed above, several aspects of the Proposed Project would help manage the amount and efficiency of fuel energy consumption and would ensure that the related consumption is not inefficient, wasteful, or unnecessary, or place a significant demand on regional energy supplies. Therefore, impacts to energy resources resulting from the Proposed Project, combined with other past, present, or reasonably foreseeable future projects, would not result in a cumulative impact to which the Proposed Project would have a cumulatively considerable contribution.

3.7.4 Mitigation Measures

No mitigation measures would be required.

3.8 GEOLOGY/SOILS

3.8.1 Environmental Checklist

GEOLOGY/SOILS	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
Would the project:				
a) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving: i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map, issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42. ii) Strong seismic ground shaking? iii) Seismic-related ground failure, including liquefaction? iv) Landslides?	☐	☐	☒	☐
b) Result in substantial soil erosion or the loss of topsoil?	☐	☒	☐	☐
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☐	☒	☐
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?	☐	☐	☒	☐
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☐	☒
f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☒	☐	☐

3.8.2 Setting

Regulatory Context

Federal Earthquake Hazards Reduction Act

In October 1997, the U.S. Congress passed the National Earthquake Hazards Reduction (NEHR) Act to "reduce the risks to life and property from future earthquakes in the United States through the establishment and maintenance of an effective earthquake hazards and reduction program." To accomplish this, the act established the National Earthquake Hazards Reduction Program (NEHRP). This program was significantly amended in November 1990 by the NEHR Act, which refined the description of agency responsibilities, program goals, and objectives.

NEHRP's mission includes improved understanding, characterization, and prediction of hazards and vulnerabilities, improvement of building codes and land use practices, risk reduction through post-earthquake investigations and education, development and improvement of design and construction techniques, improvement of mitigation capacity, and accelerated application of research results. The NEHR Act designates Federal Emergency Management Agency (FEMA) as the lead agency of the program and assigns it several planning, coordinating, and reporting responsibilities. Other NEHR Act agencies include the National Institute of Standards and Technology, National Science Foundation, and the USGS.

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act was passed by the California Legislature to mitigate the hazard of surface faulting to structures. The Act's main purpose is to prevent the construction of buildings used for human occupancy on the surface trace of active faults. The Act addresses only the hazard of surface fault rupture and is not directed toward other earthquake hazards. Local agencies must regulate most development in fault zones established by the State Geologist. Before a project can be permitted in a designated Alquist-Priolo Fault Study Zone, cities and counties must require a geologic investigation to demonstrate that proposed buildings would not be constructed across active faults.

California Seismic Hazards Mapping Act

The California Seismic Hazards Mapping Act of 1990 (PRC §§ 2690–2699.6) addresses seismic hazards other than surface rupture, such as liquefaction and induced landslides. The Seismic Hazards Mapping Act specifies that the lead agency for a project may withhold development permits until geologic or soils investigations are conducted for specific sites and mitigation measures are incorporated into plans to reduce hazards associated with seismicity and unstable soils.

National Pollutant Discharge Elimination System Permit

The State Water Resources Control Board (SWRCB) administers regulations and permitting for the USEPA (55 CFR 47990) for pollution generated from stormwater under the National Pollutant Discharge Elimination System (NPDES). There are nine RWQCBs that implement the SWRCB's jurisdiction and require that an operator of any construction activities with ground disturbances of 1.0 acre or more obtain a Construction General Permit through the NPDES Stormwater Program. The Project Area is within the jurisdiction of the CVRWQCB. The Construction General Permit requires that the implementation of BMPs be employed to reduce sedimentation into surface waters and control erosion. The preparation of a

SWPPP addresses control of water pollution that includes the effects of sediments in the water during construction activities. These elements are further explained within **Section 3.11**, **Hydrology and Water Quality**.

Sacramento County General Plan

Applicable County General Plan goals, policies, and objectives include:

Safety Element – Seismic and Geologic Hazards

Goal Minimize the loss of life, injury, and property damage due to seismic and geological hazards.

Goal Minimize the loss of life, injury, and property damage due to flood hazards.

Citrus Heights California Code of Ordinances

Section 18-348 of the Citrus Heights California Code of Ordinances provides provisions for acquiring grading and clearing permits for any activities that involve the grading, filling, excavation, storage or disposal of 50 cubic yards or more of soil or earthly material.

Sacramento County Code

Chapter 16.44 of the Sacramento County Code provides provisions for acquiring grading and clearing permits for any activities that grade, fill, excavate, store or dispose of 350 cubic yards or more of soil or earthly material or clear and grub 1.0 acre or greater of land within the unincorporated area of the County.

Environmental Setting

Regional Geology

The Project Area is located in the foothills of Sierra Nevada, where the basement rocks are composed of Mesozoic metasedimentary and metavolcanic rocks of varying lithologies and ages. This basement is overlain by Miocene to Pleistocene alluvial fans of Mehrten (MPm), Laguna (Pl), and Turlock Lake Formations (Qtl). In the Project Area, these formations are covered by Pleistocene alluvial fans of Riverbank Formation (Qr) and undivided alluvial sediments of fans, terraces and basins (Qha). These undivided alluvial sediments are observed along Arcade Creek within the Project Area (**Appendix C**).

Site Topography

The topography of the Project Area exhibits the characteristics of both the uplands in the Sierra foothills and the floodplains of the Central Valley. Elevations in the Project Area range from approximately 80 feet above mean sea level (amsl) to approximately 115 feet amsl. Slopes range from relatively flat in places such as Project Site 3 to over 30% slopes in some locations along the steep hillsides and drainage banks of Project Sites 7 and 10, for example (**Appendix C**).

Regional Seismicity and Fault Zones

Sacramento is relatively distant from active faults exhibiting a high slip rate and comparatively frequent earthquake recurrence, such as the faults along the eastern edge of the Coast Range Mountains, faults along or within the Sierra Nevada foothills, San Andreas Fault, and related faults in the Bay Area. According to “Fault Activity Map of California,” the closest Quaternary fault zone to the Project Area is the

NW-SE oriented, Willows Fault Zone located approximately 5 miles southwest of the Project Area. This fault is concealed and does not rupture the surface (**Appendix C**, Plate 5). The closest known active fault to the Project Area is the Carson Range Fault, located approximately 83.4 miles to the northeast.

Although there are no known active faults in the County of Sacramento identified by the California Geological Survey, there is potential for strong ground shaking from nearby or distant seismic sources. Some of the most notable earthquakes that caused ground shaking in Sacramento were the 1892 Vacaville-Winters earthquakes, the 1906 San Francisco earthquake, the Oroville earthquake in 1975, the 1989 Loma Prieta earthquake, the 1992 Petrolia earthquake, the 1994 Double Spring Flat, Nevada earthquake, and the Lake Almanor earthquake in 2015 (**Appendix C**).

According to published maps of “Earthquake Shaking Potential for California” in 2016, peak ground acceleration values in the Project Area range from 0.3 and 0.4 g (acceleration of gravity) for an earthquake with a 2% probability of exceedance in 50 years. Along Arcade Creek and the American River channels, the value varies between 0.4 and 0.5 g (**Appendix C**, Plate 6).

Soils

The Geotechnical Investigation Report (**Appendix C**) provides detailed analysis of the soils and related geohazard mapping of the Project Sites and general region. Results indicated that the Project Area includes multiple soil types, including Mehrten (MPm), Laguna (Pl), and Turlock Lake Formations (Qtl). In the Project Sites, these formations are covered by Pleistocene alluvial fans of Riverbank Formation (Qr) and undivided alluvial sediments of fans, terraces and basins (Qha).

A soil’s rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil, while a soil’s rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. Analysis conducted for **Appendix C** concluded that soil samples taken in the Project Area were “negligibly corrosive” to "corrosive." The measured soil redox potentials in the soil samples ranged from 300 to 370 millivolts. These results are indicative of potentially “slightly corrosive” soils from anaerobic soil conditions. Corrosive-resistant piping materials have been incorporated into the design of the Proposed Project accordingly per these results.

Liquefaction is the sudden loss of soil strength caused by seismic forces acting on water-saturated, granular soil, leading to a “quicksand” condition generating various types of ground failure. Soils comprised of sand and sandy loams that are in areas with high groundwater tables or high rainfall are subject to liquefaction. For the majority of the soils and Project Sites, the liquefaction-induced settlements are negligible. **Appendix C** noted that Project Sites 2, 6, and 9 were located in areas with potential liquefaction-induced settlements.

The near-surface soils associated with the various Project Sites generally have a low plasticity and low expansion potential. The near-surface soils encountered at the Project Sites were predominantly alluvial deposits that consist of sandy silts/clays and lean clays. Those soils with a plasticity index above 15% have the potential to be expansive. Expansion potential of the near-surface soils at the Project Sites is considered low to moderate (**Appendix C**).

The Geotechnical Investigation Report (**Appendix C**) provided recommendations to ensure geotechnical soil stability for the Proposed Project, such as structural criteria for soil loading, soil stabilization measures, and maximum slopes. As stated in **Section 2.4.2**, all recommendations within **Appendix C** are considered to be components of the Proposed Project, were included in project design, and would be adhered to. Furthermore, as described in **Section 2.4.3**, all creek crossing improvements would adhere to SASD Design Standards and Sacramento County Standard Specifications.

Question A

Would the project: Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving ((i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map, issued by the State Geologist for the area or based on other substantial evidence of a known fault. Refer to Division of Mines and Geology Special Publication 42; ii) Strong seismic ground shaking; iii) Seismic-related ground failure, including liquefaction; iv) Landslides?

Less than Significant. Based on existing geologic maps and literature, there are no known active fault traces within, adjacent to, or trending towards the Project Sites. The closest known active fault to the Project Area is the Carson Range Fault, located approximately 83.4 miles to the northeast (**Appendix C**). The Project Area is not located within a Fault-Rupture Hazard Zone. Based on this information, the potential for surface fault rupture at any of the Project Sites is considered to be low. Additionally, as stated in Section 2.5 of **Appendix A**, earthquake loads based on typical design standards for the Sacramento area were considered in the design of each pipe replacement segment. Recommendations within the Geotechnical Investigation Report (**Appendix C**), such as structural criteria for soil loading, soil stabilization measures, and maximum slopes are considered to be components of the Proposed Project, were included in project design, and would be adhered to. Due to the low risk of fault rupture and the Proposed Project adhering to recommendations in the Geotechnical Investigation Report, impacts would be less than significant.

Question B

Would the project: Result in substantial soil erosion or the loss of topsoil?

Less than Significant with Mitigation. Construction of the Proposed Project would involve excavation and earth moving activities, as well as the construction of Proposed Project components such as piers and installation of riprap and anchored vegetative turf. Construction would result in the temporary disturbance of soil and would expose disturbed areas to potential storm events, which could generate accelerated runoff, localized erosion, and sedimentation. Construction activities could exacerbate soil erosion and result in the loss of topsoil; this is a potentially significant impact. Implementation of **Mitigation Measure HYD-1** would require construction activities to employ erosion and sediment control measures, as discussed in **Section 3.11**. This includes limiting ground disturbance areas, restoring disturbed areas to pre-construction contours, installing erosion control measures, and revegetating. Implementation of **Mitigation Measure HYD-1** would ensure that potential impacts resulting from soil erosion or the loss of topsoil would be reduced to a less-than-significant level.

Question C

Would the project: Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?

Less than Significant. As described above, for the majority of the soils within the Project Sites, the liquefaction-induced settlements are negligible, although Project Sites 2, 6, and 9 were located in areas with potential liquefaction-induced settlements. However, recommendations within the Geotechnical Investigation Report (**Appendix C**) relating to designing/replacing the pipeline segments to withstand potentially unstable soil conditions, such as structural criteria for soil loading, soil stabilization measures, and maximum slopes are considered to be components of the Proposed Project, were included in the design of the Proposed Project, and would be adhered to. Incorporation of design elements as part of the Proposed Project would reduce potential impacts to a less-than-significant level.

Question D

Would the project: Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?

Less than Significant. As described above, some of the Project Sites consist of soils that are potentially expansive and susceptible to liquefaction. However, recommendations within the Geotechnical Investigation Report (**Appendix C**) relating to designing/replacing the pipeline segments to withstand potentially expansive soil conditions were included in the design of the Proposed Project and would be adhered to. Furthermore, all pipelines would be upgraded and/or installed in compliance with the SASD's standards and design criteria. Incorporation of design elements as part of the Proposed Project would reduce potential impacts to less-than-significant levels.

Question E

Would the project: Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of wastewater?

No Impact. The Project Area consists of various soil types, of varying suitability for on-site wastewater disposal systems. However, no new on-site wastewater disposal system is being proposed. No impact would occur.

Question F

Would the project: Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

Less than Significant with Mitigation. As described in **Section 3.6.2**, no paleontological resources were observed within the Project Sites. However, there is always the potential, however remote, that previously unknown unique paleontological resources or sites could be encountered during subsurface construction activities. This is a potentially significant impact. In the event that paleontological resources or sites are found, **Mitigation Measure GEO-1** would ensure that the Proposed Project would not directly or indirectly destroy a unique paleontological resource. Furthermore, no unique geological features are

known to exist within the vicinity of the Project Sites. After implementation of **Mitigation Measure GEO-1**, impacts to paleontological resources would be less than significant.

Cumulative Impacts

Less than Significant with Mitigation. Implementation of the Proposed Project and other potential cumulative projects in the region, including growth resulting from build-out of the City and County General Plans could result in increased erosion and soil hazards, expose additional structures and people to seismic hazards, and potentially damage unique paleontological resources or sites. These impacts are mitigatable with implementation of construction-period erosion control programs, standard seismic safety measures incorporated in building design, and procedures for inadvertent paleontological discoveries. The Proposed Project would incorporate **Mitigation Measures HYD-1** and **GEO-1** to ensure a less-than-significant effect; therefore, the Proposed Project's contribution to potential cumulative impacts would be less than significant.

3.8.3 Mitigation Measures

GEO-1 Paleontological Resources

In the event of any inadvertent discovery of paleontological resources, all work within a 50-foot radius of the find shall be halted and the corresponding Project Site jurisdiction shall be notified. Workers shall avoid altering the materials until a professional paleontologist can evaluate the significance of the find and make recommendations to the appropriate jurisdiction on the measures that shall be implemented to protect the discovered resources.

3.9 GREENHOUSE GAS EMISSIONS

3.9.1 Environmental Checklist

Greenhouse Gas Emissions	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
Would the project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☒	☐

3.9.2 Setting

Regulatory Setting

The following regulatory background gives context to the issues of climate change and importance to reducing GHGs in California.

State and Local

Assembly Bill 1493

Signed by the California Governor in 2002, AB 1493 requires that CARB adopt regulations requiring a reduction in GHG emissions emitted by cars in the State. AB 1493 is intended to apply to 2009 and newer vehicles. On June 30, 2009, the USEPA granted a necessary CAA waiver for California to implement AB 1493.

Executive Order S-3-05

Executive Order (EO) S-3-05 was signed by the California Governor on June 1, 2005 and established the following State-wide emission reduction targets:

- Reduce GHG emissions to 2000 levels by 2010,
- Reduce GHG emissions to 1990 levels by 2020, and
- Reduce GHG emissions to 80% below 1990 levels by 2050.

EO S-3-05 created a Climate Action Team (CAT) headed by the California Environmental Protection Agency that included several other State agencies. The CAT is tasked by EO S-3-05 with outlining the

effects of climate change on California and recommending an adaptation plan, as well as creating a strategy to meet emission reduction targets.

California Global Warming Solutions Act of 2006 (AB-32)

Signed by the California Governor on September 27, 2006, AB 32 codifies a key requirement of EO S-3-05, specifically the requirement to reduce GHG emissions in California to 1990 levels by 2020. AB 32 tasks CARB with monitoring State sources of GHGs and designing emission reduction measures to comply with emission reduction requirements. However, AB 32 also continues the efforts of the CAT to meet the requirements of EO S-3-05 and states that the CAT should coordinate overall State climate policy.

To accelerate the implementation of emission reduction strategies, AB 32 requires that CARB identify a list of discrete early action measures that can be implemented relatively quickly. In October 2007, CARB published a list of early action measures that it estimated could be implemented and would serve to meet about 25% of the required 2020 emissions reductions (CARB, 2007). To assist CARB in identifying early action measures, the CAT published a report in April 2007 that updated their 2006 report and identified strategies for reducing GHG emissions (USEPA, 2007). In its October 2007 report, CARB cited the CAT strategies and other existing strategies that can be utilized to achieve the remainder of the emissions reductions (CARB, 2007). AB 32 requires that CARB prepare a comprehensive “scoping plan” that identifies all strategies necessary to fully achieve the required 2020 emissions reductions. Consequently, in December 2008, CARB released its scoping plan to the public; the plan was approved by CARB on December 12, 2008. An update to the Climate Change Scoping Plan occurred on May 22, 2014, and included new strategies and recommendations to ensure reduction goals of near-term 2020 are met with consideration of current climate science.

A second update to the Climate Change Scoping Plan was adopted on December 14, 2017. The 2017 Scoping Plan Update addresses the 2030 target established by SB 32, as discussed below, and establishes a proposed framework of action for California to meet a 40% reduction in GHG by 2030 when compared to 1990 levels. The key programs that the 2017 Scoping Plan Update builds on include the Cap-and-Trade Regulation, the Low Carbon Fuel Standard, an increase in the use of renewable energy in the State, and a reduction of methane emissions from agricultural and other wastes (CARB, 2017).

Executive Order S-01-07

EO S-01-07 was signed by the California Governor on January 18, 2007. It mandates a State-wide goal to reduce the carbon intensity of transportation fuels by at least 10% by 2020. This target reduction was identified by CARB as one of the AB 32 early action measures in the October 2007 report (CARB, 2007).

Senate Bill 375

SB 375 was approved by the California Governor on September 30, 2008. SB 375 provides for the creation of a new regional planning document called a “Sustainable Communities Strategy” (SCS). An SCS is a blueprint for regional transportation infrastructure and development that is designed to reduce GHG emissions from cars and light trucks to target levels set by CARB for 18 regions throughout California. Each of the various metropolitan planning organizations must prepare an SCS that is included in their respective regional transportation plan. An SCS influences transportation, housing, and land use planning. CARB then determines whether the SCS will achieve regional GHG emissions reduction goals.

Senate Bill 605

On September 21, 2014, the California Governor signed SB 605 that requires CARB to complete a comprehensive strategy to reduce emissions of short-lived climate pollutants in the State no later than January 1, 2016. As defined in the statute, short-lived climate pollutant means "an agent that has a relatively short lifetime in the atmosphere, from a few days to a few decades, and a warming influence on the climate that is more potent than that of carbon dioxide." SB 605, however, does not prescribe specific compounds as short-lived climate pollutants or add to the list of GHGs regulated under AB 32. In developing the strategy, CARB completed an inventory of sources and emissions of short-lived climate pollutants in the State based on available data, identified research needs to address any data gaps, identified existing and potential new control measures to reduce emissions, and prioritized the development of new measures for short-lived climate pollutants that offer co-benefits by improving water quality or reducing other air pollutants that impact community health and benefit disadvantaged communities.

The final strategy released by CARB in March 2017 focuses on methane (CH_4), black carbon, and fluorinated gases, particularly hydrofluorocarbons (HFC), as important short-lived climate pollutants. The final strategy recognizes emission reduction efforts implemented under AB 32 (e.g., refrigerant management programs) and other regulatory programs (e.g., in-use diesel engines and solid waste diversion). The measures identified in the final strategy and their expected emission reductions will feed into the update to the CARB Scoping Plan.

Executive Order B-30-15

EO B-30-15 was signed by the California Governor on April 29, 2015. It sets interim GHG targets of 40% below 1990 by 2030, to ensure California will meet its 2050 targets set by EO S-3-05. It also directs the CARB to update the Climate Change Scoping Plan. The 2030 Target Scoping Plan Concept Paper was released on June 17, 2016.

Senate Bill 350

SB 350 codifies the GHG targets for 2030 set by EO B-30-15. To meet these goals, SB 350 also raises the California Renewables Portfolio Standard (RPS) from 33 percent renewable generation by 2020 to 50% renewable generation by December 31, 2030.

Senate Bill 32

Additionally, SB 32, signed in 2016, further strengthens AB 32 with goals of reducing GHG emissions to 40% below 1990 levels by 2030. Based on GHG emissions inventory data compiled by CARB through 2017 and the emission limit of 431 million metric tons (MT) of carbon dioxide equivalents (CO_2e) established in the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report, California emission reduction goals for near-term 2020 will be met.

California Renewable Portfolio Standards - SB 1078, SB 350, and SB 100

The California RPS program was established in 2002 by SB 1078 and requires retail sellers of electricity, including investor-owned utilities and community choice aggregators, to provide a certain percentage of their supply from renewable sources. The initial requirement was for at least 20% of electricity retail sales to be served by renewable resources by 2017. The RPS program was accelerated in 2015 with SB 350

which mandated a 50% RPS by 2030. In 2018, SB 100 was signed into law, which again increased the RPS to 60% by 2030 and requires all electricity in the State to come from carbon-free resources by 2045.

California Green Building Standards Code

The California Green Building Standards Code (CALGreen) requires that at least 50% of the weight of non-hazardous job site debris generated by new construction be recycled, reused, or otherwise diverted from landfill disposal. CALGreen requires submission of plans and verifiable post-project documentation to demonstrate compliance.

CEQA Guidelines

Under CEQA, GHG impacts are exclusively cumulative impacts because no single project could, by itself, result in a substantial change in climate (CEQA *Guidelines* § 15064.4(b)). Therefore, the evaluation of cumulative GHG impacts presented below evaluates whether the Proposed Project would make a considerable contribution to cumulative climate change effects.

In April 2020, SMAQMD adopted an update to their land development project operational GHG threshold, which requires a project to demonstrate consistency with CARB's 2017 Climate Change Scoping Plan. The Sacramento County Board of Supervisors adopted the updated GHG threshold in December 2020. SMAQMD's technical support document, "Greenhouse Gas Thresholds for Sacramento County," identifies operational measures that should be applied to a project to demonstrate consistency.

All projects must implement Tier 1 BMPs to demonstrate consistency with the Climate Change Scoping Plan. After implementation of Tier 1 BMPs, project emissions are compared to the operational land use screening levels table (equivalent to 1,100 MT of CO_2e per year). If a project's operational emissions are less than or equal to 1,100 MT of CO_2e per year after implementation of Tier 1 BMPs, the project will result in a less than cumulatively considerable contribution and has no further action. Tier 1 BMPs include:

- BMP 1. No Natural Gas: projects shall be designed and constructed without natural gas infrastructure.
- BMP 2. Electric Vehicle (EV) Ready: projects shall meet the current CalGreen Tier 2 standards.
- EV capable requires the installation of "raceway" (the enclosed conduit that forms the physical pathway for electrical wiring to protect it from damage) and adequate panel capacity to accommodate future installation of a dedicated branch circuit and charging station(s)
- EV ready requires all EV capable improvements plus installation of dedicated branch circuit(s) (electrical pre-wiring), circuit breakers, and other electrical components, including a receptacle (240-volt outlet) or blank cover needed to support future installation of one or more charging stations

Projects that implement BMP 1 and BMP 2 can utilize the screening criteria for operation emissions outlined in **Table 3-6**. Projects that do not exceed 1,100 MT per year are then screened out of further requirements.

TABLE 3-6. SMAQMD CEQA THRESHOLDS OF SIGNIFICANCE FOR GHGS

LAND DEVELOPMENT AND CONSTRUCTION PROJECTS		
POLLUTANT	**CONSTRUCTION**	**OPERATION**
GHGs	1,100 MT of CO_2e/yr	1,100 MT of CO_2e/yr
Source: SMAQMD, 2020		

Environmental Setting

"Global warming" and "climate change" are common terms used to describe the increase in the average temperature of the earth's near-surface air and oceans since the mid-20th century. Natural processes and human actions have been identified as impacting climate. The IPCC has concluded that variations in natural phenomena such as solar radiation and volcanoes produced most of the warming from pre-industrial times to 1950 and had a small cooling effect afterward. Since the 19th century however, increasing GHG concentrations resulting from human activity such as fossil fuel combustion, deforestation, and other activities are believed to be a major factor in climate change. GHGs in the atmosphere naturally trap heat by impeding the exit of solar radiation that has hit the earth and is reflected back into space—a phenomenon sometimes referred to as the "greenhouse effect." Some GHGs occur naturally and are necessary to keep the earth's surface inhabitable. However, increases in the concentrations of these gases in the atmosphere during the last 100 years have trapped solar radiation and decreased the amount that is reflected back into space, intensifying the natural greenhouse effect and resulting in the increase of global average temperature (IPCC, 2014).

CO_2, CH_4, nitrous oxide (N_2O), HFCs, perfluorocarbons (PFC), and sulfur hexafluoride (SF_6) are the principal GHGs. When concentrations of these gases exceed historical concentrations in the atmosphere, the greenhouse effect is intensified. CO_2, CH_4, and N_2O occur naturally and are also generated through human activity. Emissions of CO_2 are largely by-products of fossil fuel combustion, whereas CH_4 results from off-gassing, natural gas leaks from pipelines and industrial processes, and incomplete combustion associated with agricultural practices, landfills, energy providers and other industrial facilities. Other human-generated GHGs include fluorinated gases such as HFCs, PFCs, and SF_6, which have much higher heat-absorption potential than CO_2, and are byproducts of certain industrial processes (IPCC, 2014).

CO_2 is the reference gas for climate change, and is the GHG emitted in the highest volume. The effect that each GHG has on global warming is the product of the mass of their emissions and their Global Warming Potential (GWP). GWP indicates how much a gas is predicted to contribute to global warming relative to how much warming would be predicted to be caused by the same mass of CO_2. For example, CH_4 and N_2O are substantially more potent GHGs than CO_2, with GWPs of approximately 30 and approximately 275 times that of CO_2, which has a GWP of 1 (IPCC, 2014).

In emissions inventories, GHG emissions are typically reported as MT of CO_2e. CO_2e is calculated as the product of the mass emitted by a given GHG and its specific GWP. While CH_4 and N_2O have much higher GWPs than CO_2, CO_2 is emitted in higher quantities and accounts for the majority of GHG emissions in CO_2e, both from commercial developments and human activity (IPCC, 2014).

3.9.3 Discussion of Impacts

Given the global nature of climate change impacts, individual project impacts are most appropriately addressed in terms of the incremental contribution to global cumulative impacts. This approach is consistent with the view articulated by the IPCC *Change Fifth Assessment Report* (IPCC, 2014). Therefore, this analysis is of the cumulative impacts related to climate change.

Methodology

The Proposed Project's short-term construction-related GHG emissions were estimated using the RCEM. The model quantifies GHG emissions from construction (including vehicle use), as well as indirect GHG emissions, such as GHG emissions from energy use, solid waste, vegetation planting and/or removal, and water use. The site-specific inputs and assumptions used for the purposes of GHG emissions modeling are listed in **Section 3.4.3**.

Questions A and B

Would the project: Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment; or Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

Construction

Less than Significant. Construction of the Proposed Project would emit GHG emissions from the combustion of diesel fuel in heavy equipment. As shown in **Table 3-7**, emissions generated by construction of the Proposed Project would be approximately 440 MT of CO_2e. Construction GHG emissions are a one-time release and are typically considered separate from operational emissions, as global climate change is inherently a cumulative effect that occurs over a long period of time and is quantified on a yearly basis. As shown in **Table 3-7**, project construction emissions would be below the SMAQMD threshold of 1,100 MT of CO_2e per year. Therefore, construction-related GHG impacts are considered less than significant.

TABLE 3-7. CONSTRUCTION GHG EMISSIONS

SOURCE	GHG
	MT OF CO_2E
Construction-Related GHG Emission	**440**
SMAQMD Significance Threshold	*1,100*
Exceed SMAQMD threshold?	No
Source: **Appendix I**	

Operation

Less than Significant. As described above in **Section 3.4.3**, operation of the Proposed Project would require maintenance of sewer pipelines and appurtenant structures. However, maintenance activities would result in a negligible increase in additional traffic, and the resulting additional trips added to the roadway network would not cause an exceedance of the SMAQMD GHG thresholds. As described above,

SMAQMD requires all projects to implement Tier 1 BMPs to reduce GHG emissions. However, these requirements are not applicable, as the Proposed Project does not involve the development of buildings of permanent parking spaces. Accordingly, because construction emissions from the Proposed Project would be below the SMAQMD thresholds of significance and no operational GHG emissions would be generated, the Proposed Project would not generate GHG emissions, either directly or indirectly, that would have a significant impact on the environment or conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs. The Proposed Project's contribution to cumulative effects associated with climate change is considered less than significant.

Cumulative Impacts

Less than Significant. Under CEQA, GHG impacts are exclusively cumulative impacts because no single project could, by itself, result in a substantial change in climate (CEQA *Guidelines* § 15064.4(b)). Therefore, the evaluation of GHG impacts presented above evaluates whether the Proposed Project would make a considerable contribution to cumulative climate change effects.

3.9.4 Mitigation Measures

No mitigation measures would be required.

3.10 HAZARDS AND HAZARDOUS MATERIALS

3.10.1 Environmental Checklist

HAZARDS AND HAZARDOUS MATERIALS	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☒	☐	☐
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☒	☐	☐
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☒	☐	☐
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code § 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the Project Area?	☐	☐	☐	☒
f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☒	☐
g) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?	☐	☐	☐	☒

3.10.2 Setting

Regulatory Context

Definition of Hazardous Material

A material is considered hazardous if it appears on a list of hazardous materials prepared by a federal, State, or local agency, or if it has characteristics defined as hazardous by such an agency. A hazardous material is defined in Title 22 of the CCR as:

> *A substance or combination of substances which, because of its quantity, concentration, or physical, chemical or infectious characteristics, may either (1) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or (2) pose a substantial present or potential hazard to human health or environment when improperly treated, stored, transported or disposed of or otherwise managed" (CCR, Title 22, Section 66260.10).*

U.S. Environmental Protection Agency

The USEPA administers numerous statutes pertaining to human health and the environment. The USEPA regulates toxic air contaminants through its implementation of the CAA. Although the CAA covers a range of air pollutants, Section 112(r) specifically covers "extremely hazardous materials" which include acutely toxic, extremely flammable, and highly explosive substances. The USEPA also regulates the land disposal of hazardous materials through the Resource Conservation and Recovery Act (RCRA). Under RCRA, the USEPA regulates the activities of waste generators, transporters, and handlers (any individual who treats, stores, and/or disposes of a designated hazardous waste). RCRA further requires the tracking of hazardous waste from its generation to its final disposal through a process often referred to as the "cradle-to-grave" regulation. The "cradle-to-grave" regulation requires detailed documentation and record keeping for hazardous materials generators, transporters, and/or handlers in order to ensure proper accountability for violations (USEPA, 2020).

Comprehensive Environmental Response, Compensation, and Liability Act

The Comprehensive Environmental Response, Compensation, and Liability Act provides a federal fund to clean up uncontrolled or abandoned hazardous-waste sites as well as accidents, spills, and other emergency releases of pollutants and contaminants into the environment. Through various enforcement mechanisms, the USEPA obtains private party cleanup orders and recovers costs from financially viable individuals and companies once a response action has been completed. Uncontrolled or abandoned hazardous waste site identification, monitoring, and response activities in states are coordinated though the state environmental protection or waste management agencies.

Federal Occupational Safety and Health Administration

OSHA regulates the preparation and enforcement of occupational health and safety regulations with the goal of providing employees a safe working environment. OSHA regulations apply to the work place and cover activities ranging from confined space entry to toxic chemical exposure. OSHA regulates workplace exposure to hazardous chemicals and activities through regulations governing work place procedures and equipment.

U.S. Department of Transportation

The U.S. Department of Transportation regulates the interstate transport of hazardous materials and wastes through implementation of the Hazardous Materials Transportation Act. This act specifies driver-training requirements, load labeling procedures, and container design and safety specifications. Transporters of hazardous wastes must also meet the requirements of additional statutes such as RCRA, discussed previously.

Department of Toxic Substances Control

The California Department of Toxic Substances Control (DTSC) regulates the generation, transportation, treatment, storage, and disposal of hazardous waste under RCRA and the State Hazardous Waste Control Law. Both laws impose “cradle-to-grave” regulatory systems for handling hazardous waste in a manner that protects human health and the environment.

California Occupational Safety and Health Administration

California Occupational Safety and Health Administration (Cal/OSHA) assumes primary responsibility for developing and enforcing workplace safety regulations in the State. Cal/OSHA regulations concerning the use of hazardous materials in the workplace, as detailed in Title 8 of the CCR, include requirements for safety training, availability of safety equipment, accident and illness prevention programs, hazardous substance exposure warnings, and emergency action and fire prevention plan preparation.

Cal/OSHA enforces hazard communication program regulations that contain training and information requirements, including procedures for identifying and labeling hazardous substances, communicating hazard information related to hazardous substances and their handling, and preparation of health and safety plans to protect workers and employees at hazardous waste sites. The hazard communication program requires that Safety Data Sheets be available to employees and that employee information and training programs be documented.

Regional Water Quality Control Board

The SWRCB and RWQCBs also regulate hazardous substances, materials, and wastes through a variety of State statutes including, for example, the Porter Cologne Water Quality Control Act, Cal. Water Code § 13000 et seq., and the underground storage tank cleanup laws (CA Health and Safety Code §§ 25280-25299.8). RWQCBs regulate all pollutant or nuisance discharges that may affect either surface water or groundwater. Any person proposing to discharge waste within any region must file a report of waste discharge with the appropriate regional board. The Project Area is located within the jurisdiction of the CVRWQCB.

3.10.3 Discussion of Impacts

Question A

Would the project: Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

Less than Significant with Mitigation. The Proposed Project involves improving various sewer mainline segments across the County of Sacramento. The 12 pipeline crossings have been identified by SASD as

part of their Sewer System Management Plan (2021) for improvement due to degrading site conditions such as structural failure and support failure due to erosion, undermining, or exposure. Construction of the Proposed Project would require site preparation activities, such as excavation at the pipeline locations. During construction, oil, diesel fuel, gasoline, hydraulic fluid, and other liquid hazardous materials could be used. If spilled, these substances could pose a risk to the environment or human health. This is a potentially significant impact. **Mitigation Measure HYD-1** would require construction activities to comply with either the California NPDES Construction General Permit and/or develop an ESCP, which would address potential leaks and spills from vehicles and construction equipment. With implementation of **Mitigation Measure HYD-1** and adherence to regulatory requirements, potential impacts associated with hazardous materials during construction activities would be less than significant.

Once constructed, the Proposed Project would transport sewage through the various improved pipelines. Although sewer pipelines would convey potentially hazardous sewage waste, sewage would be contained within the pipe and therefore would not create a significant hazard to the public or the environment. As described in **Section 2.4** and **Section 3.8**, the pipelines are specifically being replaced to improve the condition and safety of the pipes and have been designed to withstand potential disruption or corrosion and ultraviolet radiation. With the implementation of **Mitigation Measure HYD-1** and incorporation of design elements as part of the Proposed Project, impacts would be reduced to a less-than-significant level.

Question B

Would the project: Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?

Less than Significant with Mitigation. As discussed above, construction and operation of the Proposed Project could potentially create a hazard to the public or the environment in the event of an accidental release of hazardous materials into the environment. This is a potentially significant impact. However, **Mitigation Measure HYD-1** and incorporation of appropriate material and design elements as outlined in **Appendix B**, would reduce impacts to a less-than-significant level.

Question C

Would the project: Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?

Less than Significant with Mitigation. There are several schools within the boundaries of the Project Area. During construction, oil, diesel fuel, gasoline, hydraulic fluid, and other liquid hazardous materials could be used. If spilled, these substances could pose a risk to the environment or human health. This is a potentially significant impact. **Mitigation Measure HYD-1** would require implementation of erosion and sedimentation BMPs, which address potential leaks and spills from vehicles and construction equipment. Once construction is complete, components of the Proposed Project would be improved and returned to pre-construction conditions and there would be no operational risks related to hazardous materials. Therefore, impacts related to the handling of hazardous materials within one-quarter mile of a school would be less than significant with mitigation.

Question D

Would the project: Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code § 65962.5 and, as a result, would it create a significant hazard to the public or the environment?

No Impact. The Hazardous Waste and Substances Sites (Cortese) List is a planning tool used by the State, local agencies, and developers to comply with CEQA requirements in providing information about the location of hazardous materials release sites. The Cortese list is prepared in accordance with California Government Code § 65962.5. The List of Hazardous Waste and Substances sites from DTSC EnviroStor and the SWRCB GeoTracker databases were reviewed to locate "Cortese List" sites. No sites of Potential Environmental Concern and/or Clean Up sites occur within 2,000 feet of any Project Site location (EnviroStor, 2022; GeoTracker, 2022). Therefore, the Proposed Project would not create a significant hazard to the public or the environment. No impact would occur.

Question E

For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the Project Area?

No Impact. The Project Area is not within an airport land use plan or overlapping an airport safety zone or established noise contour. Neither temporary construction activities nor operations of the Proposed Project would affect the safe operations of any local airport. The Proposed Project would not result in a safety hazard or excessive noise for people residing or working in the vicinity of a private airstrip. No impact would occur.

Question F

Would the project: Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

Less than Significant. Construction of the Proposed Project could result in temporary lane closures. Lane closures, if not properly regulated, could potentially interfere with an adopted emergency response or evacuation plan. This would be a potentially significant impact. However, as described in **Appendix B**, Special Provision SP-23, a traffic control plan would be prepared in accordance with Section 12-4.02 of the County Specifications and submitted for review and approval to the County. Therefore, with implementation of a traffic control plan, the Proposed Project would not interfere with an adopted emergency response plan or emergency evacuation plan in place through the State, County, or City. Impacts would be less than significant.

Question G

Would the project: Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?

No Impact. The Project Area is urban in nature and largely developed. As described in **Section 3.21**, the Project Area is located in a Non-Very High Fire Hazard Severity Zone (VHFHSZ) within a Local

Responsibility Area (LRA) (California Department of Forestry and Fire Protection [CAL FIRE], 2008). Furthermore, the Project Area does not involve unique slopes or other factors that would exacerbate wildfire risks. The Proposed Project would not expose people or structures to a significant risk of loss, injury, or death involving wildland fires. No impact would occur.

Cumulative Impacts

Less than Significant with Mitigation. Hazard-related impacts are site specific (i.e., have the potential to affect only a limited area). Various existing and proposed development infrastructure, including residential, industrial, and public facilities in the vicinity of the Project Area would all involve the storage, use, disposal, and transport of hazardous materials to varying degrees during construction and operations; hazardous materials utilized during construction and operations of the Proposed Project would be limited to the individual Project Sites.

Construction of the Proposed Project could potentially have adverse impacts associated with hazards and hazardous materials. **Mitigation Measure HYD-1** and incorporation of design elements as part of the Proposed Project would mitigate potential impacts from accidental release of hazardous materials to a less-than-significant level. Reduction of on-site hazardous related impacts, as discussed above, would ensure that construction activities would not result in impacts that would be cumulatively considerable. Operation of the Proposed Project and cumulative projects could result in a cumulative impact if these projects were to result in potential exposure of hazardous materials to sensitive individuals or the general public-at-large, or if additional projects in the vicinity were to include the use or storage of hazardous materials. Because any hazardous materials use would be properly contained onsite, operation of the Proposed Project would not contribute to cumulatively considerable hazardous impacts.

3.10.4 Mitigation Measures

Implement **Mitigation Measure HYD-1**.

3.11 HYDROLOGY AND WATER QUALITY

3.11.1 Environmental Checklist

HYDROLOGY/WATER QUALITY	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
Would the project:				
a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	☐	☒	☐	☐
b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	☐	☐	☒	☐
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would: i) result in a substantial erosion or siltation on- or off-site; ii) substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite; iii) create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or iv) impede or redirect flood flows?	☐	☒	☐	☐
d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	☐	☐	☒	☐
e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	☒	☐	☐

3.11.2 Setting

Regulatory Context

Clean Water Act

The CWA (33 USC §§ 1251-1376), as amended by the Water Quality Act of 1987, is the major federal legislation governing water quality. The objective of the CWA is "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." Important sections of the Act are as follows:

- Sections 303 and 304 provide for water quality standards, criteria, and guidelines. Under Section 303(d) of the CWA, the USEPA publishes a list every two years of impaired bodies of water for which water quality objectives are not attained. Total Maximum Daily Loads are established for contaminants of concern in order to ensure contamination levels decrease over time.
- Section 401 (Water Quality Certification) requires an applicant for any federal permit that proposes an activity, which may result in a discharge to waters of the U.S. to obtain certification from the State that the discharge will comply with other provisions of the Act.
- Section 402 establishes the NPDES, a permitting system for the discharge of any pollutant (except for dredged or fill material) into waters of the U.S. This permit program is administered by the SWRCB and is discussed in detail below.
- Section 404 establishes a permit program for the discharge of dredged or fill material into waters of the U.S. This permit program is jointly administered by USACE and the USEPA.

Federal Anti-Degradation Policy

The federal Anti-Degradation Policy is part of the CWA (Section 303(d)) and is designed to protect water quality and water resources. The policy directs states to adopt a state-wide policy that includes the following primary provisions: 1) existing instream uses and the water quality necessary to protect those uses shall be maintained and protected; 2) where existing water quality is better than necessary to support fishing and swimming conditions, that quality shall be maintained and protected unless the state finds that allowing lower water quality is necessary for important local economic or social development; and 3) where high-quality waters constitute an outstanding national resource, such as waters of national and state parks, wildlife refuges, and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected.

Safe Drinking Water Act

Under the Safe Drinking Water Act (SDWA) (Public Law 93-523), passed in 1974, USEPA regulates contaminants of concern to domestic water supply. Contaminants of concern relevant to domestic water supply are defined as those that pose a public health threat or that alter the aesthetic acceptability of the water. These types of contaminants are regulated by USEPA primary and secondary Maximum Contaminant Levels (MCL). MCLs and the process for setting these standards are reviewed triennially. Amendments to the SDWA enacted in 1986 established an accelerated schedule for setting drinking water MCLs.

National Pollution Discharge Elimination System

Under Section 402(p) of the CWA, the USEPA established the NPDES to enforce discharge standards from a variety of sources. Both point source and non-point-source pollution is covered under the NPDES. Dischargers in both categories can apply for individual discharge permits, or apply for coverage under the Construction General Permits that cover certain qualified dischargers. Point source discharges come from "any discernible, confined, and discrete conveyance," including municipal and industrial wastewater, stormwater runoff, combined sewer overflows, sanitary sewer overflows, and municipal separated storm sewer systems. NPDES permits impose limits on the pollutants discharged based on minimum performance standards or the quality of the receiving water, whichever type is more stringent in a given situation.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act (California Water Code Section 13000 et seq.) provides the basis for water quality regulation within California. The Act requires a "Report of Waste Discharge" for any discharge of waste (liquid, solid, or otherwise) to land or surface waters that may impair a beneficial use of surface or groundwater of the State. The RWQCB implements waste discharge requirements identified in the report.

State Non-Degradation Policy

In 1968, as required under the federal Anti-Degradation Policy described previously, the SWRCB adopted a Non-Degradation Policy aimed at maintaining high quality for waters in California. The Non-Degradation Policy states that the disposal of wastes into State waters shall be regulated to achieve the highest water quality consistent with maximum benefit to the people of the State and to promote their peace, health, safety, and welfare. The policy provides as follows:

1. Where the existing quality of water is better than required under existing water quality control plans, such quality would be maintained until it has been demonstrated that any change would be consistent with maximum benefit to the people of the State and would not unreasonably affect present and anticipated beneficial uses of such water.
2. Any activity which produces waste or increases the volume or concentration of waste and which discharges to existing high-quality waters would be required to meet WDRs that would ensure 1) pollution or nuisance would not occur and 2) the highest water quality consistent with the maximum benefit to the people of the State would be maintained.

Sacramento County 2030 General Plan

Applicable County General Plan goals, policies, and objectives include:

Delta Protection Element

GOAL	Protect and enhance long-term water quality in the Delta for agriculture, municipal, industrial, water-contact recreation, and fish and wildlife habitat uses, as well as all other beneficial uses.

Conservation Element

GOAL	Ensure that a safe, reliable water supply is available for existing and planned urban development and agriculture while protecting beneficial uses of waters of the State of California, including important associated environmental resources.
Objective	Manage groundwater to preserve sustainable yield.

Safety Element

GOAL	Minimize the loss of life, injury, and property damage due to flood hazards.

City of Citrus Heights General Plan

Applicable City General Plan goals, policies, and objectives include:

Resource Conservation

Goal 37	Ensure that surface and groundwater quality supports public use, enjoyment, and a healthy aquatic environment.

Environmental Setting

The Project Sites are within the lower American River watershed and within the large Sacramento Valley North American Sub-basin (CDWR, 2019). FEMA oversees the delineation of flood zones and the provision of federal disaster assistance. FEMA manages the National Flood Insurance Program and publishes the Flood Insurance Rate Maps, that show the expected frequency and severity of flooding by area, typically for the existing land use and type of drainage/flood control facilities present. The Project Sites are primarily located within Zone X determined to be outside the 0.2% annual chance floodplain. However, the creek channels, incised into the alluvial plain of Zone X, are prone to flooding. The channels are classified as Zone AE, or “Area inundated by the base flood with flood depths of 1 to 3 feet (usually areas of ponding) and base flood elevations determined” (**Appendix B**, Plate 7). All Project Sites contain creek channels in which work would be performed. These channels are detailed in **Appendix F**.

3.11.3 Discussion of Impacts

Question A

Would the project: Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?

Less than Significant with Mitigation. Construction of the Proposed Project could potentially violate water quality standards or WDRs, as construction equipment and materials have the potential to result in accidental discharge of pollutants into water resources while working in and around these features. This would be a potentially significant impact. Potential pollutants include particulate matter, sediment, oils and greases, concrete, and adhesives. Implementation of **Mitigation Measure HYD-1** would require construction activities to either comply with the California NPDES Construction General Permit and/or develop an ESCP. This includes limiting ground disturbance areas, restoring disturbed areas to pre-construction contours, erosion control measures, and revegetation. Disturbed areas would be restored to pre-construction conditions and once operational, the Proposed Project would not generate potential pollutants that could affect water quality. Additionally, **Mitigation Measures BIO-6** would require dry-

season work (May 1 – October 15) as well as the placement of temporary mats over the seasonal wetland on Project Site 2. With implementation of **Mitigation Measures BIO-6** and **HYD-1**, impacts related to water quality standards would be less than significant.

Question B

Would the project: Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?

Less than Significant. The Proposed Project would not require groundwater supplies and disturbed areas would be restored to pre-construction conditions, with only a minimal additional impervious surface added with some modification to existing impervious surfaces, which would not significantly inhibit groundwater recharge. No impact to groundwater resources would occur.

Question C

Would the project: Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would: i) result in a substantial erosion or siltation on- or off-site; ii) substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite; iii) create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or iv) impede or redirect flood flows?

Less than Significant with Mitigation. The Proposed Project would not substantially alter the existing drainage pattern of the area around the Project Sites, as grading is proposed to reduce existing scouring and disturbed areas would be restored to pre-construction conditions. However, construction of the Proposed Project has the potential to result in erosion, siltation, temporary changes to drainage patterns, and contamination of stormwater. This would be a potentially significant impact. Implementation of **Mitigation Measure HYD-1** would require construction activities to either comply with the California NPDES Construction General Permit and/or develop an ESCP. This would include implementation of BMPs during construction to reduce the potential for impacts associated with erosion and exceeding water quality thresholds. Implementation of BMPs such as fiber rolls, hay bales, and silt fencing, would reduce the potential for sediment and stormwater runoff containing pollutants from entering receiving waters. Additionally, **Mitigation Measure BIO-6** would require all aquatic resource permits to be acquired and for additional bank restoration and invasive species removal. With the implementation of **Mitigation Measure HYD-1** and **BIO-6**, impacts related to alterations in drainage patterns and impervious surfaces would be less than significant.

Question D

Would the project: In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?

Less than Significant. None of the Project Sites are within a tsunami zone (DOC, 2009). The Project Sites are primarily located outside of the 0.2% annual chance floodplain (FEMA-defined Zone X). However, the creek channels, incised into the alluvial plain of Zone X, are prone to flooding. The channels

are classified as Zone AE, or "Area inundated by the base flood with flood depths of 1 to 3 feet (usually areas of ponding) and base flood elevations determined" (**Appendix B**, Plate 7). Although the creek channels are naturally prone to flooding, the Proposed Project would not risk release of pollutants due to project inundation. The Proposed Project would follow specific design criteria as well as SASD construction and maintenance standards, designed to reduce the potential for leaks or discharge. Once construction is complete, all improved pipelines would be fortified, improved, and stabilized. The pipelines would be more resistant to flood hazards and the potential risk of pollutant discharge would be reduced. Impacts would be less than significant.

Question E

Would the project: Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

Less than Significant with Mitigation. Water quality in stormwater runoff is regulated by the SWRCB, which facilitates local compliance with the CWA. As described in Question A above, construction of the Proposed Project could potentially violate water quality standards or WDRs, as construction equipment and materials have the potential to result in accidental discharge of pollutants into water resources. This would be a potentially significant impact. However, **Mitigation Measure HYD 1** would require coverage under the NPDES Construction General Permit for construction activities, which would ensure that the Proposed Project would not violate water quality standards or discharge pollutants. Furthermore, the Proposed Project would not use groundwater supplies or obstruct groundwater recharge due to the minimal addition of impervious surfaces. With implementation of **Mitigation Measure HYD 1**, impacts would be less than significant.

Cumulative Impacts

Less than Significant with Mitigation. The Proposed Project and potential cumulative projects in the vicinity of the Project Sites would be required to either obtain coverage under the NPDES Construction General Permit or develop an ESCP (or similar), which is intended to reduce the potential for cumulative impacts to water quality during construction (refer to **Mitigation Measure HYD-1**). Therefore, impacts on cumulative construction-related water quality effects would be less than significant after compliance with **Mitigation Measure HYD-1**. Additionally, the Proposed Project would result in many newly stabilized and restored creek banks as part of project design.

Cumulative development projects and the Proposed Project would be subject to local, State, and federal regulations designed to minimize cumulative impacts to hydrology and water resources. Mitigation measures for the Proposed Project in combination with compliance with City, State, and federal regulations, are expected to reduce cumulatively considerable impacts to a less-than-significant level.

3.11.4 Mitigation Measures

HYD-1 Erosion Control

Construction of sewer mainline segments would take place at varying locations and within individual construction timelines. If it's determined that a specific pipeline segment requires coverage under the NPDES Construction General Permit, the Applicant shall obtain coverage prior to initiation of construction activities. The SWRCB requires that construction sites have adequate control measures to reduce the

discharge of sediment and other pollutants to streams to ensure compliance with Section 303 of the CWA. To comply with the NPDES permit, a Notice of Intent shall be filed with the SWRCB and a SWPPP shall be approved prior to construction. The SWPPP shall include a detailed, site-specific listing of the potential sources of stormwater pollution; pollution prevention measures (erosion and sediment control measures and measures to control non-stormwater discharges and hazardous spills) including a description of the type and location of erosion and sediment control BMPs to be implemented at the Project Site; and a BMP monitoring and maintenance schedule to determine the amount of pollutants leaving the Project Site. A copy of the SWPPP shall be kept on the Project Site.

If it's determined that coverage under the NPDES Construction General Permit is not required, the Applicant shall complete an ESCP in accordance with Sacramento County Standard Specification Section 10-4. The ESCP shall be approved by the engineer prior to the beginning of any construction activity. The contractor shall maintain a copy of the ESCP at the project site.

3.12 LAND USE/PLANNING

3.12.1 Environmental Checklist

LAND USE/PLANNING	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
Would the project:				
a) Physically divide an established community?	☐	☐	☐	☒
b) Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☒

3.12.2 Setting

Regulatory Context

Sacramento County General Plan

Applicable County General Plan goals, policies, and objectives include:

Public Facilities Element – Wastewater Collection and Treatment

Goal — Safe, efficient, and environmentally sound public sewer system and treatment facility serving all urban development.

Environmental Setting

The Project Area encompasses 12 sewer mainline segments located within the City of Citrus Heights, the unincorporated areas of Carmichael, and Fair Oaks, within Sacramento County. The segments fall under various City zoning and land use classifications. Project Site zoning and General Plan classifications are listed in **Table 3-8** below.

TABLE 3-8. ZONING AND GENERAL PLAN DESIGNATIONS

PROJECT SITE	PIPELINE SEGMENT CROSSING #	NEAREST CROSSROAD	JURISDICTION	ZONING DESIGNATION	GENERAL PLAN LAND USE DESIGNATION
1	1	Hope Ln.	Unincorporated Sacramento County	RD-2 – Residential	LDR – Low Density Residential
2	2	Winding Way	Unincorporated Sacramento County	RD-2 – Residential	LDR – Low Density Residential

					REC – Recreation
3	3 and 4	Arcade Creek/ Garfield Ave. and Thousand Oaks Ct.	Unincorporated Sacramento County	O – Recreation	LDR – Low Density Residential REC – Recreation
4	5	Concho Ct.	Unincorporated Sacramento County	RD-2 – Residential RD – 5 - Residential	LDR – Low Density Residential
5	6	Gina Ct.	Unincorporated Sacramento County	RD-2 – Residential RD – 5 - Residential	LDR – Low Density Residential
6	7	San Lorenzo Way	Unincorporated Sacramento County	RD-1 (PC)(NPA) - Residential/Parkway Corridor/Neighborhood Preservation Area O (PC)(NPA) - Recreation/ Parkway Corridor/Neighborhood Preservation Area RD-3 (PC)(NPA) - Residential/Parkway Corridor/Neighborhood Preservation Area	LDR – Low Density Residential
7	8	Sutter Ave	Unincorporated Sacramento County	RD-2 (NPA) – Residential/Neighborhood Preservation Area	LDR – Low Density Residential
8	9	Campfire Way	City of Citrus Heights	RD5 – Low Density Residential	Low Density Residential
9	10	Indian River Dr.	City of Citrus Heights	SPA – Special Planning Area	Open Space/Low Density Residential
10	11 and 12	Hegseth Ct. / Dietz Way	Unincorporated Sacramento County	RD5 – Low Density Residential	LDR – Low Density Residential

3.12.3 Discussion of Impacts

Question A

Would the project: Physically divide an established community?

No Impact. Projects that have the potential to physically divide an established community typically include new freeways and highways, major arterials streets, and railroad lines. The Proposed Project would not physically divide an established community. No impact would occur.

Question B

Would the project: Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?

No Impact. The 12 pipeline crossings have been identified by SASD as part of their Sewer System Management Plan (2021) for improvement due to degrading site conditions such as structural failure and support failure due to erosion, undermining, or exposure. Mitigation measures have been recommended throughout this IS to reduce any potential environmental impacts associated with the Proposed Project to less-than-significant levels. Implementation of the Proposed Project would not conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environment effect. No impact would occur.

Cumulative Impacts

Less than Significant. Potential cumulative projects in the vicinity of the Project Area, including population growth resulting from build-out of the County of Sacramento's and City of Citrus Heights' General Plans, would be developed in accordance with local and regional planning documents. As described above, the Proposed Project is planned for and part of SASD's Sewer System Management Plan (2021), which meets the requirements of the Statewide General WDRs, Water Quality Order No. 2006-0003 (Sanitary Sewer Order) approved on May 2, 2006, Provisions D 13 (D13). Thus, cumulative impacts associated with land use compatibility are expected to be less than significant. Additionally, as discussed above, the Proposed Project is consistent with the General Plan land use designations, goals, and policies, and thus would not contribute to the potential for adverse cumulative land use effects.

3.12.4 Mitigation Measures

No mitigation measures would be required.

3.13 MINERAL RESOURCES

3.13.1 Environmental Checklist

Mineral Resources	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
Would the project:				
a) Result in the loss of availability of a known mineral resource that would be a value to the region and the residents of the state?	☐	☐	☐	☒
b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒

3.13.2 Setting

Regulatory Setting

Pursuant to the mandate of the Surface Mining and Reclamation Act of 1975 (SMARA), the State Mining and Geology Board (SMGB) designates mineral deposits that have regional, multi-community, or State-wide economic significance. SMARA allows the SMGB to designate and classify lands containing mineral deposits of regional or State-wide significance. Classification of minerals is completed by the State Geologist in accordance with the SMGB's priority list, into four Mineral Resource Zones (MRZ). Lands classified as MRZ-1 are areas where geologic information indicates no signification mineral deposits are present; MRZ-2 indicates areas that contain identified mineral resources; MRZ-3 indicates areas of undetermined mineral resources significance; MRZ-4 indicates areas of unknown mineral resource potential (DOC, 2019).

Environmental Setting

Mineral resources in the County include sand, gravel, clay, gold, silver, peat, topsoil, lignite, natural gas, and petroleum. Aggregates (sand and gravel) and natural gas are the principal resources in production (County, 2011). There are no known mineral resources in the Project Area. According to the USGS Mineral Resources Data System, there are no known mineral resources located in the Project Area (USGS, 2021). No mining is known to occur in the area. The County General Plan Conservation Element identifies known mineral resource zones in the County. A County-defined MRZ-2 zone is located along the American River, which is in the vicinity of Project Sites 6, 7, and 9, and is likely associated with sand and gravel resources (County, 2011). However, the Proposed Project would not result in a loss to these resources.

3.13.3 Discussion of Impacts

Question A

Would the project: Result in the loss of availability of a known mineral resource that would be a value to the region and the residents of the state?

No impact. According to the USGS Mineral Resources Data System, there are no known mineral resources located in the Project Area (USGS, 2021). A County-defined MRZ-2 zone is located along the American River, which is in the vicinity of Project Sites 6, 7, and 9, and is likely associated with sand and gravel resources (County, 2011). However, the Proposed Project would not result in a loss to these resources. No impacts would occur to mineral resources.

Question B

Would the project: Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?

No impact. According to the USGS Mineral Resources Data System, there are no known mineral resources located in the Project Area (USGS, 2021). A County-defined MRZ-2 zone is located along the American River, which is in the vicinity of Project Sites 6, 7, and 9, and is likely associated with sand and gravel resources (County, 2011). However, the Proposed Project would not result in a loss to these resources. No impacts would occur to mineral resources.

3.13.4 Mitigation Measures

No mitigation measures would be required.

3.14 NOISE

3.14.1 Environmental Checklist

NOISE	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
Would the project result in:				
a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☒	☐	☐
b) Generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☒	☐
c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the Project Area to excessive noise levels?	☐	☐	☐	☒

3.14.2 Setting

Background Information on Noise

Fundamentals of Acoustics

Acoustics is the science of sound. Sound may be thought of as mechanical energy of a vibrating object transmitted by pressure waves through a medium to human (or animal) ears. If the pressure variations occur frequently enough (at least 20 times per second), then they can be heard and are called sound. The number of pressure variations per second is called the frequency of sound and is expressed as cycles per second or Hertz.

Noise is a subjective reaction to different types of sounds. Noise is typically defined as (airborne) sound that is loud, unpleasant, unexpected, or undesired, and may therefore be classified as a more specific group of sounds. Perceptions of sound and noise are highly subjective from person to person.

Measuring sound directly in terms of pressure would require a very large and awkward range of numbers. To avoid this, the decibel (dB) scale was devised. The dB scale uses the hearing threshold

(20 micropascals), as a point of reference, defined as 0 dB. Other sound pressures are then compared to this reference pressure, and the logarithm is taken to keep the numbers in a practical range. The dB scale allows a million-fold increase in pressure to be expressed as 120 dB, and changes in levels (dB) correspond closely to human perception of relative loudness.

The perceived loudness of sounds is dependent upon many factors, including sound pressure level and frequency content. However, within the usual range of environmental noise levels, perception of loudness is relatively predictable, and can be approximated by A-weighted sound levels (expressed as dBA). There is a strong correlation between A-weighted sound levels and the way the human ear perceives sound. For this reason, the A-weighted sound level has become the standard tool of environmental noise assessment.

The dB scale is logarithmic, not linear. In other words, two sound levels 10 dB apart differ in acoustic energy by a factor of 10. When the standard logarithmic decibel is A-weighted, an increase of 10 dBA is generally perceived as a doubling in loudness. For example, a 70 dBA sound is half as loud as an 80 dBA sound, and twice as loud as a 60 dBA sound.

Community noise is commonly described in terms of the ambient noise level, which is defined as the all-encompassing noise level associated with a given environment. A common statistical tool is the average, or equivalent, sound level (L_{eq}), which corresponds to a steady-state A weighted sound level containing the same total energy as a time varying signal over a given time period (usually one hour). The L_{eq} is the foundation of the composite noise descriptor, L_{dn}, and shows very good correlation with community response to noise.

The day/night average level (also referred to as L_{dn}) is based upon the average noise level over a 24-hour day, with a +10-dB weighing applied to noise occurring during nighttime (10:00 p.m. to 7:00 a.m.) hours. The nighttime penalty is based upon the assumption that people react to nighttime noise exposures as though they were twice as loud as daytime exposures. Because L_{dn} represents a 24-hour average, it tends to disguise short-term variations in the noise environment.

Table 3-9 lists several examples of the noise levels associated with common situations.

TABLE 3-9. TYPICAL NOISE LEVELS

COMMON OUTDOOR ACTIVITIES	NOISE LEVEL (DBA)	COMMON INDOOR ACTIVITIES
	--110--	Rock Band
Jet Fly-over at 300 meters (1,000 ft.)	--100--	
Gas Lawn Mower at 1 meter (3 ft.)	--90--	
Diesel Truck at 15 meters (50 ft.), at 80 km/hour (50 miles per hour)	--80--	Food Blender at 1 meter (3 ft.) Garbage Disposal at 1 meter (3 ft.)

Noisy Urban Area, Daytime Gas Lawn Mower, 30 m (100 ft.)	--70--	Vacuum Cleaner at 3 meters (10 ft.)
Commercial Area Heavy Traffic at 90 meters (300 ft.)	--60--	Normal Speech at 1 meter (3 ft.)
Quiet Urban Daytime	--50--	Large Business Office Dishwasher in Next Room
Quiet Urban Nighttime	--40--	Theater, Large Conference Room (Background)
Quiet Suburban Nighttime	--30--	Library
Quiet Rural Nighttime	--20--	Bedroom at Night, Concert Hall (Background)
	--10--	Broadcast/Recording Studio
Lowest Threshold of Human Hearing	--0--	Lowest Threshold of Human Hearing
Source: Caltrans, 2013		

Effects of Noise on People

The effects of noise on people can be placed in three categories:

- Subjective effects of annoyance, nuisance, and dissatisfaction
- Interference with activities such as speech, sleep, and learning
- Physiological effects such as hearing loss or sudden startling

Environmental noise typically produces effects in the first two categories. Workers in industrial plants can experience noise in the last category. There is no completely satisfactory way to measure the subjective effects of noise or the corresponding reactions of annoyance and dissatisfaction. A wide variation in individual thresholds of annoyance exists and different tolerances to noise tend to develop based on an individual's past experiences with noise.

Thus, an important way of predicting a human reaction to a new noise environment is the way it compares to the existing environment to which one has adapted: the so-called ambient noise level. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by those hearing it.

With regard to increases in A-weighted noise level, the following relationships occur:

- Except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived;

- Outside of the laboratory, a 3-dBA change is considered a just-perceivable difference;
- A change in level of at least 5dBA is required before any noticeable change in human response would be expected; and
- A 10-dBA change is subjectively heard as approximately a doubling in loudness, and can cause an adverse response.

Stationary point sources of noise – including stationary mobile sources such as idling vehicles – attenuate (lessen) at a rate of approximately 6 dB per doubling of distance from the source, depending on environmental conditions (e.g., atmospheric conditions and either vegetative or manufactured noise barriers, etc.). Widely distributed noises, such as a large industrial facility spread over many acres, or a street with moving vehicles, would typically attenuate at a lower rate.

Existing Noise and Vibration Environments

Existing Sensitive Receptors

Some land uses are considered more sensitive to noise than others. Land uses often associated with sensitive receptors generally include residences, schools, libraries, hospitals, and passive recreational areas. Sensitive noise receptors may also include threatened or endangered noise sensitive biological species, although many jurisdictions have not adopted noise standards for wildlife areas. Noise sensitive land uses are typically given special attention in order to achieve protection from excessive noise.

As described in **Section 2.2**, the majority of pipeline improvements would take place adjacent to residential areas, with some occurring near parks and roadsides.

Existing Noise Conditions

As described in **Appendix G**, noise monitoring was conducted to establish existing ambient noise levels around the Project Sites. Figure 2 of **Appendix G** shows the locations of the ambient noise survey points. Table 2 of **Appendix G** provides a summary of the collected ambient noise readings.

Regulatory Setting

Sacramento County Construction Noise Standards

Chapter 6.68.090 of the Sacramento County Municipal Code exempts construction noise between the hours of 6:00 a.m. to 8:00 p.m. on weekdays and 7:00 a.m. to 8:00 p.m. on weekends. The relevant standards from the municipal code have been reproduced below:

The following activities shall be exempted from the provisions of this chapter:

e. Noise sources associated with construction, repair, remodeling, demolition, paving or grading of any real property, provided said activities do not take place between the hours of eight p.m. and six a.m. on weekdays and Friday commencing at eight p.m. through and including seven a.m. on Saturday; Saturdays commencing at eight p.m. through and including seven a.m. on the next following Sunday and on each Sunday after the hour of eight p.m. Provided, however, when an unforeseen or unavoidable condition occurs during a construction project and the nature of the project necessitates that work in process be continued until a specific phase is completed, the contractor or owner shall be allowed to continue work after eight p.m. and to operate machinery and

equipment necessary until completion of the specific work in progress can be brought to conclusion under conditions which will not jeopardize inspection acceptance or create undue financial hardships for the contractor or owner;

City of Citrus Heights Construction Noise Standards

Sec. 34-88 of the City of Citrus Heights Municipal Code exempts construction noise between the hours of 6:00 a.m. to 8:00 p.m. on weekdays and 7:00 a.m. to 8:00 p.m. on weekends. The relevant standards from the municipal code have been reproduced below:

The following activities shall be exempted from this article:

(5) Noise sources associated with construction, repair, remodeling, demolition, paving or grading of any real property, provided the activities do not take place between the hours of 8:00 p.m. and 6:00 a.m. on weekdays and Friday commencing at 8:00 p.m. through and including 7:00 a.m. on Saturday, Saturdays commencing at 8:00 p.m. through and including 7:00 a.m. on the next following Sunday, and on each Sunday after the hour of 8:00 p.m. However, when an unforeseen or unavoidable condition occurs during a construction project and the nature of the project necessitates that work in process be continued until a specific phase is completed, the contractor or owner shall be allowed to continue work after 8:00 p.m. and to operate machinery and equipment necessary until completion of the specific work in progress can be brought to conclusion under conditions which will not jeopardize inspection acceptance or create undue financial hardships for the contractor or owner.

3.14.3 Discussion of Impacts

Question A

Would the project result in: Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Construction

Less than Significant with Mitigation. Construction noise varies depending on the construction process, type of equipment involved, location of the construction site with respect to sensitive receptors, the schedule proposed to carry out each task (e.g., hours and days of the week), and the duration of the construction work. Table 3 of **Appendix G** shows predicted construction noise levels for each of the project construction phases. Based on the data shown in Table 3 of **Appendix G**, construction noise is predicted to range between 84 to 87 dBA at 50 feet. It should be noted that these estimates are based on the worst-case scenario of all equipment being used in a busy hour and are likely conservative estimates of noise levels that would be expected throughout the project construction.

A summary of the noise prediction results for each Project Site is shown in **Table 3-10**.

TABLE 3-10. NOISE PREDICTION RESULTS

PIPELINE SEGMENT CROSSING #	DISTANCE TO NEAREST HOME (ft.)	APPROX. DAYTIME AMBIENT NOISE (Leq)	CONSTRUCTION NOISE LEVEL AT 50 FEET (dBA Leq)	CONSTRUCTION NOISE LEVEL AT NEAREST HOME (dBA Leq)	NOISE LEVEL AT NEAREST HOME WITH SHIELDING	CHANGE (dBA)	CHANGE WITH SHIELDING (dBA)
1	55	56	86	85	80	29	24
2	85	52	87	82	77	30	25
3	75	54	86	82	77	28	23
4	140	54	86	77	72	23	18
5	85	48	84	79	74	31	26
6	65	48	84	82	77	34	29
7	65	50	86	84	79	34	29
8	100	53	87	81	76	28	23
9	175	56	86	75	70	19	14
10	90	57	87	82	77	25	20
11	70	47	84	81	76	34	29
12	90	47	84	79	74	32	27

Source: **Appendix G**

As can be seen from the results outlined in **Table 3-10,** noise levels from the loudest phases of construction could substantially exceed existing ambient noise levels by up to 34 dBA at the nearest residences. However, hours of construction associated with the Proposed Project (Monday through Friday between the hours of 7 a.m. to 6 p.m. and 8 a.m. to 6 p.m. when within residential property) are within the exempt construction hours established by the municipal code of the County and the City of Citrus Heights. Given the temporary nature of construction activities and restrictions on construction times required by the applicable municipal code, impacts relating to construction noise levels associated with the Proposed Project would be considered less than significant. Nonetheless, due to the close proximity to residences, noise reduction measures have been incorporated into **Mitigation Measure N-1** below to reduce noise impacts at nearby sensitive receptors to the maximum extent feasible.

Operation

Less than Significant. Operation of the Proposed Project would require routine maintenance of sewer pipelines and appurtenant structures. However, maintenance activities would result in a negligible increase in additional traffic and associated noise. Such noises would not result in a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Project Sites in excess of standards established in the local general plan or noise ordinance. Therefore, impacts relating to noise levels due to operation of the Proposed Project would be considered less than significant.

Question B

Would the project result in: Generation of excessive groundborne vibration or groundborne noise levels?

Less than Significant. The primary vibration-generating activities associated with the Proposed Project would occur during construction when activities such as trenching, drilling, and paving occur. For structural damage, Caltrans uses a vibration limit of 0.5 inches/second, peak particle velocity (in/sec, PPV), for buildings structurally sound and designed to modern engineering standards; 0.2 in/sec PPV for buildings that are found to be structurally sound but where structural damage is a major concern; and a conservative limit of 0.08 in/sec PPV for historic buildings or buildings that are documented to be structurally weakened (Caltrans, 2013). All surrounding structures are assumed to be structurally sound, but damage would be a concern, therefore the 0.2 in/sec PPV would be used as a threshold of significance for structural damage. The threshold of 0.2 in/sec PPV is also used by Caltrans as the threshold for human annoyance caused by vibration. Therefore, activities creating vibrations exceeding 0.2 in/sec PPV would impact sensitive receptors in nearby residences (Caltrans, 2013). **Table 3-11** shows the typical vibration levels produced by construction equipment.

TABLE 3-11. VIBRATION LEVELS FOR VARIOUS CONSTRUCTION EQUIPMENT

TYPE OF EQUIPMENT	PEAK PARTICLE VELOCITY AT 25 FEET (INCHES/SECOND)	PEAK PARTICLE VELOCITY AT 50 FEET (INCHES/SECOND)
Loaded Trucks	0.076	0.027
Small Bulldozer	0.003	0.001
Auger/drill Rigs	0.089	0.031
Jackhammer	0.035	0.012
Vibratory Hammer	0.070	0.025
Source: Caltrans, 2013		

The data in **Table 3-11** indicates that construction vibration levels anticipated for the Proposed Project are less than the 0.2 in/sec threshold at distances of 25 feet. Sensitive receptors located less than 25 feet from construction activities could be impacted by construction-related vibrations, especially drill rigs and vibratory hammers. However, as described above, construction would occur Monday through Friday, excluding legal holidays, between the hours of 7 a.m. to 6 p.m., and work within private residential property would occur between the hours of 8 a.m. to 6 p.m. Accordingly, no construction activities associated with the Proposed Project would occur outside of the exempt construction hours established by the municipal code of the County or the City Citrus Heights, minimizing the potential for vibration-related disruption. Given the temporary nature of construction activities, and restrictions on construction times required by the applicable municipal code, impacts relating to construction vibration levels associated with the Proposed Project would be considered less than significant.

Question C

For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the Project Area to excessive noise levels?

No Impact. The Project Sites are not located within the vicinity of a private airstrip or land use and are not located within 2 miles of an airport. No impact would occur.

Cumulative Impacts

Less than Significant. As stated above, operation of the Proposed Project would not increase existing ambient noise levels above the applicable thresholds at sensitive receptors. Therefore, the Proposed Project would not result in cumulatively considerable impacts. This impact is considered less than significant.

3.14.4 Mitigation Measures

N-1 Noise Reduction Measures

To reduce construction noise, the following measures are recommended:

- Equipment and trucks used for project construction shall utilize the best available noise control techniques (e.g., improved mufflers, equipment redesign, use of intake silencers, ducts, engine enclosures and acoustically attenuating shields or shrouds) wherever feasible.
- Except as provided herein, impact tools (e.g., jack hammers, pavement breakers, and rock drills) used for project construction shall be hydraulically or electrically powered to avoid noise associated with compressed air exhaust from pneumatically powered tools. However, where use of pneumatic tools is unavoidable, an exhaust muffler on the compressed air exhaust shall be used; this muffler can lower noise levels from the exhaust by up to about 10 dBA. External jackets on the tools themselves shall be used, if such jackets are commercially available, and this could achieve a reduction of 5 dBA. Quieter procedures shall be used, such as drills rather than impact equipment, whenever such procedures are available and consistent with construction procedures.
- Contractors shall use best-available quiet technology generators where feasible and generators should be placed as far from sensitive receptors as possible. Use of temporary shielding of the generator(s) should be employed where additional noise control may be required.
- Stationary noise sources shall be located as far from adjacent properties as possible, and they shall be muffled and enclosed within temporary sheds, insulation barriers shall be incorporated, or other measures shall be used, as feasible, to provide equivalent noise reduction.
- Pumps or generators used for bypass pumping shall be housed in sound attenuation enclosures and the bypass staging area should be shielded with acoustic site fencing consisting of ½" plywood or minimum STC 27 sound curtains.
- Bypass pumping noise should be monitored at startup by an acoustic engineer to ensure that the noise control measures are property installed and achieving the best possible noise control.
- The noise and safety enforcement manager for the project shall ensure responsive and corrective action to complaints within the same working day if the complaint is received during the

noise-related incident and from sensitive receptors residing within the adjacent residential building.

3.15 POPULATION AND HOUSING

3.15.1 Environmental Checklist

POPULATION AND HOUSING	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
Would the project:				
a) Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	☒
b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

3.15.2 Setting

Environmental Setting

SASD provides wastewater collection service to more than one million people in the Sacramento region, approximately 270 square miles of the greater Sacramento Area. The Proposed Project does not involve upsizing or expansion of the SASD sewer system which could lead to population growth. The Proposed Project is planned for and part of SASD's Sewer System Management Plan (2021), which meets the requirements of the State-wide General WDRs, Water Quality Order No. 2006-0003 (Sanitary Sewer Order) approved on May 2, 2006 Provisions D 13 (D13).

3.15.3 Discussion of Impacts

Question A

Would the project: Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?

No Impact. The Proposed Project involves improving various existing sewer mainline segments across the County. The 12 pipeline crossings have been identified by SASD as part of their Sewer System Management Plan (2021) for improvement due to degrading site conditions such as structural failure and support failure due to erosion, undermining, or exposure. Sewer mainline segments would not be upsized and overall system capacity would not increase. Therefore, population growth would not be induced as a result of the Proposed Project. The expansion of sewer/water infrastructure would not occur. No impact would occur.

Question B

Would the Project: Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?

No Impact. The Proposed Project would not displace existing housing or people that would necessitate the construction of replacement housing. No impact would occur.

Cumulative Impacts

No Impact. The Proposed Project is not expected to increase unplanned growth, and therefore would not contribute to cumulative impacts associated with growth. No impact would occur.

3.15.4 Mitigation Measures

No mitigation measures would be required.

3.16 PUBLIC SERVICES

3.16.1 Environmental Checklist

PUBLIC SERVICES	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
Would the project:				
Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:				
a) Fire Protection?	☐	☐	☒	☐
b) Police Protection?	☐	☐	☒	☐
c) Schools?	☐	☐	☒	☐
d) Parks?	☐	☐	☒	☐
e) Other public facilities?	☐	☐	☒	☐

3.16.2 Setting

Public services are provided to the Project Area by the County for residents located in unincorporated areas of the County and by cities within the County, such as Citrus Heights. The Sacramento County Sheriff's office provides police services to unincorporated County and the Citrus Heights Police Department provides services to residents in the jurisdiction of the City of Citrus Heights. Fire protection services in the County are provided by the cities of Folsom, Galt, Isleton, Sacramento, Elk Grove, and other independent fire districts. The Proposed Project involves improving various existing sewer mainline segments within the urbans services area of the County; the provision of additional public services is not anticipated.

3.16.3 Discussion of Impacts

Questions A through E

Would the project: Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the

construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services: fire protection; police protection; schools; parks; other public facilities?

Less than Significant. The Proposed Project involves improving various existing sewer mainline segments across the County and would not introduce housing or residents that could lead to an increase demand for public services. The Proposed Project was planned for in SASD's Sewer System Management Plan (2021). Thus, improvements to pipeline segments as part of the Proposed Project, are accounted for and anticipated within County planning documents, and are specifically required to meet current and future capacity demands within the County. Therefore, the Proposed Project would not lead to unanticipated growth or expanded facilities, or affect the performance objectives of public facilities.

As detailed in **Appendix B**, Special Provision SP-19, the existing sanitary sewer system and all other utilities within the limits of the Proposed Project shall remain in service at all times during construction. As Described in **Section 2.4.4**, temporary bypassing of sewer lines would be required to ensure that sewer service is not disrupted during construction activities. The contractor would be required to submit a BPP for approval prior to construction in accordance with Section 302.2 of the SASD Standards and Specifications. The BPP would include lateral outage durations, monitoring and control plans for the bypassing system, and environment protection plans and responses plans so that sewage remains properly contained within the system. The contractor would be required to undertake safe plugging and sewer flow control measures to insure uninterrupted trunk sewer flows and flows from all collector sewers and laterals at all times. Therefore, public utilities would not be affected as a result of the Proposed Project.

Construction of the Proposed Project may result in temporary lane closures. Lane closures, if not properly regulated, could potentially interfere with fire and police emergency response times. This would be a potentially significant impact. However, as described in **Sections 3.10.3** and **3.18.3**, a traffic control plan would be prepared in accordance with Section 12-4.02 of the County Specifications and submitted for review and approval to the County (refer to **Appendix B**, Special Provision SP-23). Therefore, with implementation of a traffic control plan, the Proposed Project would not interfere with acceptable emergency response time. Impacts would be less than significant.

Cumulative Impacts

Less than Significant. As described above, the Proposed Project would not increase the demand for fire, police, schools, parks, or other public facilities. However, construction of the Proposed Project would result in temporary lane closures. Because the Proposed Project requires that a traffic control plan be developed prior to the start of construction activities, and other developments within the County requiring lane closures would also be required to provide adequate emergency access and regulate traffic flow, cumulative impacts would be less than significant after mitigation.

3.16.4 Mitigation Measures

No mitigation measures would be required.

3.17 RECREATION

3.17.1 Environmental Checklist

RECREATION	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☐	☒

3.17.2 Setting

The Proposed Project does not involve introducing housing or residents to the Project Area, who would potentially utilize the parks and recreational facilities.

3.17.3 Discussion of Impacts

Question A

Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?

No Impact. The Proposed Project would not increase the use of existing neighborhood and regional parks or other recreational facilities, as the Proposed Project does not involve introducing housing or residents to the Project Area, who could potentially utilize these facilities. No impact would occur.

Question B

Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?

No Impact. The Proposed Project does not involve or require the construction or expansion of recreational facilities. No impact would occur.

Cumulative Impacts

No Impact. The Proposed Project would have no cumulative impact on existing recreational facilities.

3.17.4 Mitigation Measures

No mitigation measures would be required.

3.18 TRANSPORTATION

3.18.1 Environmental Checklist

TRANSPORTATION	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
Would the project:				
a) Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	☐	☐	☒	☐
b) Conflict or be inconsistent with CEQA Guidelines § 15064.3, subdivision (b)?	☐	☐	☒	☐
c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☒
d) Result in inadequate emergency access?	☐	☐	☒	☐

3.18.2 Setting

Transportation Network

The geographic setting of the County affected the historical development of the roadway system. The roadway system is focused on downtown Sacramento and is limited by the Sacramento River and American River crossings. All of the major interregional roadways radiate from the hub of downtown Sacramento. Interstate 5 and State Route (SR) 99 are generally parallel north-south routes. Interstate 80 and US 50 serve east-west trips. The interstate routes, all of US 50 and most of SR-99 are limited access freeways within the County. The arterial system within the County serves local community areas and provides access to the interregional freeway system. It is also utilized for longer distance intra-county trips. The majority of the arterial system follows a north-south, east-west grid pattern. Exceptions are generally older roadways that originally served long distance trips before they were replaced in function by freeways. For the County, the American River is a major obstacle to north-south travel. River crossings are limited, particularly east of the City of Sacramento.

Bikeways, Pedestrian Facilities, Public Transportation System

The Sacramento Regional Transit District (RT) operates 97 bus routes and 37.4 miles of light rail covering a 418 square-mile service area. Buses and light rail run 365 days per year using 76 light rail vehicles, 256 buses powered by compressed natural gas and 16 shuttle vans. Buses operate daily from 5 a.m. to

11:30 p.m. every 15 to 75 minutes, depending on the route. Light rail trains begin operation at 4:30 a.m. with service every 15 minutes during the day and every 30 minutes in the evening. Passenger amenities include 47 light rail stops or stations, 25 bus and light rail transfer centers, and 18 free park-and-ride lots. RT also serves more than 3,600 bus stops throughout Sacramento County (Sacramento County, 2010).

The provision of pedestrian facilities varies greatly in the County. In unincorporated Sacramento County, most of the roadway infrastructure was constructed after World War II when emphasis was placed on the automobile as the emerging dominant form of transportation. Thus, many roadways lack pedestrian infrastructure or a continuous pedestrian infrastructure.

In 1994, the County adopted the 2010 Bikeway Master Plan, the goal of which is to develop a bikeway system that will benefit the recreational and transportation needs of the public.

3.18.3 Discussion of Impacts

Question A

Would the project: Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?

Less than Significant. The Proposed Project is not considered a trip-generating project. Operation of the Proposed Project is not anticipated to increase traffic. While periodic maintenance of sewer pipelines would be required, maintenance activities would result in a negligible increase in additional traffic.

Construction would result in a short-term increase in traffic levels on roadways in the Project Site areas. Construction vehicles and equipment expected to be used include, but are not limited to, legally loaded trucks, delivery and service trucks, and construction worker vehicles. At estimated peak day levels, up to approximately 20 one-way construction worker vehicle trips could occur (**Appendix D**). Therefore, construction-related traffic would result in a negligible increase in traffic volumes throughout the County. Construction of the Proposed Project could result in temporary detours to roadways and pedestrian and bicycle routes, however all facilities including sidewalks and pavement would be returned to normal operating conditions after construction. Therefore, no long-term impacts to transit, bicycle, or pedestrian facilities would occur.

Construction of the Proposed Project could result in temporary lane closures. Lane closures, if not properly regulated, could potentially conflict with a program, plan, ordinance, or policy addressing the circulation system. This would be a potentially significant impact. However, as described in **Appendix B**, Special Provision SP-23, a traffic control plan shall be prepared in accordance with Section 12-4.02 of the County Specifications and submitted for review and approval to the County. Therefore, with implementation of a traffic control plan, adequate emergency access would be provided to all land uses adjacent to construction activities. Accordingly, the Proposed Project would not conflict with an applicable plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities, and a less-than-significant impact would occur.

Question B

Would the project: Conflict or be inconsistent with CEQA Guidelines § 15064.3, subdivision (b)?

Less than Significant. Section 15064.3 was recently added to the CEQA *Guidelines* and describes specific considerations for evaluating a project's transportation impacts. Section 15064.3(b) establishes VMT as the most appropriate measure of transportation impacts, shifting away from the use of level of service analysis that evaluates a project's impacts on traffic conditions at nearby roadways and intersections.

The Office of Planning and Research (OPR) Technical Advisory on Evaluating Transportation Impacts in CEQA contains screening thresholds for land use projects and suggests lead agencies may screen out VMT impacts using project size, maps, and transit availability (OPR, 2018). For small projects, absent substantial evidence indicating that a project would generate a potentially significant level of VMT, or inconsistency with a SCS or general plan, and projects that generate or attract fewer than 110 trips per day generally, may be assumed to cause a less-than-significant impact.

As described above, construction of the Proposed Project would generate a maximum of 20 trips per day. Therefore, as the number of additional trips generated by the Proposed Project is below the 110-trip screening threshold for VMT impacts contained in the OPR Technical Advisory, the Proposed Project can be assumed to cause a less-than-significant transportation impact related to VMT.

Question C

Would the project: Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

No Impact. The Proposed Project does not include modification to the existing roadways or design features that would increase hazards. As described above, construction of the Proposed Project could result in temporary roadway detours, however all facilities would be returned to normal operating conditions after construction and a traffic control plan would be prepared in accordance with Section 12-4.02 of the County Specifications. Therefore, the Proposed Project would not substantially increase hazards due to a geometric design feature or incompatible uses. No impact would occur.

Question D

Would the project: Result in inadequate emergency access?

Less than Significant. Construction of the Proposed Project could result in temporary lane closures. Lane closures, if not properly regulated, could potentially result in inadequate emergency access. This would be a potentially significant impact. However, as described in **Appendix B**, Special Provision SP-23, a traffic control plan shall be prepared in accordance with Section 12-4.02 of the County Specifications and submitted for review and approval to the County. Therefore, with implementation of a traffic control plan, adequate emergency access would be provided to all land uses adjacent to construction activities. Accordingly, the Proposed Project would not result in inadequate emergency access and a less-than-significant impact would occur.

Cumulative Impacts

Less than Significant. Transportation impacts from the Proposed Project would be limited to short-term construction effects on roadways providing access to the Project Sites. As described above, with implementation of a traffic control plan, adequate emergency access would be provided to all land uses

adjacent to construction activities. Therefore, the Proposed Project would not contribute to cumulative impacts. No concurrent construction activities near the Project Sites are anticipated. However, if construction activities from other projects do occur within the vicinity of the Project Sites, it is assumed that each project would be responsible for mitigating traffic impacts and obtaining a traffic control plan, if applicable. Impacts would be less than significant after mitigation.

3.18.4 Mitigation Measures

No mitigation would be required.

3.19 TRIBAL CULTURAL RESOURCES

3.19.1 Environmental Checklist

TRIBAL CULTURAL RESOURCES	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
Would the project:				
a) Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code § 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:				
i. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or	☐	☒	☐	☐
ii. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code § 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code § 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	☐	☒	☐	☐

3.19.2 Setting

California Native American prehistoric, historic, archaeological, cultural, and sacred places are essential elements in tribal cultural traditions, heritages, and identities. Because CEQA calls for a sufficient degree of analysis, tribal knowledge about the land and tribal cultural resources (TCR) at issue are included in environmental assessments for projects that may have a significant impact on such TCRs. TCRs can only be identified by members of the Native American community, thus requiring consultation under CEQA.

Regulatory Context

AB 52, signed into law in 2014, established a new category of resources in CEQA called "tribal cultural resources" that considers the tribal cultural values in addition to the scientific and archaeological values when determining impacts and mitigation. Pursuant to PRC, Division 13, § 21074, TCRs can be either:

1. Sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe that are either:

    a. Included or determined to be eligible for inclusion in the CRHR; or

    b. Included in a local register of historical resources as defined in subdivision (k) of § 5020.1.

2. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to the eligibility criteria for the CRHR (PRC § 5024.1(c)). In applying these criteria, the lead agency must consider the significance of the resource to a California Native American Tribe.

Native American tribes traditionally and culturally affiliated with a geographic area may have expertise concerning their TCRs. In light of this, AB 52 requires that, within 14 days of a decision to undertake a project or determination that a project application is complete, a lead agency shall provide written notification to California Native American tribes that have previously requested placement on the agency's notice list. Notice to tribes shall include a brief project description, location, lead agency contact information, and the statement that the tribe has 30 days to request consultation. The lead agency shall begin the consultation process within 30 days of receiving a request for consultation from a tribe.

Consultation

The County sent notification letters to the groups registered with the County: UAIC, Wilton Rancheria, and the Ione Band of Miwok Indians on April 14, 2022. Requests for consultation were received from UAIC on May 12, 2022 and Wilton Rancheria on April 18, 2022. Emails exchanged with Wilton Rancheria in May of 2022 resulted in phone correspondence with Wilton Rancheria on June 9, 2022.

The UAIC response included the request to have all locations monitored by an archaeologist who would notify UAIC in the event of any finds, including isolated artifacts, with the addition of a tribal monitor at Crossing Numbers 2, 3, and 6. The response also included recommended mitigation measures, which have been incorporated as **Mitigation Measure TCR-1** below. Wilton Rancheria, via phone correspondence on June 9, 2022, indicated that they would like some sites monitored with an archaeological monitor (Crossing Numbers 1, 4, 8, 9), with the remainder monitored by a tribal monitor (Crossing Numbers 2, 3, 5, 6, 7, 11, 12).

3.19.3 Discussion of Impacts

Question A

Would the project: Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code § 21074 as either a site, feature, place, cultural

landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is: Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k)?

Less than Significant with Mitigation. As discussed in **Section 3.6**, no TCRs were identified during cultural resources investigations or consultation with Native American tribes. However, there is the possibility that unanticipated discoveries of subsurface archaeological deposits or human remains may occur. This is a potentially significant impact. **Mitigation Measures TCR-1**, **CR-1**, and **CR-2**, which provide for the protection of unanticipated finds made during ground disturbing activities, would reduce impacts to TCRs to a less-than-significant level.

Question B

Would the project: Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code § 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is: A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code § 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code § 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.

Less than Significant with Mitigation. As discussed in **Section 3.6**, no TCRs were identified during cultural resources investigations or consultation with Native American tribes. However, there is the possibility that unanticipated discoveries of subsurface archaeological deposits or human remains may occur. This is a potentially significant impact. **Mitigation Measures TCR-1**, **CR-1**, and **CR-2,** which provide for the protection of unanticipated finds made during ground disturbing activities, would reduce impacts to TCRs to a less-than-significant level.

Cumulative Impacts

Less than Significant with Mitigation. Development of the Proposed Project may impact TCRs, adding to cumulative impacts from other projects in the region. TCRs that could be affected by the Proposed Project as well as others in the region are subject to protections under PRC §§ 5024.1, 21083.2 and 21084.1, and CEQA *Guidelines* § 15064.5. In addition, projects with federal involvement would be subject to Section 106 of the National Historic Preservation Act. Given the non-renewable nature of TCRs, any impact to TCRs is potentially cumulatively considerable. However, as discussed above, no TCRs were identified during cultural resources investigations or consultation with Native American tribes. If resources are uncovered during construction, application of the consultation process under **Mitigation Measures TCR-1**, **CR-1**, and **CR-2** would reduce impacts to TCRs to a less-than-significant level, Application of similar measures to TCRs located within the region would similarly reduce the Proposed Project's incremental contribution to cumulative impacts to TCRs to a less-than-significant level.

3.19.4 Mitigation Measures

TCR-1 Post-Review Discovery Procedures

A) SASD and/or the project contractor shall retain a qualified professional archaeologist to monitor construction at all project locations.. SASD shall further retain a tribal monitor from either UAIC or Wilton Rancheria to monitor at Crossing Numbers 2, 3, 5, 6, 7, 11, and 12. SASD shall contact the Tribes at least two weeks prior to ground disturbance to notify the Tribes of construction and set up monitoring agreements.

B) If subsurface deposits believed to be cultural or human in origin, or TCRs, are discovered during construction, all work shall halt within a 100-foot radius of the discovery, and the Construction Manager shall immediately notify SASD by phone. The qualified professional archaeologist, meeting the Secretary of the Interior's Professional Qualification Standards for archaeology and subject to approval by SASD or the tribal monitor, shall evaluate the significance of the find and develop appropriate management recommendations in consultation with UAIC or Wilton Rancheria. All management recommendations shall be provided to SASD in writing for SASD's review and approval. If feasible, the preferred mitigation is avoidance. Mitigation shall be completed prior to the resumption of construction.

The professional archaeologist shall make a determination, based on professional judgement and supported by substantial evidence, within one business day of being notified, as to whether or not the find represents a cultural resource or has the potential to be a TCR. The subsequent actions shall be determined by the type of discovery, as described below. These include: 1) a work pause that, upon further investigation, is not actually a discovery and the work pause was simply needed in order to allow for closer examination of soil (a "false alarm"); 2) a work pause and subsequent action for discoveries that are clearly not related to tribal resources, such as can and bottle dumps, artifacts of European origin, and remnants of built environment features; and 3) a work pause and subsequent action for discoveries that are likely related to tribal resources, such as midden soil, bedrock mortars, groundstone, prehistoric artifacts, human remains, or other similar expressions.

Whenever there is question as to whether or not the discovery represents a tribal resource, culturally affiliated tribes shall be consulted in making the determination. Whenever a tribal monitor is present, the monitor has the authority to stop work.

The following processes shall apply, depending on the nature of the find, subject to the review and approval of SASD:

- Response to False Alarms: If the professional archaeologist determines that the find is negative for any cultural indicators, then work may resume immediately upon notice to proceed from a SASD representative. No further notifications or tribal consultation is necessary because the discovery is not a cultural resource of any kind. The professional archaeologist shall provide written documentation of this finding to SASD.
- Response to Non-Tribal Discoveries: If a tribal monitor is not present at the time of discovery and a professional archaeologist determines that the find represents a non-tribal cultural

resource from any time period or cultural affiliation, SASD shall be notified immediately, to consult on a finding of eligibility and implementation of appropriate treatment measures, if the find is determined to be a Historical Resource under CEQA, as defined in CEQA *Guidelines* § 15064.5(a). The professional archaeologist shall provide a photograph of the find and a written description to SASD. SASD shall notify the tribe(s) who, in writing, requested notice of unanticipated discovery of non-tribal resources. Notice shall include the photograph and description of the find, and a tribal representative shall have the opportunity to determine whether or not the find represents a TCR. If a response is not received within 24 hours of notification (none of which time period may fall on weekends or SASD holidays), SASD shall deem this portion of the measure completed in good faith as long as the notification was made and documented. If requested by a tribe(s), SASD may extend this timeframe, which shall be documented in writing (electronic communication may be used to satisfy this measure). If a notified tribe responds within 24 hours to indicate that the find represents a TCR, then the Response to Tribal Discoveries portion of this measure applies. If the tribe does not respond or concurs that the discovery is non-tribal, work shall not resume within the no-work radius until SASD, through consultation as appropriate, determines that the site either: 1) is not a Historical Resource under CEQA, as defined in CEQA *Guidelines* § 15064.5(a); or 2) that the treatment measures have been completed to its satisfaction.

- Response to Tribal Discoveries: If the find represents a tribal or potentially TCR that does not include human remains, the tribe(s) SASD shall be notified. SASD shall consult with the tribe(s) on a finding of eligibility and implement appropriate treatment measures, if the find is determined to be either a Historical Resource under CEQA, as defined in CEQA *Guidelines* § 15064.5(a), or a TCR, as defined in PRC § 21074. Preservation in place is the preferred treatment, if feasible. Work shall not resume within the no-work radius until SASD, through consultation as appropriate, determines that the site either: 1) is not a Historical Resource under CEQA, as defined in CEQA *Guidelines* § 15064.5(a); or 2) not a TCR, as defined in PRC § Section 21074; or 3) that the treatment measures have been completed to its satisfaction.
- Response to Human Remains: If the find includes human remains, or remains that are potentially human, the construction supervisor or on-site archaeologist shall ensure reasonable protection measures are taken to protect the discovery from disturbance (AB 2641) and shall notify the County Coroner (per § 7050.5 of the Health and Safety Code). The provisions of § 7050.5 of the California Health and Safety Code, PRC § 5097.98, and AB 2641 shall be implemented. If the Coroner determines the remains are Native American and not the result of a crime scene, the Coroner shall notify the NAHC, which shall then designate a Native American MLD for the project (PRC § 5097.98). The designated MLD shall have 48 hours from the time access to the property is granted to make recommendations concerning treatment of the remains. Public Resources Code § 5097.94 provides structure for mediation through the NAHC if necessary. If the landowner does not agree with the recommendations of the MLD, the NAHC can mediate (PRC § 5097.94).
- If no agreement is reached, the landowner must rebury the remains in a respectful manner where they will not be further disturbed (PRC § 5097.98). This shall also include either recording the site with the NAHC or the appropriate Information Center; using an open space

or conservation zoning designation or easement; or recording a reinternment document with the County in which the property is located (AB 2641). Work shall not resume within the no-work radius until SASD, through consultation as appropriate, determines that the treatment measures have been completed to its satisfaction.

3.20 UTILITIES/SERVICE SYSTEMS

3.20.1 Environmental Checklist

UTILITIES/SERVICE SYSTEMS	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
Would the project:				
a) Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	☐	☐	☒	☐
b) Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?	☐	☐	☒	☐
c) Result in a determination by the waste water treatment provider, which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☒
d) Generate solid waste in excess of state or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	☐	☐	☒	☐
e) Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	☐	☐	☐	☒

3.20.2 Setting

Regulatory Context

Sacramento County General Plan

Applicable County General Plan goals, policies, and objectives include:

Public Facilities Element

Goal	Safe, efficient, and environmentally sound public sewer system and treatment facility serving all urban development.

Sacramento County Municipal Code

Applicable County Public Utilities Code include:

Section 15.04.090	The design of all public sewers shall be in conformance with the then current "improvement standards" and shall be constructed in conformance with the then current "standard construction specifications" and "standard drawings," as adopted by the County.

Environmental Setting

SASD provides service to more than one million people in the Sacramento region, including the areas of the County, the cities of Citrus Heights, Rancho Cordova, and Elk Grove, as well as portions of the cities of Folsom and Sacramento. SASD owns and operates thousands of miles of lower lateral and main line pipes and is responsible for the day-to-day operations and maintenance of these sewer pipes. Once collected in the SASD system, sewage flows into the Sacramento Regional County Sanitation District interreceptor system, where it is conveyed to the Sacramento Regional Wastewater Treatment Plant near Elk Grove (SASD, 2022).

In 2021, a Sewer System Management Plan was developed to provide SASD a system-wide living management plan for the operation, maintenance, expansion, repair, and replacement of SASD's sewer collection system. The Sewer System Management Plan meets the requirements of the Statewide General WDRs, Water Quality Order No. 2006-0003 (Sanitary Sewer Order) approved on May 2, 2006, Provisions D 13 (D13) (SASD, 2021).

Solid Waste Disposal

As described in **Section 2.4.4**, significant amounts of solid waste are not anticipated. However, any surplus concrete, removed pipe material, rubble, asphalt, or other material from construction would be taken to an appropriate disposal site or landfill and would not deposited in the creeks.

3.20.3 Discussion of Impacts

Question A

Would the project: Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?

Less than Significant. The Proposed Project involves improving various existing sewer mainline segments across the County. The Proposed Project was planned for in SASD's Sewer System Management Plan (2021). Thus, improvements to sewer mainline segments as part of the Proposed Project are accounted for an anticipated within County planning documents. Potential impacts relating to upgrades of these utilities are accessed throughout this IS and where appropriate, mitigation measures have been introduced to reduce potentially significant impacts to less-than-significant levels. The

Proposed Project would not require new or expanded stormwater drainage, electrical power, natural gas, or telecommunications facilities. Therefore, impacts associated with the construction or relocation of utilities would be less than significant.

Question B

Would the project: Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?

Less than Significant. The Proposed Project would not require water supplies once operational. Construction of the Proposed Project would require minimal amounts of water for activities such as washing aggregates, dust suppression, and washing surfaces. However, water would be limited during the construction phase and quantities are not anticipated to be significant. Water is anticipated to be trucked to each Project Site. If water is required to be sourced from a nearby fire hydrant, the contractor would obtain all necessary permits from the relevant authority. Impacts to water supplies would be less than significant.

Question C

Would the project: Result in a determination by the waste water treatment provider, which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?

No Impact. As described above, the Proposed Project involves improving various existing sewer mainline segments across the County. The Proposed Project itself does not directly generate wastewater; however, the improved sewer lines would continue to transport wastewater to the wastewater treatment provider (SASD). No impact would occur.

Question D

Would the project: Generate solid waste in excess of state or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?

Less than Significant. The Proposed Project would generate solid waste only during the construction phase as existing pipeline is removed and replaced. Because solid waste generated from the Proposed Project is expected to be minimal and temporary, impacts would be less than significant.

Question E

Would the project: Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?

No Impact. As mentioned above, the Proposed Project would only generate solid waste during the construction phase. Disposal of replaced pipeline would comply with federal, State, and local management and reduction statutes and regulations related to solid waste. No impact would occur.

Cumulative Impacts

Less than Significant. Various existing sewer mainline segments across the County would be improved as part of the Proposed Project. However, potential cumulative projects in the vicinity of the Project Sites would be developed in accordance with local and regional planning documents. The Proposed Project is planned for and part of SASD's Sewer System Management Plan (2021), which meets the requirements of the Statewide General WDRs, Water Quality Order No. 2006-0003 (Sanitary Sewer Order) approved on May 2, 2006, Provisions D 13 (D13). Additionally, as discussed earlier, the Proposed Project is consistent with the General Plan land use designations, goals, and policies, and thus would not contribute to the potential for adverse cumulative land use effects. Thus, cumulative impacts associated with utilities are expected to be less than significant.

3.20.4 Mitigation Measures

No mitigation measures would be required.

3.21 WILDFIRE

3.21.1 Environmental Checklist

WILDFIRE	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:				
a) Substantially impair an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	☐	☐	☐	☒
c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	☐	☐	☐	☒
d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	☐	☐	☐	☒

3.21.2 Setting

Regulatory Context

State Responsibility Areas

State Responsibility Areas (SRA) are lands in California where CAL FIRE has legal and financial responsibility for wildfire protection and where CAL FIRE administers fire hazard classifications and building standard regulations. Local Responsibility Areas (LRA) include land in cities, cultivated agricultural lands, unincorporated non-flammable areas, and lands that do not meet the criteria for SRA of Federal Responsible Areas. California PRC §§ 4201–4204 and California Government Code §§ 51175–51189 direct CAL FIRE to map fire hazard zones within SRAs and LRAs, respectively, based on relevant factors such as fuels, terrain, and weather. These zones, referred to as fire hazard severity zones, are

based on the physical conditions that give a likelihood that an area will burn over a 30- to 50-year period without considering modifications such as fuel reduction efforts. The zones also relate to the requirements for building codes designed to reduce the ignition potential to buildings in wildland-urban interface zones.

Sacramento County General Plan

Applicable County General Plan goals, policies, and objectives include:

Safety Element: Fire Hazards

Goal Minimize the loss of life, injury, and property damage due to fire hazards.

Environmental Setting

The Project Area is urban in nature and largely developed. The Project Area is not located in an SRA but is located in an LRA. The Project Area is classified by CAL FIRE to be within a Non-VHFHSZ (CAL FIRE, 2008). The only area within the County that is classified as a VHFHSZ is south of the designated area of Clay, California, more than 20 miles southeast of the Project Area.

3.21.3 Discussion of Impacts

Question A

If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project: Substantially impair an adopted emergency response plan or emergency evacuation plan?

No Impact. The Project Area is not located in a SRA or in/near a VHFHSZ. Construction of the Proposed Project could result in temporary lane closures. Lane closures, if not properly regulated, could potentially impair an adopted emergency response or evacuation plan. However, as described in **Section 3.10.3**, a traffic control plan would be prepared in accordance with Section 12-4.02 of the County Specifications and submitted for review and approval to the County (refer to **Appendix B**, Special Provision SP-23). No impact would occur.

Question B

If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project: Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?

No Impact. As mentioned earlier, the Proposed Project is not located in an SRA or a VHFHSZ. Pipeline upgrades would take place on relatively flat areas, predominantly surrounded by urban developed land. The Proposed Project does not involve unique slopes or other factors that would exacerbate wildfire risks. No impact would occur.

Question C

If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project: Require the installation or maintenance of associated infrastructure (such as roads, fuel

breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?

No Impact. As mentioned previously, the Proposed Project is not located in a SRA or a VHFHSZ. Construction associated with the Proposed Project would occur within tight and defined boundaries of each pipeline improvement location and is not expected to exacerbate fire risk. No impact would occur.

Question D

If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project: Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?

No Impact. As mentioned previously, the Proposed Project is not located in an SRA or a VHFHSZ. As stated in **Section 3.11.3**, the Proposed Project would not substantially alter the existing drainage pattern of the area around the improvement locations. Pipeline segments would be buried underground and would not expose people or structures to significant risks as a result of flooding, post-fire slope instability, or drainage changes. No impact would occur.

Cumulative Impacts

No Impact. The Proposed Project would have no cumulative impact related to wildfire.

3.21.4 Mitigation Measures

No mitigation measures would be required.

3.22 MANDATORY FINDING OF SIGNIFICANCE

MANDATORY FINDINGS OF SIGNIFICANCE	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
a) Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☒	☐	☐
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)	☐	☒	☐	☐
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☒	☐	☐

Question A

Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?

Less than Significant with Mitigation. As discussed in the previous sections, the Proposed Project could potentially have significant environmental effects with respect to Air Quality, Biological Resources, Cultural Resources, Geology/Soils, Hazards and Hazardous Materials, Hydrology and Water Quality, Noise, and Tribal Cultural Resources. However, the impacts of the Proposed Project would be reduced to less-than-significant levels with the implementation of the mitigation measures identified in this IS.

Question B

Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)

Less than Significant with Mitigation. Cumulative impacts for each resource area have been considered within the analysis of each resource area. When appropriate, mitigation measures have been provided to reduce all potential impacts to a less-than-significant level.

Question C

Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?

Less than Significant with Mitigation. The potential direct environmental effects of the Proposed Project have been considered within the discussion of each environmental resource area in the previous sections. When appropriate, mitigation measures have been provided to reduce all potential impacts to less-than-significant levels.

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APPENDIX A

PRELIMINARY DESIGN REPORT

SACRAMENTO AREA SEWER DISTRICT

Creek Crossings Project

Preliminary Design Report

JANUARY, 2022

Prepared by Water Systems Consulting, Inc.

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ACRONYMS & ABBREVIATIONS

ABS	Acrylonitrile Butadiene Styrene
ADWF	Average Dry Weather Flow
CBEC	CBEC Inc. Eco Engineering
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CFS	Cubic Feet per Second
CIP	Cast Iron Pipe
CIPP	Cured In Place Pipe
DIP	Ductile Iron Pipe
District	Sacramento Area Sewer District
FEMA	Federal Emergency Management Agency
FIS	Flood Insurance Study
FPS	Feet Per Second
KV	Kilovolt
MGD	Million Gallons per Day
PAC	Project Approval Committee
NPDES	National Pollutant Discharge Elimination System
OSHA	Occupational Safety and Health Administration
PWWF	Peak Wet Weather Flow
RCP	Reinforced Concrete Pipe
RWQCB	Regional Water Quality Control Board
SASD	Sacramento Area Sewer District
SMUD	Sacramento Municipal Utilities District
SSO	Sanitary Sewer Overflow
SSMP	Sanitary Sewer Management Plan
SWRCB	State Water Resources Control Board
TRM	Turf Reinforced Mat
USACE	United States Army Corp of Engineers
VCP	Vitrified Clay Pipe

Report Summary

The following report provides the preliminary design for twelve gravity sewer creek crossings for the Sacramento Area Sewer District (SASD or District). The document chapters and a summary of their content is provided in Table 0-1. The appendices and a summary of their content is provided is Table 0-2.

Table 0-1. Report Summary.

REPORT SECTION	SUMMARY OF CONTENT
Chapter 1: Introduction	Includes project background and introductory information for the twelve crossing sites.
Chapter 2: Basis of Design	Includes relevant SASD standards and discipline specific basis of design descriptive text and design criteria for the project.
Chapter 3: Preliminary Design	Includes crossing information and repair recommendations for each site. Also provides site specific SASD standards deviations, structural, permitting and easement requirements, construction considerations for bypassing, access, work hours, tree removal, and estimated construction costs. This chapters should be reviewed in conjunction with the Appendix A 30% Drawings.
Chapter 4: Construction Cost Estimate	Provides a summary table of the total estimated construction costs.
Chapter 5: Project Schedule	Provides the estimated work durations per site and references the updated project schedule through construction.

Table 0-2. Appendices Summary.

APPENDICES	SUMMARY OF CONTENT
Appendix A. 30% Drawings.	The 30% drawings include site access plans and site improvement plans for each site.
Appendix B. Summary Tables.	Summary tables are provided for SASD reference. Consolidated summary tables are provided for sewer flows at the crossings, waterway flows, SASD standard deviations, tree removal, and easements.
Appendix C. Cost Estimate	Appendix includes the detailed estimated of probable construction costs.
Appendix D. Preliminary Structural Calculations	Preliminary structural calculations are provided for aerial crossings sites to justify the pier spacing and casing diameters for these crossings.
Appendix E. Project Schedule	Appendix is the Microsoft Project based overall project schedule through construction.

It should be noted that the following work items are in progress at the time of this draft report submittal:

1. Confirmation of existing easements at several of crossing sites. These existing easements will be updated in the final preliminary design report.
2. The access to the Dietz way crossing is a work in progress. Coordination with the property owner to the east of the crossings is underway. A site visit will be required to confirm the potential for access from the east.
3. The vertical proximity of power lines at Winding Way present clearance issues with drilling piers at this site. A discussion of this issue is provided in Winding Way section of Chapter 3. Coordination with local drillers and the geotechnical team is ongoing to resolve this item.

The overall estimated cost for construction of the project is $3,345,000. The current schedule for the project anticipates construction occurring in the 2024 and 2025 dry weather seasons. The project permitting and easement acquisition activities drive the critical path of the schedule up to construction.

1

1.0 Introduction

1.1 Purpose

The purpose of this report is to provide the preliminary design for rehabilitation or replacement of twelve gravity sewer creek crossings for the Sacramento Area Sewer District (SASD or District). Project alternatives were identified, and preferred solutions were selected in the Creek Crossing Project's Alternatives Analysis Report dated August 27th, 2021. This Preliminary Design Report provides additional details for each of the preferred solutions and includes the design criteria and basis of design, site descriptions and backgrounds, preliminary design descriptions and drawings, capital cost estimates, as well as construction, site access, and easement considerations for the twelve sites. An updated overall project schedule through construction is also provided.

This draft report is to obtain SASD input of the preliminary design concepts, costs, and schedule prior to beginning the detailed design phase of the project.

1.2 Background

As a part of Sanitary Sewer Management Plan (SSMP) guidelines, SASD performs annual and post 2-year recurrence interval storm inspections of creek crossings to assess conditions of critical sites. As a result of these inspections, twelve sites were identified for improvement by the District. These crossings pose an unacceptable risk of a sanitary sewer overflow (SSO) due to degrading site conditions and require a mitigation action to reduce that risk. The locations of all the crossings can be seen in Figure 1-1. The District asset numbers and names, in the order presented in this report, for these twelve crossings are:

Asset 59646: Hope Lane
Asset 48368: Winding Way
Asset 49894: Arcade Creek Park
Asset 41018: Garfield Thousand Oaks
Asset 44237: Concho Court
Asset 50528: Gina Court
Asset 170877: San Lorenzo Way
Asset 78865: Sutter Avenue
Asset 36529: Campfire Way
Asset 78531: Indian River Drive
Asset 68559: Hegseth Court
Asset 239693: Dietz Way

Initial field investigations at the twelve sites were completed on May 19th and 20th, 2021. The field investigations included geotechnical, geomorphology, environmental, structural, civil, and mechanical assessment of the sites. Based on the field findings and background document review, conceptual alternatives for each site were developed and presented for input at a Creek Crossing Alternatives Workshop on July 15th, 2021. Feedback from the workshop was included in the alternatives for each site and the final recommended alternatives were presented in the Alternative Analysis Report submitted August 27th, 2021. These recommended alternatives for each site were presented at the Project Approval Committee (PAC) meeting on October 25th, 2021 and approved for continuation to the preliminary design phase. This Preliminary Design Report advances the alternatives chosen in the Alternatives Analysis Report and approved by the PAC to a 30% design stage.

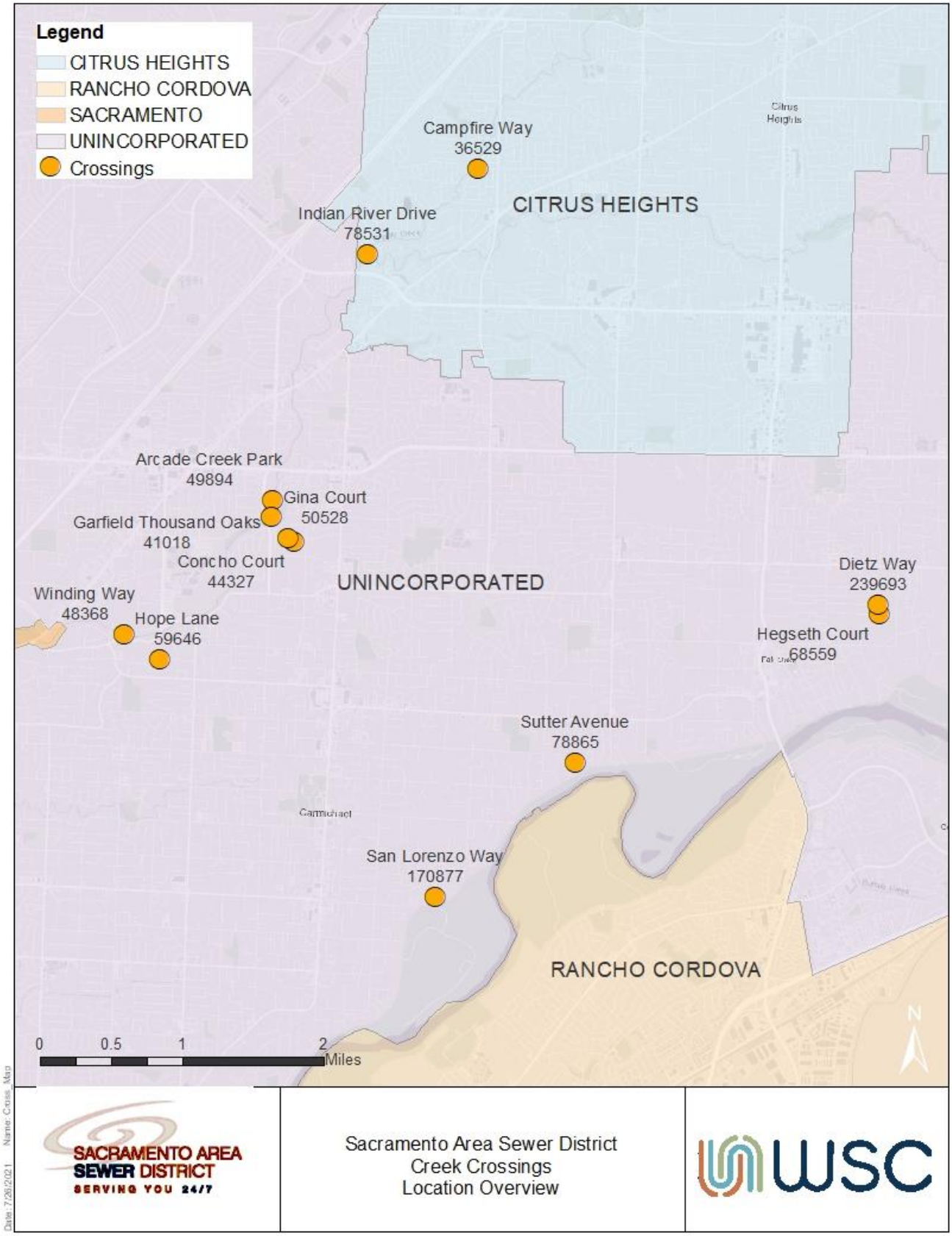


Figure 1-1. Creek Crossings Location Map

2

2.0 Basis of Design

2.1 SASD Design Standards

A summary of key SASD design standards (revised 2021 version) related to creek crossings improvements is provided as Table 2.1-1. The repair recommendation for each creek crossing incorporated these design standards except where the configuration and/or condition of the creek crossing does not allow for compliance with the design standards. Deviation requests from some of the standards below will be necessary to implement some of the alternatives. These deviations are provided in each site section of Chapter 3: Preliminary Design.

Table 2.1-1. Key Creek Crossing Related 2021 SASD Design Standards

SASD STANDARD	CATEGORY	DESCRIPTION
GRAVITY PIPELINE		
202.1.1	Size	The minimum size of main lines is 8 inches.
202.1.2	Velocity	Minimum velocity is 2 feet per second and maximum velocity is 8 feet per second when the main line is flowing half full.
202.1.3	Slope	Maintain a constant slope between nodes.
202.1.4	Ratio of Depth to Flow	Size new trunk lines to carry the projected PWWF of 1 mgd (million gallons per day) or larger assuming the pipe runs full (i.e., d/D of 1.0).
202.1.5	Slopes and Capacity	The minimum slope on collectors serving less than 6 EDUs is 0.007.
202.2	Depth	Collector main lines with lower laterals must not exceed a depth of 19 feet at the invert
202.6	Bedding and Initial Backfill	Includes minimum bedding and cover widths and depths.
202.7	Cathodic Protection	Metal materials must have cathodic protection. Coating in lieu of cathodic protection will be evaluated on a case-by-case basis.
202.8.5	Manhole Size Criteria	For pipes up to 21 inches in diameter, use 48-inch (inside diameter) precast reinforced concrete manholes. When pipe sizes 18 inches and larger enter a manhole such that the flow of one must change direction by more than 20 degrees, use a 60-inch or larger manhole.
202.8.6	Manhole Elevation Criteria	When two pipelines of the same size enter a manhole such that the flow does not change directions, or changes 20 degrees and less, the invert grade at the exit must be at least 0.05-foot below that of the entrance pipe for precast manhole bases. Otherwise the invert grade at the exit must be at least 0.10-foot below that of the entrance pipe.
202.8.7	Manhole Elevation Criteria for Lower Laterals	Install lower laterals entering a manhole with the invert elevation of the lower lateral pipe matching the crown elevation of the exit pipe, except when an internal drop connection is used.
CREEK CROSSINGS		

202.12.1	General	For buried crossings, the top of the pipe must maintain a minimum 3 feet of cover below the scour depth. Aerial crossings are exempt from the depth of cover requirements.
202.12.2	Design	Provide sufficient depth at all areas subject to erosion to ensure protection from damage due to erosion and scour.
202.12.3	Buried Waterway Crossings	Encase all buried waterway crossings within an SASD approved conductor casing for the full width of waterway (top-of-bank to top-of-bank), plus 10 feet on each side. Encase the conductor casing pipe in concrete or soil cement if necessary to protect the pipe for the full width of the waterway. A clay trench plug is required at each end of the crossing. The plug must be a minimum of 4 feet long, extend the full width of the trench, and extend 12 inches above and below the pipe.
202.12.4	Aerial Waterway Crossings	The following are requirements to construct aerial waterway crossings: • VCP carrier pipe within an approved coated welded steel conductor casing pipe extending the full width of waterway (top-of-bank to top-of-bank) plus 10 feet on each side, or • DIP or welded steel pipe with approved coating (no encasement required) extending the full width of waterway (top-of-bank to top-of-bank), plus 10 feet on each side. Steel pipe must be lined and coated with fusion-bonded epoxy or approved equal. The crossing must be perpendicular to the flow of the waterway. Make provisions to prevent pedestrian traffic from traveling along the top of the aerial waterway crossing. The invert elevation at the point of maximum deflection of the suspended pipe must be higher than the invert of the pipe at its downstream support.
202.13.2	Conductor Casing	Casing must be long enough for maintenance, use pipe large enough to fill annular space with sand. Inside diameter must be 6-inches larger than the carrier pipe. All casings must end 10-feet before the manhole.
OTHER		
202.8.9	Manhole Exterior Walls	SASD requires a coal tar emulsion waterproofing agent be applied to exterior walls of vaults, wet wells, and manholes when groundwater is within pipe zone.
204.11	Cathodic Protection	Geotechnical report must provide corrosivity analysis for metallic structures and make recommendation for cathodic protection system. Cathodic protection must last at least 50 years.

2.2 Sewer Design Flows

The existing average dry weather flow (ADWF) and peak wet weather flow (PWWF) 10-year design storm flows for each crossing were provided from SASDs sewer model. It should be noted that crossing improvements are designed for the protection from damage as the crossing and not to increase the capacity of the system. The extents of improvements would need to expand if sewer capacities need to be increased for the subject sewer crossings.

2.3 Hydrologic Basis of Design

Stream flow estimates were provided by project geomorphologists, CBEC Inc. Eco Engineering (CBEC), from both StreamStats Peak Flow and Federal Emergency Management Agency (FEMA) Flood Insurance Study (FIS)-Based Peak Flow values for the 10-, 50-, and 100- year recurrence interval storms. These flow events provide a general basis of the creek size.

Often during these 10-, 50- and 100-year high flow events, the banks of the creeks are flooded. The maximum velocities in the creek coincide with the water levels at or below the top of bank elevation. As such, the waterway for sites were modeled at depth intervals up to a bank full flow scenario to determine the maximum velocity anticipated to occur. This captures the highest creek velocities at the crossings and therefore the greatest anticipated extents of scouring. At these conditions, the depth of water over the crossing location and maximum velocity are provided. A table summarizing this information is provided in Chapter 3 for each site as well as being summarized in Appendix B.

2.4 Geotechnical Basis of Design

Geotechnical field work for the project was completed in late December 2021 except the Winding Way crossing site which was inaccessible to drilling equipment due to heavy rains. A geotechnical report for the twelve crossing sites will be completed in the Spring of 2022, upon completion of investigations at Winding Way, to allow for the geotechnical findings to be incorporated during the final design phase of the project.

The geotechnical design team has reviewed and provided preliminary input on the design concepts, specifically drilled pier sizes and depths, slope stabilization measures and rip rap extents.

2.5 Structural Basis of Design

For the structural design of each site, dead loads, lateral loads, impact loads (vertically and horizontally), and earthquake loads were considered. A summary of the general structural loading criteria is provided in Table 2.5-1. Site specific loading conditions are provided in Chapter 3: Preliminary Design.

Dead loads for each site were dependent on site-specific design and conditions. Lateral loads were determined from both hydrodynamic loads imposed by water flowing in the creek in addition to lateral impact loads from debris being carried by the creek flows. Similar to previous SASD creek crossing improvement projects, a 1,000-pound lateral impact force from a fully saturated, queen size mattress impacting the crossings is used as the basis of lateral load design. Earthquake loads are applicable to all sites based on typical design standards for the Sacramento area and are provided in Table 2.5-1.

The vertical impact loads for exposed crossings were determined by calculating the force of a falling tree branch 18 inches in diameter and 30 feet long. This force translates to an impact force of 2,000 pounds. The tree branch length and diameter were estimated by the design team based on the field observations of tree sizes around the three aerial crossing sites. This vertical impact force did not impact the SASD standard thickness requirements for casing pipes of the three aerial crossings.

Table 2.5-1.Structural Design Criteria

LOADING TYPE	LOADING CRITERIA	
Dead Loads	o Dependent on each site (generally includes pipe, flows in pipe, and casing and/or encasement as applicable).	
Live Loads	o When applicable, live loads for people/animals walking across the aerial crossing is included in calculations.	
Lateral Impact Load	o For exposed crossings, 1,000 pounds from a fully saturated queen size mattress hitting the pipe or casing pipe at the peak creek flow velocity.	
Vertical Impact Load	o For aerial crossings, 2,000 pounds from a tree limb hitting the casing pipe during a storm event.	
Earthquake Loads	In accordance with the California Building Code, 2019 edition:	
	o Occupancy Category:	III
	o Seismic Design Category:	D
	o Site Class:	D
	o Design Spectral Acceleration at Short Periods (g)	SDS = 0.567
	o Design Spectral Acceleration at 1-Second (g)	SDI = 0.355
	o Importance Factor	I = 1.25
Deflection Criteria	o For aerial crossings, length of crossing between drilled piers divided by 360.	

2.6 Permitting

A standard list of permits for the twelve crossing sites is provided in Table 2.6-1. Permits in addition to this list are discussed for each crossing in Chapter 3: Preliminary Design. A summary table of the Permitting requirements for the twelve crossing sites is provided in Appendix B.

Table 2.6-1. Permits Required for All Sites

PERMIT	JURISDICTION	RESPONSIBLE PARTY
United States Army Corps of Engineers (USACE) 404: Clean Water Act Section 404E Nationwide Permit 3, Maintenance	United States Army Corp of Engineers	Owner
Regional Water Quality Control Board (RWQCB) 401: Clean Water Act Section 401 Water Quality Certification	Central Valley Regional Water Quality Control Board	Owner
CDFW 1602: Streambed Alteration Agreement	California Department of Fish and Wildlife (CDFW)	Owner
General Stormwater Discharge Permit during Construction (Order 2012-0006-DWQ)	Central Valley Regional Water Quality Control Board	Contractor
Erosion and Sediment Control Plan	Sacramento County	Contractor
Sacramento Area Sewer District Access Permit	Sacramento Area Sewer District	Contractor

3

3.0 Preliminary Design

The following sections discuss the following topics for each of the twelve crossing sites:

- Site and existing crossing descriptions
- Waterway Characterizations
- Repair Recommendations
- Site specific Design loading criteria
- Deviations from the SASD standards
- Permitting
- Construction schedule and work hours
- Easements
- Site Access
- Bypass requirements
- Tree Removal
- Environmental
- Construction Costs

This preliminary design section is written to be reviewed in conjunction with the 30% design drawings for each site. The 30% drawings include a site access plan and site plan for each crossing and provide a depiction the described improvements for each site. These 30% drawings are included as Appendix A of this report.

Summary tables for sewer flows, waterway flows, water velocity and elevation, deviations from SASD standards, tree removal, permitting requirements, and easements are provided for SASD review and reference in Appendix B.

3.1 Hope Lane

3.1.1 Site Description

Asset 59646 is located in the backyard of the private residence of 4915 Hope Lane in a residential neighborhood in unincorporated Sacramento County.

3.1.2 Existing Crossing Description

The existing crossing is a concrete encased 6-inch diameter cast iron pipe (CIP) pipe. The crossing encasement is exposed in the creek. The upstream and downstream soil supporting the encasement is eroding with signs of incision in the channel. The District has installed cobble around the exposed casing to provide temporary support. The crossing impedes low flows in the creek and causes minimal upstream pooling. Table 3.1-1 provides the ADWF and peak wet weather flow PWWF for the Hope Lane crossing from District flow modeling.

Table 3.1-1. Hope Lane Sewer Flows

ADWF (MGD)	ADWF d/D Ratio (Unitless)	PWWF (MGD)	PWWF d/D Ratio (Unitless)
0.00352	<0.10	0.0773	0.15

3.1.3 Waterway Characterization

The crossing is located in a small unnamed tributary of Arcade Creek. Upstream and downstream of the crossing, the waterway is incised but with a stable channel bed. The creek was found to have a sandy clay bed with low potential for further incision and scouring. The surrounding area has a few trees in a partial canopy above the crossing. The peak flow rates at the crossing location for 10-, 50-, and 100-year storms are shown in Table 3.1-2.

Table 3.1-2. Hope Lane Waterway Flow Rate

NAME	10 YR STORM (CFS)	50 YR STORM (CFS)	100 YR STORM (CFS)
StreamStats Peak Flow	49.8	68	73.2
FEMA FIS-Based Peak Flow	46	147	242

Hope Lane waterway flows are the lowest of the twelve crossings sites. As such, a peak design velocity of 6 fps (feet per second), in conjunction with CBEC model findings from the Gina Court site will be used to provide rip rap sizing recommendations.

3.1.4 Repair Recommendation

The recommended repair replaces the crossing pipe with a new ductile iron pipe (DIP) pipe with a new concrete encasement. To protect the new pipe, encasement, and waterway from erosion, riprap and turf reinforced mats (TRM) will be installed upstream and downstream of the crossing. Riprap and TRM will extend upstream and downstream of the crossing 10-feet minimum to provide long term protection and to extend beyond crossing related bank scour. Details on the extents and locations of these described improvements can be found in Appendix A: Sheet C-011. The following sections detail the

design criteria used for this site in addition to any deviations from SASD standards in the preliminary design.

3.1.4.1 Structural Design Criteria

Table 3.1-3 includes the design loading criteria for the Hope Lane site. These criteria will be used in the design of the partially exposed concrete encasement.

Table 3.1-3. Hope Lane Design Loading Criteria

LOADING TYPE	LOADING CRITERIA	
Dead Loads	o	Sewer pipe
	o	Water in the pipe
	o	Concrete encasement surrounding the pipe
Live Loads	o	People/animals walking across crossing
Lateral Impact Loads	o	Velocities up to 8 fps in creek.
Vertical Impact Loads	o	2,000 pounds from tree limbs hitting the concrete encasement.
Earthquake Loads	o	See Chapter 2.5: Structural Basis of Design

3.1.4.2 Deviations from District Standards

The design criteria used for the Hope Lane site follow SASD standards except for the deviations outlined in Table 3.1-4. For each deviation, a business case evaluation to justify the deviation is provided. A list of SASD design criteria used in this project is provided in Chapter 2: Basis of Design.

Table 3.1-4. Hope Lane Deviations from SASD Standards

STANDARD	DEVIATION FROM STANDARD	BUSINESS CASE EVALUATIONS TO JUSTIFY DEVIATION
202.1.1	Pipe diameter below minimum of 8 inches	Because only the pipe at the crossing is being replaced, the existing diameter needs to be matched. Matching the diameter prevents flow and gas issue problems that would be caused if the top or bottom of the pipe does not line up.
202.12.1	Minimum cover of 3 feet not met	Lowering pipeline was not viable at this site due to extent of rehabilitation required. See alternatives analysis report for details.
202.12.3	Carrier pipe casing not included	A carrier pipe was not included in design because it would exacerbate the profile of the encasement in the creek. The DIP pipe is encased in concrete.
202.12.3	Encasement Cover	Providing 12 inches of encasement above the existing pipe would block the creek and increase ponding upstream of the crossing. Encasement depth above the pipe is reduced to 6 inches with a rounded top of encasement to minimize upstream ponding while still protecting the DIP pipe.

3.1.5 Permitting

In additional to the standard site permits, Hope Lane will require:

- An encroachment permit for staging in the right of way
- Pending geotechnical site data, a general permit for dewatering in the trench excavation

3.1.6 Construction Considerations

3.1.6.1 Schedule and Work Hours

Construction for the Hope Lane site is expected to take from two to four weeks to replace the crossing pipe, install a new encasement, and install riprap protection around the new crossing. Work hours are expected to be between 8 am and 5 pm, Monday through Friday, in consideration of nearby neighbors. Work will be completed in the dry weather when there is no flow in the creek at the crossing site.

3.1.6.2 Easements

Table 3.1-5 summarizes the easements required for the Hope Lane crossing. An estimate of the easement areas is provided in Appendix B.

Table 3.1-5. Hope Lane Easements

APN	ADDRESS	OWNER	EXISTING EASEMENTS	ADDITIONAL EASEMENTS TYPE
240-0320-086	4915 Hope Ln, Sacramento 95821	Cardona, Amilcar & Victoria	SASD Easement	Temporary Construction Easement

3.1.6.3 Site Access

The site will be accessed from the road to the west of 4915 Hope Lane. The fence separating the road from the site will be temporarily removed during construction (one post will need to be removed and replaced). Equipment will be staged at the end of the road and carried to the site. Replacement of the homeowner's landscaping will be included for areas damaged by construction. An overview of the site access route and the anticipated staging area are provided in Appendix A: Sheet C-010.

3.1.6.4 Bypassing

Bypassing will be required at this crossing for the duration of the pipe replacement time. The Contractor will trench and expose the existing pipe and prepare the new pipe for installation limiting bypass time. Bypassing will be limited to one working day representing the required the duration to install and test the new pipeline. However, due to low flows, there is also an option to plug the route and use a pumper truck to remove flows during the construction period. Two existing manholes straddle each side of the 4915 Hope Lane property. If temporary bypassing is required, the manhole on the east side of Hope Lane would be plugged and pumped using a temporary highline force main across the 4915 Hope Lane property to a manhole located on the west side of Hope Lane. The sewer services from 4915 and 4920 Hope Lane connect to the system between these two manholes. Their service will need to be shut off during pipe replacement or otherwise stored and off hauled by the Contractor.

3.1.6.5 Tree Removal

No trees require removal at the Hope Lane site. Redwood branches will be trimmed up to 8-ft, if necessary, under the observation of a certified arborist.

3.1.6.6 Environmental

Hope Lane site is located in the backyard of a residence, as such special precautions will be observed to minimize the effects of noise and odor. Noise provisions may include limitations in work hours and type of equipment used. Odor will be controlled through provisions requiring temporary plugging of

open pipes and removal of demolished sewer materials. At the time of this report environmental field work has been completed and no significant biological, cultural, or archaeological impacts are expected. Mitigation measures will be included in the contract documents. Required permits, as summarized in Section 2.6, will be obtained through the appropriate agencies. Technical memorandums summarizing results of environmental surveys will be submitted to SASD after the preliminary design is confirmed.

3.1.7 Preliminary Opinion of Probable Cost

The capital cost for each alternative was developed to an Association for the Advancement of Cost Engineering (AACE) Class III level. The capital cost for Hope Lane improvements is expected to be $111,000 escalated to 2023 dollars. More information on the cost estimate can be found in Chapter 4 and in Appendix C.

3.2 Winding Way

3.2.1 Site Description

Asset 48368 is located on the private property of 4647 Winding Way in a residential neighborhood in unincorporated Sacramento County.

3.2.2 Existing Crossing Description

The existing crossing is an 8-inch welded aluminum pipe with no encasement. The crossing is aerial with buried concrete pier supports installed in the creek banks. The aluminum pipe is attached to the concrete supports with galvanized pipe straps. The two welded aluminum pipe joints are exposed though in good condition. The upstream manhole is located near the north bank. Table 3.2-1 provides the ADWF and PWWF for the Winding Way crossing from District flow modeling.

Table 3.2-1. Winding Way Sewer Flows

ADWF (MGD)	ADWF d/D Ratio (Unitless)	PWWF (MGD)	PWWF d/D Ratio (Unitless)
0.0392	0.20	0.342	0.60

3.2.3 Waterway Characterization

The crossing is located in Arcade Creek. Immediately upstream of the crossing, there is deep channel incision and scouring occurring with water collecting in eroded areas of the creek bed. A sand bar is forming from sediment build up upstream of the crossing. Significant debris collects at the aerial crossing. Downstream of the crossing there is also incision and scour with debris collecting in the channel. The banks of the channel on both sides are steep and large tree roots are now exposed on the south bank. The creek bed is defined as poorly graded fine to medium sand with some pebbles. The area contains riparian vegetation with oaks, willows, and redwoods near the crossing. The peak flow rates at the crossing location for 10-, 50-, and 100-year storms are shown in Table 3.2-2. Creek velocity, water surface elevation, and crossing elevation for design events are provided in Table 3.2-3. Note that the flow values associated with the in-bank events are independent of and are well below the 10-year storms flows for the Winding Way crossing.

Table 3.2-2. Winding Way Waterway Flow Rate

NAME	10 YR STORM (CFS)	50 YR STORM (CFS)	100 YR STORM (CFS)
StreamStats Peak Flow	3,910	5,190	5,590
FEMA FIS-Based Peak Flow	2,546	3,978	4,620

Table 3.2-3. Winding Way Water Depth, Velocity, and Elevations

DESIGN EVENT	CREEK WATER VELOCITY	WATER SURFACE ELEVATION	CROSSING ELEVATION	NOTES ON CROSSING ELEVATION
	(FT/S)	(FT)	(FT)	(FT)
Half Bank Full	1.96	65.0	64.5	Elevation is top of existing 8-inch pipe
Bank Full	4.27	70.7		

3.2.4 Repair Recommendation

The recommended repair design includes installing new concrete piers, installing a new DIP pipe with a welded steel casing, smoothing out the banks and grading to a 1:1 slope, and placing turf reinforced mats over the disturbed slopes. The existing slope protection, crossing pipe, and piers will be removed or abandoned per SASD standards. Further information on the improvements can be found in Appendix A: Sheet C-021. The following sections detail the design criteria used for this site in addition to any deviations from SASD standards in the preliminary design.

Concrete piers require installation by a specialized drilling subcontractor. The existing alignment is directly beneath Sacramento Municipal Utilities District (SMUD) overhead 12 kilovolt (kV) power lines. The United States Occupation Health and Safety Administration (OSHA) standard 1926.1408(h) requires a minimum clearance of 10 feet for power lines up to 50 kV. Drilling subcontractors may have more stringent clearance requirements based on their specific safety programs and liability. Additional investigation is required to verify existing clearances are sufficient for safe access.

3.2.4.1 Structural Design Criteria

Table 3.2-4 includes the design loads for the Winding Way site. Calculations for the span between the new drilled piers was conducted to determine that an eighteen inch or larger diameter schedule 40 welded steel casing provides adequate capacity for the span between piers. The preliminary structural calculations for the pier spacing and casing structural requirements is included in Appendix D.

Table 3.2-4. Winding Way Design Loading Criteria

LOADING TYPE	LOADING CRITERIA	
Dead Loads	o	DIP pipe
	o	Water in the pipe
	o	Welded steel pipe casing
	o	Casing annular fill
Live Loads	o	50 pounds linear foot for people/animals walking across the crossing
Lateral Impact Load	o	1,000 pounds from queen size mattress impact during storm event
Vertical Impact Load	o	2,000 pounds from tree limbs falling on the casing pipe
Earthquake Loads	o	See Chapter 2.5: Structural Basis of Design

3.2.4.2 Deviations from District Standards

The design criteria used for the Winding Way site follow SASD standards except for the deviations outlined in Table 3.2-5. For each deviation, a business case evaluation to justify the deviation is provided. For a summary of the SASD design criteria used in this project please see Chapter 2: Basis of Design

Table 3.2-5. Winding Way Deviations from SASD Standards

STANDARD	DEVIATION FROM STANDARD	BUSINESS CASE EVALUATIONS TO JUSTIFY DEVIATION
202.13.2	Casing will not end 10 feet from manhole	The existing manhole on the north side of the Winding Way crossing is only approximately 11 feet from the bank, there is not sufficient room to install the pier, terminate the casing, and install transition couplings without moving the manhole. This manhole also cannot be relocated with extending the sewer system improvements to the two pipes entering this manhole that travel roughly parallel to the creek as well. The proposed casing extends beyond the new concrete pier on the North bank for support and ends to provide spacing for flexible couples on the carrier pipe prior to the manhole connection. This provides the required casing structural support from the pier while maximizing the flexibility of the pipe between the casing and manhole.
202.12.4	Casing will not extend 10 feet into banks	Same justification as above

3.2.5 Permitting

In additional to the standard site permits, Winding Way will require:

- An encroachment permit for staging in the right of way
- A tree removal permit
- Pending geotechnical site data, a general permit for dewatering in the trench excavation

3.2.6 Construction Considerations

3.2.6.1 Schedule and Work Hours

Construction for the Winding Way site is expected to take from eight to ten weeks to demolish the existing piers, install new piers, install a new carrier and casing pipes, regrade slopes, and install slope protection measures. Work hours are expected to be between 8 am and 5 pm, Monday through Friday, in consideration of nearby neighbors. Work will be completed in the dry weather when there is no flow in the creek at the crossing site.

3.2.6.2 Easements

Table 3.2-6 summarizes the easements required for the Winding Way crossing. An estimate of the easement areas is provided in Appendix B.

Table 3.2-6. Winding Way Easements

APN	ADDRESS	OWNER	EXISTING EASEMENTS	ADDITIONAL EASEMENTS TYPE
240-0222-035	4349 Sycamore Ave, Sacramento 95841	Tovar, Marisol	SASD & Drainage Easements	Temporary Construction Easement
240-0222-020	4647 Winding Way, Sacramento 95841	McGinnis, James	SASD Easement	Temporary Construction Easement

APN	ADDRESS	OWNER	EXISTING EASEMENTS	ADDITIONAL EASEMENTS TYPE
240-0222-022	4740 Pasadena Ave, Sacramento 95841	Steven D Oiseth Trust	SASD Easement	Temporary Construction Easement
240-0222-051	4351 Sycamore Ave, Sacramento 95841	Vercruysse Trust	None	Temporary Construction Easement
240-0222-023	4750 Pasadena Ave, Sacramento 95841	Sudia Revocable Living Trust	None	Temporary Construction Easement

3.2.6.3 Staging and Site Access

The site will be accessed via 4750 Pasadena Avenue and the backyard of 4740 Pasadena Avenue. Protection of the homeowners' driveway will need to be considered. An allowance for grass reseeding along the access route is included in the costs for this crossing. A secondary access from 4349 Sycamore Avenue will be included from Winding Way. An overview of the site access route is provided in Appendix A: Sheet C-020.

3.2.6.4 Bypassing

Bypassing will be required at this crossing for the duration of the pier installation and pipe replacement. The pier replacement and pipe replacement time is expected to take approximately five weeks. Provided the length of time, access to site and sewer flow rates, a temporary bypass system is recommended. For temporary bypassing flows will be routed from the manhole immediately upstream of the crossing to the nearby Mission Trunk manhole on the same side of the creek. The location of this connection Manhole is shown on Sheet C-020.

3.2.6.5 Tree Removal

Table 3.2-7 summarizes the trees that will be removed.

Table 3.2-7. Winding Way Tree Removal Summary

TREE TAG	TREE DIAMETER (inches)	TREE DRIPLINE DIAMETER (feet)	TREE SPECIES
7651	8	-	Dead
7652	48	30	Oak

3.2.6.6 Environmental

Winding Way site is located in close proximity to residential properties, therefore, special precautions will be observed to minimize the effects of noise and odor. Noise provisions will include limitations in work hours and type of equipment used. Odor will be controlled through provisions requiring temporary plugging of open pipes and removal of demolished sewer materials. A designated wetland area is located in the properties north of the site as shown on the site access route (Appendix A: Sheet C-020). Special provisions will be included in the contract documents to protect the wetland area during access to the site. At the time of this report environmental field work has been completed and no significant cultural or archaeological impacts are expected. Required permits, as summarized in Section 2.6, will be obtained through the appropriate agencies. Technical memorandums summarizing results of environmental surveys will be submitted to SASD after the preliminary design is confirmed.

3.2.7 Preliminary Opinion of Probable Cost

The capital cost for each alternative was developed to an AACE Class III level. The capital cost for Winding Way improvements is expected to be $586,000 escalated to 2023 dollars. More information on the cost estimate can be found in Chapter 4 and in Appendix C.

3.3 Arcade Creek

3.3.1 Site Description

Asset 49894 is located in Arcade Creek Park at 5613 Omni Drive belonging to Arcade Creek Recreation and Park District in a residential neighborhood in unincorporated Sacramento County. This site can be accessed through the park's parking lot. A SMUD facility is located adjacent to the crossing.

3.3.2 Existing Crossing Description

The existing crossing is a 48-inch reinforced concrete pipe (RCP) pipe with no encasement. The crossing, including two bell and spigot joints, is exposed with approximately half the pipe buried in the creek bed. The joints have some chips with exposed aggregate on the bells but, overall, they are in good condition. Cobbles were placed around the pipe and extend downstream to the nearby pedestrian footbridge footing for slope protection and bed erosion prevention. The majority of these cobbles washed away in the large rainfall events of December 2021. The existing crossing is also being lined with a structural Cured-in-Place Pipe (CIPP) liner. This lining work will be completed prior to the recommended improvements at the site. Table 3.3-1 provides the ADWF and PWWF for the Arcade Creek and Garfield Thousand Oaks crossings combined from District flow modeling. Because the Garfield Thousand Oaks crossing is being rerouted, flows will add to the existing Arcade Creek flows.

Table 3.3-1. Arcade Creek Sewer Flows (Arcade and Garfield)

ADWF (MGD)	ADWF d/D Ratio (Unitless)	PWWF (MGD)	PWWF d/D Ratio (Unitless)
9.68	0.41	25.09	0.71

3.3.3 Waterway Characterization

The crossing is located in Verde Cruz Creek. The crossing is located at a bend in the creek with upstream cobble and sand deposits on the creek bed. Downstream, scour is occurring on the west bank and is moving toward the pedestrian footbridge footings downstream of the crossing. The banks on either side are steep with greater erosion on the downstream side. The creek bed is classified as poorly graded medium grain sand with some pebbles. There are some landscaping trees located near the crossing including oaks and redwoods. The peak flow rates at the crossing location for 10-, 50-, and 100-year storms are shown in Table 3.3-2. Creek velocity, water surface elevation, and crossing elevation for design events are provided in Table 3.3-3. Note that the flow values associated with the in-bank events are independent of and below the 10-year storm flows for the Arcade Creek crossing.

Table 3.3-2. Arcade Creek Waterway Flow Rate

NAME	10 YR STORM (CFS)	50 YR STORM (CFS)	100 YR STORM (CFS)
StreamStats Peak Flow	351	477	516
FEMA FIS-Based Peak Flow	274	585	795

Table 3.3-3. Arcade Creek Water Depth, Velocity, and Elevations

DESIGN EVENT	CREEK WATER VELOCITY	WATER SURFACE ELEVATION	CROSSING ELEVATION	NOTES ON CROSSING ELEVATION
	(FT/S)	(FT)	(FT)	(FT)
Depth of 0.5-ft Over Pipe	5.15	80.0	79.4	Top of Pipe
Half Bank Full	2.88	81.0		
Bank Full	2.81	83.2		

3.3.4 Repair Recommendation

The recommended repairs include building back the downstream slope on the southern side of the creek, protecting the banks with turf reinforced mats, and installing riprap in the creek bed to protect the existing pipe. SASD will install a CIPP liner as part of a separate contract prior to this work. Further information on the improvements can be found in Appendix A: Sheet C-031. The following sections detail the design criteria used for this site in addition to any deviations from SASD standards in the preliminary design.

3.3.4.1 Structural Design Criteria

There are no structural improvements at the Arcade Creek crossing site.

3.3.4.2 Deviations from District Standards

The design criteria used for the Arcade Creek site follow SASD standards except for the deviations outlined in Table 3.3-4. For each deviation, a business case evaluation to justify the deviation is provided. For a summary of the SASD design criteria used in this project please see Chapter 2: Basis of Design.

Table 3.3-4. Arcade Creek Deviations from SASD Standards

STANDARD	DEVIATION FROM STANDARD	BUSINESS CASE EVALUATIONS TO JUSTIFY DEVIATION
202.12.3	Carrier pipe casing not included	The existing pipe did not have a casing and the pipe is not being replaced. The CIPP liner inside the pipe will function as the carrier pipe with the existing RCP acting as a casing. Installation of a casing pipe would block the creek significantly and is not recommended.
202.12.1	Minimum cover of 3 feet not met	The pipe is not being replaced at this site. Rip-rap will be installed to protect the pipe and creek bed from further erosion.

3.3.5 Permitting

In additional to the standard site permits, Arcade Creek will require:

- An encroachment permit for staging in the right of way

3.3.6 Construction Considerations

3.3.6.1 Schedule and Work Hours

Construction for the Arcade Creek site is expected to take from three to five weeks to restore the creek banks, install riprap protection around the crossing, and install slope protection at the site. Work hours are expected to be between 8 am and 5 pm, Monday through Friday, in consideration of nearby neighbors and the park. Work will be completed in the dry weather when there is no flow in the creek at the crossing site.

3.3.6.2 Easements

Table 3.3-5 summarizes the easements required for the Arcade Creek crossing. An estimate of the easement areas is provided in Appendix B.

Table 3.3-5. Arcade Creek Easements

APN	ADDRESS	OWNER	EXISTING EASEMENTS	ADDITIONAL EASEMENTS TYPE
230-0080-037	5613 Omni Dr, Sacramento 95841	Arcade Creek Recreation/Park District	N/A	Temporary Construction Easement
230-0092-037	Garfield Av, Sacramento 95841	Arcade Creek Recreation/Park District	N/A	Temporary Construction Easement
230-0730-008	4894 Thousand Oaks Ct, Carmichael 95608	Lilian A Olech Trust	None	Temporary Construction Easement

3.3.6.3 Staging and Site Access

The site will be accessed via the Arcade Creek Park entrance on Omni Drive and continue through the parking area, park access roads, and open areas. Equipment will be driven into the site. Protection of and/or restoration of the park grass, sidewalks, parking area, and access roads will need to be considered. An overview of the site access route and possible staging areas are provided in Appendix A: Sheet C-030.

3.3.6.4 Bypassing

No replacement of the pipe is required as part of the selected repair. No bypassing is required.

3.3.6.5 Tree Removal

No trees require removal at the Arcade Creek site.

3.3.6.6 Environmental

Arcade Creek site is located in close proximity to residential properties; therefore, special precautions will be observed to minimize the effects of noise and odor. Noise provisions may include limitations in work hours and type of equipment used. Odor will be controlled through provisions requiring temporary plugging of open pipes and removal of demolished sewer materials. At the time of this report environmental field work has been completed and no significant biological, cultural, or archaeological impacts are expected. Mitigation measures will be included in the contract documents. Required permits, as summarized in Section 2.6, will be obtained through the appropriate agencies. Technical memo

randums summarizing results of environmental surveys will be submitted to SASD after the preliminary design is confirmed.

3.3.7 Preliminary Opinion of Probable Cost

The capital cost for each alternative was developed to an AACE Class III level. The capital cost for Arcade Creek improvements is expected to be $173,000 escalated to 2023 dollars. More information on the cost estimate can be found in Chapter 4 and in Appendix C.

3.4 Garfield Thousand Oaks

3.4.1 Site Description

Asset 41018 is located in Arcade Creek Park at 5613 Omni Drive belonging to Arcade Creek Recreation and Park District in a residential neighborhood in unincorporated Sacramento County. This site can be accessed through the park's parking lot. A SMUD facility is located adjacent to the crossing.

3.4.2 Existing Crossing Description

The existing crossing is a 24-inch vitrified clay pipe (VCP) with no encasement exposed in the creek. The pipe was originally constructed 12-inches below grade but now the crossing is resting on the creek bed with temporary downstream supports. Five VCP bell and spigot joints are now exposed in the crossing. There are some chips in the bells and several of the joints are now offset but, no breaks or leaks have occurred. Table 3.4-1 provides the ADWF and PWWF for the Garfield Thousand Oaks crossing from District flow modeling.

Table 3.4-1. Garfield Thousand Oaks Sewer Flows

ADWF (MGD)	ADWF d/D Ratio (Unitless)	PWWF (MGD)	PWWF d/D Ratio (Unitless)
0.68	0.25	2.52	0.51

3.4.3 Waterway Characterization

The crossing is located in Verde Cruz Creek upstream of the Arcade Creek crossing. Upstream of the crossing there is a tree stump with debris and sediment accumulating around it. Downstream there are sand deposits accumulating in the channel. The channel banks are steep, nearing vertical. The pipe crosses the creek at a steep angle that is exacerbating erosion around the crossing. The channel bed is characterized by poorly graded medium grain sand with some pebbles with hard pan clay underneath. There are several trees located near the crossing including oaks and redwoods. The peak flow rates at the crossing location for 10-, 50-, and 100-year storms are shown in Table 3.4-2. Creek velocity, water surface elevation, and crossing elevation for design events are not provided as the Garfield Thousand Oaks crossing is being removed from the creek and this information is not pertinent to the repair recommendations.

Table 3.4-2. Garfield Thousand Oaks Waterway Flow Rate

NAME	10 YR STORM (CFS)	50 YR STORM (CFS)	100 YR STORM (CFS)
StreamStats Peak Flow	351	477	516
FEMA FIS-Based Peak Flow	274	585	795

3.4.4 Repair Recommendation

The recommended repair design includes removing this crossing from the creek and rerouting it through Arcade Creek park connecting with the Mission Trunk pipeline further up gradient. The existing crossing location will be restored and anchored with turf reinforced mats installed to protect banks as necessary. Further information on the improvements can be found in Appendix A: Sheet C-032-034.

The following sections detail the design criteria used for this site in addition to any deviations from SASD standards in the preliminary design.

3.4.4.1 Structural Design Criteria

There are no structural improvements at the Arcade Creek crossing site.

3.4.4.2 Deviations from District Standards

There are no deviations from the District standards for the Garfield Thousand Oaks site.

3.4.5 Permitting

In additional to the standard site permits, Garfield Thousand Oaks will require:

- An encroachment permit for staging in the right of way
- A tree removal permit
- A general permit for dewatering in the trench excavation

3.4.6 Construction Considerations

3.4.6.1 Schedule and Work Hours

Construction for the Garfield Thousand Oaks site is expected to take from three to five weeks to install the new alignment, tie into the existing collection system, remove the existing crossing pipe, and restore the creek. Work hours are expected to be between 8 am and 5 pm, Monday through Friday, in consideration of nearby neighbors. Work will be completed in the dry weather when there is no flow in the creek at the crossing site.

3.4.6.2 Easements

Table 3.4-3 summarizes the easements required for the Garfield Thousand Oaks crossing. An estimate of the easement areas is provided in Appendix B.

Table 3.4-3. Garfield Thousand Oaks Easements

APN	ADDRESS	OWNER	EXISTING EASEMENTS	ADDITIONAL EASEMENTS TYPE
230-0080-037	5613 Omni Dr, Sacramento 95841	Arcade Creek Recreation/Park District	SASD Easement	Temporary Construction Easement
230-0092-014	Hemlock St, Sacramento 95841	Arcade Creek Recreation/Park District	None	Temporary Construction Easement

3.4.6.3 Staging and Site Access

Similar to the Arcade Creek site, the Garfield Thousand Oaks site will be accessed via the main Arcade Creek Park entrance on Omni Drive and continue through the parking area, park access road, and open grass area. Equipment will be driven into the site. Protection of the park grass, sidewalks, parking area, and access roads will be considered. An overview of the site access route and possible staging areas are provided in Appendix A: Sheet C-030.

3.4.6.4 Bypassing

Bypassing will be required at this crossing for short durations during sewer connections. These activities are expected to require shutdowns up to 6 hours. Temporary bypass pumping from the manhole upstream of the Garfield Thousand Oaks connection in Arcade creek park to a Mission Trunk or new Garfield Thousand oaks manhole will be required unless the existing sewer system can be plugged and hold flows for the short duration required for the sewer connections. At the preliminary design phase, the costs for short term bypassing is included in the cost estimate for this site.

3.4.6.5 Tree Removal

In order to complete the required rehabilitation, some trees will require removal. Table 3.4-4 summarizes the trees that will be removed as a part of the project.

Table 3.4-4. Garfield Thousand Oaks Tree Removal Summary

TREE TAG	TREE DIAMETER (inches)	TREE DRIPLINE DIAMETER (feet)	TREE SPECIES
7701157	7	12	Deciduous

3.4.6.6 Environmental

Garfield Thousand Oaks site is located in close proximity to residential properties and recreational park users, therefore, special precautions will be observed to minimize the effects of noise and odor. Noise provisions may include limitations in work hours and type of equipment used. Odor will be controlled through provisions requiring temporary plugging of open pipes and removal of demolished sewer materials. At the time of this report environmental field work has been completed and no significant biological, cultural, or archaeological impacts are expected. Mitigation measures will be included in the contract documents. Required permits, as summarized in Section 2.6, will be obtained through the appropriate agencies. Technical memorandums summarizing results of environmental surveys will be submitted to SASD after the preliminary design is confirmed.

3.4.7 Preliminary Opinion of Probable Cost

The capital cost for each alternative was developed to an AACE Class III level. The capital cost for Garfield Thousand Oaks improvements is expected to be $760,000 escalated to 2023 dollars. More information on the cost estimate can be found in Chapter 4 and in Appendix C.

3.5 Concho Court

3.5.1 Site Description

Asset 44237 is located in the backyard of the private residences of 4820 and 4821 Concho Court and 5665 Rolling Oak Drive in a residential neighborhood in unincorporated Sacramento County.

3.5.2 Existing Crossing Description

The existing crossing is a 6-inch VCP encased in concrete. The encasement is exposed in the creek bed and is at risk of undermining if not addressed. Table 3.5-1 provides the ADWF and PWWF for the Concho Court crossing from District flow modeling.

Table 3.5-1. Concho Court Sewer Flows

ADWF (MGD)	ADWF d/D Ratio (Unitless)	PWWF (MGD)	PWWF d/D Ratio (Unitless)
0.013	0.11	0.0613	0.31

3.5.3 Waterway Characterization

The crossing is located in Verde Cruz Creek upstream of the Gina Court Crossing. Upstream of the crossing the channel is lined with gunite with minimal signs of erosion. Downstream of the crossing is an unlined, stable channel with minimal debris or erosion. The banks on both sides are steep. The creek bed is characterized as fine sandy silt with coarse gravel and cobble. The area is considered a closed riparian canopy with many nearby trees including oaks and redwoods. The peak flow rates at the crossing location for 10-, 50-, and 100-year storms are shown in Table 3.5-2. Creek velocity, water surface elevation, and crossing elevation for design events are provided in Table 3.5-3. Note that the flow values associated with the in-bank events are independent of the 10-, 50- and 100-year storm flows for the Concho Court crossing.

Table 3.5-2. Concho Court Waterway Flow Rate

NAME	10 YR STORM (CFS)	50 YR STORM (CFS)	100 YR STORM (CFS)
StreamStats Peak Flow	332	453	490
FEMA FIS-Based Peak Flow	263	566	773

Table 3.5-3. Concho Court Water Depth, Velocity, and Elevations

DESIGN EVENT	CREEK WATER VELOCITY	WATER SURFACE ELEVATION	CROSSING ELEVATION	NOTES ON CROSSING ELEVATION
	(FT/S)	(FT)	(FT)	(FT)
Half Bank Full	2.68[1]	88.8[2]	86.2	Top of Encasement
Bank Full	3.61[2]	91.2[3]		

3.5.4 Repair Recommendation

The recommended repairs include installation of turf reinforced mats on the banks and creek bed upstream and downstream of the existing encasement. Further information on the improvements can be found in Appendix A: Sheet C-051. The following sections detail the design criteria used for this site in addition to any deviations from SASD standards in the preliminary design.

3.5.4.1 Structural Design Criteria

No structural improvements are included at the Concho Court site.

3.5.4.2 Deviations from District Standards

The design criteria used for the Concho Court site follow SASD standards except for the deviations outlined in Table 3.5-4. For each deviation, a business case evaluation to justify the deviation is provided. For a summary of the SASD design criteria used in this project please see Chapter 2: Basis of Design.

Table 3.5-4. Concho Court Deviations from SASD Standards

STANDARD	DEVIATION FROM STANDARD	BUSINESS CASE EVALUATIONS TO JUSTIFY DEVIATION
202.1.1	Pipe diameter below minimum of 8 inches	The pipe is not being replaced at this site. Existing pipe is 6-inch diameter.
202.12.3	Carrier pipe casing not included	The existing pipe did not have a casing and the pipe is not being replaced. Existing encasement will not be replaced.
202.12.1	Minimum cover of 3 feet not met	The pipe and encasement are not being replaced at this site. The top of the concrete encasement is exposed.

3.5.5 Permitting

In additional to the standard site permits, Concho Court will require:

- An encroachment permit for staging in the right of way
- A tree removal permit

[1] Concho Court water velocities were assumed to be approximately the same as Gina Court flows since the crossing is just upstream of the Gina Court crossing in the same channel.
[2] Water surface elevation at Concho Court assumes the same water depth cover over the crossing elevation as the Gina Court crossing site.

3.5.6 Construction Considerations

3.5.6.1 Schedule and Work Hours

Construction for the Concho Court site is expected to take from two to four weeks to remove the existing cobbles, install bank protection, and install riprap around the crossing. Work hours are expected to be between 8 am and 5 pm, Monday through Friday, in consideration of nearby neighbors. Work will be completed in the dry weather when there is no flow in the creek at the crossing site.

3.5.6.2 Easements

Table 3.5-5 summarizes the easements required for the Concho Court crossing. An estimate of the easement areas is provided in Appendix B.

Table 3.5-5. Concho Court Easements

APN	ADDRESS	OWNER	EXISTING EASEMENTS	ADDITIONAL EASEMENTS TYPE
230-0541-011	5665 Rolling Oak Dr, Sacramento 95841	Bitcon, James & Sue	SASD Easement	Temporary Construction Easement
230-0281-007	4821 Concho Ct, Carmichael 95608	Keith, Denis & Vera	Unknown	Temporary Construction Easement
230-0281-006	4820 Concho Ct, Carmichael 95608	Marian D Washburn Trust	Unknown	Temporary Construction Easement

3.5.6.3 Staging and Site Access

The site will be accessed via 4820 Concho Court through the side yard and backyard areas. Equipment and materials will be required to be hand carry only to the site across a private footpath and grass area. Protection of the homeowner's footpath, grass and concrete driveway will be considered. An allowance for grass reseeding along the access route is included in the costs for this crossing. An overview of the site access route and possible staging areas are provided in Appendix A: Sheet C-050.

3.5.6.4 Bypassing

Bypassing will not be required at this crossing as the pipeline will not be replaced.

3.5.6.5 Tree Removal

In order to complete the required rehabilitation, some trees will require removal. Table 3.5-6 summarizes the trees that will be removed as a part of the project.

Table 3.5-6. Concho Court Tree Removal Summary

TREE TAG	TREE DIAMETER (inches)	TREE DRIPLINE DIAMETER (feet)	TREE SPECIES
3701113[3]	-	-	Tree Cluster
3701112[4]	1.3	-	-

3.5.6.6 Environmental

The Concho Court site is located in the backyard of a residence, as such special precautions will be observed to minimize the effects of noise and odor. Noise provisions may include limitations in work hours and type of equipment used. Odor will be controlled through provisions requiring temporary plugging of open pipes and removal of demolished sewer materials. At the time of this report environmental field work has been completed and no significant biological, cultural, or archaeological impacts are expected. Mitigation measures will be included in the contract documents. Required permits, as summarized in Section 2.6, will be obtained through the appropriate agencies. Technical memorandums summarizing results of environmental surveys will be submitted to SASD after the preliminary design is confirmed.

3.5.7 Preliminary Opinion of Probable Cost

The capital cost for each alternative was developed to an AACE Class III level. The capital cost for Concho Court improvements is expected to be $81,000 escalated to 2023 dollars. More information on the cost estimate can be found in Chapter 4 and in Appendix C.

[3] This is a survey shot number. Tree not tagged in survey. Field verification required.

3.6 Gina Court

3.6.1 Site Description

Asset 50528 spans the backyard of the private residences located at 5510 and 5508 Oak River Court and 5667 and 5671 Rolling Oak Drive in a residential neighborhood in unincorporated Sacramento County.

3.6.2 Existing Crossing Description

The existing crossing is a 6-inch VCP with a concrete encasement. Although once buried, the encasement is now exposed in the creek bed. The encasement is in good condition with some exposed aggregate but no exposed pipe or cracking has been observed. The upstream manhole near the top of the creek bank is partially exposed due to creek bank erosion. Table 3.6-1 provides the ADWF and PWWF for the Gina Court crossing from District flow modeling.

Table 3.6-1. Gina Court Sewer Flows

ADWF (MGD)	ADWF d/D Ratio (Unitless)	PWWF (MGD)	PWWF d/D Ratio (Unitless)
0.00573	<0.10	0.0263	0.21

3.6.3 Waterway Characterization

The crossing is located in Verde Cruz Creek downstream of the Concho Court site. Upstream of the crossing there is heavy vegetation with minimal erosion on both banks. Downstream the channel is widening where a gradual bend in the creek occurs. The bank is steep on the downstream bank outside of the curve with signs of active erosion and a lack of stabilizing vegetation. The creek bed material is defined as hard pan coarse grain sand with pebbles and gravel. The crossing is covered by an oak canopy with some redwoods; some roots are exposed on the creek banks. The peak flow rates at the crossing location for 10-, 50-, and 100-year storms are shown in Table 3.6-2. Creek velocity, water surface elevation, and crossing elevation for design events are provided in Table 3.6-3. Note that the flow values associated with the in-bank events are independent of the 10-, 50-, and 100-year storm flows for the Gina Court crossing.

Table 3.6-2. Gina Court Waterway Flow Rate

NAME	10 YR STORM (CFS)	50 YR STORM (CFS)	100 YR STORM (CFS)
StreamStats Peak Flow	332	453	490
FEMA FIS-Based Peak Flow	263	566	773

Table 3.6-3. Gina Court Waterway Flowrate, Velocity, and Elevation

DESIGN EVENT	CREEK WATER VELOCITY	WATER SURFACE ELEVATION	CROSSING ELEVATION	NOTES ON CROSSING ELEVATION
	(FT/S)	(FT)	(FT)	(FT)
Half Bank Full	2.68	84.6	82.7	Top of Encasement
Bank Full	3.61	87.0		

3.6.4 Repair Recommendation

The recommended repairs include removing existing cobble, installing turf reinforced mats on the slopes for stabilization and protection of the manhole in the creek bank, and installing riprap on the creek bed upstream and downstream of the existing encasement. Further information on the improvements can be found in Appendix A: Sheet C-061. The following sections detail the design criteria used for this site in addition to any deviations from SASD standards in the preliminary design.

3.6.4.1 Structural Design Criteria

No structural improvements are included at the Concho Court site.

3.6.4.2 Deviations from District Standards

The design criteria used for the Gina Court site follow SASD standards except for the deviations outlined in Table 3.6-4. For each deviation, a business case evaluation to justify the deviation is provided. For a summary of the SASD design criteria used in this project please see Chapter 2: Basis of Design.

Table 3.6-4. Gina Court Deviations from SASD Standards

STANDARD	DEVIATION FROM STANDARD	BUSINESS CASE EVALUATIONS TO JUSTIFY DEVIATION
202.1.1	Pipe diameter below minimum of 8 inches	The pipe is not being replaced at this site. Existing pipe is 6-inch diameter.
202.12.3	Carrier pipe casing not included	The existing pipe did not have a casing and the pipe is not being replaced. Existing encasement will not be replaced.
202.12.1	Minimum cover of 3 feet not met	The pipe and encasement are not being replaced at this site. The top of the concrete encasement is exposed.

3.6.5 Permitting

In additional to the standard site permits, Gina Court will require:

- An encroachment permit for staging in the right of way
- A tree removal permit

3.6.6 Construction Considerations

3.6.6.1 Schedule and Work Hours

Construction for the Gina Court site is expected to take from two to four weeks to remove the existing cobbles, install bank protection, and install rip rap protection in the creek bed around the crossing. Work hours are expected to be between 8 am and 5 pm, Monday through Friday, in consideration of nearby neighbors. Work will be completed in the dry weather when there is no flow in the creek at the crossing site.

3.6.6.2 Easements

Table 3.6-5 summarizes the easements required for the Gina Court crossing. An estimate of the easement areas is provided in Appendix B.

Table 3.6-5. Gina Court Easements

APN	ADDRESS	OWNER	EXISTING EASEMENTS	ADDITIONAL EASEMENTS TYPE
230-0541-003	5671 Rolling Oak Dr, Sacramento 95841	Oliver, Donald & Gwendolyn	SASD Easement	Temporary Construction Easement
230-0541-002	5667 Rolling Oak Dr, Sacramento 95841	Swanson Trust	SASD Easement	Temporary Construction Easement
230-0730-014	5508 Oak River Ct, Carmichael 95608	Alfred E/Lydia Simonette Revocable Trust	SASD Easement	Temporary Construction Easement

3.6.6.3 Staging and Site Access

The site will be accessed via the private gate and driveway of 5667 Rolling Oak Drive. Equipment will be hand carried to the site via the existing driveway and the use of rubber wheels vehicles on the driveway will be minimized. Protection of the homeowner's grass and concrete driveway will be considered in the design requirements. An overview of the site access route and possible staging areas are provided in Appendix A: Sheet C-060.

3.6.6.4 Bypassing

Bypassing will not be required at this crossing as the pipeline will not be replaced.

3.6.6.5 Tree Removal

In order to complete the required rehabilitation, some trees will require removal. Table 3.6-6 summarizes the trees that will be removed as a part of the project.

Table 3.6-6. Gina Court Tree Removal Summary

TREE TAG	TREE DIAMETER (inches)	TREE DRIPLINE DIAMETER (feet)	TREE SPECIES
7507	3-4 + 6	12	Deciduous
7508	12	15	Deciduous

3.6.6.6 Environmental

The Gina Court site is located in the backyard of several residences, as such special precautions will be observed to minimize the effects of noise and odor. Noise provisions may include limitations in work hours and type of equipment used. Odor will be controlled through provisions requiring temporary plugging of open pipes and removal of demolished sewer materials. At the time of this report environmental field work has been completed and no significant biological, cultural, or archaeological impacts are expected. Mitigation measures will be included in the contract documents. Required permits, as summarized in Section 2.6, will be obtained through the appropriate agencies. Technical memorandums summarizing results of environmental surveys will be submitted to SASD after the preliminary design is confirmed.

3.6.7 Preliminary Opinion of Probable Cost

The capital cost for each alternative was developed to an AACE Class III level. The capital cost for Gina Court improvements is expected to be $105,000 escalated to 2023 dollars. More information on the cost estimate can be found in Chapter 4 and in Appendix C.

3.7 San Lorenzo Way

3.7.1 Site Description

Asset 170877 is located along San Lorenzo Way in the public right of way in a residential neighborhood in unincorporated Sacramento County. The site can be accessed directly from San Lorenzo Way. The site is also immediately north of Ancil Hoffman Park.

3.7.2 Existing Crossing Description

The aerial crossing is a 6-inch CIP with a CIPP liner. The pipe is not inside a casing or concrete encasement. The pipe transitions from CIP to VCP near the creek crossing. Cobble has been installed on the banks to minimize further bank erosion. The exterior of the pipe is in good condition with some minor surface corrosion near the creek banks. Table 3.7-1 provides the ADWF and PWWF for the San Lorenzo Way crossing from the District.

Table 3.7-1. San Lorenzo Way Sewer Flows

ADWF (MGD)	ADWF d/D Ratio (Unitless)	PWWF (MGD)	PWWF d/D Ratio (Unitless)
0.007	<0.10	0.007	<0.10

3.7.3 Waterway Characterization

The crossing is located in Carmichael Creek, a tributary to the American River. The crossing is located near a bend in the creek with a straight section upstream. There are signs of incision upstream although the incision is not active except at the bottom toe. Additionally, there is a sand deposit on the creek bed upstream of the crossing. Downstream of the crossing, the creek bend is causing scouring. A gravel bar is located downstream which results in pooling. The banks on both sides of the creek are not steep and appear to be stable. The creek bed is defined as clayey silt with evidence of hard pan underneath. The vegetation is characterized as ruderal with an oak canopy. The peak flow rates at the crossing location for 10-, 50-, and 100-year storms are shown in Table 3.7-2. Creek velocity, water surface elevation, and crossing elevation for design events are not provided in as the San Lorenzo Way crossing is being removed from the creek and this information is not pertinent to the repair recommendations.

Table 3.7-2. San Lorenzo Way Waterway Flow Rate

NAME	10 YR STORM (CFS)	50 YR STORM (CFS)	100 YR STORM (CFS)
StreamStats Peak Flow	506	688	743
FEMA FIS-Based Peak Flow	393	774	1,012

3.7.4 Repair Recommendation

The recommended repair design includes installing a new 48-inch sewer manhole, replacing and lowering the existing crossing, installing a concrete encasement around the new pipeline, and installing erosion protection measures over the disturbed areas. Further information on the improvements can be found in Appendix A: Sheet C-071. The following sections detail the design criteria used for this site in addition to any deviations from SASD standards in the preliminary design.

3.7.4.1 Structural Design Criteria

No structural improvements are included at the San Lorenzo site.

3.7.4.2 Deviations from District Standards

The design criteria used for the San Lorenzo Way site follow SASD standards except for the deviations outlined in Table 3.7-3. For each deviation, a business case evaluation to justify the deviation is provided. For a summary of the SASD design criteria used in this project please see Chapter 2: Basis of Design.

Table 3.7-3. San Lorenzo Way Deviations from SASD Standards

STANDARD	DEVIATION FROM STANDARD	BUSINESS CASE EVALUATIONS TO JUSTIFY DEVIATION
202.12.3	Pipe casing not included	A pipe casing is not included to allow for the pipe and concrete encasement of the pipe to remain 3 feet below the bottom of the creek and out of the scour depth.
202.1.1	Pipe diameter below minimum of 8 inches	The replacement pipe diameter will match existing to prevent trapping sewer gases or sewer flows.

3.7.5 Permitting

In additional to the standard site permits, San Lorenzo Way will require:

- An encroachment permit for staging in the right of way
- A tree removal permit
- A general permit for dewatering in the trench excavation

3.7.6 Construction Considerations

3.7.6.1 Schedule and Work Hours

Construction for the San Lorenzo Way site is expected to take from three to five weeks to replace the crossing pipe, install a new encasement, and install riprap protection around the new crossing. Work hours are expected to be between 8 am and 5 pm, Monday through Friday, in consideration of nearby neighbors. Work will be completed in the dry weather when there is no flow in the creek at the crossing site.

3.7.6.2 Easements

Table 3.7-4 summarizes the easements required for the San Lorenzo Way crossing. An estimate of the easement areas is provided in Appendix B.

Table 3.7-4. San Lorenzo Way Easements

APN	ADDRESS	OWNER	EXISTING EASEMENTS	ADDITIONAL EASEMENTS TYPE
273-0350-009	Orange Hill Ln, Carmichael 95608	Deterding Ranch Estate HOA	Unknown	Temporary Construction Easement
273-0270-036	Carmichael 95608	County of Sacramento - Regional Parks	Unknown	Temporary Construction Easement

3.7.6.3 Staging and Site Access

The site will be accessed via the west shoulder of San Lorenzo Way. Equipment and materials will be moved directly to the site from the road given the close proximity. Protection of the existing roadway pavement will need to be considered. An overview of the site access route is provided in Appendix A: Sheet C-070.

3.7.6.4 Bypassing

Bypassing will be required at this crossing for the duration of the pipe demolition, manhole installation and pipe replacement. This is expected to take two to three weeks. Two existing manholes straddle each side of the San Lorenzo Crossing. If temporary bypassing is required, the manhole in Orange Hill Lane would be plugged and pumped using a temporary highline force main across the creek to the manhole located on the east side of San Lorenzo Way. The two services that connect downstream of Orange Hill Lane will need to be isolated, stored and hauled offsite for the duration of the bypassing.

3.7.6.5 Tree Removal

In order to complete the required rehabilitation, the removal of one tree is required. Table 3.7-5 provides the details of the removed tree.

Table 3.7-5. San Lorenzo Way Tree Removal Summary

TREE TAG	TREE DIAMETER (inches)	TREE DRIPLINE DIAMETER (feet)	TREE SPECIES
7522	10	15	Deciduous

3.7.6.6 Environmental

The San Lorenzo Way site is located in close proximity to residential properties; therefore, special precautions will be observed to minimize the effects of noise and odor. Noise provisions may include limitations in work hours and type of equipment used. Odor will be controlled through provisions requiring temporary plugging of open pipes and removal of demolished sewer materials. At the time of this report environmental field work has been completed and no significant biological, cultural, or archaeological impacts are expected. Mitigation measures will be included in the contract documents. Required permits, as summarized in Section 2.6, will be obtained through the appropriate agencies. Technical memorandums summarizing results of environmental surveys will be submitted to SASD after the preliminary design is confirmed.

3.7.7 Preliminary Opinion of Probable Cost

The capital cost for each alternative was developed to an AACE Class III level. The capital cost for San Lorenzo Way improvements is expected to be $237,000 escalated to 2023 dollars. More information on the cost estimate can be found in Chapter 4 and in Appendix C.

3.8 Sutter Avenue

3.8.1 Site Description

Asset 78865 is located in the backyard of the private property of 7156 Sutter Avenue and 3751 Dell Road in a residential neighborhood in unincorporated Sacramento County.

3.8.2 Existing Crossing Description

The crossing is a 6-inch welded aluminum aerial pipe which crosses above the high-water line of the creek. The aluminum pipe is not encased and there are two exposed welded joints. These joints and the exposed pipe are in good condition. The pipe is supported by two concrete piers with metal straps. While the concrete is in good condition, the metal straps show minor signs of corrosion. Additionally, the soil below the east bank concrete pier supports has eroded away. Table 3.8-1 provides the ADWF and PWWF for the Sutter Avenue crossing from District flow modeling.

Table 3.8-1. Sutter Avenue Sewer Flows

ADWF (MGD)	ADWF d/D Ratio (Unitless)	PWWF (MGD)	PWWF d/D Ratio (Unitless)
0.0057	<0.10	0.063	0.34

3.8.3 Waterway Characterization

The crossing is located in an unnamed creek, a tributary to the American River. The crossing is located in a steep valley area above the incised creek channel. Upstream of the crossing, the banks are vegetated by grasses and oak trees and the downstream vegetation also includes blackberries and other vines. The channel is incised although erosion is limited to the toe of the banks from lower creek flows. The banks are stable and further erosion is expected to be minimal. The bed is characterized as alluvium with fine sandy silt. The vegetation is classified as a grassland or ruderal system with a blackberry and grapevines and a riparian canopy with many nearby oak trees. The peak flow rates at the crossing location for 10-, 50-, and 100-year storms are shown in Table 3.8-2. Creek velocity, water surface elevation, and crossing elevation for design events are not provided in as the Sutter Avenue crossing and supports are and will be located above the 100-year storm water surface elevation and this information is not pertinent to the repair recommendations.

Table 3.8-2. Sutter Avenue Waterway Flow Rate

NAME	10 YR STORM (CFS)	50 YR STORM (CFS)	100 YR STORM (CFS)
StreamStats Peak Flow	23.6	34.1	37.5
FEMA FIS-Based Peak Flow	27	96	168

3.8.4 Repair Recommendation

The recommended repair design includes installing new concrete piers on either bank, installing a new pipeline and casing, and hydroseeding the disturbed slope areas. Further information on the improvements can be found in Appendix A: Sheet C-080. The following sections detail the design criteria used for this site in addition to any deviations from SASD standards in the preliminary design.

3.8.4.1 Structural Design Criteria

Table 3.8-3 includes the design loading criteria for the Sutter Avenue site. Calculations for span between the new drilled piers was conducted to determine that a 16-inch or larger diameter schedule 40 welded steel casing provides adequate capacity for the span between piers. The preliminary structural calculations for the pier spacing and casing structural requirements is included in Appendix D.

Table 3.8-3. Sutter Avenue Design Loading Criteria

LOADING TYPE	LOADING CRITERIA
Dead Loads	o Steel pipe o Water in pipe o Welded steel pipe casing o Annular fill between casing and carrier pipe
Live Loads	o 50 pounds linear foot for people/animals walking across the crossing
Lateral Impact Loads	o 1,000 pounds from queen size mattress impact during storm event
Vertical Impact Loads	o 2,000 pounds from tree limbs falling on the casing pipe
Earthquake Loads	o See Chapter 2.5: Structural Basis of Design

3.8.4.2 Deviations from District Standards

The design criteria used for the Sutter Avenue site follow SASD standards except for the deviations outlined in Table 3.8-4. For each deviation, a business case evaluation to justify the deviation is provided. For a summary of the SASD design criteria used in this project please see Chapter 2: Basis of Design.

Table 3.8-4. Sutter Avenue Deviations from SASD Standards

STANDARD	DEVIATION FROM STANDARD	BUSINESS CASE EVALUATIONS TO JUSTIFY DEVIATION
202.1.1	Pipe diameter below minimum of 8 inches	The replacement pipe diameter will match existing to prevent trapping sewer gases or sewer flows.

3.8.5 Permitting

In additional to the standard site permits, Sutter Avenue will require:

- An encroachment permit for staging in the right of way
- A general permit for dewatering in the trench excavation

3.8.6 Construction Considerations

3.8.6.1 Schedule and Work Hours

Construction for the Sutter Avenue site is expected to take from four to six weeks to demolish existing pipe and piers, replace the crossing pipe, install new piers, and install slope protection. Work hours are expected to be between 8 am and 5 pm, Monday through Friday in consideration of nearby neighbors. Work will be completed in the dry weather when there is no flow in the creek at the crossing site.

3.8.6.2 Easements

Table 3.8-5 summarizes the easements required for the Sutter Avenue crossing. An estimate of the easement areas is provided in Appendix B.

Table 3.8-5. Sutter Avenue Easements

APN	ADDRESS	OWNER	EXISTING EASEMENTS	ADDITIONAL EASEMENTS TYPE
260-0301-001	3751 Dell Rd., Carmichael 95608	Grant, Cameron Joseph	None	Temporary Construction Easement
260-0250-014	7156 Sutter Ave., Carmichael 95608	George M Howard 1994 Family Trust	None	Temporary Construction Easement
260-0250-013	7146 Sutter Ave., Carmichael 95608	Christian, James Martin Christian, Mary Winona	None	Temporary Construction Easement
260-0250-081	7148 Sutter Ave., Carmichael 95608	Ing Family Trust	None	Temporary Construction Easement
260-0250-082	7152 Sutter Ave., Carmichael 95608	Tommy J/Susan E Poirier Revocable Trust	None	Temporary Construction Easement

3.8.6.3 Staging and Site Access

The site will be accessed via the 7156 Sutter Avenue private property. Equipment will be truck-mounted through the backyard to the property fence and hand carried from the fence to the site. A crane may need to be used for larger materials and equipment. An allowance for grass reseeding along the access route is included in the costs for this crossing. Protection of the homeowner's grass will be considered. An overview of the site access route and possible staging areas are provided in Appendix A: Sheet C-080.

3.8.6.4 Bypassing

Bypassing will be required at this crossing for the duration of the pipe removal and replacement time. New concrete supports can be installed prior to the removal of the existing pipe and the pipe replacement and casing pipe installation is expected to take up to one week. Provided the length of time and access to site, a temporary bypass system is recommended. Two existing manholes straddle each side of the creek. If temporary bypassing is required, the manhole on the east side of the creek would be plugged and pumped using a temporary highline force main across the channel to the next downstream manhole that is in the driveway of 7156 Sutter Ave. This bypass pipe could be routed within the existing sewer easement to this manhole.

3.8.6.5 Tree Removal

No trees require removal at the Sutter Avenue site.

3.8.6.6 Environmental

The Sutter Avenue site is located in the backyard of a residence, as such special precautions will be observed to minimize the effects of noise and odor. Noise provisions may include limitations in work hours and type of equipment used. Odor will be controlled through provisions requiring temporary plugging of open pipes and removal of demolished sewer materials. At the time of this report environmental field work has been completed and no significant biological, cultural, or archaeological

impacts are expected. Mitigation measures will be included in the contract documents. Required permits, as summarized in Section 2.6, will be obtained through the appropriate agencies. Technical memorandums summarizing results of environmental surveys will be submitted to SASD after the preliminary design is confirmed.

3.8.7 Preliminary Opinion of Probable Cost

The capital cost for each alternative was developed to an AACE Class III level. The capital cost for Sutter Avenue improvements is expected to be $223,000 escalated to 2023 dollars. More information on the cost estimate can be found in Chapter 4 and in Appendix C.

3.9 Campfire Way

3.9.1 Site Description

Asset 36529 is located off of Campfire Way in the Oak Lakes Lane public right of way open space parcel in a residential neighborhood in unincorporated Sacramento County.

3.9.2 Existing Crossing Description

The existing crossing is a concrete encased 36-inch RCP. The concrete encasement was installed with a top dimension that is wider than record drawings indicate. Deep cracks in the concrete encasement are located near the south bank. Creek bed erosion has led to undermining of the encasement on both the upstream and downstream side of the encasement. As a temporary protection measure, sandbags were placed on the downstream side of the encasement near the southern bank to shore up a scour hole where the existing encasement has deep cracks. Table 3.1-1 provides the ADWF and PWWF for the Campfire Way crossing from District flow modeling.

Table 3.9-1. Campfire Way Sewer Flows

ADWF (MGD)	ADWF d/D Ratio (Unitless)	PWWF (MGD)	PWWF d/D Ratio (Unitless)
2.291	0.29	10.87	0.70

3.9.3 Waterway Characterization

The crossing is located in Cripple Creek. Upstream of the crossing, there is significant channel and bank scouring and some pooling. Additionally, upstream there are some sand and coarse gravel deposits and debris accumulation. Downstream of the crossing a large scour hole has formed, and bedrock is exposed in some areas. Also, the channel is widening downstream with significant loss of bank material into the channel. The banks are gradual and stable and vegetated outside of the active erosion zones which are immediately around the crossing. The creek bed is composed of weakly concentrated silty sand and some clay. The area is dominated by ruderal vegetation and grasslands with a riparian canopy and some small oaks and elderberry trees. No elderberry trees are located within the site vicinity to cause permitting issues. The peak flow rates at the crossing location for 10-, 50-, and 100-year storms are shown in Table 3.9-2. Creek velocity, water surface elevation, and crossing elevation for design events are provided in Table 3.9-3. Note that the flow values associated with the in-bank events are independent of the 10-, 50- and 100-year storm flows for the Campfire Way crossing.

Table 3.9-2. Campfire Way Waterway Flow Rate

NAME	10 YR STORM (CFS)	50 YR STORM (CFS)	100 YR STORM (CFS)
StreamStats Peak Flow	1,210	1,660	1,800
FEMA FIS-Based Peak Flow	847	1,403	1,687

Table 3.9-3. Campfire Way Water Depth, Velocity, and Elevations

DESIGN EVENT	CREEK WATER VELOCITY	WATER SURFACE ELEVATION	CROSSING ELEVATION	NOTES ON CROSSING ELEVATION
	(FT/S)	(FT)	(FT)	(FT)
Depth of 1ft Over Encasement	6.20	108.0	107.0	Approximate top of existing encasement, varies
Half Bank Full	5.07	109.5		
Bank Full	5.50	112.0		

3.9.4 Repair Recommendation

The recommended repair design includes cutting down the existing concrete encasement and repairing the concrete encasement cracks, installing riprap on the creek bed upstream and downstream of the crossing, and installing turf reinforced mats on the creek banks with toe slope supports. Further information on the improvements can be found in Appendix A: Sheet C-091. The following sections detail the design criteria used for this site in addition to any deviations from SASD standards in the preliminary design.

3.9.4.1 Structural Design Criteria

No structural improvements are included at the Campfire Way site.

3.9.4.2 Deviations from District Standards

The design criteria used for the Campfire Way site follow SASD standards except for the deviations outlined in Table 3.9-4. For each deviation, a business case evaluation to justify the deviation is provided. For a summary of the SASD design criteria used in this project please see Chapter 2: Basis of Design.

Table 3.9-4. Campfire Way Deviations from SASD Standards

STANDARD	DEVIATION FROM STANDARD	BUSINESS CASE EVALUATIONS TO JUSTIFY DEVIATION
202.12.3	Carrier pipe casing not included	The existing pipe does not have a casing pipe and the pipe and existing concrete encasement are not being replaced.
202.12.1	Minimum cover of 3 feet not met	The pipe and encasement are not being replaced at this site. The existing casing is exposed.

3.9.5 Permitting

In additional to the standard site permits, Campfire Way will require:

- An encroachment permit for staging in the right of way
- A tree removal permit

3.9.6 Construction Considerations

3.9.6.1 Schedule and Work Hours

Construction for the Campfire Way site is expected to take from three to five weeks to remove excess concrete, repair the concrete encasement, install riprap in the creek bed, and restore and protect the creek banks. Work hours are expected to be between 8 am and 5 pm, Monday through Friday, in consideration of nearby neighbors. Work will be completed in the dry weather when there is no flow in the creek at the crossing site.

3.9.6.2 Easements

Table 3.9-5 summarizes the easements required for the Campfire Way crossing. An estimate of the easement areas is provided in Appendix B.

Table 3.9-5. Campfire Way Easements

APN	ADDRESS	OWNER	EXISTING EASEMENTS	ADDITIONAL EASEMENTS TYPE
211-0010-035	Oak Lakes Ln, Citrus Heights 95621	Rawdanowicz, R	SASD Easement	Temporary Construction Easement

3.9.6.3 Staging and Site Access

The site will be accessed via Campfire Way. Equipment and materials will be moved directly to the site from the road given the close proximity. Protection of the existing roadway pavement will need to be considered. An overview of the site access route and possible staging areas are provided in Appendix A: Sheet C-090.

3.9.6.4 Bypassing

No bypassing will be required for Campfire Way improvements.

3.9.6.5 Tree Removal

No trees require removal at the Campfire Way site.

3.9.6.6 Environmental

The Campfire Way site is located in close proximity to residential properties; therefore, special precautions will be observed to minimize the effects of noise and odor. Noise provisions may include limitations in work hours and type of equipment used. Odor will be controlled through provisions requiring temporary plugging of open pipes and removal of demolished sewer materials. At the time of this report environmental field work has been completed and no significant biological, cultural, or archaeological impacts are expected. Mitigation measures will be included in the contract documents. Required permits, as summarized in Section 2.6, will be obtained through the appropriate agencies. Technical memorandums summarizing results of environmental surveys will be submitted to SASD after the preliminary design is confirmed.

3.9.7 Preliminary Opinion of Probable Cost

The capital cost for each alternative was developed to an AACE Class III level. The capital cost for Campfire Way improvements is expected to be $334,000 escalated to 2023 dollars. More information on the cost estimate can be found in Chapter 4 and in Appendix C.

3.10 Indian River Drive

3.10.1 Site Description

Asset 78531 is to the east of Indian River Drive in the 6430 Indian River Drive public right of way open space parcel in a residential neighborhood in unincorporated Sacramento County.

3.10.2 Existing Crossing Description

The existing crossing is a 10-inch CIP aerial crossing with two concrete pier supports that are located in the creek flow path. Undermining of the piers is occurring especially on the south pier. Cobble was installed by the District around the base of each pier to protect against further erosion. Two restrained joints (bell and spigot with a custom restraint harness) are exposed in the creek. Small deflections at the joints were noted. The pipe exterior has undergone some wear and pitting of the bitumastic exterior coating. Table 3.10-1 provides the ADWF and PWWF for the Indian River Drive crossing from District flow modeling.

Table 3.10-1. Indian River Drive Sewer Flows

ADWF (MGD)	ADWF d/D Ratio (Unitless)	PWWF (MGD)	PWWF d/D Ratio (Unitless)
0.053	0.18	0.22	0.39

3.10.3 Waterway Characterization

The crossing is located in Arcade Creek. The crossing is east of the Indian River Drive bridge that crosses Arcade Creek. Upstream of the crossing coarse gravel is depositing while downstream sand and alluvium deposits dominate. Some pooling is also occurring downstream. The banks are eroding near the crossing. Most significantly, the north bank at the crossing has significantly eroded in the last few years and is now nearly vertical. The exposed non-cohesive trench backfill around the pipe is contributing to this accelerated erosion. The creek bed is characterized by a mix of coarse sand, gravel, and cobble with some fine sand deposits. The area is classified as a grassland with ruderal foliage and a riparian canopy. Blackberry and grape vines are also located nearby. The peak flow rates at the crossing location for 10-, 50-, and 100-year storms are shown in Table 3.10-2. Creek velocity, water surface elevation, and crossing elevation for design events are provided in Table 3.10-3. Note that the flow values associated with the in-bank events are independent of the 10-, 50- and 100-year storm events for the Indian River crossing.

Table 3.10-2. Indian River Drive Waterway Flow Rate

NAME	10 YR STORM (CFS)	50 YR STORM (CFS)	100 YR STORM (CFS)
StreamStats Peak Flow	2,530	3,420	3,710
FEMA FIS-Based Peak Flow	1,983	3,452	4,140

Table 3.10-3. Indian River Drive Waterway Flowrate, Velocity, and Elevation

DESIGN EVENT	CREEK WATER VELOCITY	WATER SURFACE ELEVATION	CROSSING ELEVATION	NOTES ON CROSSING ELEVATION
	(FT/S)	(FT)	(FT)	(FT)
Half Bank Full	3.16	99.0	97.9	Top of existing pipe
Bank Full	4.95	103.0		

3.10.4 Repair Recommendation

The recommended repair design includes installing new concrete piers outside of the creek banks, replacing the crossing pipe and adding a casing pipe, and protecting the creek banks with turf reinforced mats. Further information on the improvements can be found in Appendix A: Sheet C-101. The following sections detail the design criteria used for this site in addition to any deviations from SASD standards in the preliminary design.

3.10.4.1 Structural Design Criteria

Table 3.10-4 includes the structural loading criteria for the Indian River Drive site. Calculations for span between the new drilled piers was conducted to determine that a 20-inch or larger diameter schedule 40 welded steel casing provides adequate capacity for the span between piers. The preliminary structural calculations for the pier spacing and casing structural requirements is included in Appendix D.

Table 3.10-4. Indian River Drive Design Loading Criteria

LOADING TYPE	LOADING CRITERIA	
Dead Loads	o	DIP pipe
	o	Water in the pipe
	o	Welded steel pipe casing
	o	Casing annular fill
Live Loads	o	50 pounds linear foot for people/animals walking across the crossing
Lateral Impact Load	o	1,000 pounds from queen size mattress impact during storm event
Vertical Impact Load	o	2,000 pounds from tree limbs falling on the casing pipe
Earthquake Loads	o	See Chapter 2.5: Structural Basis of Design

3.10.4.2 Deviations from District Standards

There are no deviations from the District standards for the Indian River site.

3.10.5 Permitting

In additional to the standard site permits, Indian River Drive will require:

- An encroachment permit for staging in the right of way
- A general permit for dewatering in the trench excavation

3.10.6 Construction Considerations

3.10.6.1 Schedule and Work Hours

Construction for the Indian River Drive site is expected to take from six to eight weeks to demolish the existing pipe and piers, install new piers, replace the crossing pipe, and install side slope protection around the new crossing. Work hours are expected to be between 8 am and 5 pm, Monday through Friday, in consideration of nearby neighbors. Work will be completed in the dry weather when there is no flow in the creek at the crossing site.

3.10.6.2 Easements

Table 3.10-5 summarizes the easements required for the Indian River Drive crossing. An estimate of the easement areas is provided in Appendix B.

Table 3.10-5. Indian River Drive Easements

APN	ADDRESS	OWNER	EXISTING EASEMENTS	ADDITIONAL EASEMENTS TYPE
211-0720-055	6430 Indian River Dr, Citrus Heights 95621	Sunrise Recreation/Park District	Unknown	Temporary Construction Easement

3.10.6.3 Staging and Site Access

The site will be accessed via open space parcel off Indian River Drive. Equipment and materials will be moved directly to the site from the road given the close proximity. Protection of the open space trees, road barriers, and the roadway will need to be considered. Some of the road barriers will require removal and replacement to facilitate access from Indian River Drive. An overview of the site access route and possible staging areas are provided in Appendix A: Sheet C-100.

3.10.6.4 Bypassing

Bypassing will be required at this crossing for the duration of the pipe replacement and pier installation time which is expected to take up to three weeks. Provided the length of time, a temporary bypass system is recommended. The manholes upstream and downstream of the crossing are located in Indian River drive. The upstream manhole is located in the intersection of Little River Court and Indian River Drive. The outlet pipe of this manhole will be plugged, and sewer flows will be pumped from this manhole via temporary force main across the existing bridge and discharge into a downstream manhole in the intersection of Tall Tree Circle and Indian River Drive.

3.10.6.5 Tree Removal

No tree removal is required at the Indian River Drive site.

3.10.6.6 Environmental

The Indian River Drive site is located in close proximity to residential properties; therefore, special precautions will be observed to minimize the effects of noise and odor. Noise provisions may include limitations in work hours and type of equipment used. Odor will be controlled through provisions requiring temporary plugging of open pipes and removal of demolished sewer materials. At the time of this report environmental field work has been completed and no significant biological, cultural, or archaeological impacts are expected. Mitigation measures will be included in the contract documents.

Required permits, as summarized in Section 2.6, will be obtained through the appropriate agencies. Technical memorandums summarizing results of environmental surveys will be submitted to SASD after the preliminary design is confirmed.

3.10.7 Preliminary Opinion of Probable Cost

The capital cost for each alternative was developed to an AACE Class III level. The capital cost of Indian River Drive improvements is expected to cost $464,000 escalated to 2023 dollars. More information on the cost estimate can be found in Chapter 4 and in Appendix C.

3.11 Hegseth Court

3.11.1 Site Description

Asset 68559 is located on the private property of 8201 Hegseth Court in a residential neighborhood in unincorporated Sacramento County.

3.11.2 Existing Crossing Description

The existing crossing is an 8-inch VCP that is exposed and not encased. It is supported by a manhole in the creek, sandbags, and the creek bed. The downstream manhole is half exposed in the creek on the west bank with the transition from the crossing to the manhole also exposed. The grouted pipe transition to the manhole on the west bank is in good condition. However, the rubber clamp coupling on the east bank has a minor offset and is currently being supported by sandbags. Table 3.11-1 provides the ADWF and PWWF for the Hegseth Court crossing from District flow modeling.

Table 3.11-1. Hegseth Court Sewer Flows

ADWF (MGD)	ADWF d/D Ratio (Unitless)	PWWF (MGD)	PWWF d/D Ratio (Unitless)
0.00174	<0.10	0.016	<0.10

3.11.3 Waterway Characterization

The crossing is located in a small unnamed creek which is a tributary to the American River. The crossing is located in an incised section of the stream floodplain near a bend in the route. Upstream of the creek there is significant vegetation cover over the waterway including trees, shrubs, grass, and blackberry vines and algae growth in the creek. The banks are shallow on the western side and steeper on the eastern side. The creek bed contains mixed sand and gravel with some cobbles. The creek flows into bedrock on the eastern bank. The peak flow rates at the crossing location for 10-, 50-, and 100-year storms are shown in Table 3.11-2. Creek velocity, water surface elevation, and crossing elevation for design events are provided in Table 3.11-3. Note that the flow values associated with the in-bank events are independent of the 10-, 50- and 100-year storm events for the Hegseth Court crossing.

Table 3.11-2. Hegseth Court Waterway Flow Rate

NAME	10 YR STORM (CFS)	50 YR STORM (CFS)	100 YR STORM (CFS)
StreamStats Peak Flow	76	113	126
FEMA FIS-Based Peak Flow	80	225	349

Table 3.11-3. Hegseth Court Water Depth, Velocity, and Elevations

DESIGN EVENT	CREEK WATER VELOCITY	WATER SURFACE ELEVATION	CROSSING ELEVATION	NOTES ON CROSSING ELEVATION
	(FT/S)	(FT)	(FT)	(FT)
2-year Storm	3.08	141.5	140.0	Approximate top of existing pipe
10-year Storm	4.70	142.8		
100-year Storm	5.47	143.5		

3.11.4 Repair Recommendation

The recommended repair design includes replacing the existing pipe with a new DIP pipe, protecting the nearby manhole with tiebacks to prevent it from moving or leaning into the creek, protecting the creek banks with turf reinforced mats, and protecting the new pipe and creek bed with rip rap material in the creek bed. Further information on the improvements can be found in Appendix A: Sheet C-111. The following sections detail the design criteria used for this site in addition to any deviations from SASD standards in the preliminary design.

3.11.4.1 Structural Design Criteria

No structural improvements are included at the Hegseth Court site.

3.11.4.2 Deviations from District Standards

The design criteria used for the Hegseth Court site follow SASD standards except for the deviations outlined in Table 3.11-4. For each deviation, a business case evaluation to justify the deviation is provided. For a summary of the SASD design criteria used in this project please see Chapter 2: Basis of Design.

Table 3.11-4. Hegseth Court Deviations from SASD Standards

STANDARD	DEVIATION FROM STANDARD	BUSINESS CASE EVALUATIONS TO JUSTIFY DEVIATION
202.12.4	Pipe does not extend 10 feet from top of bank	Extending 10 feet beyond banks would require significant bank impacts and increase costs for the Hegseth crossing that has limited access. The existing creek is small and the banks will be well protected from erosion with turf reinforcement mats. The pipe will also be well supported with rip rap material across the creek and a restrained connection joint will be provided to further protect the transition.

3.11.5 Permitting

In additional to the standard site permits, Hegseth Court will require:

- An encroachment permit for staging in the right of way
- A general permit for dewatering in the trench excavation

3.11.6 Construction Considerations

3.11.6.1 Schedule and Work Hours

Construction for the Hegseth Court site is expected to take from three to five weeks to replace the crossing pipe, reinforce the existing manhole, install a new encasement, install riprap protection around the new crossing, and install slope protection. Work hours are expected to be between 8 am and 5 pm, Monday through Friday, in consideration of nearby neighbors. Work will be completed in the dry weather when there is no flow in the creek at the crossing site.

3.11.6.2 Easements

Table 3.11-5 summarizes the easements required for the Hegseth Court crossing. An estimate of the easement areas is provided in Appendix B.

Table 3.11-5. Hegseth Court Easements

APN	ADDRESS	OWNER	EXISTING EASEMENTS	ADDITIONAL EASEMENTS TYPE
246-0303-019	8201 Hegseth Ct, Fair Oaks 95628	Buckley, Holly & Thomas	SASD Easement	Temporary Construction Easement
246-0303-008	8218 Pollard Ave, Fair Oaks 95628	Wampold Family Revocable Living Trust	SASD & DWR Easements	Temporary Construction Easement
246-0303-020	8200 Hegseth Court, Fair Oaks 95628	To Be Determined	None	Temporary Construction Easement

3.11.6.3 Staging and Site Access

The site will be accessed via 8201 Hegseth Court. Equipment and materials will be hand carried to the site via the existing driveway and yard. Protection of the homeowner's landscaping and concrete driveway will need to be considered. An allowance for protection and restoration of landscaping along the access route is included in the costs for this crossing. An overview of the site access route and possible staging areas are provided in Appendix A: Sheet C-110.

3.11.6.4 Bypassing

Bypassing will be required at this crossing for the duration of the pipe replacement time. The pipe replacement time is expected to take three days. However, due to low flows, there is also an option to plug the route and use a pumper truck to remove flows during the construction period. The nearest upstream manhole is located in Hegseth Court, which will require plugging. Records show at least two laterals connect downstream of the manhole and are likely associated with 8200 and 8201 Hegseth Court. Coordination with the homeowners including provisions to furnish temporary facilities may need to be provided during this time.

3.11.6.5 Tree Removal

No tree removal is required at the Hegseth Court site.

3.11.6.6 Environmental

The Hegseth Court site is located in the backyard of a residence, as such special precautions will be observed to minimize the effects of noise and odor. Noise provisions may include limitations in work hours and type of equipment used. Odor will be controlled through provisions requiring temporary plugging of open pipes and removal of demolished sewer materials. At the time of this report environmental field work has been completed and no significant biological, cultural, or archaeological impacts are expected. Mitigation measures will be included in the contract documents. Required permits, as summarized in Section 2.6, will be obtained through the appropriate agencies. Technical memorandums summarizing results of environmental surveys will be submitted to SASD after the preliminary design is confirmed.

3.11.7 Preliminary Opinion of Probable Cost

The capital cost for each alternative was developed to an AACE Class III level. The capital cost of Hegseth Court improvements is expected to cost $173,000 escalated to 2023 dollars. More information on the cost estimate can be found in Chapter 4 and in Appendix C.

3.12 Dietz Way

3.12.1 Site Description

Asset 239693 is located on the private property of 4510 Dietz Way in a residential neighborhood in unincorporated Sacramento County.

3.12.2 Existing Crossing Description

The aerial crossing is a 4-inch Acrylonitrile Butadiene Styrene (ABS) and ferrous metal pipe (CIP or DIP) tape wrap and no encasement. There are two pipe joints exposed in the creek; one of which is at a clamp style transition joint on the northern bank with an offset which has been temporarily reinforced by the District by bracing with steel stakes and installing tape wrap. Additionally, the District has placed cobble on either bank around the pipe for slope protection. Table 3.12-1 provides the ADWF and PWWF for the Dietz Way crossing from District flow modeling.

Table 3.12-1. Dietz Way Sewer Flows

ADWF (MGD)	ADWF d/D Ratio (Unitless)	PWWF (MGD)	PWWF d/D Ratio (Unitless)
0.00031	0.12	0.0021	0.30

3.12.3 Waterway Characterization

The crossing is located in an unnamed creek which is a tributary to the American River. Immediately upstream of the crossing there is a private footbridge. The pipe crosses at a slight bend in the creek but, downstream the channel straightens. The creek banks have minimal erosion with a steeper slope on the east bank and a shallower slope on the west bank. The creek bed is composed of silt, sand, and coarse gravel with some cobble. Scouring of the bed is minimal due to the coarse nature of the materials. The vegetation is described as a riparian canopy with oaks, maples, and some other landscaping trees. The peak flow rates at the crossing location for 10-, 50-, and 100-year storms are shown in Table 3.12-2. Creek velocity, water surface elevation, and crossing elevation for design events are provided in Table 3.12-3. Note that the flow values associated with the in-bank events are independent of the 10-, 50- and 100-year storm events for the Dietz Way crossing.

Table 3.12-2. Dietz Way Waterway Flow Rate

NAME	10 YR STORM (CFS)	50 YR STORM (CFS)	100 YR STORM (CFS)
StreamStats Peak Flow	75.9	113	126
FEMA FIS-Based Peak Flow	80	225	349

Table 3.12-3. Dietz Way Water Depth, Velocity, and Elevations

DESIGN EVENT	CREEK WATER VELOCITY	WATER SURFACE ELEVATION	CROSSING ELEVATION	NOTES ON CROSSING ELEVATION
	(FT/S)	(FT)	(FT)	(FT)
2-year Storm	3.82	146.4	146.4 – 148.0	Top of existing pipe, lowers moving west to east
10-year Storm	5.87	147.3		
100-year Storm	6.42	147.8		

3.12.4 Repair Recommendation

The recommended repair design includes replacing the existing pipe, installing concrete supports on either bank, and supporting the creek banks with turf reinforced mats. Further information on the improvements can be found in Appendix A: Sheet C-121. The following sections detail the design criteria used for this site in addition to any deviations from SASD standards in the preliminary design.

3.12.4.1 Structural Design Criteria

Table 3.12-4 includes the dead loads and lateral loads for the Dietz Way site. Impact loads and earthquake loads are the same for each site and can be found in Chapter 2.5: Structural Basis of Design.

Table 3.12-4. Dietz Way Design Loading Criteria

LOADING TYPE	LOADING CRITERIA	
Dead Loads	o o	DIP pipe Water in the pipe
Live Loads	o	50 pounds linear foot for people/animals walking across the crossing
Lateral Impact Load	o	6.42 fps peak creek velocity
Vertical Impact Load	o	2,000 pounds from tree limbs falling on the pipe
Earthquake Loads	o	See Chapter 2.5: Structural Basis of Design

3.12.4.2 Deviations from District Standards

The design criteria used for the Dietz Way site follow SASD standards except for the deviations outlined in Table 3.12-5. For each deviation, a business case evaluation to justify the deviation is provided. For a summary of the SASD design criteria used in this project please see Chapter 2: Basis of Design.

Table 3.12-5. Dietz Way Deviations from SASD Standards

STANDARD	DEVIATION FROM STANDARD	BUSINESS CASE EVALUATIONS TO JUSTIFY DEVIATION
202.12.4	Pipe does not extend 10 feet from top of bank	Extending 10 feet beyond banks would require significant bank impacts, vegetation removal and impacts to homeowner decking paths at this limited access site. Additionally, the existing creek is small, the banks will be well protected from erosion with turf reinforcement mats and concrete blocks will help support the creek across the pipe in lieu of the 10-ft extension from the top of banks.

3.12.5 Permitting

In additional to the standard site permits, Dietz Way will require:

- An encroachment permit for staging in the right of way
- A general permit for dewatering in the trench excavation

3.12.6 Construction Considerations

3.12.6.1 Schedule and Work Hours

Construction for the Dietz Way site is expected to take from two to four weeks to replace the crossing pipe, install a new encasement, and install slope protection around the new crossing. Work hours are expected to be between 8 am and 5 pm, Monday through Friday, in consideration of nearby neighbors. Work will be completed in the dry weather when there is no flow in the creek at the crossing site.

3.12.6.2 Easements

Table 3.12-6 summarizes the easements required for the Dietz Way crossing. An estimate of the easement areas is provided in Appendix B.

Table 3.12-6. Dietz Way Easements

APN	ADDRESS	OWNER	EXISTING EASEMENTS	ADDITIONAL EASEMENTS TYPE
246-0303-005	4510 Dietz Way, Fair Oaks 95628	Bokisch, Nikolas & Campillo, Christina	SASD Easement	Temporary Construction Easement
246-0303-002	4520 Dietz Way, Fair Oaks 95628	Oconnell Family Trust	Drainage Easement	Temporary Construction Easement
246-0303-029	4619 Chicago Ave., Fair Oaks 95628	Deeble-Wong Family Trust	SASD Easement	Temporary Construction Easement
246-0303-036	4617 Chicago Ave., Fair Oaks 95628	To Be Determined	None	Temporary Construction Easement
246-0303-027	4615 Chicago Ave., Fair Oaks 95628	To Be Determined	None	Temporary Construction Easement

3.12.6.3 Staging and Site Access

The site will be accessed via a shared private driveway associated with the properties located at 4615, 4617, and 4619 Chicago Avenue. The site will be further accessed via footpaths and backyard of 4619 Chicago Avenue. Site access path requires further field verification and coordination with the associated owners. Equipment and materials will be hand carried to the site via the existing driveway and yard. Protection of the homeowner's driveway and footpaths will need to be considered. An allowance for protection and restoration of landscaping along the access route is included in the costs for this crossing. An overview of the site access route and possible staging areas are provided in Appendix A: Sheet C-120.

3.12.6.4 Bypassing

Bypassing will likely not be required at this crossing as the pipe is a lateral associated with 4510 Dietz Way. The pipe replacement time is expected to take three days. In lieu of bypassing coordination with

the homeowners including provisions to furnish temporary facilities may need to be provided during this time.

3.12.6.5 Tree Removal

No trees require removal at the Dietz Way site.

3.12.6.6 Environmental

The Dietz Way site is located in the backyard of a residence, as such special precautions will be observed to minimize the effects of noise and odor. Noise provisions may include limitations in work hours and type of equipment used. Odor will be controlled through provisions requiring temporary plugging of open pipes and removal of demolished sewer materials. At the time of this report environmental field work has been completed and no significant biological, cultural, or archaeological impacts are expected. Mitigation measures will be included in the contract documents. Required permits, as summarized in Section 2.6, will be obtained through the appropriate agencies. Technical memorandums summarizing results of environmental surveys will be submitted to SASD after the preliminary design is confirmed.

3.12.7 Preliminary Opinion of Probable Cost

The capital cost for each alternative was developed to an AACE Class III level. The capital cost of Dietz Way improvements is expected to cost $98,000 escalated to 2023 dollars. More information on the cost estimate can be found in Chapter 4 and in Appendix C.

4

4.0 Construction Cost Estimate

Costs for each alternative are composed of capital costs. Capital costs included design, construction, administration, environmental permitting, mitigation measures, and property acquisition. The capital cost for each alternative was developed to an AACE Class III level. Capital Costs are estimated in 2021 dollars and escalated to mid-point of construction (December 2023 dollars) based on current project schedule at the time of this report. Table 4-1 presents a summary of construction cost estimates for all twelve sites and a total project cost.

Table 4-1. Construction Cost Estimate by Site

SITE NAME	TOTAL CAPITAL COST ESTIMATE
Hope Lane	$111,000
Winding Way	$586,000
Arcade Creek	$173,000
Garfield Thousand Oaks	$760,000
Concho Court	$81,000
Gina Court	$105,000
San Lorenzo Way	$237,000
Sutter Avenue	$223,000
Campfire Way	$334,000
Indian River Drive	$464,000
Hegseth Court	$173,000
Dietz Way	$98,000
Total Project Cost	**$3,345,000**

5

5.0 Project Schedule

The facilities being rehabilitated and replaced as part of this contract are located in seasonal creeks. These creeks tend to flow during seasonal wet periods, which typically represent the months of November through April. Contract schedule considerations must be made to account for safe working conditions for the contractor and to reduce costs associated with attempting to perform work with flowing creeks. As a result, contract work is expected to occur primarily during dry weather months (May through October) over the course of two annual periods.

Appendix E includes the overall project schedule through construction. The critical path tasks are shown with red bars on the project schedule. Based on the current project schedule, the work will be completed in the 2024 and 2025 dry weather construction seasons.

5.1 Construction Durations by Site

Anticipated construction schedules are discussed on a site-specific basis in Chapter 3. Table 5.1-1 provides a summary of all twelve site anticipated construction durations.

Table 5-1. Construction Durations by Site

CROSSING SITE	APPROXIMATE CONSTRUCTION LENGTH (WEEKS)
Hope Lane	2-4
Winding Way	8-10
Arcade Creek	3-5
Garfield Thousand Oaks	3-5
Concho Court	2-4
Gina Court	2-4
San Lorenzo Way	3-5
Sutter Avenue	4-6
Campfire Way	3-5
Indian River Drive	6-8
Hegseth Court	3-5
Dietz Way	2-4

Appendix A: 30% Drawings

Appendix B: Summary Tables

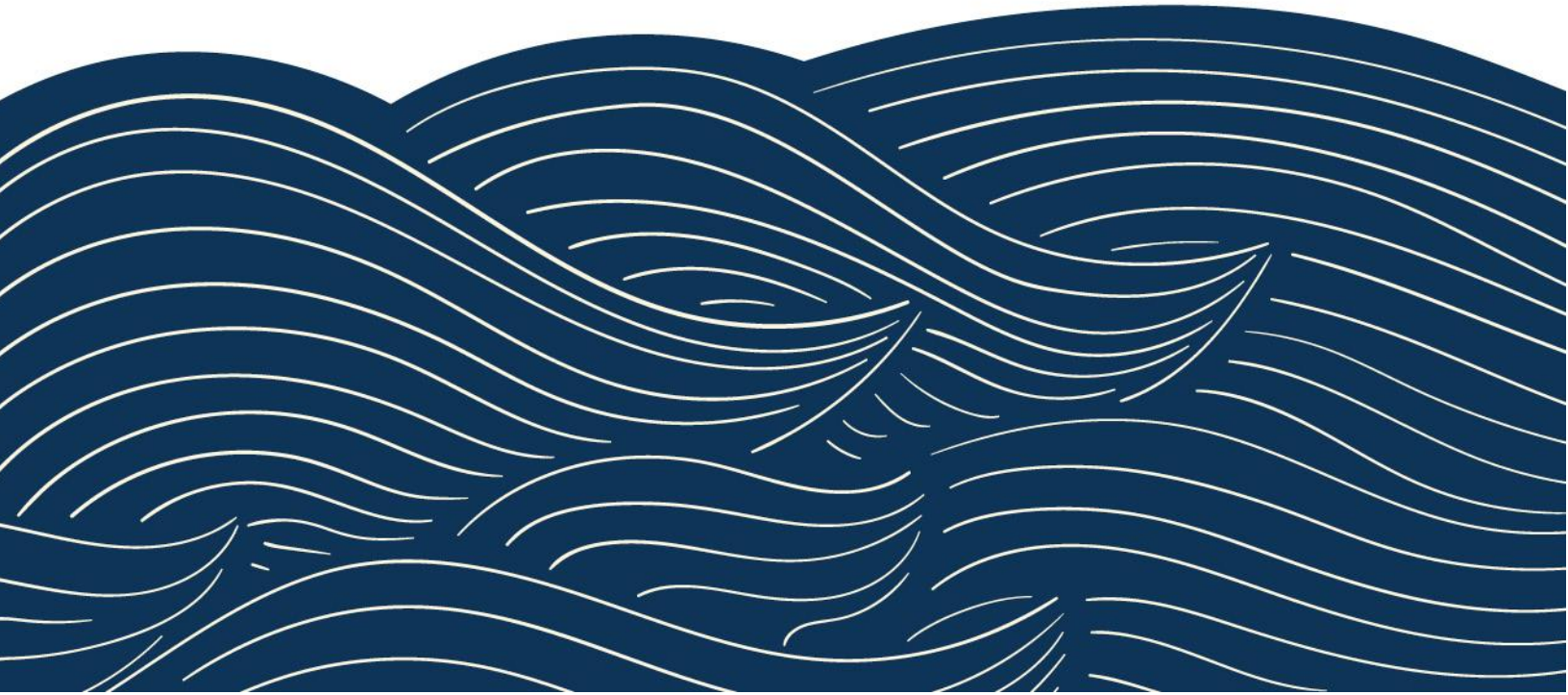
Appendix C: Cost Estimate

Appendix D: Preliminary Structural Calculations

Appendix E: Project Schedule

A

30% Drawings



SACRAMENTO AREA SEWER DISTRICT

SACRAMENTO AREA
SEWER DISTRICT

30% DRAWINGS FOR

CREEK CROSSING PROJECT

JANUARY, 2022

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SACRAMENTO AREA SEWER DISTRICT MAIN OFFICE	916-876-6000	

ENCROACHMENT APPROVAL:

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REV	DATE	BY	DESCRIPTION

WARNING
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IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

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2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
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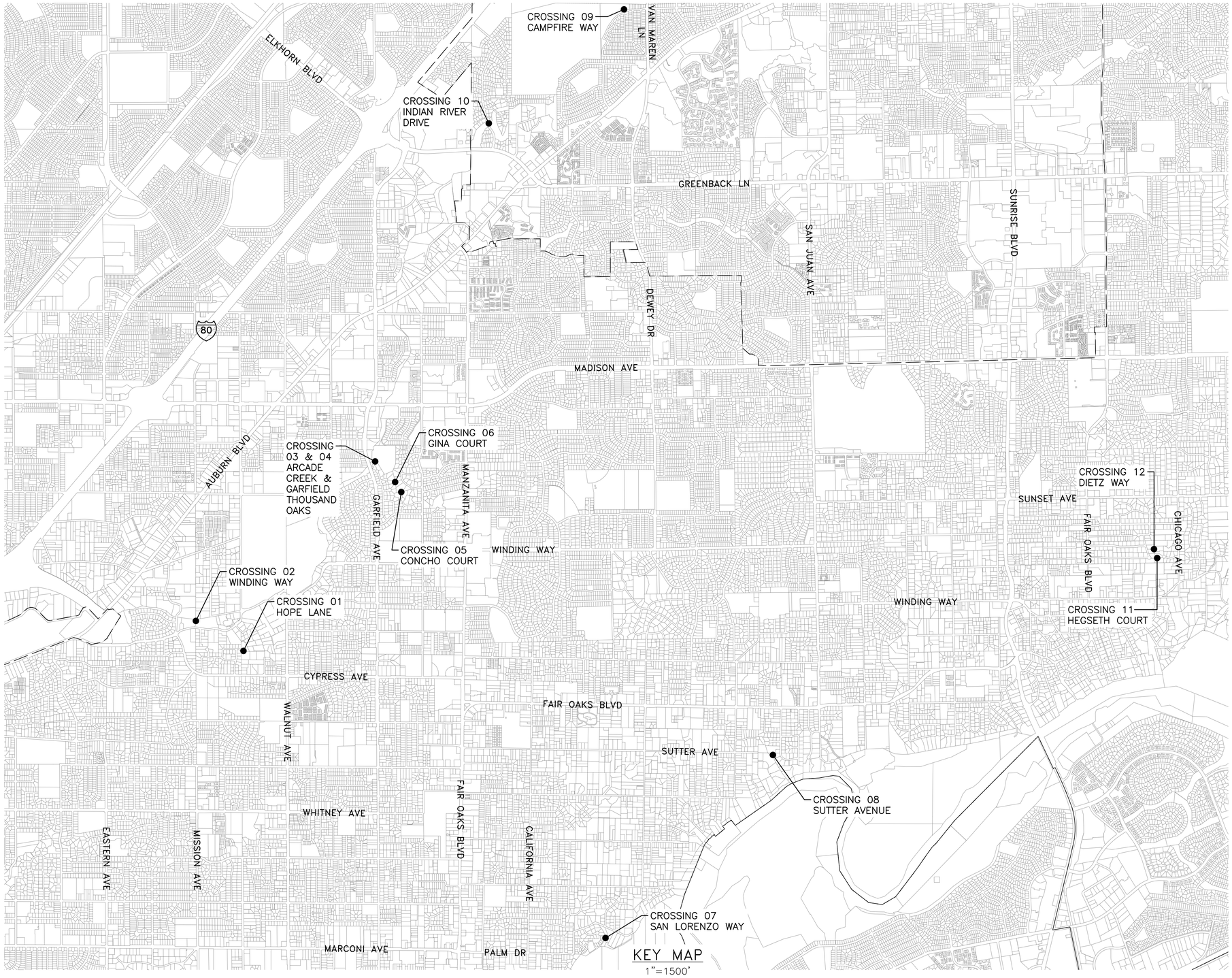
SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827
APPROVED:
_____ _ _____ POSITION DATE

SASD CREEK CROSSING PROJECT

TITLE SHEET AND APPROVALS

DRAWING
T-001
SHEET 1 OF --
PROJECT #
_

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: January 27, 2022 - 4:22 PM CADD User: Chris Durbin



KEY MAP
1"=1500'

N

0 750 1500
SCALE: 1"=1500'

SHEET INDEX

DWG No.	DESCRIPTION
T-001	TITLE SHEET AND APPROVALS
G-001	SHEET INDEX AND INDEX MAP
CROSSING 01 – HOPE LANE	
C-010	SITE ACCESS PLAN
C-011	SITE PLAN
CROSSING 02 – WINDING WAY	
C-020	SITE ACCESS PLAN
C-021	SITE PLAN
CROSSING 03 & 04 – ARCADE CREEK & GARFIELD THOUSAND OAKS	
C-030	SITE ACCESS PLAN
C-031	SITE PLAN – ARCADE CREEK
C-032	PLAN AND PROFILE STA 10+00 TO STA 13+00
C-033	PLAN AND PROFILE STA 13+00 TO STA 15+81±
C-034	DEMOLITION PLAN
CROSSING 05 – CONCHO COURT	
C-050	SITE ACCESS PLAN
C-051	SITE PLAN
CROSSING 06 – GINA COURT	
C-060	SITE ACCESS PLAN
C-061	SITE PLAN
CROSSING 07 – SAN LORENZO WAY	
C-070	SITE ACCESS PLAN
C-071	SITE PLAN
CROSSING 08 – SUTTER AVENUE	
C-080	SITE ACCESS PLAN
C-081	SITE PLAN
CROSSING 09 – CAMPFIRE WAY	
C-090	SITE ACCESS PLAN
C-091	SITE PLAN
CROSSING 10 – INDIAN RIVER DRIVE	
C-100	SITE ACCESS PLAN
C-101	SITE PLAN
CROSSING 11 – HEGSETH COURT	
C-110	SITE ACCESS PLAN
C-111	SITE PLAN
CROSSING 12 – DIETZ WAY	
C-120	SITE ACCESS PLAN
C-121	SITE PLAN

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WARNING
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SASD CREEK CROSSING PROJECT

SHEET INDEX AND INDEX MAP

DRAWING
G-001
SHEET 2 OF --
PROJECT # --

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LEGEND

- ACCESS PATH TO SITE
- WORK AREA GROUND DISTURBANCE LIMITS
- STAGING AREA

811 Know what's below. Call before you dig.

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WARNING
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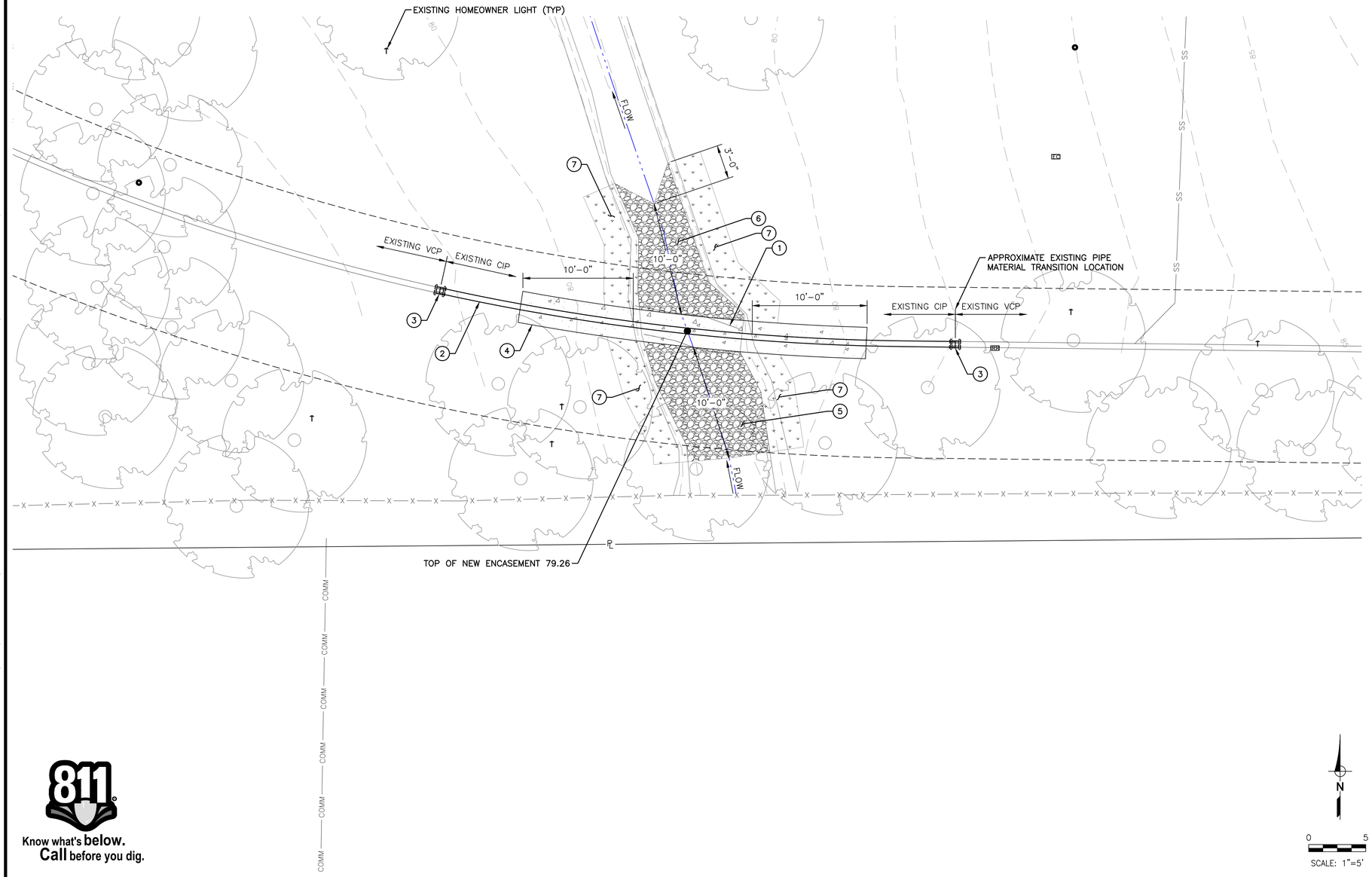
SACRAMENTO AREA SEWER DISTRICT
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SACRAMENTO, CA 95827

APPROVED:
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SASD CREEK CROSSING PROJECT
CROSSING 01 - HOPE LANE
SITE ACCESS PLAN

DRAWING
C-010
SHEET 5 OF --
PROJECT # –

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SHEET KEY NOTES

1. REMOVE EXISTING COBBLES, 6" CIP AND ENCASEMENT
2. INSTALL NEW 6"–SS PIPE MATCH EXISTING 6" CIP INVERT AND SLOPE
3. FLEXIBLE COUPLINGS AND TRANSITION COUPLING TO CONNECT TO EXISTING VCP PIPING, TYP. EACH END
4. INSTALL NEW CONCRETE ENCASEMENT 30' L X 33" W X 26" H
5. INSTALL UPSTREAM RIPRAP. SLOPE FROM TOP OF ENCASEMENT TO CHANNEL AT 5:1 (RUN:RISE) MAXIMUM SLOPE. EXTEND 10–FT UP CHANNEL FROM ENCASEMENT
6. INSTALL DOWNSTREAM RIPRAP. SLOPE FROM TOP OF ENCASEMENT TO CHANNEL AT 5:1 (RUN:RISE) MAXIMUM SLOPE
7. INSTALL ANCHORED VEGETATED TURF REINFORCED MAT OVER SLOPES. CUT SLOPES BACK TO 1:1 MAXIMUM

TREE REMOVAL

NO TREE REMOVAL FOR HOPE LANE SITE

Know what's below. Call before you dig.

N

0 5

SCALE: 1"=5'

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
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IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
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SCALE AS NOTED

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SASD CREEK CROSSING PROJECT

CROSSING 01 - HOPE LANE

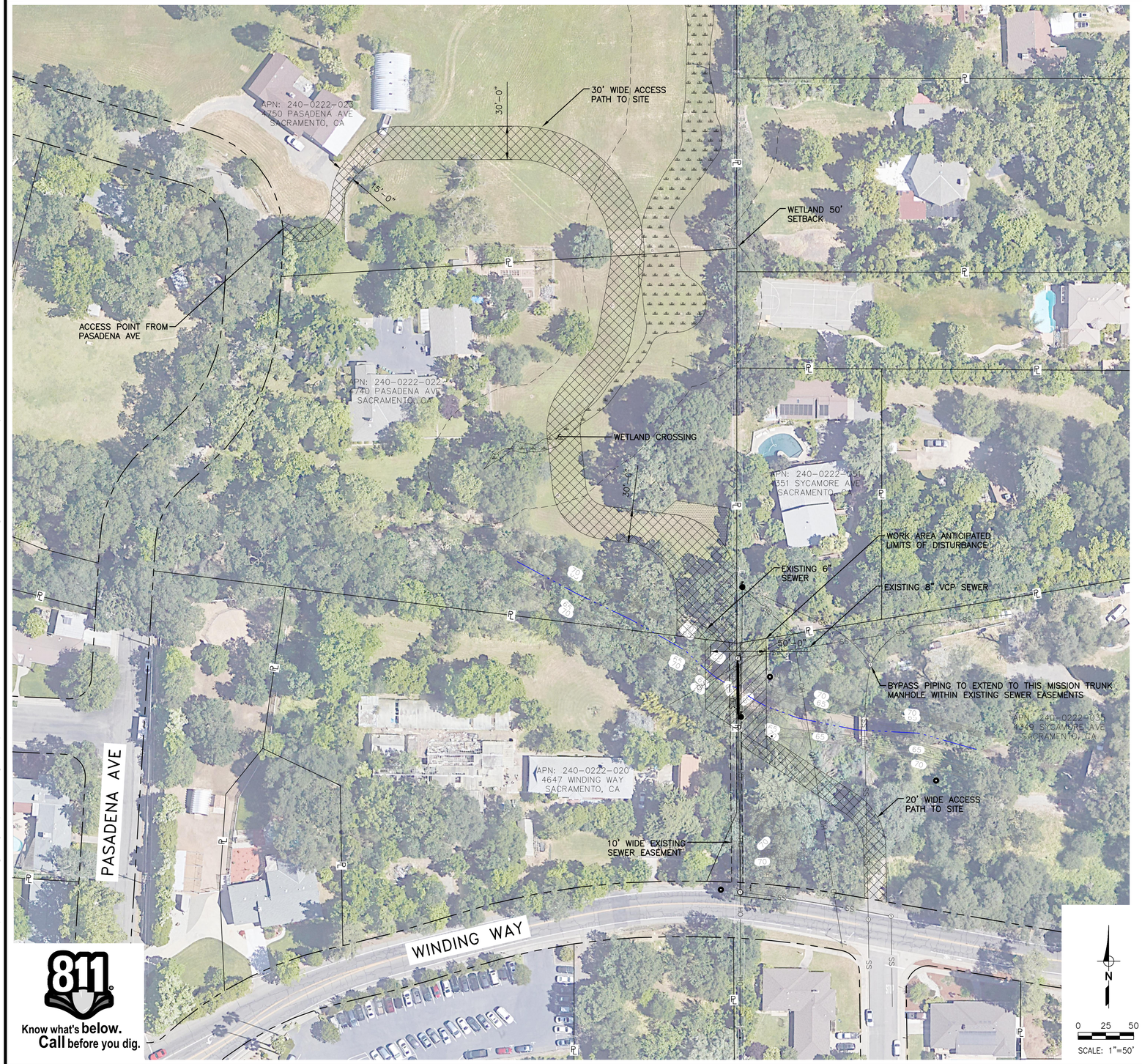
SITE PLAN

DRAWING C-011

SHEET 6 OF --

PROJECT # –

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N

0 25 50

SCALE: 1"=50'

LEGEND

- ACCESS PATH TO SITE
- WORK AREA GROUND DISTURBANCE LIMITS
- STAGING AREA
- WETLANDS

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
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IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

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SCALE AS NOTED

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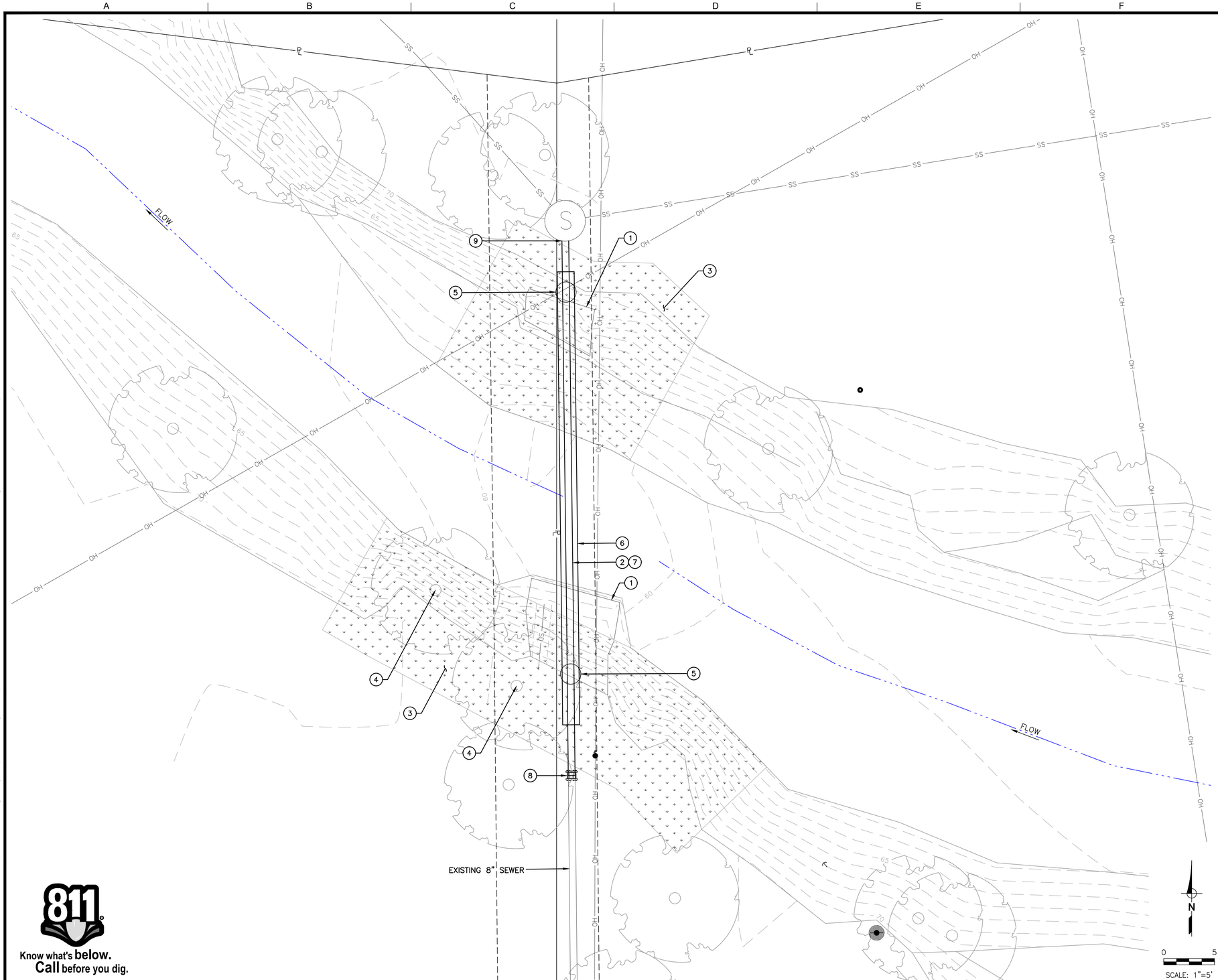
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SACRAMENTO, CA 95827

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SASD CREEK CROSSING PROJECT
CROSSING 02 - WINDING WAY
SITE ACCESS PLAN

DRAWING
C-020
SHEET 7 OF --
PROJECT # –

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: January 27, 2022 – 4:23 PM CADD User: Chris Durbin



SHEET KEY NOTES

1. REMOVE EXISTING SLOPE PROTECTION
2. REMOVE EXISTING PIPE AND EXISTING PIERS
3. INSTALL ANCHORED VEGETATED TURF REINFORCEMENT MAT ON BOTH BANKS WITH TOE EMBEDMENT. MATCH EXISTING SLOPES
4. REMOVE EXISTING TREE AS NOTED ON PLANS
5. INSTALL DRILLED PIERS TO A DEPTH OF 40'±
6. INSTALL 20" EPOXY COATED WSP CASING PIPE IN ACCORDANCE WITH SASD STANDARDS
7. INSTALL 8" SS CARRIER PIPE IN CASING PER SASD STANDARDS
8. INSTALL 8" TRANSITION COUPLING
9. CONNECT TO EXISTING MANHOLE

TREE REMOVAL

8IN DEAD	TAG 7651
48IN X 30FT OAK	TAG 7652

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REV	DATE	BY	DESCRIPTION

WARNING
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SCALE AS NOTED

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SASD CREEK CROSSING PROJECT

CROSSING 02 - WINDING WAY

SITE PLAN

DRAWING
C-021
SHEET 8 OF --
PROJECT # –

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LEGEND

- ACCESS PATH TO SITE
- WORK AREA GROUND DISTURBANCE LIMITS
- STAGING AREA

N

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SCALE: 1"=50'

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REV	DATE	BY	DESCRIPTION

WARNING
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SCALE AS NOTED

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SACRAMENTO, CA 95827

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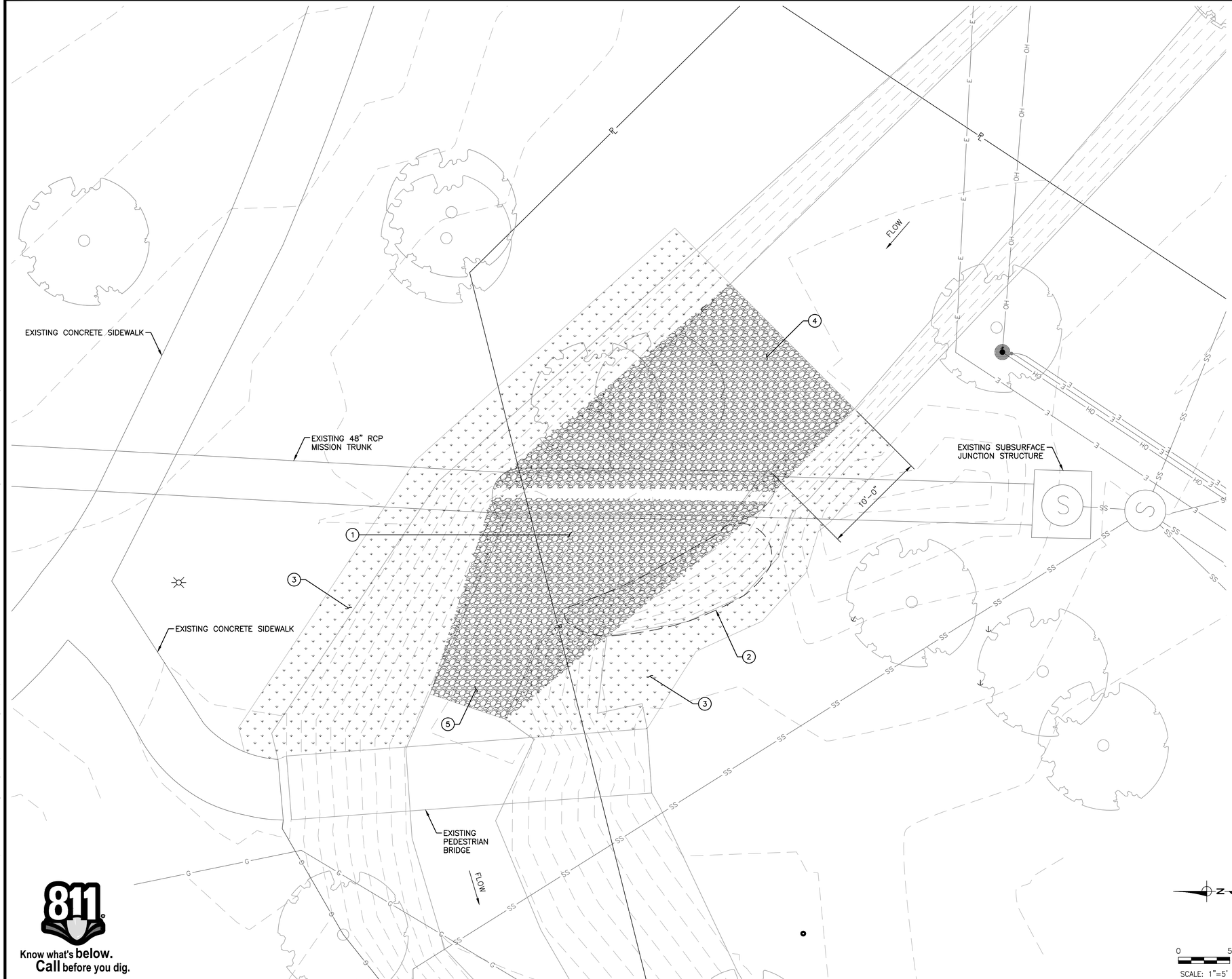
SASD CREEK CROSSING PROJECT

CROSSING 03 & 04 - ARCADE CREEK & GARFIELD THOUSAND OAKS

SITE ACCESS PLAN

DRAWING C-030
SHEET 9 OF --
PROJECT # _

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SHEET KEY NOTES

1. REMOVE EXISTING BED PROTECTION
2. BACKFILL TO RESTORE BANK
3. INSTALL ANCHORED VEGETATED TURF REINFORCEMENT MAT ON BOTH BANKS. MATCH EXISTING SLOPES
4. INSTALL UPSTREAM RIPRAP. SLOPE FROM TOP OF ENCASEMENT TO CHANNEL AT 5:1 (RUN:RISE) MAXIMUM SLOPE
5. INSTALL DOWNSTREAM RIPRAP. SLOPE FROM TOP OF EXISTING PIPE TO CONCRETE UPSTREAM OF EXISTING BRIDGE

TREE REMOVAL

NO TREE REMOVAL FOR ARCADE CREEK SITE

811 Know what's **below.** **Call** before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN PMD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
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SACRAMENTO, CA 95827

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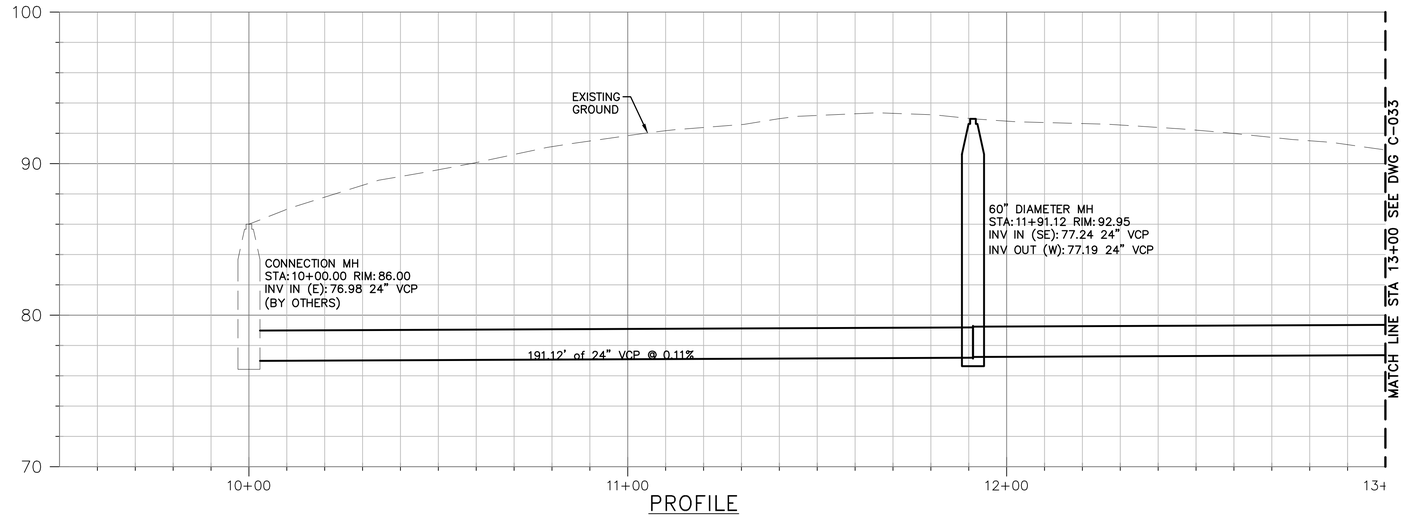
SASD CREEK CROSSING PROJECT

CROSSING 03 & 04 - ARCADE CREEK & GARFIELD THOUSAND OAKS

SITE PLAN - ARCADE CREEK

DRAWING C-031
SHEET 10 OF --
PROJECT # –

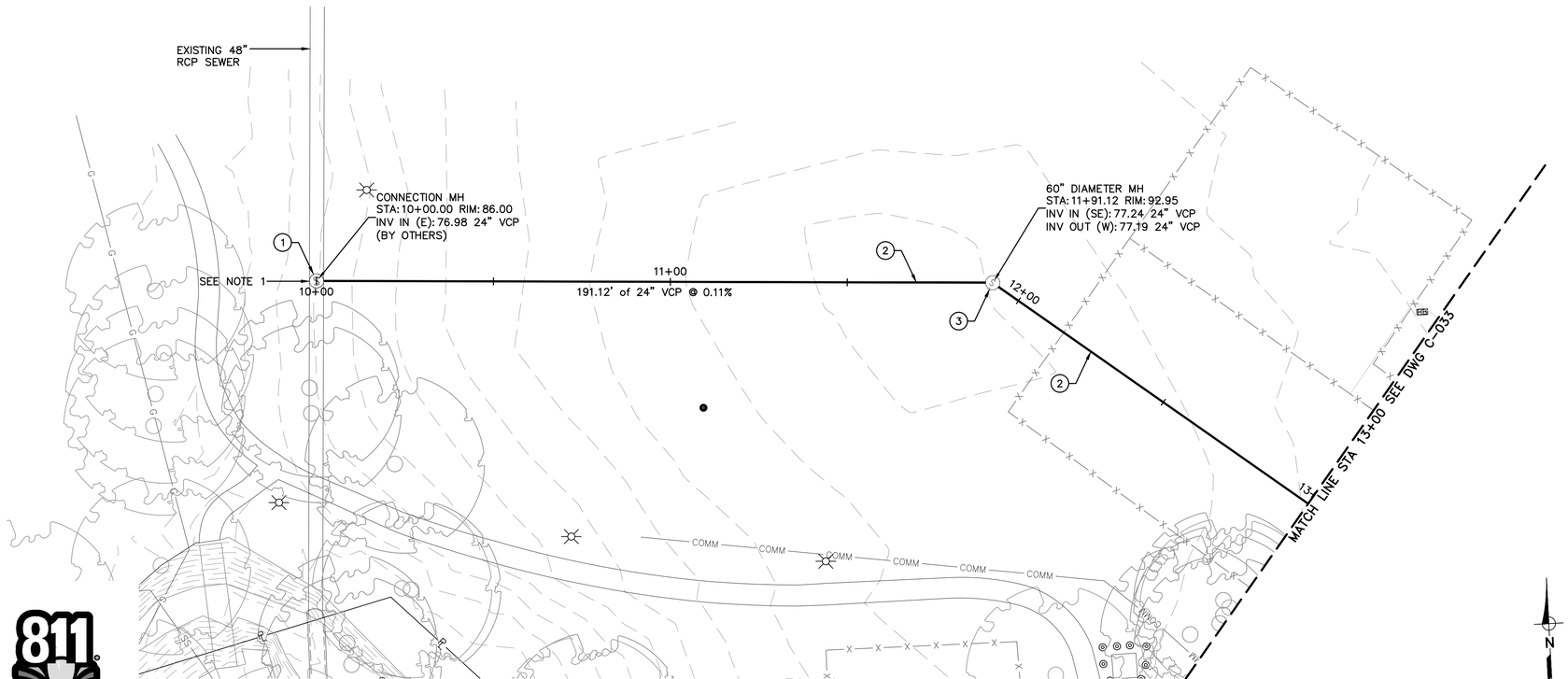
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PROFILE

SHEET KEY NOTES

1. CONNECT TO EXISTING SS MH
2. REROUTED 24"-SS, VCP PIPE
3. MANHOLE PER SASD STANDARD DETAIL MH-03



PLAN
1"=20'

NOTES:

1. APPROXIMATE INVERT OF 48" RCP AT CONNECTION LOCATION IS 75.24±

Know what's **below.** **Call** before you dig.

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REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED	MJG
DRAWN	PMD
CHECKED	RGN
SCALE	AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

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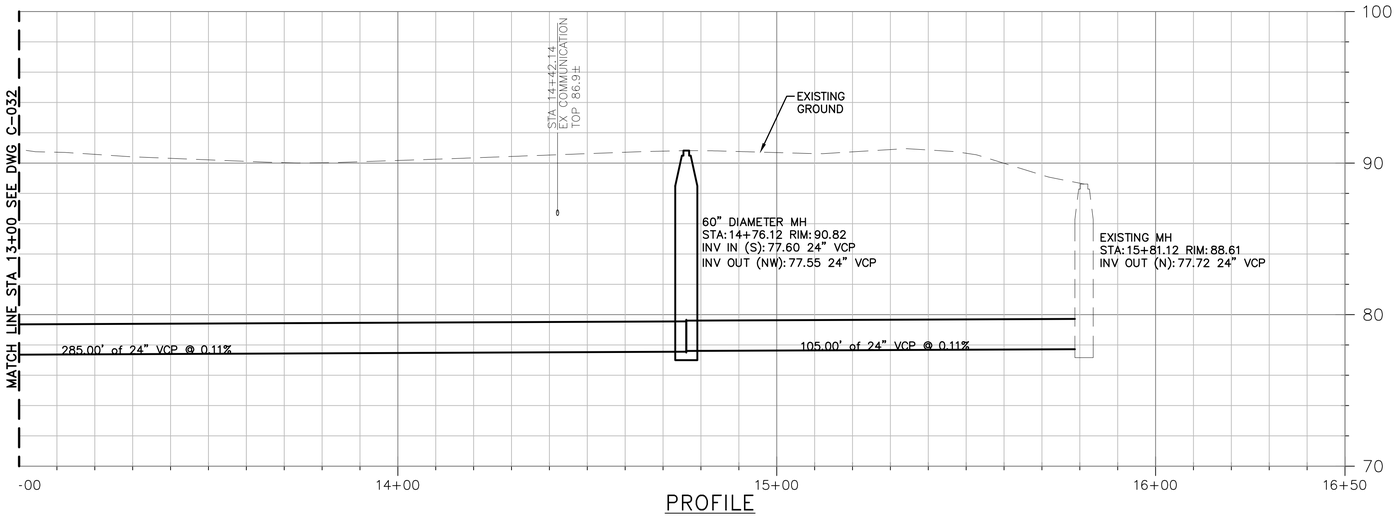
SASD CREEK CROSSING PROJECT

CROSSING 03 & 04 - ARCADE CREEK & GARFIELD THOUSAND OAKS

PLAN AND PROFILE
STA 10+00 TO STA 13+00

DRAWING
C-032
SHEET 11 OF --
PROJECT # _

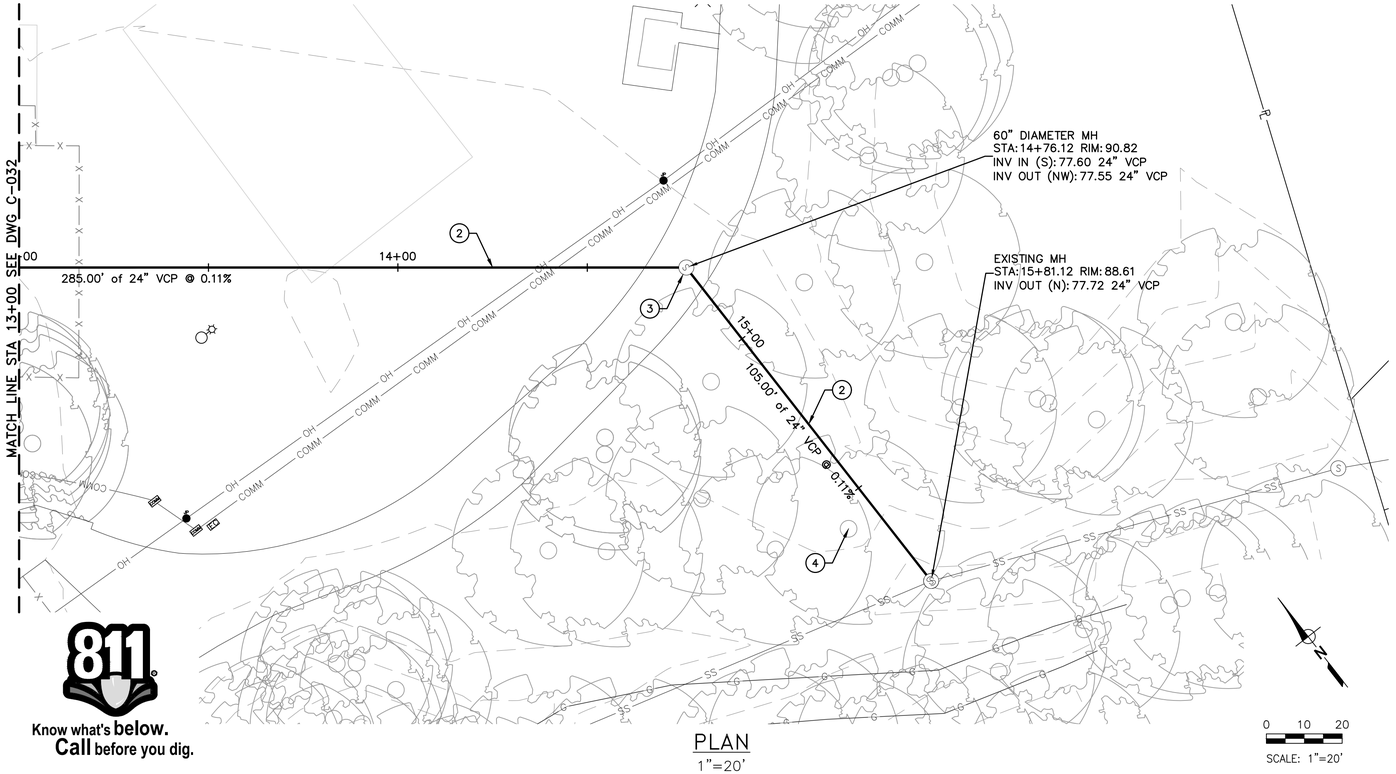
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PROFILE

SHEET KEY NOTES

1. CONNECT TO EXISTING SS MH
2. REROUTED 24"-SS, VCP PIPE
3. MANHOLE PER SASD STANDARD DETAIL MH-03
4. REMOVE EXISTING TREE AS NOTED ON PLANS



PLAN
1"=20'

TREE REMOVAL

N/A	TAG 5282

Know what's **below.** **Call** before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED	MJG
DRAWN	PMD
CHECKED	RGN
SCALE	AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT C. NAYLOR NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

WSC
2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
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SASD CREEK CROSSING PROJECT

CROSSING 03 & 04 - ARCADE CREEK & GARFIELD THOUSAND OAKS

PLAN AND PROFILE
STA 13+00 TO STA 15+81±

DRAWING
C-033
SHEET 12 OF --
PROJECT # _

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: January 27, 2022 - 4:24 PM CADD User: Chris Durbin

SHEET KEY NOTES

1. CAP AND ABANDON EXISTING 24" VCP PER SASD STANDARDS
2. ABANDON EXISTING MANHOLE PER SASD STANDARDS
3. REMOVE EXISTING 24" VCP FROM CREEK AND 5' INTO BANKS (TYP BOTH SIDES)
4. BACKFILL AND RESTORE CREEK BED AND BANKS
5. INSTALL ANCHORED VEGETATED TURF REINFORCEMENT MAT ON SLOPES DISTURBED BY WORK
6. REMOVE EXISTING TREE AS NOTED ON PLANS

TREE REMOVAL

REMOVE TWO TREE CLUSTERS INDICATED IN CREEK. CLUSTERS ARE BELOW TAGGED TREE DIAMETER SIZES.

EXISTING 24" VCP SEWER

10'-0"

5'-0"

10'-0"

5'-0"

ABANDON TO UPSTREAM MANHOLE OF REROUTED SEWER, SEE C-030 FOR EXTENTS

0 5 10

SCALE: 1"=10'

Know what's below. Call before you dig.

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REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN PMD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
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RCE No.: #####

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10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
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SASD CREEK CROSSING PROJECT

CROSSING 03 & 04 - ARCADE CREEK & GARFIELD THOUSAND OAKS

DEMOLITION PLAN

DRAWING
C-034
SHEET 13 OF --
PROJECT #
–

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: January 27, 2022 – 4:25 PM CADD User: Chris Durbin



811 Know what's below. Call before you dig.

LEGEND

- ACCESS PATH TO SITE
- WORK AREA GROUND DISTURBANCE LIMITS
- STAGING AREA

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN PMD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
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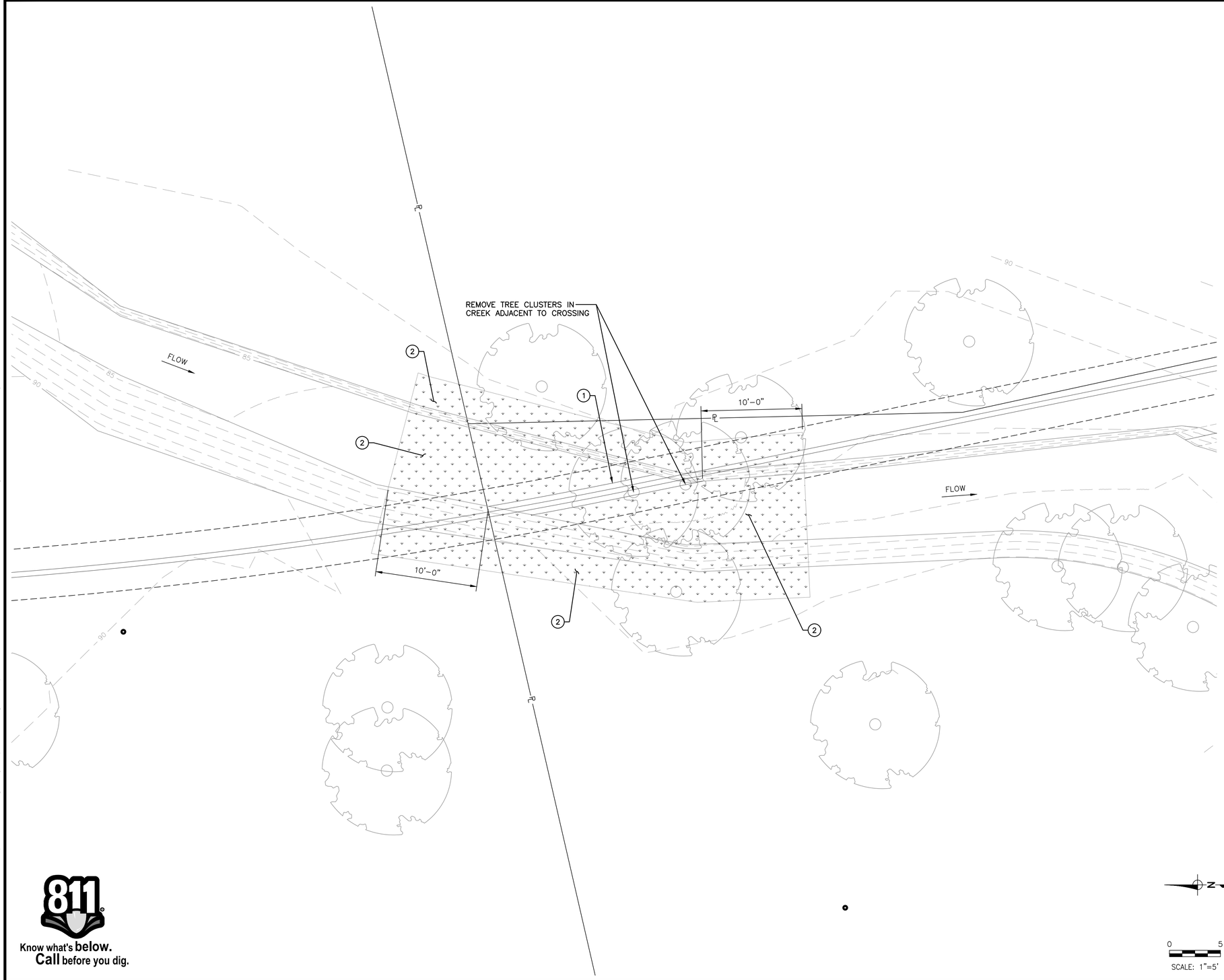
SASD CREEK CROSSING PROJECT

CROSSING 05 - CONCHO COURT

SITE ACCESS PLAN

DRAWING
C-050
SHEET 14 OF --
PROJECT # –

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: January 27, 2022 – 4:25 PM CADD User: Chris Durbin



SHEET KEY NOTES

1. REMOVE EXISTING COBBLES
2. INSTALL ANCHORED VEGETATED TURF REINFORCED MAT OVER CREEK BED AND BANKS

TREE REMOVAL

REMOVE TWO TREE CLUSTERS INDICATED IN CREEK.
CLUSTERS ARE BELOW TAGGED TREE DIAMETER SIZES.

N

0 5
SCALE: 1"=5'

811 Know what's below. Call before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN PMD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

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SACRAMENTO, CA 95827

APPROVED:
_____ – _____– POSITION DATE

SASD CREEK CROSSING PROJECT
CROSSING 05 - CONCHO COURT
SITE PLAN

DRAWING
C-051
SHEET 15 OF --
PROJECT #
–

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: January 27, 2022 – 4:25 PM CADD User: Chris Durbin



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NOTES:

1. EASEMENT RECORDS SHOWN THIS EASEMENT SEGMENT ENTIRELY WITHIN 5519 GINA COURT PROPERTY. THIS DOES NOT ALIGN WITH SURVEY RESULTS.

LEGEND

- ACCESS PATH TO SITE
- WORK AREA GROUND DISTURBANCE LIMITS
- STAGING AREA

0 10 20
SCALE: 1"=20'

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN PMD
CHECKED RGN
SCALE AS NOTED

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ENGINEER NAME DATE
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SACRAMENTO, CA 95827

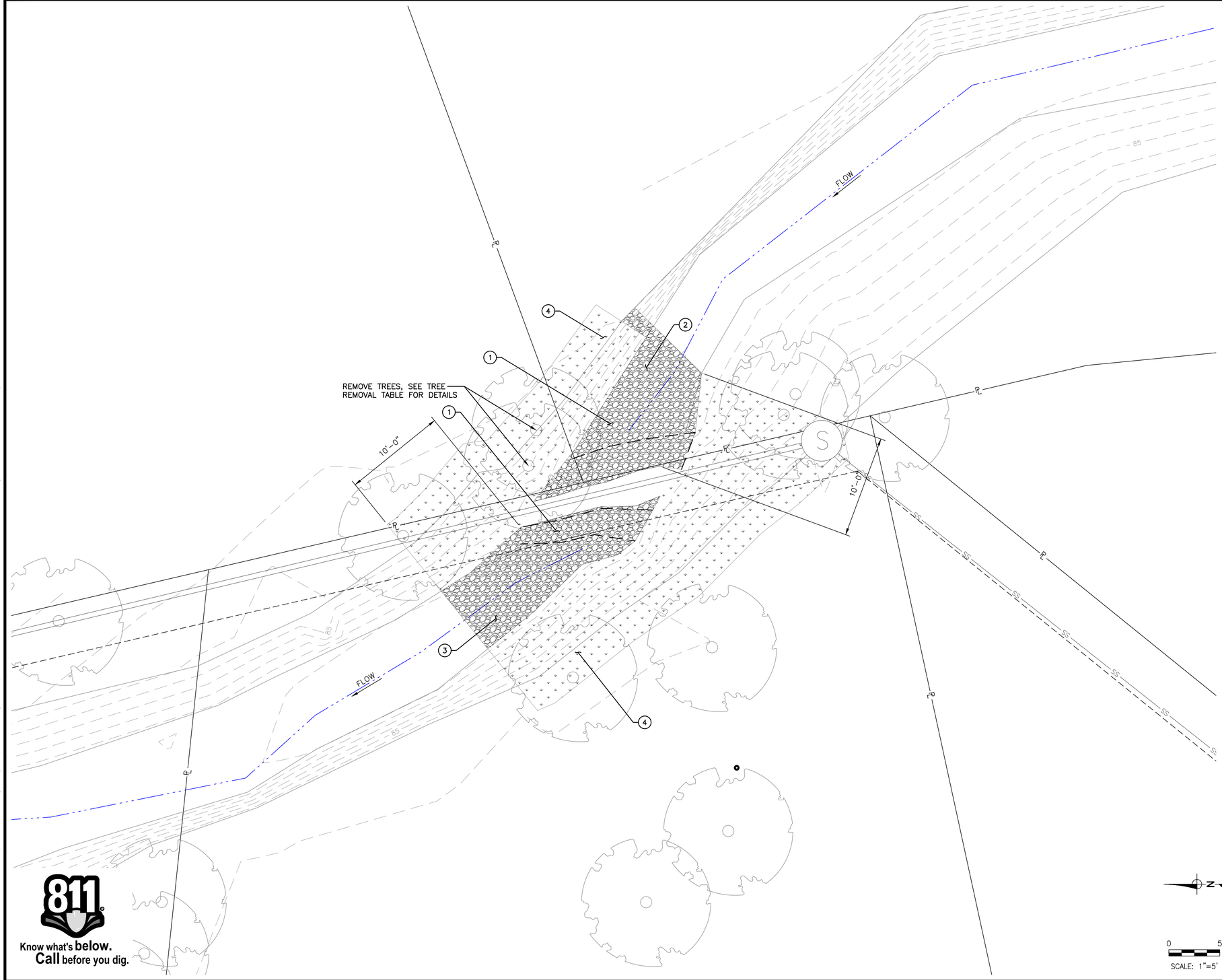
APPROVED:
_____ _ _____ POSITION DATE

SASD CREEK CROSSING PROJECT
CROSSING 06 - GINA COURT
SITE ACCESS PLAN

DRAWING
C-060
SHEET 16 OF --
PROJECT # --

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: January 27, 2022 - 4:26 PM CADD User: Chris Durbin

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: January 27, 2022 - 4:26 PM CADD User: Chris Durbin



SHEET KEY NOTES

1. REMOVE EXISTING COBBLES UPSTREAM AND DOWNSTREAM OF CROSSING
2. INSTALL UPSTREAM RIPRAP. SLOPE FROM TOP OF ENCASEMENT TO CHANNEL AT 5:1 (RUN:RISE) MAXIMUM SLOPE
3. INSTALL DOWNSTREAM RIPRAP. SLOPE FROM TOP OF ENCASEMENT TO CHANNEL AT 5:1 (RUN:RISE) MAXIMUM SLOPE
4. INSTALL ANCHORED VEGETATED TURF REINFORCED MAT OVER SLOPES

TREE REMOVAL

12IN X 15FT DEC	TAG 7508
3-4IN+6IN X 12FT DEC	TAG 7507

811 Know what's **below.** **Call** before you dig.

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REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
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DESIGNED MJG
DRAWN PMD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

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10060 GOETHE RD
SACRAMENTO, CA 95827

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SASD CREEK CROSSING PROJECT

CROSSING 06 - GINA COURT

SITE PLAN

DRAWING
C-061
SHEET 17 OF --
PROJECT # --



LEGEND

- ACCESS PATH TO SITE
- WORK AREA GROUND DISTURBANCE LIMITS
- STAGING AREA

0 10 20

SCALE: 1"=20'

Know what's below. Call before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
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DESIGNED MJG
DRAWN PMD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
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RCE No.: #####

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10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
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SASD CREEK CROSSING PROJECT

CROSSING 07 - SAN LORENZO WAY

SITE ACCESS PLAN

DRAWING
C-070
SHEET 18 OF --
PROJECT # –

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: January 27, 2022 - 4:26 PM CADD User: Chris Durbin

SHEET KEY NOTES

1. REMOVE EXISTING COBBLES FROM CREEK
2. INSTALL 48" MANHOLE UPSTREAM OF CROSSING
3. REMOVE EXISTING 6"-SS, REPLACE AT LOWER INVERT BELOW CREEK. INSTALL NEW SS PIPE CONCRETE ENCASEMENT BELOW CREEK WITH FLEXIBLE COUPLINGS ON SIDES OF ENCASEMENT
4. INSTALL CONCRETE ENCASEMENT AROUND BURIED PIPE UNDER CREEK
5. INSTALL TRM OVER DISTURBED AREA UP TO ELEVATION 77.5-FT. HYDROSEED DISTRUBED AREAS ABOVE 77.5-FT ELEVATION

TREE REMOVAL

10IN X 15FT DEC TAG 7522

REMOVE TREE, SEE TREE REMOVAL TABLE FOR DETAILS

6" SS (EXISTING, PROTECT IN PLACE) BEYOND NEW MANHOLE

NEW SSMH DROP MH #XXXX
RIM EL: 78.5'
INV. IN: 72.5'± (FIELD VERIFY)
INV. OUT: 66.12'

FL EL 71.05

FL EL 70.89

FLOW

FLOW

SSMH MT #8108
RIM ELE: 78.21'
(ABANDONED)

SSMH MH #8107
RIM EL: 79.01'
INV. (12"N): 62.76'
INV. ~~(6"SW): 71.21'~~ (PLUG)
INV. (12"S): 62.61'
INV. (6"SW): 65.81' (INSTALL)

PROTECT IN PLACE
EXISTING OAK TREE

EXISTING 12" SS

Know what's **below.** **Call** before you dig.

N

0 5
SCALE: 1"=5'

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
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DESIGNED MJG
DRAWN PMD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

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10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
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SASD CREEK CROSSING PROJECT

CROSSING 07 - SAN LORENZO WAY

SITE PLAN

DRAWING C-071
SHEET 19 OF --
PROJECT # _

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: January 27, 2022 - 4:27 PM CADD User: Chris Durbin



Know what's below. Call before you dig.

0 20 40
SCALE: 1"=40'

NOTES:

1. THE SEWER EASEMENT IN THIS AREA IS RECORDED INCORRECTLY. THE SASD ARCPAD MAPS FOR THIS AREA SHOW THE EASEMENT DIFFERENTLY THAN AS RECORDED ON THE RECORD DRAWINGS FOR THIS STRETCH OF PIPE.

LEGEND

- ACCESS PATH TO SITE
- WORK AREA GROUND DISTURBANCE LIMITS
- STAGING AREA

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
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DESIGNED MJG
DRAWN PMD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
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REGISTERED PROFESSIONAL ENGINEER ROBERT G. NAYOLI NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

WSC
2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

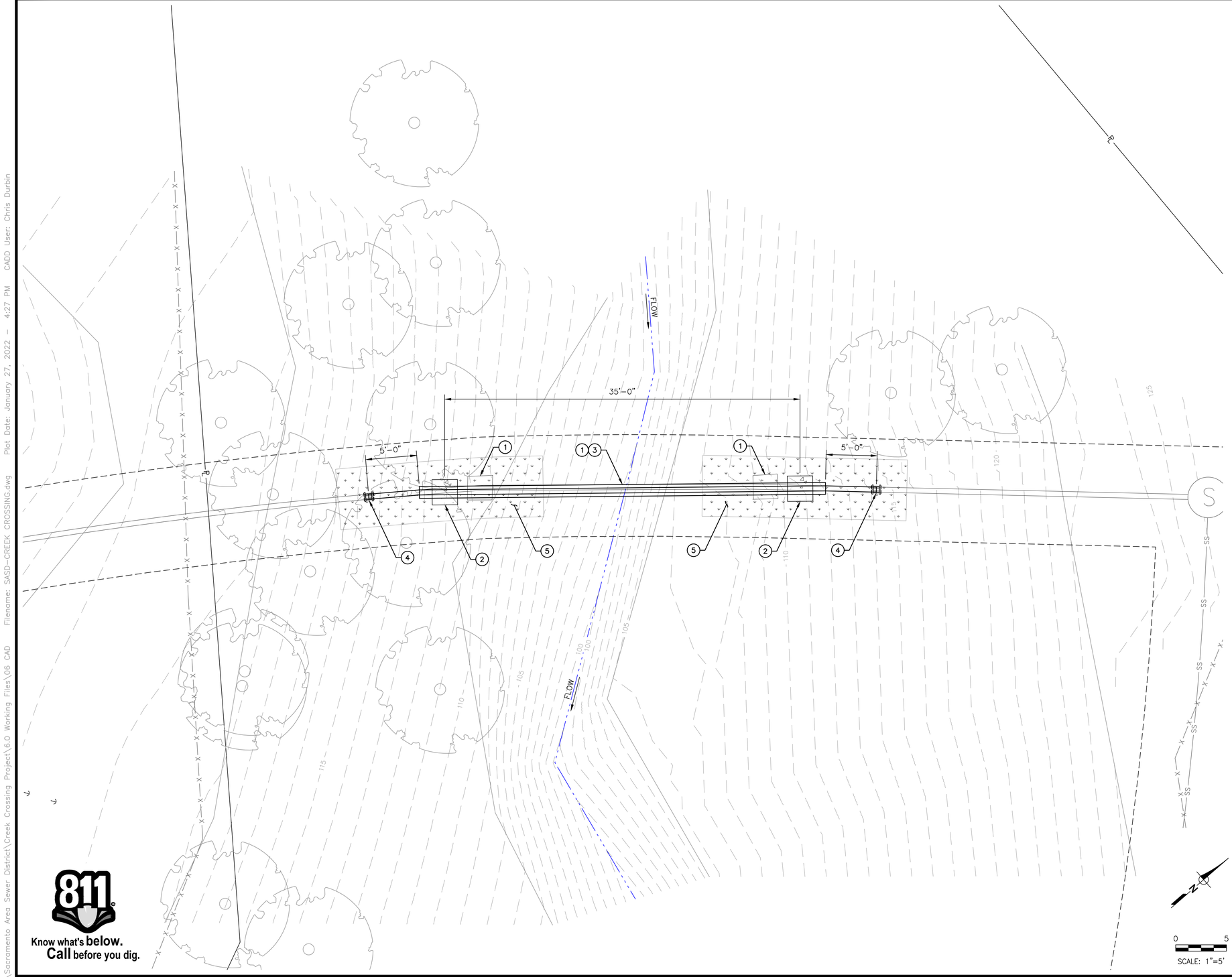
SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
_____ _ _____ POSITION DATE

SASD CREEK CROSSING PROJECT
CROSSING 08 - SUTTER AVENUE
SITE ACCESS PLAN

DRAWING
C-080
SHEET 20 OF --
PROJECT # –

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: January 27, 2022 - 4:27 PM CADD User: Chris Durbin



SHEET KEY NOTES

1. REMOVE EXISTING ALUMINUM PIPE AND CONCRETE PIERS
2. INSTALL NEW CONCRETE SUPPORTS, SET INTO BANKS FOR STABILITY
3. INSTALL NEW 6"–SS PIPE CROSSING WITH 14"–WELDED STEEL SCH. 40 CASING. 6" SS PIPE ALIGNMENT, ELEVATION AND SLOPE TO MATCH EXISTING 6" PIPE BEING REMOVED
4. INSTALL 6"–SS BEYOND CASING WITH TWO FLEXIBLE COUPLINGS PER END BEYOND CONCRETE SUPPORTS
5. HYDROSEED DISTURBED SLOPE AREAS

TREE REMOVAL

NO TREE REMOVAL FOR SUTTER AVENUE SITE

811 Know what's **below.** **Call** before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN PMD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

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SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
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SASD CREEK CROSSING PROJECT
CROSSING 08 - SUTTER AVENUE
SITE PLAN

DRAWING
C-081
SHEET 21 OF --
PROJECT # –

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: January 27, 2022 – 4:27 PM CADD User: Chris Durbin



LEGEND

- ACCESS PATH TO SITE
- WORK AREA GROUND DISTURBANCE LIMITS
- STAGING AREA

N

0 10 20

SCALE: 1"=20'

811 Know what's below. Call before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
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DESIGNED MJG
DRAWN PMD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
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RCE No.: #####

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APPROVED:
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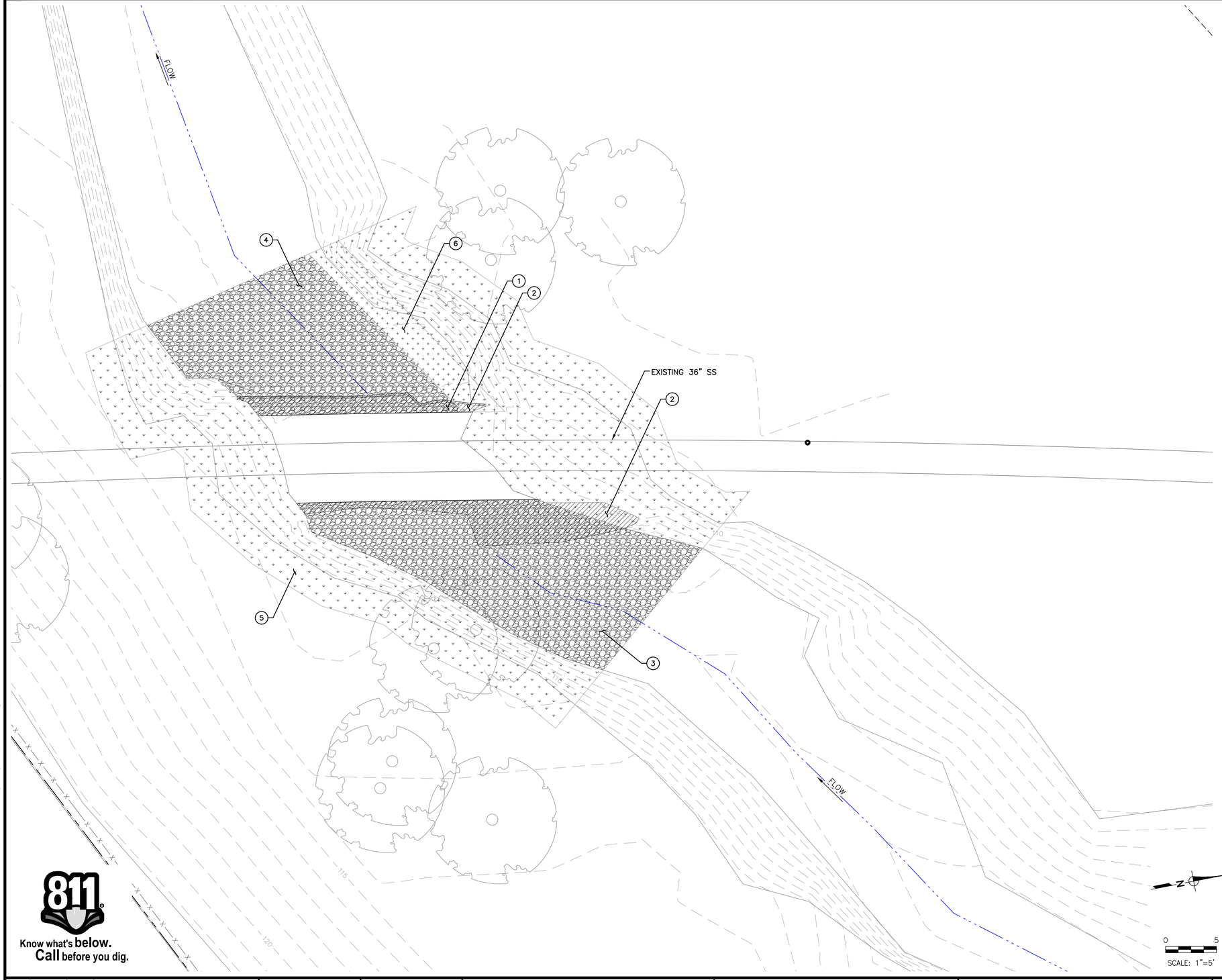
SASD CREEK CROSSING PROJECT

CROSSING 09 - CAMPFIRE WAY

SITE ACCESS PLAN

DRAWING C-090
SHEET 22 OF --
PROJECT # _

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: January 27, 2022 - 4:28 PM CADD User: Chris Durbin

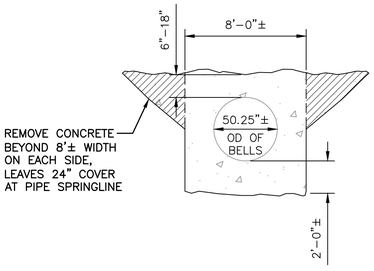


SHEET KEY NOTES

1. REMOVE EXISTING SANDBAGS AND COBBLES
2. REMOVE EXISTING CONCRETE ENCASEMENT. REPAIR CONCRETE CRACKS FOR REMAINING ENCASEMENT, SEE DETAIL 1, THIS SHEET
3. INSTALL UPSTREAM RIPRAP. SLOPE FROM TOP OF ENCASEMENT TO CHANNEL AT 5:1 (RUN:RISE) MAXIMUM SLOPE
4. INSTALL DOWNSTREAM RIPRAP. SLOPE FROM TOP OF ENCASEMENT TO CHANNEL AT 5:1 (RUN:RISE) MAXIMUM SLOPE
5. INSTALL ANCHORED VEGETATED TURF REINFORCED MAT OVER SLOPES
6. INSTALL TURF REINFORCED MAT TOE OF SLOPE SUPPORT

TREE REMOVAL

NO TREE REMOVAL FOR CAMPFIRE WAY SITE



CONCRETE ENCASEMENT DETAIL

1 / –

NOT TO SCALE

811 Know what's below. Call before you dig.

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REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
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CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
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REGISTERED PROFESSIONAL ENGINEER ROBERT C. NAOUM NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

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SASD CREEK CROSSING PROJECT
CROSSING 09 - CAMPFIRE WAY
SITE PLAN

DRAWING C-091
SHEET 23 OF ––
PROJECT # –

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: January 27, 2022 – 4:28 PM CADD User: Chris Durbin



LEGEND

- ACCESS PATH TO SITE
- WORK AREA GROUND DISTURBANCE LIMITS
- STAGING AREA

811 Know what's below. Call before you dig.

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REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
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DESIGNED	MJG
DRAWN	PMD
CHECKED	RGN
SCALE	AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

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SACRAMENTO, CA 95827

APPROVED:
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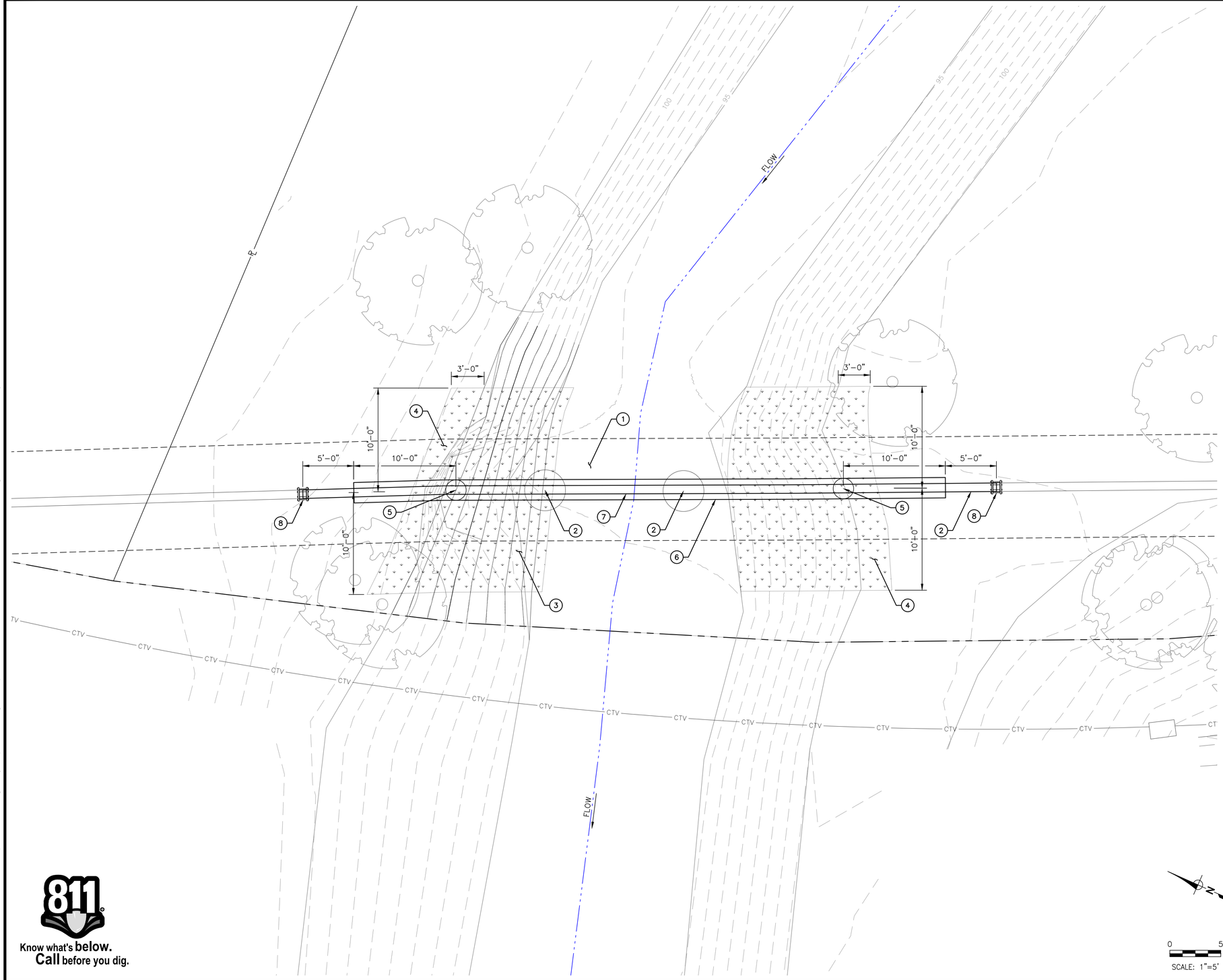
SASD CREEK CROSSING PROJECT
CROSSING 10 - INDIAN RIVER DRIVE
SITE ACCESS PLAN

DRAWING
C-100
SHEET 24 OF --
PROJECT #
–

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: January 27, 2022 – 4:28 PM CADD User: Chris Durbin

SHEET KEY NOTES

1. REMOVE EXISTING BED PROTECTION
2. REMOVE EXISTING PIPE FOR EXTENTS OF PIPE REPLACEMENT, REMOVE EXISTING CONCRETE PIERS
3. BACKFILL AND RESTORE BANK TO MATCH SURROUNDING GRADES
4. INSTALL ANCHORED VEGETATED TURF REINFORCEMENT MAT ON BOTH BANKS. MATCH EXISTING SLOPES
5. INSTALL DRILLED PIERS TO A DEPTH OF 40'±
6. INSTALL 24" EPOXY COATED WSP CASING
7. INSTALL 10" SS CARRIER PIPE. EXTEND MINIMUM 5' PAST CASING ON BOTH ENDS
8. INSTALL 10" TRANSITION COUPLING VCP TO VCP



Know what's below. Call before you dig.

0 5
SCALE: 1"=5'

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
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DESIGNED MJG
DRAWN PMD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
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10060 GOETHE RD
SACRAMENTO, CA 95827
APPROVED:
_____ – _____– POSITION DATE

SASD CREEK CROSSING PROJECT
CROSSING 10 - INDIAN RIVER DRIVE
SITE PLAN

DRAWING
C-101
SHEET 25 OF --
PROJECT #
–

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: January 27, 2022 – 4:29 PM CADD User: Chris Durbin



Know what's below. Call before you dig.

LEGEND

- ACCESS PATH TO SITE
- WORK AREA GROUND DISTURBANCE LIMITS
- STAGING AREA

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED	MJG
DRAWN	PMD
CHECKED	RGN
SCALE	AS NOTED

PREPARED BY:

ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT G. NAYOLI NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

WSC
2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:

_____ – _____– POSITION DATE

SASD CREEK CROSSING PROJECT

CROSSING 11 - HEGSETH COURT

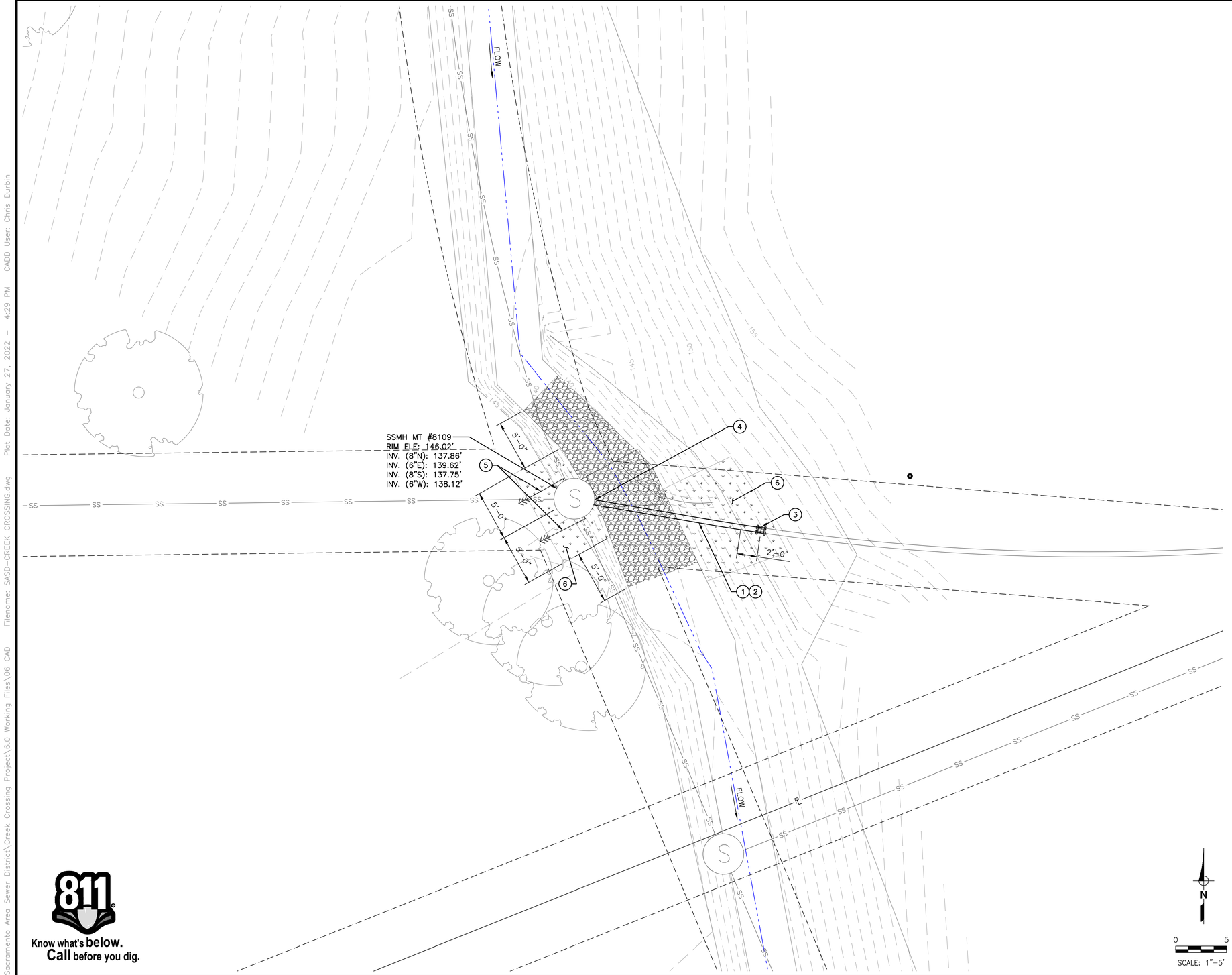
SITE ACCESS PLAN

DRAWING
C-110
SHEET 26 OF --
PROJECT #
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SHEET KEY NOTES

1. REMOVE EXISTING PIPE AND COBBLES IN CREEK
2. INSTALL 8" EPOXY COATED WSP
3. INSTALL 8" TRANSITION COUPLING WSP TO VCP
4. REPLACE PIPE TO MANHOLE CONNECTION. INSTALL NEW SEAL AND GROUT ANNULAR SPACE
5. INSTALL MANHOLE PROTECTION TIE-BACKS AND STRUCTURAL BANDS
6. INSTALL ANCHORED VEGETATED TURF REINFORCEMENT MAT ON BOTH BANKS. MATCH EXISTING SLOPES



Know what's below. Call before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED	MJG
DRAWN	PMD
CHECKED	RGN
SCALE	AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT G. NAPOLI NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

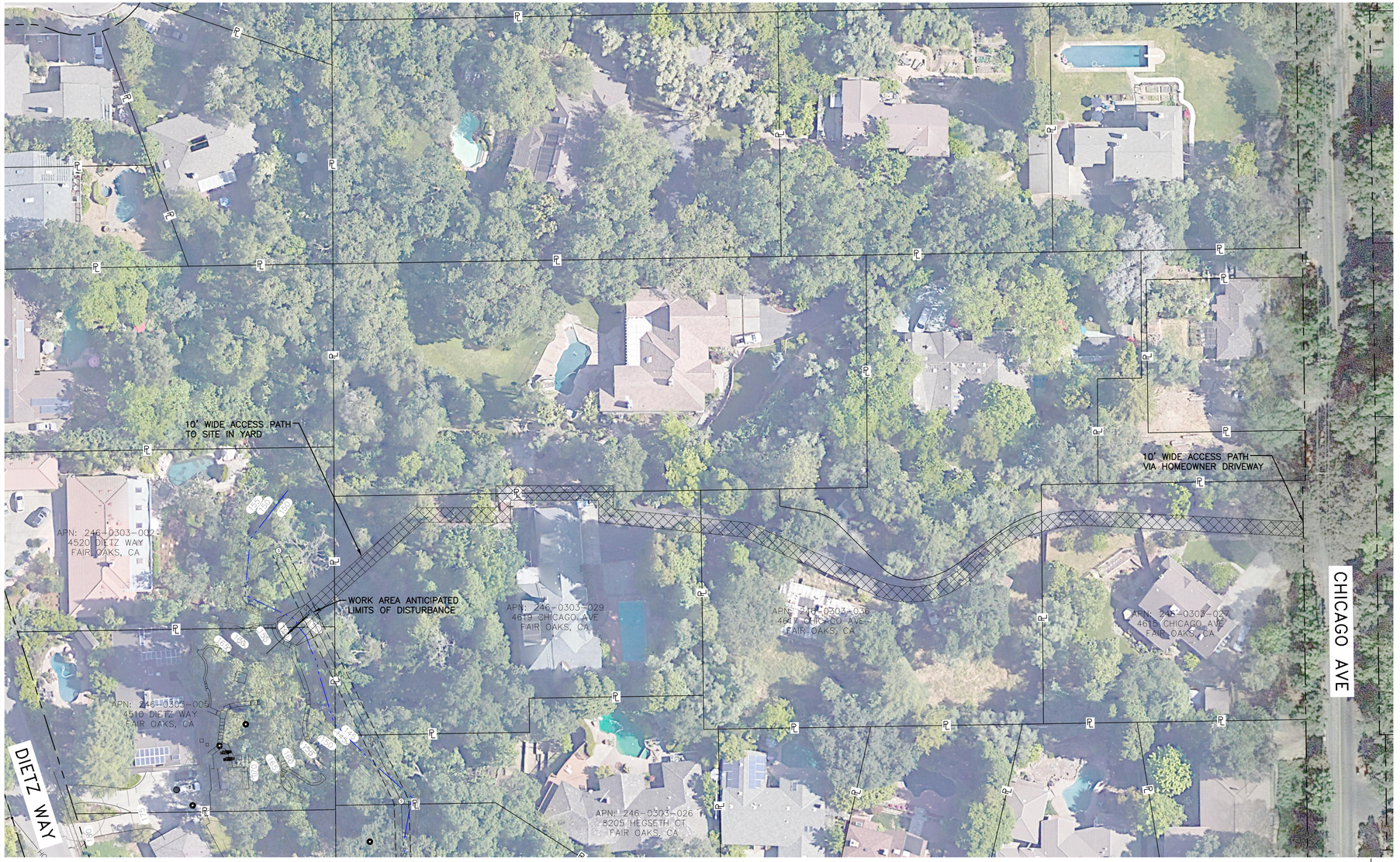
WSC
2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827
APPROVED:
_____ – _____– POSITION DATE

SASD CREEK CROSSING PROJECT
CROSSING 11 - HEGSETH COURT
SITE PLAN

DRAWING
C-111
SHEET 27 OF --
PROJECT #
–

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: January 27, 2022 - 4:29 PM CADD User: Chris Durbin



NOTES:

1. SITE ACCESS PATH SHOWN REQUIRES FIELD VERIFICATION

LEGEND

- ACCESS PATH TO SITE
- WORK AREA GROUND DISTURBANCE LIMITS
- STAGING AREA

N

0 20 40

SCALE: 1"=40'

811 Know what's **below.** **Call** before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED	MJG
DRAWN	PMD
CHECKED	RGN
SCALE	AS NOTED

PREPARED BY:

ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT G. NAYOLI NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

WSC
2330 EASST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
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SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:

_____ – _____– POSITION DATE

SASD CREEK CROSSING PROJECT

CROSSING 12 - DIETZ WAY

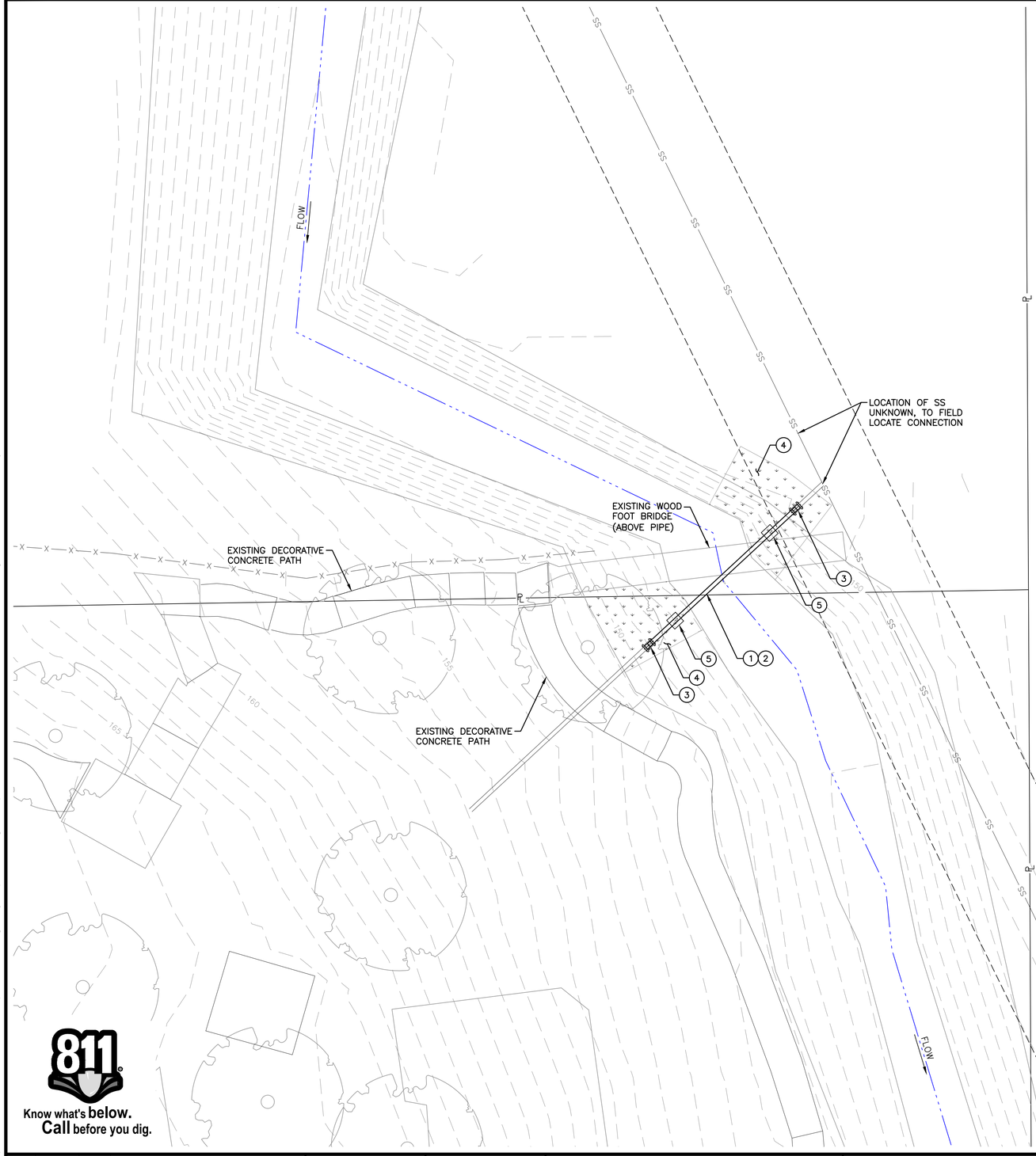
SITE ACCESS PLAN

DRAWING
C-120
SHEET 28 OF --
PROJECT #
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SHEET KEY NOTES

1. REMOVE EXISTING PIPE
2. INSTALL 4" EPOXY COATED WSP
3. INSTALL 4" TRANSITION COUPLING WSP TO VCP
4. INSTALL ANCHORED VEGETATED TURF REINFORCEMENT MAT ON BOTH BANKS. MATCH EXISTING SLOPES
5. INSTALL CONCRETE SUPPORTS





Know what's below. Call before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED	MJG
DRAWN	PMD
CHECKED	RGN
SCALE	AS NOTED

PREPARED BY:

ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT C. NAYOLI NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

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SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:

_____ – _____– POSITION DATE

SASD CREEK CROSSING PROJECT

CROSSING 12 - DIETZ WAY

SITE PLAN

DRAWING
C-121
SHEET 29 OF --
PROJECT #
–

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: January 27, 2022 – 4:30 PM CADD User: Chris Durbin

B

Summary Tables

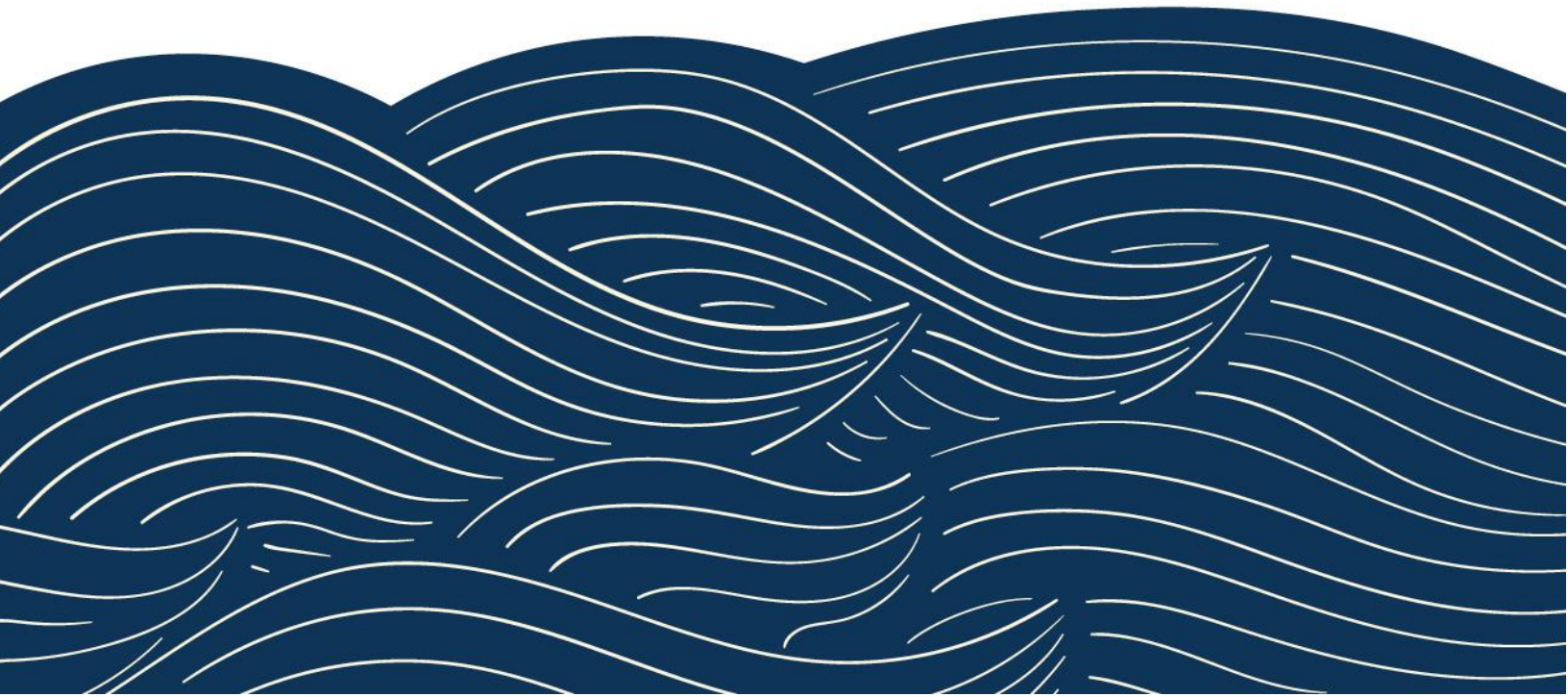


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Table 1. ADWF and PWWF Sewer Flows

SITE	ADWF (MGD)	ADWF d/D Ratio (Unitless)	PWWF (MGD)	PWWF d/D Ratio (Unitless)
Hope Lane	0.00352	<0.10	0.0773	0.15
Winding Way	0.0392	0.20	0.342	0.60
Arcade Creek	9.0	0.41	22.57	0.71
Garfield Thousand Oaks	0.68	0.25	2.52	0.51
Concho Court	0.013	0.11	0.0613	0.31
Gina Court	0.00573	<0.10	0.0263	0.21
San Lorenzo Way	0.007	<0.10	0.007	<0.10
Sutter Avenue	0.0057	<0.10	0.063	0.34
Campfire Way	2.291	0.29	10.87	0.70
Indian River Drive	0.053	0.18	0.22	0.39
Hegseth Court	0.00174	<0.10	0.016	<0.10
Dietz Way	0.00031	0.12	0.0021	0.30

Table 2. Waterway Flow Rates

CROSSING SITE	NAME	10 YR FLOOD (CFS)	50 YR FLOOD (CFS)	100 YR FLOOD (CFS)
Hope Lane	StreamStats Peak Flow	49.8	68	73.2
	FEMA FIS-Based Peak Flow	46	147	242
Winding Way	StreamStats Peak Flow	3,910	5,190	5,590
	FEMA FIS-Based Peak Flow	2,546	3,978	4,620
Arcade Creek	StreamStats Peak Flow	351	477	516
	FEMA FIS-Based Peak Flow	274	585	795

CROSSING SITE	NAME	10 YR FLOOD (CFS)	50 YR FLOOD (CFS)	100 YR FLOOD (CFS)
Garfield Thousand Oaks	StreamStats Peak Flow	351	477	516
	FEMA FIS-Based Peak Flow	274	585	795
Concho Court	StreamStats Peak Flow	332	453	490
	FEMA FIS-Based Peak Flow	263	566	773
Gina Court	StreamStats Peak Flow	332	453	490
	FEMA FIS-Based Peak Flow	263	566	773
San Lorenzo Way	StreamStats Peak Flow	506	688	743
	FEMA FIS-Based Peak Flow	393	774	1,012
Sutter Avenue	StreamStats Peak Flow	23.6	34.1	37.5
	FEMA FIS-Based Peak Flow	27	96	168
Campfire Way	StreamStats Peak Flow	1,210	1,660	1,800
	FEMA FIS-Based Peak Flow	847	1,403	1,687
Indian River Drive	StreamStats Peak Flow	2,530	3,420	3,710
	FEMA FIS-Based Peak Flow	1,983	3,452	4,140
Hegseth Court	StreamStats Peak Flow	76	113	126
	FEMA FIS-Based Peak Flow	80	225	349
Dietz Way	StreamStats Peak Flow	75.9	113	126
	FEMA FIS-Based Peak Flow	80	225	349

Table 3. Water Depth, Velocity, and Elevations[1]

CROSSING SITE	DESIGN EVENT	CREEK WATER VELOCITY (FT/S)	WATER SURFACE ELEVATION (FT)	CROSSING ELEVATION (FT)	NOTES ON CROSSING ELEVATION (FT)
Winding Way	Half Bank Full	1.96	65.0	64.5	Elevation is top of existing 8" pipe
	Bank Full	4.27	70.7		
Arcade Creek	Depth of 0.5-ft Over Pipe	5.15	80.0	79.4	Top of Pipe
	Half Bank Full	2.88	81.0		

[1] Crossings excluded from the table above are not impacted by creek water depths or velocities. Hope Lane will only requires flow velocity information for rip-rap sizing and this sizing will be based on Geomorphological model results for Gina Court and experience with other similar small crossings.

CROSSING SITE	DESIGN EVENT	CREEK WATER VELOCITY (FT/S)	WATER SURFACE ELEVATION (FT)	CROSSING ELEVATION (FT)	NOTES ON CROSSING ELEVATION (FT)
	Bank Full	2.81	83.2		
Concho Court	Half Bank Full	2.68[2]	88.8[3]	86.2	Top of Encasement
	Bank Full	3.61[2]	91.2[3]		
Gina Court	Half Bank Full	2.68	84.6	82.7	Top of Encasement
	Bank Full	3.61	87.0		
Campfire Way	Depth of 1ft Over Encasement	6.20	108.0	107.0	Approximate top of existing encasement, varies
	Half Bank Full	5.07	109.5		
	Bank Full	5.50	112.0		
Indian River Drive	Half Bank Full	3.16	99.0	97.9	Top of existing pipe
	Bank Full	4.95	103.0		
Hegseth Court	2-year Storm	3.08	141.5	140.0	Approximate top of existing pipe
	10-year Storm	4.70	142.8		
	100-year Storm	5.47	143.5		
Dietz Way	2-year Storm	3.82	146.4	146.4 – 148.0	Top of existing pipe, lowers moving west to east
	10-year Storm	5.87	147.3		
	100-year Storm	6.42	147.8		

Table 4. Deviations from SASD Standards

CROSSING SITE	STANDARD	DEVIATION FROM STANDARD	BUSINESS CASE EVALUATIONS TO JUSTIFY DEVIATION
Hope Lane	202.1.1	Pipe diameter below minimum of 8”	Because only the pipe at the crossing is being replaced, the existing diameter needs to be matched. Matching the diameter prevents flow and gas issue problems that would be caused if the top or bottom of the pipe does not line up.
	202.12.1	Minimum cover of 3’ not met	Lowering pipeline was not viable at this site due to extent of rehabilitation required. See alternatives analysis report for details.
	202.12.3	Carrier pipe casing not included	A carrier pipe was not included in design because it would exacerbate the profile of the encasement in the creek. The DIP pipe is encased in concrete.

[2] Concho Court water velocities were assumed to be approximately the same as Gina Court flows since the crossing is just upstream of the Gina Court crossing in the same channel.

[3] Water surface elevation at Concho Court assumes the same water depth cover over the crossing elevation as the Gina Court crossing site.

CROSSING SITE	STANDARD	DEVIATION FROM STANDARD	BUSINESS CASE EVALUATIONS TO JUSTIFY DEVIATION
	202.12.3	Encasement Cover	Providing 12" of encasement above the existing pipe would block the creek and increase ponding upstream of the crossing. Encasement depth above the pipe is reduced to 6" with a rounded top of encasement to minimize upstream ponding while still protecting the DIP pipe.
Winding Way	202.13.2	Casing will not end 10' from manhole	The existing manhole on the north side of the Winding Way crossing is only approximately 11' from the bank, there is not sufficient room to install the pier, terminate the casing, and install transition couplings without moving the manhole. This manhole also cannot be relocated with extending the sewer system improvements to the two pipes entering this manhole that travel roughly parallel to the creek as well. The proposed casing extends beyond the new concrete pier on the North bank for support and ends to provide spacing for flexible couples on the carrier pipe prior to the manhole connection. This provides the required casing structural support from the pier while maximizing the flexibility of the pipe between the casing and manhole.
	202.12.4	Casing will not extend 10' into banks	Same justification as above
Arcade Creek	202.12.3	Carrier pipe casing not included	The existing pipe did not have a casing and the pipe is not being replaced. The CIPP liner inside the pipe will function as the carrier pipe with the existing RCP acting as a casing. Installation of a casing pipe would block the creek significantly and is not recommended.
	202.12.1	Minimum cover of 3' not met	The pipe is not being replaced at this site. Rip-rap will be installed to protect the pipe and creek bed from further erosion.
Garfield Thousand Oaks	None	None	None
Concho Court	202.1.1	Pipe diameter below minimum of 8"	The pipe is not being replaced at this site. Existing pipe is 6" diameter.
	202.12.3	Carrier pipe casing not included	The existing pipe did not have a casing and the pipe is not being replaced. Existing encasement will not be replaced.
	202.12.1	Minimum cover of 3' not met	The pipe and encasement are not being replaced at this site. The top of the concrete encasement is exposed.
Gina Court	202.1.1	Pipe diameter below minimum of 8"	The pipe is not being replaced at this site. Existing pipe is 6" diameter.
	202.12.3	Carrier pipe casing not included	The existing pipe did not have a casing and the pipe is not being replaced. Existing encasement will not be replaced.
	202.12.1	Minimum cover of 3' not met	The pipe and encasement are not being replaced at this site. The top of the concrete encasement is exposed.
San Lorenzo Way	202.12.3	Pipe casing not included	A pipe casing is not included to allow for the pipe and concrete encasement of the pipe to remain 3-ft below the bottom of the creek and out of the scour depth.
	202.1.1	Pipe diameter below minimum of 8"	The replacement pipe diameter will match existing to prevent trapping sewer gases or sewer flows.

CROSSING SITE	STANDARD	DEVIATION FROM STANDARD	BUSINESS CASE EVALUATIONS TO JUSTIFY DEVIATION
Sutter Avenue	202.1.1	Pipe diameter below minimum of 8”	The replacement pipe diameter will match existing to prevent trapping sewer gases or sewer flows.
Campfire Way	202.12.3	Carrier pipe casing not included	The existing pipe does not have a casing pipe and the pipe and existing concrete encasement are not being replaced.
	202.12.1	Minimum cover of 3’ not met	The pipe and encasement are not being replaced at this site. The existing casing is exposed.
Indian River Drive	None	None	None
Hegseth Court	202.12.4	Pipe does not extend 10’ from top of bank	Extending 10-ft beyond banks would require significant bank impacts and increase costs for the Hegseth crossing that has limited access. The existing creek is small and the banks will be well protected from erosion with turf reinforcement mats. The pipe will also be well supported with rip rap material across the creek and a restrained connection joint will be provided to further protect the transition.
Dietz Way	202.12.4	Pipe does not extend 10’ from top of bank	Extending 10-ft beyond banks would require significant bank impacts, vegetation removal and impacts to homeowner decking paths at this limited access site. Additionally, the existing creek is small, the banks will be well protected from erosion with turf reinforcement mats and concrete blocks will help support the creek across the pipe in lieu of the 10-ft extension from the top of banks.

Table 5. Tree Removal Summary

CROSSING SITE	TREE TAG	TREE DIAMETER (inches)	TREE DRIPLINE DIAMETER (feet)	TREE SPECIES
Winding Way	7651	8	--	Dead
Winding Way	7652	48	30	Oak
Garfield Thousand Oaks	7701157	7	12	Deciduous
Concho Court	3701113[4]	-	-	Tree Cluster
Concho Court	3701112[4]	1.3	-	-
Gina Court	7507	3-4 + 6	12	Deciduous
Gina Court	7508	12	15	Deciduous
San Lorenzo Way	7522	10	15	Deciduous

[4] This is a survey shot number. Tree not tagged in survey. Field verification required.

Table 6. Site Permitting Requirements

PERMIT	JURISDICTION	RESPONSIBLE PARTY	HOPE LANE	WINDING WAY	ARCADE CREEK	GARFIELD T. OAKS	CONCHO COURT	GINA COURT	SAN LORENZO	SUTTER AVENUE	CAMPFIRE WAY	INDIAN RIVER	HEGSETH COURT	DEITZ WAY
USACE 404: Clean Water Act Section 404E Nationwide Permit 3, Maintenance**	**United States Army Corp of Engineers**	**Owner**	X	X	X	X	X	X	X	X	X	X	X	X
RWQCB 401: Clean Water Act Section 401 Water Quality Certification**	**Central Valley Regional Water Quality Control Board**	**Owner**	X	X	X	X	X	X	X	X	X	X	X	X
CDFW 1602: Streambed Alteration Agreement**	**California Department of Fish and Wildlife**	**Owner**	X	X	X	X	X	X	X	X	X	X	X	X
General Stormwater Discharge Permit during Construction (Order 2012-0006-DWQ)**	**Central Valley Regional Water Quality Control Board**	**Contractor**	X	X	X	X	X	X	X	X	X	X	X	X
Erosion and Sediment Control Plan**	**Sacramento County**	**Contractor**	X	X	X	X	X	X	X	X	X	X	X	X
Sacramento Area Sewer District Access Permit**	**Sacramento Area Sewer District**	**Contractor**	X	X	X	X	X	X	X	X	X	X	X	X
General Permit for Dewatering (NPDES Permit No. CAG995001)***	Central Valley Regional Water Quality Control Board	Contractor	X	X		X			X	X		X	X	X
Encroachment	City of Citrus Heights*	Contractor									X	X		
Encroachment	Sacramento County	Contractor	X	X	X	X	X	X	X	X			X	X
Tree Removal Permit	City of Citrus Heights*	Owner									X			
Tree Removal Permit	Sacramento County	Owner		X		X		X	X					

**The Indian River Drive and Campfire Way crossings are in the City of Citrus Heights. All other crossings are in unincorporated Sacramento County.*

***Permits in bold are considered the standard permits for all sites as noted in the report text.*

****The need for a general permit for dewatering will be confirmed when the geotechnical report and groundwater depths are determined for design.*

Table 7. Easement Acquisition Summary

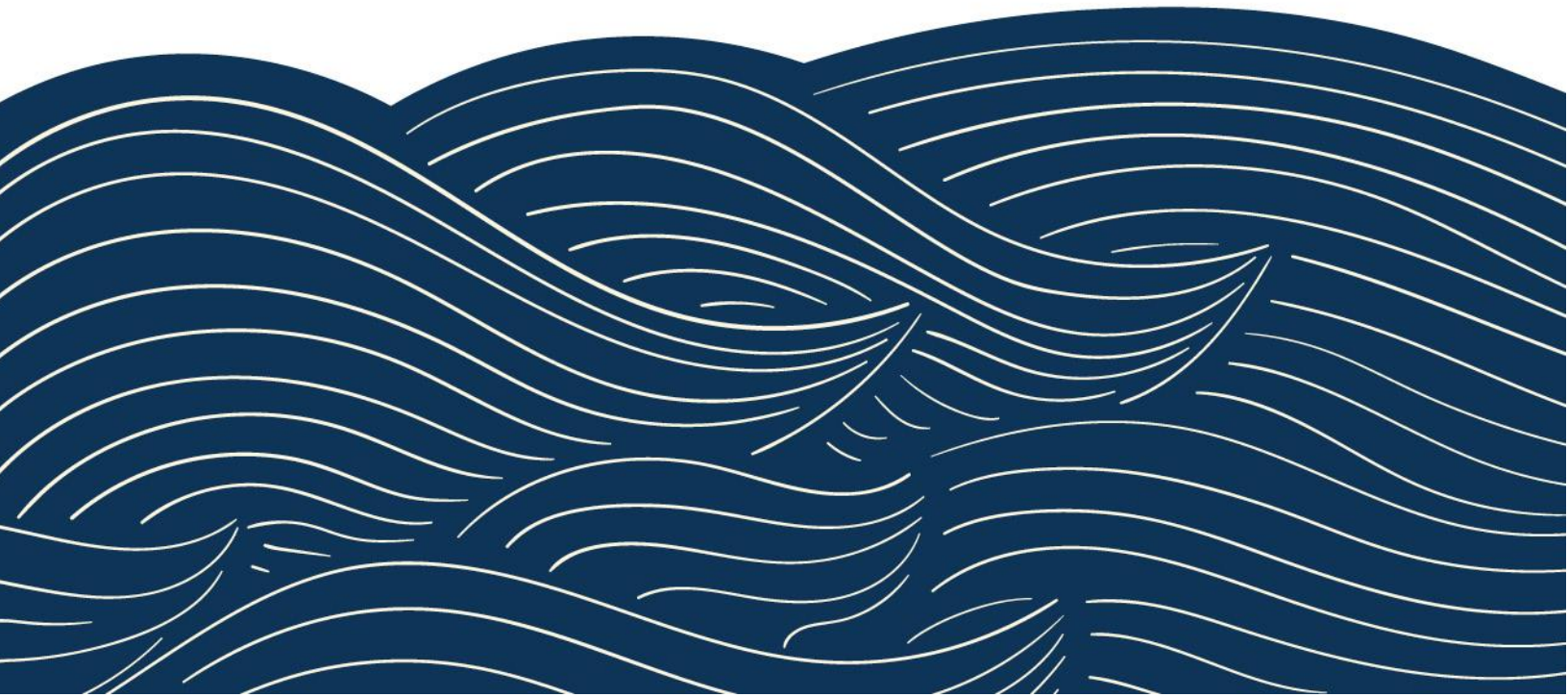
CROSSING SITE	APN	ADDRESS	OWNER	EXISTING EASEMENTS	ADDITIONAL EASEMENTS TYPE	ACCESS AREA (SF)	CONSTRUCTION AREA (SF)	STAGING AREA (SF)
Hope Lane (Asset 59646)	240-0320-086	4915 Hope Ln, Sacramento 95821	Cardona, Amilcar & Victoria	SASD Easement	Temporary Construction Easement	200	600	-
Winding Way (Asset 48368)	240-0222-035	4349 Sycamore Ave, Sacramento 95841	Tovar, Marisol	SASD & Drainage Easements	Temporary Construction Easement	3,600	2,400	0
	240-0222-020	4647 Winding Way, Sacramento 95841	McGinnis, James	SASD Easement	Temporary Construction Easement	0	1,700	0
	240-0222-022	4740 Pasadena Ave, Sacramento 95841	Steven D Oiseth Trust	SASD Easement	Temporary Construction Easement	12,600	700	800
	240-0222-051	4351 Sycamore Ave, Sacramento 95841	Vercruysse Trust	None	Temporary Construction Easement	500	800	0
	240-0222-023	4750 Pasadena Ave, Sacramento 95841	Sudia Revocable Living Trust	None	Temporary Construction Easement	11,700	0	0
Arcade Creek (Asset 49894)	230-0080-037	5613 Omni Dr, Sacramento 95841	Arcade Creek Recreation/Park District	N/A	Temporary Construction Easement	5,500	1,500	1,100
	230-0092-037	Garfield Av, Sacramento 95841	Arcade Creek Recreation/Park District	N/A	Temporary Construction Easement	0	0	0
	230-0730-008	4894 Thousand Oaks Ct, Carmichael 95608	Lilian A Olech Trust	None	Temporary Construction Easement	0	1,100	0
Garfield Thousand Oaks (Asset 41018)	230-0080-037	5613 Omni Dr, Sacramento 95841	Arcade Creek Recreation/Park District	SASD Easement	Temporary Construction Easement	11,700	11,800	1,400
	230-0092-014	Hemlock St, Sacramento 95841	Arcade Creek Recreation/Park District	None	Temporary Construction Easement	200	1,300	0
Concho Court (Asset 44327)	230-0541-011	5665 Rolling Oak Dr, Sacramento 95841	Bitcon, James & Sue	SASD Easement	Temporary Construction Easement	-	300	-
	230-0281-007	4821 Concho Ct, Carmichael 95608	Keith, Denis & Vera	Unknown	Temporary Construction Easement	-	500	-
	230-0281-006	4820 Concho Ct, Carmichael 95608	Marian D Washburn Trust	Unknown	Temporary Construction Easement	600	600	-
Gina Court	230-0541-003	5671 Rolling Oak Dr, Sacramento 95841	Oliver, Donald & Gwendolyn	SASD Easement	Temporary Construction Easement	-	300	-

CROSSING SITE	APN	ADDRESS	OWNER	EXISTING EASEMENTS	ADDITIONAL EASEMENTS TYPE	ACCESS AREA (SF)	CONSTRUCTION AREA (SF)	STAGING AREA (SF)
(Asset 50528)	230-0541-002	5667 Rolling Oak Dr, Sacramento 95841	Swanson Trust	SASD Easement	Temporary Construction Easement	1,800	600	150
	230-0730-014	5508 Oak River Ct, Carmichael 95608	Alfred E/Lydia Simonette Revocable Trust	SASD Easement	Temporary Construction Easement	-	1,200	-
San Lorenzo Way (Asset 170877)	273-0350-009	Orange Hill Ln, Carmichael 95608	Deterding Ranch Estate HOA	Unknown	Temporary Construction Easement	-	200	-
	273-0270-036	Carmichael 95608	County of Sacramento - Regional Parks	Unknown	Temporary Construction Easement	-	1,500	150
Sutter Avenue (Asset 78865)	260-0301-001	3751 Dell Rd., Carmichael 95608	Grant, Cameron Joseph	None	Temporary Construction Easement	200	1,600	-
	260-0250-014	7156 Sutter Ave., Carmichael 95608	George M Howard 1994 Family Trust	None	Temporary Construction Easement	6,900	-	200
	260-0250-013	7146 Sutter Ave., Carmichael 95608	Christian, James Martin Christian, Mary Winona	None	Temporary Construction Easement	4,700	-	-
	260-0250-081	7148 Sutter Ave., Carmichael 95608	Ing Family Trust	None	Temporary Construction Easement	1,500	-	-
	260-0250-082	7152 Sutter Ave., Carmichael 95608	Tommy J/Susan E Poirier Revocable Trust	None	Temporary Construction Easement	1,800	-	-
Campfire Way (Asset 36529)	211-0010-035	Oak Lakes Ln, Citrus Heights 95621	Rawdanowicz, R	SASD Easement	Temporary Construction Easement	2,700	3,500	-
Indian River Drive (Asset 78531)	211-0720-055	6430 Indian River Dr, Citrus Heights 95621	Sunrise Recreation/Park District	Unknown	Temporary Construction Easement	1,800	1,900	1,600
Hegseth Court (Asset 68559)	246-0303-019	8201 Hegseth Ct, Fair Oaks 95628	Buckley, Holly & Thomas	SASD Easement	Temporary Construction Easement	200	1,000	-
	246-0303-008	8218 Pollard Ave, Fair Oaks 95628	Wampold Family Revocable Living Trust	SASD & DWR Easements	Temporary Construction Easement	500	-	-
	246-0303-020	8200 Hegseth Court, Fair Oaks 95628	To Be Determined	None	Temporary Construction Easement	700	-	-

CROSSING SITE	APN	ADDRESS	OWNER	EXISTING EASEMENTS	ADDITIONAL EASEMENTS TYPE	ACCESS AREA (SF)	CONSTRUCTION AREA (SF)	STAGING AREA (SF)
Dietz Way (Asset 239693)	246-0303-005	4510 Dietz Way, Fair Oaks 95628	Bokisch, Nikolas & Campillo, Christina	SASD Easement	Temporary Construction Easement	-	200	-
	246-0303-002	4520 Dietz Way, Fair Oaks 95628	Oconnell Family Trust	Drainage Easement	Temporary Construction Easement	200	300	-
	246-0303-029	4619 Chicago Ave., Fair Oaks 95628	Deeble-Wong Family Trust	SASD Easement	Temporary Construction Easement	3,400	-	-
	246-0303-036	4617 Chicago Ave., Fair Oaks 95628	To Be Determined	None	Temporary Construction Easement	2,800	-	-
	246-0303-027	4615 Chicago Ave., Fair Oaks 95628	To Be Determined	None	Temporary Construction Easement	2,000	-	-

C

Cost Estimate



Cost Analysis Summary

The detailed capital cost estimates provided in Appendix C are the basis for costs presented in the Preliminary Design Report.

This capital cost estimates performed as part of this Preliminary Design Report are AACE International Class III Estimates for feasibility and project screening. As such, the expected accuracy range could span -20% to +30% (assuming a full bid accuracy is -2% to +5%). The costs and assumptions used during this exercise were developed from the information available at the time the opinion was prepared since the upgrades have not yet been fully designed. There are numerous design related criteria, decisions, and assumptions that will need to be vetted and evaluated, including input from SASD and their operations staff, as well as additional surveys, modeling, permit conditions, and unforeseen circumstances that could impact the cost of the project as the design progresses.

Capital costs included construction and contractor overhead, contingency for unknown conditions, and an escalation to the mid-point of construction. Construction costs were developed using cost indexes, quotes from suppliers, recent bids for similar projects, recent engineering estimates, and known industry planning-level unit costs. Quantities were estimated using 30% Drawings. Escalation to mid-point of construction was developed by averaging the last 10 years of ENR's Historical Construction Cost Index and applying that to a time of 30 months (January 2022 to December 2023). A summary of construction, soft cost and escalation assumptions is provided in the table below.

DESCRIPTION	VALUE	UNITS	APPLIED TO
Contingency for unknown conditions	30	%	Sum of Contractor Overhead and Construction Costs
Escalation to Mid-Point of Construction (December 2023)	9.9	%	Sum of Contractor Overhead and Construction Costs

The final costs of the project will depend on actual labor and material costs and competitive market conditions at the time of bidding, actual site conditions, final design scope, implementation schedule, continuity of personnel and engineering, and other variable factors.

Preliminary Design Opinion of Probable Cost Computation

Project:	Creek Crossing Project		
Site:	Hope Lane	***By:***	***MG***
Task:	AACE Class 3 Cost Estimate	***Reviewed by:***	***RN***
		Date:	***1/26/2022***

DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
CONTRACTOR OVERHEAD COSTS				
Mobilization/Demobilization	1	LS	7.00%	$5,200
Bonds and Insurance	1	LS	2.00%	$1,400
General Conditions	1	LS	3.00%	$2,200
Shop Drawings and O&M Manuals	1	LS	2.50%	$1,800
Contractor Overhead subtotal				**$11,000**
CONSTRUCTION COSTS				
Environmental protection, permit compliance, and BMPs	1	LS	$10,000	$10,000
Residential landscaping/driveway/walkway repair allowance	1	LS	$8,000	$8,000
Tree limbing	2	EA	$1,500	$3,000
Coffer dam, creek flow diversion	1	LS	$6,600	$6,600
Pumper truck (low flows)	2	DAY	$2,000	$4,000
Sheeting and shoring protection	1	LS	$5,000	$5,000
Machine excavation	14	BCY	$195	$2,712
Machine remove & haul excavated material	18	LCY	$50	$900
Backfill	3	CY	$295	$821
Backing No. 2	11	CY	$170	$1,891
Bedding layer	3	CY	$170	$473
Geofabric/geotextile	159	SQFT	$3	$478
Turf reinforcement mat	161	SQFT	$22	$3,549
6" Ductile Iron, Buried Gravity or Forcemain	46	LF	$150	$6,825
Concrete encasement	8	CY	$1,300	$10,137
Seed slopes/banks/disturbed areas	165	SY	$5	$825
Flexible/transition couplings	2	EA	$1,000	$2,000
Construction Costs Subtotal				**$68,000**
Constractor Overhead Costs Subtotal				$11,000
Construction Subtotal				**$79,000**
Contingency for unknown conditions	30%	PERCENT		$24,000
Escalation	9.9%	PERCENT		$8,000
Total Project Cost				**$111,000**

Preliminary Design Opinion of Probable Cost Computation

Project:	Creek Crossing Project		
Site:	Winding Way	***By:***	***MG***
Task:	AACE Class 3 Cost Estimate	***Reviewed by:***	***RN***
		Date:	***1/26/2022***

DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
CONTRACTOR OVERHEAD COSTS				
Mobilization/Demobilization	1	LS	7.00%	$27,300
Bonds and Insurance	1	LS	2.00%	$7,400
General Conditions	1	LS	3.00%	$11,200
Shop Drawings and O&M Manuals	1	LS	2.50%	$9,300
Contractor Overhead subtotal				**$56,000**
CONSTRUCTION COSTS				
Environmental protection, permit compliance, and BMPs	1	LS	$15,000	$15,000
Residential landscaping/driveway/walkway repair allowance	1	LS	$8,000	$8,000
Clear and grub new access from north for larger equipment	1	LS	$15,000	$15,000
Coffer dam, creek flow diversion	1	LS	$6,600	$6,600
Demolish existing sacked concrete	1	LS	$2,500	$2,500
Remove existing debris accumulated on pipe	1	LS	$2,500	$2,500
Tree removal	2	EA	$3,500	$7,000
Tree removal permit costs	8	IN-DIA	$0	$0
Tree removal permit costs	48	IN-DIA	$1,000	$48,000
Sheeting and shoring protection	1	LS	$5,000	$5,000
Flexible/transition couplings	2	EA	$1,000	$2,000
Bypass system set-up (low flows)	1	LS	$19,000	$19,000
Bypass system operation (low flows)	2	WEEK	$5,250	$10,500
Machine excavation	84	BCY	$195	$16,354
Machine remove & haul excavated material	11	LCY	$50	$541
Backfill	84	CY	$295	$24,740
Turf reinforcement mat	943	SQFT	$22	$20,744
8" Ductile Iron, Buried Gravity or Forcemain	53	LF	$200	$10,550
20" Steel Casing	45	LF	$600	$26,700
Drilled piers	2	EA	$50,000	$100,000
Pipe straps at piers	1	LS	$1,500	$1,500
Pipe to manhole connection and repair	1	LS	$1,000	$1,000
Seed slopes/banks/disturbed areas	3,615	SY	$5	$18,073
Construction Costs Subtotal				**$362,000**
Constractor Overhead Costs Subtotal				$56,000
Construction Subtotal				**$418,000**
Contingency for unknown conditions	30%	PERCENT		$126,000
Escalation	9.9%	PERCENT		$42,000
Total Project Cost				**$586,000**

Preliminary Design Opinion of Probable Cost Computation

Project:	Creek Crossing Project		
Site:	Arcade Creek	***By:***	***MG***
Task:	AACE Class 3 Cost Estimate	***Reviewed by:***	***RN***
		Date:	***1/26/2022***

DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
CONTRACTOR OVERHEAD COSTS				
Mobilization/Demobilization	1	LS	7.50%	$8,600
Bonds and Insurance	1	LS	2.00%	$2,200
General Conditions	1	LS	4.00%	$4,500
Shop Drawings and O&M Manuals	1	LS	1.50%	$1,700
Contractor Overhead subtotal				**$17,000**
CONSTRUCTION COSTS				
Environmental protection, permit compliance, and BMPs	1	LS	$20,000	$20,000
Site and property protection	1	LS	$2,000	$2,000
Pedestrian control, bridge access, signs, etc.	1	LS	$1,500	$1,500
Coffer dam, creek flow diversion	1	LS	$6,600	$6,600
Temporary fencing rental	1	LS	$3,000	$3,000
Machine excavation	99	BCY	$195	$19,374
Machine remove & haul excavated material	125	LCY	$50	$6,250
Backfill	13	CY	$295	$3,934
Rip rap (1/4 ton)	67	CY	$220	$14,669
Bedding layer	13	CY	$170	$2,267
Geofabric/geotextile	720	SQFT	$3	$2,160
Turf reinforcement mat	1,045	SQFT	$22	$22,979
Seed slopes/banks/disturbed areas	116	SY	$5	$580
Construction Costs Subtotal (no bypassing or CIPP)				**$106,000**
Constractor Overhead Costs Subtotal				$17,000
Construction Subtotal				**$123,000**
Contingency for unknown conditions	30%	PERCENT		$37,000
Escalation	9.9%	PERCENT		$13,000
Total Project Cost				**$173,000**

Preliminary Design Opinion of Probable Cost Computation

Project:	Creek Crossing Project		
Site:	Garfield Thousand Oaks	***By:***	***MG***
Task:	AACE Class 3 Cost Estimate	***Reviewed by:***	***RN***
		Date:	***1/26/2022***

DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
CONTRACTOR OVERHEAD COSTS				
Mobilization/Demobilization	1	LS	7.50%	$38,000
Bonds and Insurance	1	LS	2.00%	$9,600
General Conditions	1	LS	4.00%	$19,500
Shop Drawings and O&M Manuals	1	LS	1.50%	$7,200
Contractor Overhead subtotal				**$75,000**
CONSTRUCTION COSTS				
Environmental protection, permit compliance, and BMPs	1	LS	$20,000	$20,000
Removal/restoration of dog park fencing	1	LS	$4,000	$4,000
Pedestrian control, bridge access, signs, etc.	1	LS	$1,500	$1,500
Coffer dam, creek flow diversion	1	LS	$6,600	$6,600
Demolish existing 24" VCP	1	LS	$4,000	$4,000
Sheeting and shoring protection	1	LS	$50,000	$50,000
Bypass system set-up (low flows)	1	LS	$19,000	$19,000
Bypass system operation (low flows)	1	WEEK	$5,250	$5,250
Temporary fencing rental	2	LS	$3,000	$6,000
Machine remove & haul excavated material	1,076	LCY	$50	$53,800
24" VCP, Buried Gravity	581	LF	$400	$232,400
Install 10-ft deep manhole	1	EA	$15,000	$15,000
Install 20-ft deep manhole	1	EA	$25,000	$25,000
Existing bank restoration, grubbing and surface preparation	1	LS	$3,500	$3,500
Turf reinforcement mat	406	SQFT	$22	$8,930
Tree removal	3	EA	$500	$1,500
Seed slopes/banks/disturbed areas	2,231	SY	$5	$11,156
Construction Costs Subtotal				**$468,000**
Constractor Overhead Costs Subtotal				$75,000
Construction Subtotal				**$543,000**
Contingency for unknown conditions	30%	PERCENT		$163,000
Escalation	9.9%	PERCENT		$54,000
Total Project Cost				**$760,000**

Preliminary Design Opinion of Probable Cost Computation

Project:	Creek Crossing Project		
Site:	Concho Court	***By:***	***MG***
Task:	AACE Class 3 Cost Estimate	***Reviewed by:***	***RN***
		Date:	***1/26/2022***

DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
CONTRACTOR OVERHEAD COSTS				
Mobilization/Demobilization	1	LS	7.00%	$3,700
Bonds and Insurance	1	LS	2.00%	$1,000
General Conditions	1	LS	3.00%	$1,600
Shop Drawings and O&M Manuals	1	LS	2.50%	$1,300
Contractor Overhead subtotal				**$8,000**
CONSTRUCTION COSTS				
Environmental protection, permit compliance, and BMPs	1	LS	$5,000	$5,000
Residential landscaping/driveway/walkway repair allowance	1	LS	$8,000	$8,000
Site preparation	1	LS	$2,500	$2,500
Adder for hand installation	1	LS	$5,000	$5,000
Coffer dam, creek flow diversion	1	LS	$6,600	$6,600
Minor dewatering	1	LS	$2,000	$2,000
Hand excavation	5	BCY	$400	$1,815
Hand remove & haul excavated material	6	LCY	$250	$1,500
Backfill	5	CY	$295	$1,338
Turf reinforcement mat	651	SQFT	$22	$14,318
Seed slopes/banks/disturbed areas	172	SY	$5	$861
Construction Costs Subtotal				**$49,000**
Constractor Overhead Costs Subtotal				$8,000
Construction Subtotal				**$57,000**
Contingency for unknown conditions	30%	PERCENT		$18,000
Escalation	9.9%	PERCENT		$6,000
Total Project Cost				**$81,000**

Preliminary Design Opinion of Probable Cost Computation

Project:	Creek Crossing Project		
Site:	Gina Court	***By:***	***MG***
Task:	AACE Class 3 Cost Estimate	***Reviewed by:***	***RN***
		Date:	***1/26/2022***

DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
CONTRACTOR OVERHEAD COSTS				
Mobilization/Demobilization	1	LS	7.00%	$4,900
Bonds and Insurance	1	LS	2.00%	$1,400
General Conditions	1	LS	3.00%	$2,000
Shop Drawings and O&M Manuals	1	LS	2.50%	$1,700
Contractor Overhead subtotal				**$10,000**
CONSTRUCTION COSTS				
Environmental protection, permit compliance, and BMPs	1	LS	$5,000	$5,000
Residential landscaping/driveway/walkway repair allowance	1	LS	$8,000	$8,000
Site preparation	1	LS	$2,500	$2,500
Adder for hand installation	1	LS	$5,000	$5,000
Coffer dam, creek flow diversion	1	LS	$6,600	$6,600
Minor Dewatering	1	LS	$2,000	$2,000
Hand excavation	19	BCY	$400	$7,437
Hand remove & haul excavated material	24	LCY	$250	$6,000
Backfill	5	CY	$295	$1,371
Backing No. 2	14	CY	$170	$2,371
Bedding layer	5	CY	$170	$790
Geofabric/geotextile	390	SQFT	$3	$1,170
Turf reinforcement mat	640	SQFT	$22	$14,073
Seed slopes/banks/disturbed areas	227	SY	$5	$1,134
Construction Costs Subtotal				**$64,000**
Constractor Overhead Costs Subtotal				$10,000
				$74,000
Contingency for unknown conditions	30%	PERCENT		$23,000
Escalation	9.9%	PERCENT		$8,000
Total Project Cost				**$105,000**

Preliminary Design Opinion of Probable Cost Computation

Project:	Creek Crossing Project		
Site:	San Lorenzo Way	***By:***	***MG***
Task:	AACE Class 3 Cost Estimate	***Reviewed by:***	***RN***
		Date:	***1/26/2022***

DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
CONTRACTOR OVERHEAD COSTS				
Mobilization/Demobilization	1	LS	7.00%	$11,000
Bonds and Insurance	1	LS	2.00%	$3,000
General Conditions	1	LS	3.00%	$4,600
Shop Drawings and O&M Manuals	1	LS	2.50%	$3,800
Contractor Overhead subtotal				**$23,000**
CONSTRUCTION COSTS				
Environmental protection, permit compliance, and BMPs	1	LS	$15,000	$15,000
Site and property protection	1	LS	$6,000	$6,000
Demolish existing 6" cast iron	1	LS	$2,000	$2,000
Sheeting and shoring protection	1	LS	$10,000	$10,000
Restore banks and creekbed	1	LS	$7,500	$7,500
Coffer dam, creek flow diversion	1	LS	$6,600	$6,600
Light traffic control	3	DAY	$1,500	$4,500
Temporary fencing rental	1	LS	$3,000	$3,000
Bypass system set-up (low flows)	1	LS	$19,000	$19,000
Bypass system operation (low flows)	3	WEEK	$5,250	$15,750
Machine excavation	112	BCY	$195	$21,765
Machine remove & haul excavated material	6	LCY	$50	$300
6" Ductile Iron, Buried Gravity or Forcemain	42	LF	$150	$6,300
Install 10-ft deep manhole	1	EA	$15,000	$15,000
Turf reinforcement mat	179	SQFT	$22	$3,940
Tree removal	1	EA	$3,500	$3,500
Seed slopes/banks/disturbed areas	30	SY	$5	$150
Manhole Connections	2	EA	$2,500	$5,000
Construction Costs Subtotal				**$146,000**
Constractor Overhead Costs Subtotal				$23,000
Construction Subtotal				**$169,000**
Contingency for unknown conditions	30%	PERCENT		$51,000
Escalation	9.9%	PERCENT		$17,000
Total Project Cost				**$237,000**

Preliminary Design Opinion of Probable Cost Computation

Project:	Creek Crossing Project		
Site:	Sutter Avenue	***By:***	***MG***
Task:	AACE Class 3 Cost Estimate	***Reviewed by:***	***RN***
		Date:	***1/26/2022***

DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
CONTRACTOR OVERHEAD COSTS				
Mobilization/Demobilization	1	LS	7.00%	$10,400
Bonds and Insurance	1	LS	2.00%	$2,800
General Conditions	1	LS	3.00%	$4,300
Shop Drawings and O&M Manuals	1	LS	2.50%	$3,600
Contractor Overhead subtotal				**$22,000**
CONSTRUCTION COSTS				
Environmental protection, permit compliance, and BMPs	1	LS	$15,000	$15,000
Residential landscaping/driveway/walkway repair allowance	1	LS	$8,000	$8,000
Demolish existing 6" aluminum pipe and piers	1	LS	$5,000	$5,000
Concrete supports with cutback foundations	4	CY	$3,500	$14,000
Adder for hand installation	1	LS	$5,000	$5,000
Coffer dam, creek flow diversion	1	LS	$6,600	$6,600
Bypass system set-up (low flows)	1	LS	$19,000	$19,000
Bypass system operation (low flows)	1	WEEK	$5,250	$5,250
Hand excavation	25	BCY	$400	$10,000
Hand remove & haul excavated material	32	LCY	$250	$8,000
Backfill	10	CY	$295	$2,950
6" Ductile Iron, Buried Gravity or Forcemain	50	LF	$150	$7,500
14" Steel Casing	40	LF	$420	$16,800
Backing No. 2	15	CY	$170	$2,550
Bedding layer	10	CY	$170	$1,700
Geofabric/geotextile	200	SQFT	$3	$600
Seed slopes/banks/disturbed areas	933	SY	$5	$4,664
Pipe Connections and Straps	2	EA	$2,000	$4,000
Construction Costs Subtotal				**$137,000**
Constractor Overhead Costs Subtotal				$22,000
Construction Subtotal				**$159,000**
Contingency for unknown conditions	30%	PERCENT		$48,000
Escalation	9.9%	PERCENT		$16,000
Total Project Cost				**$223,000**

Preliminary Design Opinion of Probable Cost Computation

Project:	Creek Crossing Project		
Site:	Campfire Way	***By:***	***MG***
Task:	AACE Class 3 Cost Estimate	***Reviewed by:***	***RN***
		Date:	***1/26/2022***

DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
CONTRACTOR OVERHEAD COSTS				
Mobilization/Demobilization	1	LS	7.00%	$15,600
Bonds and Insurance	1	LS	2.00%	$4,300
General Conditions	1	LS	3.00%	$6,400
Shop Drawings and O&M Manuals	1	LS	2.50%	$5,300
Contractor Overhead subtotal				**$32,000**
CONSTRUCTION COSTS				
Environmental protection, permit compliance, and BMPs	1	LS	$20,000	$20,000
Site and property protection	1	LS	$6,000	$6,000
X-ray concrete scanning for rebar and pipe locations	1	LS	$3,500	$3,500
Remove temporary protective measures	1	LS	$1,500	$1,500
Demolish portion of existing concrete encasement	1	LS	$12,000	$12,000
Concrete repair and crack sealing	1	LS	$7,500	$7,500
Coffer dam, creek flow diversion	1	LS	$6,600	$6,600
Light traffic control	10	DAY	$1,500	$15,000
Temporary fencing rental	1	LS	$3,000	$3,000
Machine excavation	207	BCY	$195	$40,286
Machine remove & haul excavated material	259	LCY	$50	$12,950
Backfill	12	CY	$295	$3,473
Rip rap (1/2 ton)	195	CY	$230	$44,809
Bedding layer	12	CY	$170	$2,001
Geofabric/geotextile	636	SQFT	$3	$1,907
Turf reinforcement mat	973	SQFT	$22	$21,408
Seed slopes/banks/disturbed areas	722	SY	$5	$3,611
Construction Costs Subtotal (no bypassing or CIPP)				**$206,000**
Constractor Overhead Costs Subtotal				$32,000
Construction Subtotal				**$238,000**
Contingency for unknown conditions	30%	PERCENT		$72,000
Escalation	9.9%	PERCENT		$24,000
Total Project Cost				**$334,000**

Preliminary Design Opinion of Probable Cost Computation

Project:	Creek Crossing Project		
Site:	Indian River Drive	***By:***	***MG***
Task:	AACE Class 3 Cost Estimate	***Reviewed by:***	***RN***
		Date:	***1/26/2022***

DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
CONTRACTOR OVERHEAD COSTS				
Mobilization/Demobilization	1	LS	7.50%	$23,200
Bonds and Insurance	1	LS	2.00%	$5,900
General Conditions	1	LS	4.00%	$11,900
Shop Drawings and O&M Manuals	1	LS	1.50%	$4,400
Contractor Overhead subtotal				**$46,000**
CONSTRUCTION COSTS				
Environmental protection, permit compliance, and BMPs	1	LS	$20,000	$20,000
Site access, clearing and grubbing	1	LS	$8,000	$8,000
Demolish existing 10" CIP and piers	1	LS	$7,000	$7,000
Coffer dam, creek flow diversion	1	LS	$6,600	$6,600
Bypass system set-up (low flows)	1	LS	$19,000	$19,000
Bypass system operation (low flows)	3	WEEK	$5,250	$15,750
Machine excavation	71	BCY	$195	$13,805
Machine remove & haul excavated material	89	LCY	$50	$4,450
Backfill	49	CY	$295	$14,422
Drilled piers	2	EA	$50,000	$100,000
Replace existing straps at piers	1	LS	$1,500	$1,500
10" Ductile Iron, Aerial	68	LF	$250	$17,000
24" Steel Casing	58	LF	$720	$41,760
Turf reinforcement mat	592	SQFT	$22	$13,013
Seed slopes/banks/disturbed areas	536	SY	$5	$2,682
Construction Costs Subtotal				**$285,000**
Constractor Overhead Costs Subtotal				$46,000
Construction Subtotal				**$331,000**
Contingency for unknown conditions	30%	PERCENT		$100,000
Escalation	9.9%	PERCENT		$33,000
Total Project Cost				**$464,000**

Preliminary Design Opinion of Probable Cost Computation

Project:	Creek Crossing Project		
Site:	Hegseth Court	***By:***	***MG***
Task:	AACE Class 3 Cost Estimate	***Reviewed by:***	***RN***
		Date:	***1/26/2022***

DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
CONTRACTOR OVERHEAD COSTS				
Mobilization/Demobilization	1	LS	7.00%	$8,000
Bonds and Insurance	1	LS	2.00%	$2,200
General Conditions	1	LS	3.00%	$3,300
Shop Drawings and O&M Manuals	1	LS	2.50%	$2,800
Contractor Overhead subtotal				**$17,000**
CONSTRUCTION COSTS				
Environmental protection, permit compliance, and BMPs	1	LS	$10,000	$10,000
Residential landscaping/driveway/walkway repair allowance	1	LS	$8,000	$8,000
Coffer dam, creek flow diversion	1	LS	$6,600	$6,600
Demolish existing pipe	1	LS	$2,500	$2,500
Connect casing and pipe to manhole, install new seal, grout annular space	1	LS	$4,500	$4,500
Coat interior of manhole	1	LS	$3,500	$3,500
Adder for hand installation	1	LS	$5,000	$5,000
Bypass system set-up (low flows)	1	LS	$19,000	$19,000
Bypass system operation (low flows)	1	WEEK	$5,250	$5,250
Manhole tie-backs	2	EA	$10,000	$20,000
Hand excavation	12	BCY	$400	$4,915
Hand remove & haul excavated material	16	LCY	$250	$4,000
Backfill	2	CY	$295	$725
8" Welded Steel Pipe	17	LF	$240	$4,080
Flexible/transition couplings	1	EA	$1,000	$1,000
Backing No. 2	10	CY	$170	$1,671
Bedding layer	2	CY	$170	$418
Geofabric/geotextile	133	SQFT	$3	$398
Turf reinforcement mat	139	SQFT	$22	$3,065
Seed slopes/banks/disturbed areas	237	SY	$5	$1,187
Construction Costs Subtotal				**$106,000**
Constractor Overhead Costs Subtotal				$17,000
Construction Subtotal				**$123,000**
Contingency for unknown conditions	30%	PERCENT		$37,000
Engineering, Administration, and Legal Costs	0%	PERCENT		$0
Total Project Cost				**$173,000**

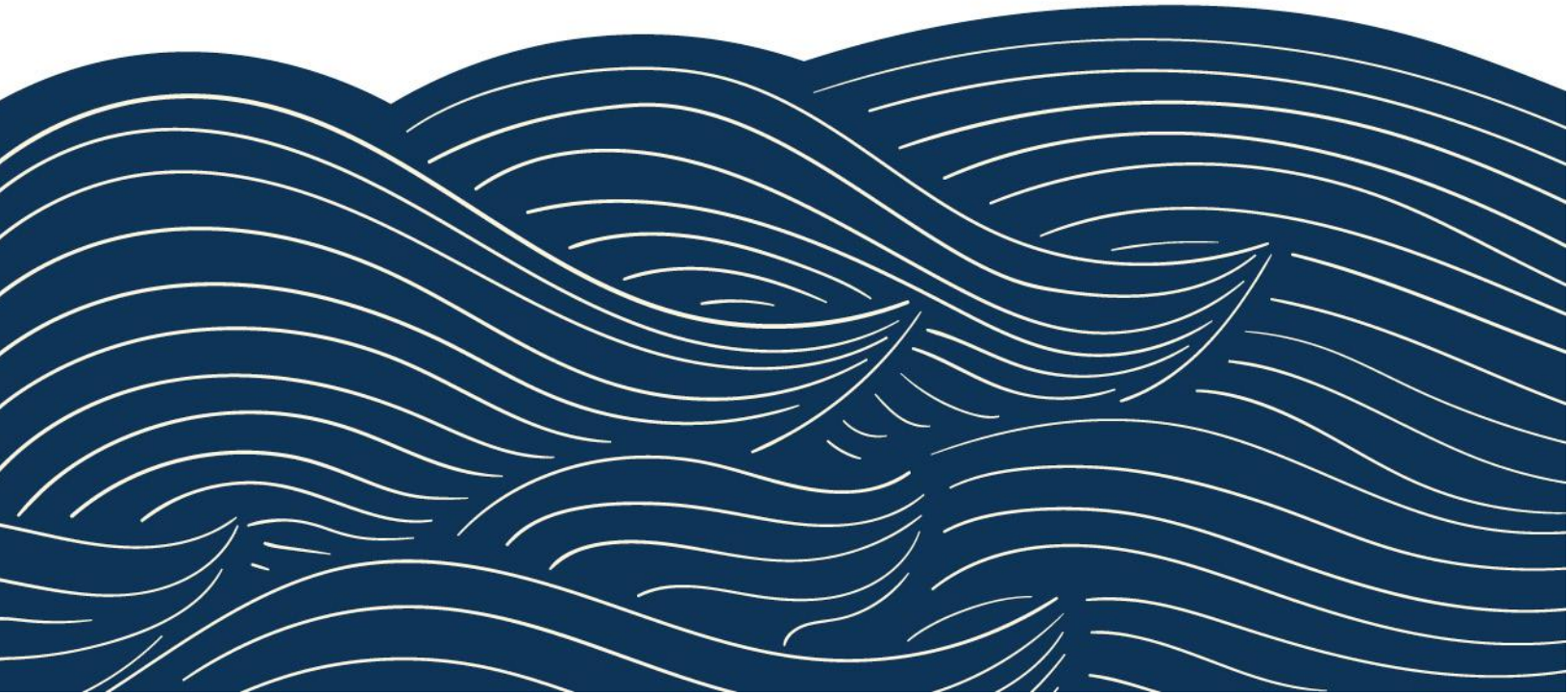
Preliminary Design Opinion of Probable Cost Computation

Project:	Creek Crossing Project		
Site:	Dietz Way	***By:***	***MG***
Task:	AACE Class 3 Cost Estimate	***Reviewed by:***	***RN***
		Date:	***1/26/2022***

DESCRIPTION	QUANTITY	UNITS	UNIT COST	TOTAL COST
CONTRACTOR OVERHEAD COSTS				
Mobilization/Demobilization	1	LS	7.00%	$4,600
Bonds and Insurance	1	LS	2.00%	$1,300
General Conditions	1	LS	3.00%	$1,900
Shop Drawings and O&M Manuals	1	LS	2.50%	$1,600
Contractor Overhead subtotal				**$10,000**
CONSTRUCTION COSTS				
Environmental protection, permit compliance, and BMPs	1	LS	$10,000	$10,000
Residential landscaping/driveway/walkway repair allowance	1	LS	$8,000	$8,000
Cap lateral, supply temporary facilities to resident	1	LS	$2,500	$2,500
Concrete supports for pipe along banks	2	EA	$4,000	$8,000
Demo and remove existing temporary improvements	1	LS	$1,500	$1,500
Adder for hand installation	1	LS	$4,000	$4,000
Coffer dam, creek flow diversion	1	LS	$6,600	$6,600
Hand excavation	12	BCY	$400	$4,889
Hand remove & haul excavated material	16	LCY	$250	$4,000
Backfill	12	CY	$295	$3,606
4" Welded steel pipe	17	LF	$120	$2,040
Flexible/transition couplings	2	EA	$500	$1,000
Turf reinforcement mat	139	SQFT	$22	$3,065
Seed slopes/banks/disturbed areas	62	SY	$5	$311
Construction Costs Subtotal				**$60,000**
Constractor Overhead Costs Subtotal				$10,000
Construction Subtotal				**$70,000**
Contingency for unknown conditions	30%	PERCENT		$21,000
Escalation	9.9%	PERCENT		$7,000
Total Project Cost				**$98,000**

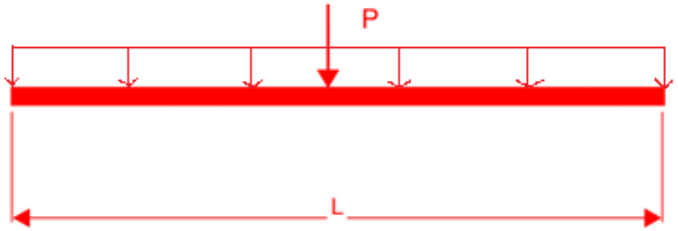
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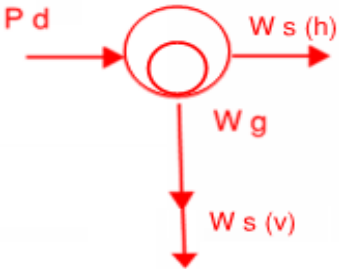
Preliminary Structural Calculations



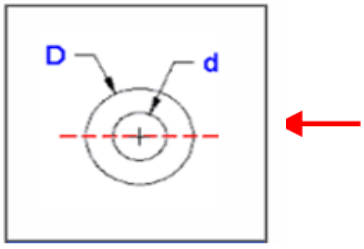
TAVANGAR CONSULTING ENGINEERS		Job No. 2021-03-001	Calc No.
		Computation	
Project	SASD	Computed OT	Date 12/16/2021
Subject	Winding Way	Checked	Date
Task	Piping Design	Sheet	Of 1 of 2

Sewer Pipe Diameter =	10	In	**Carrier Pipe Diameter =**	14	In
Schedule =	40	In	Schedule =	40	In
			Material =	A53	ASTM
Liquid unit weight =	70.0	PCF	Yield Stress Fy =	35	ksi
ID =	10.020	In	ID =	13.124	In
OD =	10.750	In	OD =	14.000	In
T =	0.365	In	T =	0.438	In
Pipe A =	11.908	In ^2	A =	18.662	
Pipe Weight Wt ps =	40.5	Lb/ft	Y =	7.000	
Weight of liquid Wt L =	65.8	Lb/ft	I xx =	429.5	
Carrier Pipe Wt pc =	63.4	Lb/ft	S xx =	61.4	
			R xx =	4.797	
Total Gravity Load =	169.7	Lb/ft			
Length L =	37.0	Ft			
S ds =	0.567	g			
Seismic Accel. Cs (h) =	0.608	g			
	Service Level				
Seismic Accel. Cs (v) =	0.113	g			
Cs (v) = 0.2 Sds					
Gravity W g =	169.7	Lb/ft			
Debris P d =	4000.0	Lb			
Seismi W s (h) =	103.2	Lb/ft			
Seismi W v (h) =	19.2	Lb/ft			





Description	Equation
Area Moment of Inertia Section Properties = I	$\frac{\pi(D^4-d^4)}{64}$
Section Modulus = Z = I/y	$\frac{\pi(D^4-d^4)}{32D}$
Radius of Gyration	$\frac{\sqrt{D^2+d^2}}{4}$
A = area	$\frac{\pi(D^2-d^2)}{4}$
y = Distance to neutral axis	D/2



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TAVANGAR CONSULTING ENGINEERS		Job No. 2021-03-001	Calc No.
		Computation	
Project	SASD	Computed OT	Date 12/16/2021
Subject	Winding Way	Checked	Date
Task	Piping Design	Sheet	Of 2 of 2

Bending Monent

Gravity	M g =	29.04	K-ft
		348.5	K-in
Debris	M d =	37.00	K-ft
		444.0	K-in
Seismic	M s(h) =	17.66	K-ft
		211.9	K-in
Seismic	M s(v) =	3.29	K-ft
		39.5	K-in

Shear Force

V grv =	3.139	K
V deb =	2.000	K
V s(h) =	1.909	K
V s(v) =	0.356	K

Load Case 1: Gravity loads + Debris Loads

M max 1 = M grav + M deb

M max 1 = 66.04 K-ft

V max 1 = V grav + V deb

V max 1 = 5.14 K

Load Case 2: Gravity loads + Seismic Loads

M max 2 = SQRT{ M grav + M seis (V)]^2 + M seis (h) ^2 }

M max 2 = 36.84 K-ft

V max 2 = SQRT{ [V grav + V seis (v)]^2 + V seis (h) ^2 }

V max 2 = 3.98 K

Design M = 66.04 K-ft

Design V = 5.14 K

Bending Stresses

f b = 12.92 ksi

Allowable Fb = 21.00 ksi

Bending is Adequate

D/C = 0.62

Shear Stress

f v = 0.28 ksi

Allowable Fv = 14.00 ksi

Shear is Adequate

D/C = 0.02

Deflection = 5 (Wg) L^4 / 384 EI + 3 (Pd) L^3 / 48 EI

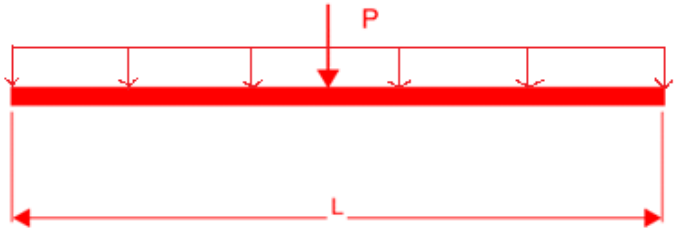
Deflection = 0.57 IN L/360 = 1.23 IN

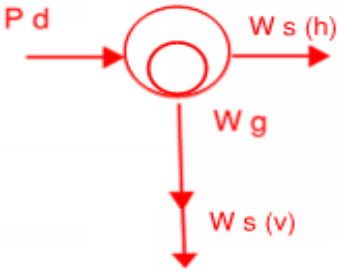
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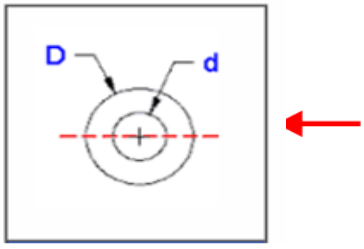
TAVANGAR CONSULTING ENGINEERS		Job No. 2021-03-001	Calc No.
		Computation	
Project	SASD	Computed OT	Date 12/16/2021
Subject	Sutter Avenue	Checked	Date
Task	Piping Design	Sheet	Of 1 of 2

Sewer Pipe Diameter =	8	In	**Carrier Pipe Diameter =**	16	In
Schedule =	40	In	Schedule =	40	In
			Material =	A53	ASTM
Liquid unit weight =	70.0	PCF	Yield Stress Fy =	35	ksi
ID =	7.981	In	ID =	15.000	In
OD =	8.625	In	OD =	16.000	In
T =	0.322	In	T =	0.500	In
Pipe A =	8.399	In ^2	A =	24.347	
Pipe Weight Wt ps =	28.6	Lb/ft	Y =	8.000	
Weight of liquid Wt L =	85.9	Lb/ft	I xx =	731.9	
Carrier Pipe Wt pc =	82.8	Lb/ft	S xx =	91.5	
			R xx =	5.483	
Total Gravity Load =	197.2	Lb/ft			
Length L =	28.0	Ft			
S ds =	0.567	g			
Seismic Accel. Cs (h) =	0.608	g			
	Service Level				
Seismic Accel. Cs (v) =	0.113	g			
Cs (v) = 0.2 Sds					
Gravity W g =	197.2	Lb/ft			
Debris P d =	4000.0	Lb			
Seismi W s (h) =	119.9	Lb/ft			
Seismi W v (h) =	22.4	Lb/ft			





Description	Equation
Area Moment of Inertia Section Properties = I	$\frac{\pi(D^4-d^4)}{64}$
Section Modulus = Z = I/y	$\frac{\pi(D^4-d^4)}{32D}$
Radius of Gyration	$\frac{\sqrt{D^2+d^2}}{4}$
A = area	$\frac{\pi(D^2-d^2)}{4}$
y = Distance to neutral axis	D/2



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TAVANGAR CONSULTING ENGINEERS		Job No. 2021-03-001	Calc No.
		Computation	
Project	SASD	Computed OT	Date 12/16/2021
Subject	Sutter Avenue	Checked	Date
Task	Piping Design	Sheet	Of 2 of 2

Bending Monent

Gravity	M g =	19.33	K-ft
		232.0	K-in
Debris	M d =	28.00	K-ft
		336.0	K-in
Seismic	M s(h) =	11.75	K-ft
		141.0	K-in
Seismic	M s(v) =	2.19	K-ft
		26.3	K-in

Shear Force

V grv =	2.761	K
V deb =	2.000	K
V s(h) =	1.679	K
V s(v) =	0.313	K

Load Case 1: Gravity loads + Debris Loads

M max 1 = M grav + M deb

M max 1 = 47.33 K-ft

V max 1 = V grav + V deb

V max 1 = 4.76 K

Load Case 2: Gravity loads + Seismic Loads

M max 2 = SQRT{ [M grav + M seis (V)]^2 + M seis (h) ^2 }

M max 2 = 24.52 K-ft

V max 2 = SQRT{ [V grav + V seis (v)]^2 + V seis (h) ^2 }

V max 2 = 3.50 K

Design M = 47.33 K-ft

Design V = 4.76 K

Bending Stresses

f b = 6.21 ksi

Allowable Fb = 21.00 ksi

Bending is Adequate

D/C = 0.30

Shear Stress

f v = 0.20 ksi

Allowable Fv = 14.00 ksi

Shear is Adequate

D/C = 0.01

Deflection = 5 (Wg) L^4 / 384 EI + 3 (Pd) L^3 / 48 EI

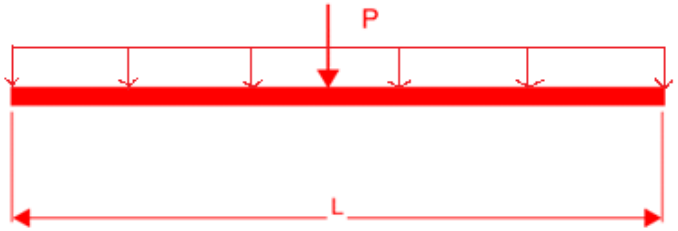
Deflection = 0.13 IN L/360 = 0.93 IN

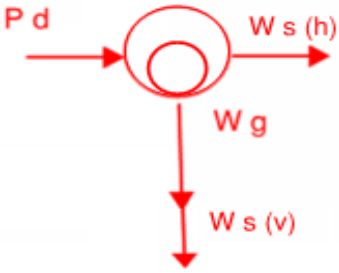
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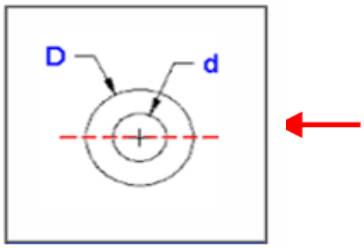
TAVANGAR CONSULTING ENGINEERS		Job No. 2021-03-001	Calc No.
		Computation	
Project	SASD	Computed OT	Date 12/16/2021
Subject	Indian River Drive	Checked	Date
Task	Piping Design	Sheet	Of 1 of 2

Sewer Pipe Diameter =	12	In	**Carrier Pipe Diameter =**	16	In
Schedule =	40	In	Schedule =	40	In
			Material =	A53	ASTM
Liquid unit weight =	70.0	PCF	Yield Stress Fy =	35	ksi
ID =	11.938	In	ID =	15.000	In
OD =	12.750	In	OD =	16.000	In
T =	0.406	In	T =	0.500	In
Pipe A =	15.745	In ^2	A =	24.347	
Pipe Weight Wt ps =	53.5	Lb/ft	Y =	8.000	
Weight of liquid Wt L =	85.9	Lb/ft	I xx =	731.9	
Carrier Pipe Wt pc =	82.8	Lb/ft	S xx =	91.5	
			R xx =	5.483	
Total Gravity Load =	222.2	Lb/ft			
Length L =	38.0	Ft			
S ds =	0.567	g			
Seismic Accel. Cs (h) =	0.608	g			
	Service Level				
Seismic Accel. Cs (v) =	0.113	g			
Cs (v) = 0.2 Sds					
Gravity W g =	222.2	Lb/ft			
Debris P d =	4000.0	Lb			
Seismi W s (h) =	135.1	Lb/ft			
Seismi W v (h) =	25.2	Lb/ft			





Description	Equation
Area Moment of Inertia Section Properties = I	$\frac{\pi(D^4-d^4)}{64}$
Section Modulus = Z = I/y	$\frac{\pi(D^4-d^4)}{32D}$
Radius of Gyration	$\frac{\sqrt{D^2+d^2}}{4}$
A = area	$\frac{\pi(D^2-d^2)}{4}$
y = Distance to neutral axis	D/2



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TAVANGAR CONSULTING ENGINEERS		Job No. 2021-03-001	Calc No.
		Computation	
Project	SASD	Computed OT	Date 12/16/2021
Subject	Indian River Drive	Checked	Date
Task	Piping Design	Sheet	Of 2 of 2

Bending Monent

Gravity	M g =	40.11	K-ft
		481.3	K-in
Debris	M d =	38.00	K-ft
		456.0	K-in
Seismic	M s(h) =	24.39	K-ft
		292.6	K-in
Seismic	M s(v) =	4.55	K-ft
		54.6	K-in

Shear Force

V grv =	4.222	K
V deb =	2.000	K
V s(h) =	2.567	K
V s(v) =	0.479	K

Load Case 1: Gravity loads + Debris Loads

M max 1 = M grav + M deb
M max 1 = 78.11 K-ft
V max 1 = V grav + V deb
V max 1 = 6.22 K

Load Case 2: Gravity loads + Seismic Loads

M max 2 = SQRT{ [M grav + M seis (V)]^2 + M seis (h) ^2 }
M max 2 = 50.88 K-ft
V max 2 = SQRT{ [V grav + V seis (v)]^2 + V seis (h) ^2 }
V max 2 = 5.36 K

Design M = 78.11 K-ft
Design V = 6.22 K

Bending Stresses

f b = 10.24 ksi
Allowable Fb = 21.00 ksi

Bending is Adequate
D/C = 0.49

Shear Stress

f v = 0.26 ksi
Allowable Fv = 14.00 ksi

Shear is Adequate
D/C = 0.02

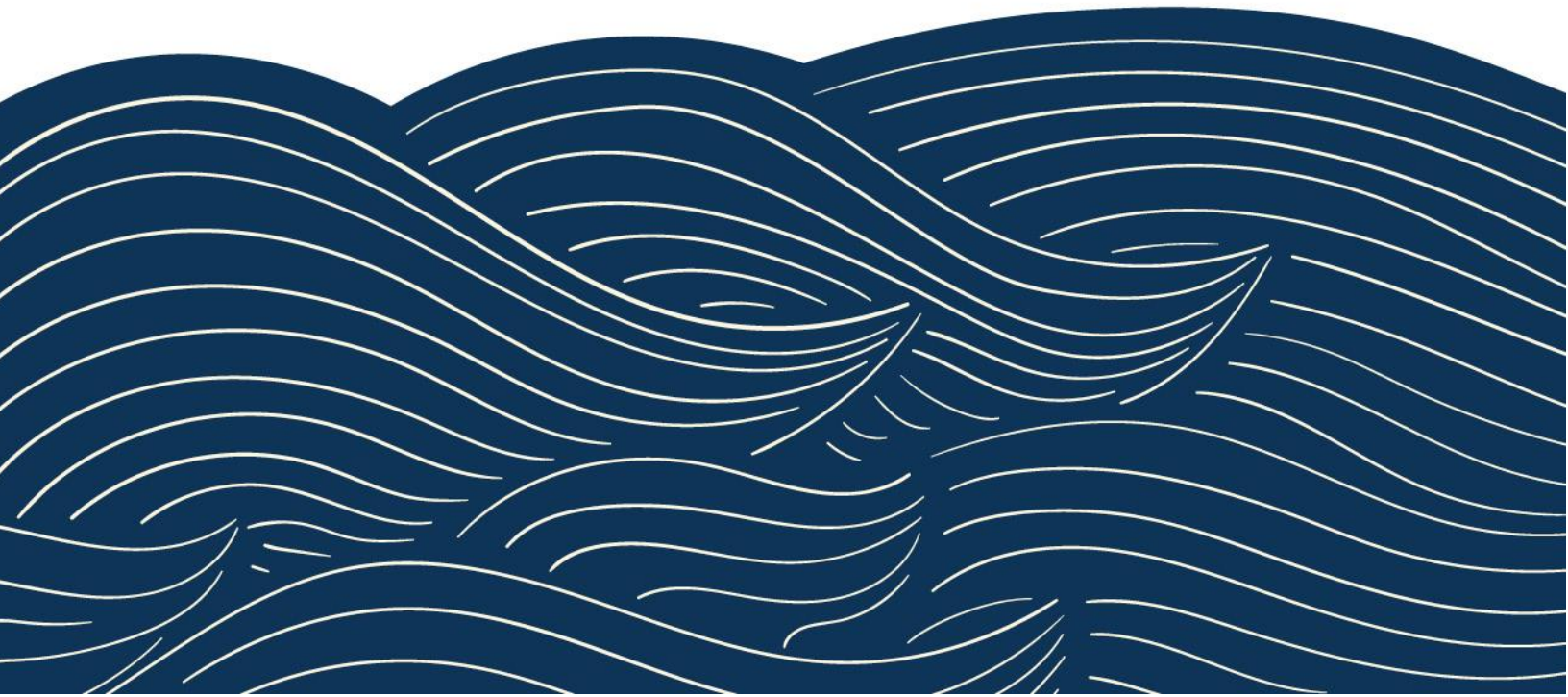
Deflection = 5 (Wg) L^4 / 384 EI + 3 (Pd) L^3 / 48 EI
Deflection = 0.49 IN L/360 = 1.27 IN

Preliminary

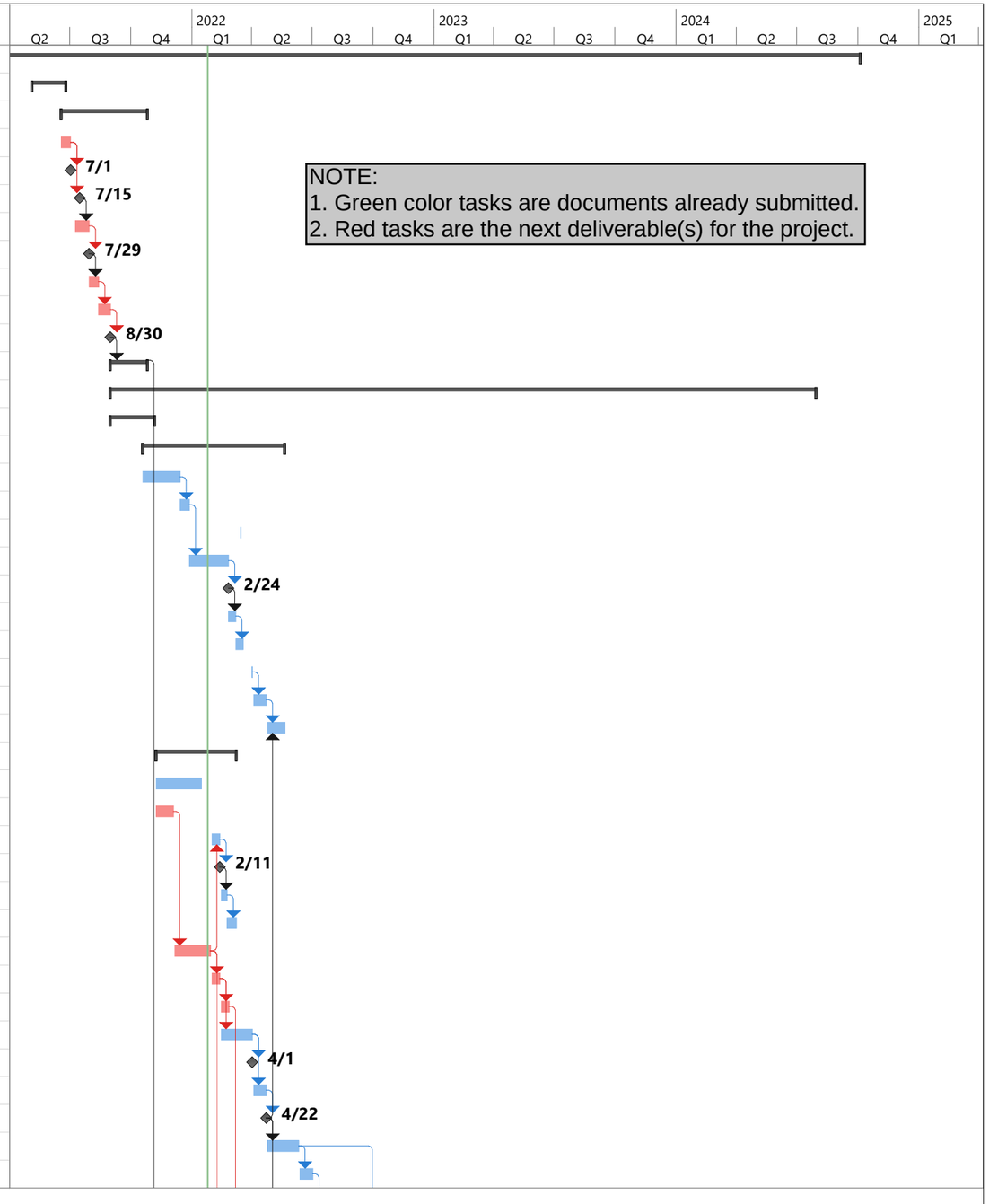
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Project Schedule



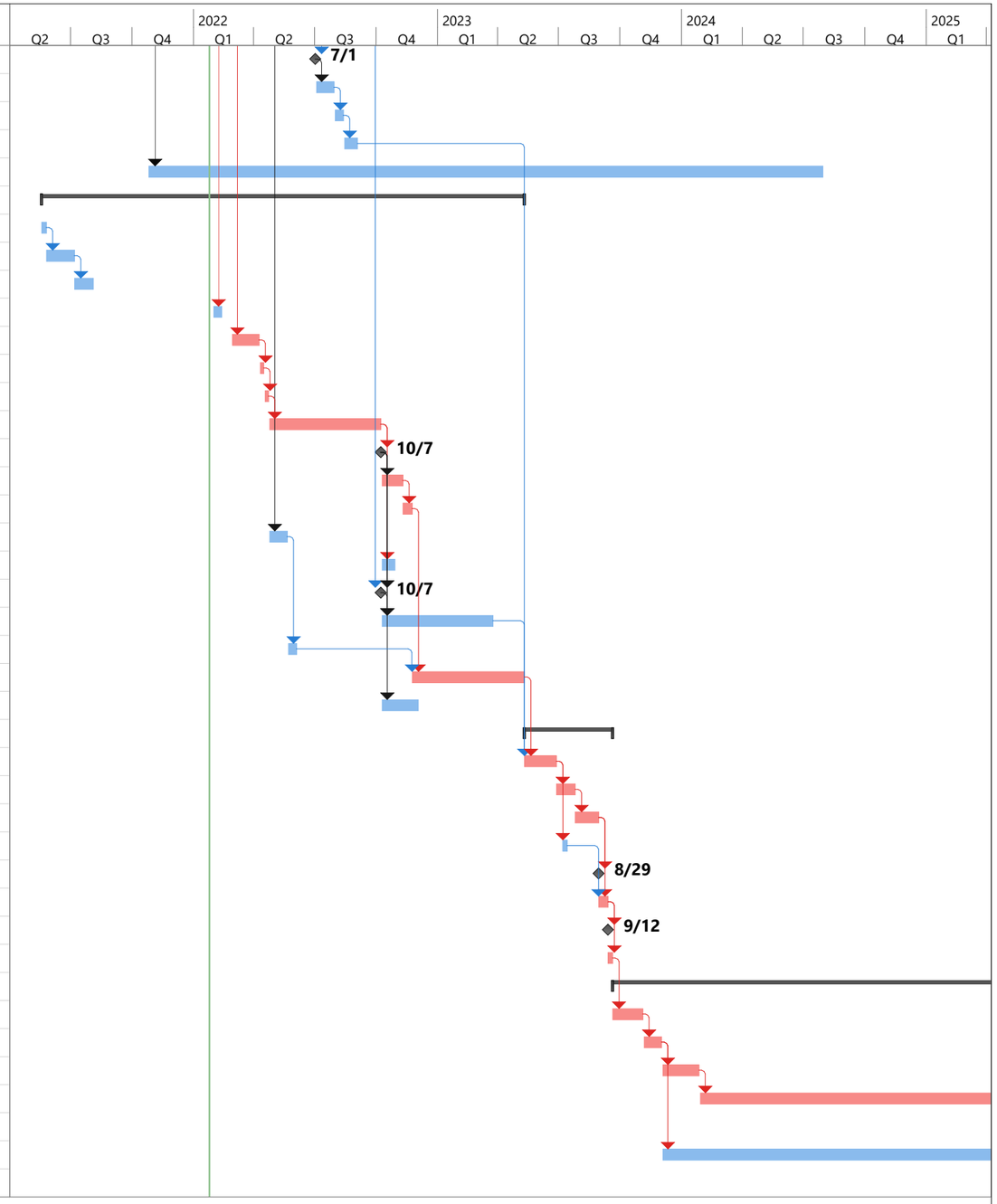
ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors
1		**Task 1 - Project Management**	**970 days**	**Mon 1/18/21**	**Fri 10/4/24**	
6		**Task 2 - Condition & Site Assessment**	**37 days**	**Wed 5/5/21**	**Thu 6/24/21**	
17		**Task 3 - Alternative Analysis**	**92 days**	**Fri 6/18/21**	**Mon 10/25/21**	
18		Develop Concept Alternatives	10 days	Fri 6/18/21	Thu 7/1/21	14
19		**Submit Concept Alternatives**	**0 days**	**Thu 7/1/21**	**Thu 7/1/21**	**18**
20		Alternative Workshop	0 days	Thu 7/15/21	Thu 7/15/21	18FS+10 days
21		Develop Draft Alternatives Analysis Report	15 days	Fri 7/9/21	Thu 7/29/21	20FS-5 days
22		**Submit Draft Alternatives Analysis Report**	**0 days**	**Thu 7/29/21**	**Thu 7/29/21**	**21**
23		SASD Review	10 days	Fri 7/30/21	Thu 8/12/21	22
24		Develop Final Alternatives Analysis Report	12 days	Fri 8/13/21	Mon 8/30/21	23
25		**Submit Final Alternatives Analysis Report**	**0 days**	**Mon 8/30/21**	**Mon 8/30/21**	**24**
26		**PAC Approval**	**40 days**	**Tue 8/31/21**	**Mon 10/25/21**	**25**
31		**Task 4 - Design Services**	**760 days**	**Tue 8/31/21**	**Mon 7/29/24**	
32		**Field Survey**	**49 days**	**Tue 8/31/21**	**Fri 11/5/21**	
37		**Geotechnical**	**154 days**	**Tue 10/19/21**	**Fri 5/20/22**	
38		Schedule Geotechnical Field work	40 days	Tue 10/19/21	Mon 12/13/21	30FF+5 days
39		Geotechnical Field Investigation	10 days	Tue 12/14/21	Mon 12/27/21	38
40		Winding Way Field Work	1 day	Tue 3/15/22	Tue 3/15/22	
41		Geotechnical Analysis and Report Preparation	43 days	Tue 12/28/21	Thu 2/24/22	39
42		Draft Geotechnical Report Available to Design Team	0 days	Thu 2/24/22	Thu 2/24/22	41
43		Draft Geotehcnical WSC Review	7 days	Fri 2/25/22	Mon 3/7/22	42
44		**Draft Geotechnical Report (Less Winding Way) to SASD**	**9 days**	**Tue 3/8/22**	**Fri 3/18/22**	**43**
45		Winding Way Field Work	1 day	Fri 4/1/22	Fri 4/1/22	
46		Analysis of Winding Way Field Work	15 days	Mon 4/4/22	Fri 4/22/22	45
47		Final Geotechnical Report (including Winding Way)	20 days	Mon 4/25/22	Fri 5/20/22	61,46FS-10 days
48		**Geomorph - Hydraulic Modeling**	**87 days**	**Mon 11/8/21**	**Tue 3/8/22**	**36**
49		Model Development and results	50 days	Mon 11/8/21	Fri 1/14/22	36
50		Preliminary model results for key sites	20 days	Mon 11/8/21	Fri 12/3/21	36
51		**Draft Model/Scour Analysis TM Development**	**10 days**	**Mon 1/31/22**	**Fri 2/11/22**	**55**
52		Submit Draft Model/Scour Analysis TM	0 days	Fri 2/11/22	Fri 2/11/22	51
53		Draft Model/Scour Analysis Review	7 days	Mon 2/14/22	Tue 2/22/22	52
54		Final Model/Scour Analysis TM Development	10 days	Wed 2/23/22	Tue 3/8/22	53
55		**Draft PDR**	**40 days**	**Mon 12/6/21**	**Fri 1/28/22**	**36FS-10 days,50**
56		SASD Review	10 days	Mon 1/31/22	Fri 2/11/22	55
57		**Final PDR**	**10 days**	**Mon 2/14/22**	**Fri 2/25/22**	**56**
58		**60% Design**	**35 days**	**Mon 2/14/22**	**Fri 4/1/22**	**56**
59		Submit 60% Design	0 days	Fri 4/1/22	Fri 4/1/22	58
60		SASD Review	15 days	Mon 4/4/22	Fri 4/22/22	58
61		60% Review Workshop	0 days	Fri 4/22/22	Fri 4/22/22	60
62		90% Design	35 days	Mon 4/25/22	Fri 6/10/22	61
63		SASD Review	15 days	Mon 6/13/22	Fri 7/1/22	62



Project: SASD CC Schedule
Date: Tue 1/25/22

Task	Project Summary	Manual Task	Start-only	Deadline	Manual Progress
Split	Inactive Task	Duration-only	Finish-only	Critical	
Milestone	Inactive Milestone	Manual Summary Rollup	External Tasks	Critical Split	
Summary	Inactive Summary	Manual Summary	External Milestone	Progress	

ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors
64		90% Review Workshop	0 days	Fri 7/1/22	Fri 7/1/22	63
65		100% Design	20 days	Mon 7/4/22	Fri 7/29/22	64
66		SASD Review	10 days	Mon 8/1/22	Fri 8/12/22	65
67		Bid Set	15 days	Mon 8/15/22	Fri 9/2/22	66
68		Public Outreach Support	36 mons	Tue 10/26/21	Mon 7/29/24	26
69		**Task 5 - Permitting Assistance**	**516 days**	**Wed 5/19/21**	**Wed 5/10/23**	
70		Site Visit & Identify Permits	5 days	Wed 5/19/21	Tue 5/25/21	11SS
71		CEQA Field Investigations	30 days	Wed 5/26/21	Tue 7/6/21	70
72		Arborist Tree Survey	20 days	Wed 7/7/21	Tue 8/3/21	71
73		Final CEQA Field Investigations	10 days	Mon 1/31/22	Fri 2/11/22	55
74		**Draft Environmental Reports to SASD**	**30 days**	**Mon 2/28/22**	**Fri 4/8/22**	**57**
75		County Review of Env. Reports	5 days	Mon 4/11/22	Fri 4/15/22	74
76		Finalize Enviromental Reports	5 days	Mon 4/18/22	Fri 4/22/22	75
77		County Draft CEQA Document	6 mons	Mon 4/25/22	Fri 10/7/22	76
78		Draft CEQA Document Submitted for Public Review	0 days	Fri 10/7/22	Fri 10/7/22	77
79		30 day Public Review of CEQA Document	23 days	Mon 10/10/22	Wed 11/9/22	78
80		Final CEQA	10 days	Thu 11/10/22	Wed 11/23/22	79
81		Identify ROW and Easements & Meet w/ Owners	20 days	Mon 4/25/22	Fri 5/20/22	61
82		Prepare Permit Applications	15 days	Mon 10/10/22	Fri 10/28/22	77
83		Submit Permit Applications	0 days	Fri 10/7/22	Fri 10/7/22	62,78
84		Obtain Permits	6 mons	Mon 10/10/22	Fri 3/24/23	83,78
85		Prepare Plats & Legals	10 days	Mon 5/23/22	Fri 6/3/22	81
86		Easements and Property Acquistion	6 mons	Thu 11/24/22	Wed 5/10/23	85,80
87		Assist w/ Property Agreements	40 days	Mon 10/10/22	Fri 12/2/22	78
88		**Task 6 - Engineering Services During Bidding**	**94 days**	**Thu 5/11/23**	**Tue 9/19/23**	
89		County Prepare to Advertise	34 days	Thu 5/11/23	Tue 6/27/23	67,84,86
90		Board Approval	20 days	Wed 6/28/23	Tue 7/25/23	89
91		Respond to Bidder RFIs/Bidding Period	25 days	Wed 7/26/23	Tue 8/29/23	90
92		Pre Bid Conference	5 days	Fri 7/7/23	Thu 7/13/23	89FS+7 days
93		Bid Opening	0 days	Tue 8/29/23	Tue 8/29/23	91
94		Escrow Bid Doc Review	10 days	Wed 8/30/23	Tue 9/12/23	91,92
95		Issuance of Intent to Award	0 days	Tue 9/12/23	Tue 9/12/23	94
96		Bid Protest Window	5 days	Wed 9/13/23	Tue 9/19/23	94
97		**Task 7 - Construction Support**	**558 days**	**Wed 9/20/23**	**Fri 11/7/25**	
98		Award Contract	33 days	Wed 9/20/23	Fri 11/3/23	96
99		Notice to Proceed	20 days	Mon 11/6/23	Fri 12/1/23	98
100		Submittals	40 days	Mon 12/4/23	Fri 1/26/24	99
101		Construction	23 mons	Mon 1/29/24	Fri 10/31/25	100
102		Conformed Documents	5 days	Mon 11/3/25	Fri 11/7/25	101
103		Attend meetings & ESDC	25 mons	Mon 12/4/23	Fri 10/31/25	99
104		Record Drawings	15 days	Mon 10/13/25	Fri 10/31/25	103FF



Project: SASD CC Schedule
Date: Tue 1/25/22

Task	Project Summary	Manual Task	Start-only	Deadline	Manual Progress
Split	Inactive Task	Duration-only	Finish-only	Critical	
Milestone	Inactive Milestone	Manual Summary Rollup	External Tasks	Critical Split	
Summary	Inactive Summary	Manual Summary	External Milestone	Progress	

APPENDIX B

SPECIAL PROVISIONS AND TECHNICAL SPECIFICATIONS

SACRAMENTO AREA SEWER DISTRICT
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60% SPECIAL PROVISIONS AND TECHNICAL SPECIFICATIONS

NOT FOR CONSTRUCTION

CREEK CROSSING PROJECT

CONTRACT NO. _____

WSC

CREEK CROSSING PROJECT
CONTRACT NO. _____

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**Not included in the 60% design submittal.*

SACRAMENTO AREA SEWER DISTRICT
CREEK CROSSING PROJECT
CONTRACT NO. _____

SPECIAL PROVISIONS

SP-01 STANDARDS

STANDARD SPECIFICATIONS: The Standard Specifications include the following District documents adopted November, 2021, and amendments thereto are part of the Contract Documents of this project, and all materials and construction shall be in strict conformance with these Standard details and specifications except as modified by these Contract Documents for the Creek Crossing Project. Copies of the Standard Specifications are available online at www.sacsewer.com. Standard documents include the following:

1. The Sacramento Area Sewer District Standards and Specifications, Dated November 30, 2021.

SACRAMENTO COUNTY SPECIFICATIONS AND PLANS: Sections 1-10 of the Sacramento County Standard Construction Specifications (County Specifications), adopted September 2001 and revised February 2017, and amendments thereto are part of the Contract Documents of this project, and all materials and construction shall be in strict conformance with the County Standards except as modified by these Contract Documents for the Creek Crossing Project. Copies of the County Standards are available online at saccountyspecs.saccounty.gov/ or may be purchased from County of Sacramento Technical Resources Division, 827 Seventh Street, Room 105, Sacramento, California.

SP-02 RESPONSIBILITY FOR MATERIALS AND EQUIPMENT

A. **Items Furnished by Contractor:** The Contractor shall be fully responsible for all materials and equipment which are furnished, unless otherwise noted.

B. **Owner Furnished Materials:** The Owner shall furnish two (2) project signs for each site as described in the plans, and shall furnish sewer relief caps at service cleanouts for any service requiring reconnection.

SP-03 SCOPE AND LOCATION OF WORK

A. The work to be performed under this contract includes the furnishing of all labor, materials, tools, and equipment for the Creek Crossing Project. The work includes replacement of sewer pipeline crossings at eight (8) individual sites: Hope Lane (Site 01), Winding Way (Site 02), Garfield-Thousand Oaks (Site 04), San Lorenzo Way (Site 07), Sutter Avenue (Site 08), Indian River Drive (Site 10), Hegseth Court

(Site 11), and Dietz Way (Site 12), and the protection of a sewer pipeline crossings at four (4) individual sites: Arcade Creek (Site 03), Concho Court (Site 05), Gina Court (Site 06), and Campfire Way (Site 09). Pipeline replacements will consist of the removal and/or abandonment of the existing crossings and include either construction of a new crossing or construction of a realignment pipeline in accordance with Table 1 below. Pipe protections will consist of constructing protections around existing pipe to prevent direct impact from debris within the creek, and providing slope protection of disturbed creek banks to mitigate the risk of further erosion and exposure of the pipeline. Existing pipelines are ductile iron pipe (DIP), vitrified clay pipe (VCP), welded aluminum pipe, or reinforced concrete pipe (RCP).

B. All work associated with this contract shall include, but is not limited to, mobilization/demobilization, dewatering of the creek and excavations, tree removal and protection, sheeting, shoring, and bracing of excavations, traffic control, erosion and sediment control, cleaning, debris removal and disposal, verification of pipe lengths and diameters, installation of steel pipe/casing, DIP, and VCP, permitting compliance, site restoration, and additional items or details that are required by the Contract Documents to be performed, placed, constructed or installed.

C. Work includes sewer flow control for pipeline work including bypass pumping over or around creeks.

D. Work includes the bypass/control of creek flow to dewater the work area.

E. Work includes installation of new machine drilled piers and piles as well as hand constructed structural supports as shown on the plans.

F. Such other items or details not mentioned above that are required by these specifications shall be performed, placed, constructed, or installed in accordance with the Standard Specifications and these Special Provisions.

Table 1. Creek Crossing Project

Site No.	Site Name	Project Description
01	Hope Lane	Replace existing 6-inch VCP creek crossing with a new pipe and encasement in same alignment, provide bank and creek protection measures.
02	Winding Way	Replace existing 8-inch welded aluminum creek crossing with a new pipe and casing in same alignment, install drilled micro piles, and provide bank protection measures.
03	Arcade Creek	Perform bank restoration and provide upstream, downstream, and bank creek protection measures.
04	Garfield-Thousand Oaks	Remove existing alignment in creek, install 24-inch VCP along new alignment, and provide bank protection measures.
05	Concho Court	Provide upstream, downstream, and bank creek protection measures.
06	Gina Court	Provide upstream, downstream, and bank creek protection measures.
07	San Lorenzo Way	Remove existing pipe in creek, install new upstream manhole, VCP pipe and concrete encasement at lower elevation, provide bank and creek protection measures.
08	Sutter Avenue	Replace existing 6-inch welded aluminum creek crossing with a new pipe and casing in same alignment, install cast-in-place piers, and provide bank protection measures.
09	Campfire Way	Perform bank restoration and provide upstream, downstream, and bank creek protection measures.
10	Indian River Drive	Replace existing 10-inch CIP creek crossing with a new pipe and casing in same alignment, install drilled micro piles, and provide bank protection measures.
11	Hegseth Court	Remove existing pipe in creek, install new 6-inch WSP at lower elevation, provide bank and creek protection measures.
12	Dietz Way	Remove existing pipe in creek, install new 4-inch WSP at same alignment, install hand-drilled piers, provide bank and creek protection measures.

SP-04 TIME OF COMPLETION

As set forth in Section 7-15, TIME OF COMPLETION, of the County Specifications, the time for completion of this contract shall be as follows:

A. All work to be accomplished under this contract shall be started within 30 working days of receipt of the Notice to Proceed (NTP).

B. All work shall be substantially complete on or before October 1, 2024, and this date shall also be considered the Field Acceptance date for this phase of the Project per Section 7-1, 7-15, and 7-21 of the County Specifications.

C. All work shall be performed during dry weather months (see SP-06 Order of Work) over two years (2023 and 2024).

D. All work located within the backyards of residents at Sites 01, 05, 06, 11 and 12, including site restoration, shall be completed within 6 weeks of mobilization to the site to minimize the impacts to homeowner's privacy.

E. The Contractor shall submit a graphic construction schedule as a first order of work, within 15 working days of receipt of the NTP.

1. The construction schedule shall be prepared in a format approved by the Engineer and based on estimates of the required duration and sequences of each item of the work and function to be performed.

SP-05 LIQUIDATED DAMAGES

A. As set forth in Section 8-10, LIQUIDATED DAMAGES FOR DELAY, of the County Specifications, the liquidated damages for this contract shall be the sum of One Thousand Seven Hundred Dollars ($1,700) per calendar day for the first thirty (30) days that expires after the date of Field Acceptance specified in SP-04, TIME OF COMPLETION; and shall be the sum of Three Thousand Four Hundred Dollars ($3,400) per calendar day beyond thirty (30) days of the date of Field Acceptance.

SP-06 ORDER OF WORK

A. It is anticipated that the Contractor will only be allowed to perform work within the creeks (top of bank to top of bank) between May 1 and October 1 each year. All work will be complete within the creeks by October 1 each year. This includes removal of any and all equipment and materials from the creeks, and restoration/stabilization of the creek banks.

SP-07 SUBMITTALS

B. Within five (5) working days after the NTP, and prior to the submission of the initial shop Plans, the Contractor shall submit a complete list of all required submittals to the Engineer for favorable review. The Submittal and Material List shall include a description of each item, Specification reference, and the anticipated submittal date. The List shall include all items of equipment and materials for structural, mechanical, piping, electrical, equipment piping; and the names of manufacturers with whom purchase orders have been placed. Items on the List should be arranged in the same order as in these Specifications, and shall contain sufficient data to identify precisely the items of material and equipment the Contractor proposes to furnish. The List shall reference the applicable Specification Section or Drawing. After the submission is favorably reviewed and returned to the Contractor by the Engineer, it shall become the basis for the submission of detailed manufacturer's Plans, catalog cuts, curves, diagrams, schematics, data, and information on each separate item for review. No work shall proceed on any item until it has been submitted and favorably reviewed. An incomplete submittal list is not a basis for avoiding submittal required by the Specifications.

C. The procedure governing such submittals is contained in Section 5-8 CONTRACTOR'S SUBMITTALS of the County Specifications. Failure to comply with all requirements specified therein will constitute grounds for return of the submittals for proper resubmittal. The Contractor shall use the Submittal Transmittal Form provided by the District for transmitting all submittals, Plans, or other information required for review.

D. A separate transmittal form shall be used for each specific item for which a submittal is required. Transmittal of a submittal of various items using a single transmittal form will be permitted only when the items taken together constitute a manufacturer's "package" or are functionally related. A multiple-page submittal shall be bound into sets, as appropriate, prior to transmittal to the Engineer.

E. The Work covered by a submittal may be commenced only after the Engineer has reviewed the pertinent submittals and returned copies to the Contractor marked either "NO EXCEPTIONS TAKEN," "MAKE CORRECTIONS NOTED," or "FOR INFORMATION ONLY." Submittals marked as "NOT REVIEWED," "AMEND AND RESUBMIT," or "REJECTED-SEE REMARKS," are required to be re-submitted for review prior to commencing work covered by the submittal. Corrections indicated on submittals shall be considered as changes necessary to meet the requirements of the Contract Documents. Review of submittals by the Engineer shall not be construed as relieving the Contractor of his responsibilities under this Contract.

F. The Contractor shall provide six (6) copies plus one (1) reproducible copy of each submittal for review. One electronic copy of each submittal shall be uploaded by the Contractor to the District's SharePoint for each submittal and re-submittal. The electronic copy shall be in a PDF file format. Any discrepancies between hard and electronic copies shall be reason for rejection of the submittal or re-submittal.

G. If more than one item is listed on a cut sheet of the shop drawing submittal, the item being submitted shall be clearly demarcated. Failure to do so shall result in the entire shop drawing submittal being rejected.

H. The Engineer shall review submittals within twenty (20) working days and re-submittals within fifteen (15) working days. The Engineer may choose to send shop drawing submittal review comments to the Contractor in electronic file, PDF, or Word format.

I. Minimum sheet size shall be 8.5 inches by 11 inches. Maximum sheet size shall be 24 inches by 36 inches. Every page in a submittal shall be numbered in sequence. Each copy of a submittal shall be collated and stapled or bound, as appropriate. The Engineer will not collate copies.

J. Where product data from a manufacturer is submitted, clearly mark which model is proposed, with all pertinent data capacities, dimensions, clearances, diagrams, controls, connections, anchorage, and supports. Sufficient level of detail shall be presented for assessment of compliance with the Contract Documents.

K. Each submittal shall be assigned a unique number. Submittals shall be numbered sequentially. The submittal numbers shall be clearly noted on the transmittal. Original submittals shall be assigned a numeric submittal number. Resubmittals shall bear an alpha-numeric system which consists of the number assigned to the original submittal for that item, followed by a letter of the alphabet to represent that it is a subsequent resubmittal of the original. For example, if submittal 25 requires a resubmittal, the first resubmittal will bear the designation "25-A" and the second resubmittal will bear the designation "25-B" and so on.

L. Following the initial review, one "resubmittal" will be allowed by the Engineer prior to a "back charge" for engineering review and administration costs being incurred by the District. The "back charge" will be deducted from any amounts due the Contractor.

SP-08 REQUESTS FOR INFORMATION

A. The Contractor shall request clarification of the Contract Documents by using a Request for Information (RFI) form provided by the Engineer. All such requests shall be transmitted from the Contractor to the Engineer; no RFI's will be accepted directly from any subcontractor or supplier. Each RFI shall be uploaded by the Contractor to the District's SharePoint.

B. Normally a separate RFI form shall be used for each specific item for which clarification is required. An RFI form for more than one item of clarification shall be permitted only when the items are so functionally related that expediency indicates review of the group of items as a whole.

C. The Contractor shall number each RFI consecutively, reference each RFI to the applicable specification section and/or Plans, and maintain a log noting the RFI number, subject, and date of transmittal.

D. The Engineer will reply to request for clarification submitted on RFI forms within fifteen (15) working days of receipt by the Engineer.

SP-09 CPM CONSTRUCTION SCHEDULE

A. The Contractor shall submit a practicable Critical Path Method (CPM) network schedule within fifteen (15) working days of Notice to Proceed. The Schedule shall be in accordance with Section 7-5, SCHEDULES, of the County Specifications and consists of a schedule of values, a CPM network diagram that is time-scaled and include printouts showing mathematical analysis of the CPM network diagram, and an analysis of the Contractor's sequence of Work. The Contractor's Schedule shall begin with the date the District issues the Notice to Proceed and conclude on the Final completion Date of the Contract. The Contractor shall update and submit the CPM schedule on a monthly basis.

B. In accordance with Special Provisions SP-24, CONSTRUCTION PROGRESS MEETINGS, and Section 7-5.03 FOUR-WEEK ROLLING SCHEDULE, of the County Specifications, Contractor shall submit an accurate four-week rolling schedule at each weekly construction progress meeting.

C. Neither the submission nor the updating of the Contractor's original schedule submittal, revised schedule, four-week rolling schedule, or narrative submitted to the Engineer by the Contractor under this Contract, nor the Engineer's review or acceptance of any such report, schedule, or narrative shall have the effect of amending or modifying, in any way, the Contract completion date or of modifying or limiting, in any way, the Contractor's obligations under this Contract. Only a signed, fully executed Change Order can modify the Contract.

D. All schedules shall be submitted as hard copy, PDF and editable electronic copy.

SP-10 PRECONSTRUCTION DOCUMENTATION

A. PHOTOGRAPHS

1. Prior to disturbing any area of the project site, the Contractor shall take sufficient photographs of each area that will be disturbed during construction, documenting pre-construction conditions. Contractor shall provide a minimum of one photograph every 20 feet along project alignment and multiple photos of any staging, insertion, excavation or reconstruction areas, as well as all access locations. The same views shall be photographed upon completion of construction activities on any section of the project, and submitted with Contractor's application for payment for work on the section. Pre-construction photography shall document the pre-construction condition of existing landscaped areas, trees and plants, fences, streets, sidewalks, drives, and in general, any area that will be disturbed or utilized on private properties before commencing work. Photographs shall be prepared and submitted in accordance with SP-07 of these Specifications.
2. At the Contractor's option, a DVD may be submitted in lieu of photographs. The content and quality requirements for the photography shall apply to the DVD. A copy of each DVD shall be provided to the District, along with a log describing the address, date, and viewing orientation of each recorded segment. DVD shall be prepared and submitted in accordance with Section 301, PRECONSTRUCTION PHOTOGRAPHS, of the SASD Standards and Specifications.
3. Acceptable Photographs and DVDs shall be submitted and approved prior to disturbing any area of the project.
4. The Contractor shall provide additional photograph and video recordings as deemed necessary by the Engineer at no additional cost to the Owner.

SP-11 RECORD DRAWINGS

A. The Contractor shall maintain a neatly marked set of record Drawings showing the final layout of all piping, structures (including abandoned and demolished structures), liner thickness, final inside diameter, and other facilities in accordance with Section 332.2 RECORD DRAWINGS of the SASD Standards and Specifications.

B. Drawings shall be subject to the inspection of the Engineer at all times and shall be kept current weekly with all work instructions, change orders, and construction adjustments shown thereon and initialed by the Engineer. Prior to acceptance of the work, the Contractor shall submit to the Engineer two sets of record Drawings for review and approval.

SP-12 PERMITS AND LICENSES

A number of permits, approvals from various agencies, public and private, are required for execution of the project under this contract. These permits may require fees to be paid by the Contractor and may impose construction conditions. Some of these permits have been obtained by the District and some shall be obtained by the Contractor. The Contractor shall include in his overall bid the cost of obtaining any necessary permits not obtained by the District, including application fees and any other costs associated with permits not obtained by the District, and the cost for complying with all of the conditions set by all of the required permits. The intent of this section is to provide bidders with the now known list of permits required for the project under this contract. Copies of permit applications which have been submitted will be provided to the Contractor by the District prior to the start of construction. The completeness and inclusiveness of the list provided is not guaranteed. Information provided in this section does not relieve the bidders of responsibility to determine and verify the extent of permits required for this contract, or the contactor of his responsibility to obtain and abide by necessary permits. Contractor shall submit to the Engineer copies of all approved Contractor acquired permits as required in Section 300 CONSTRUCTION GENERAL of the SASD Standards and Specifications.

Permit and Coordination Table

Item	Permit	Jurisdiction	Responsible Party	Locations (Sites)
1	Clean Water Act Section 404(e) Nationwide Permit 3, Maintenance	United State Army Corp of Engineers	Owner	All sites
2	Clean Water Act Section 401 Water Quality Certification	Central Valley Regional Water Quality Control Board	Owner	All sites
3	Streambed Alteration Agreement	Dept. of Fish and Wildlife	Owner	All sites
4	General Permit for Dewatering (NPDES Permit No. CAG995001)	Central Valley Regional Water Quality Control Board	Contractor	All sites
5	General Stormwater Discharge Permit during Construction (Order 2012-0006-	Central Valley Regional Water Quality Control	Contractor	All sites

	DWQ)	Board		
6	Erosion and Sediment Control Plan	Sacramento County	Contractor	All sites
7	Sacramento Area Sewer District Access Permit	SASD	Contractor	All site
8	Tree Removal Permit	City of Citrus Heights	Owner	09
9	Tree Removal permit	Sacramento County	Owner	02, 04, 05, 06, 09
11	Encroachment	City of Citrus Heights	Contractor[a]	09
12	Encroachment	Sacramento County	Owner	01, 05, 06, 07, 11, 12

[a] Contractor is also required to obtain an encroachment permit for all work within the City of Citrus Heights (in addition to the permit obtained by the District). The application can be found at www.citrusheights.net. The Contractor will be required to put down a deposit that the City would charge against for review, etc. over the course of the project. Any remaining funds would be refunded to the Contractor at the close of the encroachment permit.

SP-13 SUBSURFACE CONDITIONS

In addition to the conditions set forth in Section 2-4, SUBSURFACE CONDITIONS, of the County Specifications, additional conditions shall be as follows:

A. A project specific geotechnical engineering investigation was performed for this project to obtain information regarding sub-surface conditions at the five project sites. The Geotechnical Investigation Report is included as Appendix XX. The Contractor assumes the responsibility to make all additional investigations he deems necessary to satisfy himself of the kind of and type of soil, and level of water table to be encountered, and to characterize the working conditions. The Contractor may make any arrangements he wishes with private individuals or public agencies to make subsurface explorations necessary to prepare an informed bid and

to plan the work. The District assumes no responsibility for sub-surface conditions.

B. The bidder shall make his own deductions and conclusions as to the nature of the materials to be excavated, the difficulties making and maintaining the required excavations, the difficulties which may arise from subsurface conditions and of doing any other work affected by the subsurface conditions and shall accept full responsibility therefor.

C. Should the bidder desire to complete his own soils investigation, he shall request permission from the District and shall be responsible for all permits and costs required for completing the investigation work. Results shall be submitted to the District if the bidder is awarded the project.

SP-14 DIFFERING SITE CONDITIONS

A. In the event that site conditions are materially different than those shown on the plans or observable from public right-of-ways during the bidding or construction period, the Contractor shall notify the Engineer in writing within five (5) working days, per Section 7-6, UNUSUAL SITE CONDITIONS of the County Specifications. The Engineer shall investigate the conditions, and if he finds that such conditions do materially differ and cause an increase or decrease in the Contractor's cost of, or the time required for performance of any part of the Work under this Contract, the Engineer will recommend to the District that an equitable adjustment be made by modifying the Contract by Change Order, per Section 9 CHANGES AND CLAIMS of the County Specifications, to account for differing site conditions.

B. No claim of the Contractor under this clause shall be allowed unless the Contractor has given the notice required in the paragraph above.

C. No claim by the Contractor for an equitable adjustment hereunder shall be allowed if asserted after final payment under this contract.

SP-15 CONTRACTOR’S USE OF PREMISES

A. The Contractor shall cooperate with private property owners in scheduling construction activities when working on private property. Contractor shall provide property owner and residents advance notice of work on private property. At minimum, Contractor shall provide property owner and residents notice of two weeks and again 48 hours in advance of anticipated work on private property unless directed otherwise by Engineer.

B. Contractor is advised that pipeline work will occur within and adjacent to environmentally sensitive areas. The Contractor shall install temporary fences as shown on the Plans, as required by District Access Permit, as required by these Special Provisions, or as directed by the Engineer or Certified Biologist to keep construction activities out of environmentally sensitive areas.

C. It is anticipated that some construction activity will occur within existing easements or public right-of-way. The Contractor shall coordinate construction activities with private property owners and residents when working in private easements. The Contractor shall make every effort possible to ensure that construction activity occurs within such easements and does not enter areas that do not have easement access agreements or that are environmentally sensitive areas. Should construction activities encroach upon private property or environmentally sensitive areas, Contractor may be subject to penalties as described in Section 6 LEGAL RELATIONS AND RESPONSIBILITIES of the County Specifications.

D. The limits of disturbance for construction staging and carrying out the Work are shown on the Plans. All construction equipment, temporary facilities, staging, materials handling and storage, shall be confined to the limits of the temporary construction easement (TCE) and temporary construction access (TCA) indicated on the Plans and street rights-of-way, as permitted by the Engineer. Contractor shall secure additional staging area as required with no additional costs to the Owner.

E. The Contractor may acquire permission to use private property outside the TCE and Public Right-of-Way (PRW) for the purpose of conducting the Work of this Project. Such acquisitions shall be at the Contractor's cost. Should the Contractor acquire permission to use property outside the TCE and PRW, the Contractor shall submit for the Engineer's records copies of the agreements it enters into for access and use of property(ies) outside the TCE and PRW.

F. The Contractor shall restore all private property to match pre-construction conditions. Any damage to landscaping and/or hardscaping shall be the responsibility of the Contractor, and shall be repaired at no additional cost to the District.

SP-16 SURVEYS

A. The grades, lines, levels, stationing and benchmarks required for the project shall be established and maintained by the Contractor. Survey controls used to develop the Contract Documents are provided in the Plans. Contractor shall match existing elevations. Verify all grades, lines, levels, and dimensions as indicated on the Plans and report any errors

or inconsistencies to the Engineer before commencing work. Contractor shall be held responsible for correctness of all work. The construction staking will be in accordance with Section 5-9 SURVEYS of the County Specifications.

B. Property markers and other minor monuments will be reestablished at the right-of-way line by the County Surveyor, at the Contractor's expense. The Contractor shall notify the County Surveyor, through the Engineer, two (2) weeks before any clearing and grubbing operations are to begin in each reach of the project so the County Surveyor may perform this work.

C. The Contractor shall supply such labor as required, at no additional cost to the District, to assist the District in checking layouts, location, and grades of the work as set by the contract, as requested by the Engineer.

D. The Contractor shall provide instruments and other survey equipment that are accurate, suitable for the surveys required in accordance with recognized professional standards, and in proper condition and adjustment at all times.

E. The cost of surveying required to support the project shall be included in the prices bid in the schedule for the other items of work.

SP-17 EXISTING UTILITIES

A. Attention is directed to County Specifications Section 6-11 EXISTING UTILITIES, and these Special Provisions.

B. The Contractor shall take adequate measures to insure that his operations do not harm any existing underground facilities not specifically mentioned or shown on the Plans.

C. The Contractor is required to pothole all existing utilities, including Sacramento Area Sewer District pipes, to verify location and elevation a minimum of one (1) weeks prior to work, and prior to ordering or purchasing equipment or materials for construction of new facilities, to allow for potential redesign if necessary.

D. The Contractor is required to hand excavate a minimum of two (2) feet each side of any existing utility prior to the use of power excavating equipment.

E. The toll-free number for Underground Service Alert North (USA North) is811 or (800) 642-2444. The Contractor is required to mark the work area and call USA North two (2) working days in advance of performing excavation work.

F. Utility services to individual parcels are not shown on the plans. Contractor shall locate, protect and/or restore all utility services impacted by the project at no additional cost to the District.

G. Irrigation piping on private property/individual parcels is not shown on the plans. Contractor shall locate protect/restore all irrigation piping impacted by the project construction at no additional cost to the District, unless indicated otherwise on the plans. All existing irrigation piping shall be repaired within 4 hours. If, for some reason, repairs cannot be made within this timeframe, the Contractor shall provide an auxiliary irrigation system for all affected areas at no additional cost to the District.

H. Access to existing facilities shall be authorized by the District in advance of Contractor Access. The Contractor shall provide a District Access Permit (Appendix XX) twenty (20) calendar days in advance of required access.

SP-18 DUST CONTROL

A. Refer to Section 303 – DUST CONTROL of the Sacramento Area Sewer District Standard Construction Specification and to Section 10-1 – DUST CONTROL of the County of Sacramento Standard Specifications.

B. During the performance of the Work required by these Specifications or any operations appurtenant thereto, whether on right-of-way provided by the District or elsewhere, furnish all labor, equipment, materials, and means required, and carry out proper and efficient measures wherever and as often as necessary to reduce the dust nuisance, and to prevent dust or dirt which has originated from construction operations from damaging landscaping, existing streets, fields, and dwellings, or causing a nuisance to persons. Water sprinkling shall not be used for dust control when it creates mud or flooding on public streets. The Contractor will be held liable for any damage resulting from dust originating from his operations under these specifications on District right-of-way or elsewhere.

C. The cost of sprinkling, street cleaning, or of other methods of controlling dust shall be included in the prices bid in the schedule for the other items of work.

SP-19 SEWER FLOW CONTROL

A. The existing sanitary sewer system and all other utilities within the project limits shall remain in service at all times during construction. Safe plugging and sewer flow control measures shall be undertaken by the Contractor to insure uninterrupted trunk sewer flows and flows from all collector sewers and laterals at all times. Bypass and plugging criteria taken from the District's hydraulic sewer model, including estimated peak dry weather flow, allowable pugging time, and available capacity at downstream manhole, is provided in Appendix XX.

B. The Contractor shall submit a Bypass Pumping Plan (BPP) for approval in accordance with SP-07 within thirty (30) days after NTP and in advance of any service outage requests. BPP requirements are outlined in Section 302.2 SEWAGE BYPASS PUMPING AND FLOW CONTROL in the SASD Standards and Specifications.

In addition to the information required to be submitted in the SASD Standards and Specifications, the Contractor shall submit the following information as part of the BPP:

1. Drawings indicating the scheme and location of temporary sewer plugs and bypass discharge lines. The drawings shall also show the method and location for discharging the bypass lines. All bypass equipment and lines shall be located within the TCE/or PRW.

2. Capacities of pumps, prime movers, and standby equipment.

3. Design calculations proving adequacy of the system and selected equipment.

4. Standby power source.

5. Bypass system monitoring plan to include, but is not limited to, frequency of inspection of both intake and discharge locations, low manhole, time of day, and conditions. Monitoring logs, accounting for items outlined in the monitoring plan, are to be developed, maintained, and submitted to the District on a weekly basis for review.

6. Show suction and discharge points with elevations and stationing on the design plans.

7. Provide pump performance curves.

8. Submit calculations to verify suction lift of pumps has not been exceeded.

9. Contractor shall submit proposed noise control and exhaust control plans for pumping equipment that meets all California State regulatory and Sacramento County ordinance requirements.

10. Contractor shall submit a proposed plan for disruption of sewer service laterals.

11. Contractor shall include a bypass piping inspection plan.

12. Contractor shall include a sanitary sewer overflow (SSO) response plan.

Note:
Approval of submitted the BPP for sewer connection and temporary rerouting shall in no way relieve the Contractor of his responsibility for the protection of adjacent properties, drainage systems, water tributaries, and environment against sewage spill. Any litigation, claims, fines, etc. associated with any sewage spill shall be the sole responsibility of the Contractor.

C. The bypass pumping system shall be designed to normally maintain the wastewater flow below the top of the pipe, without surcharging.

D. The Contractor shall maintain on site a sufficient number of valves, tees, elbows, connections, tools, sewer plugs, piping, hoses and other parts of system hardware to ensure immediate repair or modification of any part of the system as necessary.

E. The Contractor shall coordinate flow control for individual and collective service sewers with the property owner and District.

F. Sewer flow control piping shall be installed in permanent easements, TCE, or PRW unless specifically noted otherwise on the Plans or approved by the District in writing.

G. Discharge of untreated or partially treated sewage to surface waters or drainage courses is prohibited during construction. Contractor is responsible for immediate and proper cleanup should any spill occur, regardless of amount. In the event accidental discharge is caused by the Contractor's operations, the District shall immediately be entitled to employ others to stop the discharge without giving written notice to the Contractor. If a contractor-initiated discharge occurs, the contractor will pay the District a penalty of $5,000 per bypass/day and per permit violation or any fines imposed including: State and Federal agencies, courts, third party suits, and shall be responsible for any SSO caused by their work including all cleanup, restoration, and fines.

H. The bypass system shall have an attendant around the clock whose only duty is to maintain the bypass pumping system until the bypassing of that specific pipeline is no longer required. The Contractor shall inspect the entire bypass pumping and piping system for leaks for spills on an hourly basis. The Contractor shall also create an inspection log and shall enter the time of the inspections and the condition of the piping and the name of the inspector into the log for review by the Engineer. Logs shall be submitted weekly for review by the Engineer.

I. The Contractor shall be qualified for confined space entry prior to accessing District facilities.

J. Contractor shall obtain SASD Access Permit approval prior to implementing any flow control measures as required in SP-17.

K. The Contractor shall provide public notification of service interruption as required in SP-37.

L. The bypassed flow shall be continuously monitored at the low manhole during bypass pumping to insure a properly functioning system.

M. If plugging is approved by the District in specific locations, plug shall be located at downstream end of pipe for ease of plug removal.

SP-20 EXISTING SEWAGE FLOWS

Existing sewage flows within the existing sanitary sewer system varies throughout the project, and estimated flows are provided in Appendix XX. The Contractor assumes the responsibility to make any investigations he deems necessary to characterize the working environment. Flow conditions vary significantly depending on the time of day and during wet weather conditions. The District assumes no responsibility for varying flow conditions.

SP-21 NOISE ABATEMENT

The noise level from the Contractor's operations, between the hours of 9:00 p.m. and 7:00 a.m., shall not exceed 50dBA at a distance of 50 feet. This requirement in no way relieves the Contractor from responsibility for complying with local ordinances regulating noise level, including the City of Citrus Heights Noise Ordinance and Sacramento County Code (SCC), Title 6, Chapter 6.68. The Contractor shall be aware that noise complaints from the public may cause permits to be revoked.

Refer to Section 12-1.09.B NOISE of the County Specifications for additional noise abatement requirements. General requirements for noise mitigations include the following:

A. VEHICLE OPERATION

1. All vehicles shall be turned off if they are not required to be moved or operated within 5 minutes of being brought to a stop or the equivalent of a full stop.
2. If necessary, vehicles shall be modified to operate auxiliary equipment using power takeoff systems using the lowest possible engine speed. That is, the necessity of running the engine at full or near full speed shall not occur unless it can be demonstrated that a change is not possible.

B. EXHAUST SYSTEMS – INTERNAL COMBUSTION ENGINES

1. All equipment with internal combustion engines used on the Work that remain at the job site permanently or for extended periods and operating shall be fitted with critical grade exhaust silencers or multiple standard grade silencers.
2. Equipment and vehicles that are at the site only temporarily or for short intervals shall include an exhaust silencer equal to that provided by the original equipment manufacturer. This is the silencer required to meet Federal drive-by sound level limits.
3. The Contractor shall meet all Sacramento Metropolitan Air Quality Management District requirements.

C. ENGINE COWLINGS

1. All equipment shall have engine cowlings that shield the engine from all noise-sensitive receptors.
2. These engine cowlings shall be in place and in the closed position to provide the maximum sound reduction.

D. Equipment that generates pure tones or impact or impulse sound should be modified to reduce or eliminate the influence of these characteristics.

SP-22 RESTORATION OF SURFACES

The restoration of surfaces shall conform to Section 327 RESTORATION OF SURFACES, in SASD Standards and Specifications and/or as specified within the contract documents and no additional compensation will be allowed.

SP-23 TRAFFIC CONTROL

A traffic control plan (or plans) shall be prepared in accordance with Section 12-4.02 TRAFFIC CONTROL PLANS of the County Specifications and submitted for review for any work requiring modifications of existing traffic patterns. The Contractor may use the Sacramento County Traffic Control Plan Templates available at https://sacdot.saccounty.net/pages/trafficcontrolplansanddetourplans.aspx. Traffic control plan (or plans) shall be submitted to the Engineer and will be reviewed by the agency (or agencies) having jurisdiction. The traffic control plan (or plans) shall include provisions for vehicular, pedestrian, and bicyclist access. Additionally, the traffic control plan (or plans) shall address traffic signal operation for any work performed within 200 feet of a signalized intersection.

SP-24 CONSTRUCTION PROGRESS MEETINGS

The Contractor shall attend and participate in a pre-construction conference in accordance with County Specifications Section 7-3 PRECONSTRUCTION

CONFERENCE AND PROGRESS MEETINGS. In addition, the Contractor shall attend and participate in construction progress meetings every one week with the District or as directed by the Engineer. Subcontractors shall also attend as necessary. Progress meeting minutes will be recorded and distributed by the Engineer. The construction progress meetings will be held at a location convenient to the work. The location for the first progress meeting will be determined at the pre-construction conference.

Locations for each subsequent progress meeting shall be agreed upon at the meeting immediately preceding it or as directed by the Engineer. In addition, at the request of the Engineer, the Contractor shall attend any pre, post or during construction community meeting related to this project. A two-day advanced notice will be given.

SP-25 FLOOD CONDITIONS

Portions of the sanitary sewer main route are within the 100-year flood plain and are periodically subject to flooding. The Contractor shall take all precautions to protect the work and their equipment from a possible flood event.

SP-26 CONFINED SPACE

A. Existing sanitary sewer (including excavations, pipelines, junction structures, and other areas that may vent to one of the work areas) is a permit-required confined space.

B. Contractor's compliance shall be in accordance with Section 302.4 – CONFINED SPACES of the Sacramento Area Sewer District Standard Construction Specifications, Section 12-1.05 CONFINED SPACES of the County of Sacramento Standard Specifications, and the California Code of Regulations (CCR) Title 8, General Industry Safety Orders (Cal/OSHA), Article 108, Section 5157, with the following exception:

1. Ventilation is not considered an adequate means of controlling the atmosphere when working in and around sewers.

C. The District has determined based on past experience or knowledge that an environment free of dangerous air contamination and/or an oxygen deficiency cannot be guaranteed.

As such, the District requires positive pressure respirators in all confined space entries with potential exposure to actively flowing sewer or systems that have contained flow.

The use of supplied air has been necessary for safe entry or work in a large percentage of confined spaces that are part of or connected to the in-service (live) sewer systems. Contractor's bid shall include the use of supplied air type respirators as a requirement for confined space entry and/or work in confined spaces associated with the live existing sewer system. Entrants shall be trained in the use of, and be equipped with, the

following equipment as required for protection: Positive pressure respirators with supplied air, escape self-contained breathing apparatus (ESCBA) with at least 10 minute air supply, hard line communication systems.

D. The Contractor shall employ qualified personnel for directing and performing all confined space work.

E. The Contractor will not be permitted to enter, or perform any work in, a permit-required confined space area until:

1. The confined space submittal has been approved by the Engineer.
2. The required numbers of suitably trained personnel are onsite.
3. All required monitoring, safety, and communication systems are onsite.
4. Contractor has demonstrated that all required safety equipment has been recently checked and is in good working order.

F. Contractor must apply all required safeguards. Engineering controls shall always be considered first. Next, administrative controls shall be applied. As a last resort, personal protective equipment shall be used.

G. Continuous air monitoring must be performed during all confined space entries. The monitoring instrument must have chlorine, CO, H_2S, O_2, and Lower Explosive Limit (LEL) sensors at a minimum, and provide both audible and visual alarm features.

H. If it is determined that the established procedures are not being complied with, or that any of the monitoring or safety equipment is malfunctioning, the work shall be stopped immediately. No payment will be authorized for any incomplete work. No increase in contract cost or extension of contract time will be allowed for any time lost due to this mandated cessation of work.

I. Submittals: The Contractor shall submit a confined space pre-entry and work procedure for review by the Engineer thirty (30) calendar days prior to entry of a confined space. Submittals shall be made in accordance with Section 12-1.05 CONFINED SPACES of the County Specifications, checklist in Part 6 below, and SP-07 SUBMITTALS. At a minimum, the submittals shall include:

1. A detailed description and step-by-step procedure of the proposed method of construction for all work within confined space areas. Include a step-by-step procedure for entry of excavations and District-owned facilities.
2. A list of all equipment to be used in the confined space.
3. Detailed written procedures for safe entry, rescue, and emergency services for confined space operations, and copies of all forms to be used.

4. Clear delegation of responsibilities, authority, and accountability for all employees involved in the entry. Authorized entrant(s) and standby employees shall be trained in confined space procedures, familiar with all equipment, and able to recognize hazardous conditions.
5. Employee training records (i.e. certificates) as well as records pertaining to the use of respiratory equipment (i.e. medical approval)
6. Checklist of Contractor's Submittal: Requirements for permit required confined space operation procedure.
    a. The Contractor's submittal must contain a detailed description of the work.
    b. The Contractor's submittal shall identify all equipment to be used including:
        1) The specific type and number of supplied-air respirator (SA) or self contained breathing apparatus (SCBA) plus escape bottle, to be available on site for use by both entry worker and standby employee during all phases of the project.
        2) The type of continuous atmospheric monitoring equipment to be used and also where the equipment will be located with respect to the confined space.

        Also state when and how monitor's accuracy was last tested.

        3) The type and range of any communication equipment to be used.
        4) The type of life line/safety harness and lifting hoist.
        5) The type and description (CFM, Electric vs. Gas, Push Pull) of ventilation equipment if used.
        6) The type and description of any lighting, power tools, or other supporting systems and equipment to be used in the confined space. Special attention should be paid to avoiding possible ignition sources; intrinsically safe equipment shall be used.
        7) Type and description of any other equipment required by the Contractor's method of construction to complete work in the confined space area.
    c. The submittal shall include copies of all records and documentation forms associated with the confined space operating procedures; including the proposed entry permit.
    d. The Contractor's submittal shall include clear and concise operating and rescue procedures, including notification procedures, name and contact information of the

emergency response agency, and method of communication with an outside rescue source, which incorporates the following provisions:

1) Specific language requiring that copies of the procedure be distributed to Contractor's affected employees and subcontractors and made available on site.

2) Specific language defining the air quality parameters that will be tested for and must include provisions for the following existing or anticipated concentrations as a minimum:

i) Lack of oxygen (less than 19.5% - 23.5% by volume) or oxygen enriched (greater than 23% by volume).

ii) Presence of combustible gases and vapors specifically Methane [greater than 10% of LEL (Lower Explosive Limit)].

iii) Presence of toxic air contaminants.

Contractor shall test in the order listed above.

e. Records: Signed copies specifically require that continual monitoring of work area with a multi-gas detector will be conducted and that findings will be recorded and shown to work crew.

f. Specifically require that members of the Contractor's confined space entry crew are trained in operating and rescue procedures including instructions as to handling any hazards they may encounter.

g. Specifically require that Contractor's employees entering a permit required confined space will be specially trained and wearing approved SA or SCBA gear plus escape bottle as well as a safety harness and life line (half inch min. diameter and 2000 lb. Test), the free end of which is to be secured outside of opening. (Note: Harness and life-line may be eliminated only if is shown that its presence would further endanger the life of the worker in the confined space.)

h. Specifically require that at least one specially trained person shall be on standby outside the confined space ready to assist in case of an emergency and that the standby person shall have their own independent SA or SCBA gear on hand. The submittal must clearly indicate that the standby person may enter the confined space in case of an emergency

ONLY after he informs the third person indicated below of his intent.

i. Specifically require an additional third person to be within sight or calling distance to go for help.

j. Specifically require that if entry is through a top opening, the safety belt provided shall be of the harness type and a hoist shall be provided for lifting workers out of the confined space.

k. Specifically prohibit the use of ignition causing equipment or open flame in or near any confined space work area unless additional specially approved precautions are taken.

7. Records: Signed copies of the Contractor's completed pre-entry check lists shall be filed with the Engineer each time a permit-required entry is entered for the first time during a shift.

SP-27 INSURANCE REQUIREMENTS

A. GENERAL LIABILITY: Subparagraph of the first paragraph of Section 3-9.01, "GENERAL LIABILITY" of the County Specification is amended to read as follows:

Each Occurrence or Claim	$5 Million Dollars ($5,000,000)
Products and Completed Operations Aggregate	$5 Million Dollars ($5,000,000)
Personal and Advertising Injury	$1 Million Dollars ($1,000,000)
General Aggregate	$5 Million Dollars ($5,000,000)
Fire Damage	One Hundred Thousand Dollars ($100,000)

B. AUTOMOBILE LIABILITY: Subparagraph of the first paragraph of Section 3-9.02, "AUTOMOBILE LIABILITY" of the County Specification is amended to read as follows:

Bodily Injury and Property Damage
Combined Single Limit: Three Million Dollars ($3,000,000)

C. INSURANCE PROVISIONS: Builders Risk Insurance

1. Insurance requirements shall be in accordance with Section 3-9.07 of County Specifications except as modified herein:

a. Builder’s Risk Insurance: District shall procure, maintain, and keep in force at all times during the term of the Contract and until the date of transfer of the insurable interest to and acceptance by the District, at the District's sole expense, Builder's Risk insurance with limits of liability equal to one hundred percent (100%) of the replacement cost of the Work, which shall include the cost of materials and the cost of labor to install materials. The Contractor and sub-contractors shall be included under the District’s Builder’s Risk insurance and listed on a certificate of insurance as additional insurers. The District’s Builders Risk insurance shall contain a waiver of subrogation in favor of the Contractor and sub-contractors on the project.

b. The District’s Builder’s Risk insurance shall cover the project for loss or damaged due to all risks of physical damage or loss, land movement and flood.

c. The Contractor shall be responsible for the first $25,000, per occurrence, of any loss caused by all risks of physical damage or loss and flood. The Contractor shall not be responsible for the deductible if the loss is caused by land movement.

D. ENVIRONMENTAL LIABILITY INSURANCE: Insurance requirements shall be in accordance with Section 3-9.08 of County Specifications except as modified herein:

1. Contractor, or its environmental sub-contractor, shall procure, maintain, and keep in force at all times during the term of the Contract, at the Contractor’s sole expense, Contractor’s Pollution Liability insurance with limits not less than:

2.

Each Occurrence or Claim	$5 Million Dollars ($5,000,000)
General Aggregate	$5 Million Dollars ($5,000,000)

3. The Contractor or its environmental sub-contractor shall name the Sacramento Area Sewer District (formerly known as County Sanitation District 1) and the County of Sacramento as additional insureds on the Contractor’s Pollution Liability insurance policy. The Contractor’s Pollution Liability insurance policy shall not contain any cross liability limitations as regards the Sacramento Area Sewer District and the County of Sacramento as additional insureds. The Contractor or its environmental sub-contractor’s Automobile Liability

insurance shall be endorsed to include pollution liability coverage with a combined single limit for bodily injury and property damage of not less than Five Million Dollars ($5,000,000).

E. RESPONSIBILITY FOR FINES FOR VIOLATION OF ENVIRONMENTAL REGULATIONS

Contractor shall assume sole responsibility for and payment of any fines levied on either the District, the County of Sacramento, or the Contractor by any local, state or federal authority (hereinafter Authority) for breaches of the Authority's environmental regulations. The Contractor agrees to be solely liable for the payment of all fines regardless of whether the fines are a result of the sole or partial acts or omissions of the Contractor. In addition, the Contractor understands and acknowledges that, during the course of construction, the environmental regulations implemented or imposed by the Authority on the District may change and the Contractor specifically agrees to comply with any future environmental regulations implemented or imposed by the Authority on the District.

Contractor shall pay all fines levied by the Authority on the Contractor or the District when levied or, if the Contractor believes that a violation of the Authority's regulations did not occur, appeal the levy of the fine to the Authority. Until the fine is paid or withdrawn by the Authority, the District shall deduct the amount of the fine from the monthly partial payments owed the Contractor for work performed on the project and hold the payment(s) in reserve until the fine is paid or withdrawn by the Authority. After the Contractor pays the fine or, the Authority withdraws the fine, the District will pay the withheld monies to the Contractor with the next monthly partial payment for work performed on the project.

SP-28 ARCHEOLOGICAL PROVISIONS

The Contractor during the course of construction shall follow the requirements of SP-30, ENVIRONMENTAL MITIGATION AND MONITORING MEASURES and Section 10-12, ARCHEOLOGICAL AND CULTURAL RESOURCES of the County Specifications.

SP-29 EXISTING TREES

The Contractor during the course of construction shall follow the requirement of SP-30, ENVIRONMENTAL MITIGATION AND MONITORING MEASURES and Section 10-13, PROTECTION OF EXISTING TREES of the County Specifications. A copy of the project arborist report is provided for reference in Appendix XX.

SP-30 ENVIRONMENTAL MITIGATION AND MONITORING MEASURES

A. The Contractor shall provide schedule information and general construction activity information to the Engineer's Public Outreach officer

when requested. Contractor shall cooperate with public outreach activities as requested by the Engineer.

B. Permits for the Creek Crossing Project are included as Appendix XX of this specification. Mitigation measures for which the Contractor must comply are included in the plans and specifications, as well as in the attached permits. The permit packages include the following:

1. State of California Department of Fish and Wildlife (DFW) Notification of Lake or Streambed Alteration (404)
2. U.S. Army Corps of Engineers South Pacific Division Nationwide Permit Pre-Construction Notification (PCN) Form
3. California Regional Water Quality Control Board Central Valley Region Section 401 Water Quality Certification Application Form

C. The following summary of BMPs to protect fish, wildlife, plant, and historical resources is provided as a courtesy overview, but does not relieve the Contractor from meeting all requirements as outlined in the Project permit and contract documents.

1. Details to be added at after Draft IS/MND prepared.

D. In addition to the requirements set forth within the permits provided in Appendix XX, the Contractor shall prepare, submit, and provide necessary BMPs in accordance with an Erosion and Sediment Control Plan to comply with the Sacramento County Stormwater Ordinance.

E. FIRE CONTROL

Work within the construction zone, staging areas, welding areas, or areas slated for use of spark producing equipment shall be cleared of dried vegetation or other materials that could serve as fire fuel. The Contractor shall keep these areas clear of combustible materials in order to maintain a fire break.

Any construction equipment that normally includes a spark arrester shall be equipped with an arrester in good working order. This includes, but is not limited to, vehicles, heavy equipment, and chainsaws.

SP-31 WORK RESTRICTIONS AND CONDITIONS

A. The Contractor shall comply with Section 7 PROSECUTION OF THE WORK of the County Specifications.

B. No open trenches will be allowed during non-working hours. The Contractor shall ensure that trenches and excavations are filled and compacted or covered with steel plates to provide safe passage for pedestrians and vehicles.

C. It is anticipated that the Contractor will only be allowed to perform work within the creeks (top of bank to top of bank) between May 1 and October 1 each year. All work shall be complete within the creeks by October 1 each year. This includes removal of any and all equipment and materials from the creeks, and restoration of the creek to pre-project conditions.

D. All work, and subsequent restoration activities, within privately owned residential property must be completed within 6 weeks of mobilization to the site to avoid excessive nuisance to homeowners. No work within privately owned residential property shall begin prior to 8:00 AM.

E. WORK PERCENTAGES

The Contractor shall perform at least Fifty Percent (50%) of the Contract bid amount. This portion of work shall encompass the performance of work by the Contractor's forces and equipment, the procurement of materials and equipment by the Contractor and field related general conditions required to support and supervise the construction effort.

The Contractor shall provide a detailed breakdown of the planned distribution of work, by dollar amount specifically indicating the aforementioned Contractor's work percentage, prior to the NTP.

Failure to comply with the aforementioned percentage may result in monetary penalties and/or contract termination.

Subcontractors shall not be responsible for the performance of any work or procurement of materials and equipment within the above Contractor's work percentage allotment.

F. ACCESS FOR OPERATING PERSONNEL

The Contractor's attention is drawn to the fact that during the course of the work of this Contract, adjacent existing facilities will be used and maintained by District personnel. The Contractor shall coordinate its work in such a way as to interfere as little as possible with the routine work of existing facilities except in direct pursuit of the work of this Contract and as favorably reviewed by the Engineer. The Contractor shall provide safe access at all times to all existing facilities for operating personnel and equipment.

G. ENVIRONMENTAL CONSTRAINTS

The Contractor is advised that construction activities will be restricted by environmental mitigation and monitoring measures addressed in Section SP-30 ENVIRONMENTAL MITIGATION AND MONITORING MEASURES and various permits and agreements addressed in SP-12 PERMITS AND LICENSES.

H. OFF-PERIOD WORK

A written request to work at any time on Saturdays, Sundays, or legal holidays, or to close a lane of traffic during peak hours must be submitted to the District and to agency having jurisdiction, at least two (2) Working Days in advance of the intended work. The Contractor's request will be evaluated to determine if there is a benefit to the District, a nuisance or a hazard to the public, the project, or the area surrounding the site, and if the Contractor shall pay all overtime costs related to the off-period work. The

District or agency having jurisdiction may place conditions on any approval of off-period work based on this analysis.

I. WORK HOURS

Normal work periods shall be Monday through Friday excluding legal holidays during the times outlined as follows:

Within the County of Sacramento 7:00 a.m. to 6:00 p.m. except that no lane of traffic shall be closed to the public during the peak hours of 6:30 a.m. to 8:00 a.m. and 3:30 p.m. to 6:00 p.m., except as necessary for the proper care and protection of work already performed or in case of an emergency repair and only with the Agency's written permission. Work within private residential property shall be occur between 8:00 a.m. and 6:00 p.m.

SP-32 MEASUREMENT AND PAYMENT

**TO BE INCLUDED AT 90% DESIGN PHASE

SP-33 REFERENCE DOCUMENTS

A. GEOTECHNICAL REPORT

A geotechnical engineering investigation and report have been prepared for design purposes by Fugro USA Land, Inc.

1. Geotechnical Investigation Report,
   Sacramento Area Sewer District
   Creek Crossing Project Sacramento, California
   Date: XXXX

This report is included in Appendix XX.

B. ACCESS PERMIT FORM

A copy of the standard SASD Access Permit form required for approval prior to accessing or entering any existing sewer facilities is provided in Appendix XX.

C. SEWER BYPASS REPORT

A sewer bypass report has been prepared by SASD documenting the anticipated peak dry weather flows, plug times, and downstream capacity for each of the priority sites to aid bidders in determining the appropriate sewer bypassing. A copy of the report is provided in Appendix XX.

D. ARBORIST REPORT

The project arborist report was prepared by Montrose Environmental Solutions and is included in Appendix XX.

E. PERMIT PACKAGES)

Project permit from DFG, USACE, and the RWQCB are included in Appendix XX

F. EXISTING CLOSED CIRCUIT TELEVISION RECORDINGS

A random sample of recordings on DVD is available upon request. Fax request for DVD to 916-876-6159 or submit request to project Engineer.

SP-34 ESCROW BID DOCUMENTS

A. SCOPE

1. The three low bidders shall submit to the Contracts Desk at 9660 Ecology Lane, Sacramento, CA 95827, within the specified time after receipt of bids, one copy of all documentary information generated in preparation of bid prices for this project. This material is hereinafter referred to as Escrow Bid Documents (EBDs). The Escrow Bid Documents of the successful bidder will be held in escrow for the duration of the contract.
2. The successful bidder agrees, as a condition of award of the Contract, that the Escrow Bid Documents constitute the only complete documentary information used in preparation of his bid. No other bid preparation information shall be considered in resolving disputes.
3. Nothing in the Escrow Bid documents shall change or modify the terms or conditions of the Contract.

B. OWNERSHIP

1. The EBDs are and shall always remain the property of the Contractor subject only to joint review by the District and the Contractor, except as provided for herein.
2. The District stipulates and expressly acknowledges that the EBDs, as defined herein, constitute trade secrets. This acknowledgment is based on the District's express understanding that the information contained in the EBDs is not known outside the Contractor's business, is known only to a limited extent and only by a limited number of employees of the Contractor, is safeguarded while in the Contractor's possession, and is extremely valuable to competitors by virtue of it reflecting the Contractor's contemplated techniques of construction.
3. The District acknowledges that EBDs and the information contained therein are made available to the District only because such action is an express prerequisite to award of the Contract. The District acknowledges that the EBDs include a compilation of information used in the Contractor's business, intended to give the Contractor an opportunity to obtain an advantage over competitors who do not know of or use the contents of the documentation. The District agrees to safeguard the EBDs and all information contained therein to the fullest extent permitted by law.

C. PURPOSE

1. EBDs will be used to assist in the negotiation of price adjustments and variations and in the settlement of disputes, claims, and other controversies. They will not be used for pre-award evaluation of the Contractor's anticipated methods of construction or to assess the Contractor's qualifications for performing the Work.

D. FORMAT AND CONTENTS

1. Bidders may submit EBDs in their usual cost estimating format. It is not intended that extra work is required in preparing the bid but to ensure that the EBDs will be adequate to enable complete and proper understanding and proper interpretation for their intended use. The EBDs shall be in the English language only.
2. The EBDs shall clearly itemize the estimated costs of performing the work of each item contained in the Bid Schedule. Items should be separated into sub-items as required to present a complete and detailed cost estimate and allow a detailed cost review. The EBDs shall include all quantity take-offs, crews, equipment, calculations of rates of production and progress, copies of quotations from sub-

contractors and suppliers, and memoranda, narratives, consultants reports, add/deduct sheets and all other information used by the Contractor to arrive at the prices contained in the bid. Estimated costs shall be broken down into the Contractor's usual estimate categories such as direct labor, repair labor, equipment operation, equipment ownership, expendable materials, permanent material and subcontract costs as appropriate. Plant and equipment and indirect costs should be detailed in the Contractor's usual format. The Contractor's allocation of plan and equipment, indirect costs, contingencies, mark-up and other items to each bid item shall be clearly indicated.

3. The EBDs shall clearly show in calculations, text, or both, the relationship between baseline indications presented in the contract Documents and assumptions that form the basis for the Contractor's means, methods, equipment selection, rates of production, and costs.

4. All costs shall be identified. For bid items where the extended amount is less than $10,000, estimated unit costs are acceptable without a detailed cost estimate, providing that labor, equipment, materials and subcontracts, as applicable, are included and provided that indirect costs, contingencies, and mark-up, as applicable, are allocated.

5. Bid Documents provided by the Owner should not be included in the EBDs unless needed to comply with the above requirements.

E. SUBMITTAL

1. The EBDs shall be submitted to the Contracts Desk at 9660 Ecology Lane, Sacramento, CA 95827 by the three lowest bidders in a sealed container by 3:00 PM Pacific Time on the first Monday following bid opening. The container shall be clearly marked on the outside with the Bidder's name, date of submittal, project name, Contract No., and the words "Escrow Bid Documents."

2. The EBDs shall be accompanied by the "Bid Documentation Certification", signed by an individual authorized by the bidder to execute the bid, stating that the material in the Escrow Bid Documentation constitutes all the documentary information used in the preparation of the bid and that he or she has personally examined the contents of the EBDs container and has found that the documents in the container are complete.

"Escrow Bid Document Certification"

THE UNDERSIGNED HEREBY CERTIFIES THAT THE BID DOCUMENTATION CONTAINED HEREIN CONSTITUTES ALL

THE INFORMATION USED IN PREPARATION OF THE BID AND THAT I HAVE PERSONALLY EXAMINED THESE CONTENTS AND HAVE FOUND THAT THIS BID DOCUMENTATION IS COMPLETE.

SIGNATURE:_____
NAME:_____(Print)
TITLE:_____
FIRM:_____
DATE:_____

3. Prior to award of the contract, the EBDs of the apparent successful bidder will be examined, organized, and inventoried by representatives of the Owner, together with members of the Contractor's staff who are knowledgeable in how the bid was prepared. This examination is to ensure that the EBDs are authentic, legible, and complete. It will not include review of and will not constitute approval of proposed construction methods, estimating assumptions, or interpretations of the contract documents. Examination will not alter any condition(s) or term(s) of the Contract.
4. If all documentation required in SP-34 (D) "FORMAT AND CONTENTS" of the Special Provision, has not been included in the original submittal, additional documentation shall be submitted, at the Owner's discretion, prior to award of the Contract. The detailed breakdown of estimated costs shall be reconciled and revised, if appropriate, by agreement between the Contractor and owner before making the award.
5. If the Contract is not awarded to the apparent successful lowest bidder, the EBDs of the next bidder to be considered for award shall be processed, as described above.
6. Timely submission of the complete EBDs is an essential element of the bidder's responsibility and a prerequisite to contract award. Failure to provide the necessary EBDs within the specified time frame will be sufficient cause for the Owner to reject the bid.
7. If the bidder's proposal is based on subcontracting any part of the Work, each subcontractor whose total subcontract price exceeds five percent of the total contract price proposed by the bidder, shall provide separate EBDs to be included with those of the bidder. These documents will be opened and examined in the same manner and at the same time as the examination described above for the apparent successful bidder.
8. If the Contractor wishes to subcontract any portion of the Work after award, the Owner retains the right to require the Contractor

to submit EBDs from the subcontractor before the subcontract is approved.

9. EBDs submitted by unsuccessful bidders will be returned unopened, unless opened as provided for above, following award of the Contract.

F. STORAGE

1. The EBDs shall be placed in escrow prior to award of the contract, for the life of the Contract, in a mutually agreeable institution. The cost of storage will be borne by the Owner.

G. EXAMINATION

1. The EBDs shall be examined by both the Owner and the Contractor, at any time deemed necessary by either the Owner or the Contractor, to assist in the negotiation of price adjustments and change orders, or the settlement of disputes.

   Examination of the EBDs is subject to the following conditions:

   a. As trade secrets, the EBDs are proprietary and confidential as described above.
   b. The Owner and the Contractor shall each designate, in writing to the other party a minimum of ten days prior to examination, representatives who are authorized to examine the EBDs. No other person shall have access to the EBDs.
   c. Access to the EBDs will take place only in the presence of duly designated representatives of both the Owner and the Contractor.

H. FINAL DISPOSITION

1. The EBDs will be returned to the Contractor at such time as the Contract has been completed and final settlement has been achieved.

SP-35 PROJECT CONTROL

A. The Owner will use and maintain a Project Control System (PCS) as a means of communicating correspondence related to the Contractor's Submittals, RFI, Advisory Notices, Non-Compliance Issues, and formal project correspondence via the Internet. The Contractor shall be required to use this PCS for its administrative communications with the Engineer in the processing of all submittals and RFIs. The PCS is a web-based server using SharePoint and will provide a location for

correspondence related to the project. All other correspondence shall be submitted to the Engineer via e-mail or in writing. The Contractor and all PCS participants shall be responsible for frequent monitoring of the SharePoint documents and delivery status.

Note that the use of the PCS does not waive the requirement for the provisions of hard copies of all formal correspondence, submittals, and RFIs. The hard copies of all documents must match the electronic copies of correspondence, RFIs, and submittals.

B. Equipment – To process submittals and RFIs, the Contractor must have in place the required basic components outlined below:

1. Hardware – Computers and a color flatbed scanner, with a minimum resolution of 600 dpi x 1200 dpi, capable of scanning document sizes up to 11-inch x 17-inch.
2. Software – Adobe Acrobat Pro DC, Microsoft EDGE, Microsoft Office 2016 or higher. Other software may be utilized if compatible with the Owner's standards and approved by the Owner.
3. Facilities – The Contractor shall provide high speed Internet access (minimum 1.5 MBPS downstream, 384 KBPS upstream) within 14 calendar days after the Contractor's site facilities installation.

C. Training – To familiarize the Contractor's personnel on the use of the PCS, the Contractor is required to provide no more than four (4) of its employees proposed for the project engineering and administrative duties to attend one-two (2) hour training class. Additional Contractor's employees may be added to the training at the approval of the Owner. The Owner will train up to four (4) Contractor designated personnel on the use of the PCS and the electronic signatures. The Contractor is responsible for training replacement personnel. The Owner will provide the location, date, and time of training to the Contractor during the period between the Contract Award and the Notice to Proceed.

D. Electronic Files – Files transferred via the PCS are to be generated, scanned in, or converted to (.pdf) file format using Adobe Acrobat Reader DC or higher.

AutoCAD 2020 drawing files transferred via the PCS shall also be in (.pdf) file format. When specifically requested by the Engineer, AutoCAD 2020 files shall be made available to the Engineer in (.dwg) file format, transmitted on CD.

E. Electronic Signatures – The Engineer and the Contractor will make use of certificates for electronic signatures to process all submittals and RFIs. The electronic signatures and their certificates will be developed using the Adobe Acrobat Digital Signature plug-ins during the 2-hour

training class. The Contractor will be assigned up to four (4) digital signature licenses at one time. Only those Contractor personnel approved for access to the PCS will be able to sign the submittal transmittal sheet and the RFIs form.

F. Submittals – Submittals shall be in accordance with SP-07 SUBMITTALS. The provisions of SP-07 shall apply both to electronic copies and hard copies of submittals.

G. Project Forms – The Owner has developed the necessary electronic submittal transmittal form and the RFIs form for use by both the Contractor and the Engineer.

The Contractor shall use these forms to generate new submittals and RFIs. Through the processing of these electronic forms, SharePoint maintains a database and records the information within these forms for use by the Engineer and the Contractor.

H. The time for review and response will commence on the business day following the posting of the document(s). The time for return of the document to the Contractor shall be noted as the date following the posting of the return documents by the Owner's representative to the SharePoint.

SP-36 STORM WATER POLLUTION CONTROL

A. Water pollution control shall comply with the provisions of Section 10-4 EROSION, SEDIMENT, AND WATER POLLUTION CONTROL, of the County Specifications and these Special Provisions.

B. The Contractor shall assume responsibility for storm water runoff management and erosion and sediment control throughout the duration of the project. The Contractor shall comply with the terms of the Water Quality Order No. 2012-006-DWQ (General Permit/Order), National Pollutant Discharge Elimination System (NPDES) General Permit for Discharges of Storm Water Runoff Associated with Construction Activity (Permit No. CAS000002), and the Sacramento County Stormwater Ordinance as described in the Sacramento County Standard Specifications.

C. The Contractor shall be responsible and fully bear costs incurred by the District as a result of violations under the Federal Clean Water Act, the State Porter-Cologne Water Quality Control Act, or for unauthorized release or discharge from the work including but not limited to penalties assessed or levied, third party claims, citizen suits, labor, materials, analytical analyses, and handling of waste. Fines shall be deducted from contract payments.

D. Submittals shall be made in accordance with SP-07.

E. An Erosion and Sediment Control Plan is required in accordance with Sacramento County Standard Specification Section 10-4, and must be approved by the Engineer prior to the beginning of any construction activity.

F. The Contractor shall become fully informed with, and comply with the applicable provisions of the Permit and Federal, State, and local regulations that govern the Contractor's operations and storm water discharges from both the project site and areas of disturbance outside the project limits during construction. The Contractor shall maintain a copy of the ESCP and Permit at the project site and shall make the Permit available during construction activities.

G. Unless arrangements for the disturbance of areas outside the project limits are made by the District and made part of the contract, it is expressly agreed that the District assumes no responsibility to the Contractor and property owner whatsoever with respect to any arrangement made between the Contractor and the property owner to allow disturbance of areas outside the project limits.

H. The Contractor shall, at reasonable times, allow authorized agents of the California Regional Water Quality Control Board, State Water Resources Control Board, U.S. Environmental Protection Agency and local storm water management agency, upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon construction site and the Contractor's facilities pertinent to the work.
2. Have access to and copy any records that must be kept as specified in the Permit.
3. Inspect the construction site and related soil stabilization practices and sediment control measures; and sample or monitor for the purposes of ensuring compliance with the Permit. The Contractor shall notify the Engineer immediately upon request from regulatory agencies to enter, inspect, sample, monitor, or otherwise access the project site or the Contractor's records.

I. Within 14 calendar days after the approval of the contract, the Contractor shall submit 3 copies of the ESCP to the Engineer. The Contractor shall allow 20 working days for the Engineer to review. If revisions are required, as determined by the Engineer, the Contractor shall revise and resubmit the ESCP within 10 working days of receipt of the Engineer's comments and shall allow 10 working days for the Engineer to review the revisions. Upon approval of the ESCP, 3 additional copies of the ESCP, incorporating the required changes, shall be submitted to the Engineer.

J. Upon approval of ESCP, the Contractor shall be responsible throughout the duration of the project for installing, constructing, inspecting, and maintaining the control measures included in the document and any amendments thereto and for removing and disposing of temporary control measures. The Contractor's responsibility for implementation shall continue through any temporary suspension of work.

K. Contractor shall ensure that all employees and all employees of all Subcontractors are trained in the proposed controls, Best Management Practices (BMPs), and implementation procedures.

L. Contractor shall submit schedule of values for all BMPs.

M. Contractor shall meet all BMP requirements outlined in the permit packages provided in Appendix XX. The following provides a courtesy summary of the BMPs required to protect water quality in the creeks involved with the project, but in no way relieves the Contractor from meeting all BMP requirements set forth in the Project permit or as required by each jurisdictional agency.

1. Equipment used in and around waters of the United States shall be in good working order and free of dripping or leaking engine fluids.
2. All vehicle maintenance, staging, and materials storage shall be performed at least 50 feet from all drainages and wetlands.
3. Any necessary equipment washing shall be carried out where the water cannot flow into drainages.
4. Any surplus concrete rubble, asphalt, or other rubble from construction shall be taken to an appropriate disposal site or landfill and not deposited in creeks.
5. The ESCP shall include the following provisions and protocols:
   - Discharge from dewatering operations, if needed, and runoff from disturbed areas shall be made to conform to the water quality requirements of the waste discharge permit issued by the RWQCB.
   - Material stockpiles shall be located in non-traffic areas only. Side slopes shall not be steeper than 2:1. A filter fabric fence and interceptor dike shall surround all stockpile areas.
   - Temporary erosion control measures, such as sandbagged silt fences, shall be applied throughout construction of the proposed project and shall be removed after the working area is stabilized or as directed by the engineer. The ESCP for the project shall detail the applications and types of measures and the allowable exposure of unprotected soils.

6. Soil exposure shall be minimized through use of temporary BMPs, groundcover, and stabilization measures. Exposed dust-producing surfaces shall be sprinkled daily, if necessary, until wet; this measure shall be controlled to avoid producing runoff. Paved streets shall be swept daily following construction activities.
7. The contractor shall conduct periodic maintenance of erosion and sediment control measures.
8. An appropriate seed mix of native species shall be planted on disturbed areas upon completion of construction.
9. All temporary erosion and sediment control measures shall be removed after the working area is stabilized or as directed by the Engineer.

SP-37 PUBLIC OUTREACH

A. The Contractor shall provide public outreach through notification to affected private property owners. Notification of Contractor work shall be provided in the form of door hangers a minimum of two weeks in advance of the start of construction. Contractor shall notify the District 24 hours in advance of posting property owner notifications. The District shall provide door hangers for the Contractor's use.

SP-38 DOCUMENT PRECEDENCE

A. Any Work shown to be performed in one of the Contract Documents but not shown in another shall be executed by the Contractor as if indicated in both. In case of conflict in the Contract Documents, the following order of precedence shall govern interpretation of the Contract requirements: Section 4-6 of the Standard Specifications is modified as follows:

1. Field Instructions or Other Written Directives
2. Addenda
3. Special Provisions
4. Project Technical Specifications
5. Project Plans
6. Sacramento Area Sewer District Standards and Specifications
7. County of Sacramento Standard Construction Specifications
8. State of California Standard Plans and Specifications
9. Figure dimensions in plans take precedence over scaled dimensions
10. Detailed plans take precedence over general plans.

SP-39 CLOSED CIRCUIT TELEVISION (CCTV) INSPECTION

A. The Contractor must complete post-construction CCTV inspections of all newly constructed main lines and lower laterals for submission to the Engineer for review and approval. The submitted post-construction CCTV inspections must be completed in Granite.net. The CCTV inspection contractor must be approved by the District prior to the commencement of any CCTV inspection work.

****END OF SECTION****

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SECTION 03 21 11
CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section specifies reinforcing steel for use in reinforced concrete.

1.02 SUBMITTALS

A. The Contractor shall furnish reinforcement placing drawings, shop bending diagrams, placing lists, and drawings of all reinforcement steel prior to fabrication in accordance with the requirements of SP-07, SUBMITTALS.

B. Details of the concrete reinforcement steel and concrete inserts shall be submitted by the Contractor at the earliest possible date after receipt by the Contractor of the Notice to Proceed. Said details of reinforcement steel for fabrication and erection shall conform to ACI 315 and the requirements specified and shown. The shop bending diagrams shall show the actual lengths of bars, to the nearest inch measured to the intersection of the extensions (tangents for bars of circular cross section) of the outside surface. The shop drawings shall include bar placement diagrams that clearly indicate the dimensions of each bar splice.

C. Contractor shall submit mill tests reports for each heat of reinforcement steel.

D. Contractor shall submit all reinforcing for a given structure in a single submittal at one time. Partial reinforcing submittals may be returned to the Contractor rejected for incompleteness.

1.03 QUALITY ASSURANCE

A. If requested by the District, the Contractor shall provide samples from each heat of reinforcement steel delivered in a quality adequate for testing. Costs of tests will be paid by the Contractor.

B. Inspection: All work hereunder shall be subject to continuous inspection by a Special Inspector selected by the District and approved by the local Building Official having jurisdiction. Special Inspection shall be performed in accordance with the latest edition of the California Building Code. The Special Inspector shall work under the direct supervision of the District. All costs of such inspection shall be borne by the Contractor and shall be included in the price bid for completion of the work.

1. The Special Inspector shall observe the following work for conformance with the design drawings and specifications:
2. During placing of all reinforcing steel in concrete requiring special inspection; during the welding of all reinforcing steel.

PART 2 - PRODUCTS

2.01 BAR REINFORCEMENT

A. Reinforcing bars shall be deformed billet steel in conformance with ASTM A615, including supplementary requirements.

B. Bars shall be Grade 60.

C. Bars to be welded or field bent shall be deformed billet steel conforming to ASTM A706. ASTM A616 or ASTM A617 steel shall not be used.

2.02 WIRE FABRIC

A. Wire fabric shall be welded steel mesh conforming to ASTM A185.

2.03 WIRE AND PLAIN BARS

A. Wire used as reinforcement and bars used as spiral reinforcement in structures shall be cold drawn steel conforming to ASTM A82.

2.04 TIE WIRE

A. The wire shall be minimum 16 gage annealed steel conforming to FEDSPEC QQ-W-461H.

2.05 BAR SUPPORTS

A. Bar supports coming into contact with forms shall be CRSI Class 1 plastic protected or Class 2 stainless steel protected and shall be located in accordance with CRSI MSP-1 and placed in accordance with CRSI PRB.

B. Concrete block supports shall be provided for footing and slabs on grade.

C. Stainless steel or plastic protected plain steel supports shall be provided for other work.

PART 3 - EXECUTION

3.01 FABRICATION

A. Reinforcing steel shall not be bent or straightened in a manner which will injure the material. Bars with kinks or with bends not shown shall not be used.

B. Heating or welding bars shall be performed in accordance with AWS D1.4 and shall only be permitted where specified or approved by the Engineer. Bars shall not be welded at the bend.

3.02 PLACEMENT

A. Reinforcing steel shall be placed in accordance with CRSI PRB and CRSI MSP-1.

B. Reinforcing steel shall be positioned accurately and secured against displacement by using annealed iron wire at intersections and shall be supported by concrete or metal chairs, spacers or metal hangers. Tack welding of cross bars is not acceptable.

C. Bars shown on the drawings shall not be repositioned (buried) to act as support bars. Additional bars shall be provided as required for supports.

D. Steel rods and pegs may be used to support reinforcing steel on rock foundations.

E. Reinforcing steel shall be placed in such a manner as to not damage waterproofing membrane or plastic lining which has been previously applied or constructed.

F. Reinforcing steel shall be shop-bent or slightly relocated where necessary to clear waterstop. Reinforcing steel shall not be placed on fresh concrete or forced into fresh concrete.

G. Supports for embedded items shall not be welded to the reinforcement. Additional reinforcement may be provided for this purpose.

3.03 SPLICING

A. Reinforcing steel shall be spliced as shown. Additional splices may be provided where approved by the Engineer.

B. In slabs, beams, girders and walls, reinforcing steel shall not be spliced in areas of maximum stress. Splices of adjacent bars shall be staggered at least one splice length, unless otherwise specified. Splices in welded wire fabric shall be at least 1 1/2 meshes wide.

3.04 CLEANING

A. Reinforcing steel shall be cleaned of mill rust scale, dried concrete, or other coatings that may reduce bond.

B. Reinforcement reduced in section is not acceptable.

C. When concrete placement is delayed, reinforcement shall be cleaned by sandblasting if directed by the Engineer.

END OF SECTION

SECTION 09 96 56
FUSION-BONDED EPOXY LININGS AND COATINGS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section includes materials, application, and testing of one part, fusion-bonded, heat cured, thermosetting, 100 percent solids epoxy linings and coatings on steel, cast iron, and ductile-iron pipe and equipment.

1.02 QUALITY ASSURANCE

A. The Contractor shall comply with CAL/OSHA requirements, and the Contractor’s own safety plan requirements for confined space permitting and entry. The Contractor is responsible for all necessary confined space entry permitting, monitoring and compliance.

B. Comply with all applicable CAL/OSHA and safety standards, including but not limited to Confined Space Entry, Respiratory Protection, and Fall Prevention.

C. Contractor shall comply with Monterey Bay Air Resources District requirements and guidelines.

D. The Coating Subcontractor shall hold a valid State of California Contractor's Class C-33 Painting and Decorating Contractors license for performing abrasive blast cleaning and coating work.

E. Include on label of containers:
   1. Manufacturer's name
   2. Date of Manufacture
   3. Type of coating
   4. Manufacturer's stock number
   5. Color
   6. Instructions for reducing, where applicable
   7. Label analysis
   8. Federal specification number

F. Provide material test samples at random from sealed containers stored on-site.

G. Paint used in successive field coats are to be provided by all the same Manufacturer.

H. Field coats should not damage shop applied undercoats.

1.03 SUBMITTALS

A. Submittals shall be provided in accordance with SP-7 and shall include the following information:
   1. A copy of this specification section, with addendum updates included, with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements. A check mark shall denote full compliance with a paragraph as a whole. If deviations from the specifications are indicated, and therefore requested by the CONTRACTOR, each deviation shall be underlined and denoted by a number in the margin to the right of the identified paragraph referenced to a detailed written explanation of the reasons for requesting the deviation. The ENGINEER shall be the final authority for determining acceptability of requested deviations. The remaining portions of the paragraph not underlined will signify compliance on the part of the CONTRACTOR with the specifications. Failure to include a copy of the marked-up specification section, along with justification(s) for any requested deviations to the specification requirements, with the submittal shall be sufficient cause for rejection of the entire submittal with no further consideration.
   2. Manufacturer’s catalog literature and product data sheets, describing the physical and chemical properties of the epoxy lining and coating. Describe application and curing procedure.

3. Lining and coating application test records for measuring lining/coating thickness and holiday detection for each item or pipe section and fitting. Describe repair procedures used.
4. Contractor shall submit a plan for review and approval by the District prior to construction outlining the proposed method to ensure field repair can be performed to the fusion bonded epoxy lining and coating at each pipe joint (interior and exterior of pipe). Contractor shall also provide adequate access for lining and coating inspection staff to ensure field repairs have been performed according to the specifications.

1.04 WARRANTY INSPECTION

A. Warranty inspection of coating work shall be conducted between the period of eleventh (11th) month through twelfth (12th) month following final acceptance of the Contract work. The inspection window may be extended up to an additional 4 months at Owner's option.

B. Owner will establish the date for the inspection and shall notify the Contractor at least 30 days in advance. Owner may, by written notice to the Contractor, reschedule the warranty inspection to another date within the eleven through twelfth month inspection period, or may cancel the warranty period altogether.

C. Contractor shall attend this inspection. Contractor shall be responsible for notifying all directly involved parties of the date and time of the inspection. Contractor's Coating Subcontractor(s) shall be present at this inspection.

D. The entire interior and exterior coating systems shall be visually inspected to determine whether any repair work is necessary or if a more detailed inspection will be needed.

E. Owner shall prepare and deliver to the Contractor an Inspection Report covering the warranty inspection, setting forth the number and types of failures observed, the percentage of the surface area where failure has occurred, and the names of the persons making the inspections. Color photographs illustrating each type of failure shall be included in the report. Where coatings have peeled off, bubbled, or cracked, and any location where rusting is evident shall be considered to be a failure of the coating system. Upon completion of inspection and receipt of Inspection Report, Owner shall establish a date for Contractor to proceed with remedial work.

F. Repairs shall be commenced on a date established by Owner and shall be completed within one month (thirty days). At locations where the warranty inspection of the coatings have shown evidence of peeling, bubbling, rusting or cracking coats, this shall be considered to be a failure of the coating system. Contractor shall make repairs at all locations where failures are observed by removing the deteriorated coating, cleaning the surface and recoating with the same coating system in strict accordance with the specification, Manufacturer's recommendations and the satisfaction of Owner. If the area of failures exceeds twenty-five (25) percent of the area of a portion of the surface, then for that portion, the entire coating system shall be re-moved and recoated.

PART 2 - MATERIALS

2.01 PIPING AND EQUIPMENT SURFACES

A. The Contractor shall require the equipment suppliers to provide equipment that is free of salts, oil, and grease to the lining and coating applicator.

B. The Contractor shall require pipe suppliers to provide bare pipe that is free of salts, oil, and grease to the lining/coating applicator.

2.02 SHOP-APPLIED EPOXY LINING AND COATING

A. Lining and coating shall be a 100 percent solids, thermosetting, fusion-bonded, dry power epoxy resin: Scotchkote 134 or 206N, Lily Powder Coatings "Pipeclad 1500 Red," H.B. Fuller 1F-3003, or equal. Epoxy lining and coating shall meet or exceed the following requirements:

Criteria	**Requirement**
Hardness (minimum)	Barcol 17 (ASTM D 2583), Rockwell 50 ("M" scale)

Abrasion resistance (maximum value)	1,000 cycles: 0.05 gram removed 5,000 cycles: 0.115 gram removed ASTM D 1044, Tabor CS 17 wheel, 1,000 gram weight
Adhesion (minimum)	3,000 psi (Elcometer)
Tensile strength	7,300 psi (ASTM D 2370)
Penetration	0 mil (ASTM G 17)
Adhesion overlap shear, 1/8-inch steel panel, 0.010 glue line	4,300 psi, ASTM D 1002
Impact (minimum value)	100 inch-pounds (Gardner 5/8-inch diameter tup)

2.03 FIELD-APPLIED EPOXY LINING AND COATING FOR PATCHING

A. Use a two-component, 80 percent solids liquid resin, such as Scotchkote 306 or approved equal.

2.04 PAINTING AND COATING OF GROOVED-END AND FLEXIBLE PIPE COUPLINGS

A. Line and coat couplings the same as the pipe. Color shall match the color of the pipe fusion epoxy coating.

PART 3 - EXECUTION

3.01 SHOP APPLICATION OF FUSION-BONDED EPOXY LINING AND COATING--GENERAL

A. Grind surface irregularities, welds, and weld spatter smooth before applying the epoxy. The allowable grind area shall not exceed 0.25 square foot per location, and the maximum total grind area shall not exceed one square foot per item or piece of equipment. Do not use any item, pipe, or piece of equipment in which these requirements cannot be met.

B. Remove surface imperfections, such as slivers, scales, burrs, weld spatter, and gouges. Grind outside sharp corners, such as the outside edges of flanges, to a minimum radius of 1/4 inch.

C. Uniformly preheat the pipe, item, or piece of equipment prior to blast cleaning to remove moisture from the surface. The preheat shall be sufficient to ensure that the surface temperature is at least 5°F above the dew point temperature during blast cleaning and inspection.

D. Sandblast surfaces per SSPC SP-5. Protect beveled pipe ends from the abrasive blast cleaning.

E. Apply a phosphoric acid wash to the pipe, item, or piece of equipment after sandblasting. The average temperature, measured in three different locations, shall be 80°F to 130°F during the acid wash procedure. The acid wash shall be a five percent by weight phosphoric acid solution. The duration in which the acid is in contact with the surface shall be determined by using the average temperature as tabulated below:

Pipe Temperature (°F)	Contact Time(seconds)
80	52
85	45
90	36
95	33
100	28
105	24
110	21
130	10

F. After the acid wash has been completed, remove the acid with demineralized water having a maximum conductivity of 5 micromhos/cm at a minimum nozzle pressure of 2,500 psi.

G. Apply lining and coating by the electrostatic spray or fluidized bed process. Minimum thickness of lining or coating shall be 15 mils. Heat and cure per the epoxy manufacturer's recommendations. The heat source shall not leave a residue or contaminant on the metal surface. Do not allow oxidation of surfaces to occur prior to coating. Do not permit surfaces to flash rust before coating.

3.02 SHOP APPLICATION OF FUSION-BONDED EPOXY LINING AND COATING TO PIPE--ADDITIONAL REQUIREMENTS

A. Apply lining and coating per AWWA C213 except as modified herein.

B. Grind 0.020 inch (minimum) off the weld caps on the pipe weld seams before beginning the surface preparation and heating of the pipe.

3.03 QUALITY OF LINING AND COATING APPLICATION

A. The cured lining or coating shall be smooth and glossy, with no graininess or roughness. The lining or coating shall have no blisters, cracks, bubbles, underfilm voids, mechanical damage, discontinuities, or holidays.

3.04 FACTORY TESTING OF LINING AND COATING--GENERAL

A. Test linings and coatings with a low-voltage wet sponge holiday detector. Test pipe linings and coatings per AWWA C213, Section 5.3.3.

B. If the number of holidays or pinholes is fewer than one per 20 square feet of coating surface, repair the holidays and pinholes by applying the lining and coating manufacturer's recommended patching compound to each holiday or pinhole and retest.

C. If the number of pinholes and holidays exceeds one per 20 square feet of coating surface, remove the entire lining or coating and recoat the item or pipe.

D. Measure the lining and coating thickness at three locations on each item or piece of equipment or pipe section using a thickness gauge calibrated at least once per eight-hour shift. Record each measured thickness value. Where individual measured thickness values are less than the specified minimum thickness, measure the coating thickness at three additional points around the defective area. The average of these measurements shall exceed the specified minimum thickness value, and no individual thickness value shall be more than 2 mils below or 3 mils above the specified minimum value.

E. If a section of the pipe, item, or piece of equipment does not meet these criteria, remove the entire lining or coating and recoat the entire item or piece of equipment.

3.05 FACTORY TESTING OF LINING AND COATING OF PIPE--ADDITIONAL REQUIREMENTS

A. Check for coating defects on the weld seam centerlines. There shall be no porous blisters, craters, or pimples lying along the peak of the weld crown.

3.06 FIELD REPAIRS

A. Patch scratches and damaged areas and areas exposed by field cuts incurred while installing fusion-bonded epoxy coated items with a two-component, 80 percent solids (minimum), liquid epoxy resin.

B. Wire brush or sandblast the damaged areas per SSPC SP-10.

C. Lightly abrade or sandblast the coating or lining on the sides of the damaged area before applying the liquid epoxy coating.

D. Apply a two-part epoxy coating to defective linings and coatings to areas smaller than 20 square inches.

E. Patched areas shall overlap the parent or base coating a minimum of 0.5 inch. If a defective area exceeds 20 square inches, remove the entire lining and coating and recoat the entire item or piece of equipment. Apply the liquid epoxy to a minimum dry-film thickness of 15 mils.

END OF SECTION

SECTION 31 05 00
EARTHWORK

PART 1 - GENERAL

1.01 DESCRIPTION

A. SCOPE:
   1. This section specifies earthwork which consists of excavation, filling, grading, and disposal of excess material.

1.02 QUALITY ASSURANCE

A. TESTS:
   1. The Contractor shall take at least one in-place density test per lift for every 100 feet of open cut trench, or fraction thereof. At least one test shall be completed per lift regardless of the size or location of the fill area. At least one test shall be completed per lift for compaction of trench backfill within creek crossing open cut trench. Results of in-place density testing shall be provided to the Engineer at the end of each day.
   2. The Contractor shall take at least one in-place density test per lift for every 200 square feet of fill on the creek bed and banks, or fraction thereof. At least one test shall be completed per lift and at least one test complete per creek bank regardless of the size or location of the fill area. Results of in-place density testing shall be provided to the Engineer at the end of each day.
   3. The Contractor shall remove surface material at locations designated by the Engineer and provide such assistance as necessary for sampling and testing. The Engineer may direct the Contractor to construct inspection trenches in compacted or consolidated backfill to determine that the Contractor has complied with these specifications.
   4. Tests will be made in accordance with the following:

Test	Standard Procedure
Moisture content	ASTM D3017
Gradation	ASTM C136
Density in-place	ASTM D1556 and ASTM D6938
Moisture-density relationships	ASTM D1557 and ASTM D6938

1.03 SUBMITTALS

A. Submittals shall be in accordance with SP-07 and shall include the following:
   1. Contractor shall submit a copy of the approved excavation permit issued by the California Department of Industrial Safety.
   2. Contractor shall submit a sheeting and shoring plan in accordance with Sacrament Area Sewer District Standard Specification 311.2.4 and County Standard Specification 12-6.02.

B. Shop Drawings:
   1. Excavation Plan, Detailing:
      a. Methods and sequencing of excavation.
      b. Numbers, types, and sizes of equipment proposed to perform excavations.
      c. Excavation slopes, shoring (refer to Shoring Plan), and ground improvement.
      d. Proposed locations of stockpiled excavated material.
      e. Proposed spoil disposal sites with written authorization from the property owner or facility manager accepting the spoil material.
   2. Backfill Compaction Plan, Detailing:
      a. Proposed backfill material including origin, description and method of transportation.
      b. Proposed methods and sequencing of placement including spreading, moisture conditioning, lift thickness and compaction.
      c. Proposed compaction equipment including catalog and manufacturer's data sheets.
   3. Creek Bank Stabilization Plan, Detailing:

a. Proposed methods and sequencing of placement, including expected embankment slope, depth, and details for protecting installed pipe.

4. Hazardous Materials
   a. Furnish documentation demonstrating that imported materials are freed of hazardous substances.

C. Quality Control Submittals
1. Certified Gradation Analysis: Submit not less than 30 days prior to delivery for imported materials.
2. Contractor shall submit the qualifications of the certified testing laboratory (ies) that will be performing Quality Control testing.
3. Contractor shall submit mix design and test cylinders for CLSM and/or grout to be used in the work not less than 30 days prior to delivery on site. A minimum of two test cylinders shall be supplied per mix design.

D. Potholing Report.
1. Report shall include the location of each pothole as shown on the plan and profile drawings with horizontal dimensions to a minimum of two permanent surface features (storm drain grate, edge of curb, center of manhole, etc.), the elevation of ground surface at the pothole, the depth to the top of the utility pipe, the diameter of the pipe and pipe material, the owner of the utility, and a description of any other notable features such as concrete encasement, tracer wire, or other findings.
2. Potholing shall include all existing SASD facilities at proposed connection locations to confirm location of pipe, location of nearest joint, and depth. Potholing shall include all utilities crossing the proposed alignment of any new facilities, or within 10 feet horizontally of the proposed alignment or work area.
3. For locations where a conflict appears to exist, or where an existing SASD facility location or depth contradicts the design drawings, the contractor shall survey the location of the pothole and provide this information to the Engineer immediately.
4. The potholing report shall be submitted for approval by the Engineer a minimum of two week prior to purchasing materials or commencing excavation at any site.

PART 2 - MATERIALS

2.01 FILL MATERIALS

A. Trench fill materials shall be as specified in Sections 308 (Construction Materials) and 311 (Trench Excavation, Bedding, and Backfill) of the SASD Standards and Specifications as modified below.

B. Pipe Zone Backfill:
1. Open Cut Trench
   a. Pipe bedding and initial backfill shall be crushed aggregate and/or CLSM per Sacramento Area Sewer District Standard Plan P-01.
2. Creek Crossing Open Cut Trench
   a. Pipe zone backfill shall be CLSM in accordance with the dimensions provided in the contract plans.

C. Trench Zone Backfill
1. Trench zone backfill is defined as the backfill from 12 inches above top of pipe to the bottom of road subgrade in paved areas, to topsoil in unpaved or landscaped areas, or to geotextile and rip rap in creek channels. Trench zone backfill may consist of either native material or imported material meeting the requirements below:
2. Native Material:
   a. Native material shall be “on-site” material. The soils overlying the sites are anticipated to be suitable for use as trench zone backfill, but must meet the following conditions. Native material shall be unclassified material which is free from peat, wood, roots, bark, debris, garbage, rubbish or other extraneous material. The maximum size of

stone shall not exceed 3 inches. The moisture content of these soils varies from below optimum to greater than optimum and it is possible that some drying or moisturizing will be required to achieve desired compaction. For open cut trench, material shall meet the requirements of, and installed in accordance with Sacramento County Standard Specification 19-2.03 and Detail 4-64. For Creek Crossing open cut trench, the trench backfill shall meet all of the Sacramento County requirements, except that the minimum compaction shall be 95 percent of maximum dry density.

3. Imported Fill
    a. Acceptable import fill for trench zone backfill shall include, in general, crushed rock, well-graded sand and gravel, and lean clay exhibiting a liquid limit of less than 45 percent and plasticity index of less than 20 percent. Satisfactory soil materials for structural fill are defined as those complying with ASTM D-2487 soil classification groups GW, GP, GM, SM, SP, CL, and ML. Unsatisfactory soils include those complying with ASTM D-2487 soil classification groups MH, CH, OL, OH, and Peat.
4. Imported fill shall not contain any rocks or rubble larger than 3 inches in diameter or any significant amounts of organics or debris. Material other than soil, sand, and gravel shall be considered deleterious material. Deleterious material shall all include any organic matter, wood, metal, and /or metal or plastic piping.

D. Crushed Rock
1. Crushed rock shall be Type C per Section 308.15 (Crushed Rock), SASD Standards and Specifications.

E. Controlled Low Strength Material (CLSM)
1. CLSM shall conform to the requirements of Sacramento Area Sewer District Standard Specification 308.14.

F. GEOTEXTILE FABRIC
1. See Section 31 35 19.20.

G. RIP RAP
1. See Section 31 35 19.20.

PART 3 - EXECUTION

3.01 GENERAL

A. CONTROL OF WATER
1. Control of water shall be in accordance with Section 35 20 23.33 and Section 307 (Dewatering), SASD Standards and Specifications.

B. SURPLUS MATERIAL
1. Unless otherwise specified, surplus excavated material shall be disposed of off site in accordance with applicable ordinances, Section 306.4 (Surplus Material), SASD Standards and Specifications and environmental requirements.
2. If the quantity of surplus material is specified, the quantity specified is approximate. The Contractor shall satisfy himself that there is sufficient material available for the completion of the embankments before disposing of any material inside or outside the site. Shortage of material, caused by premature disposal of any material by the Contractor, shall be replaced by the Contractor.
3. Material shall not be stockpiled to a depth greater than 5 feet above finished grade within 25 feet of any excavation or structure. The Contractor shall maintain stability of the soil adjacent to any excavation.

C. BORROW MATERIAL
1. If the quantity of acceptable material from excavation is not sufficient to construct the embankments required by the work, the quantity of material needed to complete the embankments shall consist of imported borrow conforming to specified requirements.

Borrow material shall be in accordance with Section 306.3 (Imported Borrow), SASD Standards and Specifications.

D. HAULING
   1. When hauling is done over highways or city streets, the loads shall be trimmed and the vehicle shelf areas shall be cleaned after each loading. The loads shall be watered after trimming to eliminate dust.

E. GENERAL EXCAVATION AND TEMPORARY SLOPES
   1. All temporary excavations (such as those required for utility trenches, etc.) shall be constructed in accordance with OSHA regulations. The Contractor should be aware that in no case should excavation depths and inclinations exceed those specified in local, state or federal safety regulations, specifically OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926.
   2. Information regarding the soils at each site is provided within the Geotechnical Report, provided as Attachment B to the bid documents. Any excavation slope left exposed shall be protected from erosion and saturation by rainfall and runoff. Adequately designed bracing may also be used to support excavations. Permanent and temporary excavations extending below about 10 feet may need additional analysis.
   3. For new fills placed on existing slopes, the fill should be “blended” with the existing soils by benching of the slope. The benching should have an overall slope no steeper than the recommendations in the Geotechnical Report, depending on the soil type encountered.
   4. All vehicles and other surcharge loads be kept at least 10 feet away from the top of temporary slopes.
   5. The Contractor is hereby notified that groundwater may be encountered at the site(s) and shall take appropriate measures when planning for and calculating shoring and other excavation protection systems

F. GRADING AND SUBGRAD PREPARATION
   1. Following the site clearing and preparation, soil subgrades exposed in areas to receive improvements (such as engineered fills) should be scarified to a depth of about 12 inches, moisture conditioned to approximately 3 percent above optimum water content, and compacted to the requirements for engineered fills.
   2. Locally weak soils, if encountered, should also be excavated and replaced, or otherwise stabilized as recommended by the project Geotechnical Engineer at the time of earthwork operations.
   3. The prepared subgrade surface should be firm, unyielding, and kept moist during construction. The subgrades should be protected from damage caused by weather or a sudden increase in the level of the nearby creeks.
   4. Fill Placement and Compaction: After the fill areas have been stripped and grubbed the upper 8 inches of exposed subgrade shall be scarified and recompacted to a minimum of 90 percent of the maximum dry density determined by the modified Proctor test. All fill material shall be placed in loose lifts not exceeding 8 inches in thickness and compacted to standards referenced elsewhere in this specification for each specific area. No fills should be placed on soft material, muddy or frozen ground. The compacted earth fill shall be sloped and graded to permit rapid runoff of rainwater. No ponding on the fill surface shall be allowed.
   5. Fill on Existing Slopes: Any fill that is placed on existing slopes steeper than 1 vertical (V) on 6 horizontal (H) shall be keyed into the existing slope by continuously benching in not less than 12 inch rises. Benching shall be of sufficient width to permit placing and compacting operations. The horizontal cut shall begin at the intersection of the ground line and the vertical side of the previous bench. The surfaces of the slopes shall be protected from erosion by hydroseeding.
   6. Permanent Fill Slopes: All permanent fill slopes shall be constructed by placing the fill in relatively horizontal lifts extending beyond the proposed slope face and by then cutting the placed fill back to the designed slope. The surfaces of the slopes shall be protected from

erosion by hydroseeding. Existing slopes steeper than 1 V on 5 H shall be benched with vertical faces not exceeding 3 feet before placing additional fill.

7. Finish Grading: Finished surfaces shall be smooth, compacted and free from irregularities. The degree of finish shall be that normally obtainable with a blade-grader.
8. Finished grade shall be as specified by the contours plus or minus 0.10 foot except where a local change in elevation is required to match sidewalks, curbs, manholes and catch basins, or to ensure proper drainage. Allowance for topsoil and grass cover, and subbase and pavement thickness shall be made so that the specified thickness of topsoil can be applied to attain the finished grade.
9. When the work is at an intermediate stage of completion, the lines and grades shall be as specified plus or minus 0.5 foot to provide adequate drainage.
10. If the soil is to be cultivated or straw is to be incorporated into the surface, rocks larger than 2-1/2 inches in maximum dimension, roots, and other debris on the surface of the slope shall be removed and disposed of prior to cultivation or placement of straw.

G. CONTROL OF EROSION:

1. The Contractor shall maintain earthwork surfaces true and smooth and protected from erosion. Where erosion occurs, the Contractor shall provide fill or shall excavate as necessary to return earthwork surfaces to the grade and finish specified.

3.02 PLACEMENT AND COMPACTION REQUIREMENTS

A. After the fill areas have been stripped and grubbed, the upper 12 inches of exposed subgrade shall be scarified and recompacted at a minimum of 90 percent as determined by Section 306.2 (Subgrade Preparation), SASD Standards and Specifications. All fill material shall be placed in loose lifts not exceeding 8 inches in thickness and compacted with power operated tampers, rollers, idlers, or vibratory equipment. Backfill of utility trenches shall require the same compaction as that of the adjacent fill. Material type, relative compaction, and general application are specified in Table A. No fills shall be placed on soft material.

B. Table A, Compaction Requirements

Material	Location	Compaction Requirement	Compaction Standard
Pipe Zone Backfill, Open Cut Trench Pipe Zone Backfill, Creek Crossing Open Cut (CLSM)	Around pipe per SASD Std Plan P-01 Around pipe per contract plans	95% NA	Modified ASTM D1557 NA
Trench Zone Backfill – Open Cut Trench, Unpaved Areas	Trenches and structure backfill. Supporting or within 10 feet of structure, outside of right of way or creek crossing areas.	90%	Modified ASTM D1557
AB per Sacramento County Standards	Supporting driveways or parking areas or pavement	95%	Modified ASTM D1557
Trench Zone Backfill, Creek Crossing Open Cut Trench	Trenches within 10 feet of creek banks	95%	Modified ASTM D1557
Rip rap	Bank protection for creeks as described in	NA	Hand placed for optimal gradation

	drawings.		
CLSM	As called for in Drawings	NA	NA

3.03 EARTHWORK FOR STRUCTURES

A. STRUCTURE EXCAVATION:
   1. The bottom shall not be more than 0.15 foot above or below the lines and grades specified. If the elevation of structure excavation is not specified, the excavation shall be not more than 0.15 foot above or below the elevation specified for fill material below the structure. Slopes shall vary no more than 0.5 foot from specified grade unless the excavation is in rock where the maximum variation shall be 2 feet.
   2. Should the excavation be carried below the lines and grades specified on the drawings or should the bottom of the excavation be disturbed because of the Contractor's operations and require overexcavation and backfill, the Contractor shall refill such excavated space to the proper elevation in accordance with the procedure specified for backfill. The cost of such work shall be borne by the Contractor.
   3. Unless otherwise specified, excavations shall extend a sufficient distance from walls and footings to allow for placing and removal of forms, installation of services, and for inspection, except where concrete is specified to be placed directly against excavated surfaces.

B. STRUCTURE BACKFILL:
   1. Unless otherwise specified, structure backfill shall be as shown in Table A.
   2. After completion of construction below the elevation of the final grade, and prior to backfilling, forms shall be removed and the excavation shall be cleaned of debris.
   3. Structure backfill shall not be placed until the subgrade portions of the structure have been inspected by the Engineer. No backfill material shall be deposited against concrete structures until the concrete has developed a strength of not less than 2500 pounds per square inch in compression, or until the concrete has been in place for 28 days, whichever occurs first.
   4. Backfill material shall be placed in uniform layers and shall be brought up uniformly on all sides of the structure. Unless otherwise specified, backfill around and above pipelines within the excavation line of any structure shall be the same as that specified for structures.

3.04 EARTHWORK FOR PIPELINES AND CONDUITS

A. GENERAL:
   1. Earthwork for pipelines and conduits shall be performed in accordance with Section 311 TRENCH EXCAVATION, BEDDING, AND BACKFILL, SASD Standards and Specifications as modified below. Earthwork for pipelines and conduits is also specified in paragraph 3.02, Table A (this specification section); Section 501 STANDARD PLANS, SASD Standards and Specifications; and in the following paragraphs.

B. PIPELINE EXCAVATION:
   1. The bottom of the trench shall be carried to the specified lines and grades with proper allowance for pipe thickness and for bedding as specified.

C. PIPELINE BACKFILL:
   1. Backfill material, placement, and compaction above the pipe zone shall be as specified. Backfill above the pipe zone shall not commence until pipe zone backfill has been inspected and accepted by the Engineer.

3.05 SUBGRADE FOR PAVEMENT

A. The prepared subgrade shall be scarified to a depth of at least 12 inches and recompacted to at least 95 percent of the maximum density.

END OF SECTION

SECTION 31 10 00
SITE CLEARING AND RESTORATION

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, equipment and materials to perform clearing, grubbing, stripping, existing facilities protection and restoration, complete as specified and shown.

B. Construction restoration shall be in accordance with SP-22, Restoration of Surfaces and these specifications.

C. The Contractor shall retain and have on staff a California Certified Arborist to determine impacts to trees.

1.02 SUBMITTALS

A. Submittals shall be made in accordance with SP-07, SUBMITTALS.

B. Contractor shall submit the qualifications and certification of any proposed arborist that will be retained for oversight of tree protection during construction.

C. Contractor shall prepare and implement a landscape protection and replacement plan for public or private land uses, as appropriate, that are within the construction zone of the Project. Contractor shall submit a copy of the landscape protection and replacement plan to the Engineer for approval prior to the start of any construction activities. The landscape protection and replacement plan shall include, but not be limited to, the following items:

1. Detailed photographs of all site entry and exit routes, surrounding property, and all landscape features prior to construction that will require replacement. Photographs shall be collected in accordance with SP-10, PRECONSTRUCTION DOCUMENTATION.
2. Topsoil removal and replacement stockpiling and methods.
3. Replacement improvements, such as fencing on private property.
4. Naturally occurring landscaping on public or private property, such as the park district lands. Restoration of riparian areas will not include those areas currently with domestic residential landscaping, which shall be restored to preconstruction conditions. The planting plan shall include plant species, planting locations, spacing, maintenance provisions, monitoring requirements, success criteria and plant replacement provisions should a plant die within the monitoring period.
5. Replacement of existing irrigation piping and facilities
6. Replacement shall be completed within five calendar days of completion of the project work in the affected area.
7. Finished ground surface shall be constructed to the original contours and drainage grades as existed prior to construction except as noted in the project plans.
8. Contractor shall replace all landscaping damaged during construction in kind and at the Contractor's expense as part of the construction work.

PART 2 PRODUCTS

2.01 MATERIALS

A. TYPE A - GRASS SEED MIXTURE. The required grass seed mixture to be used for reseeding areas disturbed/created as part of the construction shall be comprised as shown in the following table. The seed material will be obtained from suppliers located in the Sacramento County region. The seed material will be state-certified seed from the most recent growing season and will be provided in original sealed bags bearing the supplier's guaranteed analysis.

Botanical Name	Common Name	Seed Rate PLS Lbs/Ac	Purity	Germ	PLS	PLS LBS/AC
Leymus triticoides Rio	Rio Creeping Wildrye	8.0	90.00%	80.00%	72.00%	4.00

Hordeum brachyantherum	Meadow Barley	10.00	90.00%	80.00%	72.00%	5.00
Vulpia microstachys	Three Week Fescue	5.00	90.00%	80.00%	72.00%	2.50
Triflolium obtusiflorum	Clammy Clover	2.00	98.00%	45.00%	44.10%	1.00
Eschscholzia californica	California Poppy	3.00	98.00%	75.00%	73.50%	1.50
Gilia tricolor	Bird's Eye	2.00	98.00%	75.00%	75.00%	1.00

1. TREES. [*To be updated at 90% deliverable pending completion of MMRP/CEQA*] For each tree removed, a replacement tree will be planted per details provided in the Project Plans. Trees shall be either Live Oak or Blue Oak, with a minimum root ball size of 30 inches in diameter.
2. RIPARIAN HABITAT. [*To be updated at 90% deliverable pending completion of MMRP/CEQA*] To mitigate for temporary loss of riparian habitat, all disturbed areas shall be vegetated with locally native riparian plants. To ensure species diversity, a single species shall not comprise more than 50% of the total number of plants planted.

PART 3 EXECUTION

3.01 GENERAL

A. Unless otherwise specified, the Contractor shall remove obstructions such as brush, trees, logs, stumps, roots, heavy sod, vegetation, rock, stones larger than 6 inches in any dimension, broken or old concrete and pavement, debris, and structures where the completion of the work require their removal.

B. Material that is removed and is not to be incorporated in the work shall be disposed of off the site at a location authorized to take such material.

C. All site restoration shall be inspected by Owner and meet the requirements of the Engineer.

3.02 STRUCTURES

A. The Contractor shall take all precautions necessary to protect the integrity and usefulness of all existing facilities.

B. If necessary, the Contractor may, with the approval of the Owner, remove such existing structures, including curbs, gutters, pipelines and utility poles as may be necessary for the performance of the work, and shall rebuild the structures removed in as good a condition as found or better with the requirements specified.

C. Contractor shall also repair existing structures which may be damaged as a result of the work under this contract.

3.03 ROADS AND STREETS

A. Unless otherwise specified, roads and streets in which the surface is removed, broken, or damaged, or in which the ground has caved or settled during the work under this contract, shall be resurfaced and brought to the original grade and section.

B. Roadways used by the Contractor shall be cleaned and repaired. Before resurfacing material is placed, edges of pavements shall be trimmed back far enough to provide clean, solid, vertical faces, and shall be free of loose material.

C. All paved surfaces shall be cut with a pavement saw. Rough cuts are not allowed. Repair work shall conform to the local jurisdiction paving requirements.

3.04 CULTIVATED AREAS AND OTHER SURFACE IMPROVEMENTS

A. Cultivated or planted areas and other surface improvements which are damaged by actions of the Contractor shall be restored as nearly as possible to their original condition.

B. Restoration shall take place within 5 calendar days, or sooner, as directed by the Engineer. Existing guard posts, barricades, and fences shall be protected and replaced if damaged.

3.05 RESEEDING

A. Disturbed and exposed areas at the project sites will receive a native seed mix/erosion control mix, provided in the table in Part 2 of this specification.

B. The seed material will be applied following the restoration of site grading to match surrounding contours.

C. Seeding is expected to occur in late summer or fall.

D. Prior to applying the seed mix, the soil surface will be scarified for better root penetration.

E. The seed mix will be applied at a rate of 52 pounds per acre, using a standard broadcast seeding technique.

F. No supplemental watering is anticipated because it is expected that the seed mix will be adequately supported by seasonal rainfall, ponding, and soil saturation.

G. The creek banks will have Anchored Vegetated Turf Reinforcement Mats placed over the reseeded areas to prevent the seeds from washing away prior to root establishment. See Section 31 35 19.20.

3.06 TREE PLANTING

A. *[To be updated at 90% deliverable pending completion of MMRP/CEQA]*

3.07 RIPARIAN HABITAT

A. *[To be updated at 90% deliverable pending completion of MMRP/CEQA]*

3.08 DELIVERY, STORAGE, AND HANDLING

A. Contractor shall comply with manufacturer's recommended storage and handling of planting materials so that no degradation occurs prior to placement as part of the project.

3.09 PROTECTION

A. SITE:
   1. Site preparation shall not damage existing improvements, structures or other surface features on or adjacent to the site.
   2. The Contractor shall repair or replace any damage as a result of work to a pre-construction condition.
   3. The Contractor shall provide temporary protection devices, including barricades, fencing, guardrails, warning signs, lights, and other devices necessary to ensure the security of, and safety within, the project site during all of the work.
   4. All excavations shall be completely fenced at all times and plated at the end of each workday in locations where vertical trench walls to the ground surface are used and where backfill to the surface is not in place.
   5. Contractor shall comply with the standards specified by the latest edition of the Standard Specifications.

B. CONSTRUCTION EASEMENTS:
   1. Contractor shall stay within the limits of all construction easements and work zones identified on the Plans.

C. TREES AND HABITAT:
   1. Contractor shall protect all trees that are not specifically identified for removal on the project plans.
   2. All work related to tree canopy and root pruning shall be performed by a California Certified Arborist and shall be approved by the Engineer prior to the pruning taking place.
   3. All tree protection and work related to construction activities will be completed in accordance with the requirements set forth in the arborist report attached to the Special

Provisions and the Project Plans [*To be updated at 90% deliverable pending completion of report]*.

D. WORK WITHIN ROADWAYS:
   1. Where possible, Contractor shall perform all work so as to minimize damage to existing pavement.
   2. Damaged pavement, sidewalks, curbs, gutters, and signage outside of limits shown on the Plans shall be repaired to the standards of the local jurisdiction at Contractor's expense at no additional cost to the Owner.

3.10 ENVIRONMENTAL MITIGATION AND MONITORING MEASURES

A. Contractor shall comply with the requirements of SP-30 Environmental Mitigation and Monitoring Measures as a part of these specifications.

3.11 DEMOLITION AND REMOVAL (PAVEMENT)

A. When portions of asphalt pavements and concrete pads are to be removed and later construction is to be reconnected, edges shall be saw cut, on a neat line at right angles to the curb face.

3.12 UTILITY INTERFERENCE

A. Existing utilities shall be protected in place. Existing utilities within the project work area shall be potholed by the Contractor prior to commencing construction of any new facilities. Where existing utilities interfere with the prosecution of the work, the Contractor shall halt work and notify the Engineer immediately.

3.13 RESTORATION

A. Construction related site restoration within the public right of way shall be in accordance with the constraints and standard specifications of the local governing jurisdiction.

B. Construction related site restoration within construction easements shall be in conformance to the requirements on the Plans and as required in the Mitigation and Monitoring Reporting Plan contained within these specifications.

C. Embankments impacted by construction work shall be hydromulched using material Type A seed mixture (provided in Part 2 of this specification).

D. All foreign materials such as gravel shall be removed from the temporary construction easements prior to field acceptance.

E. Replacement/restoration of construction impacts shall be completed within five calendar days of completion of the project in the affected area. Replacement/restoration of construction impacts to businesses shall be replaced immediately upon project completion in the affected area.

F. Finished ground surface shall be constructed to the original contours and drainage grades as existed prior to construction, except at noted on the project plans.

G. Contractor shall replace all landscaping/fencing damaged during construction in kind and at the Contractor's expense as part of the construction work.

END OF SECTION

SECTION 31 35 19.20
ENGINEERED MATERIALS FOR EARTHWORK

PART 1 - GENERAL

1.01 DESCRIPTION

A. SCOPE:
   1. The work for this section shall consist of furnishing all materials, equipment, and labor necessary for the installation of engineered earthwork materials such as rip rap, Anchored Vegetated Turf Reinforcement Mat (TRM), Engineered Mattress System, and Engineered Bank Stabilization System for constructing stream banks.

1.02 SUBMITTALS

A. Submittals shall be in accordance with SP-07.

B. Creek Bank Stabilization Plan, Detailing:
   1. Proposed stabilization materials, including rip rap, grout, pins, anchors, geotextile fabric, TRM, and seed mixtures including manufacturer's data sheets and installation recommendations where applicable. Calculations of slope stability and anchor penetration depth will be required for TRM.

C. Submit product data and proposed methods and sequencing of placement, including expected embankment slope, depth, details for protecting installed pipe and existing trees, anchor depths and installation methods, and other relevant product installation details.

D. Engineered Earth Anchor Testing:
   1. The following documentation shall be submitted to the engineer of record and/or project owner for review and approval prior to installation.
   2. The contractor's baseline establishment testing program to demonstrate the engineered earth anchor's holding capacity at each discrete area of the engineered earth armoring solution meets the design requirements. The baseline establishment testing program shall consist of the following at a minimum:
      a. Install one (1) anchor at a location designated by the engineer or record and/or the owner, setting the anchor at an appropriate embedment depth, and loading the anchor under constant tension.
      b. Measure the depth of initial embedment (after setting the anchor), and commence loading through use of a crane, jack, or similar apparatus. Loading must be recorded using an in-line transducer (load cell) or Dillon scale. Spring / pulley type devices are not acceptable for load measurements.
      c. Loads shall be recorded at tendon displacements of every 25 mm (1 inch), until a load cannot be sustained (indicating impending pull-out), or displacement beyond a minimum embedment as specified by the engineer of record has been achieved.
   3. The baseline establishment test results shall be submitted to the engineer of record and/or owner by the contractor, and reviewed by the manufacturer. Prior to commencing full installation, the engineer of record and/or owner must inform the contractor in writing of sufficient holding capacity demonstrated by the test.
   4. Documentation from the engineer of record and/or owner to the contractor stating who will perform and the frequency of additional quality control load testing during the installation following the initial baseline test in each discrete area.
   5. A corrective action plan providing guidance should any subsequent quality control load testing results fall below a specific tolerance required by the engineer of record, owner and/or manufacturer. The contractor shall cease installation immediately until such time that the engineer of record and/o owner has consulted with the manufacturer.

1.03 QUALITY ASSURANCE

A. TRM shall be subject to sampling and testing to verify conformance with this specification. Sampling for testing shall be in accordance with ASTM D-4354.

B. Acceptance shall be in accordance with ASTM D-4759 based on testing of either conformance samples obtained using Procedure A of ASTM D-4354, or based on manufacturer's certifications and testing of quality control samples obtained using Procedure B of ASTM D 4354.

C. Quality Assurance Sampling and Testing shall be waived for ISO 9001:2015 Certified Manufacturing Facilities. Documentation of ISO 9001:2015 Certification shall be provided.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Material labeling, shipment and storage shall follow ASTM D-4873.

B. Product labels shall clearly show the manufacturer or supplier name, style name, and roll number.

C. Each shipping document shall include a notation certifying that the material is in accordance with the manufacturer's certificate.

D. Material shall be wrapped with a material that will protect the product from damage due to shipment, water, sunlight, and contaminants. Individual roll wrapping will not be required for TRMs exceeding the UV Resistance requirements per ASTM D-4355. The protective wrapping shall be maintained during periods of shipment and storage.

E. During storage, the material shall be elevated off the ground and adequately covered to protect them from the following: Site construction damage, extended exposure to ultraviolet (UV) radiation, precipitation, chemicals that are strong acids or strong bases, flames, sparks, temperatures in excess of deg F and any other environmental condition that might damage the product.

PART 2 - MATERIALS

2.01 ENGINEERED BANK STABLIZATION MATERIALS

A. GEOTEXTILE FABRIC
   1. Geotextile fabric shall be of the woven type and shall meet the requirements of Sacramento Area Sewer District Standard Specification 308.10.2.

B. RIP RAP
   1. Rip rap shall be used for creek bank stabilization as indicated on the Drawings, and shall be hard angular quarry rock with the following gradation:
      a. 95-100 Percent with minimum dimension of 12 inches or greater
      b. 50-100 Percent with minimum dimension of 18 inches or greater
      c. 0-5 percent with minimum dimension of 27 inches or greater

C. ANCHORED VEGETATED TURF REINFORCEMENT MAT
   1. Manufacturers:
      a. Armormax as manufactured by Propex
      b. Or approved equal.
   2. Description:
      a. The anchored vegetated turf reinforcement mat (TRM) shall be used for bank stabilization as indicated on the drawings, and shall consist of the vegetated TRM, percussion driven earth anchors, and pins. The TRM shall consist of void spaces to capture sediment, seed, and moisture on steep slopes.
      b. TRM material properties:

Property	**Test Method**	**Test Parameters**	**Unit(s)**	**Property Requirements**
Thickness	ASTM D-6525	Minimum	in	0.40
Light Penetration (% Passing)	ASTM D-6567	Maximum	percent	10

Tensile Strength	ASTM D-6818	Minimum	lb/ft	4,000 x 3,000
Tensile Elongation	ASTM D-6818	Maximum	percent	40 x 35
Resiliency	ASTM D-6524	Minimum	percent	80
Flexibility	ASTM D-6575	Maximum	in-lb	0.534
UV Resistance	ASTM D-4355	Minimum	percent	90 at 3,000 hrs 90 at 6,000 hrs

3. Performance characteristics
   a. Flume Testing: The TRM must meet the following at a minimum when subjected to at least 0.5 hrs of continuous flow producing the following conditions.
      1) Unvegetated TRM with engineered anchors
         (a) Permissible velocity: 13 ft/sec
         (b) Permissible shear stress: 4.8 psf
      2) Partially Vegetated TRM
         (a) Permissible velocity: 15 ft/sec
         (b) Permissible shear stress: 8 psf
      3) Fully Vegetated TRM
         (a) Permissible velocity: 25 ft/sec
         (b) Permissible shear stress: 16 psf
4. TRM accessories
   a. Securing Pins:
      1) Securing pins shall be stainless steel.
      2) Securing pins should be a minimum of 0.20 in. diameter steel with a 1.5 in. steel washer at the head of the pin.
      3) Length: 12 to 24 inches as depicted on the drawings to provide sufficient ground penetration for pullout resistance.
      4) Heavier metal securing pins and/or stakes may be required in rocky soils.
   b. Engineered Ea
      1) Anchors with a minimum drive depth, size, loading, and spacing specified by the engineer of record and/or the manufacturer used to provide surficial slope stabilization and/or erosion protection as depicted in the construction plans, engineering submittals and/or drawings.
      2) The engineered earth anchor components shall be constructed of materials suitable to resist corrosion and UV degradation particularly at the soil/air interface.
      3) The top load bearing plate shall have openings allowing vegetative growth through the plate. The bearing plate shall include a recessed cavity so that the tendon can be cut flush or below the bearing plate surface.
      4) The top load bearing plate shall be of sufficient size to resist forces acted upon by the tensioned anchor.
      5) For quality control purposes and warranty claims, engineered earth anchors should be delivered to the jobsite fully assembled and ready for installation.
      6) Material Properties:

Component	Material Composition	Physical Properties
Anchor Head	Aluminum	6.43 in. x 1.84 in. x 2.36 in. (L x W x H) Bearing Area: 10.3 in^2
Cable Tendon	Galvanized Steel	Diameter: 0.1875 in.
Lower Termination	Aluminum Ferrule	Length: 0.65 in. Wall Thickness: 0.11 in.

Load Bearing Plate	Aluminum	5.98 in. x 6.60 in. x 0.75 in. (L x W x H) Bearing Area: 17.43 in^2
Top Termination	Aluminum	Circumferential Triple Wedge Grip Assembly to Eliminate Cable Pinch PointsGrip to Cable Contact Surface Area: 0.505 in^2 Grip to Cable Contact Ratio: 97% of Cable Diameter

7) Performance Characteristics:
   (a) Ultimate Assembly Strength: 2,800 lbs
   (b) Ultimate Cable Strength: 3,700 lbs
   (c) Typical Working Load: 2,000 lbs
   (d) Minimum Embedment Depth: 6.0 ft
   (e) Maximum Embedment Depth: 12.0 ft

D. ENGINEERED MATRESS SYSTEM
   1. Manufacturers:
      a. Pyramatress Engineered Mattress System as manfuctured by Propex
      b. Or approved equal
   2. Description:
      a. Engineered Mattress System: A flexible armoring system composed of a TRM, fiber-composite internal bracing, synthetic stakes, and other geosynthetics.
      b. The system shall be constructed in the field, creating internal cells that shall be filled with earth, sand, gravel, crushed rock and other material as specified.
      c. See TRM specifications in Section 2.02.A.
   3. Geotextile Lining:
      a. The geotextile construction shall be a nonwoven, staple fiber, needlepunched, polypropylene geotextile; the fibers are needled together to form a stable network that retains dimensional stability relative to each other.
      b. The geotextile lining shall meet the following values:

Property	**Test Method**	**Units**	**Property Requirement**
Grab Tensile Strength	ASTM D 4632	lbs	160
Elongation	ASTM D 4632	percent	50
CBR Puncture	ASTM D 6241	lbs	410
Trapezoidal Tear	ASTM D 4533	lbs	60
Apparent Opening Size (Maximum Avg. Roll Value)	ASTM D 4751	US Std. Sieve	70
Permittivity	ASTM D 4491	sec^{-1}	1.5
Water Flow Rate	ASTM D 4491	gpm/ft^2	110
UV Resistance	ASTM D 4355	percent	70

(percent retained at 500 hours)			

4. Internal Bracing:
   a. The internal brace assembly comprises 3 nonmetallic polymer bars specially designed, whereby 2 of the bars are threaded through the pyramidal projections of the TRM to form a semi-rigid base and upright member, which both are then connected using the third bar as a transverse member. These braces shall be installed within each internal baffle not to exceed 24 inches.
   b. Synthetic stakes are used to secure the various connections between the TRM panels. The synthetic stakes are to be composed of a UV stabilized, nonmetallic polymer and designed to provide a positive connection between the different layers of TRM.

E. ENGINEERED BANK STABLIZATION
1. Manufacturers:
   a. ScourLok Engineered Bank Stablization System as manfuctured by Propex
   b. Or approved equal
2. Description:
   a. Engineered Bank Stablization System: A system constructed of rigid cells armored with a TRM and internally lined with high durability nonwoven geotextile.
   b. The TRM shall be fastened to the rigid cells to provide a flexible exterior, control erosion, and improve system durability and forms pockets that can be filled with mulch or other media to promote and sustain vegetation.
   c. The durable geotextile lining shall allow the rigid cell to be filled with earth, sand, gravel, crushed rock and other granular material.
   d. Engineered Earth Anchors shall also be utilized with the system to provide additional resistance to lateral earth pressures.
   e. See TRM specifications in Section 2.02.A.
3. Geotextile:
   a. The geotextile construction shall be a nonwoven, staple fiber, needlepunched, polypropylene geotextile; the fibers are needled together to form a stable network that retains dimensional stability relative to each other.
   b. The geotextile should be resistant to UV degradation and biological and chemical environments normally encountered in soils.
   c. The geotextile lining should meet the following values:

Property	**Test Method**	**Test Parameters**	**Units**	**Property Requirement**
Mass Per Unit Area	ASTM D-5261	Minimum	oz/yd^2	6.5
Thickness	ASTM D-5199	Minimum	mils	57
Grab Tensile Strength	ASTM D-4632	Minimum	lbs	210
Grab Tensile Elongation	ASTM D-4632	Minimum	%	80
Trapezoidal Tear	ASTM D-4533	Minimum	lbs	80
CBR Puncture	ASTM D-6241	Minimum	lbs	550

Apparent Opening Size (AOS)	ASTM D-4751	Maximum	in	0.004 - 0.007
Permittivity	ASTM D-4491	Minimum	sec^{-1}	1.1
UV Resistance	ASTM D-4355	Minimum	%	80 at 1000 hrs

4. Rigid Cell:
   a. The rigid cell should meet the following values:

Property	Test Method	Units	Property Requirement
Ultimate Tensile Strength	ASTM E8/E8M	psi	99,350
Ultimate Tensile Elongation	ASTM E8/E8M	%	7
Weld Shear Strength	ASTM E8/E8M	%	70
Wire Diameter	-	inches	0.157

5. Engineered Earth Anchors
   a. See TRM specifications in Section 2.02.A.4.b

PART 3 - EXECUTION

3.01 GENERAL

A. SURPLUS MATERIAL
   1. Unless otherwise specified, surplus excavated material shall be disposed of off site in accordance with applicable ordinances, Section 306.4 (Surplus Material), SASD Standards and Specifications and environmental requirements.
   2. If the quantity of surplus material is specified, the quantity specified is approximate. The Contractor shall satisfy himself that there is sufficient material available for the completion of the embankments before disposing of any material inside or outside the site. Shortage of material, caused by premature disposal of any material by the Contractor, shall be replaced by the Contractor.
   3. Material shall not be stockpiled to a depth greater than 5 feet above finished grade within 25 feet of any excavation or structure. The Contractor shall maintain stability of the soil adjacent to any excavation.

B. GRADING AND SUBGRADE PREPARATION
   1. Rip Rap:
      a. Woven geotextile fabric shall be placed at the slopes indicated in the contract plans. Crushed rock shall be used to fill any voids so that fabric is fully supported.
      b. Rip rap shall be hand placed to its full course thickness in a single operation, in a manner that will result in relatively well-graded mass of stone with the minimum practicable percentage of voids.
   2. Anchored Vegetated Turf Reinforcement Mat:
      a. The area(s) to be treated with the engineered earth armoring solution shall be cleared, grubbed, graded and compacted as indicated on the construction plans and technical specifications or as directed by the Engineer of Record.
      b. The placement of new fill or addressing a sloughed slope may require soil placed to be keyed into the existing slope and compacted in horizontal lifts per the Engineer of Record. To ensure compaction at the face of the slope, the slope face may be over-

built, compacted in lifts, and then regraded or trimmed to the final grade. All fill shall be placed and compacted per the project's earthwork technical specifications.

c. The subgrade shall be uniform and smooth. Large rocks, soil clods, vegetation, and other sharp objects shall be removed prior to installation of the TRM. This will assist in the TRM maintaining direct contact with the soil surface.

d. Construct a perimeter trench around the area(s) limits to be treated with the engineered earth armoring solution as follows:
   1) Excavate a Crest of Slope (COS) trench a minimum of 3 ft horizontal over the crest of the slope when possible. Trench dimensions shall be 12 in wide by 12 in deep.
   2) Excavate a Toe of Slope (TOS) trench a minimum of 3 ft horizontal over the crest of the slope when possible. Trench dimensions shall be 12 in wide by 12 in deep.
   3) Excavate a side trench perpendicular to the contours at each end of the area to be treated (longitudinal limits). Trench dimensions shall be 6 in minimum wide by 6 in minimum deep.

e. Refer to Section 3.2 for the appropriate vegetation establishment method.

3. Engineered Mattress System:
   a. Excavate the area to be protected to 12 in deep below finished grade as needed using an excavator with smooth bucket to reduce disturbance at the defined subgrade elevation.
   b. Deleterious material (overly wet soil, uncontrolled loose fill, construction debris, organics, etc.) encountered during this excavation shall be over-excavated, removed, and replaced with compacted granular fill or approved backfill soil. Compact the subgrade as specified by the Engineer.
   c.
4. Engineered Bank Stabilization System:
   a. Excavate a shallow, level trench at least 3 ft wide and 6 to 9 in deep below finished grade using an excavator with smooth bucket to reduce disturbance at the defined subgrade elevation.
   b. The cut-slope excavation width shall not exceed the lines and grades shown on the Plans, and care shall be taken to avoid encroachment near bordering properties.
   c. Deleterious material (overly wet soil, uncontrolled loose fill, construction debris, organics, etc.) encountered during this excavation shall be over-excavated, removed, and replaced with compacted granular fill or approved backfill soil. Compact the subgrade as specified by the Engineer.
   d. If specified by the engineer, a perforated drainage pipe shall be installed at the back of the trench and connected to a prescribed outlet for draining groundwater.
   e. Granular soil is defined as:
   f. Classified as GM, GW, SM, SW, GW-GM, SW-SM referencing the USCS (Unified Soil Classification System).
   g. Contains maximum particle size of 1-1/2 in and less than 12 percent fines passing No. 200 sieve.
   h. Inert earth material with less than 3 percent organics or other deleterious substances (wood, metal, plastic, waste, etc).
   i. For clay subgrade soils, line the trench with nonwoven geotextile. 4 in thick loose lift of granular soil on top of the filter fabric and compact it to at least 90 percent of the specified modified Procter dry density per ASTM D 1557. Smooth the surface of the compacted soil to provide a level pad needed for the first unit.
5. Finish Grading: Finished surfaces shall be smooth, compacted and free from irregularities. The degree of finish shall be that normally obtainable with a blade-grader.
6. Finished grade shall be as specified by the contours plus or minus 0.10 foot except where a local change in elevation is required to match sidewalks, curbs, manholes and catch

basins, or to ensure proper drainage. Allowance for topsoil and grass cover, and subbase and pavement thickness shall be made so that the specified thickness of topsoil can be applied to attain the finished grade.

7. When the work is at an intermediate stage of completion, the lines and grades shall be as specified plus or minus 0.5 foot to provide adequate drainage.
8. If the soil is to be cultivated or straw is to be incorporated into the surface, rocks larger than 2-1/2 inches in maximum dimension, roots, and other debris on the surface of the slope shall be removed and disposed of prior to cultivation or placement of straw.

C. CONTROL OF EROSION:
   1. The Contractor shall maintain earthwork surfaces true and smooth and protected from erosion. Where erosion occurs, the Contractor shall provide fill or shall excavate as necessary to return earthwork surfaces to the grade and finish specified.

3.02 VEGETATION ESTABLISHMENT

A. Establish permanent vegetation, where feasible, to assist in the long-term performance of the engineered system and the control of erosion.

B. A site-specific soil test shall be conducted to determine the recommended soil amendments required to establish permanent vegetation.

C. The type and method of vegetation establishment should be unique to the projects geometry, location, climate, season, topography, soils, seed type, etc. and shall be as directed per one of the following:
   1. Construction plans
   2. Technical Specifications
   3. Manufacturer’s engineered earth armoring solution submittal
   4. As directed by the Engineer of Record
   5. As directed by the project owner.

D. Water and/or irrigate seeded/sodded areas as needed to establish and maintain permanent vegetation until the desired vegetative density has been achieved.

E. Rubber-tired or rubber-tracked vehicles shall be used, and sharp turns avoided. No heavy and/or metal-tracked equipment or sharp turns shall be permitted on the installed engineered earth armoring solution. Foot traffic and construction equipment shall be avoided over the TRM if loose or wet soil conditions exist.

3.03 INSTALLATION

A. RIP RAP
   1. Rock shall be wetted in place prior.
   2. Spading or rodding of the interstices may be necessary to achieve the desired penetration.

B. ANCHORED VEGETATED TURF REINFORCEMENT MAT
   1. The TRM shall be installed, anchored, and pinned as shown in the Plans. TRM shall be laid from downstream to upstream, with panel edges overlapping/shingling by a minimum of 3 inches in the direction of creek flow.
   2. Each TRM panel shall be rolled down from the anchor trench at crest of slope. Splicing together rolls to make up a panel section will not be permitted. For installation of TRM panels around curved sections of a slope, trim panels at an angle so that no more than two layers of TRM overlap at any point in time.
   3. Vehicle traffic shall not be allowed on the TRM at any time.
   4. Patching or repairs to TRM may be accepted on a case-by-case basis by the Engineer, and shall be performed in accordance with manufacturer recommendations, including placement of additional pins and anchors at no additional cost to SASD.
   5. Pins shall be installed to hold the mat in place until the percussion driven earth anchors (PDEAs) can be installed. PDEAs shall be driven into place using a drive steel.

6. A percussion hammer shall be used to guide the drive steel into the ground perpendicular to the slope surface until the desired embedment is reached. The drive steel shall then be removed, the load bearing plate and load-lock mechanism slid into place against the TRM surface on the anchor tendon, and the anchor shall be set by pulling the anchor tendon out of the ground (up to 8-inches depending on soil conditions). The anchor shall be load-locked by continuing to apply tension to the anchor tendon until a slight depression is observed on the TRM surface.
7. Anchor load tests shall be performed on ten percent of the installed anchors to confirm a minimum pullout strength of 1,200 lbs has been achieved. If any anchor is found that does not meet the minimum pullout strength, all adjacent anchors shall also be tested and any deficient anchors shall be removed and replaced at the Contractor's expense. Upon completion of testing all excess anchor tendons shall be cut off flush to the load bearing plate at the TRM surface.
8. Upon completion of installation, the projections on the surface of the TRM shall be filled with top soil until the top ridges are barely visible, or the filled TRM thickness is approximately 1 inch.
9. The soil filled TRM shall then be hydroseeded with 50 percent of the seed mix in Specification Section 01700. TRM anchor trenches shall be installed as shown in the plans. The surface should be watered daily for the first two weeks following placement to promote vegetation growth. A fine spray shall be used for light watering to prevent erosion of seeds or soil. Irrigation shall be a minimum of 0.75 and a maximum of 1.0 inches per square foot per day (20,364 gallons minimum or 27,152 gallons maximum per acre per day). Initial fertilization shall be applied 14 days after vegetation is placed, using 25-lbs per acre ammonium nitrate or ammonium sulfate. Post-construction fertilization shall be conducted 30 to 45 days after installation, at the same rate as initial fertilization.

C. ENGINEERED MATRESS SYSTEM:
1. Install the Engineered Mattress System at elevation and alignment indicated.
2. Prior to placement of the TRM component, install the geotextile liner across the bottom and up the sides of the excavated area.
3. Beginning at the downstream end of the protected area, begin placement of TRM, ensuring enough extra material along edges of installation to cover the side of the excavated area and the top overlap. This amount may vary by project, but would be around 18 in for a 12 in deep excavation.
4. Continue with the placement of additional TRM as needed to cover the excavated area, overlapping proceeding layers a minimum of 2 ft and allowing for enough extra material along the overlap to construct the transition baffle. This amount may vary by project, but would be around 18 in for a 12 in deep excavation.
5. Secure TRM overlap along the bottom layer with synthetic stakes on 2 ft spacing.
6. Once the bottom layer of TRM has been placed, internal baffles are to be constructed with the TRM material facing downstream along each overlap. Additional TRM baffles are to be constructed and placed facing downstream to maintain a maximum baffle spacing of 8 ft.
7. To construct an internal baffle, weave the bottom and upright internal bracing components (bars) through the interior pyramidal projections of the TRM along the overlap toward the 2 ft overlap line, being sure to catch 4-8 yarns with the bracing bar at each pyramid. Fold the fabric and stand-up the face, then connect the bars using a bar slot at the overlap line. While holding the face near vertical, connect those two bars with the third bar, aligned transverse to the other two using the bar slots. Install these braces at a maximum uniform spacing of 2 ft along the baffle.
8. To construct additional internal baffles, cut a 3.5 ft wide strip of TRM and follow the process shown in paragraph C.7 (above). Once constructed and placed, all additional baffles should be secured to the lower TRM layer with synthetic stakes on 2 ft spacing.
9. Once bottom layer of TRM and internal baffles are placed, begin infilling the Engineered Mattress System with approved material. Care should be taken when placing fill around

the braces and on each side of the internal baffles, so as to fill on both sides concurrently and avoid damaging the internal baffles.

10. Fill should be placed to bring the total infill height up to 12 in. If needed, the upper 2-3 in of the Engineered Mattress System can be separated with the geotextile liner and filled with topsoil to aid in vegetation establishment.
11. Fold the remaining 6 in portion of the TRM at each internal baffle over the backfill zone in the upstream direction.
12. With the bottom layer of TRM and internal baffles installed and the infill placed, align the upper TRM layer and secure with synthetic stakes on each overlap and internal baffle connection on 1 ft spacing and across the body of the installation on 2 ft spacing.
13. Exercise extreme caution when driving or operating equipment across the TRM, as sudden turns or braking may deform or damage the TRM, or pull the internal baffles out of proper alignment.
14. Rubber-tired or rubber-tracked vehicles shall be used, and sharp turns avoided. No heavy and/or metal-tracked equipment or sharp turns shall be permitted on the installed TRM. Foot traffic and construction equipment shall be avoided over the TRM if loose or wet soil conditions exist.
15. Establish permanent vegetation, where feasible, to assist in the long-term performance of the Engineered Mattress System and the control of erosion.

D. ENGINEERED BANK STABLIZATION SYSTEM:
   1. Install the Engineered Bank Stabilization at elevation and alignment indicated.
   2. Starting with the lowest portion of the alignment, lower the first unit onto the foundation layer and expand into place. At each terminus of this lowest section of the alignment, curve the turn the unit into the slope so the ends of this run can be buried.
   3. Gradual curves can be created due to the system flexibility. Curving is done during setup and all curved units must be set out and joined before filling. Each of the 15 ft long units can be curved a maximum of 12 in from the tangent line set by the previous unit. Tighter concave or convex curves can be achieved as shown below.
   4. Concave curves are formed by removing a single rear facing panels and creating a triangular unit.
      a. Begin the process by removing the spirals on each side of the panel and cut along the geotextile inside the unit, just under the row of staples.
      b. Remove the rigid cell panel and reapply the spirals at each corner to secure the internal panels.
      c. Overlap the corner spirals and insert the joining pins in order to complete the triangular cell.
      d. Zip-tie the excess geotextile liner to the rigid cell panel to keep it out of the way during filling.
   5. Convex curves are formed by removing a single front facing panel and creating a triangular unit.
      a. Begin the process by cutting the exterior TRM down the middle of the cell to expose the rigid cell panel and geotextile lining.
      b. Remove the spirals on each side of the panel and cut along the geotextile inside the unit, just under the row of staples.
      c. Remove the rigid cell panel and reapply the spirals at each corner to secure the internal panels.
      d. Overlap the corner spirals and insert the joining pins in order to complete the triangular cell.
      e. Zip-tie the excess geotextile liner to the rigid cell panel to keep it out of the way during filling.
      f. Shingle the exterior TRM in the direction of flow and trim excess material in order to maintain a 6 in overlap.

g. Using stainless steel hog rings, secure the overlap to the rigid cell, leaving a minimum of 3 in beyond the hog rings.

6. If required, Engineered Earth Anchors can be utilized with the system to provide additional resistance to lateral movement.
   a. With the unit set in place, expanded, and filled approximately halfway, mark the location of anchors on the slope behind the units. Anchor locations should align with the intermediate dividing walls of the unit.
   b. Cut a hole in the geotextile liner near the intermediate dividing wall to thread the anchor head from the inside of the unit toward the marked location on the slope behind the unit. The hole should be cut approximately 1 ft from the top of the unit.
   c. Place the drive rod into the anchor head and drive anchor near horizontal into rear excavation at the marked locations. Remove anchor drive rod and set anchor.
   d. On the inside of the unit, apply light force to ensure the anchor top plate is set against the walls of the unit and the locking mechanism of the anchor is set.
7. Place a 6 in thick fill material approved by the Engineer within the units. Check and adjust the units to ensure a level placement. If joining the units together in series, do not fill the end cell more than 6 in prior to joining units.
8. Install remaining fill in lifts no more than 2 ft. Fill the units and backfill behind the units simultaneously so as to balance the earth pressures. When normal water levels are present, face units should be filled with granular, self-consolidating material. Compact infill and backfill to the specified modified Proctor dry density per the Engineer's recommendation, but never less than 87% of the maximum dry density per ASTM 1557.
9. For vegetation establishment on the face of the units, fill the pocket between the TRM and the cell with seed and growth media. This can consist of topsoil, or other organic material, and seed mix in accordance with Section 31 10 00. Place a minimum of 1 in of topsoil/seed mix on the top of the filled unit.
10. Pull the remaining portion of the TRM tightly across the top of the filled unit. Fasten the TRM top cover to the back of the unit walls as well as the intermediate walls with stainless steel hog rings. Turn down excess TRM along the back side of the unit prior to placing fill behind unit.
11. Units can be joined by connecting the spirals from one unit to another.
    a. Align the units, overlapping the spirals and insert the joining pin to permanently attached to each other.
    b. When joining facing units, the TRM is to be spliced together. Shingle the exterior TRM in the direction of flow and trim excess material in order to maintain a 6 in overlap. Using stainless steel hog rings, secure the overlap to the rigid cell, leaving a minimum of 3 in beyond the hog rings.
12. Repeat paragraphs D.1. through D.11. (above) for each subsequent unit. Incorporate a setback with unit to provide the desired overall slope angle.

END OF SECTION

SECTION 31 63 63
DRILLED MICROPILES

PART 1 - GENERAL

1.01 SUMMARY

A. This work shall consist of constructing micropiles as shown on the Contract Drawings and approved working drawings and as specified herein. The Contractor is responsible for furnishing of all materials, products, accessories, tools, equipment, services, transportation, labor and supervision, and manufacturing techniques required for design.

1.02 MICROPILE DESIGN REQUIREMENTS

A. Furnish, install, and test micropiles capable of supporting loads specified in the Contract Documents.

B. Micropiles are defined as small diameter, high capacity drilled and grouted piles. Each pile shall consist of an inner steel reinforcement, centralizers, permanent steel casing, and cement grout that is tremied into the drill holes. The micropiles shall be of Type B classification as defined in the Federal Highway Administration publication, FHWA-NHI-05-039.

C. Micropiles shall be designed in accordance with the IBC, the Contract Specifications, and the Contract Drawings.

1.03 SUBMITTALS

A. Submittals shall be in accordance with SP-07.

B. Shop Drawings including:
   1. A plan view identifying location of all micropiles.
   2. An elevation view identifying locations and elevations of all micropiles.
   3. Construction sequencing or special construction details.
   4. Micropile typical sections including micropile spacing, minimum drillhole diameter, pipe casing and reinforcing bar details, splice types and locations, centralizers and spacers, grout bond zone and casing plunge lengths (if used), corrosion protection details, and connection details to the footing.
   5. Details, dimensions, and schedules for all micropiles, casing and reinforcing steel, including reinforcing bar bending details.

C. Grout Mix Design, shall include the following:
   1. Type of Portland cement
   2. Aggregate source and gradation
   3. Proportions of mix by weight and water-cement ratio
   4. Manufacture's brand name and technical literature for proposed admixtures
   5. Compressive strength test results per ASTM C109 by a qualified independent testing laboratory verifying the specified minimum 3- and 28-day grout compressive strengths. Previous test results for the proposed grout mix completed within one year of the start of grouting may be submitted for initial verification and acceptance of the required compressive strengths and start of production work.

D. Detailed step-by-step description of the proposed micropile construction procedure including personnel, testing and equipment to assure quality control. Include the following information:
   1. Submit installation instructions for placement of micropiles.
   2. Detailed narrative describing the drilling equipment, drilling process, procedures, placement of reinforcement and grout, and methods to be used for all aspects of work
   3. Proposed micropile installation schedule.
   4. Verification of headroom and space requirements for installation.
   5. Proposed grouting plan.
   6. Plan for control and disposal of surface water, drill flush, and excess waste grout.

E. Certified mill test reports for steel micropiles with ultimate strength, yield strength, elongation, and material properties composition.

F. Detailed plans for the proposed micropile proof testing method:
   1. Include drawings, details, and structural design calculations necessary to clearly describe the proposed test method, reaction load system capacity and equipment setup, types and accuracy of apparatus to be used for applying and measuring the test loads and pile top movements.
   2. Proof test equipment including instrumentation and calibration data for hydraulic jack, pump pressure gauge, and load cell to be used for proof testing. The calibration tests shall be performed on the jack and pressure gauge as a unit by an independent testing laboratory. Perform and submit calibration of jack and pressure gauge, and load cell within one hundred and eighty calendar days of proof testing.

G. Test Reports: Submit certified test reports for grout strength in accordance with ASTM C 109.

H. Certificates: Certification identifying cement, brand name, type, mill location, and quantity to be used.

I. Drilling Logs: The Contractor shall review, approve, and submit the drilling logs prepared by the Owner's Testing Agency for each micropile on a daily basis. Logs shall include identification, micropile diameter, bottom elevation, top elevation, nature and location of obstructions, and grout placement.

J. Reports: The Contractor shall submit to the Engineer within 14 calendar days after the completion of the micropile work a report containing the following:
   1. As-built drawings showing the locations of the micropiles and the pile lengths.
   2. Reinforcing steel mill test reports for the steel components incorporated into the installation.
   3. Micropile test results and graphs.
   4. Remarks, unusual conditions encountered, any deviations from requirements.

K. As-built drawings showing the micropile locations, elevations of top and bottom reinforcing steel, total pile length, and bond length.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: A minimum of 5 years' experience and not less than three successfully completed projects with similar soil and groundwater conditions, micropile size and depth as contained in the project. Provide a list of qualified drill operators and on-site supervisors who will be assigned to the project including experience in sufficient detail.

B. Pre-construction Conference: A minimum two weeks prior to scheduled commencement of micropile installation and associated work, meet at project site with installer of micropiles, installers of related work, the Owner's Structural Engineer, Owner's Representative, Owner's Testing Agency, Owner's Geotechnical Engineer, and other representatives directly concerned with performance of the work. Review foreseeable methods and procedures related to micropile work. Record discussion of conference and decisions reached, and furnish copy of record to each party attending.

C. Micropile foundation construction shall be observed by the Owner's Geotechnical Engineer at all times and is a "Special Inspection" item in accordance with Section 1704 of the International Building Code. The Contractor shall provide the Owner's Geotechnical Engineer with a minimum 5 days notice prior to each commencement of micropile installation. The Contractor shall not install micropiles without the presence of the Owner's Geotechnical Engineer.

D. The Contractor shall be responsible for all testing of the mixed grout. Grout samples shall be obtained on a daily basis and tested in accordance with the Specifications. The Contractor shall coordinate and cooperate with the testing and inspection program.

E. The Engineer may suspend the micropile construction if the micropile Contractor substitutes unqualified personnel for approved personnel during construction. If work is suspended due to

substitution of unqualified personnel, the Contractor shall be fully liable for additional costs resulting from the suspension of work and no adjustment in contact time resulting for the suspension of work will be allowed.

1.05 PROJECT CONDITIONS

A. Site Information: A geotechnical report has been prepared for this Project and is available for information only. The report is not part of the Contract Documents and is not guaranteed to represent conditions that will be encountered. Opinions expressed in this report are those of the geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by the geotechnical engineer. The Owner will not be responsible for interpretations or conclusions drawn from this data by the Contractor.
   1. Additional test borings and other exploratory operations may be made by the Contractor at no additional cost to the Owner.
   2. The geotechnical report is referenced in Appendix XX.

B. Existing Utility Lines and Foundations: Any existing underground utility lines and foundations shown on the Drawings are shown from the best possible information available and shall be verified prior to any excavation or grading work.
   1. Known utilities and foundations have been shown only where their existence has been determined by survey, investigation, or record drawings. The precise location of these lines, as well as careful reconnaissance of all areas for both above- and below-ground utilities as well as protection of same, shall be the sole responsibility of the Contractor.
   2. Existing utility lines to be retained and shown on the Civil Drawings, or the location of which are made known to the Contractor prior to excavation operations, shall be protected from damage during excavation drilling, filling, and backfilling, and if damaged, shall be repaired by the Contractor, at his expense, and in a manner as directed by the Engineer.
   3. New Utility Lines: New utility lines shown on the Civil Drawings, or the location of which are made known to the Contractor prior to concrete pier construction, shall be protected from damage during excavation, drilling, filling, and backfilling, and if damaged, shall be repaired by the Contractor, at his expense, and in a manner as directed by the Engineer.
   4. Underground Utilities: All underground utilities, basements, and footings of all buildings and other structures shall be identified and located before drilling operations and shall be protected from harm as required to prevent damage. The outside diameter of the micropiles shall clear utilities by a minimum of 5 feet.
   5. Existing Adjacent Facilities: The Contractor shall assume all responsibility for the premises and loss or damage to the property, adjoining property, public ways and utilities, shoring, bracing, and barricades protecting adjacent property. All costs for protecting, repairing, and replacing adjacent property shall be borne by the Contractor.

C. All construction equipment, temporary facilities, staging, materials handling and storage, shall be confined to the limits of the temporary construction easement (TCE), temporary construction access (TCA), permanent utility easements (PUEs) indicated on the Contract Drawings. Contractor's use of the site(s) shall be in accordance with SP-15.

D. The Contractor shall assume all responsibility for the premises and loss or damage to the property, adjoining property, public ways and utilities, shoring, bracing, and barricades and protecting adjacent property. All work shall conform to the requirements of the local jurisdiction. All costs for protecting, repairing, and replacing adjacent property shall be borne by the Contractor.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General: Provide materials that are either new or in serviceable condition.

B. Grout:
   1. Material: Portland Cement ASTM C150, Type I or II

2. Description: Neat cement (Portland cement and water) or a sand-cement grout with a fluid consistency, water cement ratio of 0.4, a minimum compressive strength of 3,000 psi at 7 days and 4,000 psi at 28 days in accordance with ASTM C109. The grout shall contain suitable admixtures to control bleeding and improve flowability.
3. Grout shall have the following admixtures, or equivalent:
    a. MasterRoc FLC 100, 3 lbs. per sack of cement
    b. MCI 2005NS by Cortec, 1 oz. per sack of cement
4. Water: Clean, fresh, potable, and free from injurious amounts of mineral and organic substances

C. Reinforcing Steel: Grade 60 (ASTM A615), all-threaded reinforcing bar

D. Centralizers: Fabricated from plastic or material that is non-detrimental to the reinforcing steel. Wood shall not be used. The centralizer shall be able to support the reinforcing so a minimum of 1-inch of grout cover is provided and shall permit grout to freely flow up the drill hole.

E. Hex Nut: Hex nut shall develop the full ultimate load of the all-threaded rebar in tension or compression. Size of hex nut shall be compatible with the all-threaded rebar. Hex nut shall be furnished by the all-threaded rebar manufacturer.

F. Drill Bit: Shall have a minimum diameter capable of meeting the required diameter as called out on the Drawings. The bit shall be capable of drilling through hard cobbles, hard boulders, stiff silt and clay, submerged sand and gravel, and other subsurface conditions as indicated on the boring logs.

PART 3 - EXECUTION

3.01 PREPARATION

A. Coordinate the work and the excavation so the micropile structures are safely constructed. Perform the micropile construction and related excavation in accordance with the Construction Documents and Specifications.

3.02 PILE INSTALLATION

A. Micropile allowable construction tolerances are as follows:
1. Centerline of piling shall not be more than 3 inches from indicated plan location.
2. Pile shall be plumb or battered within 2 percent of total-length plan alignment.
3. Top elevation of pile shall be plus 1 inch or minus 2 inches maximum from vertical elevation indicated.
4. Centerline of reinforcing steel shall not be more than 0.5 inches from indicated location.

B. Reinforcing steel placement shall be performed as follows:
1. Non-corrosive centralizers shall be used for the reinforcing bars. The centralizers shall be placed at a spacing not exceeding 10 feet. In addition, the top centralizer shall be located within 5 feet of the top of the micropile and the lower centralizer shall be located not more than one foot above the bottom of the reinforcing bar.
2. Reinforcing steel shall be spliced only with mechanical couplers specifically manufactured for splicing bars and capable of achieving the full tensile strength of the bar. Contractor shall submit mechanical coupler data to the Engineer for acceptance.

C. Grout placement shall be performed as follows:
1. The grouting in each micropile shall be placed by starting from the deepest point in the drill hole and working upward.
2. It shall be pumped through grout tubes, pipes, or drill rods. The grout pressures and grout takes shall be controlled to reduce the amount of ground heave and excessive grout takes.
3. After completing the grouting, the grout tube or pipe may remain in the hole, but it shall be filled with grout of equal or greater strength than the grout used in the installations.

4. One set of grout specimens shall be taken for each day of production micropile installation.
5. Each set shall consist of six cubes. Grout specimens shall be cured under laboratory conditions.
6. Cubes shall be tested in accordance with ASTM C109. Strength tests shall be made for two cubes at 7 days and for four cubes at 28 days.
7. If the strength tests of one or more cubes of a set from a pile are at 10 percent or more below the required compressive strength required at 28 days, the micropile shall be abandoned and replaced by micropile(s) placed adjacent to the abandoned micropile as directed by the Engineer at the Contractor's expense.
8. All tests shall be made by an independent testing laboratory (accredited testing laboratory) approved by the Engineer and paid for by the Contractor.

D. Abandon and cut off rejected piles as directed by the Engineer. Leave rejected piles in place and installed new piles in locations as directed by the Engineer.

3.03 PERFORMANCE AND PROOF TESTING

A. The Contractor shall conduct performance tests and proof tests consisting of tension load testing on micropiles. The tests are to be done on piles installed from the bottom of the excavation.

B. Performance Testing:
1. Performing testing will be used at one location per site to verify the design of the micropile load transfer bond zone, and the construction method proposed by the Contractor including drilling, installing, and grouting of the micropiles. The drilling-and-grouting method, casing length and outside diameter, reinforcing bar lengths, and depth of embedment for the performance test micropile shall be identical to those specified for the production micropiles at the given location. The performance test micropile structural steel sections shall be sized to safety resist the maximum test load that is equal to 2.8 times the Design Load indicated on the drawings, where 2.8 is the factor of safety (2.0) times a factor of 1.4, which is to account for intermediate state of effective stress due to dewatering system.
2. The Owner’s Representative will observe performance testing at each testing location. Performance test results must be reviewed and approved by the Owner’s Representative prior to installing any production micropiles.
3. If a micropile that is performance tested fails to meet any of the acceptance criteria for testing as determined by the Owner’s Representative, that micropile will be rejected and Contractor shall modify the design or construction procedures and submit revised working drawings. The Contractor shall install and conduct performance test for another micropile. Micropile installation operations shall not continue until the Owner’s Representative has approved the revised working drawings in writing. No extensions of time or compensation will be made for installing and testing additional micropiles.

C. Proof Testing:
1. All micropiles shall be proof tested before pipe support foundation concrete is cast. The test load shall be equal 1.5 times the Design Loads indicated on the Contract Drawings.
2. If any production micropile that is proof tested fails to meet any of the acceptance criteria for proof testing specified herein, that pile will be rejected. Rejected micropiles shall be replaced at locations approved by the Owner’s Representative. The Contractor shall submit to the Owner’s Representative for approval a remedy plan for replacing rejected micropiles. The remedy plan shall consist of details for replacement of micropiles including additional micropiles to be installed on the Contract Drawings. No extension of time or compensation will be made for the review of a remedy plan for replacing or installing additional micropiles.

D. Proof and Performance Testing shall be performed under the direction of the Contractor’s personnel experienced and competent in pile load testing. Static axial pile load testing shall

include all equipment necessary to conduct pile testing, interpret the data, and prepare an engineering report documenting this work.

E. The Contractor shall complete the Daily Field Report Form for each day in which pile load test activities occur at the test site. Each day, the Contractor shall supply to the Owner's Representative a completed Daily Field Report Form describing the day's activities.

F. All equipment necessary to perform the pile load test shall be furnished by the Contractor and shall conform to the requirements of ASTM D 3689.

G. At least 4 working days prior to performance testing, and before mobilizing any testing equipment, the Contractor shall submit to the Owner's Representative two copies of the following:
   1. A diagram of the load test frame, including reference beams, location and identification of instrumentation.
   2. Load cell calibration(s).
   3. Hydraulic jack calibration(s).
   4. Displacement gauge and transducer calibrations.
   5. Any proposed deviation from the testing methods specified herein.
   6. Records of all calibrations that have been conducted within 6 months prior to testing. The records shall be traceable to a NIST standard.

H. Proof and Performance Testing shall be performed in accordance with ASTM D 3689, modified as follows:
   1. A load test frame shall be provided that is designed to carry at least twice the maximum test load required for the pile in direction of loading.
   2. All pile load tests shall be conducted until the test load is reached.
   3. Primary and secondary measurement systems shall be utilized for measuring load and displacement. Displacement gauges shall have sufficient travel to determine pile displacement up to 1.5 times the calculated expected displacement of the test pile. Said displacement gauges shall read to an accuracy of 0.001 in. (primary) and 0.01 in. or 0.001 ft. (secondary. These displacement gauges shall be mounted to reference beams whose supports allow a clear distance of not less than 8 ft. from the test pile. Reference beams shall be made of steel or aluminum, shall not be crossed braced, and be sufficiently stiff. The connection between the displacement gauges and the reference beam shall be sufficiently stiff. Displacement gauges shall bear on glass plates.
   4. The testing shall begin with a zero reading taken on all the primary and secondary systems.
   5. For performance tension load tests, the load applied and the corresponding durations shall be as shown in Table A.
      a. During Initial Loading, at least three readings of the primary and secondary systems shall be taken for each load increment. The first reading shall be taken immediately after the load is attained. The second and the third reading shall be taken 1 and 5 minutes, respectively, after the load is attained.
      b. After the five-minute reading is taken, the next load increment shall be applied to the test pile. Once the maximum load for the initial cycle has been reached, the full load shall be held constant for 10 minutes.
      c. During the load hold, the reading shall be taken at 1, 2, 3, 4, 5, 6, and 10 minutes. If the total recorded movement between 1 minute and 10 minutes exceeds 0.04 inch, the test load shall be held for an additional 50 minutes.
      d. Total movement shall be measured at 15, 20, 25, 30, 45, and 60 minutes. If the load is held for 60 minutes, a creep curve showing the creep movement between 1 minute and 60 minutes shall be plotted as a function of the logarithm of time.
      e. After this initial maximum load hold is complete, the pile shall be unloaded by reducing the load as described in Table A.

f. During the unloading, at least two readings of the primary and secondary system taken immediately after the load is attained; the second reading shall be taken 1 minute after the load is attained.
g. After this one minute reading is taken, the load may be decreased to the next load. At the end of the initial cycle, the load shall be a zero, and an initial and 1-minute reading shall be taken.
h. Upon reloading, all loads that have been previously attained shall be held for 1 minute and at least on initial and 1-minute reading shall be taken.
i. At 1.0F load increments, readings of the primary and secondary systems shall be taken when the load is attained, and at 1, 2, 3, 4, 5, 6, 10, 15, 20, 25, and 30 minutes, until the head of the pile is not more than 0.01 inches in 30 minutes.
j. Table A is presented as follows:

Performance Tension Load Test Schedule	
Load	Duration
0	1 minute
0.10F	5 minutes
0.20F	5 minutes
0.30F	5 minutes
0.40F	5 minutes
0.50F	10 minutes for Creep Test
0.60F	5 minutes
0.70F	5 minutes
0.80F	5 minutes
0.90F	5 minutes
1.00F	10 minutes or 60 minutes for Creep Test
0.75F	1 minute
0.50F	1 minute
0.25F	1 minute
0	1 minute
0.10F	1 minute
0.20F	1 minute
0.30F	1 minute
0.40F	1 minute
0.50F	1 minute
0.60F	1 minute
0.70F	1 minute
0.80F	1 minute
0.90F	1 minute
1.00F*	10 minutes or 30 minutes for Creep Test
F = Performance Test Load = 1.4 × FS × Design Load, where FS = 2.0 (1.4 is the factor to account for the immediate state of effective stress due dewatering) *After a 30-minute interval, remove the full load from the pile in four approximately equal decrements with 5-minute intervals between each decrement.	

6. For proof tension load tests, the loads applied and the corresponding durations shall be as shown in Table B.

a. During initial loading, at least three readings of the primary and secondary systems shall be taken for each load increment.
b. The first readings shall be taken immediately after the load is attained. The second and the third readings shall be taken 1 and 5 minutes, respectively, after the load is attained.
c. After the five-minute reading is taken, the next load increment shall be applied to the test pile. The final test load (1.00T) shall be held constant for 10 minutes.
d. During the load hold, the reading shall be taken at 1, 2, 3, 4, 5, 6 and 10 minutes. If the total recorded movement between 1 minute and 10 minutes exceeds 0.04 inch, the test load shall be held for an additional 50 minutes.
e. Total movement shall be measured at 15, 20, 25, 30, 45 and 60 minutes. If the load is held for 60 minutes, a creep curve showing the creep movement between 1 minute and 60 minutes shall be plotted as a function of the logarithm of time.
f. Table B is presented as follows:

Proof Tension Load Test Schedule	
Load	Duration
0	1 minute
0.25T	5 minutes
0.50T	5 minutes
0.75T	5 minutes
1.00T*	10 minutes or 60 minutes for Creep Test
T = Proof Test Load = 1.4 × FS × Design Load, where FS = 1.1 (1.4 is the factor to account for the immediate state of effective stress due dewatering) *After a 10- or 60-minute interval, remove the full load from the pile in four approximately equal decrements with 5-minute intervals between each decrement.	

7. “Load applied to the pile by hydraulic jacks acting between supported test beams and a reaction frame anchored to the pile” as specified in Paragraph 4.3 of ASTM D 3689 shall be used for performance test piles.
8. Proof tensile load testing shall be performed against reaction piles or cribbing in accordance with ASTM D 3689. Existing footings, piles, or other structures shall not be used as reaction points for load testing. An adjacent production micropile in a group may be used as reaction pile. If cribbing is used, the contractor’s attention is drawn to the presence of poor bearing soils and underground utilities, which may require special measures to protect against settlement and damage.

I. Within three working days after the piles are ready for testing, a preliminary report shall be transmitted to the Owner’s Representative. Said Preliminary report shall include: a completed Daily Field Report, indication the Contractor’s assessment of the pile capacity load test data sheets, and a load displacement plot.

J. Within 10 working days of the completion of a pile load test, the Contractor shall provide to the Owner’s Representative an engineering report documenting the pile load testing and findings. The report shall follow the outline stated in ASTM D 3689 and including the following:
1. Project identification and location, Project Name, and test site location, including the pile numbering system used by the Structural Representative.
2. Discussion of the installation dates for the test and reaction piles. Drilling equipment and method of drilling, including make and model, drilling records for test and reaction piles. Names of the pile installation personnel and pile test operator, and other key personnel. Discussion of drilling including depth and diameter, use of casing, footing excavation description, grouting procedure, quantities and pressures.

3. Discussion of as-built tip elevation, bottom of footing elevation, ground surface elevation, pile to elevation, for all test and reaction piles. Discussion of pile type, including grade of steel, splicing grouting, dates of drilling and grouting, and dimensions. Condition of test and reaction piles. Discussion of the sub-service condition, including location, date, and description of nearest soil boring, ground-water elevation, and date determined.
4. Discussion of the deviation from the testing method specified herein (said deviation shall be approved be Owner's Representative prior to testing). Description of the load test set-up including (primary and secondary) instrumentation used to measure load and displacement.
5. Attachments shall include the following:
    a. Vicinity Map with Test Location labeled.
    b. General Plan with test location labeled.
    c. Foundation Plan with test locations labeled.
    d. Footing details, with test and reaction pile location labeled.
    e. Grouting records.
    f. Plot of load vs. displacement (kips and inches) with the elastic tension/line (PL/AE).
    g. Sketch of load test set-up, including all instrumentation.
    h. Load cell calibration(s).
    i. Hydraulic jack calibration(s).
    j. Displacement gauge or transducer calibration(s).
    k. Relevant sheets from the Log-of-Test Borings.
    l. Two copies of the Load Testing Report shall be made and transmitted to the Owner's Representative.

K. A performance-tested micropile shall conform to the following acceptance criteria:
1. The micropile shall sustain the test load of 0.5 F, with a total axial movement at the top of the pile, measured relative to the top of the pile prior to the start of load testing, not exceeding 0.6 inches. Furthermore, the micropile shall sustain the test load 0.8 F, with a total axial movement at the top of the pile, measured relative to the top of the pile prior to the start of load testing, not exceeding 1.4 inches.
2. The creep movement of the end of the micropile of the end of the micropile at the maximum test load F, between 1 and 10 minutes, is less than 0.04 inch. If this creep movement exceeds 0.04 inch, the micropile will be accepted if it meets the creep requirements specified in Article 3.3 M below.
3. Failure does not occur at the 1.00xF maximum test load. Failure is defined as load at which attempts to further increase the test load simply results in continued pile movement.

L. A proof-tested micropile shall conform to the following acceptance criteria:
1. The micropile shall sustain the test load of 1.0T, with a total axial movement at the top of the pile, measured relative to the top of the pile prior to the start of load testing, not exceeding 0.825 inches.
2. The creep movement of the end of the micropile at the maximum test load T, between 1 and 10 minutes, is less than 0.04 inch. If this creep movement exceeds 0.04 inch, the micropile will be accepted if it meets the creep requirements specified in Article 3.3 M below.
3. Failure does not occur at the 1.00xT maximum test load. Failure is defined as load at which attempts to further increase the test load simply results in continued pile movement.

M. If the creep curve plotted from the movement data for micropiles indicates a creep rate of 0.08 inch or less for the last log cycle of time between 6 and 60 minutes, the micropile will be accepted.

N. If a performance-tested or proof-tested micropile is not accepted, micropile operation shall not continue until the Contractor has modified the design or construction procedures or both for the remaining micropile to comply with the specified acceptance criteria. The modifications shall be as agreed to by the Owner's Representative.

3.04 FIELD QUALITY CONTROL

A. General: Work under this Section shall be subject to special inspection and testing by the Owner's Testing Agency and the Owner's Geotechnical Engineer. .

B. Continuous Inspection: The Owner's Geotechnical Engineer and the Owner's Testing Agency shall provide continuous inspection during all pile installation and testing and will inspect each micropile for the following conditions:
   1. Observe drilling operations, and maintain complete and accurate records for each micropile.
   2. Verify placement locations, plumbness, and confirm micropile diameters, lengths, and embedment into rock (if applicable).
   3. Record grout volumes.
   4. Verify reinforcing details and depth to which reinforcement was placed.
   5. Identify any pile deviations or unusual occurrences during pile installation.

3.05 CLEANUP AND DISPOSAL OF MATERIALS

A. Upon completion of work, remove all materials, tools, scaffolding, refuse and debris generated by the work from premises, leaving premises in clean and satisfactory condition.

B. Contractor shall perform daily clean up. Remove rubbish and debris from the site daily, unless otherwise directed. Do not allow accumulations around the boreholes. Store materials where permitted on Drawings.

C. Remove surplus excavated material and slurry or grout and legally dispose of it off the Owner's property.

END OF SECTION

SECTION 35 20 23.33
DEWATERING AND CREEK BYPASS

PART 1 GENERAL

1.01 SUMMARY

A. This section specifies the dewatering of pipeline trench excavations and creek beds.

B. All dewatering shall be performed in accordance with Section 308 DEWATERING of the SASD Standards and Specifications.

C. Creek bypassing shall only be permissible between May 1st and October 1st, in accordance with the Streambed Alteration Agreement and Clean Water Act Section 404 and 401 permits. No work shall be permitted within the dewatered area of the creek during precipitation.

1.02 SUBMITTALS

A. The Contractor shall provide the following submittals as specified in SP-07. Contractor shall submit the qualifications and certification of any proposed arborist that will be retained for oversight of tree protection during construction.

B. Shop Drawings and Product Data:
   1. Before dewatering commences, the Contractor shall submit plans of the proposed dewatering system for review. The dewatering system plans shall be in sufficient detail to indicate power source, sizes of pumps, piping, appurtenances, and the ultimate disposal point for water; and to permit the review of the overall completeness and effectiveness of the proposed system. Cofferdams and flow-through piping design shall be sealed and signed by a Civil Engineer registered in the State of California.
   2. Review of the dewatering plans in no way relieves the Contractor of complete responsibility for providing effective and safe dewatering of the construction area. The control of groundwater shall be such that softening of the bottom of excavations or formation of "quick" conditions or "boils" do not occur. Dewatering systems shall be designed and operated to prevent relocation of the natural soils. Dewatering system submittal shall demonstrate coordination with the contractor-designed shoring and bracing method and submittal.

1.03 DESIGN REQUIREMENTS

A. Limit dewatering efforts to localized areas and specific structures.

B. Dewatering can affect improvements in the work area. Take adequate precautions in the design and implementation of the dewatering plan to protect existing improvements and avoid damage thereto.

C. The dewatering system, shoring system, and ground improvement system shall work together to meet all the following minimum requirements:
   1. The dewatering system shall provide stable excavation walls and keep the bottom of all excavations reasonably dry.
   2. Creek dewatering system composed of sand bags shall include dual containment upstream of the work zone within the creek waterway to provide a safe and dry work zone.
   3. Filter native soil and prevent loss of ground through dispersion and erosion.
   4. Prevent piping (boiling) of the excavation bottom.
   5. Preserve the undisturbed bearing capacity of the subgrade soils at the bottom of the excavation.
   6. Control of nuisance water.

1.04 Creek Flow Rates

A. The Contractor shall design the dewatering system to be capable of accommodating the anticipated peak water flow rate shown in Table 1 and ensure that the following flow rates are contained during dewatering/construction activities. The flow rates provided represent the

discharge associated with a 10-year return interval storm event. The Contractor may provide a bypass system for lower flow rates associated with dry weather conditions, but must be able to demonstrate that the bypass can be completely removed within a 24-hour period in the event of forecast precipitation, or can be augmented to supply the full flows provided in Table 1. Discharge calculations must be provided for any bypass system sized to convey flows less than those provided in Table 1. Costs of removing and re-installing creek bypass equipment will be the sole responsibility of the Contractor.

B.

Table 1. Maximum Creek Flow Rates for Bypass

Location	Flowrate, cfs
Site 1	49.8
Site 2	3,910
Site 3	351
Site 4	351
Site 5	332
Site 6	332
Site 7	506
Site 8	23.6
Site 9	1,210
Site 10	2,530
Site 11	76
Site 12	75.9

1.05 PERMIT REQUIREMENTS

A. The Contractor shall obtain any and all permits required in conjunction with their dewatering operations and shall meet all permit requirements.

1.06 PRECIPITATION FORECASTING

A. Contractor shall monitor the weather forecasts and shall limit creek bypass activities to periods where extended forecasts do not indicate precipitation. If precipitation is expected while bypass is in place, Contractor shall remove all equipment, materials, and personnel from dewatered portion of the creek bed until the probability of precipitation returns to zero. Owner shall be notified immediately if weather forecasts indicate that precipitation will occur while creek bypass is in place.

PART 2 MATERIALS

2.01 DEWATERING MATERIALS

A. CREEK DEWATERING: acceptable coffer dam materials and construction used to isolate sections of creeks or creek banks include:
   1. Portable coffer dams manufactured by Portadam or approved equal.

2. Sandbags: If sand bags are used for cofferdam construction, all sand bags and other parts of the anchoring system shall be biodegradable. Sand bags shall be filled with clean sand. No concrete, asphalt, or construction debris shall be used. Plastic sheeting may be used on water bearing side of coffer dam(s).
3. Bladders: Coffer dam bladders shall be filled with clean water or other inert material. All bladder fill material shall be hauled offsite at completion of the localized project. No water or other bladder fill material shall be released or deposited within the creek zone at any time.
4. All temporary channel flow bypass piping, including pipe and fittings, shall be rigid with a rippled interior surface and restrained joints suitable for the intended service, clean, free of rust, dirt, debris, and foreign material. Pipe and fittings shall be as short as possible and shall facilitate fish passage and discourage spawning. Pipe shall be removed as quickly as possible.
5. Pipe and fittings shall not impart any objectionable substance, taste, odor, or color to the water. Pipelines and/or fittings that have been used for conveying sewage shall not be used for bypassing.
6. No cast-in-place or fresh concrete shall be allowed. No mechanical connection to channel or culverts shall be allowed.

B. EXCAVATION DEWATERING: all excavation dewatering shall be in accordance with SASD construction Specifications Section 308, DEWATERING.

PART 3 EXECUTION

3.01 Discharge Requirements

A. For dewatering pumping outside normal working hours, engines shall be equipped and/or shielded in a manner to keep noise to a minimum. Testing is required to show compliance with local ordinances. The Contractor shall conduct all work to minimize the impact of construction noise on nearby residential neighborhoods.

B. Dewatering pump noise shall be mitigated, especially at night. The noise level from the Contractor's operations shall not exceed the requirements outlined in the Sacramento County Noise Ordinance Standards and the City of Citrus Heights Noise Ordinance.

C. Water shall be disposed of in accordance with all dewatering permit conditions, in a manner which causes no damage to public health or safety and prevents damage to adjacent public and private property and silting of existing drains and structures. The Contractor shall follow the District’s Best Management Practices for dewatering operations which may include construction of sedimentation basins or sedimentation traps. Drainage of water from any excavation through the pipeline under construction or an existing sanitary sewer is prohibited unless prior written approval is requested by the contractor and granted by the District's Environmental Compliance Division.

D. Dewatering piping shall not interfere with traffic. Under no circumstances shall dewatering water be allowed to flood streets or otherwise cause hazardous conditions for traffic.

E. The Contractor shall keep excavations reasonably free from water during construction. The static water level shall be drawn down to a sufficient depth below the bottom of excavations to maintain the undisturbed state of natural soils and allow the placement of any fill to the specified density. Disposal of water shall not damage property or create a public nuisance. The Contractor shall have on hand pumping equipment and machinery in good working condition for emergencies and shall have workmen available for its operation. Dewatering systems shall operate continuously until backfill has been completed to 1 foot below the finished grade elevation.

F. Groundwater shall be controlled to prevent softening of the bottom of excavations, or formation of "quick" conditions. Dewatering systems shall not remove natural soils. The Contractor shall control surface runoff to prevent entry or collection of water in excavations.

G. Release of groundwater to its static level shall be controlled to prevent disturbance of the natural foundation soils or compacted fill and to prevent flotation or movement of structures or pipelines.

H. Dewatering shall control subsurface water as well as surface water.

I. The Contractor shall furnish, install, and maintain all pumping, ditching or other approved measures for the removal of groundwater or exclusion of water, including stormwater and wastewater reaching the site of the work from any source, so as to prevent damage to the work or adjoining property. The intent of this requirement is that the Contractor shall at his cost provide all dewatering facilities required to enable pipe and structure installation in excavations that are free from standing or flowing water.

J. The area within the creek channel shall be isolated by temporary cofferdams as indicated in the drawings and dewatered for the duration of sewer main and creek bank stabilization installation.
   1. Operation of creek channel dewatering shall occur no earlier than May 1 and no later than October 1. All bypass flood control, flow-through piping, cofferdam, and other materials temporarily installed within the creek channel shall be removed from the channel and the channel creek bank stabilization installed prior to October 1.
   2. Localized sumps or point-wells may be used for dewatering excavations as required. All discharge water from constructed sumps or point-wells shall be in accordance with all State regulatory and permit requirements and include discharge water treatment as required. All water treatment require for dewatering discharge shall be at the expense of the Contractor.
   3. The water table shall be lowered to a minimum of 3-ft below the bottom of the excavation.
   4. The type of cofferdams used to isolate the construction areas, creek flow by-pass pumping, and the flow-through piping to allow flow between cofferdams shall be determined by the Contractor. The cofferdam shall not bear against or modify existing culverts, headwalls, or other existing installed structures. No portion of the cofferdams shall extend beyond the limits of construction identified on the contract drawings.
   5. Pumps used for dewatering the area isolated by the cofferdams shall have screening with openings no greater than 3/32- inch (measured diagonally) over intakes.
   6. If feasible, connectivity of the creek channel upstream and downstream of the cofferdams shall be maintained such that flow, wildlife and fish passage is unimpeded. This shall be accomplished by providing a gravity flow-through bypass pipe between the cofferdams. The flow-through piping shall be one continuous section of pipe with no joints, defects, breaks or repairs.
   7. If utilized, channel flow bypass shall minimize backwatering effects upstream and downstream of the temporary seepage control system.

3.02 ELECTRICAL SUPPLY FOR INSTALLATION OF DEWATERING SYSTEMS

A. Supply the electrical service used for dewatering separate from all other Contractor electrical requirements and dedicated solely to the operation of the dewatering systems.

3.03 DEWATERING SYSTEM PROTECTION

A. Take all reasonable precautions necessary to insure continuous, successful operation of the system. This includes adequate marking of all pump and pipeline locations.

B. Wherever headers or discharge lines are to be crossed for access or egress, use ramps to protect the system from vehicular traffic. All ramps shall be capable of supporting the heaviest equipment on site.

C. All ramped pipelines shall be valved on both sides of the ramp.

3.04 STANDBY EQUIPMENT

A. Maintain on site sufficient equipment and materials to insure continuous and successful operation of the dewatering, recharge and monitoring systems.

B. Test daily all standby centrifugal pumps and generators to insure their immediate availability.

C. Maintain onsite a sufficient number of valves, tees, elbows, connections, length of pipe, tools, recorder charts and parts or other system hardware to insure immediate repair or modification of any part of the system as necessary.

3.05 MONITORING SYSTEM

A. Ensure that an accurate and continuous record of water level and flow information is maintained. Consistency is an important factor in ensuring the water level data is accurate.

3.06 DAMAGES

A. Repair any damage to work in place including structures, other contractor's equipment and the excavation, including damage to the bottom due to heave and removal of material and pumping out of the excavated area, that may result from inadequate or improper dewatering system installation, maintenance and operation of the dewatering system, and any mechanical or electrical failure of the dewatering system at no additional cost to the Owner.

3.07 MAINTAINING EXCAVATION IN DEWATERED CONDITION

A. Maintain the dewatering systems in operation at all times.

B. Provide personnel skilled in the operation, maintenance, and replacement of system components, standby and spare equipment of the same capacity and quantity, and any other work required to maintain the systems.

C. Dewatering shall be continuous operation and interruptions due to outages and any other reasons will not be permitted.

D. Be responsible for all damages to the work on the excavation area and for damages to any other area caused by the failure tom maintain and operate the dewatering system.

3.08 SOIL DATA

A. Use of available soil test information in no way relieves the Contractor from the responsibility for design, installation, and operation of a properly functioning dewatering system.

3.09 SYSTEM REMOVAL

A. After construction, the Contractor shall clean all storm drains affected by his operations to the satisfaction of the local City or County, as applicable.

END OF SECTION

SECTION 40 05 13.14
STEEL CASING

PART 1 - GENERAL

1.01 SCOPE

A. This section specifies furnishing and installing steel casing pipe with fusion bonded epoxy protective coating.

1.02 QUALITY ASSURANCE

A. WELDING REQURIEMENTS:
   1. Welding Requirements:
      a. All welding procedures used to fabricate steel casings shall be prequalified under the provisions of ANSI/AWS D1.1.
      b. Welding procedures shall be required for, but not necessarily limited to, longitudinal and girth or special welds for pipe cylinders, casing joint welds, and reinforcing plates.
   2. All welding shall be performed by qualified welders, welding operators, and tackers who have had prior experience with the type of material to be used.
   3. Welders shall be qualified under the provisions of ANSI/AWS D1.1 by an independent local, approved testing agency not more than 6 months prior to commencing work on the casing or pipeline.
   4. Machines and electrodes similar to those used in the work shall be used in qualification tests.
   5. The Contractor shall bear the full expense of qualifying welders.

1.03 SUBMITTALS

A. The Contractor shall submit, in accordance with SP-07, SUBMITTALS, drawings, and complete design data showing methods and equipment he proposes to utilize for steel casings for approval by the Engineer. The submittal shall include the following information:

B. Shop Drawings:
   1. Manufacturer’s material on end seals.
   2. Steel casing pipe shop drawings, indicating length, proposed location of welds, and welding procedures.
   3. Product data for protective lining and coating.
   4. Manufacturer’s information for insulating spacers

C. WORK PLAN:
   1. Contractor shall submit work plan describing the equipment and procedures to be used for installing carrier pipe, placing spacers, and filling annular space with clean sand for approval by the Engineer.

D. Welding certifications.

E. Physical and chemical properties of all steel.

PART 2 - PRODUCTS

2.01 GENERAL

A. Steel casings shall be welded steel pipe no less than the minimum diameter as specified and shown on the drawings and a minimum thickness as shown on the drawings. Each end of the steel casing shall be factory beveled to accommodate field welding.

2.02 MATERIALS

A. STEEL CASING:
   1. The steel casing pipe shall be in accordance with ASTM A139, Grade B, unless shown otherwise, and the nominal sizes shall be as shown in the Contract Drawings.

2. The wall thickness shall be 1/2-inch minimum.
3. The exterior of the steel casing pipe shall be shop applied fusion bonded epoxy. The interior of the steel casing pipe shall be shop applied fusion bonded epoxy.
4. Ferrous metal surfaces shall be prepared in accordance with SSPC SP-5 (White Metal Blast Cleaning).

B. INSULATING SPACERS:
1. Spacers shall consist of a 12-inch wide fusion bonded epoxy coated steel band with 2-inch wide glass reinforced polymer runners.
2. Where applicable, the runner risers shall be sized to locate the carrier pipe eccentrically within the casing to minimize the amount of annular space between the top of pipe and the inside of the casing, yet still allow for sand to be blown into the annular space. Spacing and installation of spacers along the carrier pipe shall be per manufacturer's recommendations.
3. Spacers shall be Model C by PSI, or approved equal.

C. END SEALS
1. End seals shall consist of field-fabricated 2-inch redwood planks or brick and mortar per SASD Standard Plan-05, or shall be manufactured of EPDM rubber to match outside diameters of casing and carrier pipe and restrained with stainless steel end clamps. Manufactured end seals shall be Model C or Model W by PSI, or approved equal.

PART 3 - EXECUTION

3.01 GENERAL

INSTALLATION:

A. Install casing pipe in accordance with the Contract Drawings and SASD Standard Plans and Construction Specifications.

B. Clean casing of all debris.

C. Fill annular space between casing and carrier pipe with clean dry sand in accordance with SASD Standard Plan P-04.

D. Seal ends of casing pipe

END OF SECTION

APPENDIX C

GEOTECHNICAL REPORT

Geotechnical Investigation Report

SASD Creek Crossing | Sacramento Area, California

04.00185381-PR-001 01 | March 10, 2022

Draft-60% Design

WSC, Inc.

Document Control

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Client Information

Client	WSC, Inc.
Client Address	2330 East Bidwell Street, Suite 110 Folsom, California 95630
Client Contact	Mr. Scott Duren

Revision History

Issue	Date	Status	Comments on Content	Prepared By	Checked By	Approved By
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March 10, 2022

Dear Mr. Duren,

Fugro is pleased to submit this geotechnical investigation report for the proposed Creek Crossing Project located within the City of Citrus Heights, Fair Oaks, and an unincorporated area of Carmichael, California. Our work was authorized by the Contract Agreement between WSC and Fugro, effective on May 17, 2021, and was executed in general accordance with the scope listed in our Proposal No. 04.P0185381-P-001 (02) dated February 19, 2021.

This report was prepared to identify the key geologic and geotechnical aspects of the site and provide geotechnical recommendations for design and construction of the project. This report also summarizes the results of our geotechnical and geologic site data review, field exploration, laboratory testing, and geologic and seismic hazard evaluations for the project site. We appreciate this opportunity to be of service to WSC, Inc. Should you have any questions or require additional information, please contact us.

Sincerely,

Reza Rahimnejad, Ph.D.
Senior Engineer

Hadi Fattal
Senior Project Engineer

Deron van Hoff, P.E., G.E.
Principal Engineer

Distribution: (1) electronic copy to the addressee

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1. Introduction

This report presents the results of the geotechnical investigation conducted by Fugro for the proposed Sacramento Area Sewer District (SASD or District) Creek Crossing Project located in the City of Citrus Heights, Fair Oaks, and an unincorporated area of Carmichael, California, as shown on the Site Vicinity Map (**Plate 1**).

1.1 Project Description

We understand the project consists of rehabilitating and replacing up to twelve gravity sewer creek crossings for SASD. As part of the Sanitary Sewer Management Plan (SSMP) guidelines, we understand that SASD performs annual and post 2-year recurrence interval storm inspections of creek crossings to assess conditions of critical sites. As a result of the inspections, twelve sites were identified for improvement by the District. We understand that the crossings pose an unacceptable risk of sanitary sewer overflow due to the degrading site conditions, and therefore require mitigation action to reduce that risk. The crossings (assets) that are addressed in this report are (in no specific order): Hope Lane, San Lorenzo Way, Winding Way, Sutter Avenue, Arcade Creek Park, Garfield & Thousand Oaks, Indian River Drive, Hegseth Court, Dietz Way, Concho Court, Gina Court, and Campfire Way.

1.2 Scope of Services

The purpose of our geotechnical investigation and geologic hazards evaluation was to identify key geotechnical and geologic hazards of the site that could impact the project and provide geotechnical recommendations for design and construction of the project. The scope of our services performed included the following:

- Review geotechnical and geologic site conditions based on the subsurface data obtained from our explorations, generally available geologic maps and hazard zonation maps, and other related literature.
- Perform a site reconnaissance to observe the existing site conditions from a geotechnical and geologic viewpoint.
- Conduct a field exploration program at several of the sites, including drilling nine (9) exploratory borings to a maximum depth of about 31-1/2 feet and performing three (3) hand augers to a maximum depth of about 10 feet.
- Perform geotechnical laboratory testing on selected soil samples for classification, index, strength, and corrosivity testing.
- Identify the geotechnical and geologic conditions (e.g., stratigraphy, depth to groundwater, existing fill thickness, and geologic hazards such as surface fault rupture, seismic shaking, and liquefaction) that could impact the project.
- Perform geotechnical engineering analyses.

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- Develop seismic design criteria per 2019 California Building Code (CBC).
- Prepare this report to summarize the results of our geotechnical and geologic data review, field exploration, laboratory testing, geologic hazards evaluations, and engineering analyses, and to provide geotechnical conclusions and recommendations for design and construction of the project.

The data obtained, and the analyses performed were for the primary purpose of providing geotechnical recommendations for design and construction of the project. Chemical analytical assessment of onsite materials or groundwater for contaminants was beyond our scope of work.

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2. Field Exploration

2.1 Field Explorations

Fugro performed a geotechnical field exploration program that consisted of performing eleven (11) exploratory borings (B-01 through B-11) to a maximum depth of about 31-1/2 feet from December 14, 2021 to February 24, 2022, and three (3) hand-auger borings (H-01 through H-03) to a maximum depth of about 10 feet on December 16 and 21, 2021. The approximate locations of the borings are shown on the Site Plans (**Plates 2a through 2g**). These locations were determined by tape measuring from field landmark references; and should be considered accurate only to the degree implied by the method used.

Underground Service Alert (USA) was notified to clear all locations prior to explorations. In addition, drilling permits were obtained from Sacramento Environmental Management Department, for the explorations.

The borings were performed by a State of California C-57 licensed driller, Clear Heart Drilling of Santa Rosa, California, using a DR8K track-mounted drill rig and a limited access tripod apparatus, both equipped with 7-inch and 4-inch diameter hollow-stem and solid-stem augers, respectively. A 140-pound automatic drop hammer was used on the track rig and a 140-pound manual hammer was used on the tripod rig to drive sampling equipment at selected depths. According to Clear Hear Drilling, the automatic hammer used at the site was rated as having average energy transfer ratios of about 80 percent (calibrated in 2020). The manual hammer (cathead and rope) typically is assumed to have 60 percent hammer efficiency.

Our field engineer logged soils encountered in the borings. The soils were classified in general accordance with the Unified Soil Classification System (ASTM D2487 and D2488). The logs of the borings as well as a key for the classification of the soils are included in **Appendix A**. Upon completion of our field explorations, the borings were backfilled with neat cement grout in accordance with the Sacramento Environmental Management Department requirements. Drilling-derived soil cuttings were drummed and off-hauled.

Representative soil samples were obtained from the borings using a Modified California split-barrel drive sampler (outside diameter of 3.0 inches, inside diameter of 2.5 inches) and a Standard Penetration Test (SPT) split-barrel drive sampler (outside diameter of 2.0 inches, inside diameter of 1.375 inches). Soil samples were transmitted to laboratories for evaluation and testing. The sampler types are indicated in the "Sampler" column of the boring log as designated in **Plate A-1**.

Resistance blow counts were obtained with the drive samplers by dropping a 140-pound manual or automatic drop hammer through a 30-inch free fall in general accordance with ASTM D1586.

The sampler was driven 18 inches, or a shorter distance where hard resistance was encountered, and the number of blows were recorded for each 6 inches of penetration. The blows per foot recorded on the boring logs represent the accumulated number of blows that were required to drive the last 12 inches. When the SPT split spoon sampler was used, these blow counts are the standard penetration resistance values (N values). However, due to the larger diameter of the Modified California sampler, the blow counts recorded for this sampler are not standard penetration resistance values. These values were multiplied by a conversion factor of 0.63 for the Modified California Sampler and the calculated approximate equivalent N values are presented on our logs within parenthesis. Hammer energy correction factors were not applied on the N values presented on the logs.

2.2 Laboratory Testing

Our geotechnical laboratory testing program was directed toward a quantitative and qualitative evaluation of the physical and mechanical properties of the soils underlying the site. This program included:

- Twenty-eight (28) moisture content and dry unit weight determinations per ASTM D2937,
- Five (5) sieve analyses per ASTM D 6913 and sixteen (16) percent passing #200 sieve analyses per ASTM D1140,
- Eight (8) plastic and liquid limits per ASTM D4318,
- Fourteen (14) unconfined compressive strength tests per ASTM D2166,
- Two (2) unconsolidated undrained triaxial shear strength test (TXUU) per ASTM D2850,
- Corrosivity tests on six (6) selected samples.

Tests were performed by Cooper Testing's geotechnical laboratory in Palo Alto, California. Our laboratory testing results are included in **Appendix B**. Some of the test results are also presented on the boring logs (**Appendix A**) at the appropriate sample depths.

Corrosivity tests that include redox, pH, chlorides, sulfates, and resistivity were performed by CERCO Analytical, Inc. in Concord, California, on six representative soil samples (from Boring B-06, B-07, B-08, B-10, B-12, H-02 and H-03, at about 7.5, 7.5, 5, 5, 3.7, and 1 foot deep, respectively. The test results and a brief evaluation report prepared by CERCO regarding the near-surface soil corrosivity are also included in **Appendix B**.

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3. Site Conditions

3.1 Regional and Site Geology

Sacramento is located at the northern portion of the NW-SE oriented Great Valley forearc basin which is formed by the subduction of oceanic crust beneath the California continental margin. Great Valley is delimited by Coast Ranges on the west and Sierra Nevada on the east. Geology of the Sacramento area is the result of this subduction mechanism which has dominated the geologic history of western North America 500 to 18 million years ago. Remnants of these subduction zones and collided blocks are preserved in the northern Sierra Nevada and beneath the Sacramento Valley while the rocks that were added to the western margin of California during this subduction period are now preserved in the Coast Ranges.

Great Valley is subdivided into the Sacramento Valley in the north and the San Joaquin Valley in the south. Sacramento is located at the southern part of the Sacramento Valley at the confluence of the Sacramento and American rivers. This portion of the valley basin consists of late Cenozoic alluvial sediments of Sacramento and American Rivers, and glacial outwash deposits. These sediments overlie the basement rocks of Sierra Nevada.

Project area is located in the foothills of Sierra Nevada, where the basement rocks are composed of Mesozoic metasedimentary and metavolcanic rocks of varying lithologies and ages. This basement is overlain by Miocene to Pleistocene alluvial fans of Mehrten (MPm), Laguna (Pl) and Turlock Lake Formations (Qtl). In the project area, these formations are covered by Pleistocene alluvial fans of Riverbank Formation (Qr) and undivided alluvial sediments of fans, terraces and basins (Qha). These undivided alluvial sediments are observed along the Arcade Creek at the project site (**Plates 3 & 4**) (Gutierrez, 2011).

3.2 Site Faulting and Seismicity

Sacramento is relatively distant from active faults exhibiting a high slip rate and comparatively frequent earthquake recurrence, such as the faults along the eastern edge of the Coast Range Mountains, faults along or within the Sierra Nevada foothills, San Andreas Fault and related faults in the Bay Area. According to "Fault Activity Map of California," the closest Quaternary fault zone to the project area is NW-SE oriented, Willows Fault Zone located approximately 5 miles southwest of the project site (**Plate 5**) (Jennings & Bryant, 2010). This fault is concealed and does not rupture the surface.

Although there are no known active faults in the city and county of Sacramento identified by the California Geological Survey, there is potential for strong ground shaking from nearby or distant seismic sources. Some of the most notable earthquakes that caused ground shaking in Sacramento were the 1892 Vacaville-Winters earthquakes, the 1906 San Francisco earthquake,

the 1960 Dog Valley earthquake near Truckee, the Oroville earthquake in 1975, the 1989 Loma Prieta earthquake, the 1992 Petrolia earthquake, the 1994 Double Spring Flat, Nevada earthquake, and the Lake Almanor earthquake in 2015 (Anderson et al., 2018).

According to published maps of "Earthquake Shaking Potential for California" in 2016, peak ground acceleration values in the project range from 0.3 and 0.4 g for an earthquake with a 2 percent probability of exceedance in 50 years. Along Arcade Creek and American River channels, the value varies between 0.4 and 0.5 g (**Plate 6**) (Branum et al., 2016).

3.3 Surface Conditions and Repair Plan

As shown on the attached Site Vicinity Map (**Plate 1**) and Site Plans (**Plates 2a through 2g**), the project is located in City of Citrus Heights, Fair Oaks, and an unincorporated area of Carmichael, California. Below is a summary of the existing conditions at each Asset location, as well as the proposed improvements.

3.3.1.1 Hope Lane

Asset 59646 is located in the backyard of the private residence of 4915 Hope Lane in a residential neighborhood in unincorporated Sacramento County. The existing crossing is a concrete encased 6-inch diameter cast iron pipe (CIP). The crossing encasement is exposed in the creek. The upstream and downstream soil supporting the encasement is eroding with signs of incision in the channel. The presence of the concrete encasement prevents the low flow of water and causes upstream pooling. The District has installed cobble around the exposed casing to provide temporary support. About 1 to 1.5 feet in-plane bank erosion was apparent at the east bank with less observed erosion on the west bank. Soil at the creek bed is generally medium stiff to stiff sandy clay.

The recommended repair replaces the crossing pipe with a new ductile iron pipe (DIP) with a new concrete encasement. To protect the new pipe, encasement, and waterway from erosion, riprap and turf reinforced mats (TRM) will be installed upstream and downstream of the crossing. The side slopes will be cut to one horizontal to one vertical slope (1H:1V) and will be covered by anchored TRM. The creek bed will be protected by riprap on the upstream with 5H:1V slope and will extend upstream and downstream of the crossing 10-feet minimum measured from the concrete encasement to provide long term protection and to extend beyond crossing-related bank scour.

3.3.1.2 Winding Way

Asset 48368 is located on the private property of 4647 Winding Way in a residential neighborhood in unincorporated Sacramento County. The existing crossing is an 8-inch welded aluminum pipe with no encasement. The crossing is supported by concrete piers that are

installed in the creek banks. The aluminum pipe is attached to the concrete supports with galvanized pipe straps. The upstream manhole is located near the north bank.

The stream banks at the vicinity of the crossing are protected against erosion by stacked sand-cement bags. Some of the cement bags are dislodged leaving the banks unprotected. Base of the slope protection is undermined due to erosion. Creek bed is covered with 2 feet of poorly-graded depositional sand with few pebbles near the crossing.

The recommended repair includes removing existing crossing, bank protection, the concrete piers and installing new DIP with a welded steel casing and installing new concrete piers. The slope bank will be graded to a 1:1 slope. To protect the slope against erosion, anchored TRM is planned to be installed on the on the creek banks upstream and downstream of the crossing.

3.3.1.3 Arcade Creek

Asset 49894 is located in Arcade Creek Park at 5613 Omni Drive belonging to Arcade Creek Recreation and Park District in a residential neighborhood in unincorporated Sacramento County.

The existing crossing is a 48-inch reinforced concrete pipe (RCP) with no encasement. Approximately half the pipe is buried in the creek bed. Cobbles were placed around the pipe and extend downstream to the nearby pedestrian footbridge footing for slope protection and bed erosion prevention. The majority of these cobbles washed away in the large rainfall events of December 2021. The creek bed is covered by about 1 foot of loose poorly-graded sand sediments overlying medium stiff to very stiff sandy clay. The existing crossing is also being lined with a structural Cured-in-Place Pipe (CIPP) liner. This lining work will be completed prior to the recommended improvements at the site.

The repair plan includes building back the downstream slope on the southern side of the creek, protecting the banks with reinforced TRM and installing riprap on the creek bed. The riprap slope on the upstream side will be a 5H:1V slope from the top of the pipe and will be extended a minimum 10 feet from the nearest side of the pile. On the downstream side, the riprap will be extended to the upstream side of the existing pedestrian bridge.

3.3.1.4 Garfield Thousand Oaks

Asset 41018 is located in Arcade Creek Park at 5613 Omni Drive belonging to Arcade Creek Recreation and Park District in a residential neighborhood in unincorporated Sacramento County.

The existing crossing is a 24-inch vitrified clay pipe (VCP) with no encasement exposed in the creek. The pipe was originally constructed 12 inches below grade but now the crossing is resting on the creek bed with temporary downstream supports. The creek bed soil is stiff to very stiff silt that is covered with sand sediments and transported gravel and cobble-sized rocks.

The repair plan is to cap and abandon the pipeline and the existing manhole and reroute the pipeline through Arcade Creek Park to connect with the Mission Trunk pipeline. The existing crossing will be removed from the creek and 5 feet into the banks. The creek bed and banks will be backfilled and restored. The creek banks then will be protected by anchored TRM.

A new 24-inch VCP will be used to reroute the crossing with the aid of a new manhole. The bottom of VCP and the manhole will be about 8 to 16 feet below the existing ground.

3.3.1.5 Concho Court (Asset 44237)

Asset 44237 is located in the backyard of the private residence of 4820 and 4821 Concho Court and 5665 Rolling Oak Drive in a residential neighborhood in unincorporated Sacramento County.

The existing crossing is a 6-inch VCP encased in concrete that is exposed and likely to be undermined due to erosion and scour. Minimal erosion was observed on the upstream and downstream side of the crossing. The creek bed soil is stiff to hard, slightly indurated silt with some fine sand. Sand sediments and transported gravel and cobble-sized rocks were observed at the creek bed.

The repair plan for this crossing is to remove the existing loose soil, gravels, cobbles and protect the creek bed and banks by anchored TRM. The extent of the TRM is proposed to be 10 feet from both ends of the crossing where it enters the banks on both sides.

3.3.1.6 Gina Court (Asset 50528)

Asset 50528 is located in the backyard of the private residence at 5510 and 5508 Oak River Court and 5667 and 5671 Rolling Oak Drive in a residential neighborhood in unincorporated Sacramento County.

Similar to Concho Court, this crossing is a 6-inch VCP encased in concrete. The encasement was originally buried however, due to erosion it is exposed (about 2 feet exposure from the creek bed) but no sign of damage or crack was observed on the encasement. A portion of the manhole located at the upstream side of the crossing is also exposed due to erosion. The creek bed near the crossing is covered by sand and gravel to cobble-sized rocks.

The repair plan is to remove the existing loose soil, gravels, cobbles and install upstream and downstream riprap with a 5H:1V slope and protect the banks by anchored TRM. The extent of the riprap and TRM is proposed to be 10 feet from both ends of the crossing where it enters the banks on both sides.

3.3.1.7 San Lorenzo Way (Asset 170877)

Asset 170877 is located along San Lorenzo Way in the public right of way in a residential neighborhood in unincorporated Sacramento County.

The aerial crossing is a 6-inch CIP with a CIPP liner. The pipe is not inside a casing or concrete encasement. The pipe transitions from CIP to VCP near the creek crossing. Cobble has been installed on the banks to minimize further bank erosion. Creek banks seem to be stable with a 3H:1V to 2H:1V slopes. The creek bed soil is very dense weakly indurated clayey silt.

The repair plan is to remove the existing cobbles form the creek, remove the existing 6-inch SS pipe, and replace by a new SS pipe that is encased by concrete below the creek bed elevation. The disturbed area is proposed to be protected by TRM to above elevation 77.5 feet. A new manhole will be installed on the upstream side of the crossing to a depth of about 10 feet below the existing ground.

3.3.1.8 Sutter Avenue (Asset 78865)

Asset 78865 is located in the backyard of the private property of 7156 Sutter Avenue and 3751 Dell Road in a residential neighborhood in unincorporated Sacramento County.

The crossing is a 6-inch welded aluminum aerial pipe which is not encased and crosses above the high-water line of the creek. The pipe is supported by two concrete foundations. According to the provided plans by WSC, the foundations were originally 5.5 feet high with about 3 feet buried into the slope. While the concrete is in good condition, the foundation support is locally undermined due to erosion. The creek bank slopes are about 1.25H:1V and steeper.

The repair plan includes removing existing pipe and concrete foundations and replacing by new pipe and foundations that are set further back into the slope. The pipe will also be extended further beyond the foundation and 5 feet beyond the casing on both ends and will be connected to the existing pipeline. The disturbed areas will be covered by hydroseed for erosion protection.

3.3.1.9 Campfire Way (Asset 36529)

Asset 36529 is located off of Campfire Way in the Oak Lakes public right of way open space in a residential neighborhood in unincorporated Sacramento County.

The existing crossing is a concrete-encased 36-inch RCP. The evidence of deep cracks in the concrete encasement are observed near the south bank. The encasement is undermined on both upstream and downstream sides. Sandbags are used temporarily to prevent further progression of the scour holes near the concrete encasement cracked areas. The creek banks are undermined due to erosion and creek widening on the downstream side. Side banks in the immediate vicinity of the crossing seem to be stable with about 2.5H:1V slopes. The creek bed under the exposed encasement consists of loose to medium dense sandy clay. Further away from the encasement however, the creek bed soil is very stiff to hard, weakly-cemented silty sand with minor clay.

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The repair plan includes removal of existing sandbags and cobbles and existing concrete encasement wings, installation of upstream and downstream riprap with maximum slope of 5H:1V away from the top of the encasement, and installation of TRM over banks.

3.3.1.10 Indian River Drive (Asset 78531)

Asset 78531 is to the east of Indian River Drive in the 6430 Indian River Drive public right of way open space parcel in a residential neighborhood in unincorporated Sacramento County.

The existing crossing is a 10-inch CIP aerial crossing with two concrete pier supports that are located in the creek flow path. Currently, the south pier is undermined due to scour and is hanging on the crossing pipe. Cobble was installed by the District around the base of each pier to protect against further erosion. The bank erosion is ongoing near the crossing which is more pronounced at the north bank where the slopes are near vertical. Most likely, during the installation of the original pipe, the north bank was restored using granular material. The creek bed soil consists of medium dense to dense clayey sand and covered by gravel to cobble-sized river rocks and loose sand.

The repair plan includes removal of the existing bed protection and existing pipe to about 15 feet beyond the existing foundations on both sides, installation of drilled piers close to the top of the bank, a 24-inch WSP casing, and a 10-inch SS carrier pipe that extends 5 feet beyond the casing on both ends. The repair plan also includes restoration of the banks to match the surrounding grades, and bank protection using TRM that extends at least 10 feet away from the pipe on both banks.

3.3.1.11 Hegseth Court (Asset 68559)

Asset 68559 is located on the private property of 8201 Hegseth Court in a residential neighborhood in unincorporated Sacramento County.

The existing crossing is an uncased 8-inch VCP that is exposed. It is supported by a manhole immediately adjacent to the creek, sandbags, and the creek bed. The downstream manhole is half exposed in the creek on the west bank with the transition from the crossing to the manhole also exposed. Side banks are near vertical and covered by dense vegetation.

The repair plan includes removal of the existing pipe and cobbles in the creek, installation of a new WSP that extends 2 feet beyond the east bank and connects to the existing pipe and enters the manhole on the other side of the creek, placement of riprap on the upstream and downstream side of the crossing, installation of anchored TRM on both banks to match the existing slopes, and installation of tiebacks to support the existing manhole.

3.3.1.12 Dietz Way (Asset 239693)

Asset 239693 is located on the private property of 4510 Dietz Way in a residential neighborhood in unincorporated Sacramento County.

The aerial uncased crossing is a 4-inch Acrylonitrile Butadiene Styrene (ABS) and ferrous metal pipe (CIP or DIP) tape wrap The District has placed cobble on either bank around the pipe for slope protection. Minimal erosion was observed on the side banks. The creek bed material on the side consists of loose to coarse sand and at the centerline the soil is medium stiff to stiff sandy clay. The side bank is near 0.5H:1V on the east and about 1H:1V on the west side of the creek.

The repair plan includes removal of the existing pipe, installation of the new WSP pipe that extend beyond the top of the slope, installation of the anchored TRM on both banks, and installation of the concrete supports that are now moved further back into the side banks.

3.4 Subsurface Conditions

The subsurface conditions encountered during our field explorations were consistent with the geologic mapping within the project site vicinity. The subsurface soils encountered in our borings and hand augers consisted of layers of loose to very dense clayey sand and medium stiff to very stiff sandy clay, with interlayered poorly graded sand and silty sand to sandy silt, to the maximum depth explored of 31 ½ feet below ground surface (bgs).

The near-surface soils generally have a low plasticity and low expansion potential. Our boring logs are presented in **Appendix A**. Our laboratory testing results of pertinent soil samples are included in **Appendix B**.

3.5 Groundwater

Table below summarizes the depth of encountered groundwater during drilling operations. Because drilling commenced during a storm event, the indicated depths of groundwater are not the long-term static groundwater table. The groundwater table observed at Sutter Ave. location is the water that seeped through the ground from the water runoff and appeared in the boring hole. The Winding Way location was drilled about 3 months after the storm event and groundwater was not encountered. Borings might not have been left open for a sufficient period of time to establish equilibrium groundwater conditions. In addition, fluctuations in the groundwater level should be expected to occur due to change in seasons, variations in rainfall, and other factors.

Table 3.1: Summary of Groundwater Depths During Drilling

Location	Boring	Depth (ft)
Arcade Creek Park	B-03	7.0
Sutter Ave.	B-08	11 (seepage)*
Indian River Dr	B-10 B-11	8 5
Dietz Way	H-01	0.5
Hegseth Ct	H-02	6
Hope Lane	H-03	5

*Note: encountered groundwater is likely due to the seepage of the water from the slope due to heavy rain prior to the drilling and is not a stable groundwater.

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4. Conclusions and Recommendations

It is our opinion that the project is feasible from a geotechnical and geological engineering standpoint, provided that the conclusions and recommendations presented in this report are incorporated into the project design and specifications. The principal geotechnical considerations are discussed in the following sections.

4.1 Geologic Hazards and Seismic Design Considerations

4.1.1 Fault Rupture

Based on existing geologic maps and literature, there are no known active fault traces within, adjacent to, or trending towards the project site. The closest known active fault is the Carson Range Fault, located approximately 83.4 miles to the northeast. The site is not located within a Fault-Rupture Hazard Zone. No other faults are mapped or known to occur near the project site. Based on this information, the potential for surface fault rupture at the site is considered to be very low.

4.1.2 Seismic Design Criteria

This section presents the seismic design parameters for the proposed Creek Crossing project located in the City of Citrus Heights, Fair Oaks, and an unincorporated area of Carmichael, California.

We recommend the proposed development be designed to resist the lateral forces generated by earthquake shaking in accordance with Chapter 16 of the 2019 California Building Code (CBC). This section presents seismic design criteria for use with the 2019 CBC and its companion document, ASCE 7-16, *Minimum Design Loads for Buildings and Other Structures*.

Based on the subsurface soil conditions encountered at each site, we judge that all the sites can be characterized as Site Class D, described as a “stiff soil” profile. Our analyses using the U.S. Seismic Design Maps (https://earthquake.usgs.gov/ws/designmaps/) indicate the site seismic design parameters provided in **Table 4.1** are appropriate.

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Table 4.1: Seismic Design Parameters

Parameter	ASCE 7-16 Tables/Figure	Factor/ Coefficient	Hope Lane	Winding Way	Arcade Creek/ Thousand Oaks	Concho Ct./ Gina Ct	San Lorenzo Way	Sutter Ave.	Campfire Way.	Indian River Dr.	Hegseth Ct./ Dietz Way
Mapped Short-Period MCE_R	Figure 22-1	S_s	0.473	0.474	0.465	0.464	0.460	0.451	0.449	0.456	0.436
Mapped 1.0s Period MCE_R	Figure 22-2	S_1	0.229	0.230	0.227	0.227	0.226	0.223	0.223	0.225	0.219
Soil Profile Type	Table 20.3-1	Site Class	D	D	D	D	D	D	D	D	D
Site Coefficient	Table 11.4-1	F_a	1.422	1.420	1.428	1.429	1.432	1.439	1.441	1.435	1.451
Site Coefficient	Table 11.4-2	F_V	2.142	2.140	2.146	2.146	2.148	2.154	2.154	2.150	2.162
Site-Adjusted MCE_R Spectral Response Parameters	Equation 11.4-1	S_{MS}	0.672	0.674	0.664	0.662	0.659	0.649	0.647	0.654	0.633
	Equation 11.4-2	S_{M1}	0.491	0.492	0.487	0.487	0.485	0.480	0.480	0.484	0.473
Long-period Transition	Figure 22-14	T_L	12 Seconds	12 Seconds	12 Seconds	12 Seconds	12 Seconds	12 Seconds	12 Seconds	12 Seconds	12 Seconds
Design Spectral Acceleration Parameters	Equation 11.4-3	S_{DS}	0.448	0.449	0.422	0.422	0.439	0.433	0.431	0.436	0.422
	Equation 11.4-4	S_{D1}	0.327	0.328	0.325	0.325	0.324	0.320	0.320	0.323	0.316
Geometric Mean MCE Peak Ground Acceleration adjusted for Site Effects	Figure 22-9 and Equation 11.8-1	PGA_M	0.280g	0.280g	0.465g	0.276g	0.274g	0.270g	0.270g	0.273g	0.264g

***Note:** ASCE 7-16 allows the use of the F_v, S_{M1}, and S_{D1} values listed in this table **only if** Cs is determined by Eq. (12.8-2) for values of $T \leq 1.5T_s$, and taken as equal to 1.5 times the value computed in accordance with either Eq. (12.8-3) for $T_L \geq T > 1.5T_s$ or Eq. (12.8-4) for $T > T_L$. Alternatively, ASCE 7-16 requires a ground motion hazard analysis at this site.

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4.1.3 Soil Liquefaction

Soil liquefaction is a phenomenon primarily associated with saturated cohesionless soil layers. These soils can dramatically lose strength due to increased pore water pressure during cyclic loading, such as imposed by earthquakes. During the loss of strength, the soils acquire mobility sufficient to permit both horizontal and vertical movements. Soils that are most susceptible to liquefaction are clean, loose, uniformly graded, saturated sands that lie close to the ground surface; although, liquefaction can also occur in fine-grained soils, such as low-plasticity silts. Densification can occur where the loose soils are unsaturated.

We performed both SPT-based liquefaction triggering and post-liquefaction deformation analyses for the site generally in accordance with the guidelines listed in the CGS Special Publication 117A (2008)[1] and the recommended procedures by Southern California Earthquake Center (SCEC, 1999)[2].

Our analyses were based on a peak ground acceleration from a Maximum Considered Earthquake (MCE) event. CGS requires utilizing the MCE magnitude in accordance with 2019 CBC Section 1803A.5.12 in liquefaction analysis. According to Building Seismic Safety Council 2014 (BSSC), the mean earthquake magnitude is 6.6. This magnitude along with the geometric mean MCE peak ground acceleration (PGA_M) of 0.28g (max PGA_M of **Table 4.1**) were used in our analysis. Our recommended project design groundwater level, immediately below the structure foundation was used in the analyses to assess its impacts on liquefaction and liquefaction induced ground surface damage potential.

The SPT-based analyses generally followed the methodology described in the EERI Monograph 12 (MNO-12, Idriss & Boulanger, 2008)[3]. Per CGS Note 48 requirements, post-liquefaction deformations were calculated for soil layers that have a factor of safety against liquefaction less than 1.3. for the majority of the sites the liquefaction-induced settlements are negligible. A summary of the sites with potential liquefaction-induced settlements is as follows:

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[1] California Geological Survey, 2008. *Guidelines for Evaluating and Mitigating Seismic Hazards in California*, CGS Special Publication 117A.

[2] Martin and Lew, March 1999. *Recommend Procedures for Implementation for DMG Special Publication 117, Guidelines for Analyzing and Mitigating Liquefaction Hazards in California*, Southern California Earthquake Center.

[3] Idriss and Boulanger, 2008. *Soil Liquefaction During Earthquakes*, EERI Monograph MNO-12.

Table 4.2: Summary of Groundwater Depths During Drilling

Location	Boring	Liquefaction-Induced Settlement (inch)
Winding Way	B-01 B-02	2.1 0.3
San Lorenzo Way	B-07	0.5
Indian River Dr.	B-10 B-11	4.7 2.1

4.1.4 Expansive Soils

The near-surface soils encountered at the site were predominantly alluvial deposits that consist of sandy silts/clays and lean clays. The expansion potential of the near-surface soils at this site is considered low to moderate. The potential expansive soil hazard can be further reduced provided our recommendations in the report are followed.

4.1.5 Flooding

The creeks of the project area are small tributaries of the Sacramento or American River which pass through and provide drainage for urban areas northeast of Sacramento. These tributaries include Dry Creek, Magpie Creek, and Arcade Creek (Anderson et al., 2018). According to National Flood Hazard Layer published by Federal Emergency Management Agency (FEMA, 2022), the project site is located within Zone X determined to be outside the 0.2% annual chance floodplain. However, the creek channels, incised into the alluvial plain of Zone X, are prone to flooding. The channels are classified as Zone AE, or "Area inundated by the base flood with flood depths of 1 to 3 feet (usually areas of ponding) and base flood elevations determined" (**Plate 7**).

According to the technical memorandum[4]. provided by CBEC Eco Engineering dated February 25, 2022, the proposed creek peak velocities and streambed shear stress near pipe crossings for the selected storm events are summarized in table below:

[4] CBEC Echo Engineering, February 25, 2022, 30% Hydraulic/Scour and Geomorphic Design Guidance Technical Memorandum, 21-1012 Sacramento Area Sewer District Creek Crossing Project.

Table 4.3: Estimated Proposed Peak Velocities and Shear Stresses Near Pipe Crossings

Crossing	Storm Event	Flow Scenario	Future Velocity (fps)	Future Shear Stress (lb/ft^2)
Winding Way	2 YR	Half-Bankfull	1.96	0.10
		Bankfull	4.27	0.36
Arcade Creek Park	5 YR	Peak	5.15	1.51
		Half-Bankfull	2.88	0.29
		Bankfull	2.81	0.22
Gina Court	5 YR	Peak	3.61	0.33
		Half-Bankfull	2.68	0.21
		Bankfull	3.61	0.33
Campfire Way	5 YR	Peak	6.20	1.81
		Half-Bankfull	5.07	0.83
		Bankfull	5.50	0.78
Indian River Drive	2 YR	Half-Bankfull	3.16	0.27
		Bankfull	4.95	0.54
Hegseth Court	2 YR	Peak	3.08	0.30
	10 YR	Peak	4.70	0.65
	100 YR	Peak	5.47	0.86
Dietz Way	2 YR	Peak	3.82	0.51
	10 YR	Peak	5.87	1.06
	100 YR	Peak	6.42	1.25

4.1.6 High Groundwater

As described previously in **Section 3.5**, groundwater was encountered in our borings B-03, B-08, B-10, B-11, H-01, H-02 and H-03, at depths ranging from 0.5 to 8 feet below the ground surface during drilling. Fluctuations in the groundwater level could occur due to change in seasons, variations in rainfall, and other factors.

Given the large variance in the groundwater encountered, and that the creeks are responsive to the heavy rainfall, we recommend a design ground water at the ground surface or at flood level at all asset locations explored if in close proximity to the creek crossing.

Subgrade stabilization and dewatering during construction may be required if high groundwater conditions are encountered. Any planned structures located below the design groundwater level should be designed to resist hydrostatic forces on the below grade walls (undrained case) and uplift forces on the below grade slab due to high groundwater conditions.

4.1.7 Soil Corrosion Potential

Corrosivity tests, that include redox, pH, chlorides, sulfates, and resistivity were performed on six soil samples from Borings B-06, B-07, B-08, B-09, B-10, H-02 and H-03 at about 7.5, 7.5, 5, 15, 3.7, and 1 foot deep, respectively. The test results and a brief evaluation report prepared by CERCO regarding the onsite soil corrosivity are also included in **Appendix B**.

The table below summarizes the corrosivity tests results on the soil samples from the site.

Table 4.4: Summary of Corrosion Test Results for Buried Concrete and Ferrous Metals

Location	Boring	Depth (ft)	Sulfate (mg/kg)	Chloride (mg/kg)	pH	Resistivity (ohm-cm)	Redox Potential (mV)
Garfield & Thousand Oaks	B-06	7.5 – 8.3	N.D.	N.D.	6.98	34,000	300
San Lorenzo Way	B-07	7.5 – 9	N.D.	N.D.	6.01	6,800	340
Sutter Ave	B-08	5 – 6.5	N.D.	N.D.	6.94	7,100	330
Indian River Dr	B-10	15 – 16	N.D.	N.D.	6.20	16,000	360
Hagseth Ct	H-02	3.7 – 4	85	78	6.54	1,900	370
Hope Lane	H-03	1 – 1.5	N.D.	N.D.	6.34	8,600	370

ND = Not Detected

Based on CERCO's evaluations on the lab test results, the detected sulfate ion concentrations in the soil samples ranged from none detected to 85 mg/kg. In their opinion, the soils with the low sulfate ion concentrations at the site are insufficient to potentially be detrimental to reinforced concrete structures and cement mortar-coated steel.

Chloride ion concentrations in the soil samples ranged from none detected to 78 mg/kg, which are determined to be insufficient to attack steel embedded in a concrete mortar coating.

The pH of the soil samples ranged from 6.01 to 6.98, which does not present corrosion problems for buried iron, steel, mortar-coated steel and reinforced concrete structures.

Based on the resistivity measurements, CERCO classified these soil samples as "negligibly corrosive" to "corrosive". All buried iron, steel, cast iron, ductile iron, galvanized steel and dielectric coated steel or iron should be properly protected against corrosion depending upon the critical nature of the structure. All buried metallic pressure piping such as ductile iron pipeline should be protected against corrosion.

The measured soil redox potentials in the soil samples ranged from 300 to 370 mV. These results are indicative of potentially "slightly corrosive" soils from anaerobic soil conditions.

We recommend these test results and CERCO's brief evaluation report be forwarded to your underground contractors, pipeline designers, and foundation designers and contractors so that they can design and install corrosion protection measures for buried concrete structures and ferrous metal. We also recommend additional testing be performed if the test results in **Appendix B** are deemed insufficient by the designers of the corrosion protection.

4.2 Erosion and Slope Stability

The creek crossings will be protected against erosion with the aid of riprap and anchored vegetated Turf Reinforcement Mat (TRM). These erosion resistant solutions should be designed to withstand the flow velocities and shear stresses provided in CBEC Eco Engineering technical memorandum (**Table 4.2**). The recommendations for the riprap are provided in this report however, a TRM specialty contractor should provide design and recommendations for the TRM solution.

4.2.1 Riprap

The creek beds at the vicinity of the crossings at Hope Lane, Arcade Creek Park, Gina Court, San Lorenzo Way, Campfire Way, and Hegseth Court are planned to be protected against erosion by riprap. According to the CBEC Eco Engineering technical memorandum, the predicted water flow velocities at the crossings are estimated for 2 year, 5 year, 10 year, and 100 year storm events for the peak flow scenario. NCHRP Report No. 568 guidelines were used for the riprap design. We recommend riprap specification consistent with Caltrans RSP Class III with a D50 of 12 inches be used for creek bed protection. Recommended gradation and particle size is as follows:

Table 4.5: Minimum and Maximum Particle Size for RSP (Caltrans Specs. Section 72)

Class	Nominal Size (in)	D_{15} (in) min-max	D_{50}* (in) min-max	D_{100} (in) min-max
III	12	7.3-10.5	11.5-14.0	24.0

Note: * D_{50}: particle size for which 50% is finer by weight

The minimum thickness of the recommended riprap is the smaller of 1.5 x D50 and D100. The Caltrans Class III riprap median rock weighs about 120 to 210 lbs (nominal median particle weight, W50=150 lbs).

Table 4.6: Minimum and Maximum Particle Weight in Pounds (Caltrans Specs. Section 72)

Class	Nominal Weight (lbs)	W_{15} (lbs) min-max	W_{50}* (lbs) min-max	W_{100} (lbs) min-max
III	150	120-210	310-510	1100

Note: * W_{50}: weight corresponding to D_{50}

Based on engineering analyses and RSP Class III, we recommend using a two-layer granular filter with each layer being a minimum 6 inches thick. Layer 1 should be placed over the creek bed. Layer 2 should be placed between Layer 1 and the Class III riprap. Layer 1 can be replaced by filter fabric if allowed by environmental considerations.

General recommendations for the gradation of Filter Layers 1 and 2 are provided in **Tables 4.7 and 4.8**; however, materials falling slightly outside these gradations may be suitable. We recommend that the contractor provide a submittal with the recommended filter materials and their gradations for our review and approval prior to importing to the project site.

Table 4.7: Recommended Specification for Granular Filter, Layer 1

Sieve Size	Percent Passing by Weight
1-inch	100
3/8-inch	80-100
No. 30	15-65
No. 200	0-5

Table 4.8: Recommended Specification for Granular Filter, Layer 2

Sieve Size	Percent Passing by Weight
6-inch	100
1-1/2-inch	50-100
No. 4	5-50
No. 10	0-25
No. 200	0-5

4.2.2 Slope Stability

Slope stability analysis may be required for the Winding Way and Indian River Drive. We understand that the manhole at Hegseth Ct. crossing will be supported by a tieback to the ground next to the manhole. Stability of the existing or future (after repair) slopes can be evaluated by commercial 2D, limit equilibrium computer programs such as SLOPE/W or SLIDE. For the seismic performance seismic coefficient (k) should be determined based on the 2014

USGS Unified Hazard Tool Deaggregation model[5], an average stiff soil site condition (Site Class D), the causative earthquake mode magnitude, distance to the earthquake fault, and a threshold displacement of 5 centimeters (approximately 2 inches). As stated in the SCEC publication, the threshold displacements provide an index of slope performance. The 5 centimeters (2 inches) value distinguishes conditions in which very little displacements are likely from conditions in which moderate or higher displacements are likely. We recommend a horizontal seismic coefficient (kh) of 0.17g be used for the pseudo-static slope stability analysis.

Part of the repair plan for almost all of the crossings include re-building some of the slopes to their original geometry and cover with anchored TRM. The following design cases were considered in slope stability analyses:

- Case 1, Static - Long Term: This case represents the end of construction.
- Case 2, Full Flood Stage - Steady Seepage: In this condition, peak flood elevation remains long enough that the steady state seepage condition occurs. Phreatic surfaces calculated from the steady state seepage analyses are used in the slope stability analyses for this case.
- Case 3, Rapid Drawdown - This case refers to the condition where prolonged flood remains long enough that floodwater saturates a major part of slopes and then the floodwater recedes rapidly.
- Case 4, Seismic - 200-year Return Period (Current State Urban Levee Design Criteria Earthquake): An estimated seismic coefficient (k) based on a 200-year return period earthquake event is used in slope stability analyses to evaluate the seismic slope performance.
- Case 5, Seismic - 2,475-year Return Period (Maximum Considered Earthquake per 2019 CBC/ASCE 7-16): Similar to Case 4, except for using a seismic coefficient (k) based on a 2,475-year return Maximum Considered Earthquake (MCE) event.

Based on the generally accepted geotechnical engineering standards and as recommended by SCEC and USACE, the minimum factors of safety for levee slope stability are presented in the table below:

Table 4.9: Minimum Acceptable Factors of Safety for Slope Stability

	Case 1	Case 2	Case 3	Case 4*	Case 5*
Factor of Safety	1.5	1.4	1.1	1.0	1.0

We recommend the following engineering soil parameters be used for the slope stability analysis. Bond stress is provided for locations where ground anchors are used for slope stabilization or tiebacks.

[5] U. S. Geological Survey, 2014. Unified Hazard Tool deaggregation model, Dynamic: Conterminous U.S. 2014 (v4.1.1).

Table 4.10: Slope Stability Analysis - Soil Engineering Properties

Asset Location	Layer Thickness (ft)	Effective Unit Weight (pcf)	Undrained Condition		Drained Condition		Ground Anchor Ultimate Bond Stress (psf)
			Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)	
Winding Way	0 – 10	47.6	0	28	0	28	750
	10 – 20	57.6	1000	0	100	30	1,000
	20 – below	57.6	2000	0	100	32	1,500
Indian River Dr.	0 – 15	47.6	0	26	0	26	600
	15 – 25	57.6	0	30	0	30	1,000
	25 – below	57.6	2000	0	150	32	1,500
Other Locations	0 – 5	37.6	0	28	0	28	750
	5 – below	47.6	1,000	0	50	28	1,000

4.3 Earthwork

4.3.1 Excavation, Temporary Slopes, Shoring, and Bracing

The Contractor should be aware that in no case should excavation depths and inclinations exceed those specified in local, state or federal safety regulations. Specifically, one needs to be aware of the current OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926. We understand that these regulations are strictly enforced and if they are not closely followed, the owner, Contractor, and/or his earthwork and utility subcontractors could be liable for substantial penalties. The Contractor's "responsible person", as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the Contractor's safety procedures. In addition, the Contractor or its specialty subcontractor should design temporary construction slopes to conform to OSHA's "Guidelines for Excavations and Temporary Sloping."

For planning purposes, the native clayey soils classify as OSHA Type B while the native granular soils can be categorized as OSHA Type C with temporary slope inclination of no steeper than 1:1 and 1.5:1 (horizontal to vertical), respectively. Our preliminary classification is based solely on the materials encountered in widely spaced exploratory borings and the general conditions observed during our exploration program. The Contractor or responsible subcontractor, based on the subsurface conditions exposed at the time of construction, should determine temporary slope inclinations.

For new fills placed on existing slopes, the fill should be "blended" with the existing soils by benching of the slope. The benching should have an overall slope no steeper than the above recommendations, depending on the soil type encountered.

If temporary slopes are left open for extended periods of time, exposure to weathering and rain could have detrimental effects such as sloughing and erosion. Temporary slopes should be protected from excessive drying and/or saturation during construction. In addition, we recommend that all vehicles and other surcharge loads be kept at least 10 feet away from the top of temporary slopes.

Where shoring extends below the groundwater table and terminates in or near granular soil layers, the shoring should be designed to avoid a piping condition. Shoring should also be designed to check against heave at the bottom of the excavation. The required penetration depth should be determined by the Contractor's designer to ensure lateral stability with a factor of safety of at least 1.5. If groundwater is present behind the shoring, the hydrostatic pressure should be included in addition to the soil lateral pressures.

The top of shoring should also be designed to account for load surcharging from typical construction traffic. Heavy construction equipment should not be allowed within a distance equal to the shoring depth unless the shoring is specifically designed for the appropriate surcharge. The anticipated deflections of the shoring system should be estimated by the shoring designer to check if they are acceptable with respect to the adjacent existing ground and structures. If the deflections of the shoring are estimated to be excessive, considerations should be given to using a more rigid shoring system, such as secant pile wall or tieback wall.

The shoring system should be designed by a licensed Civil Engineer or Structural Engineer, experienced in the design of retaining systems for similar site subsurface conditions, and installed by an experienced shoring specialty subcontractor. The shoring designer should be responsible for the design of temporary shoring in accordance with applicable regulatory requirements. We recommend the project shoring plans be reviewed by the project Structural and Geotechnical Engineers.

4.3.2 Subgrade Preparation

Following the site clearing and preparation, soil subgrades exposed in areas to receive improvements (such as engineered fills) should be scarified to a depth of about 12 inches, moisture conditioned to approximately 3 percent above optimum water content, and compacted to the requirements for engineered fills. Locally weak soils, if encountered, should also be excavated and replaced, or otherwise stabilized as recommended by the project Geotechnical Engineer at the time of earthwork operations.

The prepared subgrade surface should be firm, unyielding, and kept moist during construction. The subgrades should be protected from damage caused by weather or a sudden increase in the level of the nearby creeks.

4.3.3 Engineered Fill Materials

New fills placed at the site should consist of compacted engineered fills, except for landscaping materials which are placed on level ground. Engineered fills should have an organic content of less than 3 percent by volume and should not contain rocks or lumps larger than 4 inches in greatest dimension with not more than 15 percent larger than 2.5 inches. Onsite soils and fills can be used as new fills in general fill areas. Imported fills not used as non-expansive fills should have a liquid limit less than 40 percent and a plasticity index not exceeding 20. Imported non-expansive fills should be predominantly granular, have a plasticity index not exceeding 12, and have a significant fines content. Imported fills should not contain environmental contaminants or debris and should be non-corrosive.

4.3.4 Fill Placement and Compaction

Within the upper 5 feet of the finished ground surface, we recommend engineered fills be compacted to at least 90 percent relative compaction, as determined by ASTM D1557. Engineered fills below a depth of 5 feet should be compacted to at least 95 percent relative compaction. Fill material should be spread and compacted in lifts not exceeding approximately eight inches in uncompacted thickness.

We recommend engineered fills be moisture conditioned to approximately 3 percent above optimum water content. In order to achieve satisfactory compaction of fill materials, it may be necessary to adjust the water content at the time of earthwork operations. This may require that water be added to soils that are too dry, or that aeration be performed in any soils that are too wet. In order to achieve satisfactory compaction of onsite excavated soils from near or below the existing groundwater level will require drying at the time of construction.

4.3.5 Trench Backfill and Pipe Bedding

Where applicable, pipeline trenches should be backfilled with engineered fills placed in lifts of approximately 8 inches in uncompacted thickness. Thicker lifts can be used provided the method of compaction is approved by the project Geotechnical Engineer and the required minimum degree of compaction is achieved. Backfill should be placed by mechanical means only; jetting is not permitted. Onsite soils, and onsite and imported fills when used for trench backfill should be compacted to at least 90 percent relative compaction. Imported sands and aggregate bases when used for trench backfill should be compacted to at least 95 percent relative compaction and sufficient water is added during backfilling operations to prevent the soil from "bulking" during compaction. The upper 3 feet of trench backfill in foundation, slab, and pavement areas should be entirely compacted to at least 95 percent relative compaction.

Bedding material should be consistent with the recommendations of the pipe supplier and may consist of sand/gravel mixtures, Caltrans Class 2 Aggregate Base or Aggregate Base Course

(ABC) meeting the requirements of Section 26 of Caltrans Standard Specifications. All bedding material shall have 3/4-inch maximum aggregate size and be free from organic or vegetable matter, lumps, or balls of silt/clay, or any other deleterious matter.

4.4 Pipeline

4.4.1 Thrust Restraint

At all locations where the pipeline changes direction, ends, or develops thrust at valves or other attachments, and thus have a tendency to move horizontally or downward, these movements can be resisted by: 1) friction between the pipe and the backfill, and/or 2) thrust blocks. To determine the frictional force between steel pipe and backfill, a coefficient friction of 0.30 can be used. If a continuous wrapping of polyethylene is applied to the pipe or if HDPE pipe is used, this friction value should be lowered to 0.20. It is recommended that these values be reviewed and revised, as appropriate, once pipe bedding and pipe zone backfill materials are determined.

When hydraulic forces tend to move the pipe horizontally, as at horizontal curves or bend fittings, these movements can be resisted by the lateral passive resistance of the pipe backfill and adjacent soil. The horizontal passive resistance acting on thrust blocks can be evaluated using equivalent fluid weights of 100 pounds-per-cubic foot (pcf) for dead loads (static pressure). For transient loads (surge pressure), the horizontal resistance acting on thrust blocks can be evaluated using equivalent fluid weights of 200 pcf. It is recommended that these values be reviewed and revised, if necessary, on the basis of preliminary trench designs once thrust block locations and loading requirements are determined.

When hydraulic forces tend to move the pipe in the downward direction, as at vertical curves or vertical bend fittings, these movements can be resisted by the bearing capacity of the underlying soil. Thrust blocks can be designed for an allowable downward bearing pressure of 400 pounds per square foot (psf) for dead loads (static pressure) and 800 psf for transient loads (surge pressure). The thrust blocks should be at least 12 inches wide and be founded at least 12 inches below the pipe invert. It is recommended that these values be reviewed and revised, if necessary, once thrust block locations and loading requirements are determined.

When hydraulic forces tend to move the pipe in the upward direction, as at vertical curves or vertical bend fittings, these movements can be resisted by the weight of the pipe, its contents, and the overlying soil. For determination of the overlying soil weight, a soil unit weight of 120 and 55 pcf can be used above and below the design groundwater level, respectively.

4.4.2 Rigid

The structural integrity of rigid pipe should be designed to resist the earth, vehicular traffic and other temporary loads during construction, including excavated soils, construction equipment

and materials. The earth load is the weight of the soil backfill above the pipe crown that must be ultimately carried by the pipe. We recommend Marston formula be used to evaluate the imposed earth load. The imposed earth load on pipe installed by trench is usually calculated by multiplying the given Marston coefficient (Cd), moist density of the soil backfill, and outside diameter of the pipe. The Marston coefficient depends on the ratio of H/Bd (H is the height of soil cover over the top of pipe and Bd is the width of the trench at the top of pipe) and soil type used for the trench backfill. We assume the onsite soils, which has an estimated moist unit weight of 120 pcf, will be used for the trench backfill. Our recommended Marston coefficients are summarized in the table below.

Table 4.11: Cd (Marston Coefficient) for Rigid Pipeline Design

H/Bd	Cd (Marston Coefficient)
1	0.9
2	1.6
3	2.1
4	2.5
5	2.8
6	3.0
7	3.2
8	3.4
9	3.5
≥10	3.6

The earth load calculated above should be compared with rigid pipe three edge or D-load pipe strengths (along with appropriate bedding factor) to determine the minimum required pipe strength for design.

4.4.3 Flexible

We recommend Modified Iowa formula be used to evaluate the required flexible pipeline wall thickness for a given allowable soil deflection and modulus of soil reaction value (E'). Soil stiffness of medium stiff to stiff clay where most pipeline will be embedded (E'n) and Class 2 aggregate base pipe zone backfill (E'b) are estimated to be, respectively, 600 and 2,000 pounds per square inch (psi). In addition, the E' value should also be modified based on the soil supporting combining factor (S), which is determined by the ratio of Bd/D (Bd is the width of the trench at the top of pipe and D is pipe diameter). Our recommended modulus of soil reaction values (E') for various trench width configurations are summarized in the table below. If a thinner pipe-wall section is desired, a higher E' value could be applied by increasing the width of the

trench and pipe zone backfill. Since a prism loading condition is assumed in the Modified Iowa Formula, a deflection lag factor of 1.0 can be applied.

Table 4.12: E′ (Modulus of Soil Reaction Value) for Flexible Pipeline Design

E′n/E′b = 0.3	Bd/D			
	1.5	2	2.5	3
S (Soil Supporting Combining Factor)	0.4	0.53	0.75	0.88
E′ (Modulus of Soil Reaction)	800 psi	1,060 psi	1,500 psi	1,760 psi

4.5 Foundations

According to the repair plans, the pipeline at creek crossings will be either supported on deep or shallow foundations installed on both sides of the creek or will be encased by concrete that is resting on or under the creek bed. Foundations should be designed in accordance with the recommendations provided below. Deep foundations for the proposed development may consist of different types, and Fugro should review the foundation recommendations provided by the project team once a foundation type has been selected.

4.5.1 Shallow Foundations

For creek crossings where the pipeline transitions to an elevated pipe, and the slope banks have a limited potential for scour or erosion, a shallow foundation may be appropriate. The embedment of the foundation below proposed finished grade will be dependent on the erosion potential, and the lateral resistance and bearing capacity required to support the pipeline. At a minimum, footings should be at least 12 inches wide and founded at least 24 inches below lowest adjacent finished grade.

The foundation resistance to lateral loads may be provided by a combination of friction along the base of foundations and by passive pressures acting on the sides of foundations. An allowable friction coefficient of 0.3 times the dead load (includes a factor of safety of 1.5) may be used to evaluate the allowable frictional resistance along the bottom of foundations.

Where the footing is poured neat against native soils, a passive pressure equivalent to a fluid pressure of 350 pounds per cubic foot (pcf) can be used for lateral load resistance against the sides of footings perpendicular to the direction of loading. Translation or rotation of the footing is required for full mobilization of passive pressures. The passive resistance value can be linearly interpolated between at-rest pressure (equivalent to a fluid pressure of 55 pcf) at zero deflection and a fluid pressure of 350 pcf at 0.03*D displacement, where D is the depth of the footing. The upper 12 inches of soils should be ignored unless they are confined by pavement or slab. Where

a footing is located adjacent or near a downslope (e.g., Sutter Ave. and Dietz Way locations), the passive pressure reduces by 50 percent.

The allowable bearing pressure for various load conditions is provided in the table below. These allowable bearing pressures are net values; therefore, the weight of the footing can be neglected for design purposes.

Table 4.13: Allowable Spread Footing Bearing Pressures

Load Condition	Allowable Bearing Pressure (psf)	Factor of Safety
Dead Load	1,000	3.0
Dead plus Live Loads	1,500	2.0
Total Loads (including Wind or Seismic)	2,000	1.5

We recommend a modulus of subgrade reaction (k_1, 1 foot by 1 foot) of 80 pounds per cubic inch (pci) be used for the design of the footings. This value can be modified to k as 80/B pci, where B is the equivalent foundation width measured in feet.

Footings located adjacent to utility trenches should also bear below an imaginary 1.5:1 (horizontal to vertical) plane projected upward from the bottom edge of the utility trenches. Alternatively, the foundation reinforcing could be increased to span the area defined above assuming no soil support is provided.

4.5.2 Deep Foundations

The selection of deep foundation type will depend on the access conditions and subsurface conditions. The deep foundation options we evaluated include Cast-in-Drilled-Hole (CIDH) piles (alternatively known as drilled shafts) or micropiles. We understand that there are overhead powerlines (115 kV PG&E transmission lines) at the Winding Way location. An advantage with micropiles is that they require less lateral and overhead space than CIDH piles. In this report we provide preliminary results for the CIDH option.

4.5.2.1 Axial Load Capacity of CIDH Piles

The pipeline at creek crossings at Winding Way, Sutter Avenue, Indian River Drive, and Dietz Way will potentially be supported on deep foundations. The Sutter Avenue location is included here as an alternative to the currently planned shallow footing foundation. The CIDH piles should develop their load carrying capacity from soil friction/adhesion. The CIDH piles should be at least 12 inches in diameter, extend to a depth of at least 10 feet below the predicted scour depth at the creek bed, and have a center-to-center spacing of at least three times the shaft diameter if

they are used adjacent to other piles or used in a group of piles. The design lengths of the piles should be determined using the following ultimate skin frictions:

Table 4.14: Ultimate Pile Skin Frictions

Soil Profile	Asset Location	Layer Thickness (ft)	Ultimate Skin Friction (psf)
1	Winding Way	0 – 10	0
		10 – 20	1250
		20 – below	1500
2	Sutter Ave	0 – 10	750
		10 – below	1500
3	Indian River Dr.	0 – 15	0
		15 – 20	1000
		20 – below	1500
4	Dietz Way	0 – 5	500
		5 – below	1000
Note: upper 5 feet of soil measured from the existing ground should be neglected in design for axial loading			

Where liquefaction settlement is a potential, the skin friction should be ignored to the bottom of the liquefiable layer. Therefore, the upper 10 and 15 feet of skin friction should be considered zero for the Winding Way and Indian River Drive locations, respectively. For other locations, the upper 5 feet of soil measured from existing grade should be neglected in design for axial loading due to the presence of weak surficial soils, unless soil is reworked and recompacted according to recommendations in this report. The allowable axial capacity should be calculated by dividing the ultimate axial capacity by the factors of safety provided in **Table 4.14**. Eighty (80) percent of the skin friction capacity may be used in determining uplift resistance. In addition, the weight of the pile can be ignored in the calculations of the axial capacity.

Table 4.15: Factors of Safety for Axial Loading of Pile Foundation

Load Condition	Factor of Safety
Dead Load	3
Dead plus Live Loads	2
Total Loads (including Wind or Seismic)	1.5

Any portion of the pile shaft located within a 1.5:1 (horizontal to vertical) plane projected upward from the base of adjacent utility trenches should be ignored in the design of the pile. Static total and differential settlements of the pile-supported structure are estimated to be insignificant (i.e., less than 0.5 inch) and within tolerable limits for the proposed structures.

The total scour depths at selected crossings reported by CBEC Echo Engineering is summarized in the table below. The depth of scour should be added to the pile length if the foundation is located at the streambed or adjacent to the bank.

Table 4.16 Total Scour Depth Reported by CBEC

Crossing No.	Site Name	Total Scour (ft)
02	Winding Way	0.33
03	Arcade Creek Park	3.33
06	Gina Court	2.55
09	Campfire Way	2.09
10	Indian River Drive	0.10
11, 12	Hegseth Court & Dietz	3.98

4.5.2.2 Lateral Load Capacity of CIDH Piles

We evaluated the lateral pile capacity using the computer program LPILE Version 2013.7.07 (Ensoft, 2014) to model subsurface soils as a series of discrete resistances with nonlinear behavior. Our analyses assumed 12-inch diameter elastic pile with a design concrete strength of 5,000 pounds per square inch (psi) and 50% of pile stiffness (i.e., 50% EI). The following soil parameters were used in our LPILE analysis:

Table 4.17: LPILE Analysis - Soil Engineering Properties

Soil Profile	Asset Location	Layer Thickness (ft)	Effective Unit Weight (pcf)	Undrained Cohesion (psf)	Ultimate Skin Friction (psf)	Angle of Internal Friction (deg)
1	Winding Way	0 – 10	47.6	0	0	28
		10 – 20	57.6	0	1250	32
		20 – below	57.6	2000	1500	0
2	Sutter Ave	0 – 10	47.6	0	750	28
		10 - below	57.6	0	1500	34
3	Indian River Dr.	0 – 15	47.6	0	0	28
		15 – 20	57.6	0	1000	30
		20 – below	57.6	0	1500	34
4	Dietz Way	0 – 5	37.6	0	500	26
		5 – below	47.6	0	1000	30

For the analysis, we assumed two conditions: 1) the soil around the pile remains intact during an extreme flood event and long-term impacts of flooding and water fluctuations, and 2) the soil

around the pile is eroded to the bottom of the creek bed elevation. Our estimated lateral loads for 1/4-inch, 1/2-inch, and 1 inch of lateral displacement at pile heads for each pile and loading case are presented in **Tables 4.18 – 4.23**. The calculated pile deflection versus bending moment are presented on **Figures C-1** through **C-6** in **Appendix C**.

Table 4.18: Winding Way Estimated Pile Lateral Load Capacities – 12 Inch Dia., 30 Feet Long – Condition (1)

Loading Case	Pile Head Condition	Pile Head Displacement (in)	Lateral Load at Pile Head (kips)	Max Moment in Pile (kip-in)
1	Free	0.25	1.49	62.1
2	Free	0.5	2.56	113.1
3	Free	1.0	4.26	205.8

Table 4.19: Winding Way Estimated Pile Lateral Load Capacities – 12 Inch Dia., 30 Feet Long – Condition (2)

Loading Case	Pile Head Condition	Pile Head Displacement (in)	Lateral Load at Pile Head (kips)	Max Moment in Pile (kip-in)
1	Free	0.25	1.67	51.5
2	Free	0.5	2.60	93.5
3	Free	1.0	4.05	168.0

Table 4.20: Indian River Estimated Pile Lateral Load Capacities – 12 Inch Dia., 30 Feet Long – Condition (1)

Loading Case	Pile Head Condition	Pile Head Displacement (in)	Lateral Load at Pile Head (kips)	Max Moment in Pile (kip-in)
1	Free	0.25	2.27	79.8
2	Free	0.5	3.67	146.1
3	Free	1.0	5.90	267.7

Table 4.21: Indian River Estimated Pile Lateral Load Capacities – 12 Inch Dia., 30 Feet Long – Condition (2)

Loading Case	Pile Head Condition	Pile Head Displacement (in)	Lateral Load at Pile Head (kips)	Max Moment in Pile (kip-in)
1	Free	0.25	0.53	35.8
2	Free	0.5	1.03	69.9
3	Free	1.0	1.87	128.5

Table 4.22: Dietz Way Estimated Pile Lateral Load Capacities – 12 Inch Dia., 10 Feet Long –Condition (1)

Loading Case	Pile Head Condition	Pile Head Displacement (in)	Lateral Load at Pile Head (kips)	Max Moment in Pile (kip-in)
1	Free	0.25	1.38	46.3
2	Free	0.5	2.32	75.3
3	Free	1.0	3.76	119.2

Table 4.23: Dietz Way Estimated Pile Lateral Load Capacities – 12 Inch Dia., 10 Feet Long –Condition (2)

Loading Case	Pile Head Condition	Pile Head Displacement (in)	Lateral Load at Pile Head (kips)	Max Moment in Pile (kip-in)
1	Free	0.25	0.71	21.5
2	Free	0.5	1.01	29.7
3	Free	1.0	1.42	40.6

4.5.2.3 Micropiles

Small-diameter micropiles (approximately 6- to 12-inch diameter) may be used if access restrictions limit the size of the piling equipment. The micropile design, pile tip elevations, and grouting methods should be developed and implemented by the specialty foundation contractor to satisfy the design pile capacity. Consequently, the contract documents (structural plans) should specify performance criteria (load per pile) to be verified by testing. However, the design considerations discussed below are provided to (1) aid in the assessment of pile configurations and estimation of pile lengths/depths in order to support design structural loads and (2) determine additional pile design constraints (if any), such as steel casing requirements, minimum pile diameter to achieve required pile stiffness, and minimum pile length.

Micropiles gain their capacity through frictional resistance along the length of the shaft. Higher shaft friction is often possible than for drilled shafts since the grout is installed under pressure. An allowable unit grout-to-soil bond stress of 1,500 psf may be used for preliminary sizing of micropiles. The adhesion along the upper portion of micropiles should be ignored as previously provided in **Table 4.14** of **Section 4.5.2.1, Axial Load Capacity of CIDH Piles**. In addition, at Winding Way we recommend using permanent casing to a depth of 4 feet below the creek bed elevation considering the granular nature of the soil and potential creek bank scour and loss of support around the micropile.

Movement at the top of the micropile is estimated to be less than approximately ½ inch to mobilize the allowable bond stress.

Micropiles should be spaced at least three pile diameters center to center. Axial group reduction factors for allowable capacities can be provided for micropiles that are spaced more closely, upon request.

Vertical micropiles generally do not provide significant lateral load resistance (although high-strength permanent casing is sometimes added for this purpose). Therefore, we recommend battering the micropiles to resist lateral loading. The component of axial capacity in the direction of lateral loading may be used to resist lateral loads.

The contractor should determine the best means and methods for installing and grouting micropiles to provide micropiles meeting the requirements of the design capacities for lateral loading, compression loading and tension loading.

4.5.2.4 Pile Construction

We recommend that the installation of all piles be performed under the direct observation of the project Geotechnical Engineer to confirm that the pile foundations are founded in suitable materials and constructed in accordance with the recommendations presented herein. The Contractor should transmit the installation records to the Structural Engineer and Fugro daily.

4.6 Other Construction Considerations

Excavations will be required to install below grade structures and underground pipelines. All excavations that are deeper than 5 feet and will be entered by workers should be shored or sloped for safety in accordance with Occupational Safety and Health Administration (OSHA) standards. Shoring and dewatering should be designed and installed by specialty subcontractors who are familiar with working in the site subsurface conditions.

If earthwork is performed during the dry season, moisture conditioning will likely be required to raise the onsite soil moisture contents to the engineered fill placement and compaction recommendation presented in this report. If earthwork is performed during or shortly after wet weather conditions, the moisture content of the soils could be appreciably above optimum. Consequently, subgrade preparation and fill placement may be difficult. Additional recommendations for wet weather construction can be provided at the time of construction, if required.

4.7 Additional Geotechnical Services

Fugro should review geotechnical aspects of the plans and specifications to check for conformance with the intent of our recommendations. We recommend that Fugro also be retained to provide geotechnical services during earthwork operation, ground improvement, and foundation installation to observe compliance with the design concepts, specifications, and

recommendations presented in this report. Our presence will also allow us to modify design if unanticipated subsurface conditions are encountered.

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5. Limitations

The opinions, conclusions, and recommendations presented in this report are based on our reviews of available geologic and geotechnical data, maps, reports, our site subsurface exploration and laboratory testing results, our engineering analysis results, and information provided by others. Our opinions, conclusions, and recommendations are solely professional opinions and were made in accordance with generally accepted local and current geotechnical engineering principles and practices. We make no warranty, either express or implied.

Site exploration and testing characterizes subsurface conditions only at the locations where the explorations or tests are performed and at the time when services were conducted; actual subsurface conditions between explorations or tests may be different than those described in this report. Variations of subsurface conditions from those analyzed or characterized in this report are not uncommon and may become evident during construction. In addition, changes in the condition of the site can occur over time as a result of either natural processes (such as earthquakes, flooding, or changes in ground water levels) or human activity (such as construction adjacent to the site, dumping of fill, or excavating). If changes to the site's surface or subsurface conditions occur since the performance of the field work described in this report, or if differing subsurface conditions are encountered, we should be contacted immediately to evaluate the differing conditions to assess if the opinions, conclusions, and recommendations provided in this report are still applicable or should be amended.

This report has been prepared for the exclusive use of Sacramento Area Sewer District, WSC, Inc. and their consultants for specific application to the proposed Creek Crossing Project in the city of Citrus Heights, Fair Oaks, and an unincorporated area of Carmichael, California as described herein. In the event that there are any changes in the nature, design or location of the project, as described in this report, or if any future additions are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the project changes are reviewed by us, and the conclusions and recommendations presented in this report are modified or verified in writing.

Reliance on this report by others must be at their risk unless we are consulted on the use or limitations. We cannot be responsible for the impacts of any changes in geotechnical standards, practices, or regulations subsequent to performance of services without our further consultation. We can neither vouch for the accuracy of information supplied by others, nor accept consequences for unconsulted use of segregated portions of this report.

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Youd and Idriss, 2001. Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshops on Evaluation of Liquefaction Resistance of Soils, ASCE Journal of Geotechnical and Geoenvironmental Engineering, April, pp. 297-813.

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List of Plates

Title	Plate No.
Site Vicinity Map	1
Site Exploration Plan	2a – 2g
Regional Geologic Map	3
Regional Geologic Map Explanation	4
Fault Map	5
Seismic Hazard Map	6
Flood Map	7

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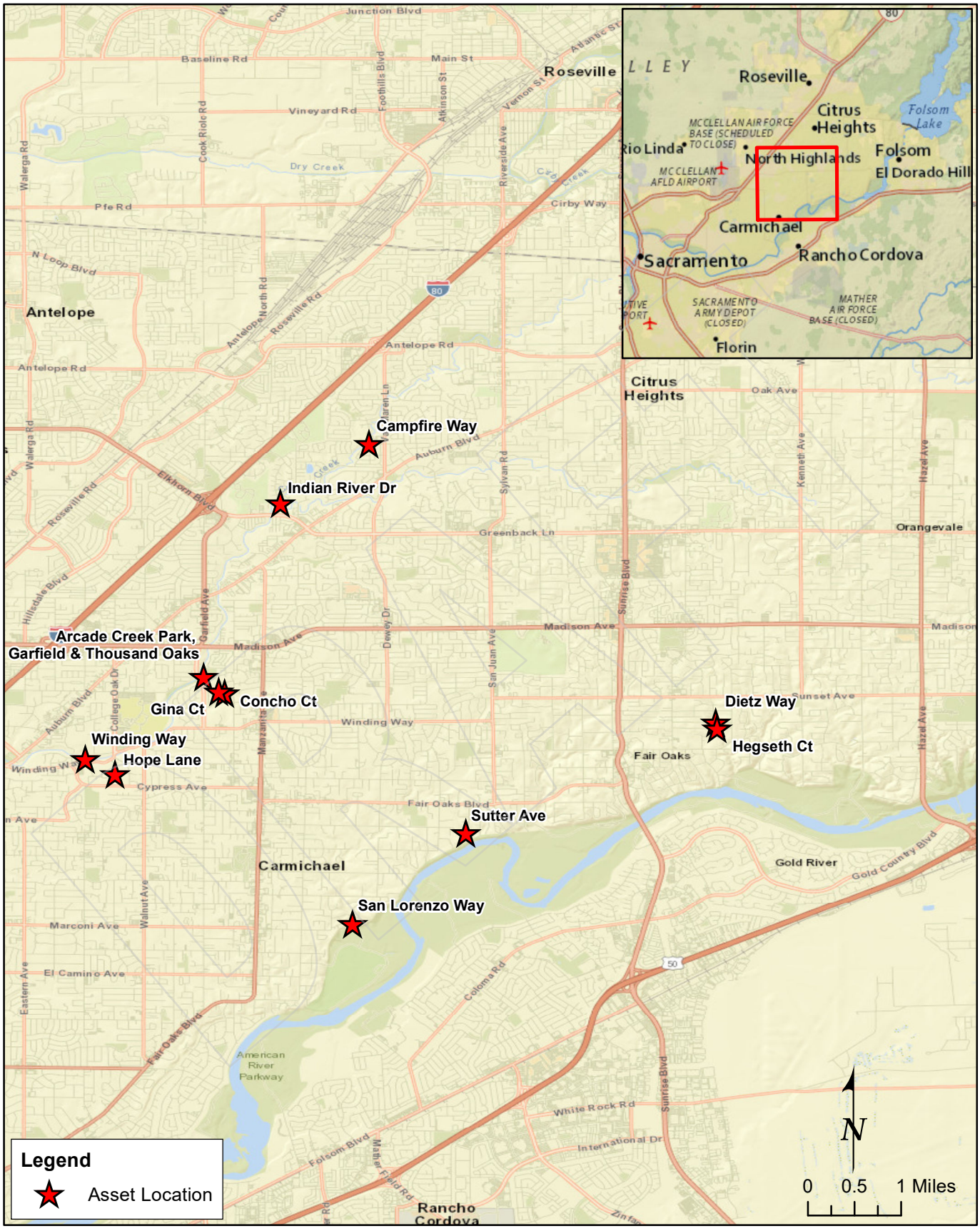


Plate 1: Site Vicinity Map



Plate 2a: Site Exploration Map - Winding Way



Plate 2b: Site Exploration Map - Arcade Creek Park, Garfield & Thousand Oaks



Plate 2c: Site Exploration Map - San Lorenzo Way

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Plate 2d: Site Exploration Map - Sutter Avenue

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Plate 2e: Site Exploration Map - Indian River Drive

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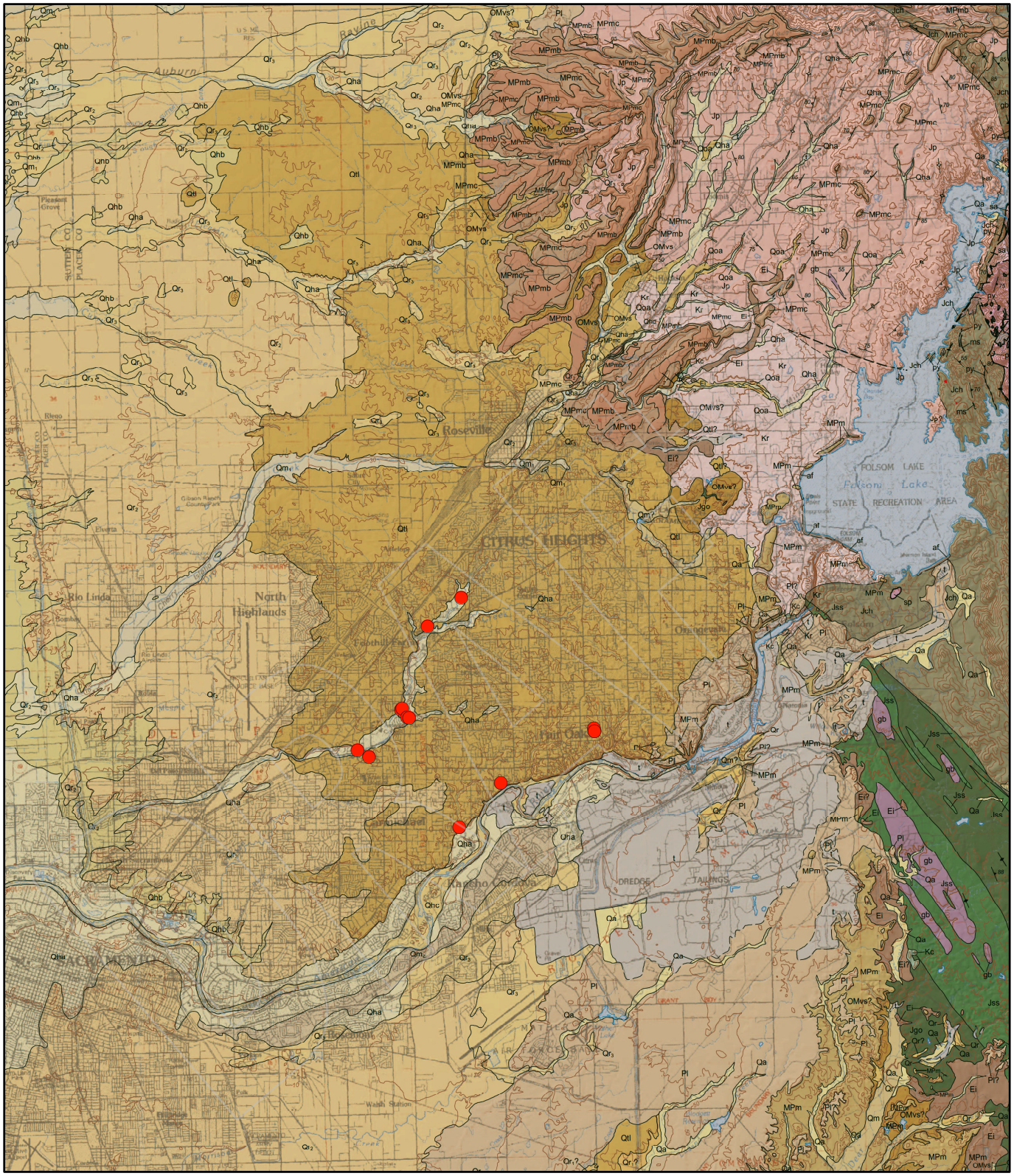


Plate 2f: Site Exploration Map - Dietz Way and Hegseth Court

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Plate 2g: Site Exploration Map - Hope Lane



Source: Gutierrez, C. I., 2011. Preliminary geologic map of the Sacramento 30' x 60' quadrangle, California, California Geological Survey
Note: Please refer to Figure D2 for geologic explanations.

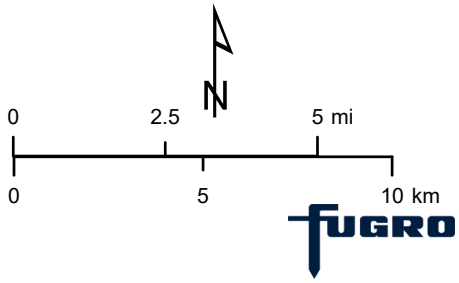
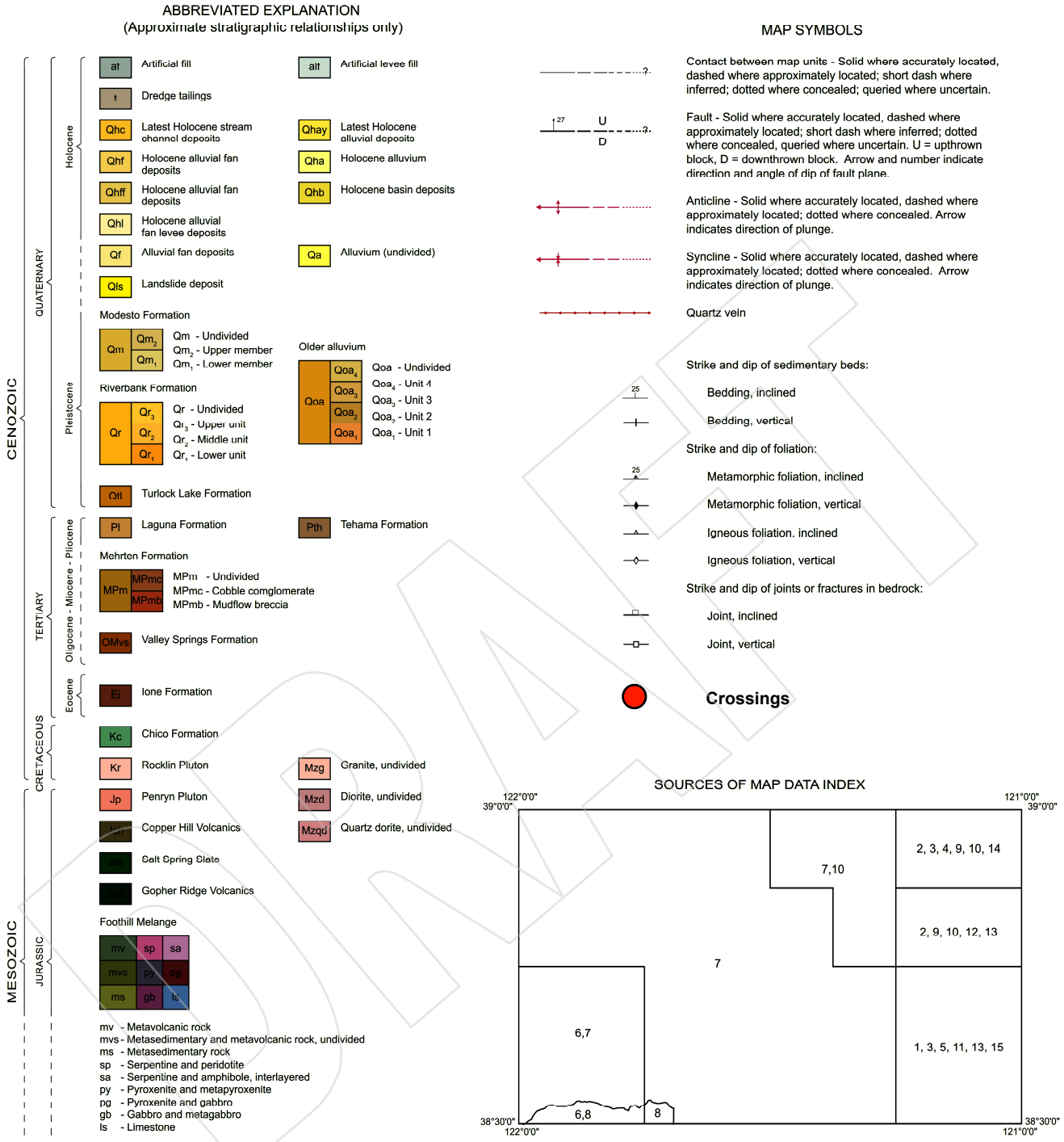


Plate 3: Geologic Map

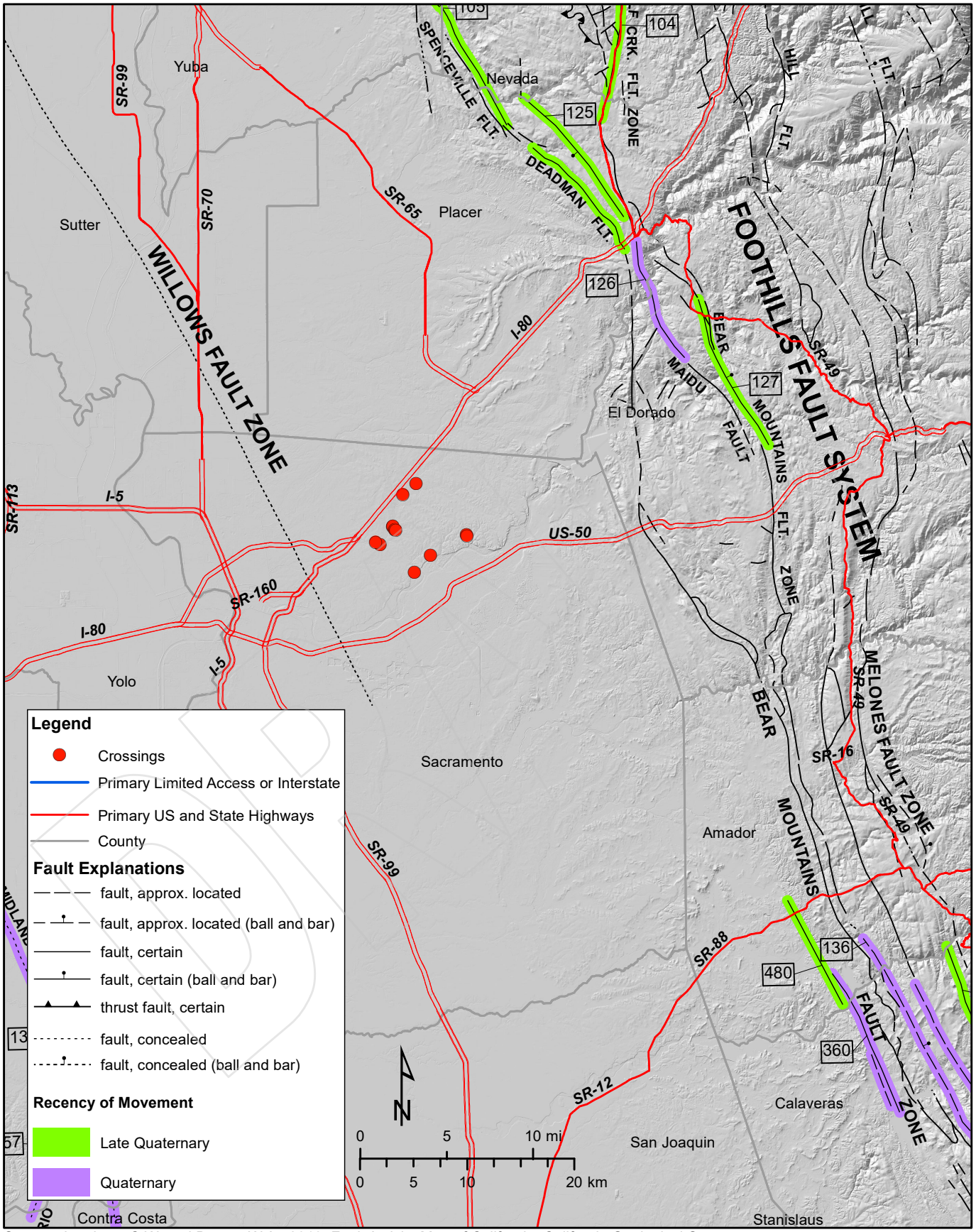
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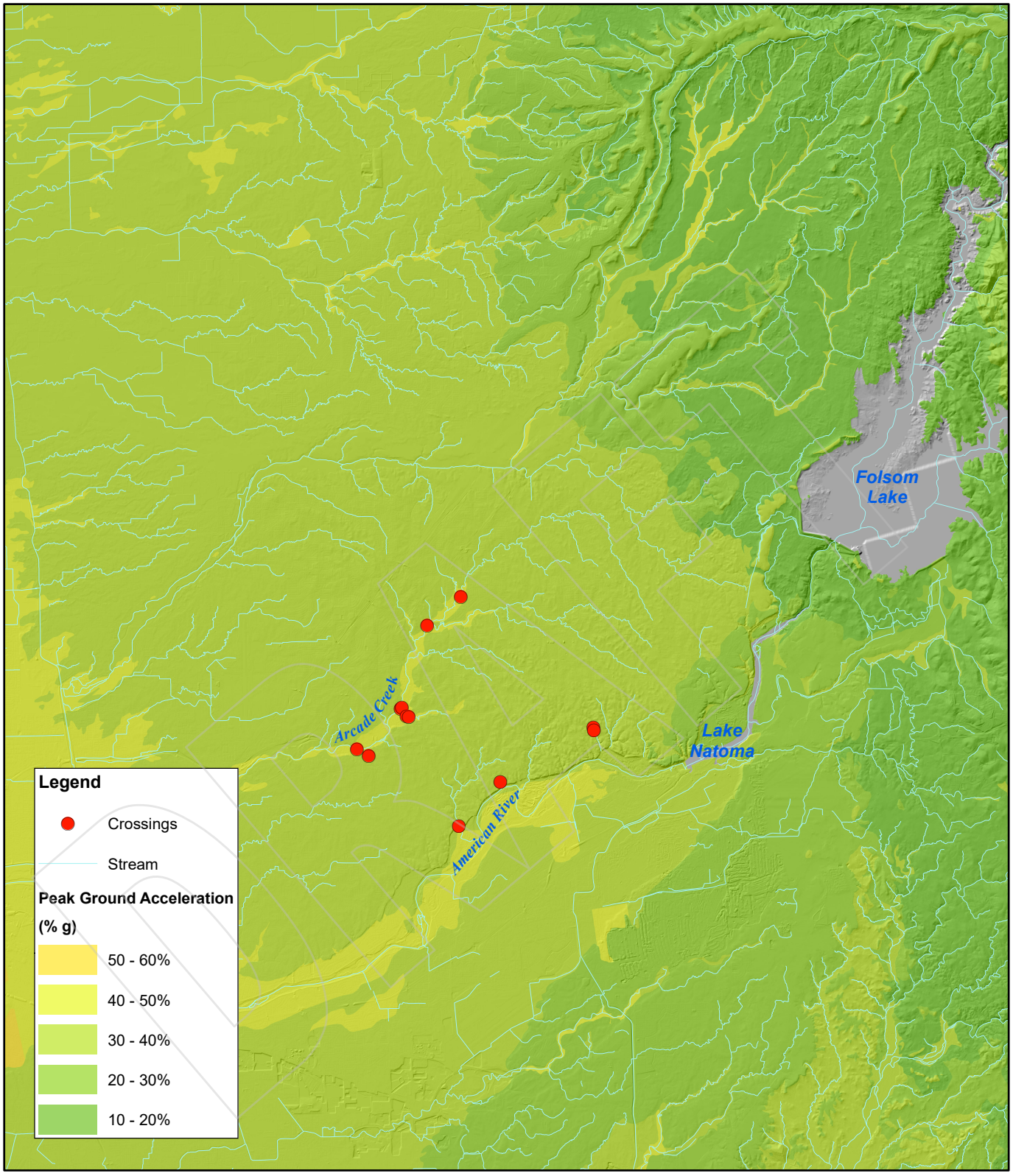
Source: Gutierrez, C. I., 2011. Preliminary geologic map of the Sacramento 30' x 60' quadrangle, California, California Geological Survey

Plate 4: Geologic Map Explanation



Source: Jennings, C.W. and Bryant, W.A., 2010. Fault Activity Map of California. California Geological Survey 150th Anniversary Edition

Plate 5: Fault Map



Source: Branum, D., Chen, R., Wills, C., and Petersen, M., 2016. Earthquake Shaking Potential for California

N

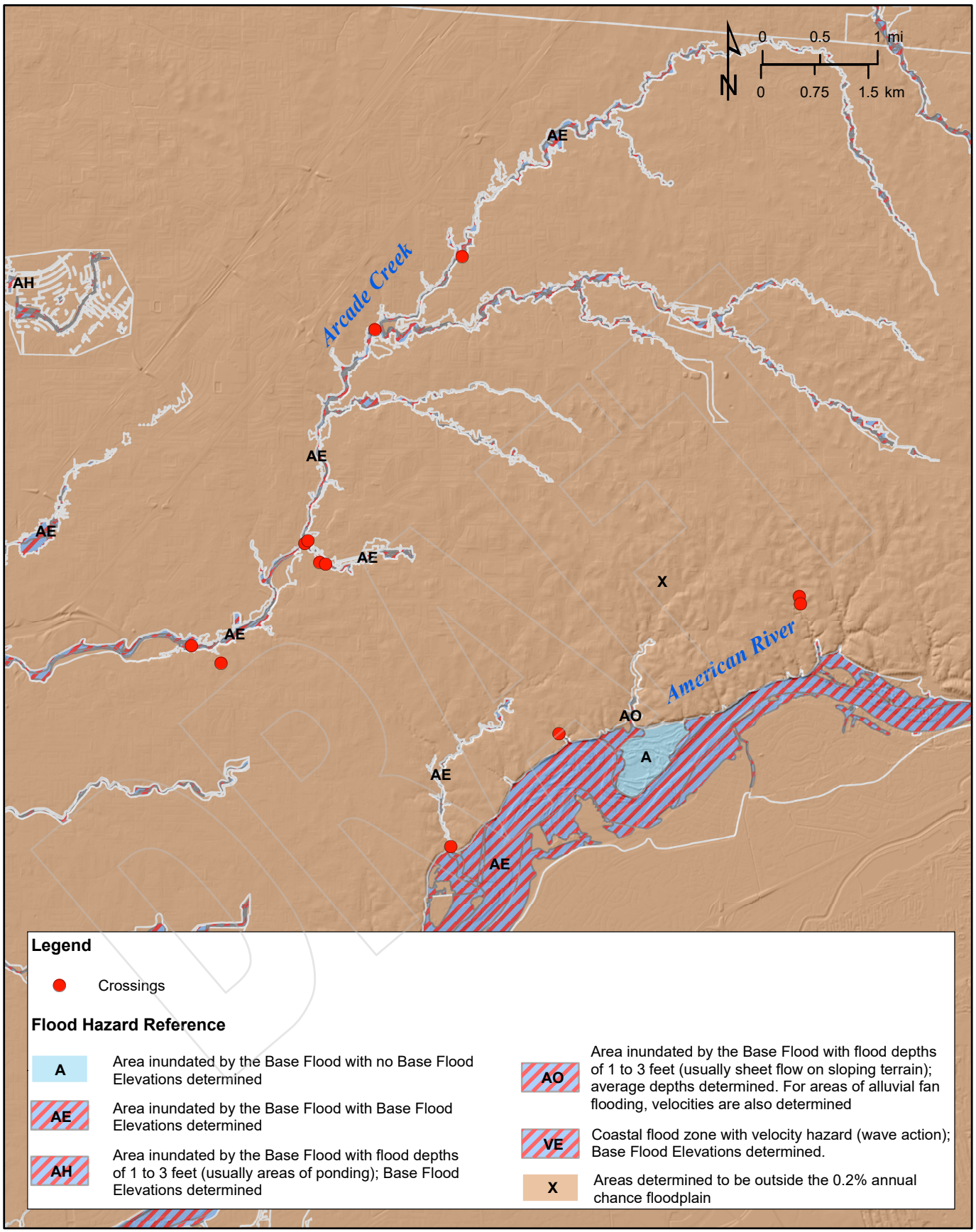
0 2.5 5 mi

0 5 10 km

Plate 6: Seismic Hazard Map

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FUGRO



Source: National Flood Hazard Layer (NFHL), 2022, Version 1.1.1.0, Federal Emergency Management Agency

Plate 7: Flood Map

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Appendix A

Field Explorations

CLASSIFICATION AND MATERIAL SYMBOLS

MAJOR DIVISIONS PER ASTM D2488-06			MAJOR GROUP NAMES AND MATERIAL SYMBOLS		
COARSE-GRAINED SOILS (More than 50% retained on the No. 200 sieve)	GRAVELS (MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE)	Clean gravels less than 5% fines	**GW**		Well-Graded GRAVEL
			GP		Poorly Graded GRAVEL
		Gravels with more than 12% fines	**GM**		SILTY GRAVEL
			GC		CLAYEY GRAVEL
	SANDS (MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE)	Clean sand less than 5% fines	**SW**		Well-Graded SAND
			SP		Poorly Graded SAND
		Sands with more than 12% fines	**SM**		SILTY SAND
			SC		CLAYEY SAND
FINE-GRAINED SOILS (50% or more passes the No. 200 sieve)	SILTS AND CLAYS (Liquid Limit Less than 50%)		**ML**		SILT
			CL		Lean CLAY
			OL		ORGANIC SILT
	SILTS AND CLAYS (Liquid Limit Greater than 50%)		**MH**		Elastic SILT
			CH		Fat CLAY
			OH		ORGANIC CLAY
HIGHLY ORGANIC SOILS			**PT**		Peat or Highly Organic Soils

Notes:
Classification of soils on the boring logs is in general accordance with ASTM D2488, or D2487 if appropriate laboratory data are available.
The geologic formation is noted in bold font at the top of interpreted interval on the boring logs.

OTHER MATERIAL SYMBOLS

 Debris or Mixed Fill

 Pavement with Aggregate Base

SAMPLER TYPE

 SPT (Driven) 1-3/8" ID 2" OD

 Modified California (Driven) 2-3/8" ID 3" OD

 Modified California (Driven) 1-7/8" ID 2-1/2" OD

 Shelby Tube (Pushed) 2-7/8" ID 3" OD

 Pitcher Barrel (Rotary-cut) 2-7/8" ID

 Osterberg (Piston) 2-7/8" ID

 101 Geobarrel (Rotary-cut) 2-7/8" ID

 Rock Core (Rotary-cut) See log for size

 Vibracore (Vibrated) See log for size

 Push-core (Pushed) See log for size

 Collected from Auger

 Other See log for details

Note: Refer to text of report for additional details or other sampler types.

BLOW COUNT

Number of blows required to drive sampler each of three 6-in. intervals, as measured in the field (uncorrected). An SPT hammer (140 lb., falling 30-in.) was used unless otherwise noted on the boring log. For example:

Blow Count	Description
5 7 8	5, 7, and 8 blows for first, second, and third interval, respectively.
35 50/3"	35 blows for the first interval. 50 blows for the first 3 inches of the second interval. Lack of third value implies that driving was stopped 3 inches into the second interval.
WOH WOH 5	"WOH" indicates that the weight of the hammer was sufficient to advance the sampler over the first two intervals. 5 blows were required to advance the sampler over the third interval.

N-VALUE

The N-Value represents the blowcount for the last 12 inches of the sample drive if three 6-inch intervals were driven. N-value presented is independant of impact energy. If 50 hammer blows were insufficient to drive through either the second or the third interval, the total number of blows and total length driven are reported (excluding the first interval). "ref" (refusal) indicates that 50 blows were insufficient to drive through the first 6-inch interval.

Parenthesis indicate that an approximate correction has been applied for non-SPT drive samplers. For example, a factor of 0.63 is commonly used to adjust blow counts obtained using a 3-inch outside diameter modified California sampler to correspond to Standard Peneteration Test.

UNDRAINED SHEAR STRENGTH

A value of undrained shear strength is reported. The value is followed by a letter code indicating the type of test that was performed, as follows:

U - Unconfined Compression
Q - Unconsolidated Undrained Triaxial
T - Torvane
P - Pocket Penetrometer
M - Miniature Vane
F - Field Vane
R - R-value

OTHER TESTS

Field or laboratory tests without a dedicated column on the boring log are reported in the Other Tests column. A letter code is used to indicate the type of test. For certain tests, a value representing the test result is also provided. Typical letter codes are as follows. Additional codes may be used. Refer to the report text and the laboratory testing results for additional information.

k - Permeability (cm/s)
Consol - Consolidation
Gs - Specific Gravity
MA - Particle Size Analysis
EI - Expansion Index
OVM - Organic Vapor Meter

WATER LEVEL SYMBOLS


Initial water level
Final water level
Seepage encountered

INCREASING MOISTURE CONTENT


Dry
Moist
Wet

CONSISTENCY OF COHESIVE SOIL

CONSISTENCY	UNDRAINED SHEAR STRENGTH (KIPS PER SQUARE FOOT)
Very Soft	< 0.25
Soft	0.25 to 0.50
Medium Stiff	0.50 to 1.0
Stiff	1.0 to 2.0
Very Stiff	2.0 to 4.0
Hard	> 4.0

Note: In absence of test data, consistency has been estimated based on manual observation.

APPARENT DENSITY OF COHESIONLESS SOIL

APPARENT DENSITY	N-VALUE
Very Loose	0 to 4
Loose	5 to 9
Medium Dense	10 to 29
Dense	30 to 49
Very Dense	> 49

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TERMS AND SYMBOLS USED ON BORING LOGS

PLATE A-1

LOCATION:

Winding Way
N 38.643673 W 121.355306 WGS84

DEPTH, ft	MATERIAL SYMBOL	SAMPLER TYPE	BLOW COUNT OR PRESSURE, psi	N VALUE OR RQD%	RECOVERY	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
		1	2 3 4	(4)	12/18"	**ALLUVIUM (Qal)** Poorly-graded SAND with CLAY (SP-SC): loose, reddish brown, moist, fine- to medium-grained sand, trace organics (roots)							
5		2	2 1 2	(2)	12/18"	- very loose, greater fines content with depth						2.3 P	
		3	6 9 8	(11)	18/18"	CLAYEY SAND with GRAVEL (SC): medium dense, yellowish brown, moist, fine- to coarse-grained sand, subrounded gravel (max diameter 0.5-inch) - increased gravel content							
10		4	8 10 18	(18)	18/18"	Lean CLAY (CL): hard, brown, moist, orange mottling, trace fine-grained sand						4.5 P	
						CLAYEY SAND (SC): dense, reddish brown, moist, fine- to coarse-grained sand							
15		5	19 25 27	(33)	15/18"								
						SILT with SAND (ML): very stiff, yellowish brown, moist, fine-grained sand							
20		6	5 10 9	19	18/18"								
25		7	11 17 22	(24)	18/18"	- thin interbedded sand layer							
						Lean CLAY with SAND (CL): very stiff, olive brown, moist, fine- to coarse-grained sand							
30		8	10 16 22	(24)	17/18"							4.3 P	
						Poorly-graded SAND (SP): dense, brown, moist, fine- to coarse-grained sand							

NOTES:
1. Terms and symbols defined on Plate A-1.

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BORING DEPTH: 31.5 ft
BACKFILL: Grout
DEPTH TO WATER: Groundwater not encountered
FIELDWORK DATE: February 24, 2022
DRILLING METHOD: 4-in. dia. Solid Flight Auger

HAMMER TYPE: Automatic Trip, 140.00 lb
RIG TYPE: Portable Track Rig
DRILLED BY: Clear Heart Drilling
LOGGED BY: Abdulhadi F
CHECKED BY: Reza R

LOG OF BORING NO. B-1
SASD Creek Crossing
Citrus Heights, Fair Oaks and Carmichael, California

WSC, Inc.
Project No. 04.00185381

DEPTH, ft	MATERIAL SYMBOL	SAMPLER TYPE	BLOW COUNT OR PRESSURE, psi	N VALUE OR RQD%	RECOVERY	LOCATION: Winding Way N 38.6429083333333 W 121.3549605 WGS84 MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
		1	5 4 5	(6)	15/18"	**ALLUVIUM (Qal)** Poorly-graded SAND with CLAY (SP-SC): loose, reddish brown, moist, fine- to coarse-grained sand, trace organics (roots), trace subrounded gravel (max diameter .5-inch)							
5		2	5 5 8	(8)	15/18"	- medium dense, less fines with depth							
		3	10 22 42	64	18/18"	SANDY Lean CLAY (CL): hard, brown, moist, fine- to medium-grained sand							
10		4	16 32 36	68	18/18"	Lean CLAY (CL): hard, yellowish brown, dry, orange mottling							
		5	26 50 50	(63)	18/18"	CLAYEY SAND with GRAVEL (SC): very dense, reddish brown, moist, fine- to coarse-grained sand, subrounded gravel (max diameter 1-inch) - decreased gravel content, less fines with depth							
15						CLAYEY SAND (SC): dense, yellowish brown, moist, fine- to medium-grained sand, orange mottling							
20		6	15 15 19	34	18/18"								
		7	10 12 18	30	18/18"	Lean CLAY (CL): very stiff, yellowish brown, moist, trace fine- to medium-grained sand - decreased fines content with depth							
25													
30		8	15 20 22	(26)	18/18"	Poorly-graded SAND (SP): dense, brown, moist, fine- to coarse-grained sand							
						NOTES: 1. Terms and symbols defined on Plate A-1.							

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BORING DEPTH: 31.5 ft
BACKFILL: Grout
DEPTH TO WATER: Groundwater not encountered
FIELDWORK DATE: February 24, 2022
DRILLING METHOD: 4-in. dia. Solid Flight Auger

HAMMER TYPE: Rope and Cathead, 140.00 lb
RIG TYPE: TriPod/Track Rig
DRILLED BY: Clear Heart Drilling
LOGGED BY: Abdulhadi F
CHECKED BY: Reza R

LOG OF BORING NO. B-2
SASD Creek Crossing
Citrus Heights, Fair Oaks and Carmichael, California

LOCATION:
Arcade Creek Park (By the Pipe)
N 38.65609025 W 121.33682508 WGS84

DEPTH, ft	MATERIAL SYMBOL	SAMPLER TYPE	BLOW COUNT OR PRESSURE, psi	N VALUE OR RQD%	RECOVERY	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
		1	6		6/6"	**ALLUVIUM (Qal)** SANDY lean CLAY (CL): soft to medium stiff, brown (7.5YR 4/4), moist, fine-grained sand, trace roots							
5		2	7 10 14	(15)	14/18"	CLAYEY SAND (SC): medium stiff, brown (7.5YR 4/4), moist, fine-grained sand, trace organics (roots)	112	17	52	25	10	0.5 U	
		3	7 9 10	19	18/18"	SANDY Lean CLAY (CL): very stiff, reddish brown, moist, fine-grained sand		14					
10		4	7 10 13	(14)	14/18"	CLAYEY SAND (SC): medium dense, brown (7.5YR 4/4), wet, fine- to medium-grained sand, poorly-graded - trace coarse-grained sand	120	15 16	28				
15		5	11 14 20	34	15/18"	SILTY SAND (SM): medium dense to dense, yellowish brown, moist, fine-grained sand							
20		6	9 13 22	(22)	9/18"	- less sand with depth		21 25	49			1.3 P	
25		7	10 13 20	33	9/18"								
30		8	18 38 50/4	88/10	16/16"	**RIVERBANK FORMATION (Qr)** CLAYEY SAND (SC): very stiff, reddish brown, moist, fine- to coarse-grained sand	89 89	31 31				1.7 U >4.5 P	

NOTES:
1. Terms and symbols defined on Plate A-1.
Hand Auger first 5 feet.

BORING DEPTH: 31.3 ft
BACKFILL: Grout
DEPTH TO WATER: 7.0 ft
FIELDWORK DATE: December 21, 2021
DRILLING METHOD: 4-in. dia. Solid Stem Auger

HAMMER TYPE: Automatic Trip, 140.00 lb
RIG TYPE: DR8K Track Rig
DRILLED BY: Clear Heart Drilling
LOGGED BY: Haotian L
CHECKED BY: Reza R

LOG OF BORING NO. B-3
SASD Creek Crossing
Citrus Heights, Fair Oaks and Carmichael, California

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WSC, Inc.
Project No. 04.00185381

LOCATION:
Arcade Creek Park (By the Pipe)
N 38.65619775 W 121.33672281 WGS84

DEPTH, ft	MATERIAL SYMBOL	SAMPLER TYPE	BLOW COUNT OR PRESSURE, psi	N VALUE OR RQD%	RECOVERY	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
						ALLUVIUM (Qal)							
						SILT with SAND (ML): dark reddish brown (5YR 3/4), moist, fine grained sand, trace roots							
		1			6/6"	Lean CLAY with SAND (CL): dark reddish brown (5YR 3/4), moist, fine grained sand		21	73				
5		2	5 7 8	(9)	14/18"	SILTY SAND (SM): loose, brown, moist, fine grained sand	117	16					
							117	16				1.0 P 0.7 U	
		3	5 8 9	17	18/18"	- medium dense							
10		4	14 50	50/6	12/12"	CLAYEY SAND (SC): very dense, reddish yellow (7.5YR 6/8), moist, fine grained sand	114	16					
							114	16				3.3 U >4.5 P	
						- less sand with depth							
15		5	8 8 10	18	18/18"								
						SILT with SAND (ML): very stiff, reddish yellow, moist, fine grained sand							
						Lean CLAY (CL): very stiff, light brown, moist, trace fine grained sand							
20		6	18 50	50/6	12/12"		73	43				1.7 U	
												>4.5 P	
						SILT (ML): very stiff, yellowish brown, moist, trace fine grained sand			88	34	NP		
25		7	5 8 10	18	18/18"								
						RIVERBANK FORMATION (Qr) CLAYEY SAND (SC): dense, reddish brown, moist, fine to coarse grained sand							
30		8	22 32 40	(45)	18/18"		91	30					
							91	30				>4.5 P 1.8 U	
						NOTES: 1. Terms and symbols defined on Plate A-1. Hand Auger first 5 feet, below that Solid Stem Auger.							

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BORING DEPTH: 31.5 ft
BACKFILL: Grout
DEPTH TO WATER: Groundwater not encountered
FIELDWORK DATE: December 20, 2021
DRILLING METHOD: 4-in. dia. Solid Stem Auger

HAMMER TYPE: Automatic Trip, 140.00 lb
RIG TYPE: DR8K Track Rig
DRILLED BY: Clear Heart Drilling
LOGGED BY: Haotian L
CHECKED BY: Reza R

LOG OF BORING NO. B-4
SASD Creek Crossing
Citrus Heights, Fair Oaks and Carmichael, California

LOCATION:

Garfield and Thousand Oaks
N 38.6565851666667 W 121.336275833333 WGS84

DEPTH, ft	MATERIAL SYMBOL	SAMPLER TYPE	BLOW COUNT OR PRESSURE, psi	N VALUE OR RQD%	RECOVERY	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
		1	6 6		6/6"	**ALLUVIUM (Qal)** SANDY SILT (ML): soft, strong brown (7.5YR 5/6), moist, fine grained sand, with an elongated coarse gravel, 2 inch, subangular							
5		2	8 16 18	(21)	5/18"	CLAYEY GRAVEL with SAND (GC): medium dense, reddish brown, dry, fine- to coarse-grained sand, angular to subangular gravel (max diameter 2-inches)							
		3	7 7 17	24	6/18"								
10		4	38 50	50/6	12/12"	- very dense		8	30				MA
						SANDY SILT (ML): very stiff, yellowish brown, dry, fine to coarse grained sand							
15		5	11 11 15	26	15/18"	- less gravel with depth		16	70				
						RIVERBANK FORMATION (Qr)							
20		6	29 62	62/6	8/12"	SANDY SILT with GRAVEL (ML): hard, brown, dry, fine- to coarse-grained sand	85 85	31 31		47	9	4.5 U >4.5 P	
25		7	6 9 15	24	18/18"	- very stiff, dry to moist							
						- less gravel with depth							
30		8	12 29 45	(46)	18/18"	CLAYEY SAND (SC): hard, brown	80 80	41 41				1.7 U	

NOTES:
1. Terms and symbols defined on Plate A-1.
Hand Auger first 5 feet, then Solid Stem Auger to 10 feet, too many rocks - moved 3 to 4 feet east and changed to Hollow Stem Auger.

BORING DEPTH: 31.5 ft
BACKFILL: Grout
DEPTH TO WATER: Groundwater not encountered
FIELDWORK DATE: December 20, 2021
DRILLING METHOD: 4-in. dia. Solid Stem Auger

HAMMER TYPE: Automatic Trip, 140.00 lb
RIG TYPE: DR8K Track Rig
DRILLED BY: Clear Heart Drilling
LOGGED BY: Haotian L
CHECKED BY: Reza R

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LOG OF BORING NO. B-5
SASD Creek Crossing
Citrus Heights, Fair Oaks and Carmichael, California

LOCATION:

Garfield and Thousand Oaks
N 38.6560833 W 121.3357222 WGS84

DEPTH, ft	MATERIAL SYMBOL	SAMPLER TYPE	BLOW COUNT OR PRESSURE, psi	N VALUE OR RQD%	RECOVERY	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
		1	6 6		6/6"	**ALLUVIUM (Qal)** Poorly-graded SAND with SILT (SP-SM): yellowish brown, moist, medium- to fine-grained sand, trace rounded gravel (max diameter 2-inches)							
5		2	1 1 1	2	15/18"	- very loose		9	11				MA
		3	1 2 3	5	15/18"	- loose							
10		4	10 16 25	(26)	12/18"	CLAYEY SAND (SC): medium dense, reddish brown, moist, fine-grained sand, trace organics (roots)	123 123	14 14	31			3.3 P 2.9 U >4.5 P	
15		5	6 8 10	18	18/18"			14	25				
20		6	11 16 23	(24)	12/18"	- less sand with depth	110	17				3.3 P 1.3 U 4.3 P	
						SILT with SAND (ML): very stiff, yellowish brown, moist, fine-grained sand							
25		7	7 12 17	29	18/18"					43	13		
						Poorly-graded SAND with SILT (SP-SM): dense, reddish yellow, moist, fine-grained sand							
30		8	20 27 34	(38)	15/18"								
						SILT with SAND (ML): hard, yellowish brown, moist, fine-grained sand						>4.5 P	

NOTES:
1. Terms and symbols defined on Plate A-1.
Hand Auger first 5 feet.

BORING DEPTH: 31.5 ft
BACKFILL: Grout
DEPTH TO WATER: Groundwater not encountered
FIELDWORK DATE: December 20, 2021
DRILLING METHOD: 4-in. dia. Solid Stem Auger

HAMMER TYPE: Automatic Trip, 140.00 lb
RIG TYPE: DR8K Track Rig
DRILLED BY: Clear Heart Drilling
LOGGED BY: Haotian L
CHECKED BY: Reza R

LOG OF BORING NO. B-6
SASD Creek Crossing
Citrus Heights, Fair Oaks and Carmichael, California

FCLP STANDARD LOG C:\USERS\M.MCCALLUM\DESKTOP\PROJECTS\04.00185381\GINT\04_0018_5381.GPJ OGEM_LIB_2018_10_09.GLB 3/10/22 04:49 p

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DEPTH, ft	MATERIAL SYMBOL	SAMPLER TYPE	BLOW COUNT OR PRESSURE, psi	N VALUE OR RQD%	RECOVERY	LOCATION: San Lorenzo Way N 38.6179863333333 W 121.3136545 WGS84 MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
		1	6 6		6/6"	**ALLUVIUM (Qal)** CLAYEY SAND (SC): loose, reddish brown, moist, trace GRAVEL (max diameter 1/2 inch)		17	49				
5		2	5 6 8	(9)	9/18"		118 118	15 15				1.5 U	
		3	5 8 9	17	18/18"	- medium dense		12					
10		4	12 27 50	(48)	14/18"	Poorly-graded SAND with CLAY (SP-SC): dense, reddish brown, moist		12					
15		5	4 5 6	11	18/18"	- medium dense							
20		6	6 6 6	12	18/18"	SILTY SAND (SM): medium dense, brown, moist, medium- to coarse-grained sand							
25		7	8 12 17	(18)	18/18"		102	23					
30		8	5 5 4	9	18/18"	Poorly-graded SAND (SP): loose, yellowish brown (10YR 5/8), moist, trace SILT							
						NOTES: 1. Terms and symbols defined on Plate A-1. Hand Auger first 5 feet, Hollow Stem Auger below that.							

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BORING DEPTH: 31.5 ft
BACKFILL: Grout
DEPTH TO WATER: Groundwater not encountered
FIELDWORK DATE: December 14, 2021
DRILLING METHOD: 7-in. dia. Hollow Stem Auger

HAMMER TYPE: Automatic Trip, 140.00 lb
RIG TYPE: DR8K Track Rig
DRILLED BY: Clear Heart Drilling
LOGGED BY: Haotian L
CHECKED BY: Reza R

LOG OF BORING NO. B-7
SASD Creek Crossing
Citrus Heights, Fair Oaks and Carmichael, California

DEPTH, ft	MATERIAL SYMBOL	SAMPLER TYPE	BLOW COUNT OR PRESSURE, psi	N VALUE OR RQD%	RECOVERY	LOCATION: Sutter Ave N 38.63255986 W 121.29655471 WGS84 MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
		1	4 13 22	(35)	14/18"	**COLLUVIUM (Qcol)** SILTY SAND (SM): medium dense, light brown, moist, fine-grained sand	113	7 7					
5		2	8 9 10	19	18/18"								
		3	13 12 14	26	18/18"	**TURLOCK LAKE FORMATION (Qtl)** CLAYEY SAND (SC): medium dense, yellowish brown, moist, fine- to coarse-grained sand		17	28				
10		4	15 25 25	(50)	18/18"	- dense							
15		5	31 50/4	50/4	10/10"	- very dense	113	17				1.8 U	
						SILT with SAND (ML): hard, yellowish brown, moist, fine-grained sand							
20		6	15 32 50/5	82/11	17/17"								
25		7	32 50/5	50/5	11/11"	CLAYEY SAND (SC): dense, light brown, moist - brown	92 92	16 16				1.2 U	
30		8	20 30 50/5	80/11	17/17"								
						NOTES: 1. Terms and symbols defined on Plate A-1.							

FCLP STANDARD LOG C:\USERS\M.MCCALLUM\DESKTOP\PROJECTS\04.00185381\GINT\04_0018_5381.GPJ OGEM_LIB_2018_10_09.GLB 3/10/22 04:50 p

BORING DEPTH: 31.4 ft
BACKFILL: Grout
DEPTH TO WATER: 11.0 ft
FIELDWORK DATE: December 15, 2021
DRILLING METHOD: 4-in. dia. Solid Stem Auger

HAMMER TYPE: Rope and Cathead, 140.00 lb
RIG TYPE: DR8K Track Rig/Portable
DRILLED BY: Clear Heart Drilling
LOGGED BY: Haotian L
CHECKED BY: Reza R

LOG OF BORING NO. B-8
SASD Creek Crossing
Citrus Heights, Fair Oaks and Carmichael, California

DEPTH, ft	MATERIAL SYMBOL	SAMPLER TYPE	BLOW COUNT OR PRESSURE, psi	N VALUE OR RQD%	RECOVERY	LOCATION: Sutter Ave N 38.63251167 W 121.29654674 WGS84 MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
		1	8 11 16	(17)	16/18"	**COLLUVIUM (Qcol)** CLAYEY SAND with GRAVEL (SC): medium dense, reddish brown, moist, fine- to medium-grained sand, angular gravel, trace organics (roots)	106	10 10					
5		2	8 25 44	69	18/18"	- very dense							
		3	30 50	50/6	12/12"								
10		4	50/5	50/ref	5/5"	**TURLOCK LAKE FORMATION (Qtl)** CLAYEY SAND (SC): very dense, reddish brown, moist, fine- to coarse-grained sand							
15		5	22 50	50/6	12/12"	- less clay with depth, increased fine-grained sand, difficulty drilling		14	34				
20		6	22 50	50/6	12/12"								
25		7	28 50	50/6	12/12"			27				2.2 U 3.8 P >4.5 P	
						SILT with SAND (ML): hard, yellowish brown, moist to wet, fine-grained sand							
30		8	14 18 30	48	18/18"								
						NOTES: 1. Terms and symbols defined on Plate A-1.							

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BORING DEPTH: 31.5 ft
BACKFILL: Grout
DEPTH TO WATER: Groundwater not encountered
FIELDWORK DATE: December 16, 2021
DRILLING METHOD: 4-in. dia. Solid Stem Auger

HAMMER TYPE: Rope and Cathead, 140.00 lb
RIG TYPE: DR8K Track Rig/Portable
DRILLED BY: Clear Heart Drilling
LOGGED BY: Haotian L
CHECKED BY: Reza R

LOG OF BORING NO. B-9
SASD Creek Crossing
Citrus Heights, Fair Oaks and Carmichael, California

LOCATION:
Indian River Dr
N 38.68304148 W 121.32497701 WGS84

DEPTH, ft	SAMPLER TYPE	BLOW COUNT OR PRESSURE, psi	N VALUE OR RQD%	RECOVERY	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
	1	5 5 4	(6)	10/18"	**ALLUVIUM (Qal)** CLAYEY SAND (SC): loose, dark brown, moist, fine-grained sand, trace organics (roots)	110	16 15	48			1.0 P	
5	2	1 1 1	2	15/18"	- very loose, wet							
					Poorly-graded SAND with CLAY (SP-SC): loose, mottled reddish brown and gray, wet, fine-grained sand							
10	3	4 4 5	(6)	18/18"		117	15					
15	4	5 5 7	12	12/18"	medium dense							
20	5	25 60	60/6	12/12"	**RIVERBANK FORMATION (Qr)** CLAYEY SAND with GRAVEL (SC): very dense, dark brown, wet, fine-grained sand, subangular gravel (max diameter 1/4 inch)	124	12	36			>4.5 P	
25	6	8 10 19	29	18/18"	SANDY SILT (ML): very stiff, yellowish brown, moist, fine-grained sand - increased sand with depth							
30	7	35 55	55/6	12/12"		92	27				2.2 U >4.5 P	

NOTES:
1. Terms and symbols defined on Plate A-1.

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BORING DEPTH: 31.0 ft
BACKFILL: Grout
DEPTH TO WATER: 8.0 ft
FIELDWORK DATE: December 17, 2021
DRILLING METHOD: 4-in. dia. Solid Stem Auger

HAMMER TYPE: Automatic Trip, 140.00 lb
RIG TYPE: DR8K Track Rig
DRILLED BY: Clear Heart Drilling
LOGGED BY: Haotian L
CHECKED BY: Reza R

LOG OF BORING NO. B-10
SASD Creek Crossing
Citrus Heights, Fair Oaks and Carmichael, California

LOCATION:
Indian River Dr
N 38.6832309 W 121.32502902 WGS84

DEPTH, ft	MATERIAL SYMBOL	SAMPLER TYPE	BLOW COUNT OR PRESSURE, psi	N VALUE OR RQD%	RECOVERY	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
		1	2 3 5	(5)	12/18"	**ALLUVIUM (Qal)** CLAYEY SAND (SC): loose, dark reddish brown, wet, fine grained sand, trace organics (roots)	114	17					
5		2	3 5 8	13	17/18"	- medium dense		16	47	24	10	0.3 P	
		3	10 15 19	(21)	12/18"	- brown	115	15				1.5 U 3.0 P	
10		4	6 10 13	23	18/18"	SANDY Lean CLAY (CL): very stiff, dark reddish brown, wet, fine-grained sand							
15		5	4 15 20	(22)	18/18"	- olive gray	94 94	30 30		40	19	1.5 P 1.3 U 3.5 P	
20		6	14 15 19	34	18/18"	- hard							
25		7	20 50	50/6	12/12"	CLAYEY SAND (SC): very dense, dark reddish brown, wet							
30		8	56 60	60/6	12/12"	Lean CLAY (CL): hard, reddish brown, moist	103	23				4.5 U >4.5 P	

NOTES:
1. Terms and symbols defined on Plate A-1.

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BORING DEPTH: 31.0 ft
BACKFILL: Grout
DEPTH TO WATER: 5.0 ft
FIELDWORK DATE: December 17, 2021
DRILLING METHOD: 4-in. dia. Solid Stem Auger

HAMMER TYPE: Rope and Cathead, 140.00 lb
RIG TYPE: DR8K Track Rig/Portable
DRILLED BY: Clear Heart Drilling
LOGGED BY: Haotian L
CHECKED BY: Reza R

LOG OF BORING NO. B-11
SASD Creek Crossing
Citrus Heights, Fair Oaks and Carmichael, California

WSC, Inc.
Project No. 04.00185381

DEPTH, ft	MATERIAL SYMBOL	SAMPLER TYPE	BLOW COUNT OR PRESSURE, psi	N VALUE OR RQD%	RECOVERY	LOCATION: Dietz Way N 38.649001 W 121.257466 WGS84 MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
		S-1		N/A	4/4"	**ALLUVIUM (Qal)** CLAYEY GRAVEL with SAND (GC): loose, yellowish brown, wet, fine- to medium-grained sand							
						- trace cobbles (max diameter 4 inches), fine to coarse rounded gravel		31	32				MA
		S-2			3/6"	SANDY Lean CLAY with GRAVEL (CL): stiff, brown, moist to wet, fine-grained sand, fine to coarse gravel							
		S-3			6/6"								
		S-4			3/6"								
		S-5			4/4"	- yellowish brown, medium stiff		27	55				MA
		S-6			4/4"								
5						- with more sand NOTES: 1. Terms and symbols defined on Plate A-1.							

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FCLP STANDARD LOG C:\USERS\M.MCCALLUM\DESKTOP\PROJECTS\04.00185381\GINT\04_0018_5381.GPJ OGEM_LIB_2018_10_09.GLB 3/10/22 04:50 p

BORING DEPTH: 5.5 ft
BACKFILL: Cuttings
DEPTH TO WATER: 0.5 ft
FIELDWORK DATE: December 16, 2021
DRILLING METHOD: 4-in. dia. Hand Auger

HAMMER TYPE: Manual Drop
RIG TYPE: Hand Auger
DRILLED BY: Clear Heart Drilling
LOGGED BY: Reza R
CHECKED BY: D. van Hoff

LOG OF BORING NO. H-1
SASD Creek Crossing
Citrus Heights, Fair Oaks and Carmichael, California

LOCATION:
Hegseth Ct
N 38.648068 W 121.2573 WGS84

DEPTH, ft	MATERIAL SYMBOL	SAMPLER TYPE	BLOW COUNT OR PRESSURE, psi	N VALUE OR RQD%	RECOVERY	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
						ALLUVIUM (Qal) SANDY Lean CLAY (CL): soft to medium stiff, dark reddish brown, moist, mostly fine-grained sand, few coarse-grained sand							
		S-1			4/4"								
		S-2			6/6"								
								21					
		S-3			4/4"				54				
		S-4			6/6"	- stiff, dark yellowish brown	108	18				1.8 Q	
		S-5			4/4"								
		S-6			4/4"								
5						- medium stiff, few gravel (max diameter 2.5 inches)							
						CLAYEY SAND (SC): yellowish brown, wet, fine- to coarse-grained sand, with organics							
		S-7			4/4"					30	13		
		S-8			3/6"								
		S-9			4/4"	- mottled gray and light brown, few rounded gravel (max diameter 2.5 inches)							
						SANDY Lean CLAY (CL): dark reddish brown, wet, fine- to coarse-grained sand							
		S-10			4/4"			30	65				MA
		S-11			4/4"				65				

NOTES:
1. Terms and symbols defined on Plate A-1.

BORING DEPTH: 10.0 ft
BACKFILL: Cuttings
DEPTH TO WATER: 6.0 ft
FIELDWORK DATE: December 16, 2021
DRILLING METHOD: 4-in. dia. Hand Auger

HAMMER TYPE: Manual Drop
RIG TYPE: Hand Auger
DRILLED BY: Clear Heart Drilling
LOGGED BY: Reza R
CHECKED BY: D. van Hoff

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LOG OF BORING NO. H-2
SASD Creek Crossing
Citrus Heights, Fair Oaks and Carmichael, California

WSC, Inc.
Project No. 04.00185381

LOCATION:
Hope Lane
N 38.641174 W 121.350391 WGS84

DEPTH, ft	MATERIAL SYMBOL	SAMPLER TYPE	BLOW COUNT OR PRESSURE, psi	N VALUE OR RQD%	RECOVERY	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
		S-1			4/4"	**ALLUVIUM (Qal)** SANDY Lean CLAY (CL): soft, reddish brown, moist, fine-grained sand							
		S-2			6/6"	- medium stiff to stiff							
		S-3			4/4"	CLAYEY SAND (SC): stiff, yellowish brown, wet, fine-grained sand		19	55				
		S-4			6/6"		115	17				1.8 Q	
5		S-5			4/4"								
		S-6			6/6"								
		S-7			4/4"								
		S-8			4/4"								
		S-9			4/4"					46	22		
		S-10			4/4"	SILT (ML): stiff, brown, dry to moist							
		S-11			4/4"								

NOTES:
1. Terms and symbols defined on Plate A-1.

BORING DEPTH: 10.0 ft
BACKFILL: Cuttings
DEPTH TO WATER: 5.0 ft
FIELDWORK DATE: December 21, 2021
DRILLING METHOD: 4-in. dia. Hand Auger

HAMMER TYPE: Manual Drop
RIG TYPE: Hand Auger
DRILLED BY: Clear Heart Drilling
LOGGED BY: Reza R
CHECKED BY: D. van Hoff

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LOG OF BORING NO. H-3
SASD Creek Crossing
Citrus Heights, Fair Oaks and Carmichael, California

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Appendix B

Laboratory Testing

WSC, Inc.
Project No. 04.00185381

DRILL HOLE	DEPTH, ft	SAMPLE NUMBER	MATERIAL DESCRIPTION	UWW pcf	UDW pcf	MC%	FINES %	ATTERBERG LIMITS		COMPACTION TEST		DIRECT SHEAR		COMPRESSIVE STRENGTH TESTS		CORROSIVITY TESTS				R-VALUE	EXPANSION INDEX	SAND EQUIVALENT (SE)	TEST LISTING
								LL	PI	MAX DD pcf	OPT MC %	C ksf	PHI deg	Qu, ksf	S_u (Cell Prs.) ksf	R ohm cm	pH	Cl mg/kg	So_4 mg/kg				
B-3	5.0	2	CLAYEY SAND (SC)	131	112	17		25	10					0.5									T, A, Qu
B-3	7.5	3	SANDY Lean CLAY (CL)			14																	M
B-3	10.0	4	CLAYEY SAND (SC)	138	120	15																	T
B-3	11.0	4	CLAYEY SAND (SC)			16																	M
B-3	20.0	6	CLAYEY SAND (SC)			21																	M
B-3	20.3	6	SILTY SAND (SM)			25																	M
B-3	30.0	8	CLAYEY SAND (SC)	117	89	31								1.7									T, Qu
B-3	30.8	8	CLAYEY SAND (SC)	117	89	31																	T
B-4	2.5	1	Lean CLAY with SAND (CL)			21																	M
B-4	5.7	2	SILTY SAND (SM)	136	117	16																	T
B-4	6.5	3	SILTY SAND (SM)	136	117	16								0.7									T, Qu
B-4	10.0	4	CLAYEY SAND (SC)	132	114	16																	T
B-4	10.5	4	CLAYEY SAND (SC)	132	114	16								3.3									T, Qu
B-4	20.0	6	Lean CLAY (CL)	105	73	43								1.7									T, Qu
B-4	25.0	7	SILT (ML)					34	NP														A
B-4	30.0	8	CLAYEY SAND (SC)	118	91	30																	T
B-4	31.0	8	CLAYEY SAND (SC)	118	91	30								1.8									T, Qu
B-5	10.0	4	CLAYEY GRAVEL with SAND (GC)			8	30																M, S
B-5	15.0	5	SANDY SILT (ML)			16																	M
B-5	20.0	6	SANDY SILT (ML)	111	85	31		47	9														T, A
B-5	20.2	6	SANDY SILT with GRAVEL (ML)	111	85	31								4.5									T, Qu
B-5	30.0	8	SANDY SILT with GRAVEL (ML)	112	80	41																	T
B-5	30.5	8	CLAYEY SAND (SC)	112	80	41								1.7									T, Qu
B-6	5.0	2	Poorly-graded SAND with SILT (SP-SM)			9	11																M, S
B-6	7.9	6	Poorly-graded SAND with SILT (SP-SM)													34000	6.98	N.D.	N.D.				Co
B-6	10.5	4	CLAYEY SAND (SC)	139	123	14								2.9									T, Qu
B-6	11.0	4	CLAYEY SAND (SC)	140	123	14																	T
B-6	15.0	5	CLAYEY SAND (SC)			14																	M
B-6	20.5	6	CLAYEY SAND (SC)	128	110	17								1.3									T, Qu
B-6	25.0	7	SILT with SAND (ML)					43	13														A

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Classification Tests
UWW = Unit Wet Weight
UDW = Unit Dry Weight
MC = Moisture Content
Fines = % Passing #200 Sieve
LL = Liquid Limit
PI = Plasticity Index

Direct Shear Test
C = Assigned Cohesion, ksf
PHI = Assigned Friction Angle, degrees

Compaction Test
MAX DD = Maximum Dry Density
OPT MC = Optimum Moisture Content

Compressive Strength Tests
Qu = Unconfined Compression
Su = Undrained Shear Strength
u = Unconsolidated Undrained
p = Pocket Penetrometer
t = Torvane
m = Miniature Vane

Corrosivity Tests
R = Resistivity, ohm-cm, satur.
pH = pH
Cl = Chloride, ppm
SO_4 = Sulfate, ppm

Test Listing Abbreviations
M = Moisture Content
T = Total & Dry Unit Weight
S = Sieve Analysis
FC = % Passing #200 Sieve
H = Hydrometer Analysis
A = Atterberg Limits
P = Compaction Test
D = Direct Shear Test
C = Consolidation Test
Co = Corrosivity Tests
CU = CU Triaxial
U = UU Triaxial
R = R-Value
SE = Sand Equivelant

SUMMARY OF LABORATORY TEST RESULTS

SASD Creek Crossing
Citrus Heights, Fair Oaks and Carmichael, California

PLATE B-1a

SUM-1 LAB_SUMMRY (C:\USERS\M.MCCALLUM\DESKTOP\PROJECTS\04.00185381\GINT\04_0018_5381.GPJ) -VTA- 3/10/22 04:58 PM

WSC, Inc.
Project No. 04.00185381

DRILL HOLE	DEPTH, ft	SAMPLE NUMBER	MATERIAL DESCRIPTION	UWW pcf	UDW pcf	MC%	FINES %	ATTERBERG LIMITS		COMPACTION TEST		DIRECT SHEAR		COMPRESSIVE STRENGTH TESTS		CORROSIVITY TESTS				R-VALUE	EXPANSION INDEX	SAND EQUIVALENT (SE)	TEST LISTING
								LL	PI	MAX DD pcf	OPT MC %	C ksf	PHI deg	Qu, ksf	S_u (Cell Prs.) ksf	R ohm cm	pH	Cl mg/kg	So_4 mg/kg				
B-7	2.5	B1A	SANDY Lean CLAY (CL)			17																	M
B-7	5.3	2	CLAYEY SAND (SC)	135	118	15								1.5									T, Qu
B-7	6.0	2	CLAYEY SAND (SC)	136	118	15																	T
B-7	8.3	3	CLAYEY SAND (SC)													6800	6.01	N.D.	N.D.				Co
B-7	9.0	3	CLAYEY SAND (SC)			12																	M
B-7	10.7	4	Poorly-graded SAND with CLAY (SP-SC)			12																	M
B-7	25.0	7	SILTY SAND (SM)	125	102	23																	T
B-8	2.5	1	SILTY SAND (SM)	121	113	7																	T
B-8	3.2	1	SILTY SAND (SM)			7																	M
B-8	5.8	2	SILTY SAND (SM)													7100	6.94	N.D.	N.D.				Co
B-8	7.5	3	CLAYEY SAND (SC)			17																	M
B-8	15.3	5	CLAYEY SAND (SC)	132	113	17								1.8									T, Qu
B-8	25.4	7	CLAYEY SAND (SC)	106	92	16																	T
B-8	25.5	7	CLAYEY SAND (SC)	107	92	16								1.2									T, Qu
B-9	2.5	1	CLAYEY SAND with GRAVEL (SC)	117	106	10																	T
B-9	3.3	1	CLAYEY SAND with GRAVEL (SC)			10																	M
B-9	15.0	5	CLAYEY SAND (SC)			14																	M
B-9	25.0	7	CLAYEY SAND (SC)			27								2.2									M, Qu
B-10	2.5	1	CLAYEY SAND (SC)			16																	M
B-10	2.8	1	CLAYEY SAND (SC)	126	110	15																	T
B-10	10.0	3	Poorly-graded SAND with CLAY (SP-SC)	134	117	15																	T
B-10	15.5	4	Poorly-graded SAND with CLAY (SP-SC)													16000	6.20	N.D.	N.D.				Co
B-10	20.0	5	CLAYEY SAND with GRAVEL (SC)	139	124	12																	T
B-10	30.0	7	SANDY SILT (ML)	117	92	27								2.2									T, Qu
B-11	2.5	1	CLAYEY SAND (SC)	134	114	17																	T
B-11	5.0	2	CLAYEY SAND (SC)			16		24	10														M, A
B-11	8.0	3	CLAYEY SAND (SC)	132	115	15								1.5									T, Qu
B-11	15.5	5	SANDY Lean CLAY (CL)	122	94	30																	T
B-11	16.0	5	SANDY Lean CLAY (CL)	122	94	30		40	19					1.3									T, A, Qu
B-11	30.0	8	Lean CLAY (CL)	127	103	23								4.5									T, Qu

Classification Tests
UWW = Unit Wet Weight
UDW = Unit Dry Weight
MC = Moisture Content
Fines = % Passing #200 Sieve
LL = Liquid Limit
PI = Plasticity Index

Direct Shear Test
C = Assigned Cohesion, ksf
PHI = Assigned Friction Angle, degrees

Compaction Test
MAX DD = Maximum Dry Density
OPT MC = Optimum Moisture Content

Compressive Strength Tests
Qu = Unconfined Compression
Su = Undrained Shear Strength
u = Unconsolidated Undrained
p = Pocket Penetrometer
t = Torvane
m = Miniature Vane

Corrosivity Tests
R = Resistivity, ohm-cm, satur.
pH = pH
Cl = Chloride, ppm
SO_4 = Sulfate, ppm

Test Listing Abbreviations
M = Moisture Content
T = Total & Dry Unit Weight
S = Sieve Analysis
FC = % Passing #200 Sieve
H = Hydrometer Analysis
A = Atterberg Limits
P = Compaction Test
D = Direct Shear Test
C = Consolidation Test
Co = Corrosivity Tests
CU = CU Triaxial
U = UU Triaxial
R = R-Value
SE = Sand Equivelant

SUMMARY OF LABORATORY TEST RESULTS

SASD Creek Crossing
Citrus Heights, Fair Oaks and Carmichael, California

PLATE B-1b

SUM-1 LAB_SUMMRY (C:\USERS\M.MCCALLUM\DESKTOP\PROJECTS\04.00185381\GINT\04_0018_5381.GPJ) -VTA- 3/10/22 04:58 PM

WSC, Inc.
Project No. 04.00185381

DRILL HOLE	DEPTH, ft	SAMPLE NUMBER	MATERIAL DESCRIPTION	UWW pcf	UDW pcf	MC%	FINES %	ATTERBERG LIMITS		COMPACTION TEST		DIRECT SHEAR		COMPRESSIVE STRENGTH TESTS		CORROSIVITY TESTS				R-VALUE	EXPANSION INDEX	SAND EQUIVALENT (SE)	TEST LISTING
								LL	PI	MAX DD pcf	OPT MC %	C ksf	PHI deg	Qu, ksf	S_u (Cell Prs.) ksf	R ohm cm	pH	Cl mg/kg	So_4 mg/kg				
H-1	1.0	1	CLAYEY GRAVEL with SAND (GC)			31	32																M, S
H-1	4.0	5/6	SANDY Lean CLAY with GRAVEL (CL)			27	55																M, S
H-2	2.0	3	SANDY Lean CLAY (CL)			21																	M
H-2	3.3	4	SANDY Lean CLAY (CL)	128	108	18									1.8(2.1)								T, Q
H-2	3.9	4	SANDY Lean CLAY (CL)													1900	6.54	78	85				Co
H-2	6.0	7	CLAYEY SAND (SC)					30	13														A
H-2	9.3	10/11	SANDY Lean CLAY (CL)			30	65																M, S
H-3	1.3	1	SANDY Lean CLAY (CL)													8600	6.34	N.D.	N.D.				Co
H-3	3.5	3	CLAYEY SAND (SC)			19																	M
H-3	4.3	4	CLAYEY SAND (SC)	134	115	17									1.8(2.7)								T, Q
H-3	8.0	9	SANDY Lean CLAY (CL)					46	22														A

Classification Tests
UWW = Unit Wet Weight
UDW = Unit Dry Weight
MC = Moisture Content
Fines = % Passing #200 Sieve
LL = Liquid Limit
PI = Plasticity Index

Direct Shear Test
C = Assigned Cohesion, ksf
PHI = Assigned Friction Angle, degrees

Compaction Test
MAX DD = Maximum Dry Density
OPT MC = Optimum Moisture Content

Compressive Strength Tests
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u = Unconsolidated Undrained
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R = Resistivity, ohm-cm, satur.
pH = pH
Cl = Chloride, ppm
SO_4 = Sulfate, ppm

Test Listing Abbreviations
M = Moisture Content
T = Total & Dry Unit Weight
S = Sieve Analysis
FC = % Passing #200 Sieve
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A = Atterberg Limits
P = Compaction Test
D = Direct Shear Test
C = Consolidation Test
Co = Corrosivity Tests
CU = CU Triaxial
U = UU Triaxial
R = R-Value
SE = Sand Equivelant

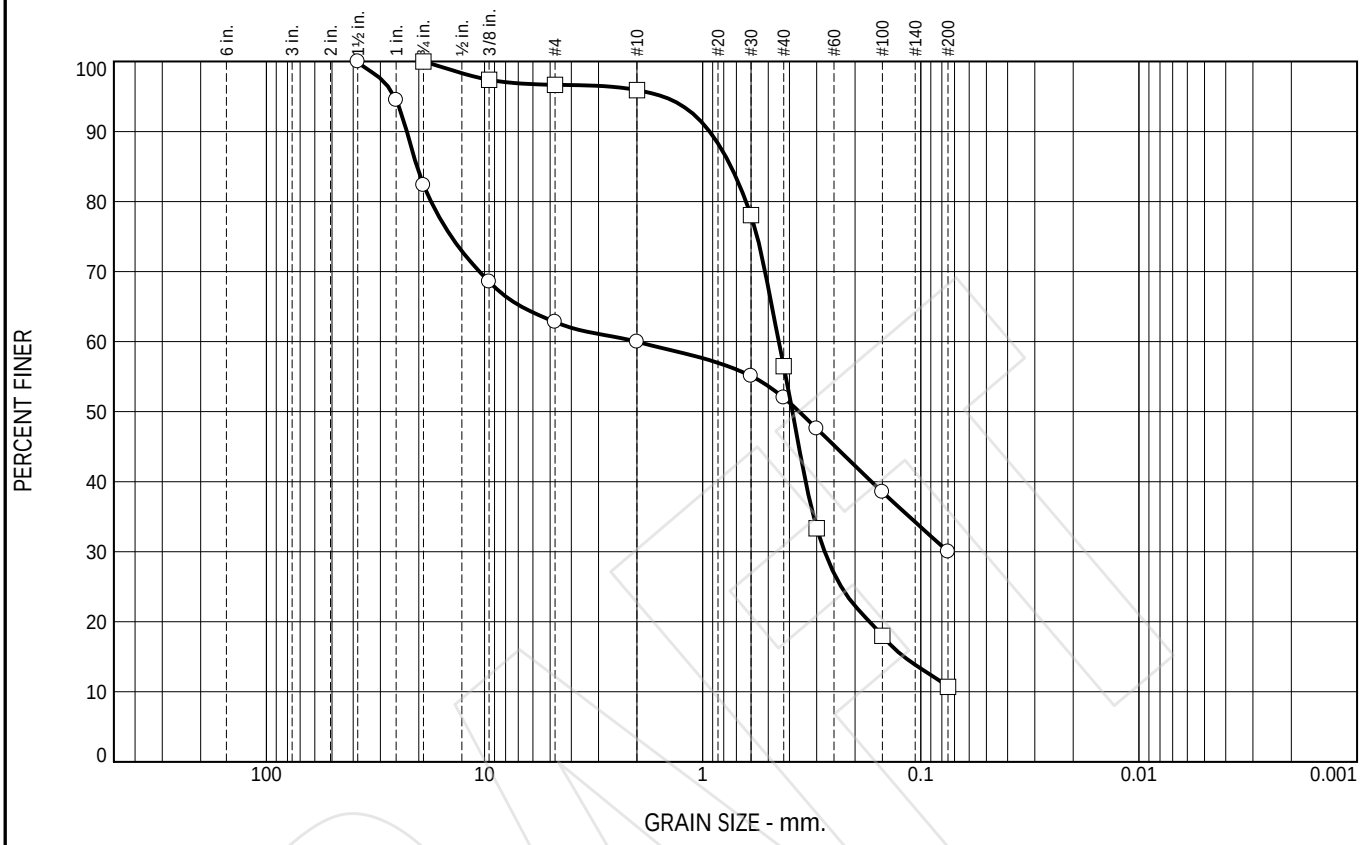
SUMMARY OF LABORATORY TEST RESULTS

SASD Creek Crossing
Citrus Heights, Fair Oaks and Carmichael, California

PLATE B-1c

SUM-1 LAB_SUMMRY (C:\USERS\M.MCCALLUM\DESKTOP\PROJECTS\04.00185381\GINT\04_0018_5381.GPJ) -VTA- 3/10/22 04:58 PM

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PL	PI
○	0.0	37.2	32.8	30.0					
□	0.0	3.3	86.0	10.7					

SIEVE inches size	PERCENT FINER ○	PERCENT FINER □
1.5	100.0	
1"	94.5	
3/4"	82.4	100.0
3/8"	68.6	97.4
GRAIN SIZE		
D_{60}	2.0116	0.4478
D_{30}		0.2759
D_{10}		
COEFFICIENTS		
C_c		
C_u		

SIEVE number size	PERCENT FINER ○	PERCENT FINER □
#4	62.8	96.7
#10	60.0	95.9
#30	55.1	78.1
#40	52.0	56.5
#50	47.6	33.3
#100	38.5	18.0
#200	30.0	10.7

Material Description

○Reddish Brown Clayey GRAVEL w/ Sand

□Yellowish Brown Poorly Graded SAND w/ Silt

REMARKS:

○

□

○Source of Sample: B5 Depth: 10' Sample Number: B4A

□Source of Sample: B6 Depth: 5' Sample Number: B2A

COOPER TESTING LABORATORY

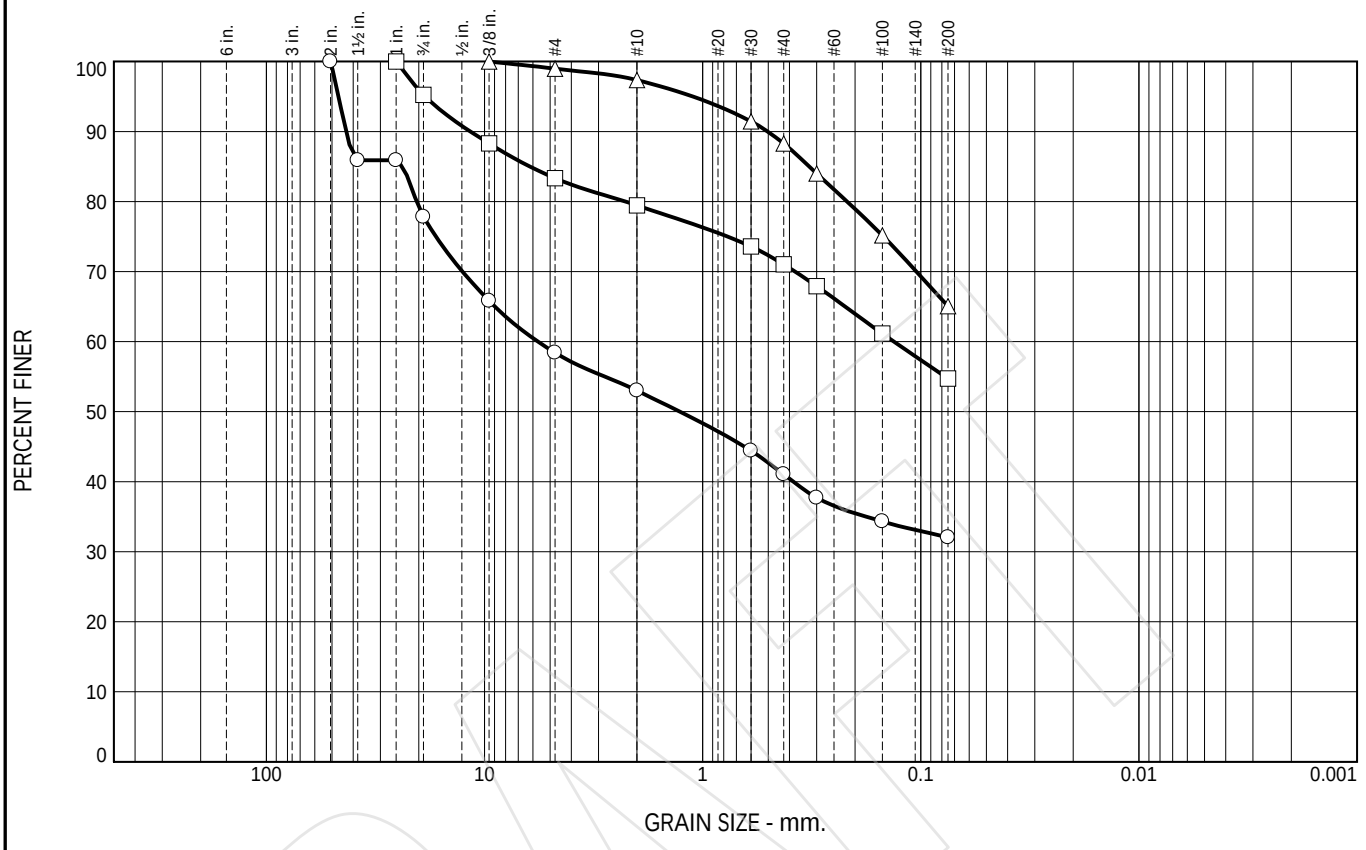
Client: Fugro USA Land

Project: SASD Creek Crossings - 04.00185381

Project No.: 446-322 Figure

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Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PL	PI
○	0.0	41.6	26.4	32.0					
□	0.0	16.7	28.6	54.7					
△	0.0	1.0	33.9	65.1					

SIEVE inches size	PERCENT FINER ○	□	△
2	100.0		
1.5	85.9		
1"	85.9	100.0	
3/4"	77.8	95.2	
3/8"	65.8	88.3	100.0
GRAIN SIZE			
D_{60}	5.6862	0.1328	
D_{30}			
D_{10}			
COEFFICIENTS			
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	58.4	83.3	99.0
#10	53.0	79.5	97.3
#30	44.4	73.6	91.4
#40	41.1	71.0	88.3
#50	37.7	67.9	84.0
#100	34.3	61.1	75.2
#200	32.0	54.7	65.1

Material Description

○Yellowish Brown Clayey GRAVEL w/ Sand

□Yellowish Brown Sandy CLAY w/ Gravel

△Dark Reddish Brown Sandy CLAY

REMARKS:

○

□

△

○Source of Sample: H1 Depth: 1' Sample Number: S1

□Source of Sample: H1 Depth: 3.5&4.5' Sample Number: S5 & S6

△Source of Sample: H2 Depth: 9&9.5' Sample Number: S10 & S11

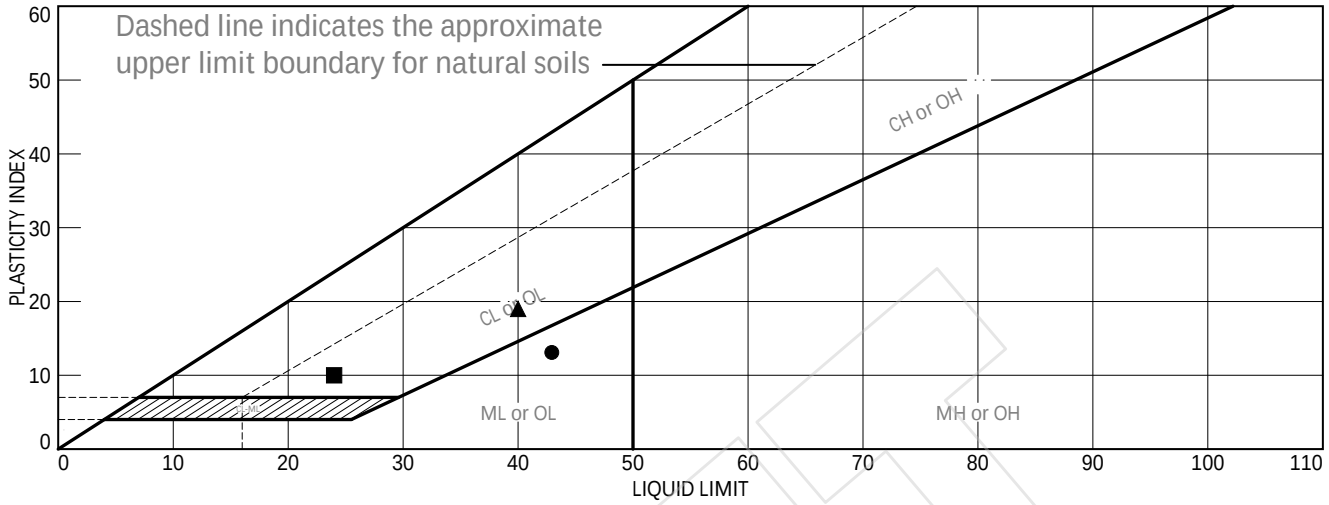
COOPER TESTING LABORATORY

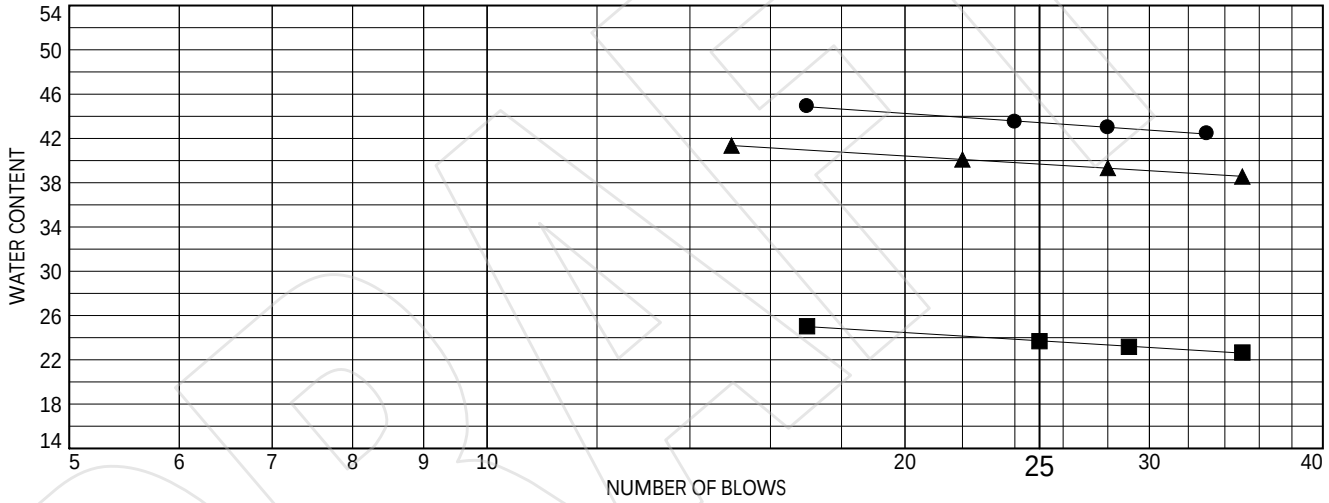
Client: Fugro USA Land

Project: SASD Creek Crossings - 04.00185381

Project No.: 446-322 Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Yellowish Brown Sandy SILT	43	30	13			
■	Dark Reddish Brown Lean Clayey SAND	24	14	10			
▲	Olive Gray Sandy Lean CLAY	40	21	19			

Project No. 446-322 Client: Fugro USA Land

Project: SASD Creek Crossings - 04.00185381

●Source of Sample: B6 Depth: 25-26.5' Sample Number: B7A

■Source of Sample: B11 Depth: 5' Sample Number: B2A

▲Source of Sample: B11 Depth: 16' Sample Number: LT5C

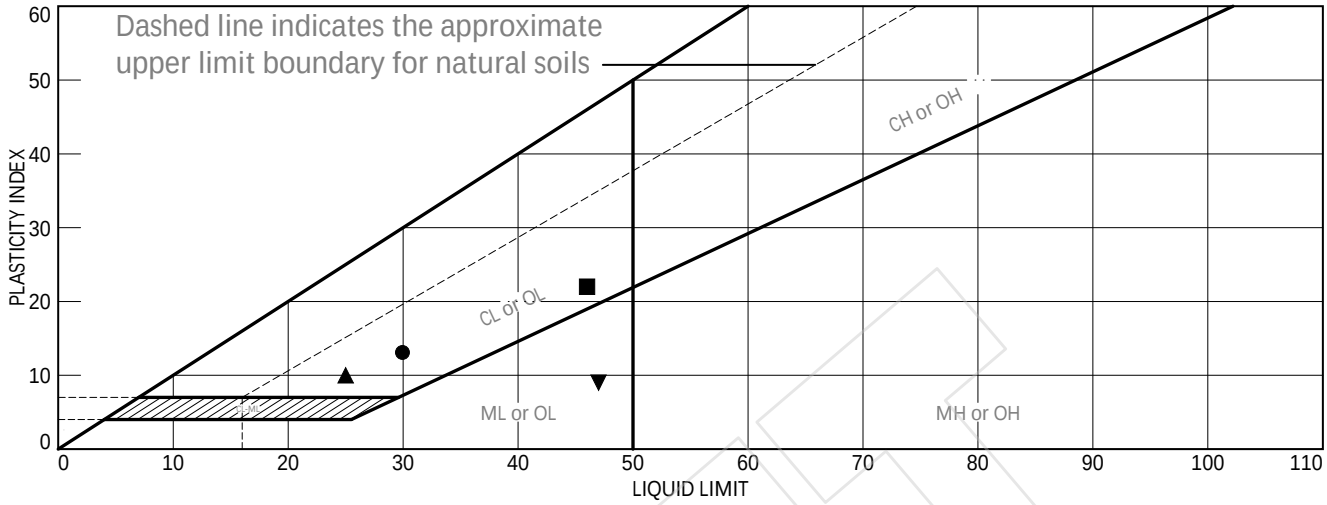
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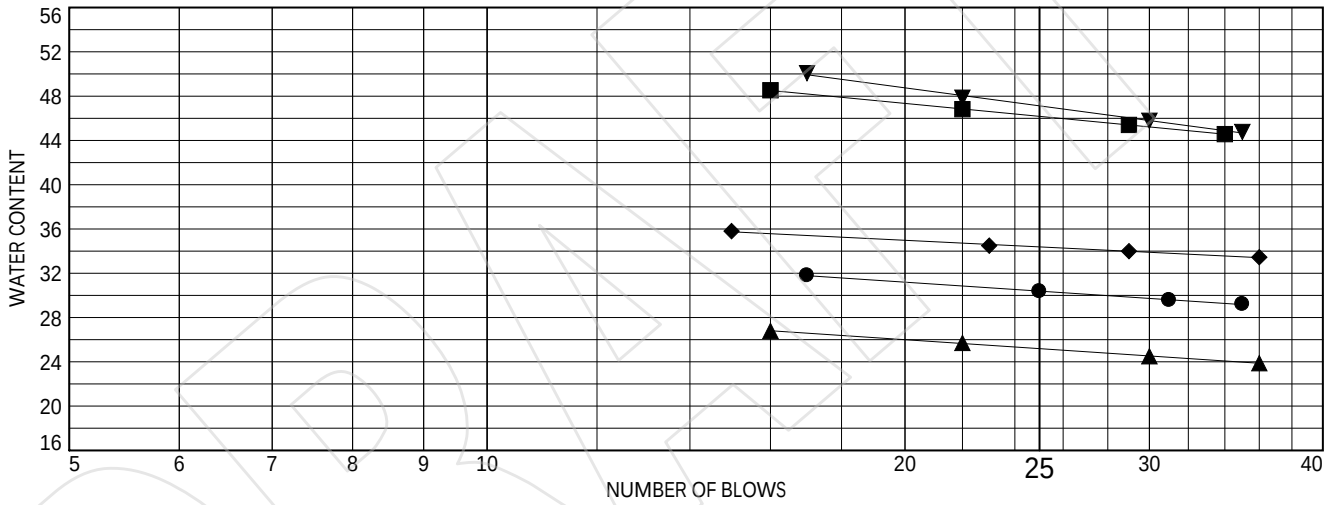
COOPER TESTING LABORATORY

Figure

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LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Yellowish Brown Lean Clayey SAND w/ organics	30	17	13			
■	Reddish Brown Sandy Lean CLAY	46	24	22			
▲	Brown Lean Clayey SAND w/ organics	25	15	10			
◆	Yellowish Brown Sandy SILT	34	35	NP			
▼	Yellowish Brown Sandy SILT	47	38	9			

Project No. 446-322 Client: Fugro USA Land

Project: SASD Creek Crossings - 04.00185381

Remarks:

●Source of Sample: H2	Depth: 6'	Sample Number: S7
■Source of Sample: H3	Depth: 8'	Sample Number: S9
▲Source of Sample: B3	Depth: 5'	Sample Number: LT2A
◆Source of Sample: B4	Depth: 25-26.5'	Sample Number: B7A
▼Source of Sample: B5	Depth: 20'	Sample Number: B6A

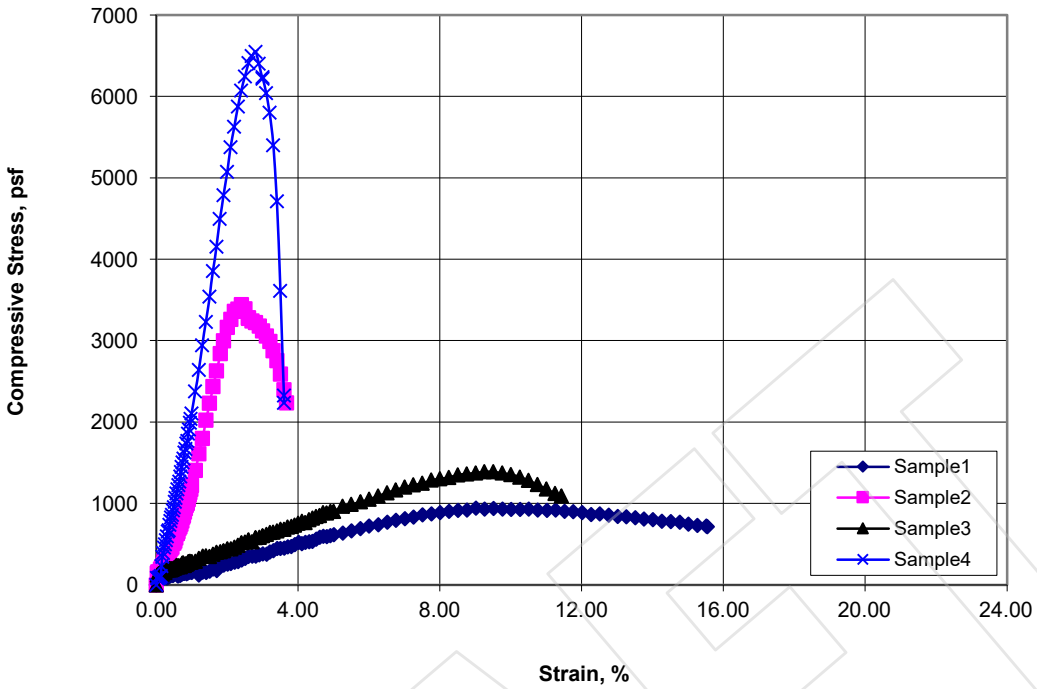
COOPER TESTING LABORATORY

Figure

DRAFT

Unconfined Compressive Strength

ASTM D2166



Sample No.:	1	2	3	4	
Unconfined Compressive Strength, psf	943	3443	1391	6548	
Unconfined Compressive Strength, psi	6.5	23.9	9.7	45.5	
Undrained Shear Strength, psf	471	1722	695	3274	
Failure Strain, %	9.0	2.4	9.3	2.8	
Strain Rate, % per minute	1.0	1.0	1.0	1.0	
Strain Rate, inches/minute	0.05	0.05	0.05	0.05	
Moisture Content, %	17.0	31.3	16.3	16.2	
Dry Density, pcf	112.2	89.2	116.8	113.7	
Saturation, %	91.3	94.9	99.2	90.8	
Void Ratio	0.502	0.889	0.444	0.482	
Specimen Diameter, inches	2.400	2.418	2.414	2.430	
Specimen Height, inches	4.94	5.01	4.89	5.03	
Height to Diameter Ratio	2.1	2.1	2.0	2.1	
Assumed Specific Gravity	2.70	2.70	2.70	2.70	

Sample Location				
	Boring	Sample	Depth, ft.	Soil Description
1	B3	LT2A	5	Brown Lean Clayey SAND w/ organics
2	B3	LT8C	30.8	Reddish Brown Clayey SAND
3	B4	LT2C	5.7	Brown Silty SAND
4	B4	LT4B	10.5	Reddish Brown Clayey SAND

Job No.:	466-322a	Type of Sample	Undisturbed
Client:	Fugro		
Project:	04.00185381		
Date:	2/4/2022 By: MD/RU		

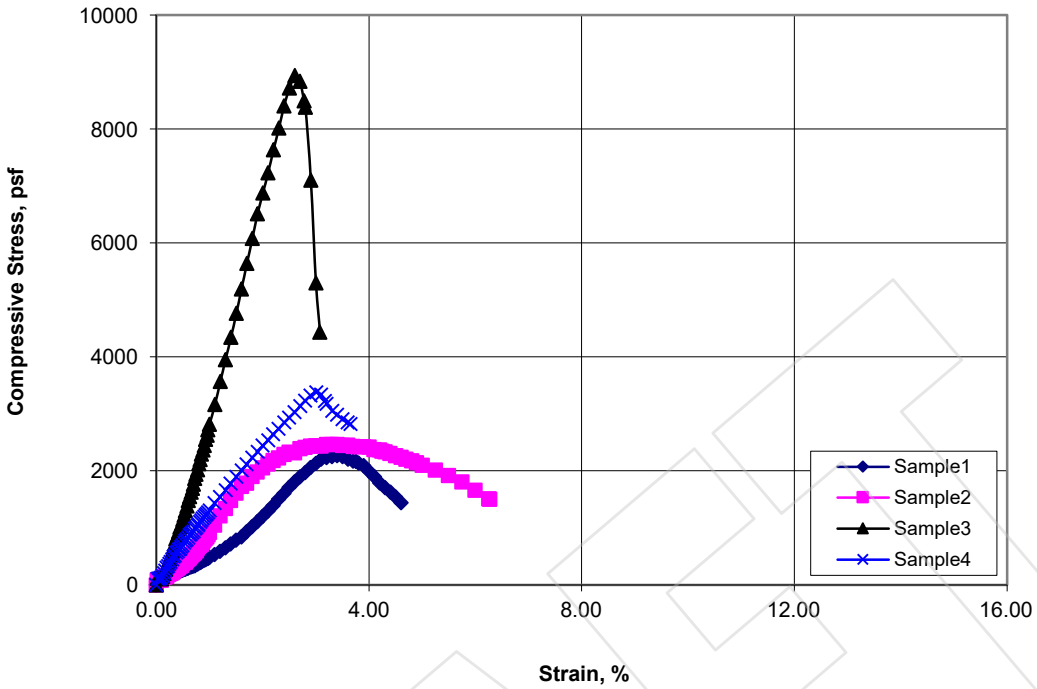
Remarks:

COOPER TESTING LABORATORY

DRAFT

Unconfined Compressive Strength

ASTM D2166



Sample No.:	1	2	3	4	
Unconfined Compressive Strength, psf	2268	2464	8940	3376	
Unconfined Compressive Strength, psi	15.8	17.1	62.1	23.4	
Undrained Shear Strength, psf	1134	1232	4470	1688	
Failure Strain, %	3.4	3.2	2.6	3.0	
Strain Rate, % per minute	1.0	1.0	1.0	1.0	
Strain Rate, inches/minute	0.05	0.05	0.05	0.05	
Moisture Content, %	43.1	30.2	31.3	40.8	
Dry Density, pcf	73.3	90.9	84.8	79.6	
Saturation, %	89.5	95.5	85.5	98.6	
Void Ratio	1.301	0.855	0.988	1.116	
Specimen Diameter, inches	2.430	2.400	2.426	2.426	
Specimen Height, inches	5.06	5.00	4.86	4.90	
Height to Diameter Ratio	2.1	2.1	2.0	2.0	
Assumed Specific Gravity	2.70	2.70	2.70	2.70	

Sample Location				
	Boring	Sample	Depth, ft.	Soil Description
1	B4	LT6A	20	Light Brown CLAY
2	B4	LT8B	31	Reddish Brown Clayey SAND
3	B5	LT6B	20.2	Brown Clayey SAND w/ Gravel
4	B5	LT8B	30.5	Brown Clayey SAND

Job No.:	446-322b	**Type of Sample**	Undisturbed
Client:	Fugro		
Project:	04.00185381		
Date:	2/4/2022 **By:** MD/RU		

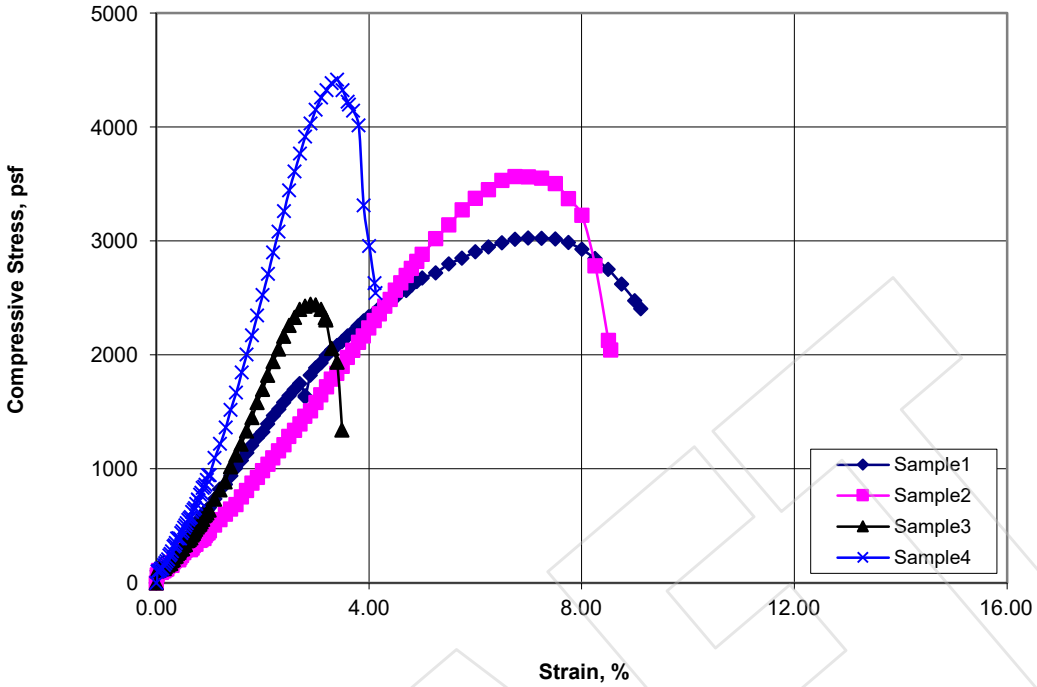
Remarks:

COOPER TESTING LABORATORY

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Unconfined Compressive Strength

ASTM D2166



Sample No.:	1	2	3	4	
Unconfined Compressive Strength, psf	3026	3565	2445	4415	
Unconfined Compressive Strength, psi	21.0	24.8	17.0	30.7	
Undrained Shear Strength, psf	1513	1782	1222	2208	
Failure Strain, %	7.0	6.7	2.9	3.4	
Strain Rate, % per minute	1.0	1.0	1.0	1.0	
Strain Rate, inches/minute	0.05	0.05	0.05	0.05	
Moisture Content, %	14.9	16.6	15.8	27.3	
Dry Density, pcf	117.8	113.4	91.6	94.0	
Saturation, %	93.4	92.0	50.7	92.8	
Void Ratio	0.431	0.486	0.839	0.794	
Specimen Diameter, inches	2.411	2.388	2.429	2.415	
Specimen Height, inches	4.94	5.00	5.06	5.03	
Height to Diameter Ratio	2.1	2.1	2.1	2.1	
Assumed Specific Gravity	2.70	2.70	2.70	2.70	

Sample Location				
	Boring	Sample	Depth, ft.	Soil Description
1	B7	LT2B	5.25	Reddish Brown Clayey SAND
2	B8	LT5B	15.3	Reddish Brown Clayey SAND
3	B8	LT7B	25.4	Light Brown Clayey SAND
4	B9	LT7B	25.5	Brown Clayey SAND

Job No.:	446-322c	**Type of Sample**	Undisturbed
Client:	Fugro		
Project:	04.00185381		
Date:	2/4/2022 **By:** MD/RU		

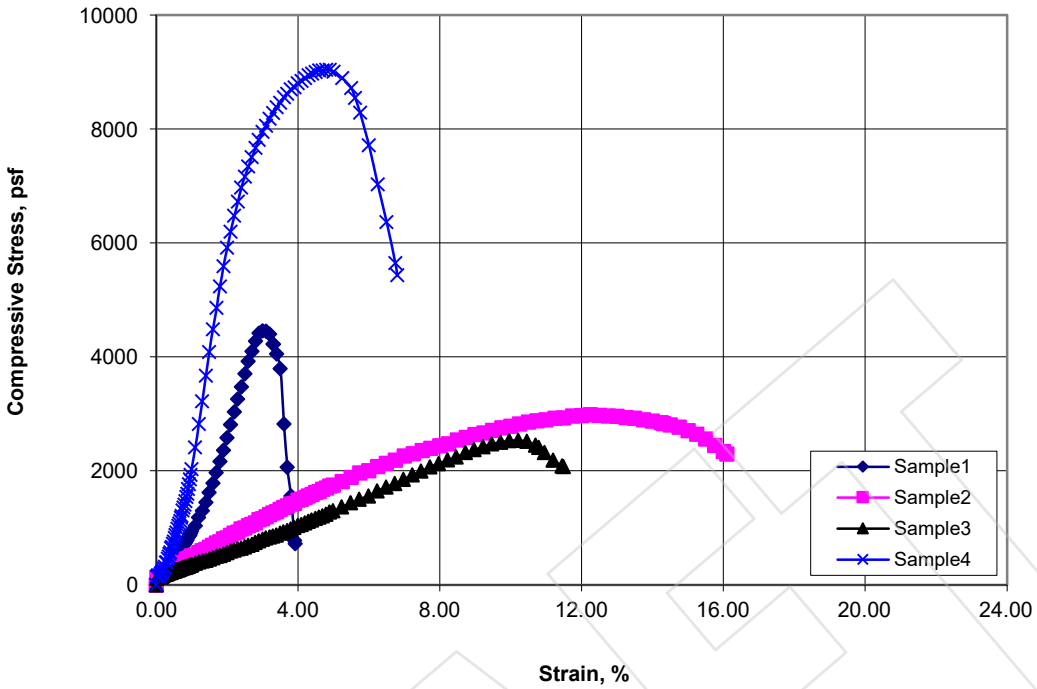
Remarks:

COOPER TESTING LABORATORY

DRAFT

Unconfined Compressive Strength

ASTM D2166



Sample No.:	1	2	3	4	
Unconfined Compressive Strength, psf	4458	2984	2534	9038	
Unconfined Compressive Strength, psi	31.0	20.7	17.6	62.8	
Undrained Shear Strength, psf	2229	1492	1267	4519	
Failure Strain, %	3.0	12.2	10.2	4.8	
Strain Rate, % per minute	1.0	1.0	1.0	1.0	
Strain Rate, inches/minute	0.05	0.05	0.05	0.05	
Moisture Content, %	27.4	15.2	29.9	23.4	
Dry Density, pcf	91.7	114.9	94.0	102.8	
Saturation, %	88.4	87.9	99.5	98.7	
Void Ratio	0.838	0.468	0.827	0.639	
Specimen Diameter, inches	2.426	2.430	2.415	2.425	
Specimen Height, inches	5.03	4.89	5.02	5.02	
Height to Diameter Ratio	2.1	2.0	2.1	2.1	
Assumed Specific Gravity	2.70	2.70	2.75	2.70	

Sample Location				
	Boring	Sample	Depth, ft.	Soil Description
1	B10	LT7B	30.5	Yellowish Brown Clayey SAND w/ Gravel
2	B11	LT3B	8	Brown Clayey SAND
3	B11	LT5C	16	Olive Gray Sandy Lean CLAY
4	B11	LT8B	30	Reddish Brown CLAY

Job No.:	446-322d	Type of Sample	Undisturbed
Client:	Fugro		
Project:	04.00185381		
Date:	2/4/2022 By: MD/RU		

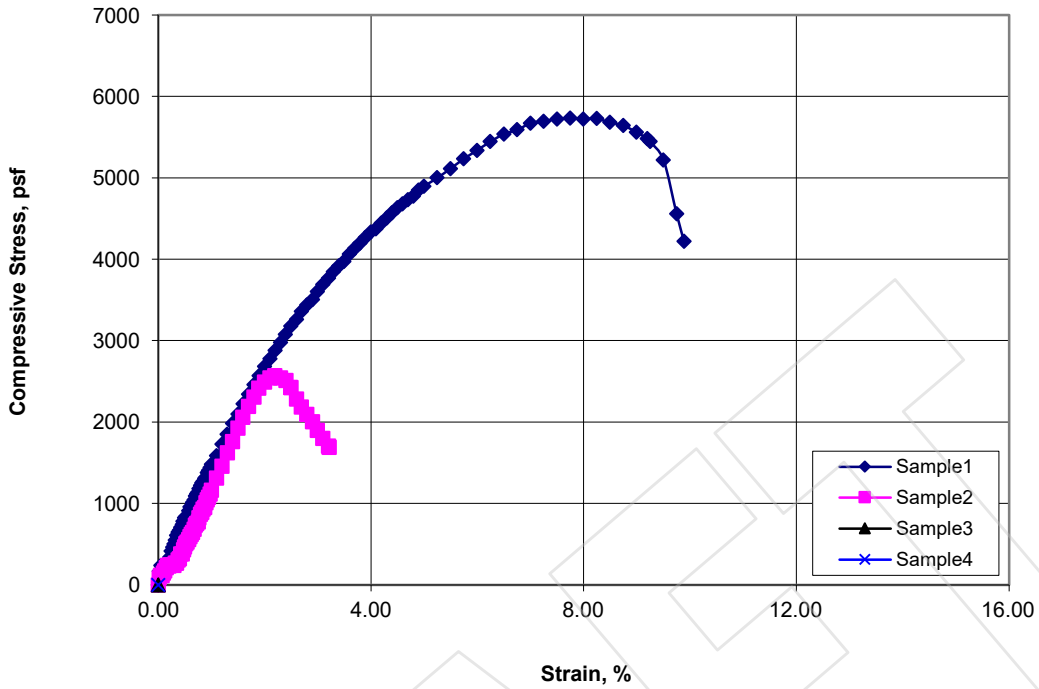
Remarks:

COOPER TESTING LABORATORY

DRAFT

Unconfined Compressive Strength

ASTM D2166



Sample No.:	1	2	3	4	
Unconfined Compressive Strength, psf	5733	2568			
Unconfined Compressive Strength, psi	39.8	17.8			
Undrained Shear Strength, psf	2866	1284			
Failure Strain, %	7.7	2.2			
Strain Rate, % per minute	1.0	1.0			
Strain Rate, inches/minute	0.05	0.05			
Moisture Content, %	13.5	16.6			
Dry Density, pcf	122.7	109.9			
Saturation, %	97.4	84.1			
Void Ratio	0.374	0.534			
Specimen Diameter, inches	2.433	2.409			
Specimen Height, inches	5.00	5.01			
Height to Diameter Ratio	2.1	2.1			
Assumed Specific Gravity	2.70	2.70			

Sample Location

	Boring	Sample	Depth, ft.	Soil Description
1	B6	LT4B	10.5	Brown Clayey SAND
2	B6	LT6B	20.5	Brown Clayey SAND
3				
4				

Job No.:	446-322e	**Type of Sample**	Undisturbed
Client:	Fugro		
Project:	04.00185381		
Date:	2/9/2022 **By:** MD/RU		

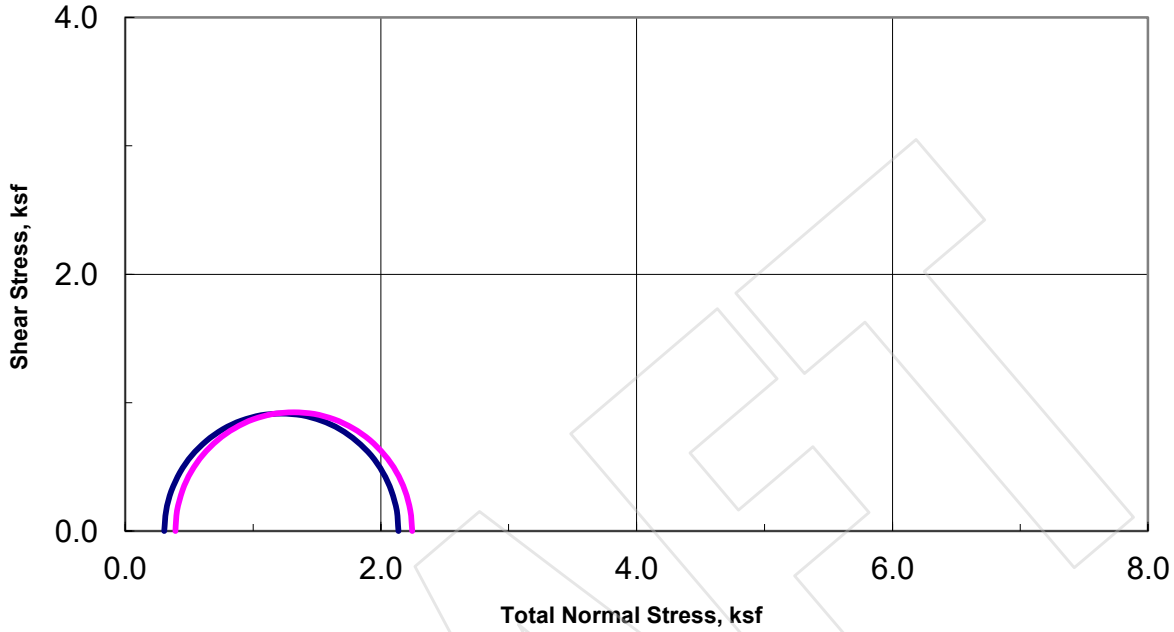
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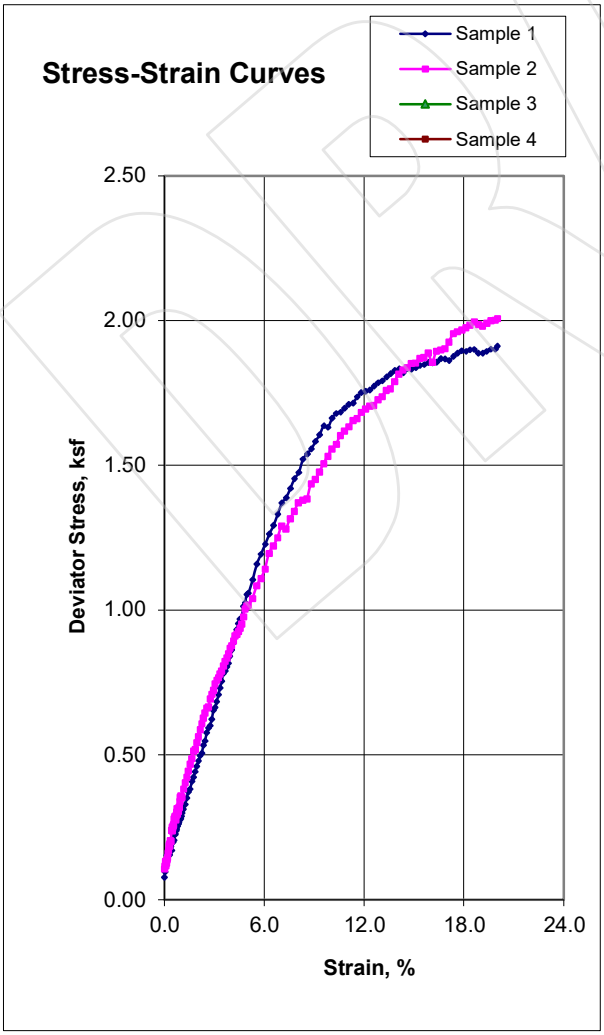
COOPER TESTING LABORATORY

DRAFT

Cooper Testing Labs, Inc.
937 Commercial Street
Palo Alto, CA 94303

Unconsolidated-Undrained Triaxial Test
ASTM D2850





Sample Data				
	1	2	3	4
Moisture %	18.4	17.1		
Dry Den,pcf	108.3	114.5		
Void Ratio	0.556	0.472		
Saturation %	89.3	97.6		
Height in	5.07	5.00		
Diameter in	2.37	2.40		
Cell psi	2.1	2.7		
Strain %	15.00	15.00		
Deviator, ksf	1.832	1.852		
Rate %/min	1.00	1.00		
in/min	0.051	0.050		
Job No.:	446-322			
Client:	Fugro USA Land			
Project:	04.00185381			
Boring:	H2	H3		
Sample:	S4	S4		
Depth ft:	3	4		

Visual Soil Description	
Sample #	
1	Dark Yellowish Brown Sandy CLAY
2	Yellowish Brown Clayey SAND
3	
4	

Remarks:

Note: Strengths are picked at the peak deviator stress or 15% strain which ever occurs first per ASTM D2850.

CERCO analytical
1100 Willow Pass Court, Suite A
Concord, CA 94520-1006
925 462 2771 Fax. 925 462 2775
www.cercoanalytical.com

Client: Fugro West, Inc.
Client's Project No.: 04.00185381
Client's Project Name: Fair Oaks, Sacrmento, CA
Date Sampled: 20-Dec-21
Date Received: 18-Feb-22
Matrix: Soil
Authorization: Signed Chain of Custody

Date of Report: 4-Mar-2022

Job/Sample No.	Sample I.D.	Redox (mV)	pH	Conductivity (umhos/cm)*	Resistivity (100% Saturation) (ohms-cm)	Sulfide (mg/kg)*	Chloride (mg/kg)*	Sulfate (mg/kg)*
2202040-001	B6 @ 7.5-8.3'	300	6.98	-	34,000	-	N.D.	N.D.
2202040-002	B7 @ 7.5-9'	340	6.01	-	6,800	-	N.D.	N.D.
2202040-003	B8 @ 5-6.5'	330	6.94	-	7,100	-	N.D.	N.D.
2202040-004	B10 @ 15-16'	360	6.20	-	16,000	-	N.D.	N.D.
2202040-005	H2 @ 3.7-4'	370	6.54	-	1,900	-	78	85
2202040-006	H3 @ 1-1.5'	370	6.34	-	8,600	-	N.D.	N.D.

Method:	ASTM D1498	ASTM D4972	ASTM D1125M	ASTM G57	ASTM D4658M	ASTM D4327	ASTM D4327
Reporting Limit:	-	-	10	-	50	15	15
Date Analyzed:	23-Feb-2022	23-Feb-2022	-	28-Feb-2022	-	23-Feb-2022	23-Feb-2022

Sherri Moore
Chemist

* Results Reported on "As Received" Basis
N.D. - None Detected

Quality Control Summary - All laboratory quality control parameters were found to be within established limits

CERCO analytical
1100 Willow Pass Court, Suite A
Concord, CA 94520-1006
925 462 2771 Fax. 925 462 2775
www.cercoanalytical.com

4 March 2022

Job No. 2202040
Cust. No. 11608

Mr. Reza Rahimnejad
Fugro Consultants, Inc.
1777 Botelho Drive, Suite 262
Walnut Creek, CA 94596

Subject: Project No.: 04.00185381
Project Name: Fair Oaks, Sacramento, CA
Corrosivity Analysis – ASTM Test Methods with Brief Evaluation

Dear Mr. Rahimnejad:

Pursuant to your request, CERCO Analytical has analyzed the soil samples submitted on February 18, 2022. Based on the analytical results, this brief corrosivity evaluation is enclosed for your consideration.

Based upon the resistivity measurements, Sample No.005 is classified as "corrosive", Samples No.002, No.003 and No.006 are classified as "moderately corrosive. Sample No.004 is classified as "mildly corrosive" and Sample No.001 is classified as "negligibly corrosive". All buried iron, steel, cast iron, ductile iron, galvanized steel and dielectric coated steel or iron should be properly protected against corrosion depending upon the critical nature of the structure. All buried metallic pressure piping such as ductile iron firewater pipelines should be protected against corrosion.

The chloride ion concentrations ranged from none detected to 78 mg/kg and determined to be insufficient to attack steel embedded in a concrete mortar coating.

The sulfate ion concentrations ranged from none detected to 85 mg/kg and are determined to be insufficient to damage reinforced concrete structures and cement mortar-coated steel at these locations.

The pH of the soils ranged from 6.01 to 6.98, which does not present corrosion problems for buried iron, steel, mortar-coated steel and reinforced concrete structures.

The redox potentials ranged from 300-mV to 370-mV and are indicative of potentially "slightly corrosive" soils resulting from anaerobic soil conditions.

This corrosivity evaluation is based on general corrosion engineering standards and is non-specific in nature. For specific long-term corrosion control design recommendations or consultation, please call *JDH Corrosion Consultants, Inc. at (925) 927-6630.*

We appreciate the opportunity of working with you on this project. If you have any questions, or if you require further information, please do not hesitate to contact us.

Very truly yours,
CERCO ANALYTICAL, INC.

Shaun Moore
for J. Darby Howard, Jr., P.E.
President

JDH/jdl
Enclosure

DRAFT

DRAFT

Appendix C

LPILE Analysis Results

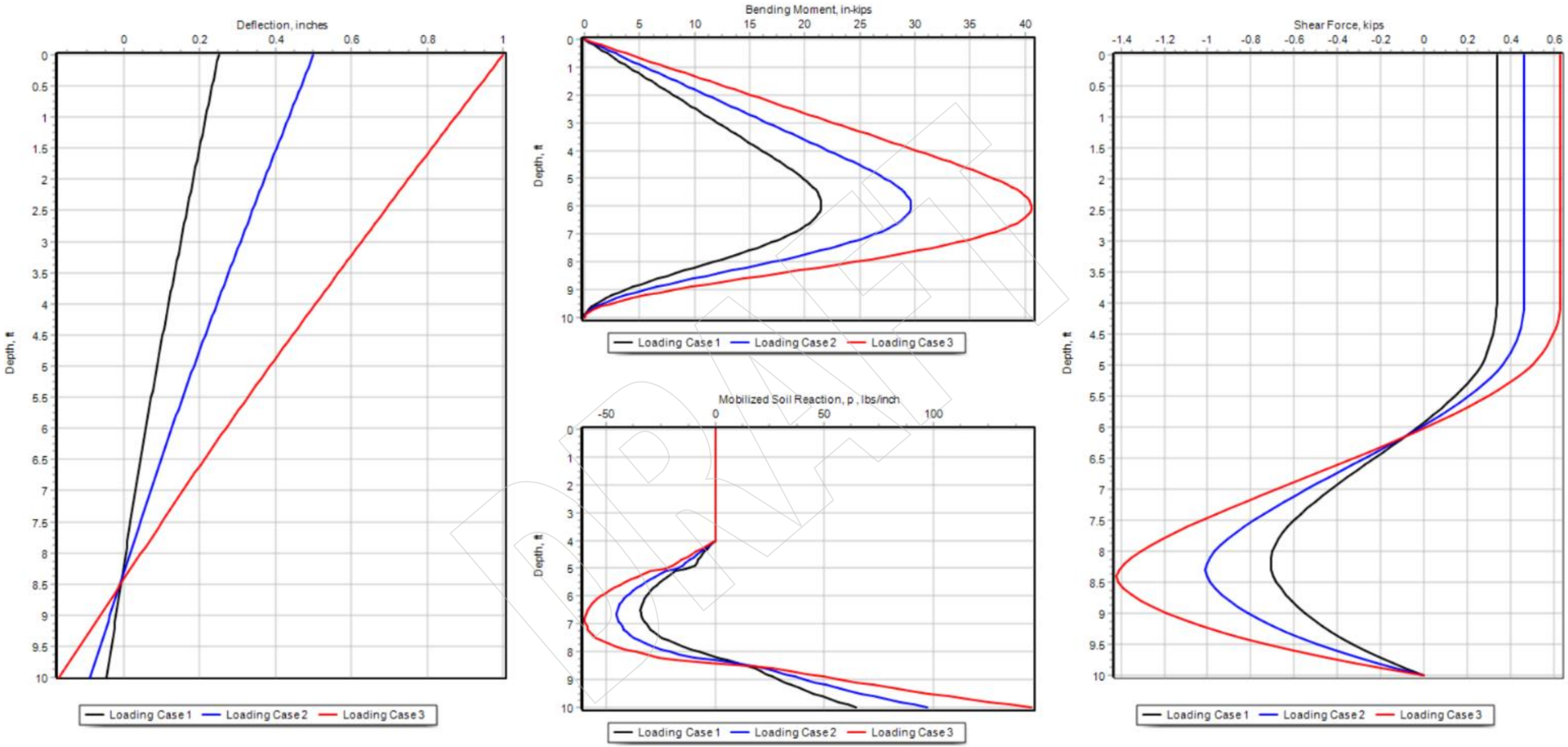
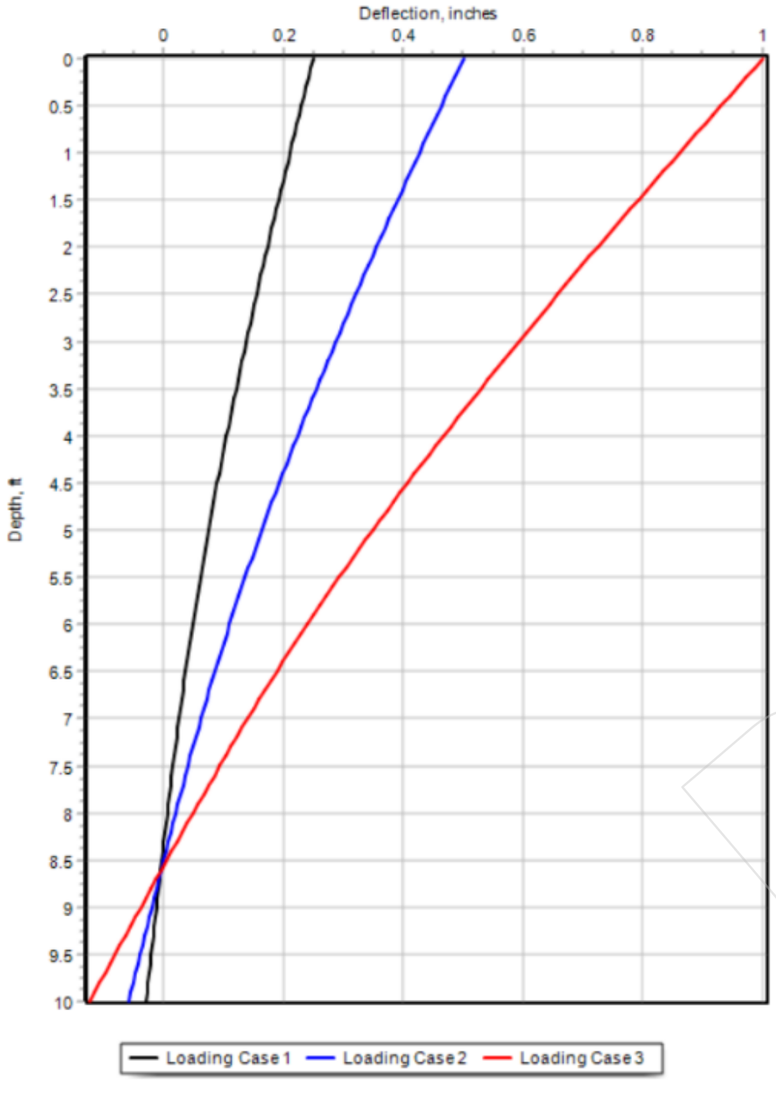
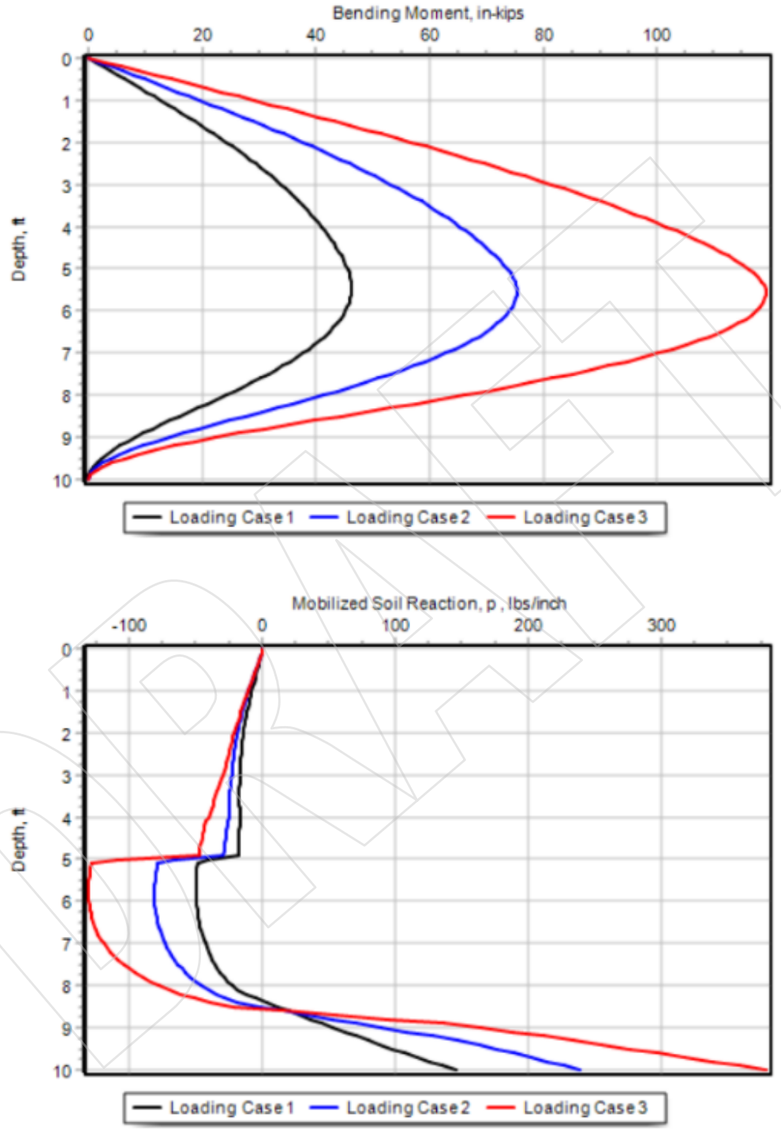


Figure C-1: Dietz Way – Extreme Condition





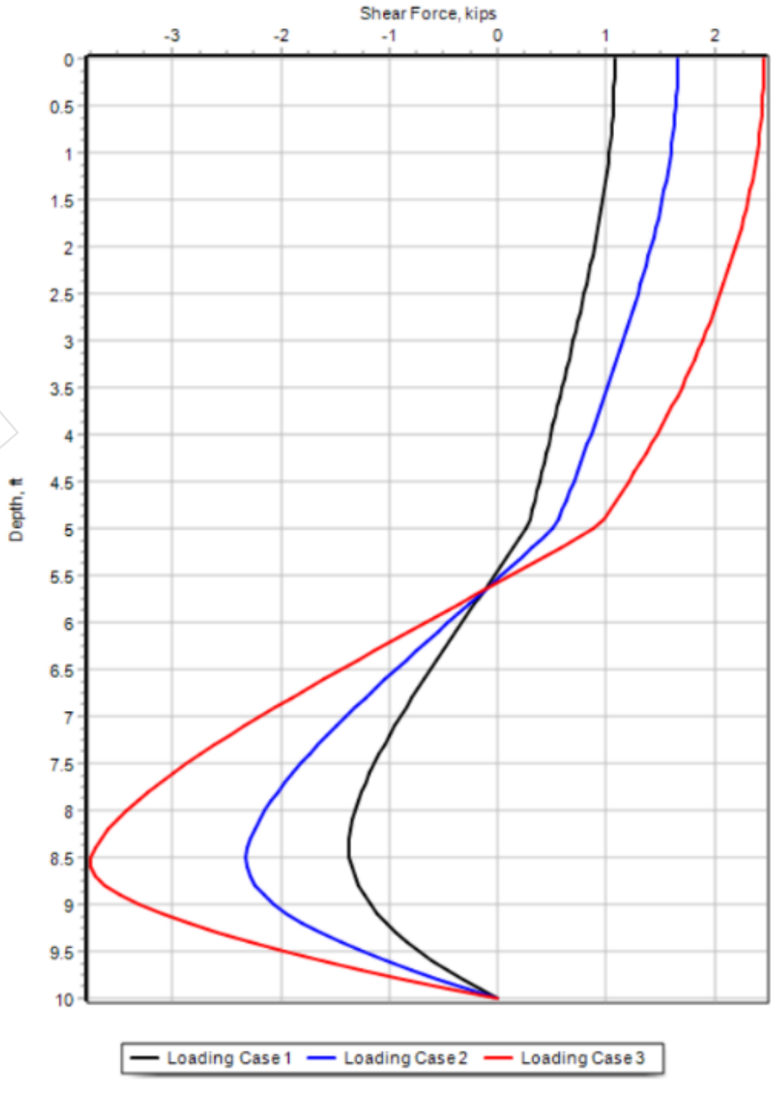


Figure C-2: Dietz Way – Normal Condition

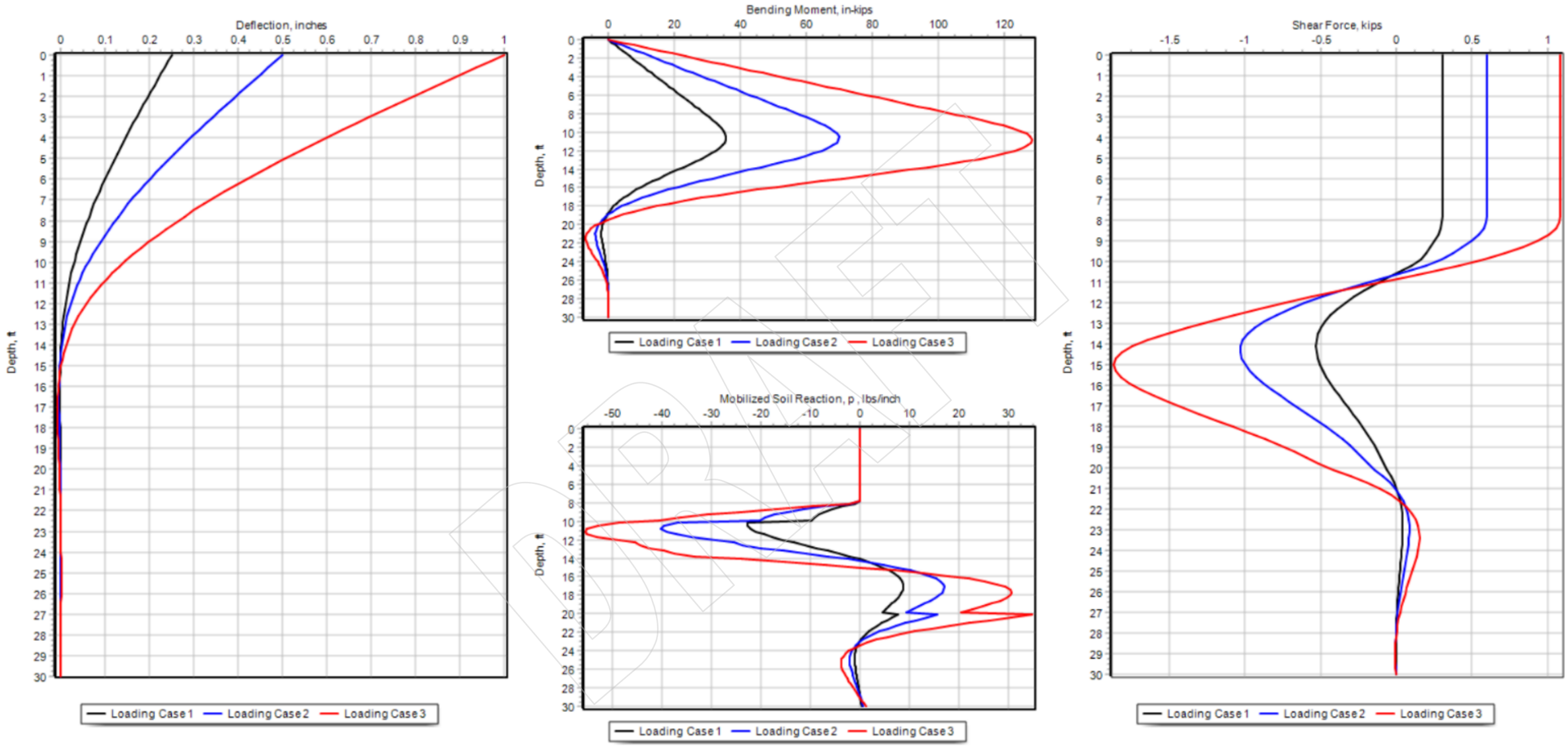
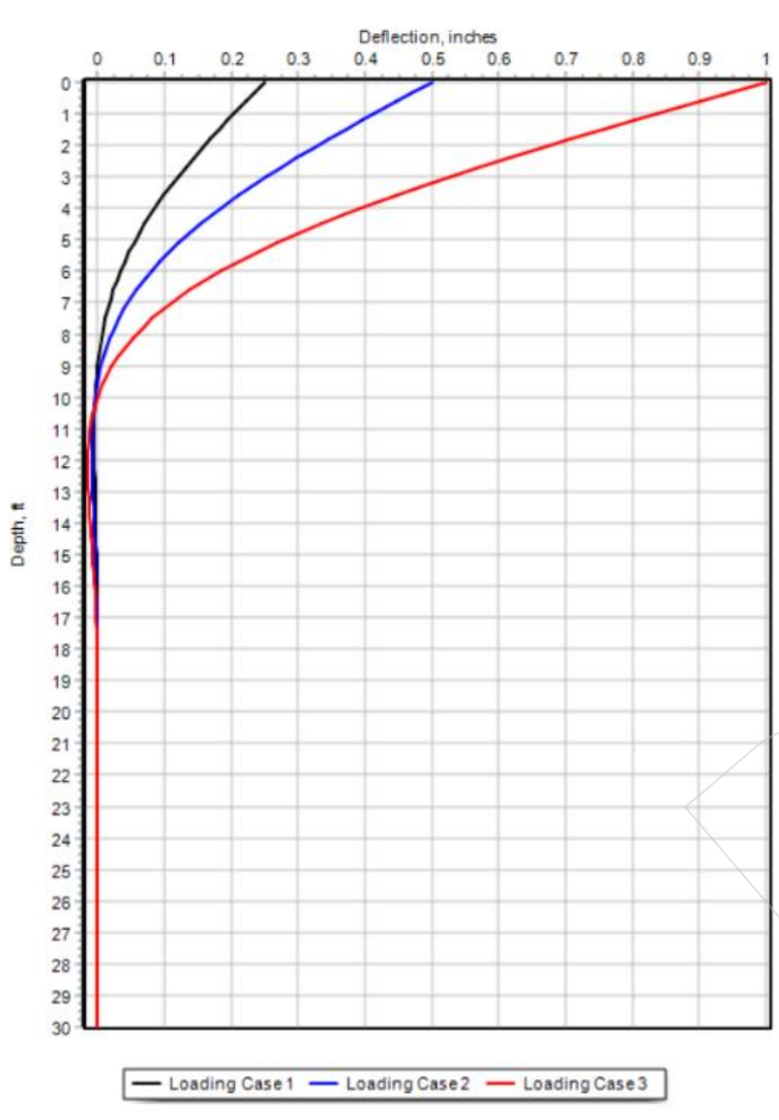
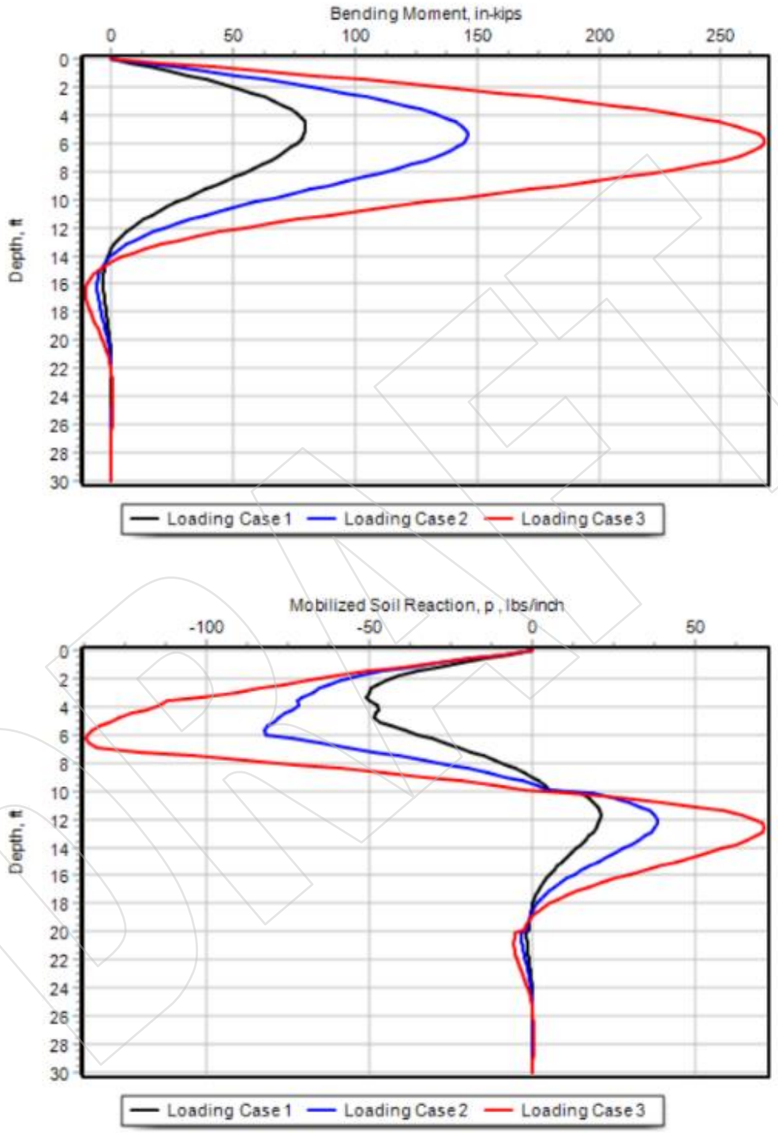


Figure C-3: Indian River – Extreme Condition





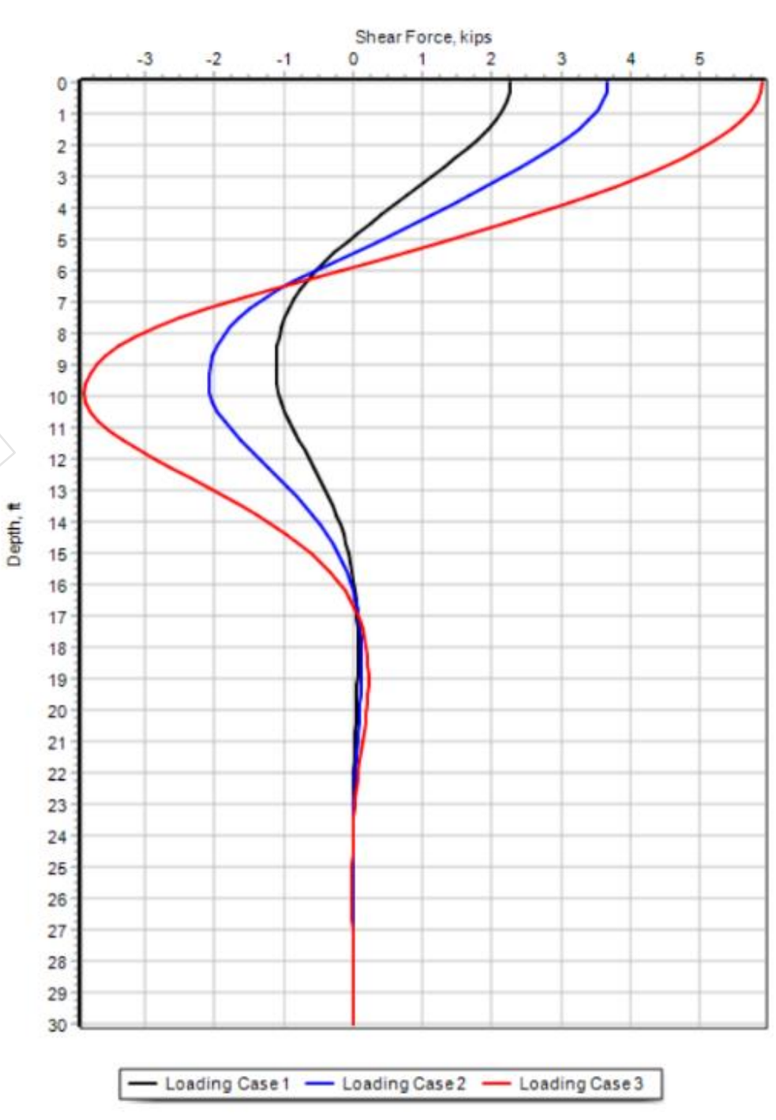


Figure C-4: Indian River – Normal Condition

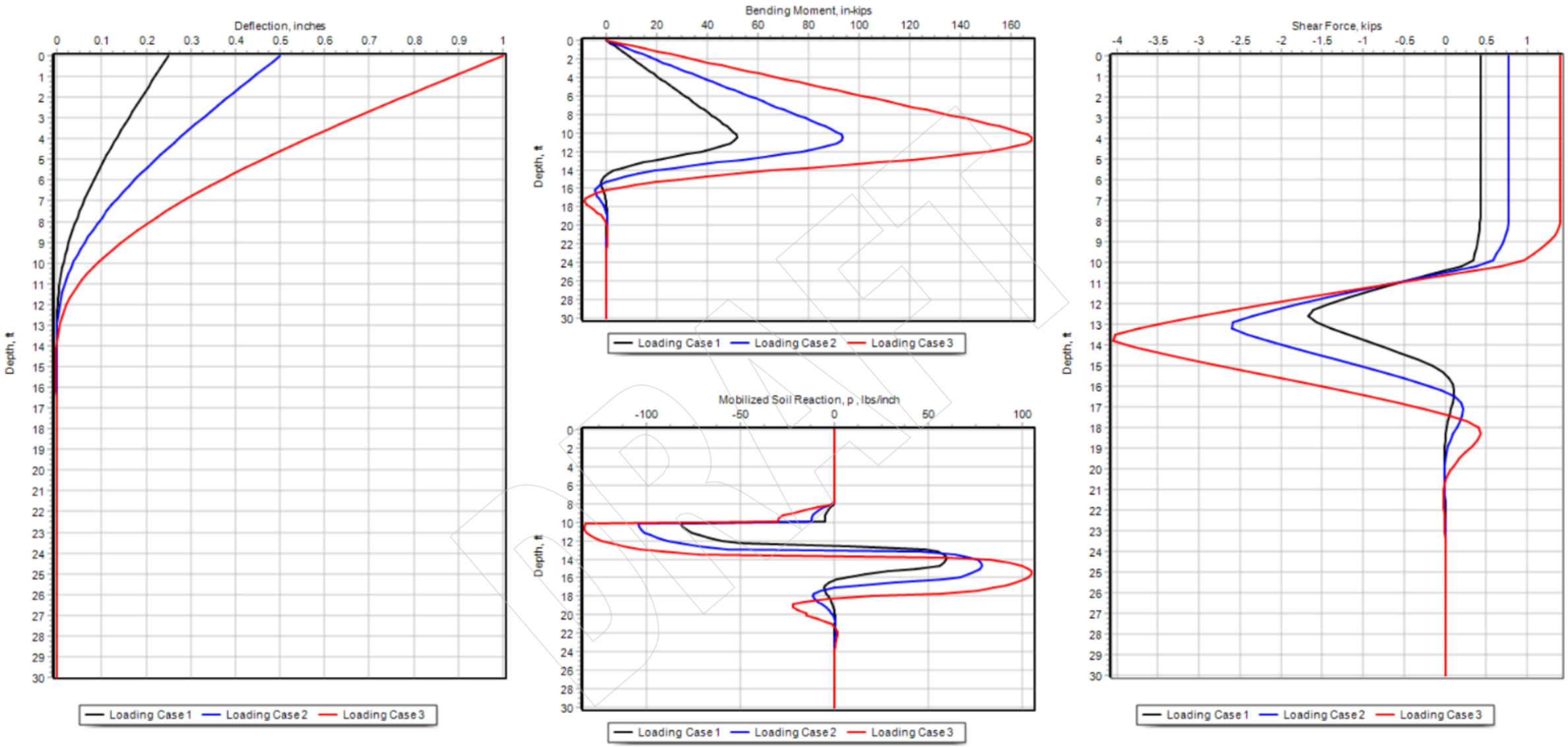


Figure C-5: Winding Way – Extreme Condition

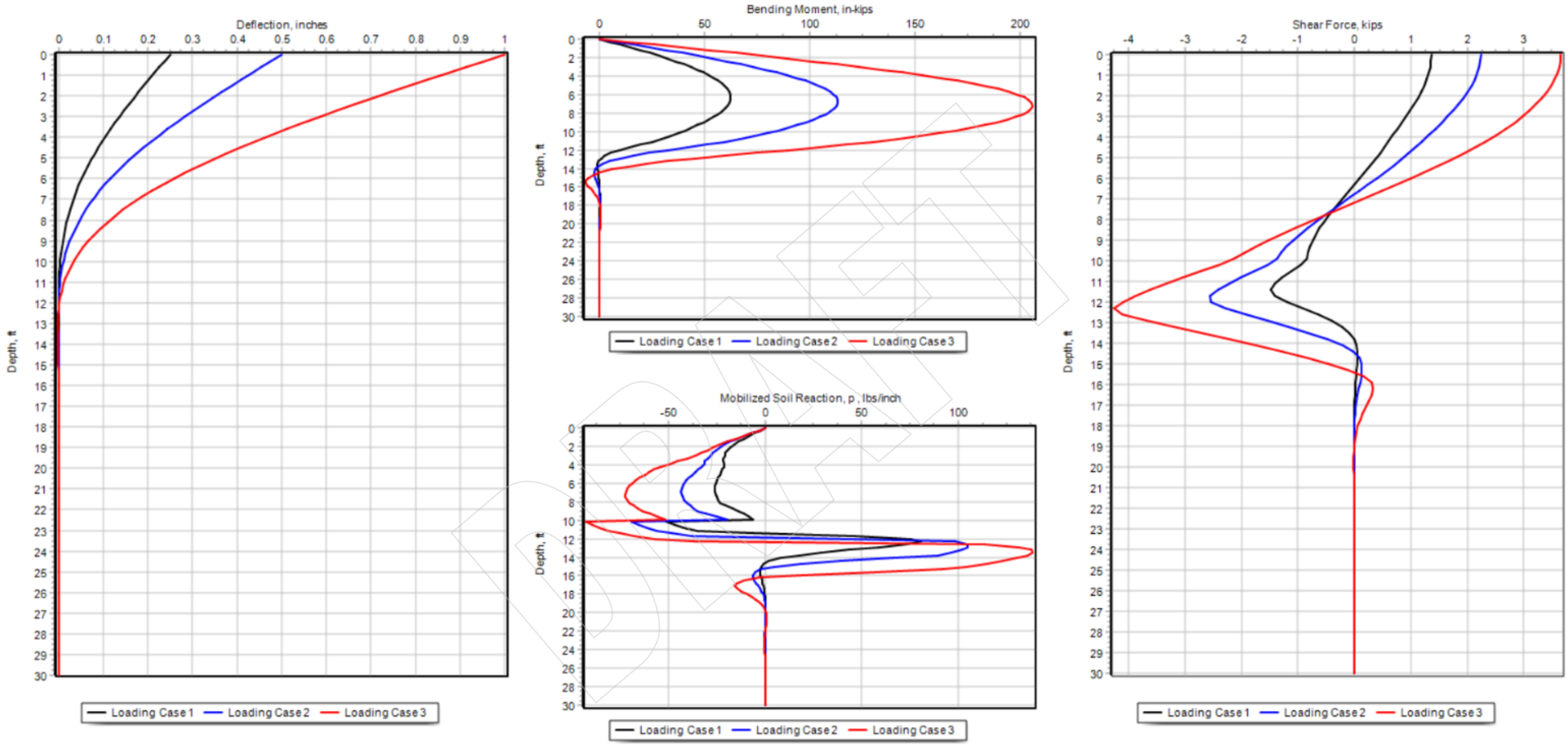


Figure C-6: Winding Way – Normal Condition

APPENDIX D

ARBORIST REPORT



ARBORIST REPORT

SACRAMENTO AREA SEWER DISTRICT CREEK CROSSING PROJECT SACRAMENTO COUNTY, CA

MAY 2022

PREPARED FOR:
Sacramento Area Sewer District
10060 Goethe Road
Sacramento, CA 95827
(916) 876-6000

SACRAMENTO AREA SEWER DISTRICT

PREPARED BY:
AES-Montrose
1801 7th Street, Suite 100
Sacramento, CA 95811
(916) 447-3479
www.analyticalcorp.com

AES

ARBORIST REPORT

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STATEMENT OF QUALIFICATIONS

Montrose Environmental Solutions (Montrose) has completed hundreds of environmental compliance and permitting undertakings throughout California, and is highly familiar with the region and expectations of local regulatory agencies. Montrose employs dozens of full-time environmental professionals in its Sacramento office, and, as a wholly-owned subsidiary of Montrose Environmental Group since 2018, has access to over 2,000 additional professionals across the U.S. Technical staff includes professionals in a range of disciplines, including biology, botany, arboriculture, wetland and soil science, geology, hydrology, toxicology, cultural resources, land use planning, and more. Jed Dowell has conducted tree surveys and biological field visits while with Montrose as a biologist and is an ISA Certified Arborist. Jed also has over two and a half years of tree survey and tree project management experience during his work as a utility forester.

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Appendix A: Tree Location Exhibit
Appendix B: Tree Information Sheet
Appendix C: Site Photographs
Appendix D: Draft Site Plans
Appendix E: Tree Removal Permit Applications

ARBORIST QUALIFICATIONS

Jedidiah Garcia Dowell

ISA Certified Arborist
WE-12932A
Tree Risk Assessment Qualified
3 Years Arboricultural Experience

1801 7th Street, Suite 100
Sacramento, CA 95811
916-447-1665
530-701-8555

1.0 INTRODUCTION

This Arborist Report (Report) summarizes Montrose's (previously known as Analytical Environmental Services) evaluation of tree removal and preservation recommendations with respect to 12 Sacramento Area Sewer District (SASD) sewer pipeline segments that require replacement and reinforcements. Each of these sewer segments crosses a creek/drainage. Tree removal and trenching work within the dripline/root protection zone (RPZ) radius to facilitate the pipeline replacement and reinforcement work (Proposed Project) is required. A field inventory and assessment of trees that would be impacted as a result of the Proposed Project was conducted on June 7th through 10th and December 21st, 2021. This report includes a discussion of inventory and evaluation methods, a summary of findings, identification of anticipated impacts, and tree protection and tree impact mitigation recommendations consistent with Chapter 19.12 of Sacramento County's Tree Preservation and Protection Code and tree removal permit process. The focus of Montrose's field evaluation was to identify and inventory on-site trees that may be impacted by the Proposed Project through tree removal or the intersection of project components and construction activities with tree RPZs.

1.1 PROJECT DESCRIPTION

SASD provides service to 1.2 million people in the Sacramento region, including the unincorporated areas of Sacramento County; the cities of Citrus Heights, Rancho Cordova, and Elk Grove; portions of the cities of Folsom and Sacramento; and the communities of Courtland and Walnut Grove. In these areas, SASD provides sewer collection services to residential, commercial, and industrial customers. Various SASD sewer pipeline segments are proposed for replacement and reinforcement per inspection results due to their exposure, condition, or vulnerability to failure due to their construction and presence within intermittent watercourses. The Proposed Project involves some degree of construction at ten locations (Project Sites) within Sacramento County in order to realign, replace, and/or rehabilitate twelve sewer mainline segments (two of the Project Sites, 3 and 10, contain two segments each). The Project Sites extend from the southwestern area of Citrus Heights, CA to Fair Oaks and Carmichael, CA (**Appendix A: Figures 1** and **2**). Each of these sewer pipeline segments crosses a creek/drainage and is at risk of degrading site conditions which could result in structural failure and support failure due to erosion, undermining, or exposure. Potential remediation options include:

- Repair the pipeline segment by reinforcing the existing segment;
- Rehabilitate the pipeline segment;
- Relocate the pipeline segment;
- Install an erosion control system; or
- Install or maintain protective coatings.

Table 1 below classifies construction equipment and techniques used for each Project Site by categories of equipment use defined in the table's key below.

Table 1: Project Site Construction Categories

Project Site	Category
1 – Hope Lane	2
2 – Winding Way	3
3 – Arcade Creek, Garfield Ave. & Thousand Oaks Ctr.	2
4 – Concho Ct.	1
5 – Gina Ct.	1

6 – San Lorenzo Way	2
7 – Sutter Ave.	3
8 – Campfire Way	2
9 – Indian River Dr.	3
10 – Hegseth Ct. & Dietz Way	1

Key

Category 1: Limited access, hand-carry tools only, typically in residential areas with access through backyards and existing landscaping
Category 2: 15-foot wide access, mechanized equipment needed for work (excavator, skid steer, etc.), occasional large rock placement
Category 3: 15 to 30-foot wide access, drill rig required for pier install and concrete work

1.2 General Site Characteristics

Pipeline segment replacement and reinforcement sites are all considered to be riparian areas composed primarily of native vegetation within intermittent watercourses. Project Sites are generally well-shaded by bank and channel trees and herbaceous cover is present throughout the Project Sites. There is a high percentage of herbaceous ground cover within the Project Sites. Common herbaceous, shrub, and ground cover species include the following: English ivy, Himalayan blackberry, poison oak, periwinkle, annual grasses, immature and sub-4 inch diameter native oaks, and bamboo. SASD pipeline segments include various straight pipe sewer lines pitched at a slight angle for directional effluent transfer. These lines vary in size from a few inches in diameter to over a foot in diameter. The pipes consist of materials such as metal and nested vitrified clay pipe segments. Supporting pipe infrastructure includes concrete pier footings, metal hardware, and large full concrete encasements. Pipeline segments are undermined and/or exposed to seasonal creek erosion and impacts with or accumulation of woody debris.

1.3 Regulatory Background

The County of Sacramento (County) and the County's Office of Planning and Environmental Review (PER) requires an arborist report to be submitted for development projects that will substantially impact or remove on-site or off-site trees following the 884 review process per guidelines created by Assembly Bill 884. The Report includes and requires many tree attributes for submission and environmental review including a list of impacted trees and an accompanying Tree Location Exhibit (**Appendices A** and **B**). Tree inventories and arborist reports submitted to DERA are used to evaluate project impacts and create appropriate mitigation pursuant to Sacramento County General Plan policies and the California Environmental Quality Act (CEQA).

Tree removal permits are required for the removal or pruning of trees within County-owned lands and/or within any right-of-way areas as well as for trees present on privately owned land per Chapter 5.2.4 Zoning Code Regulations Landscape Standards. Additionally, the City of Citrus Heights requires a permit to be issued for tree removal and protects native oaks 6 inches or more in diameter, mature trees 19 inches or more in diameter, and trees planted as part of a condition of approval or mitigation requirement with a discretionary permit. This Report is appended with the information required of a removal permit (**Appendices A, B**, and **E**).

The pipes are all located within presumed Waters of the U.S. by the US Army Corp of Engineers (USACE) and may fall under USACE jurisdiction. The Regional Water Quality Control Board, USACE, and the California Department of Fish and Wildlife (USFW) will require a 401, 404, and 1602 Lake and Streambed

Alteration Agreement (LSAA) permits, respectively, to be filed for potential impacts to the bed, bank, and channel of the watercourses associated with the Proposed Project.

2.0 METHODOLOGY

2.1 FIELD TREE INVENTORY AND EVALUATION

As required of the criteria presented in the Sacramento County Arborist Report Submittal requirements, the following attributes have been recorded for each tree impacted by the project and are presented in **Tables 2** through **4** and **Appendix B**:

- Tree Identification/Tag Number
- Tree Species Common and Scientific Name
- Tree Stem Total Diameter, Maximum and Minimum Individual Stem Diameter, and Stem Count
- Root Protection Zone (RPZ) Radius
- Tree Canopy Area/Root Protection Zone Area
- Tree Health, Structure, and Overall Condition
- Dripline Environment characteristics
- Recommendation for Preservation or Removal
- General Recommendations

Initial tree inventory occurred on June 7th through 10th and December 21st, 2021. Trunk diameter measurements were taken at 4.5 feet above the ground along the trunk axis measuring the height from the most uphill side of the bole. Trees with multiple stems and/or stems at more horizontal angles were measured at approximately 4.5 feet above the ground and/or at a location that best represented the trunk's diameter. Tree canopy radius measurements were recorded using a measuring tape or pace counts for the horizontal length of the tree limb with the longest radial extension from the bole. The location of any construction-impacted tree over 4 inches DBH or 10-inch aggregate diameter threshold for multi-trunk native oak and Northern California black walnut trees was recorded in this manner as well. GPS location was recorded using a Trimble TDC150 GPS unit. The unit has a horizontal accuracy of 1-meter. Since tree canopies can sometimes cause loss of satellite acquisition by blocking the line-of-sight to satellites, post-correction and digitization of tree points were used to best record tree location information. When trees were unable to be reached due to safety reasons or satellite limitations, data was recorded through manual digitization and distance estimation in the GPS software. Individual tree locations are presented in Figures 3a through 3j of **Appendix A,** and individual tree data is presented in **Appendix B**. Additionally, representative site photographs of Project Sites are presented in **Appendix C**. Trees were tagged when reasonable and when present in close proximity to pipeline segments. Tree tagging was often omitted during the initial survey, as many of the trees present within the initial Project Site boundaries were ornamental, landscape trees, or were present within private property with limited access. The following rating systems as used in their respective column fields in **Table 2**, **Table 3**, and **Appendix B** are described below:

- Tree Structure: graded on a numerical scale of 1-5 with the lowest rating of 1 being Poor Structure and the maximum rating of 5 being Excellent Structure.
- Tree Health: graded on a numerical scale of 0-5 with the lowest rating of 0 being Dead and the maximum rating of 5 being Excellent Health. The number ratings equate to the following health terms; (5) excellent, (4) good-fair, (3) fair, (2) fair-poor, (1) poor, and (0) dead.

- Overall Tree Condition: graded on a numerical scale with the lowest rating of 0 being Dead and the maximum rating of 5 being Excellent Condition, a prime specimen of the species. The designations of values 1 and 2 being severe decline and decline respectively per the arborist report requirements have been replaced for the purpose of this report with Poor and Fair-Poor respectively. This change was made to better capture the overall tree condition with more equally weighted values towards structure and health, as terms pertaining to decline are primarily health-related terms. For example, a tree could have a critical structural weakness and yet have healthy vigorous growth, but would not be considered declining. The tree would then have its rating more weighted towards the lower end of the scale under the adjusted weights.

For Heritage and Landmark trees recommended for removal, a Level 2 Basic Assessment consistent with ISA's Best Management Practices for Tree Risk Assessment was to be utilized and contributed to the reasoning related to the tree's removal recommendation. Soil and cavity metal probes were to be used for hazard assessment. However, Basic Assessment was not required for such trees, as their reason for removal was project-related and independent of their hazard condition. At the time of the survey, Project Site boundaries were established over a large area to conservatively capture the maximum amount of possible disturbance area. Due to this, over 500 trees were inventoried initially with no recommendations made to their preservation or removal. Only those trees deemed impacted by the Proposed Project disturbance areas and scope of work are presented in this report (**Appendix D** and **Table 1**).

3.0 RESULTS

3.1 INDIVIDUAL TREES

Montrose inventoried and assessed 10 Project Sites for potential tree impacts based on the scope of work for the replacement and reinforcement of each Project Site's pipe segment(s). A total of 12 trees are prescribed for removal at Project Sites 2, 3, 5, 6, 7, and 8 (**Appendix A: Figure 3**). Additionally, project construction disturbance, particularly trenching, may impact and/or intersect with tree RPZs within Project Sites 1, 2, 3, 6, 7, 9, and 10. Trees prescribed for removal for the Proposed Project are summarized in **Table 2**. Trees not being removed with RPZs that intersect with Proposed Project disturbance limits and construction methods are summarized in **Table 3** below. Trees in **Table 2** can also be considered as having their RPZ affected by project scope, although they are prescribed for removal.

Table 2: Trees Prescribed for Removal

Project Site	Tree #	Common Name	*Scientific Name*	Diameter Total (in.)	Individual Stem Diameter Max & Min (in.), Count			Root Protection Zone Radius (ft.)	Tree Canopy Area/RPZ (sq. ft.)	Tree Structure	Tree Health	Overall Tree Condition	Dripline Environment
2	7652	Valley oak	*Quercus lobata*	43	22	21	2	35	3847	4	4	4	Riparian, bamboo
2	7651	Interior live oak	*Quercus wislizeni*	8	8	0	1	0	0	1	0	0	Duff
2	7650	Valley oak	*Quercus lobata*	41	24	17	2	35	3847	4	4	4	Bamboo
3	7541	Fan palm	*Arecaceae*	15	15	0	1	8	201	5	5	5	Riparian ditch
3	7542	Fan palm	*Arecaceae*	16	16	0	1	8	201	5	5	5	Riparian ditch
5	7508	Privet	*Ligustrum sp.*	13	13	0	1	15	707	3	4	4	Riparian, cement
5	7507	Privet	*Ligustrum sp.*	20	6	4	4	10	314	3	4	4	Riparian, cement
6	7522	California buckeye	Aesculus californica	10	10	0	1	0	0	1	0	0	Riparian, blackberry
6	7520	Valley oak	*Quercus lobata*	25	25	0	1	24	1809	1	4	1	Riparian, pipe, road
7	7590	Blue oak	*Quercus douglasii*	13	13	0	1	0	0	0	1	0	Grass
8	7577	Interior live oak	*Quercus wislizeni*	8	4	4	2	14	615	3	3	3	Riparian
8	7573	Valley oak	*Quercus lobata*	25	25	0	1	38	4534	4	4	4	Riparian, grass

Table 3: Retained Tree Driplines Intersecting Project Disturbance Areas

Project Site	Tree #	Common Name	*Scientific Name*	Diameter Total (in.)	Individual Stem Diameter Max & Min (in.), Count			Root Protection Zone Radius (ft.)	Tree Canopy Area/RPZ (sq. ft.)	Tree Structure	Tree Health	Overall Tree Condition	Dripline Environment	Notes
1	12	Privet	*Ligustrum sp.*	18	6	1	5	10	314	3	3	3	Lawn	No Tag
1	13	Privet	*Ligustrum sp.*	20	8	2	4	8	201	3	3	3	Riparian ditch	No Tag
1	14	Privet	*Ligustrum sp.*	4	4	0	1	8	201	3	3	3	Riparian ditch	No Tag
1	15	Privet	*Ligustrum sp.*	10	4	1	4	8	201	3	3	3	Riparian ditch	No Tag
1	7531	Olive	*Olea sp.*	30	13	7	3	20	1256	4	4	4	Riparian ditch	Dripline over pipe
1	16	Valley oak	*Quercus lobata*	18	18	0	1	25	1963	4	4	4	Over fence	No Tag
2	7606	Interior live oak	*Quercus wislizeni*	18	18	0	1	30	2826	4	4	4	Grass, riparian	
2	7607	Interior live oak	*Quercus wislizeni*	6	4	2	2	5	79	4	4	4	Grass	
3	7534	Valley oak	*Quercus lobata*	13	13	0	1	18	1017	4	4	4	Riparian ditch	Dripline over pipe
3	7536	Valley oak	*Quercus lobata*	4	4	0	1	10	314	4	4	4	Riparian ditch	
3	5280	Oak	Quercus sp.	7	7	0	1	0	0	0	0	0	Grass	Dead
3	5282	Valley oak	Quercus lobata	24	24	0	1	10	314	4	4	4	Grass	
3	5279	Valley oak	Quercus lobata	20	20	0	1	18	1017	3	4	3	Grass	
3	5278	Valley oak	Quercus lobata	16	16	0	1	24	1809	4	4	4	Grass	

Project Site	Tree #	Common Name	*Scientific Name*	Diameter Total (in.)	Individual Stem Diameter Max & Min (in.), Count			Root Protection Zone Radius (ft.)	Tree Canopy Area/RPZ (sq. ft.)	Tree Structure	Tree Health	Overall Tree Condition	Dripline Environment	Notes
6	7521	Valley oak	*Quercus lobata*	23	23	0	1	24	1809	5	5	5	Hill, grasses	Good example, RPZ borderline trench
7	7588	Blue oak	*Quercus douglasii*	17	17	0	1	14	615	4	4	4	Grass, riparian	
7	7589	Blue oak	*Quercus douglasii*	12	12	0	1	30	2826	4	4	4	Grass	
7	7598	Interior live oak	*Quercus wislizeni*	23	23	0	1	35	3847	3	2	2	Grass, riparian	
7	7597	Interior live oak	*Quercus wislizeni*	9	9	0	1	30	2826	2	2	2	Grass	
8	7579	Prunus sp.	*Prunus sp.*	10	10	0	1	0	0	1	0	0	Grass	
8	7578	Oregon ash	*Fraxinus latifolia*	7	7	0	1	6	113	2	1	1	Riparian	
9	7554	Valley oak	*Quercus lobata*	22	12	10	2	20	1256	4	4	4	Grass, riparian	
9	7560	Interior live oak	*Quercus wislizeni*	28	28	0	1	30	2826	4	4	4	Bridge, riparian	
9	7561	Oregon ash	*Fraxinus latifolia*	12	9	3	2	10	314	4	4	4	Grass, riparian	
10	9	Valley oak	*Quercus lobata*	20	20	0	1	32	3215	4	4	4	Riparian	No Tag
10	7653	Privet	*Ligustrum sp.*	4	4	0	1	8	201	4	4	4	Riparian	
10	7654	Privet	*Ligustrum sp.*	6	4	2	2	8	201	4	4	4	Riparian	
10	7655	Privet	*Ligustrum sp.*	4	4	0	1	8	201	4	4	4	Riparian	
10	49	Fig	*Ficus sp.*	6	6	0	1	25	1963	1	1	1	Riparian, pipe	No Tag

Table 4: Living Impacted Protected Trees

	Protected, non-heritage native non-oaks	Protected, non-heritage native oaks	Heritage Trees	Total
Only RPZ Impacted	2	10	7	19
Prescribed Removal	0	1	4	5
Total Living Impacts	2	11	11	24

Highlight Key

Green	Heritage oaks = native oaks with a trunk 19" or larger DSH
Blue	Protected, non-heritage native trees = single trunk 4-18" DSH, multi-trunk 10-18" DSH
Orange	Non-protected oaks = single trunks < 4" DSH, multi-stemmed trunks < 10" DSH
White	Non-native trees/other
Gold	Landmark = prominent, stately, special variety (good health, no size req.)

4.0 MITIGATION AND PRESERVATION RECOMMENDATIONS

4.1 MITIGATION RECOMMENDATIONS

Based on expected tree removal resulting from the Proposed Project tree replacement requirements would be subject to tree removal permit conditions issued and approved by the County. The applicant may be required to pay mitigation fees according to County specifications for removed oak trees on a price per DBH inch as determined by the County as part of the conditions of the tree removal permit and pursuant to County Code Section 19.12. Mitigation through payment of mitigation fees are recommended.

4.2 PRESERVATION RECOMMENDATIONS

Based on expected tree RPZ trenching resulting from the Proposed Project, tree protection recommendations are provided below for all protected trees presented in **Table 3**. While preservation requirements would be subject to the trenching permit conditions issued and approved by the County, the methods to protect trees during trenching operations provided below are recommended.

1. All retained protected trees will be protected from construction-related impacts through the following methods.
    a. Hand tool trenching should be used where feasible in order to avoid damaging tree roots through avoidance and retention of substantial roots
    b. Where hand trenching is not feasible, equipment trenching with the most narrow and sharp bladed equipment shall be used
    c. Placement and installation of piping shall include avoidance of substantial roots where feasible
    d. Any exposed and damaged roots resulting from trenching will be pruned back beyond the point of damage or to the wall or edge of the trench with sharp implements or tools to provide clean-cut ends prior to trench backfill
    e. Any exposed roots resulting from trenching will not be allowed to desiccate prior to trench backfill, and root moisture may be maintained through the placement of wetted burlap, organic material, or temporary earth pack on the roots as needed
    f. Roots will not be pulled or wrenched with a backhoe or similar equipment and instead be cut away with sharp implements or tools to free the roots
    g. Do not cut main, lateral, or buttress roots during trenching
    h. All work within the RPZ of a protected tree shall be permitted and supervised by an ISA Certified Arborist who shall make recommendations to minimize the impact of County approved work on protected trees
2. Placement and storage of construction equipment or construction material within the RPZ of a protected tree shall be avoided through project design and construction.
3. Access routes for foot and equipment traffic will be clearly defined through the use of pin flagging, standard flagging, stakes, or other marker and will avoid contact with tree boles.
4. Any provisions of the permit granted by the County for trenching within protected tree RPZ shall be adhered to.
5. In the instances where temporary equipment or vehicle access within the RPZ of protected oaks is necessary, install 4-inches of new mulch and cover the mulch with metal plates or ¾-inch plywood as feasible.
6. Limit access trimming to the minimum amount necessary to facilitate work while not exceeding greater than 20 percent of canopy removal when pruning. Pruning shall be conducted adhering to ANSI A300 standards and/or be performed by an ISA certified arborist.

4.3 TREE PERMITS

The project applicant will be required to submit a Tree Permit Application to the County of Sacramento Office of Planning and Environmental Review for each project site with tree removal. An assembly of five County Tree Permit Applications is provided in **Appendix E** with each corresponding to their associated Project Site. A copy of

this report and the final project site plan should accompany the application. Once reviewed by the County, the final determination of tree replacement and mitigation requirements related to the removal of Heritage and protected oaks will be provided by the County. Lastly, an additional tree permit or conditions of approval imposed by the County for the Proposed Project's RPZ/dripline construction work for 20 protected trees shall be requested.

5.0 CONCLUSION AND DISCUSSION

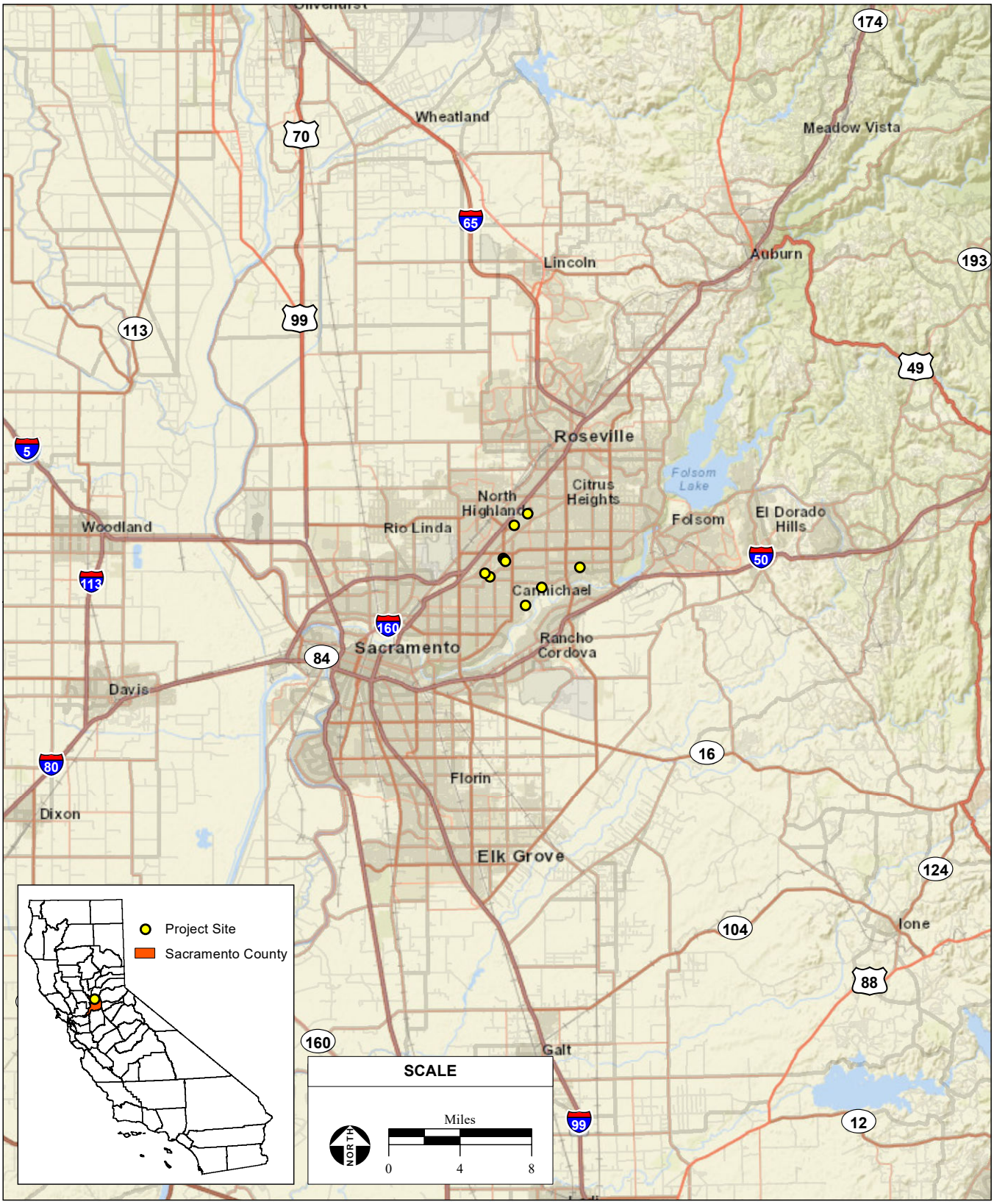
Montrose inventoried trees associated with the SASD Creek Crossing Project Site in Sacramento County, California on June 7th through 10th and December 21st, 2021. A total of 12 trees are prescribed for removal for the Proposed Project (**Table 2**). Four of these trees meet the criteria for classification as Heritage trees. Three other trees, though dead or near dead, meet the criteria for classification as Protected Non-Heritage Native/Oak trees. One other tree is a living Protected Non-Heritage Native oak. The remaining four trees prescribed for removal are unprotected non-native trees. It is expected that these four Heritage oaks in good health, three Protected Non-Heritage Native/Oak Trees in poor to dead health condition, one Protected Non-Heritage Native oak in fair overall condition, and four non-native trees will require removal to accommodate the construction of the Proposed Project. The tree removal totals presented herein represent the maximum expected quantity of tree removal for the Proposed Project. Applicant edits to the Draft Site Plans (**Appendix D**) are expected to result in no change in tree removal quantities or add any tree pruning for the Proposed Project. This report recommends that the five protected trees in fair to good health prescribed for removal for the Proposed Project be mitigated through the payment of mitigation fees to offset the impacts of removed trees as part of the permitting process at a price per DBH inch removed basis as determined by the County mitigation as detailed in **Section 4.1**. Additionally, installation of native willow stakes or willow plantings at the site of removal for the two non-native trees prescribed for removal is recommended as part of this mitigation and is recommended as mitigation to offset impacts to watercourses resulting from the Proposed Project independent of tree-related impacts. Lastly, the Proposed Project plans to remove a cluster of brush stems at Project Site 3 and two clusters of brush stems at Project Site 4. These brush stems do not meet the threshold for protection and preservation as their stems measure less than 4" DBH. Lastly, it is recommended that Tree 7520, already included in the tree removal counts discussed above, be mitigated as a hazard tree for SASD facility protection via removal for construction of the Proposed Project. This is due to a top tearout/snap causing a severe structural defect, though the tree is in good health.

An additional tree permit or conditions of approval imposed by the County for the Proposed Project's construction and trenching work within the RPZ for 19 protected trees is recommended. 15 of the 19 RPZ impacted trees are in Fair to Excellent overall condition. The quantity and size of roots encountered during trenching for the Proposed Project are likely only feasibly determined at the time of trenching. Deep root systems are likely present within many of the RPZ-affected trees, as they are unirrigated and within or near unconsolidated streambed substrates. Deep root systems tend to allow for higher resiliency in trees where grade changes and trenching occur. Additionally, the majority of trenching work occurs at the margins of tree RPZs with small overhead footprints, further reducing impacts to protected trees through project design. Placement of erosion control measures as part of the Proposed Project for pipeline segment reinforcement, typically in the form of anchored vegetative turf or rock slope protection, occurs at near soil surface-level and current grade, further reducing impacts to trees and the RPZs through project design. Mitigation and preservation measures are ultimately subject to the removal and trenching permit conditions issued by the County. This report provides conclusions and recommendations based on an inspection and survey of the trees and surrounding site by an ISA Certified Arborist.

APPENDICES

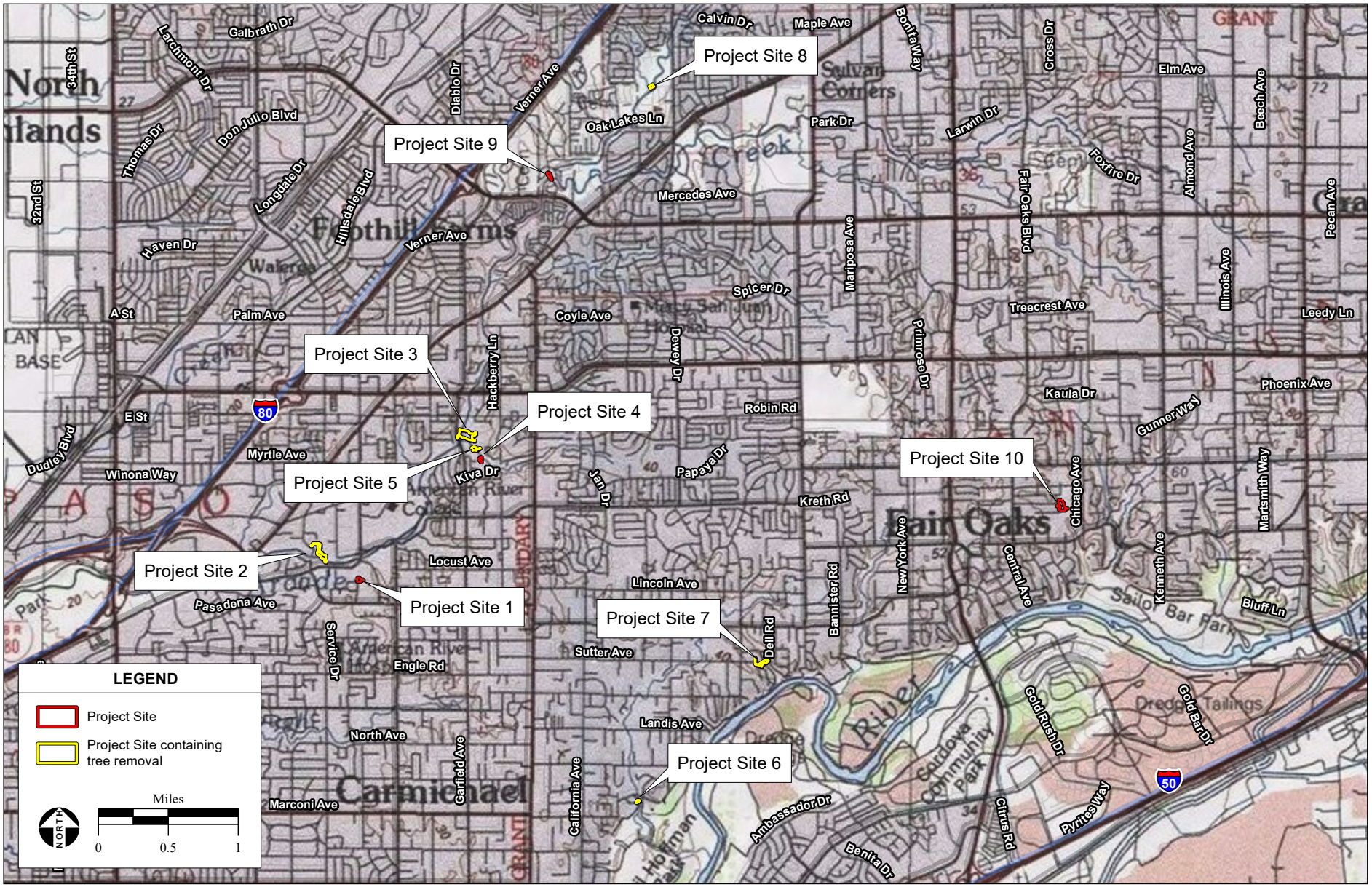
APPENDIX A

TREE LOCATION EXHIBIT



SOURCE: ESRI, 2022; AES-Montrose, 3/11/2022

Figure 1
Regional Location



SOURCE: "Sacramento, CA" USGS 100k Topographic Quadrangle, T10N R6E, T9N R6E, Unsectioned Area of Carmichael and Citrus Heights; ESRI 2021; AES, 7/8/2022

Figure 2
Site and Vicinity



SOURCE: Metro Maxar aerial photography, 3/4/2021; ESRI 2021; AES-Montrose, 5/24/2022

Figure 3a

Tree Removal Locations - Project Site 1 / Crossing #1 / Hope Ln / Asset #59646



SOURCE: Metro Maxar aerial photography, 3/4/2021; ESRI 2021; AES-Montrose, 5/24/2022

Figure 3b

Tree Removal Locations - Project Site 2 / Crossing #2 / Winding Way / Asset #48368



SOURCE: Metro Maxar aerial photography, 3/4/2021; ESRI 2021; AES-Montrose, 5/24/2022

Figure 3c

Tree Removal Locations - Project Site 3 / Crossing #3 / Arcade Creek / Asset #49894
Crossing #4 / Garfield Ave & Thousand Oaks Ct / Asset #44327



SOURCE: Metro Maxar aerial photography, 3/4/2021; ESRI 2021; AES-Montrose, 5/24/2022

Figure 3d

Tree Removal Locations - Project Site 4 / Crossing #5 / Concho Ct / Asset #41018



SOURCE: Metro Maxar aerial photography, 3/4/2021; ESRI 2021; AES-Montrose, 5/24/2022

Figure 3e

Tree Removal Locations - Project Site 5 / Crossing #6 / Gina Ct / Asset #50528



SOURCE: Metro Maxar aerial photography, 3/4/2021; ESRI 2021; AES-Montrose, 5/24/2022

Figure 3f

Tree Removal Locations - Project Site 6 / Crossing #7 / San Lorenzo Way / Asset #170877



SOURCE: Metro Maxar aerial photography, 3/4/2021; ESRI 2021; AES-Montrose, 5/24/2022

Figure 3g

Tree Removal Locations - Project Site 7 / Crossing #8 / Sutter Ave / Asset #78865



SOURCE: Metro Maxar aerial photography, 3/4/2021; ESRI 2021; AES-Montrose, 5/24/2022

Figure 3h

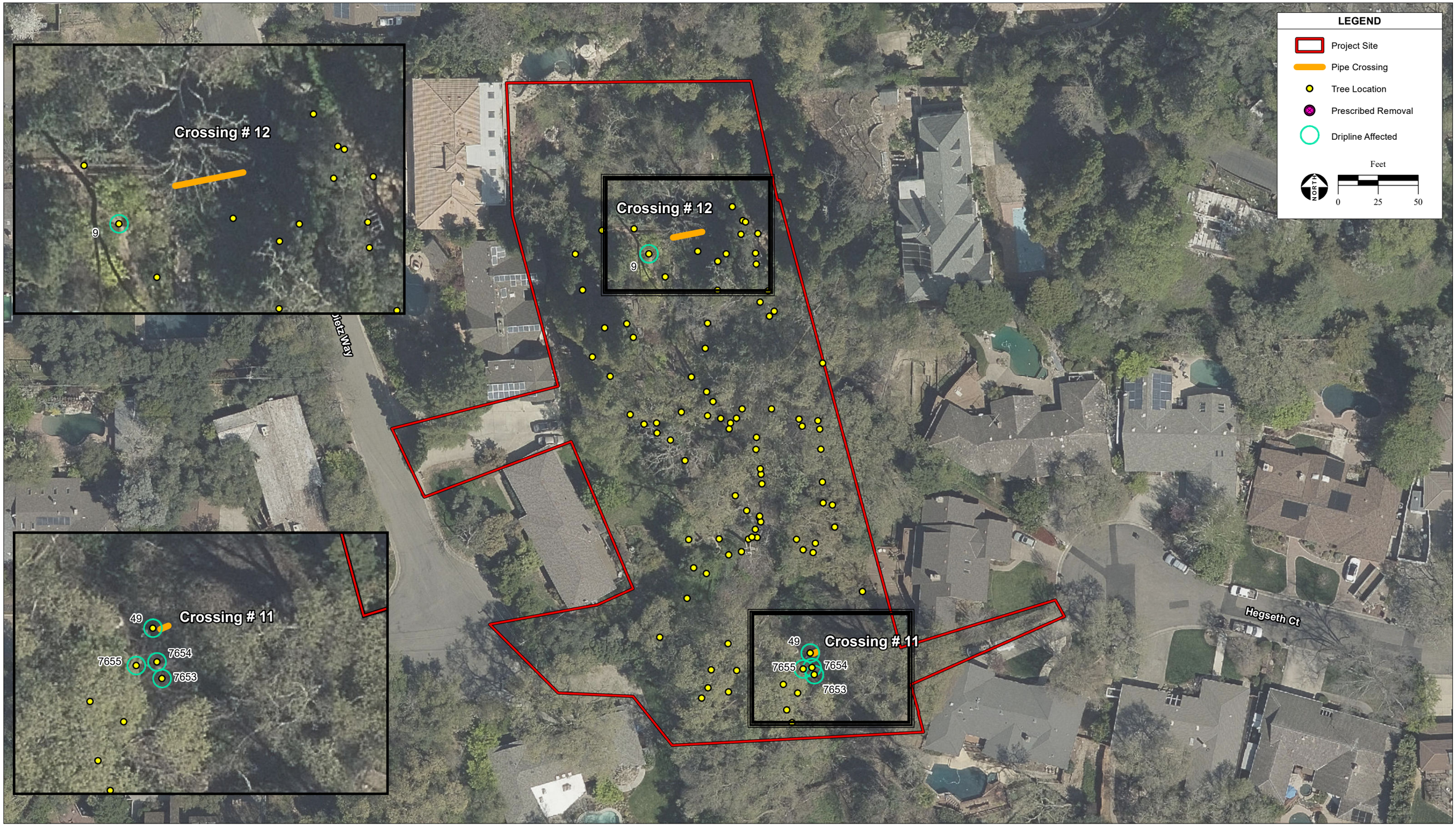
Tree Removal Locations - Project Site 8 / Crossing #9 / Campfire Way / Asset #36529



SOURCE: Metro Maxar aerial photography, 3/4/2021; ESRI 2021; AES-Montrose, 5/24/2022

Figure 3i

Tree Removal Locations - Project Site 9 / Crossing #10 / Indian River Drive / Asset #78531



SOURCE: Metro Maxar aerial photography, 3/4/2021; ESRI 2021; AES-Montrose, 5/24/2022

Figure 3j

Tree Removal Locations - Project Site 10 / Crossing #11 / Hegseth Ct / Asset #68559
Crossing #12 / Dietz Way / Asset #239693

APPENDIX B

TREE INFORMATION SHEET

TREE INFORMATION SHEET

Project Site	Tree #	Common Name	*Scientific Name*	Diameter Total (in.)	Individual Stem Diameter Max & Min (in.), Count			Root Protection Zone Radius (ft.)	Tree Canopy Area/RPZ (sq. ft.)	Tree Structure	Tree Health	Overall Tree Condition	Dripline Environment	Notes
Prescribed Removals														
2	7652	Valley oak	*Quercus lobata*	43	22	21	2	35	3847	4	4	4	Riparian, bamboo	Remove
2	7651	Interior live oak	*Quercus wislizeni*	8	8	0	1	0	0	1	0	0	Duff	
2	7650	Valley oak	*Quercus lobata*	41	24	17	2	35	3847	4	4	4	Bamboo	
3	7541	Fan palm	*Arecaceae*	15	15	0	1	8	201	5	5	5	Riparian ditch	
3	7542	Fan palm	*Arecaceae*	16	16	0	1	8	201	5	5	5	Riparian ditch	
5	7508	Privet	*Ligustrum sp.*	13	13	0	1	15	707	3	4	4	Riparian, cement	Remove
5	7507	Privet	*Ligustrum sp.*	20	6	4	4	10	314	3	4	4	Riparian, cement	Remove
6	7522	California buckeye	*Aesculus californica*	10	10	0	1	0	0	1	0	0	Riparian, blackberry	Remove
6	7520	Valley oak	*Quercus lobata*	25	25	0	1	24	1809	1	4	1	Riparian, pipe, road	Top tearout
7	7590	Blue oak	*Quercus douglasii*	13	13	0	1	0	0	0	1	0	Grass	Dead
8	7577	Interior live oak	*Quercus wislizeni*	8	4	4	2	14	615	3	3	3	Riparian	Remove
8	7573	Valley oak	*Quercus lobata*	25	25	0	1	38	4534	4	4	4	Riparian, grass	Remove
RPZ Affected Retained Trees														
1	12	Privet	*Ligustrum sp.*	18	6	1	5	10	314	3	3	3	Lawn	No Tag
1	13	Privet	*Ligustrum sp.*	20	8	2	4	8	201	3	3	3	Riparian ditch	No Tag
1	14	Privet	*Ligustrum sp.*	4	4	0	1	8	201	3	3	3	Riparian ditch	No Tag
1	15	Privet	*Ligustrum sp.*	10	4	1	4	8	201	3	3	3	Riparian ditch	No Tag
1	7531	Olive	*Olea sp.*	30	13	7	3	20	1256	4	4	4	Riparian ditch	Dripline over pipe
1	16	Valley oak	*Quercus lobata*	18	18	0	1	25	1963	4	4	4	Over fence	No Tag
2	7651	Interior live oak	*Quercus wislizeni*	8	8	0	1	0	0	1	0	0	Duff	Remove
2	7607	Interior live oak	*Quercus wislizeni*	6	4	2	2	5	79	4	4	4	Grass	
3	7534	Valley oak	*Quercus lobata*	13	13	0	1	18	1017	4	4	4	Riparian ditch	Dripline over pipe
3	7536	Valley oak	*Quercus lobata*	4	4	0	1	10	314	4	4	4	Riparian ditch	
3	5280	Oak	Quercus sp.	7	7	0	1	0	0	0	0	0	Grass	Dead
3	5279	Valley oak	Quercus lobata	20	20	0	1	18	1017	3	4	3	Grass	
3	5282	Valley oak	*Quercus lobata*	24	24	0	1	10	314	4	4	4	Grass	

Project Site	Tree #	Common Name	*Scientific Name*	Diameter Total (in.)	Individual Stem Diameter Max & Min (in.), Count			Root Protection Zone Radius (ft.)	Tree Canopy Area/RPZ (sq. ft.)	Tree Structure	Tree Health	Overall Tree Condition	Dripline Environment	Notes
3	5278	Valley oak	Quercus lobata	16	16	0	1	24	1809	4	4	4	Grass	
6	7521	Valley oak	*Quercus lobata*	23	23	0	1	24	1809	5	5	5	Hill, grasses	Good example, RPZ borderline trench
7	7588	Blue oak	*Quercus douglasii*	17	17	0	1	14	615	4	4	4	Grass, riparian	
7	7589	Blue oak	*Quercus douglasii*	12	12	0	1	30	2826	4	4	4	Grass	
7	7598	Interior live oak	*Quercus wislizeni*	23	23	0	1	35	3847	3	2	2	Grass, riparian	
7	7597	Interior live oak	*Quercus wislizeni*	9	9	0	1	30	2826	2	2	2	Grass	
8	7579	Prunus sp.	*Prunus sp.*	10	10	0	1	0	0	1	0	0	Grass	
8	7578	Oregon ash	*Fraxinus latifolia*	7	7	0	1	6	113	2	1	1	Riparian	
9	7554	Valley oak	*Quercus lobata*	22	12	10	2	20	1256	4	4	4	Grass, riparian	
9	7560	Interior live oak	*Quercus wislizeni*	28	28	0	1	30	2826	4	4	4	Bridge, riparian	
9	7561	Oregon ash	*Fraxinus latifolia*	12	9	3	2	10	314	4	4	4	Grass, riparian	
10	9	Valley oak	*Quercus lobata*	20	20	0	1	32	3215	4	4	4	Riparian	No Tag
10	7653	Privet	*Ligustrum sp.*	4	4	0	1	8	201	4	4	4	Riparian	
10	7654	Privet	*Ligustrum sp.*	6	4	2	2	8	201	4	4	4	Riparian	
10	7565	Privet	*Ligustrum sp.*	4	4	0	1	8	201	4	4	4	Riparian	
10	49	Fig	*Ficus sp.*	6	6	0	1	25	1963	1	1	1	Riparian, pipe	No Tag

Key

Green	Heritage oaks = native oaks with a trunk 19" or larger DSH
Blue	Protected, non-heritage native trees = single trunk 4-18" DSH, multi-trunk 10-18" DSH
Orange	Non-protected oaks = single trunks < 4" DSH, multi-stemmed trunks < 10" DSH
White	Non-native trees/other
Gold	Landmark = prominent, stately, special variety (good health, no size req.)

APPENDIX C

SITE PHOTOGRAPHS



PHOTO 1: South-facing view of intermittent drainage and pipe-crossing in Project Site 1.



PHOTO 2: West-facing view of pipe-crossing and intermittent drainage in Project Site 2.



PHOTO 3: West-facing view of pipe-crossing #3 and intermittent drainage in Project Site 3.



PHOTO 4: Upstream view of pipe-crossing and intermittent drainage in Project Site 4.



PHOTO 5: Downstream view of pipe-crossing and intermittent drainage in Project Site 5.



PHOTO 6: West-facing view of pipe-crossing and intermittent drainage in Project Site 6.

SOURCE: AES-Montrose, 3/17/2022

Appendix C - Figure 1
Site Photographs



PHOTO 7: South-facing view of pipe-crossing and intermittent drainage in Project Site 7.



PHOTO 8: East-facing view of pipe-crossing and intermittent drainage in Project Site 8.



PHOTO 9: North-facing view of pipe-crossing and intermittent drainage in Project Site 9.



PHOTO 10: South-facing view of pipe-crossing #11 and intermittent drainage in Project Site 10.



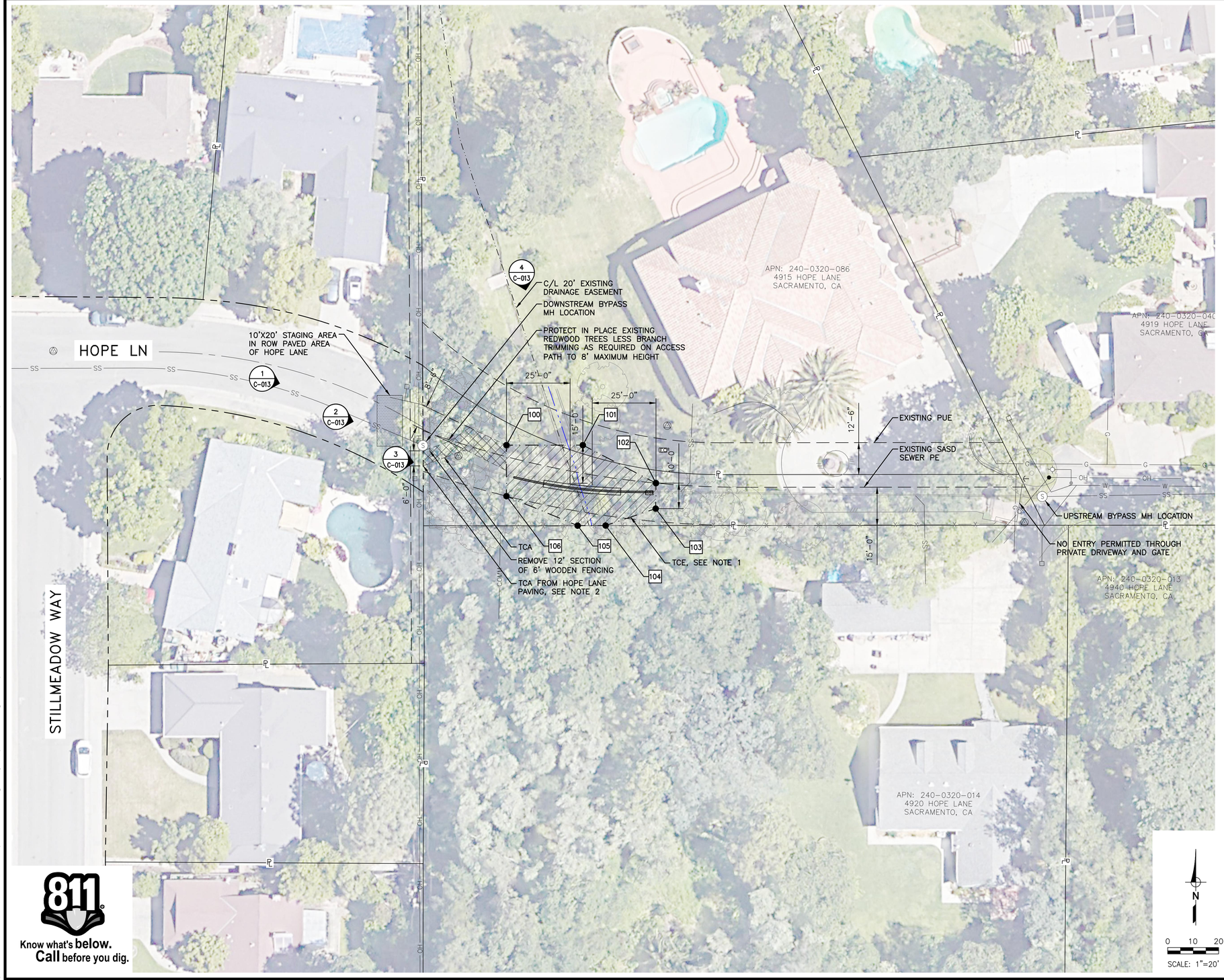
PHOTO 11: East-facing view of pipe-crossing #11 and intermittent drainage in Project Site 10.

SOURCE: AES-Montrose, 3/17/2022

Appendix C - Figure 2
Site Photographs

APPENDIX D

DRAFT SITE PLANS



NOTES

1. SEE DWG G-005 FOR TCE COORDINATES.
2. ACCESS TO CROSSING BEYOND THIS POINT IS VIA HOMEOWNER LANDSCAPED AREA INCLUDING MATURE TREES AND SHRUBS. CONTRACTOR TO SUBMIT PROPERTY PROTECTION PLAN PRIOR TO EQUIPMENT OR MATERIALS BEING BROUGHT BEYOND THIS POINT. SEE CROSSING PHOTOS FOR PATH DETAILS. CONTRACTOR SHALL NOT DAMAGE LANDSCAPING ON PRIVATE PROPERTY.
3. STAGING SHALL BE LIMITED TO THE AREA SHOWN ON THE PLAN.
4. PRUNING OF TREES WILL REQUIRE APPROVAL FROM SASD AND SHALL BE PERFORMED UNDER THE OVERSIGHT OF A CERTIFIED ARBORIST.

LEGEND

- ACCESS PATH TO SITE
- WORK AREA GROUND DISTURBANCE LIMITS
- STAGING AREA

811 Know what's below. Call before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT G. NAYOLI NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

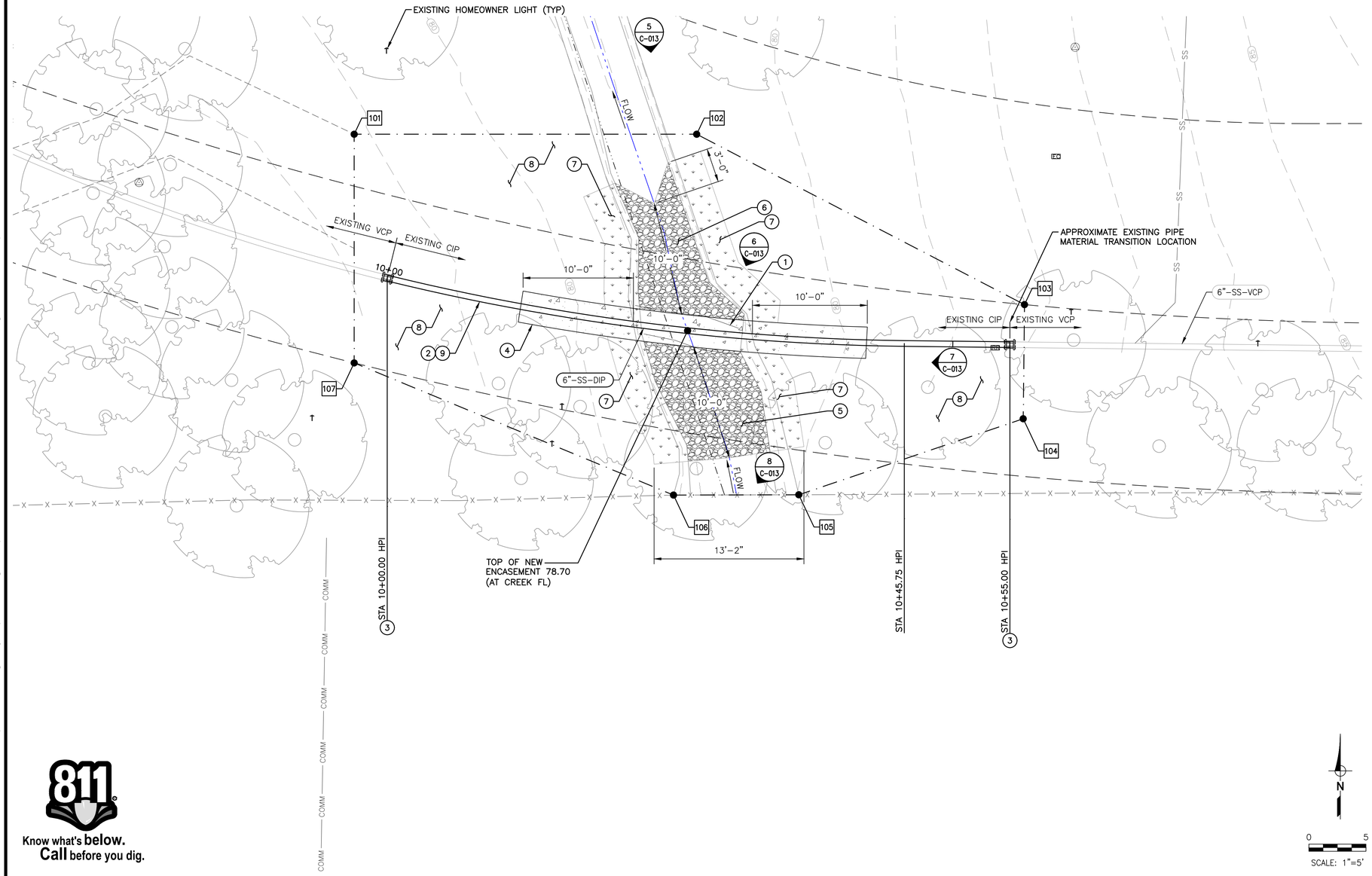
WSC
2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827
APPROVED:
POSITION DATE

SASD CREEK CROSSING PROJECT
CROSSING 01 - HOPE LANE
SITE ACCESS PLAN

DRAWING C-010
SHEET 7 OF --
PROJECT # –

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 - 3:49 AM CADD User: Chris Durbin



SHEET KEY NOTES

1. REMOVE EXISTING COBBLES
2. DEMOLISH EXISTING SS AND ENCASEMENT TO EXTENTS OF PIPE REPLACEMENT. INSTALL SS PIPE AS SAME INVERT AND ALIGNMENT, SEE SHEET C-012
3. FLEXIBLE COUPLINGS AND TRANSITION COUPLING PER SASD STANDARD 402.1.2 TO CONNECT TO EXISTING PIPING, TYP. EACH END
4. INSTALL NEW CONCRETE ENCASEMENT PER SASD STANDARD 202.12.2, 30' L X 33" W X 20" H
5. INSTALL UPSTREAM CLASS I RIPRAP. SLOPE FROM TOP OF ENCASEMENT TO CHANNEL AT 5:1 (RUN:RISE) MAXIMUM SLOPE. EXTEND 10-FT UP CHANNEL FROM ENCASEMENT
6. INSTALL DOWNSTREAM CLASS I RIPRAP. SLOPE FROM TOP OF ENCASEMENT TO CHANNEL AT 5:1 (RUN:RISE) MAXIMUM SLOPE
7. INSTALL ANCHORED VEGETATED TURF REINFORCED MAT OVER SLOPES FOR EXTENTS SHOWN. CUT SLOPES BACK TO 1:1 MAXIMUM
8. RESTORE PRIVATE PROPERTY, INSTALL SOD IN IMPACTED LAWN AREAS. REPLANT AND RESEED ACCESS PATHS TO MATCH EXISTING QUANTITY AND TYPE OF PLANTS
9. CENTER MANUFACTURER'S NOMINAL LAY LENGTH OF DIP ON CROSSING

TREE REMOVAL

NO TREE REMOVAL FOR HOPE LANE SITE

811 Know what's below. Call before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT G. NAVOLI NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

WSC
2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

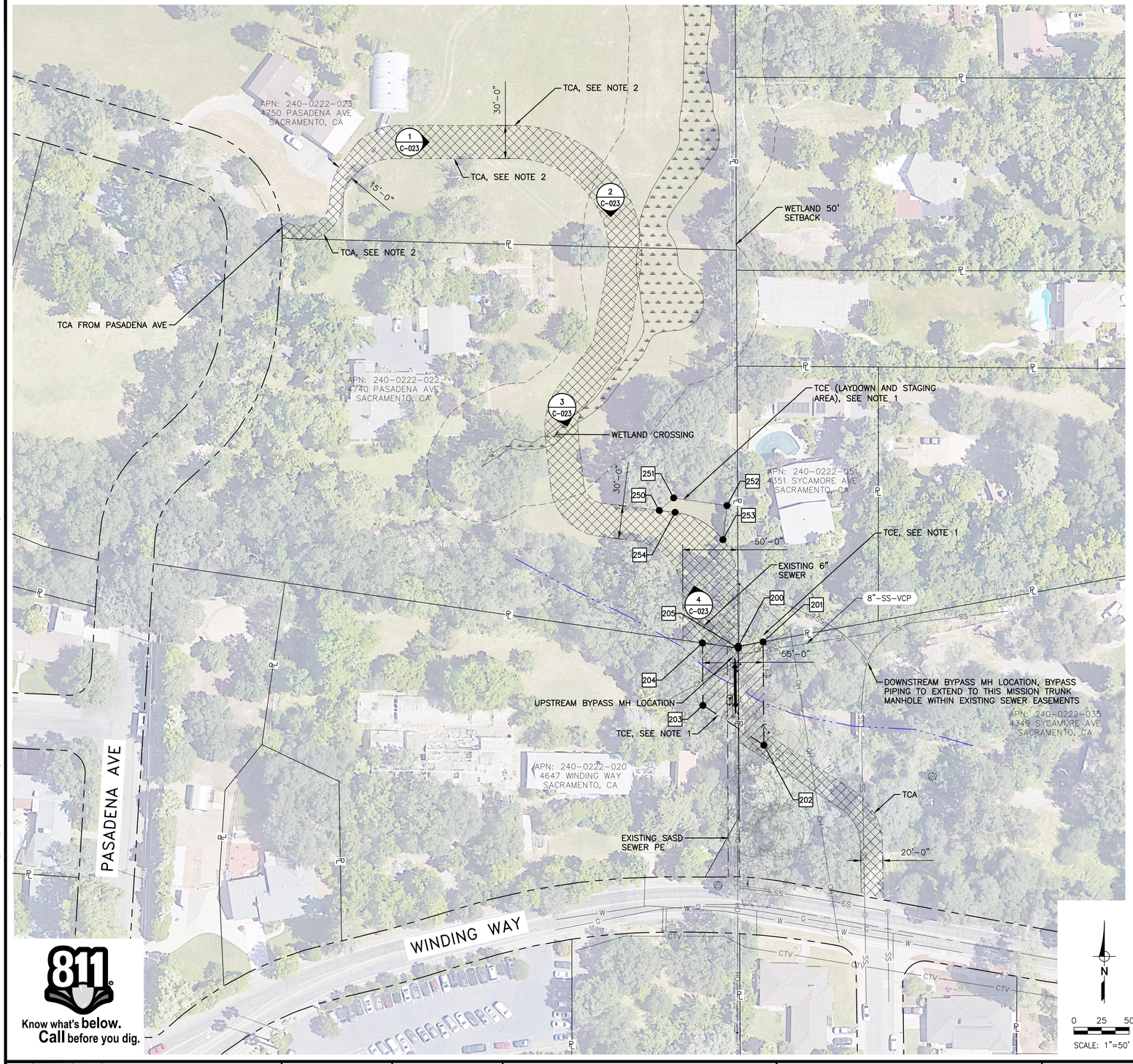
SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
POSITION DATE

SASD CREEK CROSSING PROJECT
CROSSING 01 - HOPE LANE
SITE PLAN

DRAWING C-011
SHEET 8 OF --
PROJECT # –

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811 Know what's below. Call before you dig.

NOTES

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2. ACCESS TO CROSSING BEYOND THIS POINT IS VIA HOMEOWNER PRIVATE DRIVEWAY AND FIELD INCLUDING FENCING, GATES, AND MATURE TREES AND SHRUBS. CONTRACTOR TO SUBMIT PROPERTY PROTECTION PLAN PRIOR TO EQUIPMENT OR MATERIALS BEING BROUGHT BEYOND THIS POINT. SEE CROSSING PHOTOS FOR PATH DETAILS. CONTRACTOR SHALL NOT DAMAGE LANDSCAPING ON PRIVATE PROPERTY.
3. STAGING SHALL BE LIMITED TO THE AREA SHOWN ON THE PLAN.
4. REMOVAL AND PRUNING OF TREES WILL REQUIRE APPROVAL FROM SASD AND SHALL BE PERFORMED UNDER THE OVERSIGHT OF A CERTIFIED ARBORIST.

LEGEND

- ACCESS PATH TO SITE
- WORK AREA GROUND DISTURBANCE LIMITS
- STAGING AREA
- WETLANDS

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT C. NAJOLI NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

WSC
2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

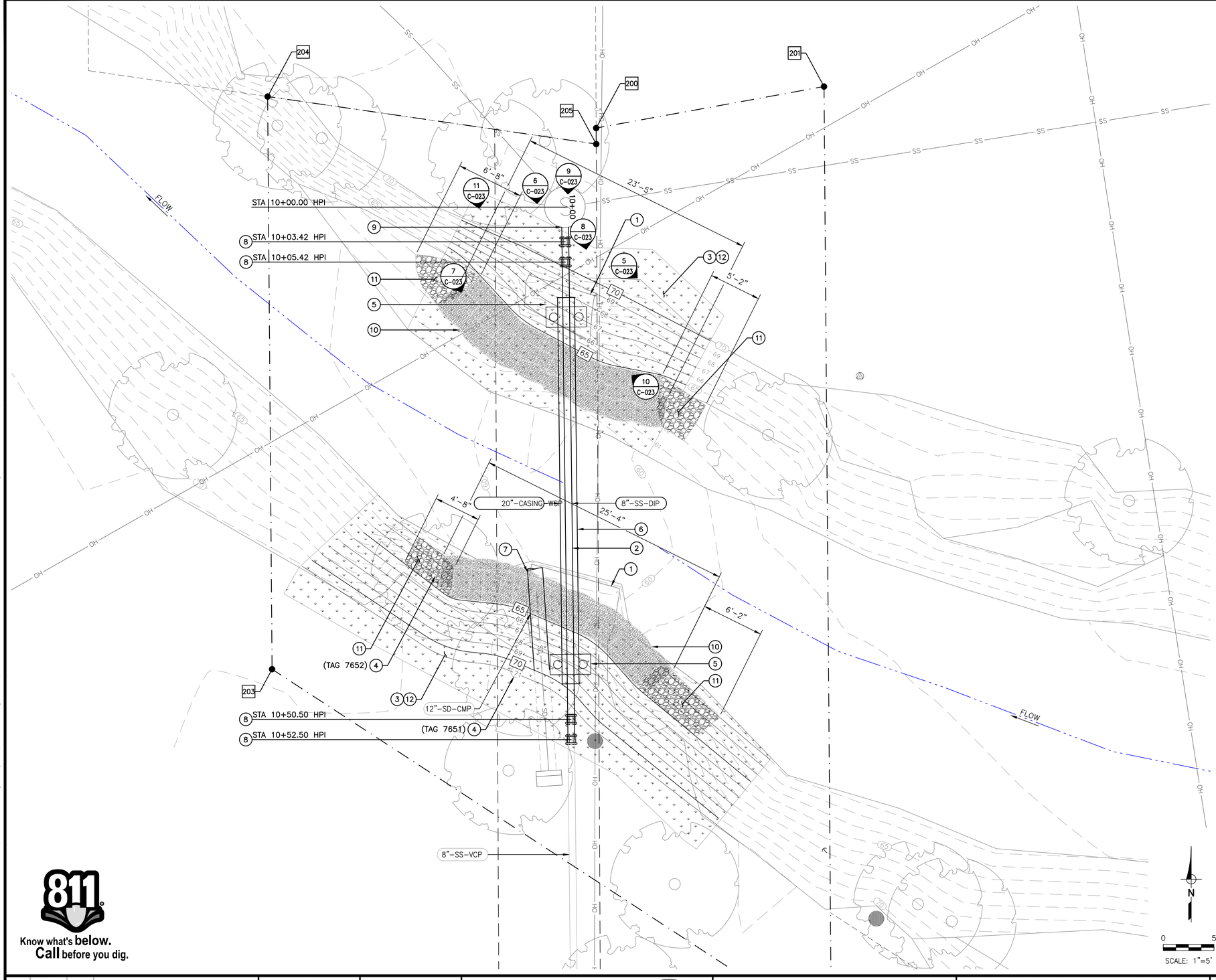
SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
POSITION DATE

SASD CREEK CROSSING PROJECT
CROSSING 02 - WINDING WAY
SITE ACCESS PLAN

DRAWING C-020
SHEET 11 OF --
PROJECT # _

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 - 3:54 AM CADD User: Chris Durbin



SHEET KEY NOTES

1. REMOVE EXISTING SLOPE PROTECTION
2. REMOVE EXISTING SS PIPE AND PIERS PER DETAIL 1, SHEET C-022. REMOVE PIPE FROM EXISTING MANHOLE. REPLACE WITH SS ON SAME ALIGNMENT. REPLACEMENT ELEVATIONS PER SHEET C-022
3. INSTALL ANCHORED VEGETATED TURF REINFORCEMENT MAT ON BOTH BANKS TO EXTENTS SHOWN. EMBED INTO ENGINEERED BANK STABILIZATION SYSTEM. INSTALL ON SLOPES SHOWN (MAX 1:1). MATCH EXISTING SLOPES
4. REMOVE EXISTING TREE AS NOTED ON PLANS
5. INSTALL (2) 8" DIAMETER DRILLED MICROPILES TO A DEPTH OF 24' BATTERED AT 15 DEGREES
6. INSTALL 20" EPOXY COATED WSP CASING PIPE IN ACCORDANCE WITH SASD STANDARD 202.12.4
7. REMOVE EXISTING 12" CMP STORM DRAIN AS NECESSARY TO COMPLETE WORK. INSTALL 12" HDPE STORM DRAIN (MIN 10' OR AS NECESSARY TO COMPELTE WORK), ADS N-12 OR APPROVED EQUAL. EXTEND THROUGH IMPROVED BANK AND MATCH EXISTING SLOPE. CONNECT TO EXISTING CMP USING MARMAC DP COUPLER OR APPROVED EQUAL.
8. INSTALL DOUBLE 8" FLEXIBLE JOINTS PER SASD STANDARD 312.3
9. CONNECT TO EXISTING MANHOLE PER SASD DETAIL MH-03
10. INSTALL ANCHORED ENGINEERED BANK STABILIZATION SYSTEM PER DETAILS
11. MINIMIZE BANK DISTURBANCE AT EDGES OF ENGINEERED BANK STABILIZATION SYSTEM. COVER DISTURBED AREAS WITH CLASS III RIP-RAP UP TO ELEVATION OF TOP TIER (MIN EL 65.0)
12. HYDROSEED ALL DISTURBED AREAS INCLUDING TURF REINFORCEMENT MAT

TREE REMOVAL

8IN DEAD	TAG 7651
48IN X 30FT OAK	TAG 7652

Know what's below. Call before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT C. NAITOLI NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

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2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
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SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
_____ – _____– POSITION DATE

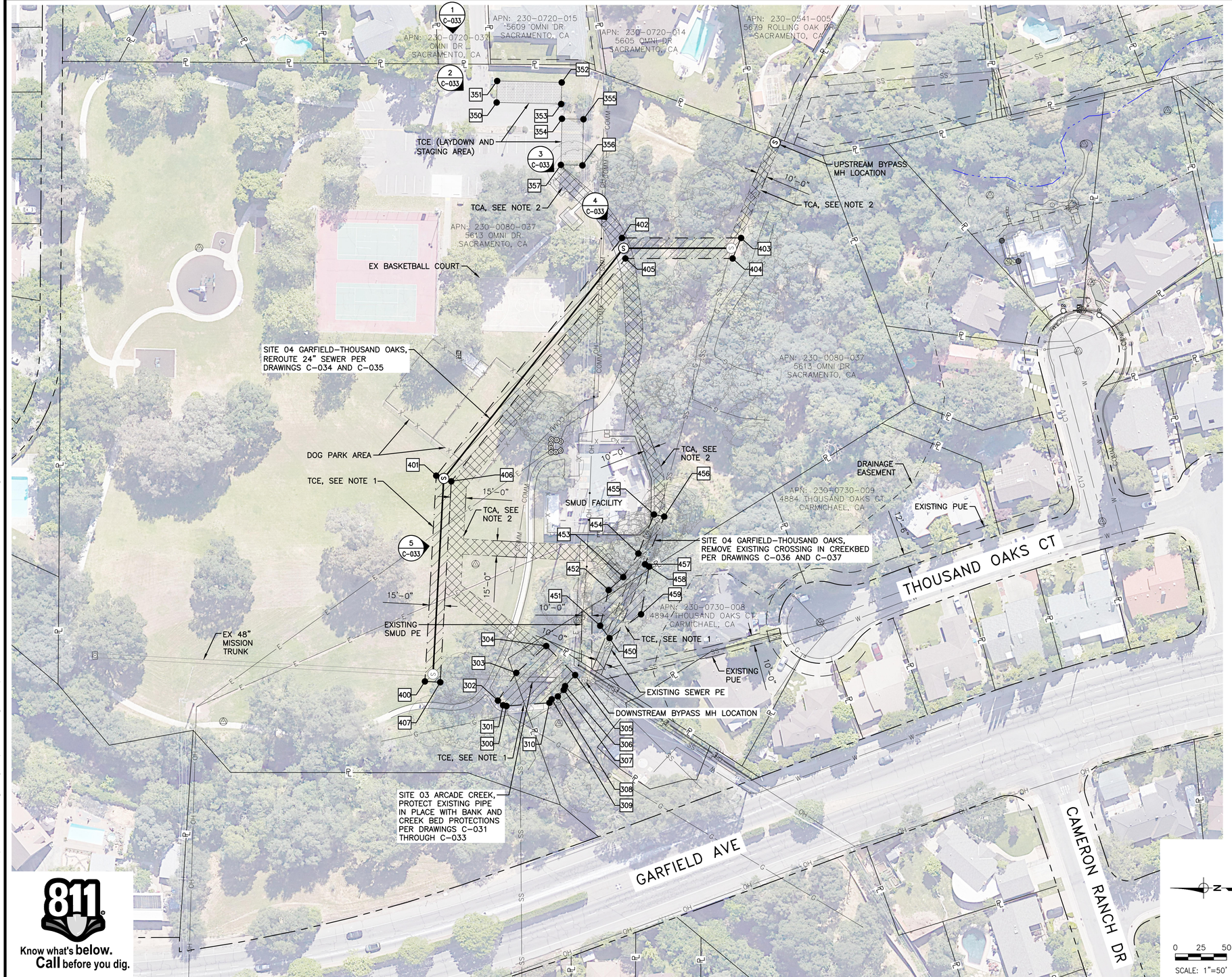
SASD CREEK CROSSING PROJECT

CROSSING 02 - WINDING WAY

SITE PLAN

DRAWING C-021
SHEET 12 OF --
PROJECT # –

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 - 3:56 AM CADD User: Chris Durbin



NOTES:

1. SEE DWG G-005 FOR TCE COORDINATES.
2. ACCESS TO CROSSINGS 03 AND 04 IS VIA ARCADE CREEK PARK INCLUDING OPEN FIELDS, ACCESS ROADS, FENCING, GATES, AND MATURE TREES AND SHRUBS. CONTRACTOR TO SUBMIT PROPERTY PROTECTION PLAN PRIOR TO EQUIPMENT OR MATERIALS BEING BROUGHT INTO THE PARK PROPERTY. SEE CROSSING PHOTOS FOR PATH DETAILS. CONTRACTOR SHALL NOT DAMAGE PARK AND SMUD PROPERTY. ALL GRASS AREAS SHALL BE RESEEDED AND RESTORED. SEE C-034 AND C-035 FOR RESTORATION OF DOG PARK AREA.
3. STAGING SHALL BE LIMITED TO THE AREA SHOWN ON THE PLAN.
4. REMOVAL AND PRUNING OF TREES WILL REQUIRE APPROVAL FROM SASD AND SHALL BE PERFORMED UNDER THE OVERSIGHT OF A CERTIFIED ARBORIST.
5. LIMIT IMPACTS TO DOG PARK AREA TO A MAXIMUM OF 3 WEEKS. IF ADDITIONAL TIME IS NEEDED CONTRACTOR TO ERECT TEMPORARY FENCING ALONG TCE/TCA TO ALLOW ACCESS TO DOG PARK.
6. ACCESS PATHS THROUGH ARCADE CREEK PARK ARE PRELIMINARY AND PENDING DISTRICT COORDINATION WITH THE PARKS DISTRICT.

LEGEND

- ACCESS PATH TO SITE
- WORK AREA GROUND DISTURBANCE LIMITS
- STAGING AREA

Know what's below. Call before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT G. NAYOLI NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

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PHONE: (916) 778-4288 FAX:(805) 888-2764

SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
POSITION DATE

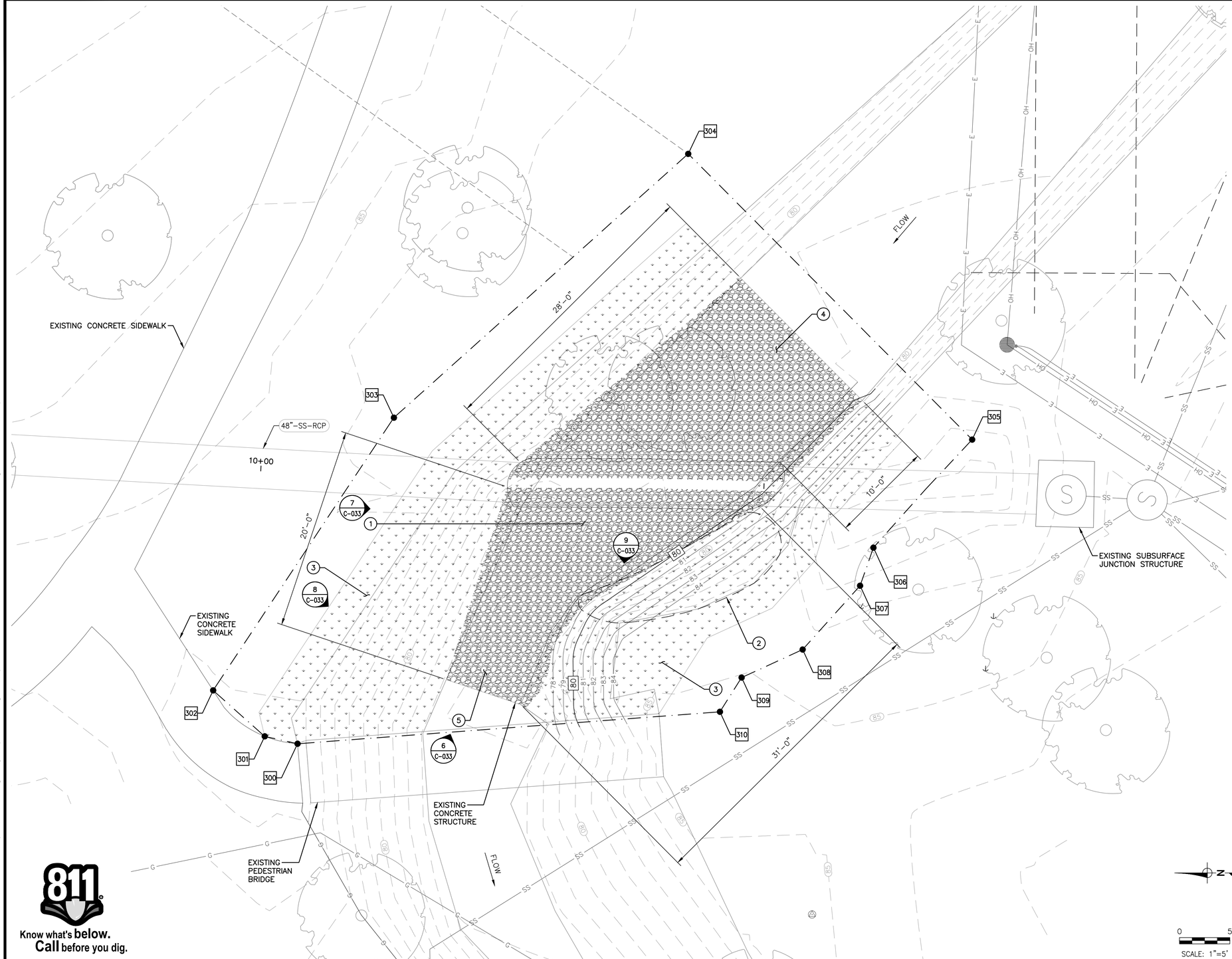
SASD CREEK CROSSING PROJECT

CROSSING 03 & 04 - ARCADE CREEK & GARFIELD THOUSAND OAKS

SITE ACCESS PLAN

DRAWING C-030
SHEET 15 OF --
PROJECT # --

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 - 3:59 AM CADD User: Chris Durbin



SHEET KEY NOTES

1. REMOVE EXISTING BED PROTECTION
2. BACKFILL TO RESTORE BANK
3. INSTALL ANCHORED VEGETATED TURF REINFORCEMENT MAT TO EXTENTS SHOWN. INSTALL ON BOTH BANKS AND ACROSS CHANNEL BENEATH RIP RAP. INSTALL ON SLOPES SHOWN (MAX 1:1)
4. INSTALL UPSTREAM CLASS III RIP RAP AND BEDDING PER DETAILS. SLOPE FROM TOP OF ENCASEMENT TO CHANNEL AT 5:1 (RUN:RISE) MAXIMUM SLOPE
5. INSTALL DOWNSTREAM CLASS III RIP RAP AND BEDDING PER DETAILS. SLOPE FROM TOP OF EXISTING PIPE TO CONCRETE STRUCTURE LOCATED UPSTREAM OF EXISTING BRIDGE
6. HYDROSEED ALL DISTURBED AREAS INCLUDING TURF REINFORCEMENT MAT

TREE REMOVAL

NO TREE REMOVAL FOR ARCADE CREEK SITE

Know what's below. Call before you dig.

SCALE: 1"=5'

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT G. NAPOLI NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

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PHONE: (916) 778-4288 FAX:(805) 888-2764

SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
POSITION DATE

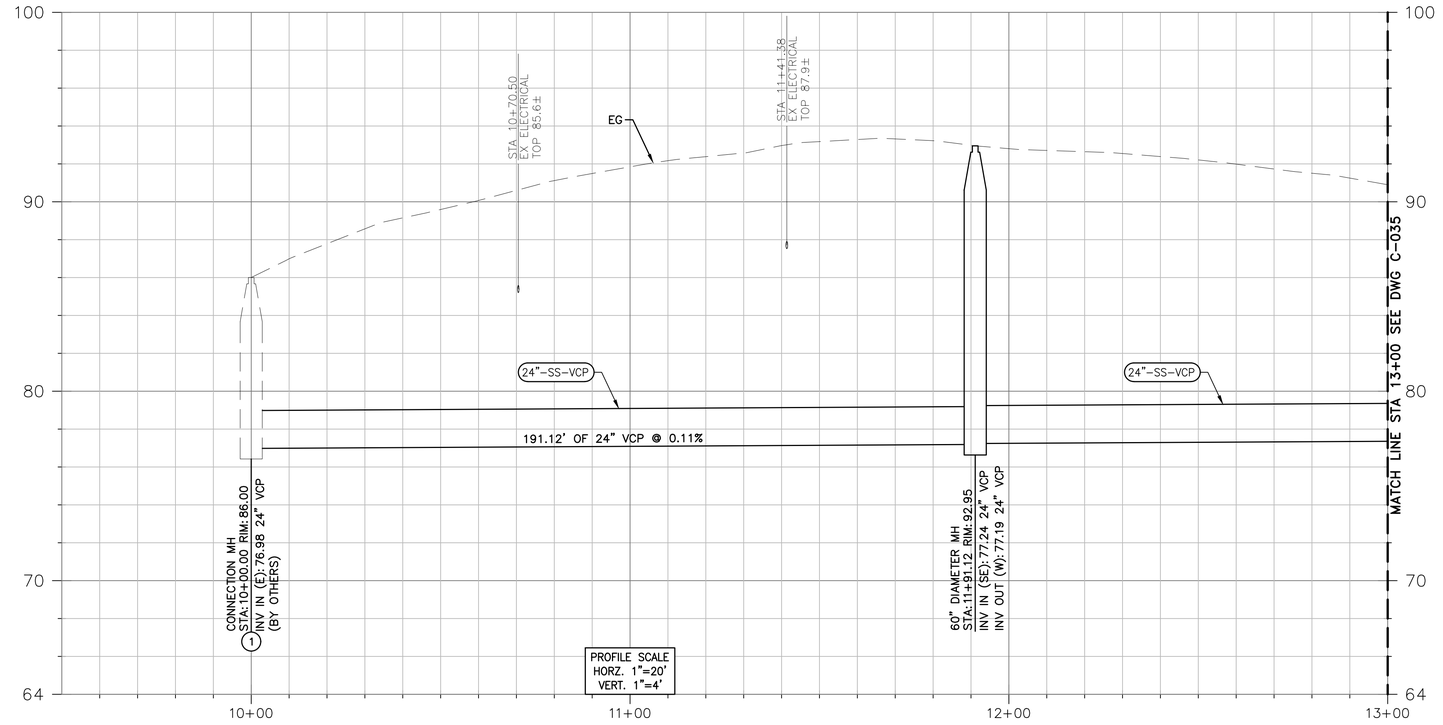
SASD CREEK CROSSING PROJECT

CROSSING 03 & 04 - ARCADE CREEK & GARFIELD THOUSAND OAKS

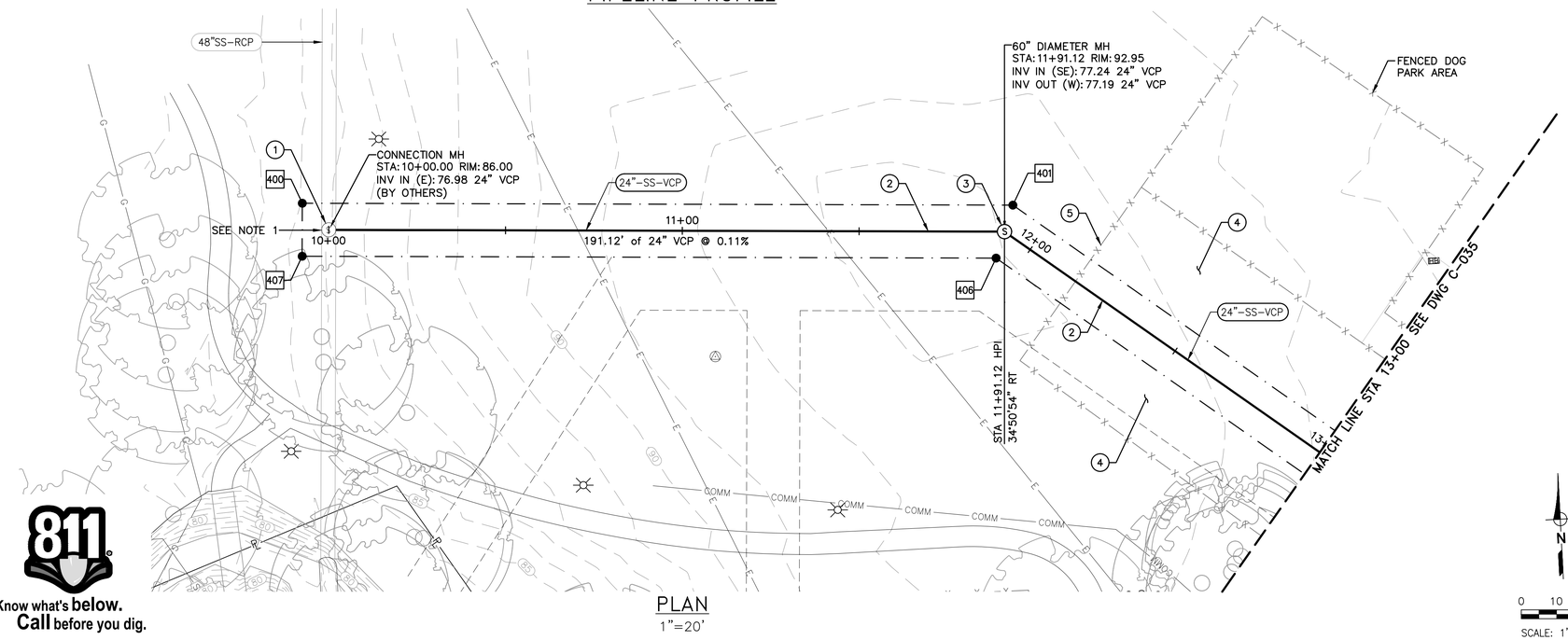
SITE PLAN - ARCADE CREEK

DRAWING C-031
SHEET 16 OF --
PROJECT # –

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 - 5:38 AM CADD User: Chris Durbin



PIPELINE PROFILE



PLAN
1"=20'

SHEET KEY NOTES

1. CONNECT TO EXISTING SS MH
2. INSTALL SS PIPE TO SLOPE AND INVERT SHOWN ON PLAN
3. INSTALL MANHOLE PER SASD STANDARD DETAIL MH-03
4. REPLACE IMPACTED AREAS WITHIN DOG PARK WITH SOD
5. REMOVE AND REPLACE EXISTING DOG FENCING IMPACTED BY ALIGNMENT, MATCH EXISTING

NOTES:

1. APPROXIMATE INVERT OF 48" RCP AT CONNECTION LOCATION IS 75.24±

Know what's **below.** **Call** before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT C. NAVOLI NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

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SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
_____ - _____ - POSITION DATE

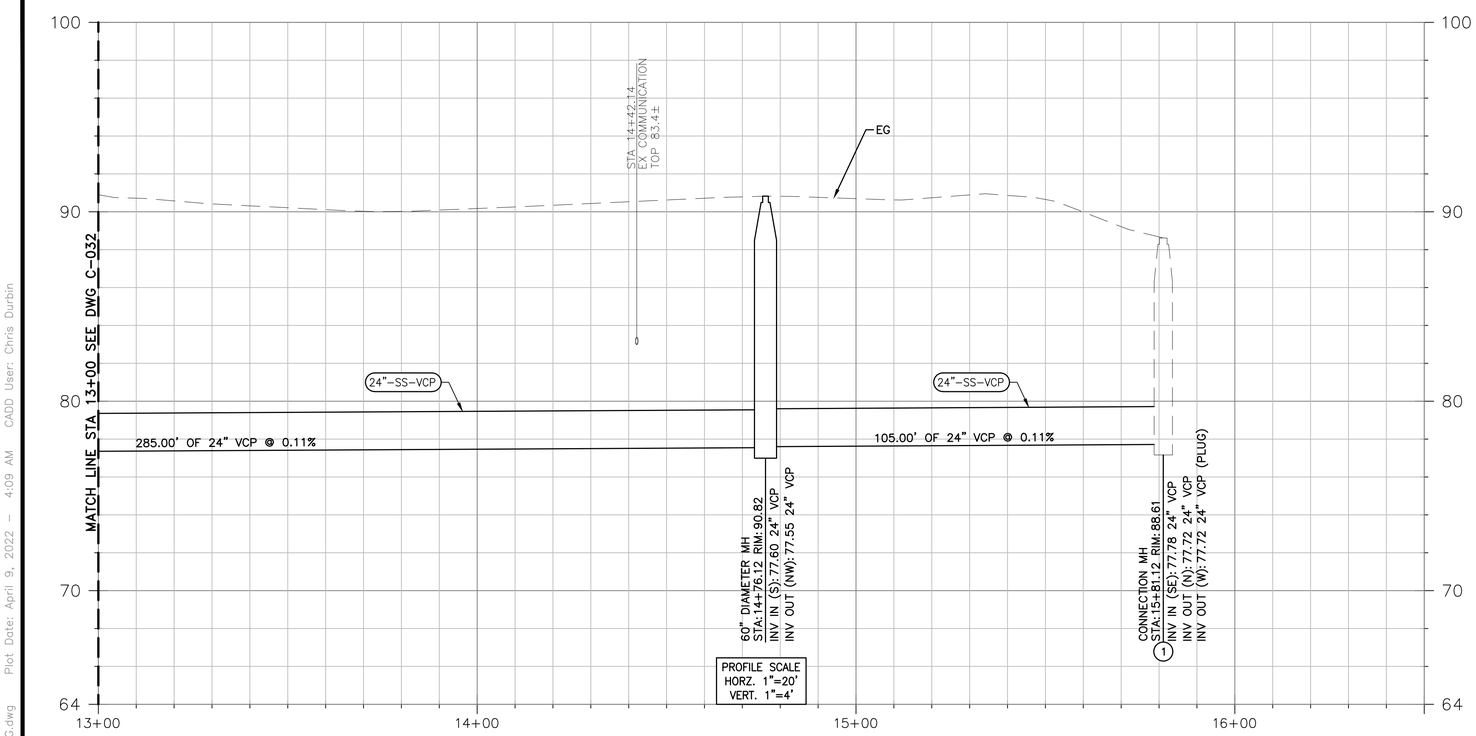
SASD CREEK CROSSING PROJECT

CROSSING 03 & 04 - ARCADE CREEK & GARFIELD THOUSAND OAKS

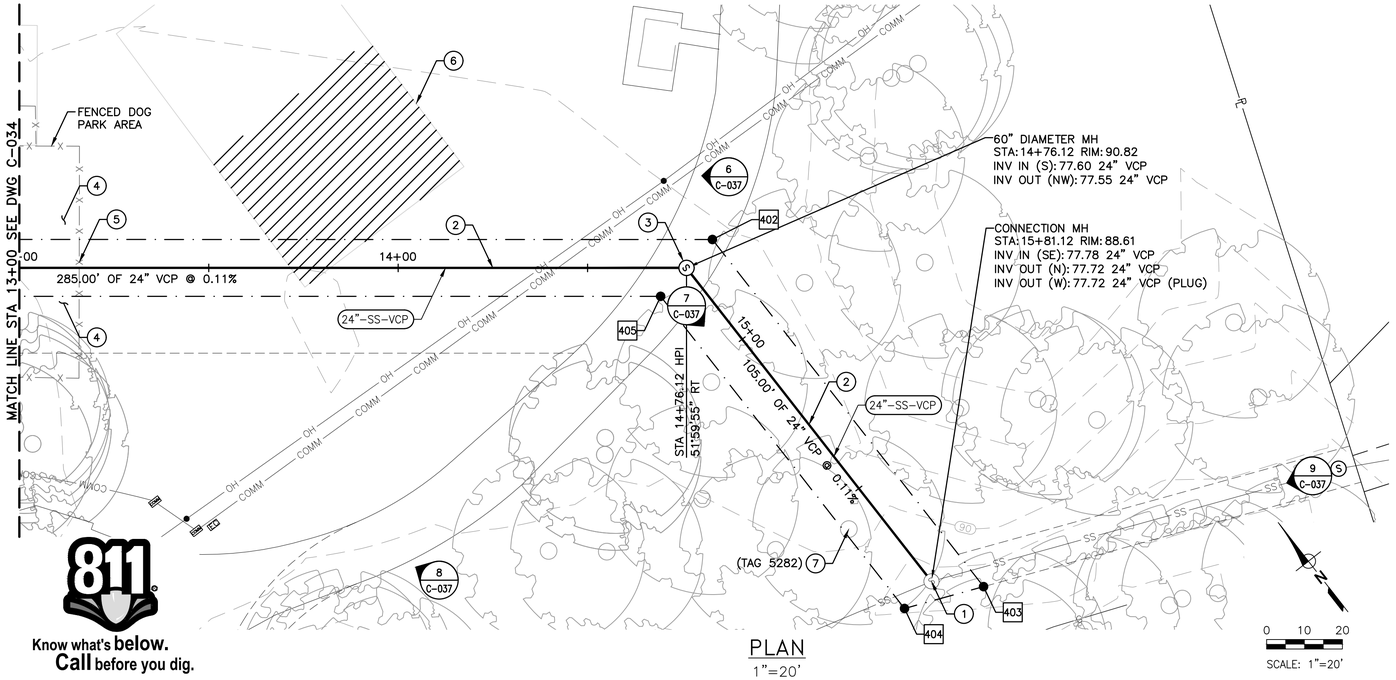
NEW 24" SS PLAN AND PROFILE
STA 10+00 TO STA 13+00

DRAWING
C-034
SHEET 19 OF --
PROJECT # _

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 - 4:06 AM CADD User: Chris Durbin



PIPELINE PROFILE



PLAN
1"=20'

SHEET KEY NOTES

1. CONNECT TO EXISTING SS MH
2. INSTALL SS PIPE TO SLOPE AND INVERT SHOWN ON PLAN
3. INSTALL MANHOLE PER SASD STANDARD DETAIL MH-03
4. REPLACE IMPACTED AREAS WITHIN DOG PARK WITH SOD
5. REMOVE AND REPLACE EXISTING DOG FENCING IMPACTED BY ALIGNMENT, MATCH EXISTING
6. REMOVE AND REPAVE HALF OF EXISTING ASPHALT BASKETBALL COURT. MATCH EXISTING DEPTH OF AC
7. REMOVE EXISTING TREE AS NOTED ON PLANS

TREE REMOVAL

N/A	TAG 5282

LEGEND

PAVEMENT EXTENTS, SEE SPECIFICATIONS FOR AC PAVEMENT REQUIREMENTS

Know what's **below.** **Call** before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT C. NAJOLI NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

WSC
2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
_____ - _____ POSITION DATE

SASD CREEK CROSSING PROJECT

CROSSING 03 & 04 - ARCADE CREEK & GARFIELD THOUSAND OAKS

NEW 24" SS PLAN AND PROFILE
STA 13+00 TO STA 15+81±

DRAWING
C-035
SHEET 20 OF --
PROJECT # _

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 - 4:09 AM CADD User: Chris Durbin

SHEET KEY NOTES

1. CAP AND ABANDON EXISTING 24" VCP PER SASD STANDARDS
2. ABANDON EXISTING MANHOLE PER SASD STANDARDS
3. REMOVE EXISTING 24" VCP FROM CREEK AND 5' INTO BANKS (TYP BOTH SIDES)
4. BACKFILL AND RESTORE CREEK BED AND BANKS
5. INSTALL ANCHORED VEGETATED TURF REINFORCEMENT MAT ON SLOPES DISTURBED BY WORK
6. REMOVE EXISTING TREES AS NOTED ON PLANS

TREE REMOVAL

REMOVE TWO TREE CLUSTERS INDICATED IN CREEK. CLUSTERS ARE BELOW TAGGED TREE DIAMETER SIZES.

ABANDON TO UPSTREAM MANHOLE OF REROUTED SEWER, SEE PLAN BELOW RIGHT FOR UPSTREAM EXTENT

ABANDON TO DOWNSTREAM MANHOLE (ADJACENT TO CREEK) SEE PLAN ABOVE LEFT FOR DOWNSTREAM EXTENT

24"-SS-VCP

5'-0"

10'-0"

5'-0"

10'-0"

SCALE: 1"=10'

Know what's below. Call before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT G. NAYOLI NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

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SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
POSITION DATE

SASD CREEK CROSSING PROJECT

CROSSING 03 & 04 - ARCADE CREEK & GARFIELD THOUSAND OAKS

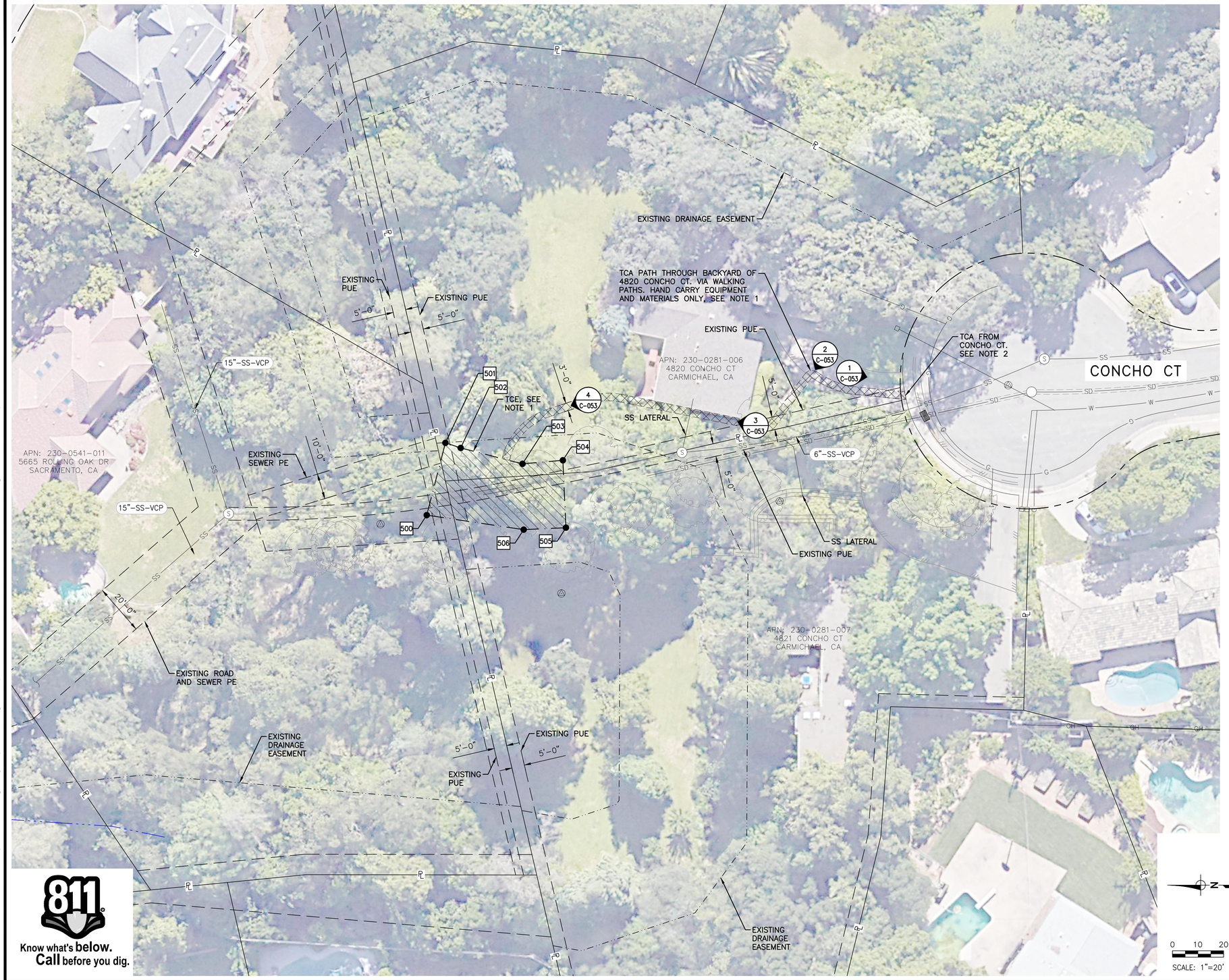
DEMOLITION PLAN

DRAWING C-036

SHEET 21 OF --

PROJECT # --

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 - 4:13 AM CADD User: Chris Durbin



NOTES:

1. SEE DWG G-005 FOR TCE COORDINATES.
2. ACCESS TO CROSSING BEYOND THIS POINT IS VIA HOMEOWNER DRIVEWAY, PATHWAYS, AND OPEN SPACE WITH MATURE TREES AND SHRUBS. CONTRACTOR TO SUBMIT PROTECTION PLAN PRIOR TO EQUIPMENT OR MATERIALS BEING BROUGHT BEYOND THIS POINT. SEE CROSSING PHOTOS FOR PATH DETAILS.
3. CONTRACTOR RESPONSIBLE FOR PROVIDING THEIR OWN STAGING AREA.
4. REMOVAL AND PRUNING OF TREES WILL REQUIRE APPROVAL FROM SASD AND SHALL BE PERFORMED UNDER THE OVERSIGHT OF A CERTIFIED ARBORIST.

LEGEND

- ACCESS PATH TO SITE
- WORK AREA GROUND DISTURBANCE LIMITS
- STAGING AREA

811 Know what's below. Call before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT G. NAYOLI NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

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2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
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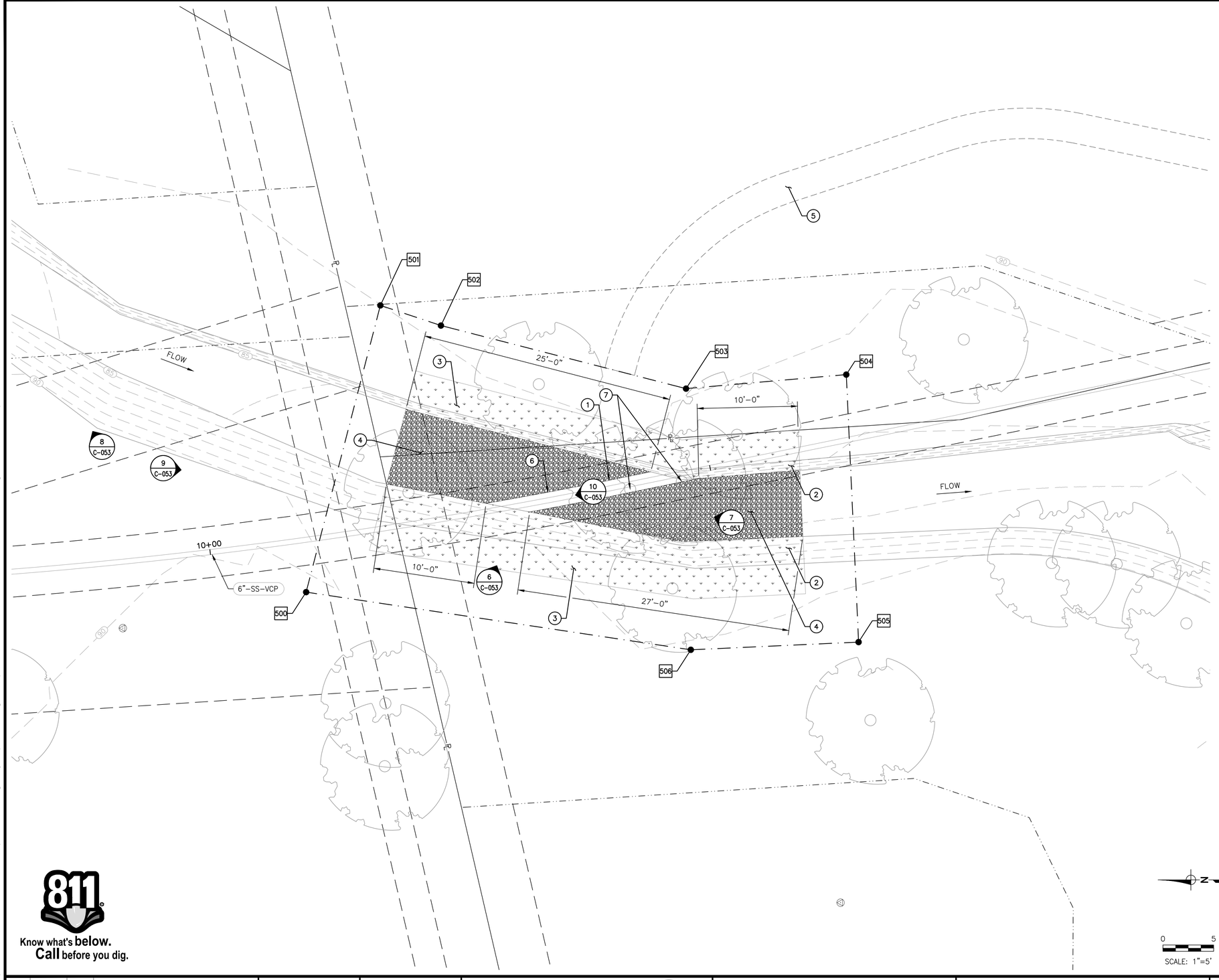
SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
_____ _____ – POSITION DATE

SASD CREEK CROSSING PROJECT
CROSSING 05 - CONCHO COURT
SITE ACCESS PLAN

DRAWING
C-050
SHEET 23 OF --
PROJECT #
–

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 – 4:15 AM CADD User: Chris Durbin



SHEET KEY NOTES

1. REMOVE EXISTING COBBLES FROM CREEK BED ADJACENT TO CROSSING
2. WHERE GRADES EXCEEDS 1:1 IN TURF REINFORCED MAT AREAS, PREPARE GRADE WITH STABILIZING FILL MATERIAL
3. INSTALL ANCHORED VEGETATED TURF REINFORCED MAT OVER SLOPES TO EXTENTS SHOWN
4. INSTALL 12" THICK ENGINEERED MATTRESS SYSTEM
5. RESTORE PRIVATE PROPERTY, INSTALL SOD IN IMPACTED LAWN AREAS. RESTORE ACCESS PATHS AND HOMEOWNER HARDSCAPE AND LANDSCAPING TO MATCH EXISTING CONDITIONS. SEE ACCESS PLANS FOR TCA ROUTE
6. PROTECT EXISTING 6" SS IN CONCRETE ENCASEMENT IN PLACE. DIMENSIONS AND EXTENT OF CONCRETE ENCASEMENT UNKNOWN. CONTRACTOR SHALL FIELD VERIFY AND SUPPORT AS NECESSARY FOR WORK
7. REMOVE EXISTING TREES AS NOTED ON PLANS

TREE REMOVAL

REMOVE TWO TREE CLUSTERS INDICATED IN CREEK. CLUSTERS ARE BELOW TAGGED TREE DIAMETER SIZES.

N

0 5
SCALE: 1"=5'

811 Know what's below. Call before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
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DESIGNED MJG
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SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT C. NAYLOR NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

WSC
2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

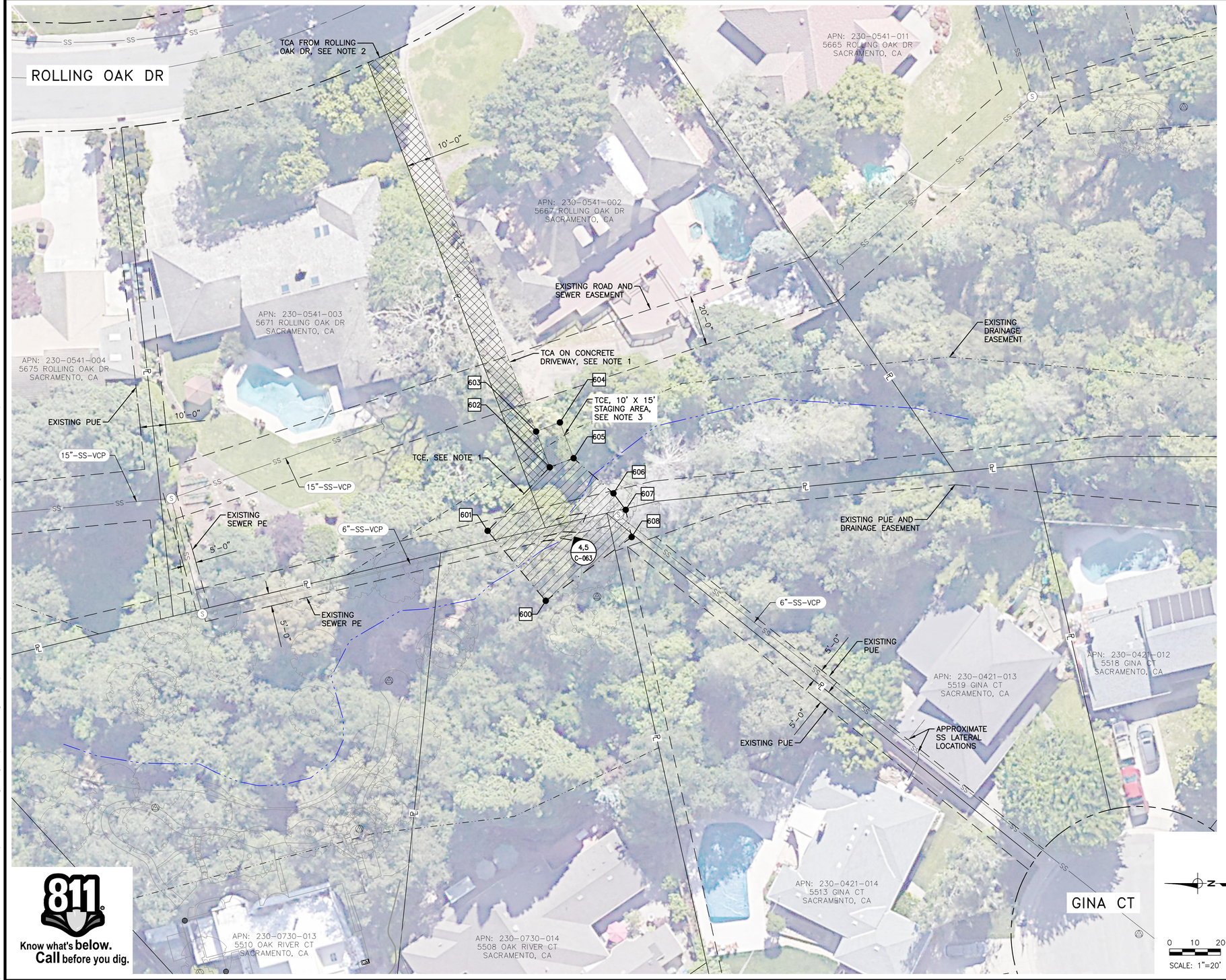
SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
_____ – _____– POSITION DATE

SASD CREEK CROSSING PROJECT
CROSSING 05 - CONCHO COURT
SITE PLAN

DRAWING
C-051
SHEET 24 OF --
PROJECT # –

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 – 4:16 AM CADD User: Chris Durbin



NOTES:

1. SEE DWG G-005 FOR TCE COORDINATES.
2. ACCESS TO CROSSING BEYOND THIS POINT IS VIA HOMEOWNER DRIVEWAY, PATHWAYS, AND OPEN SPACE WITH MATURE TREES AND SHRUBS. CONTRACTOR TO SUBMIT PROTECTION PLAN PRIOR TO EQUIPMENT OR MATERIALS BEING BROUGHT BEYOND THIS POINT. SEE CROSSING PHOTOS FOR PATH DETAILS.
3. STAGING SHALL BE LIMITED TO THE AREA SHOWN ON THE PLAN. CONTRACTOR TO COORDINATE ADDITIONAL STAGING ALONG ROLLING OAK DRIVE IN THE PAVED RIGHT OF WAY TO FACILITATE WORK.
4. REMOVAL AND PRUNING OF TREES WILL REQUIRE APPROVAL FROM SASD AND SHALL BE PERFORMED UNDER THE OVERSIGHT OF A CERTIFIED ARBORIST.

LEGEND

- ACCESS PATH TO SITE
- WORK AREA GROUND DISTURBANCE LIMITS
- STAGING AREA

N

0 10 20
SCALE: 1"=20'

811 Know what's below. Call before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT C. NAVOLI NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

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2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

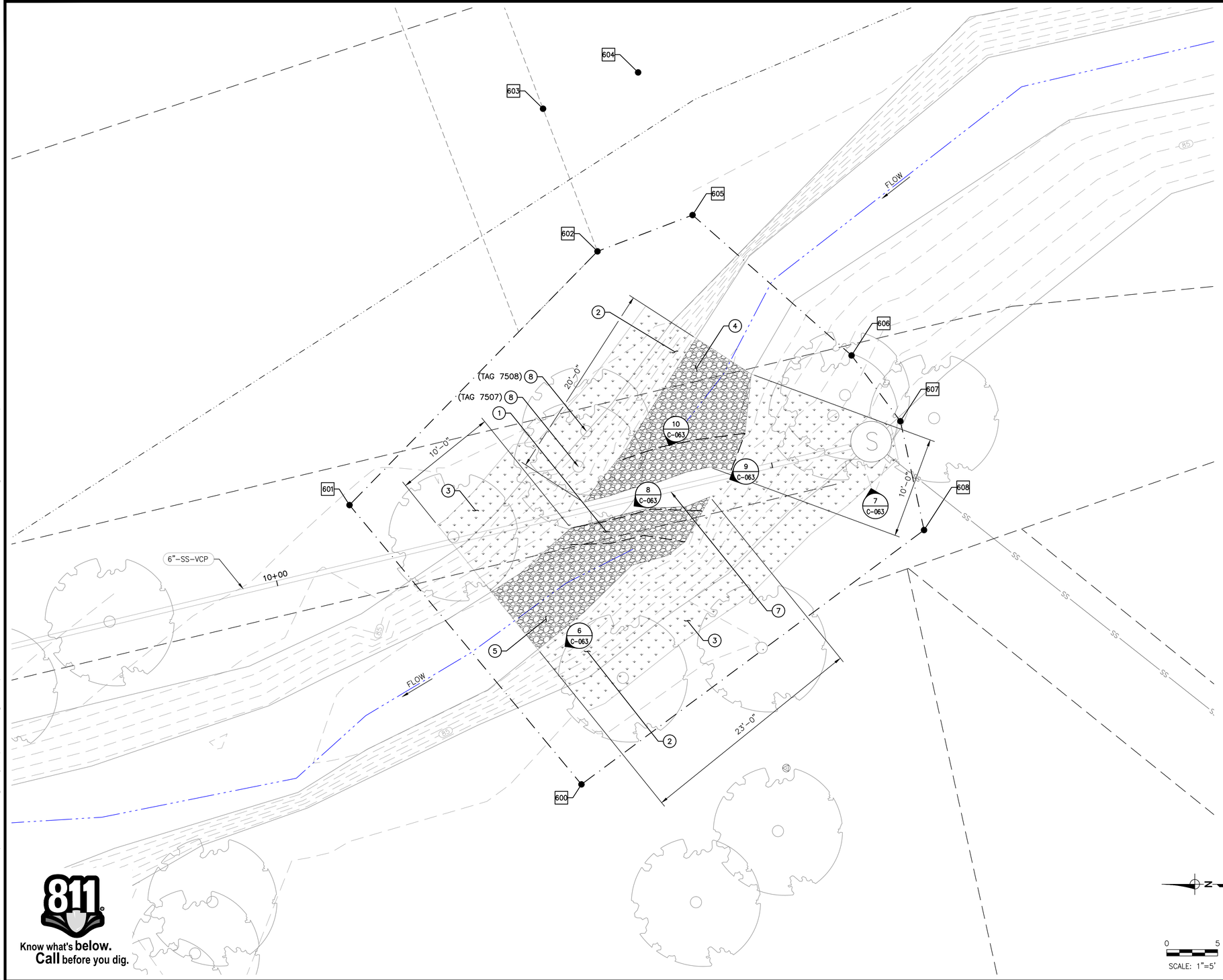
SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
_____ – _____– POSITION DATE

SASD CREEK CROSSING PROJECT
CROSSING 06 - GINA COURT
SITE ACCESS PLAN

DRAWING
C-060
SHEET 27 OF --
PROJECT #
–

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 – 5:46 AM CADD User: Chris Durbin



SHEET KEY NOTES

1. REMOVE EXISTING SASD INSTALLED COBBLES ADJACENT TO CROSSING CONCRETE ENCASEMENT
2. WHERE GRADES EXCEEDS 1:1 IN TURF REINFORCED MAT AREAS, PREPARE GRADE WITH STABILIZING FILL MATERIAL
3. INSTALL ANCHORED VEGETATED TURF REINFORCED MAT OVER SLOPES AND ACROSS THE CREEK BED TO EXTENTS SHOWN
4. INSTALL UPSTREAM AND DOWNSTREAM CLASS I RIPRAP. SLOPE FROM TOP OF ENCASEMENT TO CHANNEL BED AT 5:1 (RUN:RISE) MAXIMUM SLOPE. INSTALL TURF REINFORCEMENT MAT BELOW RIPRAP.
5. INSTALL DOWNSTREAM CLASS I RIPRAP. SLOPE FROM TOP OF ENCASEMENT TO CHANNEL BED AT 5:1 (RUN:RISE) MAXIMUM SLOPE. INSTALL TURF REINFORCEMENT MAT BELOW RIPRAP.
6. RESTORE PRIVATE PROPERTY. RESTORE ACCESS PATHS TO MATCH EXISTING CONDITIONS. SEE ACCESS PLANS FOR ROUTE.
7. PROTECT EXISTING 6" SS IN CONCRETE ENCASEMENT IN PLACE. DIMENSIONS AND EXTENT OF CONCRETE ENCASEMENT UNKNOWN. CONTRACTOR SHALL FIELD VERIFY AND SUPPORT AS NECESSARY FOR WORK
8. REMOVE EXISTING TREES AS NOTED ON PLANS

TREE REMOVAL

12IN X 15FT DEC	TAG 7508
3-4IN+6IN X 12FT DEC	TAG 7507

811 Know what's **below.** **Call** before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT C. NAJOLI NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

WSC
2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

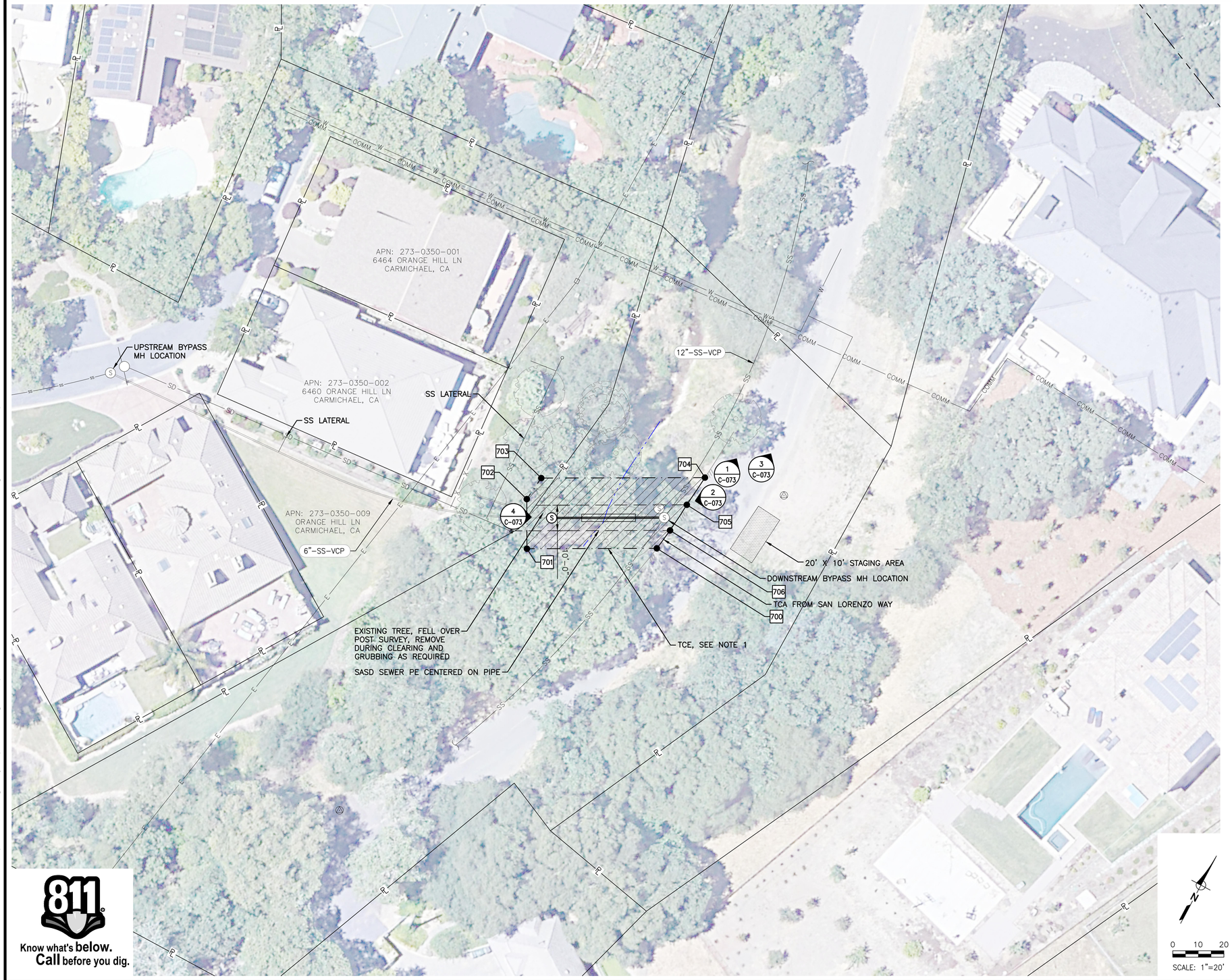
SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
POSITION DATE

SASD CREEK CROSSING PROJECT
CROSSING 06 - GINA COURT
SITE PLAN

DRAWING C-061
SHEET 28 OF --
PROJECT # _

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 - 4:21 AM CADD User: Chris Durbin



NOTES:

1. SEE DWG G-005 FOR TCE COORDINATES.
2. SEE CROSSING PHOTOS FOR ACCESS. CONTRACTOR SHALL NOT DAMAGE LANDSCAPING OR HARDSCAPING ON PRIVATE PROPERTY OR IN RIGHT OF WAY.
3. PRUNING OF TREES WILL REQUIRE APPROVAL FROM SASD AND SHALL BE PERFORMED UNDER THE OVERSIGHT OF A CERTIFIED ARBORIST.

LEGEND

- ACCESS PATH TO SITE
- WORK AREA GROUND DISTURBANCE LIMITS
- STAGING AREA

Know what's below. Call before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT G. NATOLI NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

WSC
2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

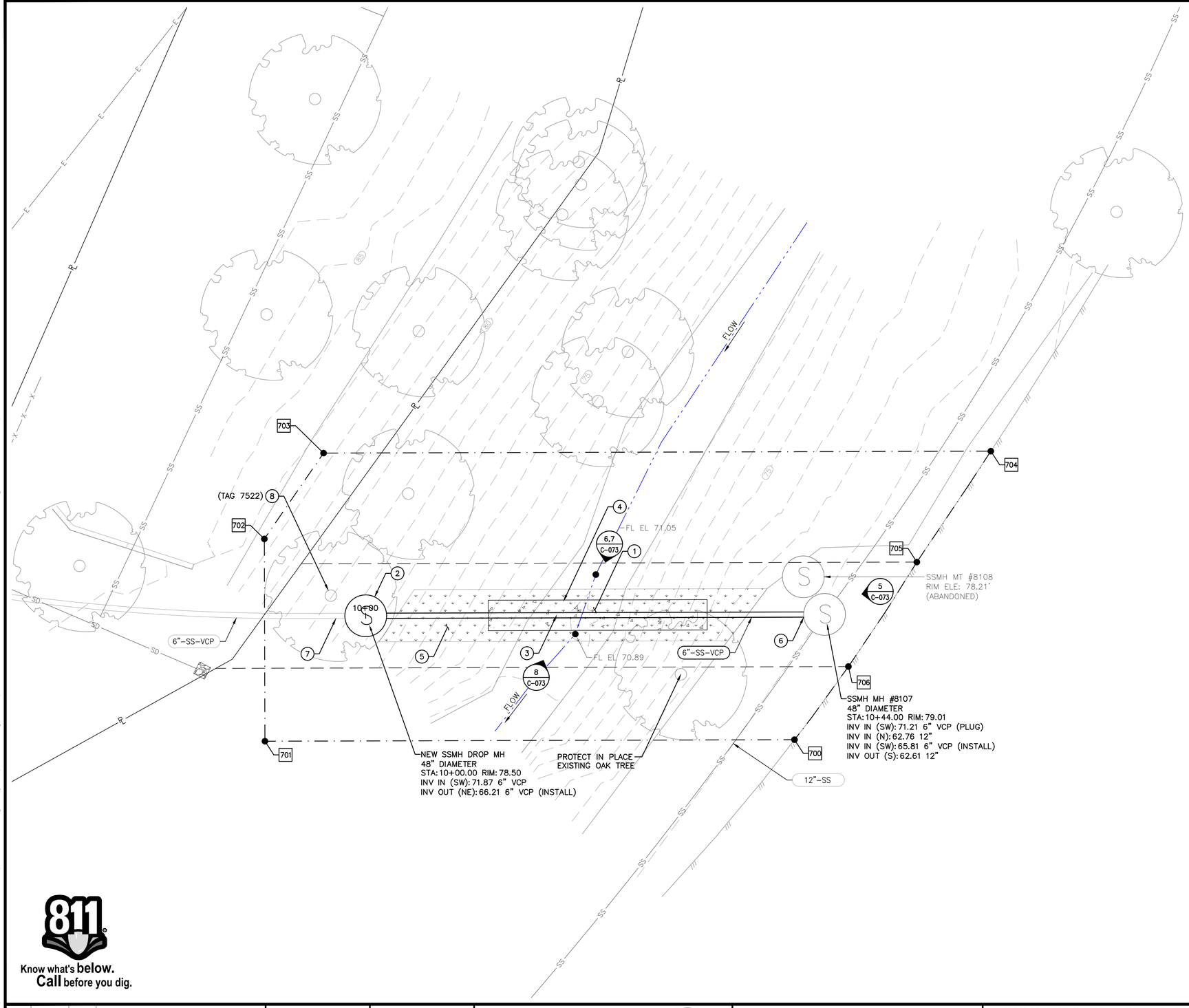
SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
_____ _____ POSITION DATE

SASD CREEK CROSSING PROJECT
CROSSING 07 - SAN LORENZO WAY
SITE ACCESS PLAN

DRAWING
C-070
SHEET 31 OF --
PROJECT # --

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 - 4:25 AM CADD User: Chris Durbin



SHEET KEY NOTES

1. REMOVE EXISTING COBBLES FROM CREEK
2. INSTALL 48" MANHOLE PER SASD STANDARD DETAIL MH–03. INSTALL INSIDE DROP CONNECTION PER SASD DETAIL MH–07 AND UPSTREAM 1' AND 2' SEGMENTS FOR FLEXIBILITY PER SASD DETAIL MH–03
3. REMOVE EXISTING 6"–SS, REPLACE AT LOWER INVERT BELOW CREEK, ALONG THE SAME ALIGNMENT, SEE SHEET C–072
4. INSTALL CONCRETE ENCASEMENT AROUND BURIED PIPE UNDER CREEK. ENCASEMENT DIMENSIONS TO BE 35" W X 35" H X 21'–0" L
5. INSTALL TRM OVER DISTURBED AREA UP TO ELEVATION 77.5–FT. HYDROSEED DISTRUBED AREAS ABOVE 77.5–FT ELEVATION
6. PLUG AND SEAL EXISTING MANHOLE CONNECTION. CORE MANHOLE AND INSTALL LINK SEAL FOR NEW SS PENETRATION
7. CONTRACTOR TO POTHOLE TO FIELD VERIFY EXISTING 6" SS MATERIAL, DEPTH, AND LOCATION PRIOR TO MANHOLE SUBMITTAL. FINAL MANHOLE LOCATION TO BE COORDINATED WITH AND APPROVED BY OWNER
8. REMOVE EXISTING TREE AS NOTED ON PLANS

TREE REMOVAL

10IN X 15FT DEC	TAG 7522

** NOTE THAT TREE FELL OVER SINCE SURVEY, TREE AND STUMP TO BE REMOVED FROM SITE.

Know what's below. Call before you dig.

0 5
SCALE: 1"=5'

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT C. NAYLOR NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

WSC
2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778–4288 FAX:(805) 888–2764

SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
_____ – _____– POSITION DATE

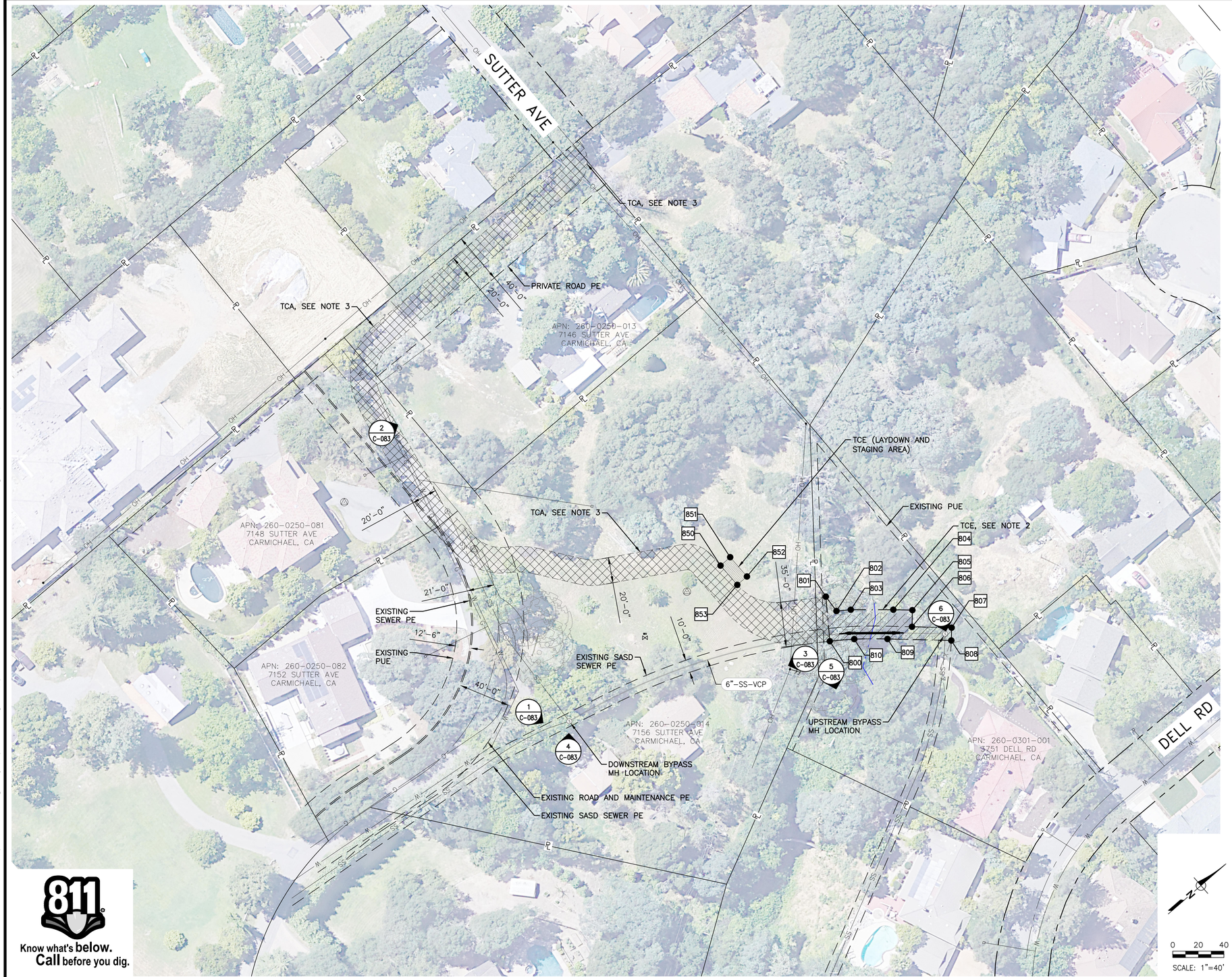
SASD CREEK CROSSING PROJECT

CROSSING 07 - SAN LORENZO WAY

SITE PLAN

DRAWING
C-071
SHEET 32 OF ––
PROJECT # –

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD–CREEK CROSSING.dwg Plot Date: April 9, 2022 – 4:27 AM CADD User: Chris Durbin



NOTES:

1. THE SEWER EASEMENT IN THIS AREA IS RECORDED INCORRECTLY. THE SASD ARCPAD MAPS FOR THIS AREA SHOW THE EASEMENT DIFFERENTLY THAN AS RECORDED ON THE RECORD DRAWINGS FOR THIS STRETCH OF PIPE.
2. SEE DWG G-005 FOR TCE COORDINATES.
3. ACCESS TO CROSSING BEYOND THIS POINT IS VIA HOMEOWNER PRIVATE PROPERTY AND FIELD INCLUDING FENCING, GATES, AND MATURE TREES AND SHRUBS. CONTRACTOR TO SUBMIT PROPERTY PROTECTION PLAN PRIOR TO EQUIPMENT OR MATERIALS BEING BROUGHT BEYOND THIS POINT. SEE CROSSING PHOTOS FOR PATH DETAILS. CONTRACTOR SHALL NOT DAMAGE LANDSCAPING ON PRIVATE PROPERTY.
4. STAGING SHALL BE LIMITED TO THE AREA SHOWN ON THE PLAN.
5. REMOVAL AND PRUNING OF TREES WILL REQUIRE APPROVAL FROM SASD AND SHALL BE PERFORMED UNDER THE OVERSIGHT OF A CERTIFIED ARBORIST.

LEGEND

- ACCESS PATH TO SITE
- WORK AREA GROUND DISTURBANCE LIMITS
- STAGING AREA

0 20 40
SCALE: 1"=40'

Know what's below. Call before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT G. NAVOLI NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

WSC
2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

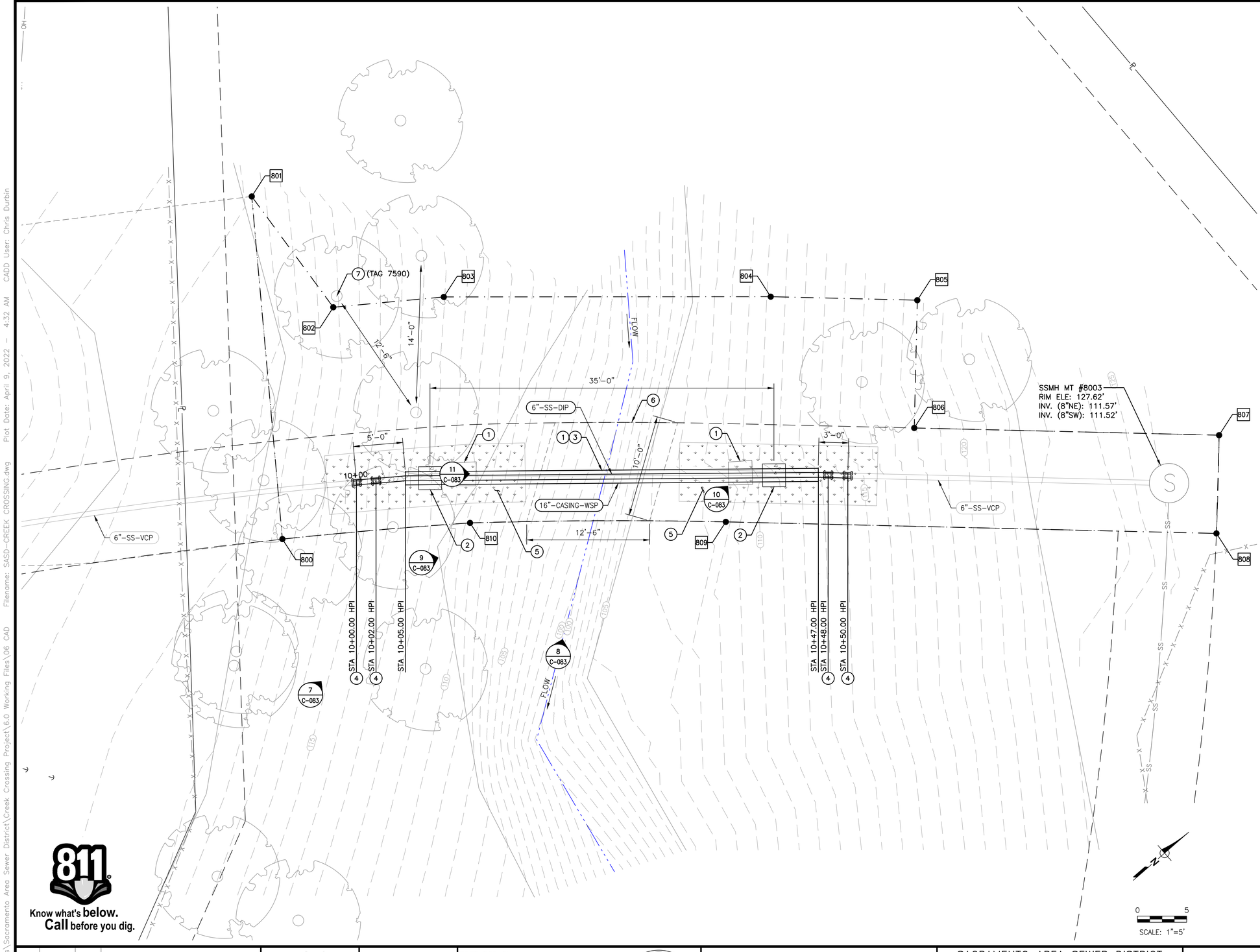
SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
_____ – POSITION DATE

SASD CREEK CROSSING PROJECT
CROSSING 08 - SUTTER AVENUE
SITE ACCESS PLAN

DRAWING
C-080
SHEET 35 OF --
PROJECT # –

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 – 4:30 AM CADD User: Chris Durbin



SHEET KEY NOTES

1. REMOVE EXISTING ALUMINUM PIPE AND CONCRETE PIERS
2. INSTALL NEW CONCRETE SUPPORTS PER STRUCTURAL DETAILS, SET INTO BANKS FOR STABILITY PER ELEVATIONS SHOWN ON SHEET C-082
3. INSTALL SS PIPE CROSSING WITH 16"-WELDED STEEL SCH. 40 CASING. 6" SS PIPE ALIGNMENT, ELEVATION AND SLOPE TO MATCH EXISTING 6" PIPE BEING REMOVED, REPLACEMENT ELEVATIONS PER SHEET C-082
4. INSTALL DOUBLE 6" FLEXIBLE JOINTS PER DETAILS. INSTALL BEYOND CASING AND SUPPORTS
5. HYDROSEED DISTURBED SLOPE AREAS
6. CONTRACTOR MAY GRADE TEMPORARY PAD 12'-6" BY 10' TO MAXIMUM EL 106.00. REMOVE MATERIAL AND RESTORE ORIGINAL CREEK BED ELEVATIONS PER PROFILE
7. REMOVE EXISTING TREE AS NOTED ON PLANS

TREE REMOVAL

DEAD TREE	TAG 7590

Know what's **below.** **Call** before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT C. NAITO NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

WSC
2330 EASST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
_____ – _____– POSITION DATE

SASD CREEK CROSSING PROJECT
CROSSING 08 - SUTTER AVENUE
SITE PLAN

DRAWING
C-081
SHEET 36 OF --
PROJECT #
–

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 – 4:32 AM CADD User: Chris Durbin



NOTES:

1. SEE DWG G-005 FOR TCE COORDINATES.
2. ACCESS TO CROSSING BEYOND THIS POINT IS VIA OPEN SPACE WITH MATURE TREES AND SHRUBS. CONTRACTOR TO SUBMIT PROTECTION PLAN PRIOR TO EQUIPMENT OR MATERIALS BEING BROUGHT BEYOND THIS POINT. SEE CROSSING PHOTOS FOR PATH DETAILS.
3. STAGING AREA ANTICIPATED TO BE IN CAMPFIRE WAY RIGHT OF WAY IN PAVED AREA. MAXIMUM AREA OF 10-FT X 25-FT ANTICIPATED.
4. REMOVAL AND PRUNING OF TREES WILL REQUIRE APPROVAL FROM SASD AND SHALL BE PERFORMED UNDER THE OVERSIGHT OF A CERTIFIED ARBORIST.

LEGEND

- ACCESS PATH TO SITE
- WORK AREA GROUND DISTURBANCE LIMITS
- STAGING AREA

N

0 10 20
SCALE: 1"=20'

811 Know what's below. Call before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT C. NAYLOR NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

WSC
2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

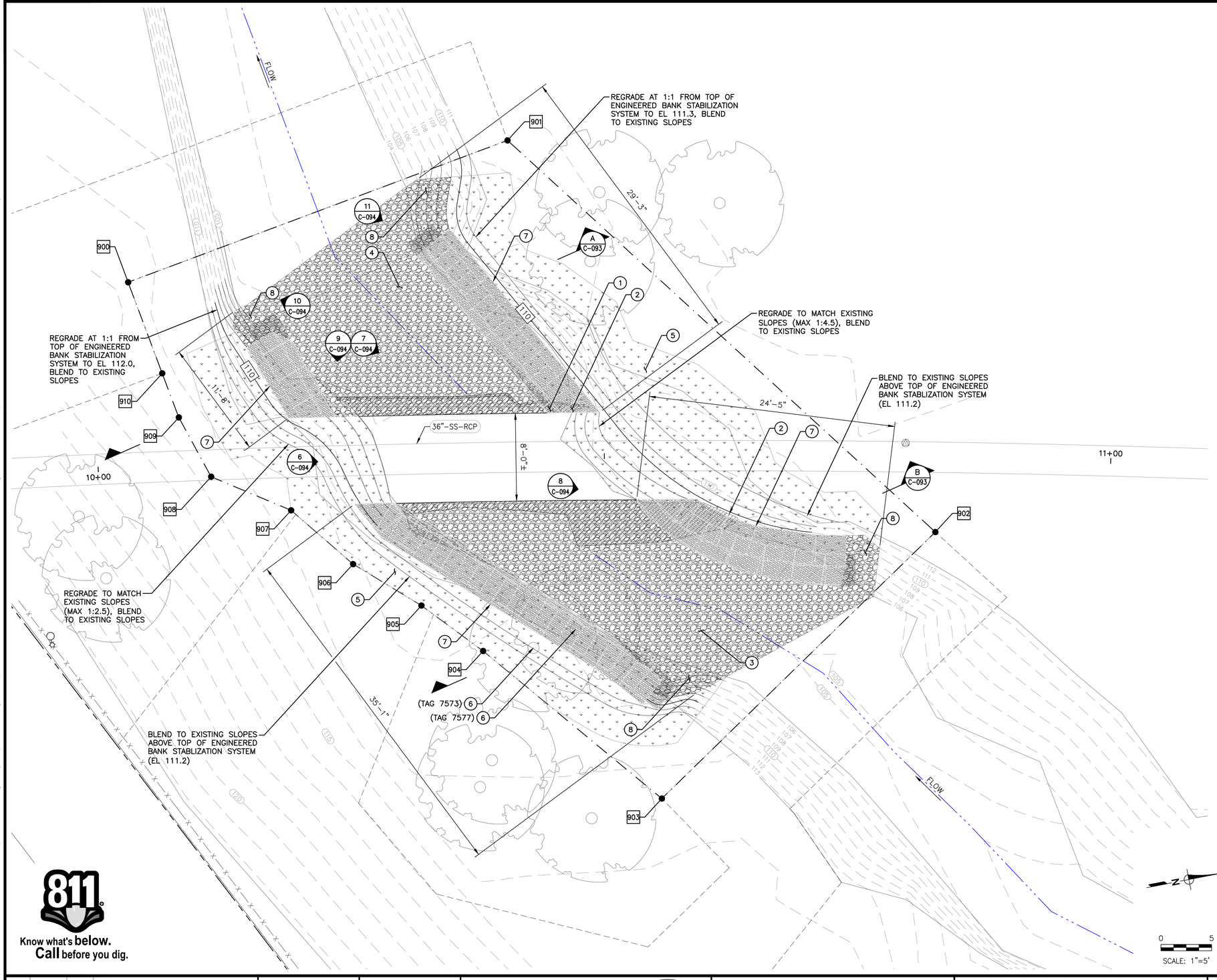
SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
_____ - _____ - POSITION DATE

SASD CREEK CROSSING PROJECT
CROSSING 09 - CAMPFIRE WAY
SITE ACCESS PLAN

DRAWING C-090
SHEET 39 OF --
PROJECT # -

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 - 4:35 AM CADD User: Chris Durbin

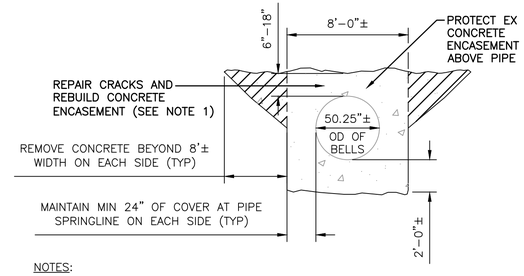


SHEET KEY NOTES

1. REMOVE EXISTING SANDBAGS AND COBBLES
2. REMOVE AND REPAIR EXISTING CONCRETE ENCASEMENT PER DETAIL 1, THIS SHEET
3. INSTALL UPSTREAM CLASS III RIP RAP AND BEDDING PER DETAILS. SLOPE FROM TOP OF ENCASEMENT TO CHANNEL AT 5:1 (RUN:RISE) MAXIMUM SLOPE
4. INSTALL DOWNSTREAM CLASS III RIP RAP AND BEDDING PER DETAILS. SLOPE FROM TOP OF ENCASEMENT TO CHANNEL AT 5:1 (RUN:RISE) MAXIMUM SLOPE
5. INSTALL ANCHORED VEGETATED TURF REINFORCED MAT OVER SLOPES TO EXTENTS SHOWN. EMBED INTO ENGINEERED BANK STABILIZATION SYSTEM AND EXISTING CONCRETE CAP. INSTALL ON SLOPES SHOWN (MAX 1:1)
6. REMOVE EXISTING TREE AS NOTED ON PLANS
7. INSTALL ANCHORED ENGINEERED BANK STABILIZATION SYSTEM PER DETAILS
8. MINIMIZE BANK DISTURBANCE AT EDGES OF ENGINEERED BANK STABILIZATION SYSTEM. COVER DISTURBED AREAS WITH CLASS III RIP-RAP UP TO ELEVATION OF TOP TIER (MIN 111.0)
9. HYDROSEED ALL DISTURBED AREAS INCLUDING TURF REINFORCEMENT MAT

TREE REMOVAL

2-5IN DEC	TAG 7577
30IN OAK	TAG 7573



NOTES:

1. AREAS WHERE CONCRETE ENCASEMENT DOES NOT PROVIDE MIN ENCASEMENT SHOWN FILL WITH CLSM
2. PERFORM CRACK REPAIR WITH INJECTION GROUTING

CONCRETE ENCASEMENT DETAIL — 1 / –
NOT TO SCALE

Know what's **below.** **Call** before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED	MJG
DRAWN	CJD
CHECKED	RGN
SCALE	AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT C. NAIVALT NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

WSC
2330 EASST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
_____ – _____– POSITION DATE

SASD CREEK CROSSING PROJECT
CROSSING 09 - CAMPFIRE WAY
SITE PLAN

DRAWING C-091
SHEET 40 OF ––
PROJECT # –

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 - 6:43 AM CADD User: Michael Goymerac

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 - 4:44 AM CADD User: Chris Durbin

APN: 211-0720-055
6430 INDIAN RIVER DR
CITRUS HEIGHTS, CA

APN: 211-0710-016
6433 INDIAN RIVER DR
CITRUS HEIGHTS, CA

APN: 211-0710-048
TALL TREE CIR
CITRUS HEIGHTS, CA

INDIAN RIVER DR

TALL TREE CIR

TCE (LAYDOWN AND STAGING AREA, SEE NOTE 3)

TCE, SEE NOTE 1

TCA, SEE NOTE 2

TCA FROM INDIAN RIVER DR, SEE NOTE 2

SEWER PE CENTERED ON PIPE

10"-SS-VCP

6"-SS-VCP

UPSTREAM BYPASS MH LOCATION

DOWNSTREAM BYPASS MH LOCATION

15'-0"

10'-0"

3 C-103

1 C-103

2 C-103

110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129

NOTES:

1. SEE DWG G-005 FOR TCE COORDINATES.
2. ACCESS TO CROSSING 10 IS VIA PARKS DISTRICT PROPERTY INCLUDING OPEN FIELDS, BOLLARDS, AND MATURE TREES AND SHRUBS. CONTRACTOR TO SUBMIT PROPERTY PROTECTION PLAN PRIOR TO EQUIPMENT OR MATERIALS BEING BROUGHT INTO THE PARK PROPERTY. SEE CROSSING PHOTOS FOR PATH DETAILS. CONTRACTOR SHALL NOT DAMAGE PARK. ALL GRASS AREAS SHALL BE RESEEDED AND RESTORED.
3. STAGING SHALL BE LIMITED TO THE AREA SHOWN ON THE PLAN.
4. REMOVAL AND PRUNING OF TREES WILL REQUIRE APPROVAL FROM SASD AND SHALL BE PERFORMED UNDER THE OVERSIGHT OF A CERTIFIED ARBORIST.

LEGEND

- ACCESS PATH TO SITE
- WORK AREA GROUND DISTURBANCE LIMITS
- STAGING AREA

0 10 20
SCALE: 1"=20'

811 Know what's below. Call before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY: MJG
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT C. NAIOLI NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

WSC
2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
_____ – _____– POSITION DATE

SASD CREEK CROSSING PROJECT

CROSSING 10 - INDIAN RIVER DRIVE

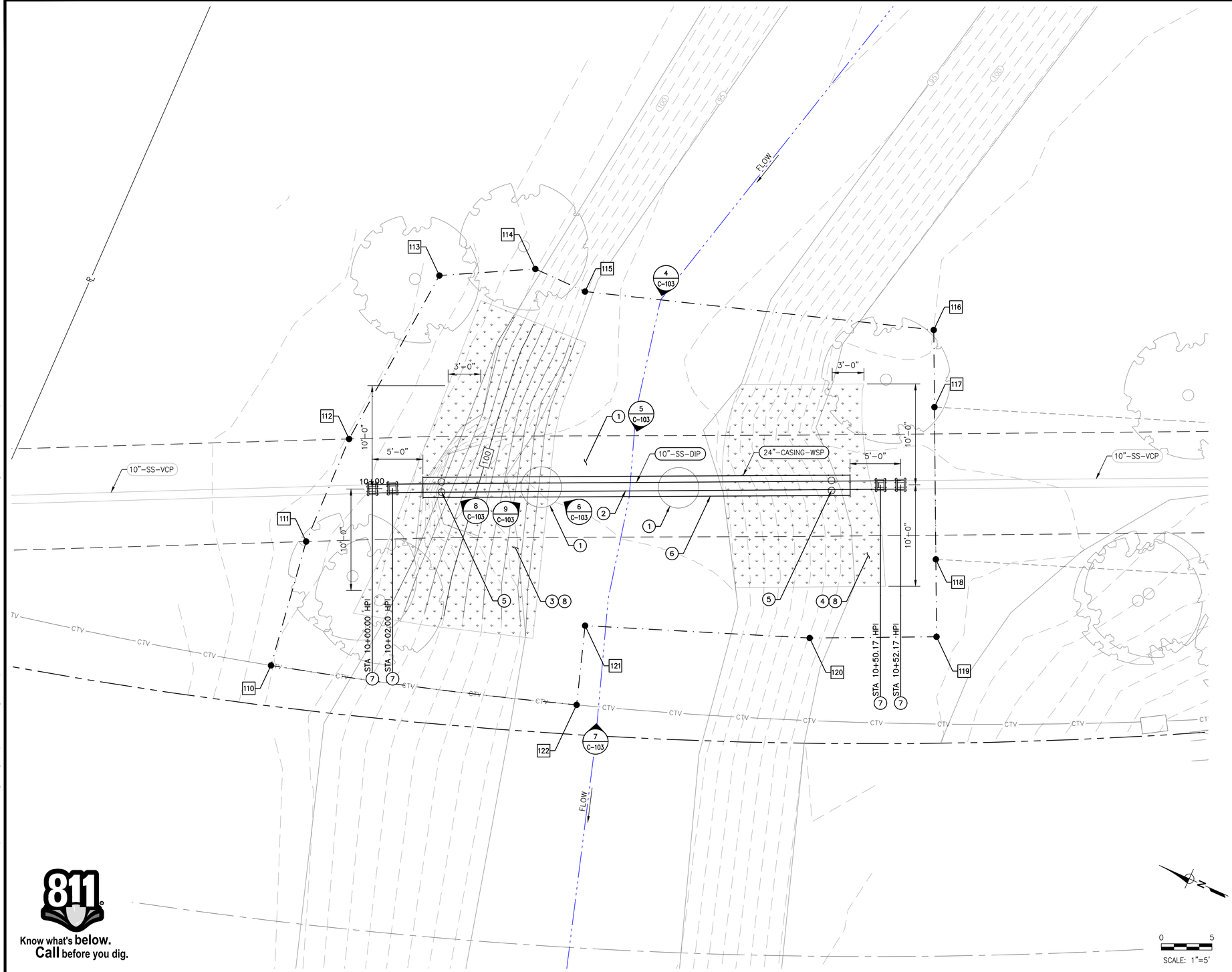
SITE ACCESS PLAN

DRAWING C-100
SHEET 44 OF --
PROJECT # –

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 - 4:45 AM CADD User: Chris Durbin

SHEET KEY NOTES

1. REMOVE EXISTING BED PROTECTION AND CONCRETE PIERS
2. REMOVE EXISTING SS PIPE AND PIERS. REPLACE WITH SS ON SAME ALIGNMENT. REPLACEMENT ELEVATIONS PER SHEET C-102
3. BACKFILL AND RESTORE NORTH BANK TO MATCH SURROUNDING GRADES. INSTALL ANCHORED VEGETATED TURF REINFORCEMENT MAT. SEE FINISH GRADES IN PROFILE PER SHEET C-102
4. INSTALL ANCHORED VEGETATED TURF REINFORCEMENT MAT ON SOUTH BANK. MATCH EXISTING SLOPES
5. 8" DIAMETER MIRCOPILES AT 15 DEGREE BATTER
6. INSTALL 24" EPOXY COATED WSP CASING
7. INSTALL DOUBLE 10" FLEXIBLE JOINTS PER DETAILS FOR TRANSITION FROM DIP TO VCP
8. HYDROSEED ALL DISTURBED AREAS INCLUDING TURF REINFORCEMENT MAT



0 5
SCALE: 1"=5'

Know what's below. Call before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT C. NAYLOR NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

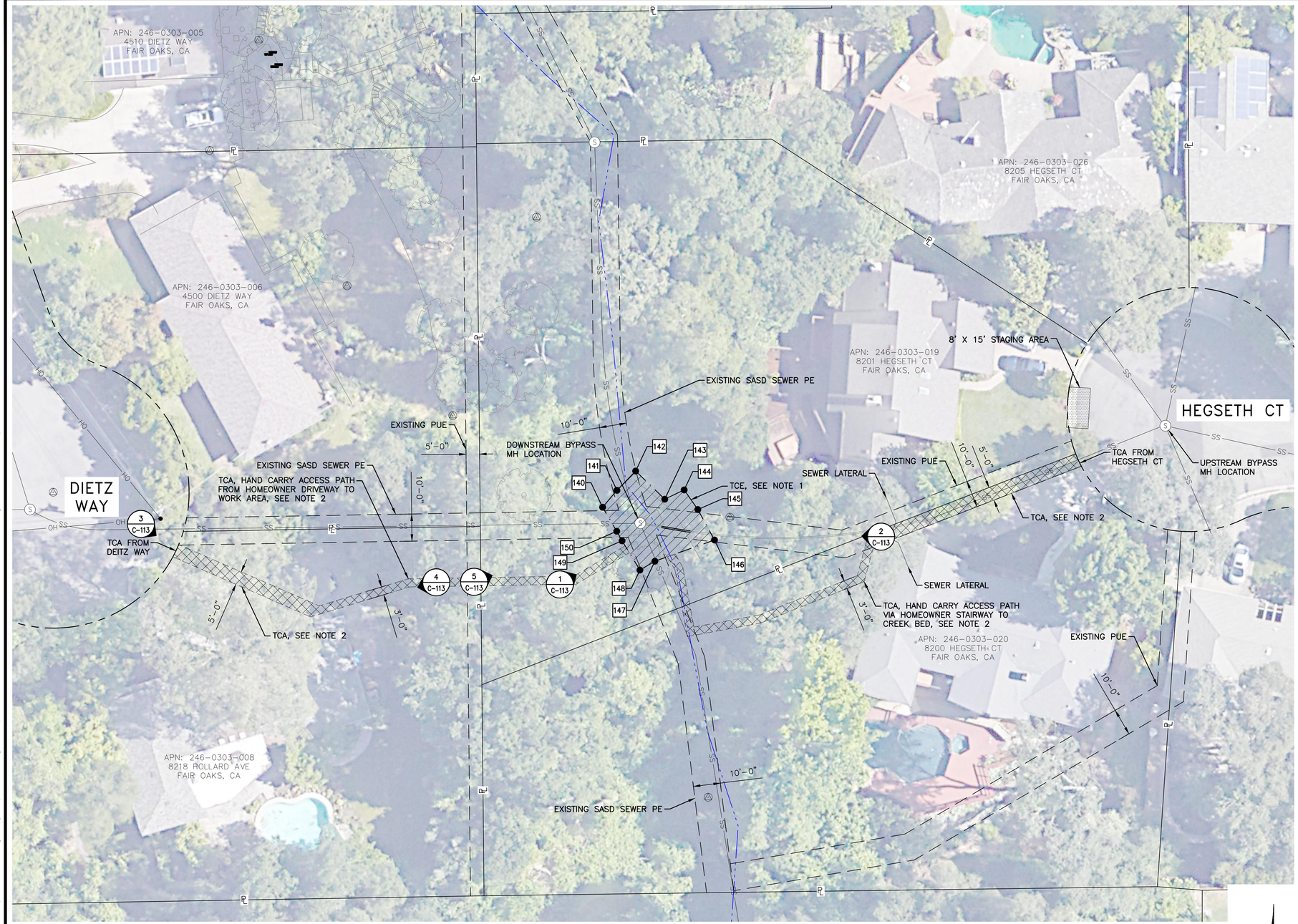
WSC
2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
_____ - _____ POSITION DATE

SASD CREEK CROSSING PROJECT
CROSSING 10 - INDIAN RIVER DRIVE
SITE PLAN

DRAWING
C-101
SHEET 45 OF --
PROJECT #
-



NOTES:

1. SEE DWG G-005 FOR TCE COORDINATES.
2. SEE CROSSING PHOTOS FOR ACCESS PATH DETAILS. CONTRACTOR SHALL NOT DAMAGE LANDSCAPING OR HARDSCAPING ON PRIVATE PROPERTY.
3. REMOVAL AND PRUNING OF TREES WILL REQUIRE APPROVAL FROM SASD AND SHALL BE PERFORMED UNDER THE OVERSIGHT OF A CERTIFIED ARBORIST.
4. SITE WORK LIMITED TO HAND CARRY TOOLS AND MATERIALS ONLY. NO MOTORIZED EQUIPMENT SHALL BE ALLOWED ON TCA'S AND TCE'S.

LEGEND

- ACCESS PATH TO SITE
- WORK AREA GROUND DISTURBANCE LIMITS
- STAGING AREA

N

0 10 20

SCALE: 1"=20'

811 Know what's **below.** **Call** before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT C. NAJOLI NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

WSC
2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
_____ _____ POSITION DATE

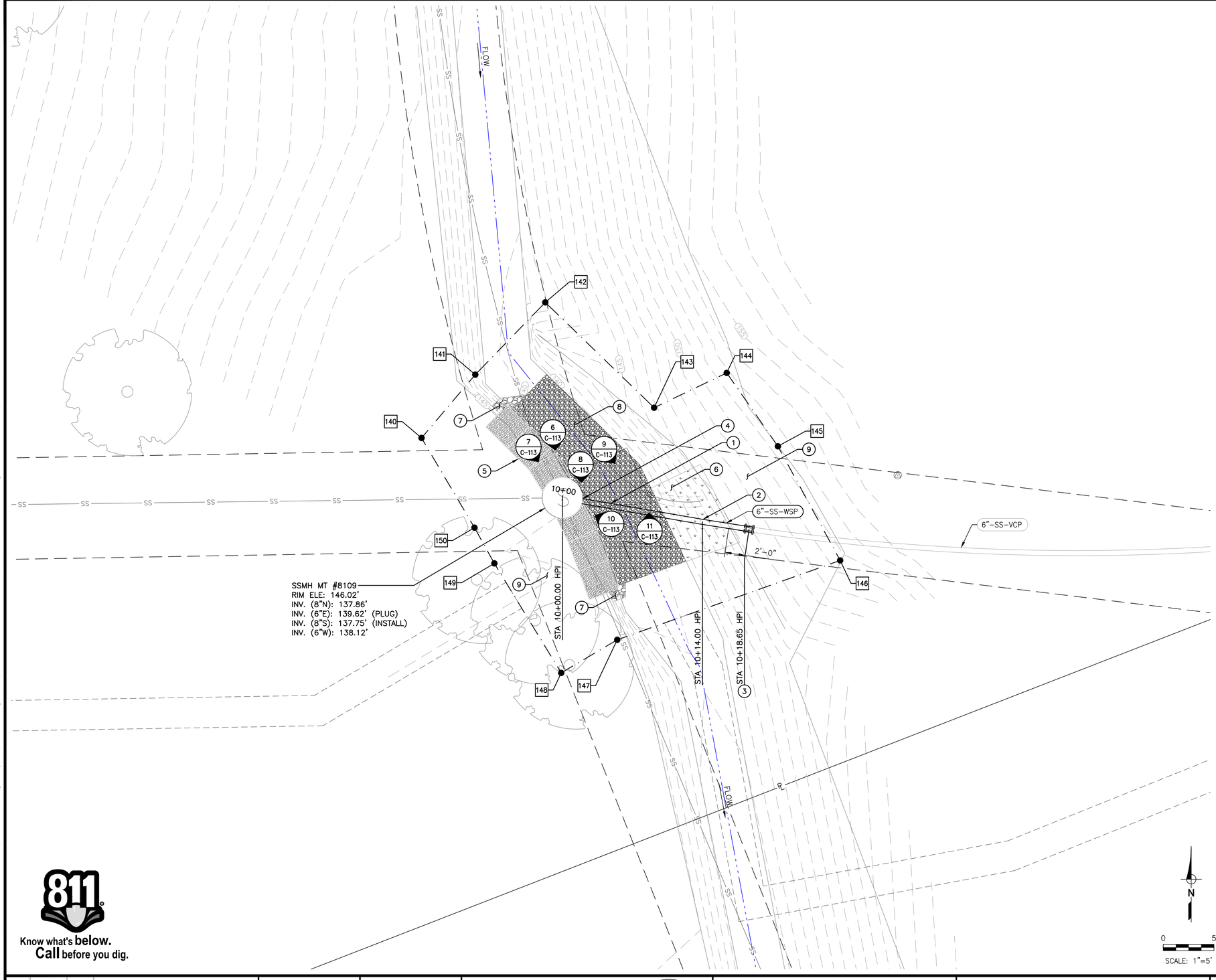
SASD CREEK CROSSING PROJECT

CROSSING 11 - HEGSETH COURT

SITE ACCESS PLAN

DRAWING C-110
SHEET 48 OF --
PROJECT # _

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 - 4:49 AM CADD User: Chris Durbin



SHEET KEY NOTES

1. REMOVE EXISTING COBBLES AND SANDBAGS IN CREEK BED
2. REMOVE EXISTING SS PIPE. REPLACE WITH WSP SS ON SAME ALIGNMENT. REPLACEMENT ELEVATIONS PER SHEET C-112
3. INSTALL 6" TRANSITION COUPLING WSP TO VCP
4. SEAL EXISTING 6" VCP MANHOLE PENETRATION. INSTALL NEW PENETRATION AT LOWER ELEVATION AND GROUT ANNULAR SPACE, SEE SHEET C-112
5. INSTALL ENGINEERED BANK STABILIZATION SYSTEM. FIELD LOCATE EXISTING SS MAIN LINE PRIOR TO ANCHORING
6. INSTALL ANCHORED VEGETATED TURF REINFORCEMENT MAT OVER DISTURBED EAST CREEK BANK AREA FOR SEWER LINE REPLACEMENT.
7. MINIMIZE BANK DISTURBANCE AT EDGES OF ENGINEERED BANK STABILIZATION SYSTEM. COVER DISTURBED AREAS WITH CLASS III RIP-RAP UP TO ELEVATION 144.0
8. INSTALL 12" THICK ENGINEERED MATTRESS SYSTEM IN CREEK BED
9. HYDROSEED DISTURBED AREAS ABOVE ELEVATION 144.0

TREE REMOVAL

NO TREE REMOVAL FOR HEGSETH COURT SITE

Know what's **below.** **Call** before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT C. NAYLOR NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

WSC
2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

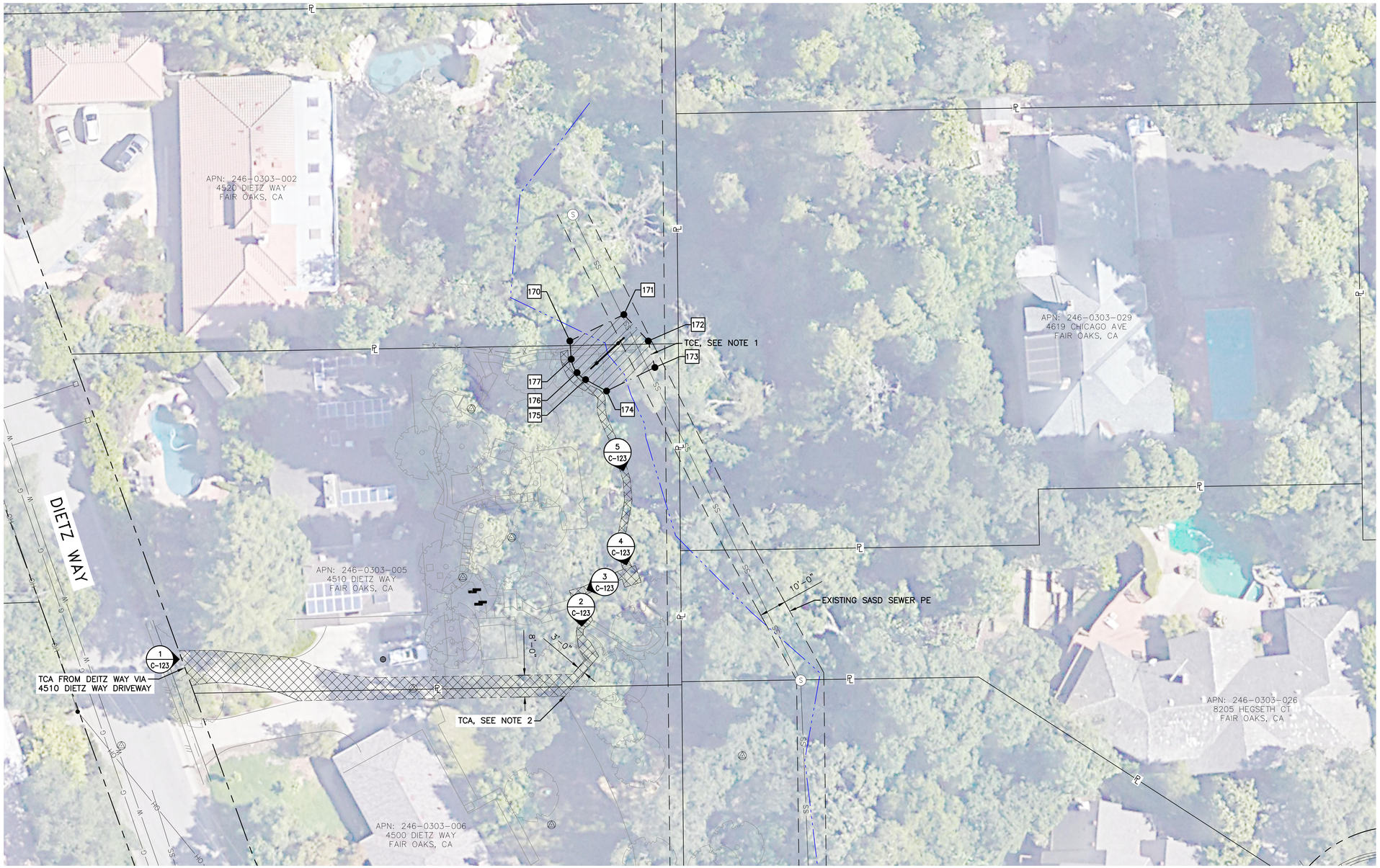
SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
_____ – _____– POSITION DATE

SASD CREEK CROSSING PROJECT
CROSSING 11 - HEGSETH COURT
SITE PLAN

DRAWING C-111
SHEET 49 OF --
PROJECT # –

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 – 4:50 AM CADD User: Chris Durbin



NOTES:

1. SEE DWG G-005 FOR TCE COORDINATES.
2. ACCESS TO CROSSING BEYOND THIS POINT IS VIA HOMEOWNER TREX DECKING, BRICK, AND CONCRETE PATHWAYS. CONTRACTOR TO SUBMIT PROPERTY PROTECTION PLAN PRIOR TO EQUIPMENT OR MATERIALS BEING BROUGHT BEYOND THIS POINT. SEE CROSSING PHOTOS FOR PATH DETAILS. CONTRACTOR SHALL NOT DAMAGE LANDSCAPING OR HARDSCAPING ON PRIVATE PROPERTY.
3. CONTRACTOR RESPONSIBLE TO FIND THEIR OWN STAGING AREA FOR DEITZ WAY CROSSING.
4. REMOVAL AND PRUNING OF TREES WILL REQUIRE APPROVAL FROM SASD AND SHALL BE PERFORMED UNDER THE OVERSIGHT OF A CERTIFIED ARBORIST.
5. SITE WORK LIMITED TO HAND CARRY TOOLS AND MATERIALS ONLY. NO MOTORIZED EQUIPMENT SHALL BE ALLOWED ON TCA'S AND TCE'S.
6. CONTRACTOR SHALL LIMIT SHUTDOWN OF SERVICES TO 4510 DIETZ WAY TO 6 HOURS MAXIMUM. TEMPORARILY RECONNECT LATERAL AT END OF EACH WORK DAY AS NECESSARY TO COMPLETE WORK.

LEGEND

- ACCESS PATH TO SITE
- WORK AREA GROUND DISTURBANCE LIMITS
- STAGING AREA

N

0 10 20

SCALE: 1"=20'

811 Know what's below. Call before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT G. NAYLOR NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

WSC
2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
_____ _____ POSITION DATE

SASD CREEK CROSSING PROJECT

CROSSING 12 - DIETZ WAY

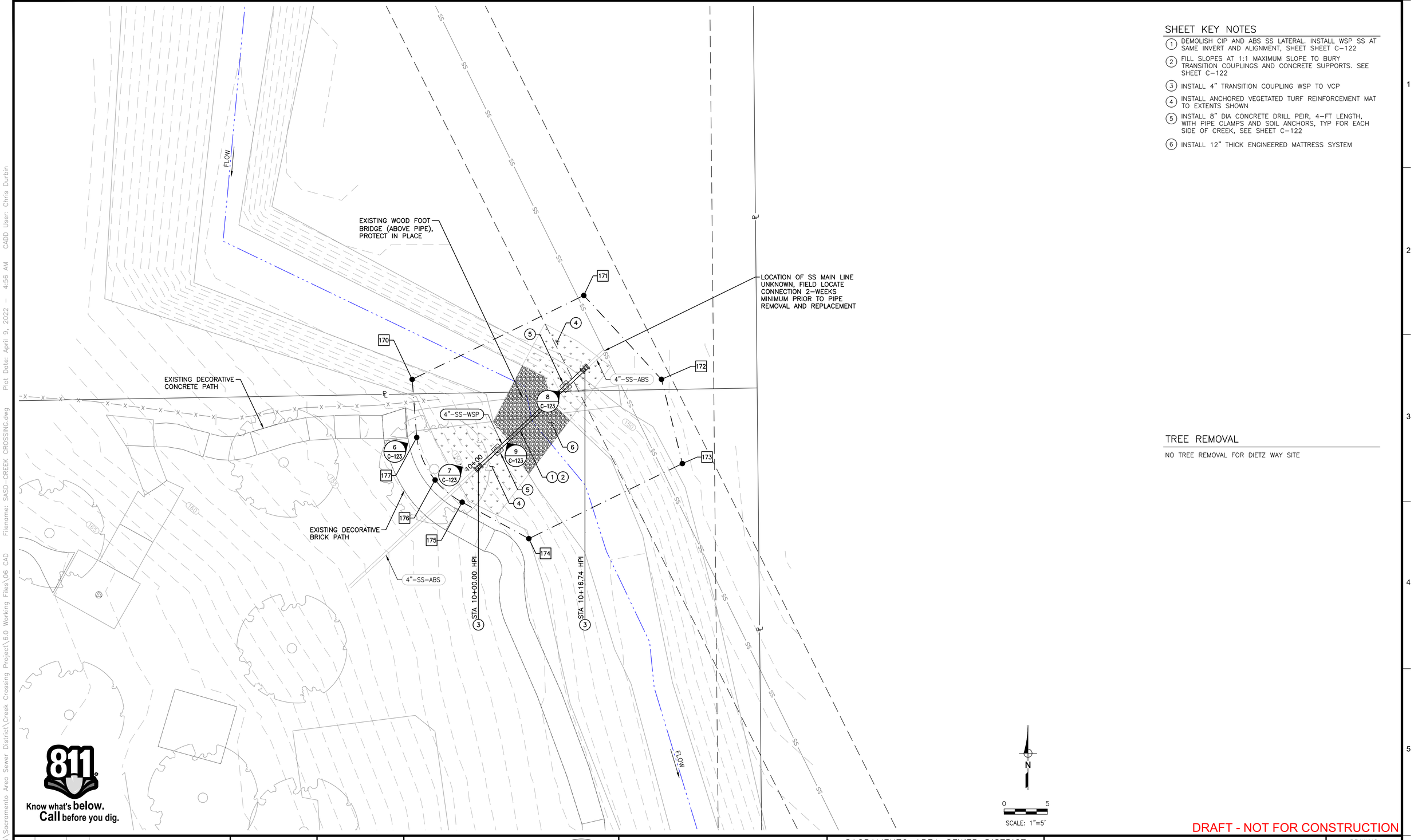
SITE ACCESS PLAN

DRAWING C-120

SHEET 52 OF --

PROJECT # --

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 - 4:54 AM CADD User: Chris Durbin



SHEET KEY NOTES

1. DEMOLISH CIP AND ABS SS LATERAL. INSTALL WSP SS AT SAME INVERT AND ALIGNMENT, SHEET SHEET C-122
2. FILL SLOPES AT 1:1 MAXIMUM SLOPE TO BURY TRANSITION COUPLINGS AND CONCRETE SUPPORTS. SEE SHEET C-122
3. INSTALL 4" TRANSITION COUPLING WSP TO VCP
4. INSTALL ANCHORED VEGETATED TURF REINFORCEMENT MAT TO EXTENTS SHOWN
5. INSTALL 8" DIA CONCRETE DRILL PEIR, 4-FT LENGTH, WITH PIPE CLAMPS AND SOIL ANCHORS, TYP FOR EACH SIDE OF CREEK, SEE SHEET C-122
6. INSTALL 12" THICK ENGINEERED MATTRESS SYSTEM

TREE REMOVAL

NO TREE REMOVAL FOR DIETZ WAY SITE

811 Know what's below. Call before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT C. NAYLOR NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

WSC
2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
_____ – _____– POSITION DATE

SASD CREEK CROSSING PROJECT
CROSSING 12 - DIETZ WAY
SITE PLAN

DRAWING C-121
SHEET 53 OF --
PROJECT # –

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 – 4:56 AM CADD User: Chris Durbin

APPENDIX E

TREE REMOVAL PERMIT APPLICATIONS

Sacramento County Tree Permit Application Form

There are multiple ways to apply for a permit:

- Online:
  - Go to https://apsonline.saccounty.net/citizenAccess/
  - Or enter the following search request into an internet browser (such as Google or Bing) "Sacramento County tree removal permit"
- In person (by appointment only): Apply in person at the Building Assistance Center at 827 7th Street, Room 102, Sacramento;
- In a letter or email: Or In a letter or email which describes the basic request with information following the application form outline (trees@saccounty.net).
- The permit applicant can be mailed to Attn: Tree Coordinator 827 7th Street, Room 102, Sacramento; CA 95814

The permit fee is $31.35, thirty one dollars and thirty five cents. The fee may be paid online or in person at 827 7th Street 1st Floor, Sacramento.

Form for applying for a tree permit:

(Warning---if the tree is located on a neighboring property, we will require a signed letter from the owner stating: the neighbor's name, address, and phone number, authorizing you, your name (or tree company name), your address and your phone number, to trim or remove the tree in question, including its diameter, location, and any limitations or conditions, signed and dated)

Address Where Tree is Located: Arcade Park, 4647 Winding Way, Sacramento, CA 95841

Name of Tree Owner: _____

Tree owner phone #: (____)_____

Name of person applying for the permit: _____

Company name: _____

Address: _____

Phone #: (____)_____ **Email:**_____

If you are a tree cutting company please provide the following:

ISA Certified Arborists # or ISA Certified Tree Workers #:_____
California State Licensed Tree Service (C-61 Specialty with a D-49 "Tree Service" Classification)_____
California State Licensed Landscaping Contractor (C-27)_____

Tree Pruning Being Requested:

ID #	Type/species of tree:	Trunk diameter at 4.5 feet off of ground:	Tree Location: front yard, parking lot	Reason for pruning: remove dead, weight reduction, corrective, etc.

Tree Removal Being Requested:

ID #	Type/species of tree:	Trunk diameter at 4.5 feet off of ground:	Tree Location: front yard, parking lot	Reason for removal:
7652	Valley Oak	43" (2X Stem)	Top of bank southwest of pipe crossing by bamboo.	Project scope/facilitation
7651	Interior Live Oak	8"		Project scope/facilitation
	alle a			Project scope/facilitation

Sketch of Tree(s) Location:

*include landmarks such as buildings, streets, pools,

Please refer to the Tree Location Exhibit found within the accompanying Arborist Report.

Project Site 2 / Crossing #2 / Winding Way / Asset #48368

Please provide photographs of the following:

- the tree(s) to be removed or pruned.
- take photo of tree from distance (50 ft), of trunk 10 ft away
- take photo of defective tree part, etc)
- If tree is damaging property take photos of damaged property (i.e. sidewalk, driveway, foundation, etc)

Sacramento County Tree Permit Application Form

There are multiple ways to apply for a permit:

- Online:
  - Go to https://apsonline.saccounty.net/citizenAccess/
  - Or enter the following search request into an internet browser (such as Google or Bing) "Sacramento County tree removal permit"
- In person (by appointment only): Apply in person at the Building Assistance Center at 827 7th Street, Room 102, Sacramento;
- In a letter or email: Or In a letter or email which describes the basic request with information following the application form outline (trees@saccounty.net).
- The permit applicant can be mailed to Attn: Tree Coordinator 827 7th Street, Room 102, Sacramento; CA 95814

The permit fee is $31.35, thirty one dollars and thirty five cents. The fee may be paid online or in person at 827 7th Street 1st Floor, Sacramento.

Form for applying for a tree permit:

(Warning---if the tree is located on a neighboring property, we will require a signed letter from the owner stating: the neighbor's name, address, and phone number, authorizing you, your name (or tree company name), your address and your phone number, to trim or remove the tree in question, including its diameter, location, and any limitations or conditions, signed and dated)

Address Where Tree is Located: Arcade Creek Park, 5613 Omni Dr, Sacramento, CA 95841

Name of Tree Owner: _____

Tree owner phone #: (____)_____

Name of person applying for the permit: _____

Company name: _____

Address: _____

Phone #: (____)_____ **Email:**_____

If you are a tree cutting company please provide the following:

ISA Certified Arborists # or ISA Certified Tree Workers #:_____
California State Licensed Tree Service (C-61 Specialty with a D-49 "Tree Service" Classification)_____
California State Licensed Landscaping Contractor (C-27)_____

Tree Pruning Being Requested:

ID #	Type/species of tree:	Trunk diameter at 4.5 feet off of ground:	Tree Location: front yard, parking lot	Reason for pruning: remove dead, weight reduction, corrective, etc.

Tree Removal Being Requested:

ID #	Type/species of tree:	Trunk diameter at 4.5 feet off of ground:	Tree Location: front yard, parking lot	Reason for removal:
7541	Fan palm	15"	South of pipe crossing #4	Project scope/facilitation
	an pal			Project scope/facilitation

Sketch of Tree(s) Location:

*include landmarks such as buildings, streets, pools,

Please refer to the Tree Location Exhibit found within the accompanying Arborist Report.

Project Site 3 / Crossing #3 / Arcade Creek / Asset #49894
Crossing #4 / Garfield Ave & Thousand Oaks Ct / Asset #44327

Please provide photographs of the following:

- the tree(s) to be removed or pruned.
- take photo of tree from distance (50 ft), of trunk 10 ft away
- take photo of defective tree part, etc)
- If tree is damaging property take photos of damaged property (i.e. sidewalk, driveway, foundation, etc)

Sacramento County Tree Permit Application Form

There are multiple ways to apply for a permit:

- Online:
  - Go to https://apsonline.saccounty.net/citizenAccess/
  - Or enter the following search request into an internet browser (such as Google or Bing) "Sacramento County tree removal permit"
- In person (by appointment only): Apply in person at the Building Assistance Center at 827 7th Street, Room 102, Sacramento;
- In a letter or email: Or In a letter or email which describes the basic request with information following the application form outline (trees@saccounty.net).
- The permit applicant can be mailed to Attn: Tree Coordinator 827 7th Street, Room 102, Sacramento; CA 95814

The permit fee is $31.35, thirty one dollars and thirty five cents. The fee may be paid online or in person at 827 7th Street 1st Floor, Sacramento.

Form for applying for a tree permit:

(Warning---if the tree is located on a neighboring property, we will require a signed letter from the owner stating: the neighbor's name, address, and phone number, authorizing you, your name (or tree company name), your address and your phone number, to trim or remove the tree in question, including its diameter, location, and any limitations or conditions, signed and dated)

Address Where Tree is Located: 5508 Oak River Ct, Carmichael, CA 95608

Name of Tree Owner: _____

Tree owner phone #: (____)_____

Name of person applying for the permit: _____

Company name: _____

Address: _____

Phone #: (____)_____ **Email:**_____

If you are a tree cutting company please provide the following:

ISA Certified Arborists # or ISA Certified Tree Workers #:_____
California State Licensed Tree Service (C-61 Specialty with a D-49 "Tree Service" Classification)_____
California State Licensed Landscaping Contractor (C-27)_____

Tree Pruning Being Requested:

ID #	Type/species of tree:	Trunk diameter at 4.5 feet off of ground:	Tree Location: front yard, parking lot	Reason for pruning: remove dead, weight reduction, corrective, etc.

Tree Removal Being Requested:

ID #	Type/species of tree:	Trunk diameter at 4.5 feet off of ground:	Tree Location: front yard, parking lot	Reason for removal:
7507	Privet	20" (4x Stem)	Northeast of pipe crossing	Project scope/facilitation
7508	Privet	13"		Project scope/facilitation

Sketch of Tree(s) Location:

*include landmarks such as buildings, streets, pools,

Please refer to the Tree Location Exhibit found within the accompanying Arborist Report.

Project Site 5 / Crossing #6 / Gina Ct / Asset #50528

Please provide photographs of the following:

- the tree(s) to be removed or pruned.
- take photo of tree from distance (50 ft), of trunk 10 ft away
- take photo of defective tree part, etc)
- If tree is damaging property take photos of damaged property (i.e. sidewalk, driveway, foundation, etc)

Sacramento County Tree Permit Application Form

There are multiple ways to apply for a permit:

- Online:
  - Go to https://apsonline.saccounty.net/citizenAccess/
  - Or enter the following search request into an internet browser (such as Google or Bing) "Sacramento County tree removal permit"
- In person (by appointment only): Apply in person at the Building Assistance Center at 827 7th Street, Room 102, Sacramento;
- In a letter or email: Or In a letter or email which describes the basic request with information following the application form outline (trees@saccounty.net).
- The permit applicant can be mailed to Attn: Tree Coordinator 827 7th Street, Room 102, Sacramento; CA 95814

The permit fee is $31.35, thirty one dollars and thirty five cents. The fee may be paid online or in person at 827 7th Street 1st Floor, Sacramento.

Form for applying for a tree permit:

(Warning---if the tree is located on a neighboring property, we will require a signed letter from the owner stating: the neighbor's name, address, and phone number, authorizing you, your name (or tree company name), your address and your phone number, to trim or remove the tree in question, including its diameter, location, and any limitations or conditions, signed and dated)

Address Where Tree is Located: San Lorenzo Way, Carmichael, CA 95608

Name of Tree Owner: _____

Tree owner phone #: (____)_____

Name of person applying for the permit: _____

Company name: _____

Address: _____

Phone #: (____)_____ **Email:**_____

If you are a tree cutting company please provide the following:

ISA Certified Arborists # or ISA Certified Tree Workers #:_____
California State Licensed Tree Service (C-61 Specialty with a D-49 "Tree Service" Classification)_____
California State Licensed Landscaping Contractor (C-27)_____

Tree Pruning Being Requested:

ID #	Type/species of tree:	Trunk diameter at 4.5 feet off of ground:	Tree Location: front yard, parking lot	Reason for pruning: remove dead, weight reduction, corrective, etc.

Tree Removal Being Requested:

ID #	Type/species of tree:	Trunk diameter at 4.5 feet off of ground:	Tree Location: front yard, parking lot	Reason for removal:
7522	California buckeye	10"	West, east bank	Project scope/facilitation
	alle oa		above pipe	Project scope/facilitation
			crossing	

Sketch of Tree(s) Location:

*include landmarks such as buildings, streets, pools,

Please refer to the Tree Location Exhibit found within the accompanying Arborist Report.

Project Site 5 / Crossing #6 / Gina Ct / Asset #50528

Please provide photographs of the following:

- the tree(s) to be removed or pruned.
- take photo of tree from distance (50 ft), of trunk 10 ft away
- take photo of defective tree part, etc)
- If tree is damaging property take photos of damaged property (i.e. sidewalk, driveway, foundation, etc)

Sacramento County Tree Permit Application Form

There are multiple ways to apply for a permit:

- Online:
  - Go to https://apsonline.saccounty.net/citizenAccess/
  - Or enter the following search request into an internet browser (such as Google or Bing) "Sacramento County tree removal permit"
- In person (by appointment only): Apply in person at the Building Assistance Center at 827 7th Street, Room 102, Sacramento;
- In a letter or email: Or In a letter or email which describes the basic request with information following the application form outline (trees@saccounty.net).
- The permit applicant can be mailed to Attn: Tree Coordinator 827 7th Street, Room 102, Sacramento; CA 95814

The permit fee is $31.35, thirty one dollars and thirty five cents. The fee may be paid online or in person at 827 7th Street 1st Floor, Sacramento.

Form for applying for a tree permit:

(Warning---if the tree is located on a neighboring property, we will require a signed letter from the owner stating: the neighbor's name, address, and phone number, authorizing you, your name (or tree company name), your address and your phone number, to trim or remove the tree in question, including its diameter, location, and any limitations or conditions, signed and dated)

Address Where Tree is Located: 7156 Sutter Ave, Carmichael, CA 95608

Name of Tree Owner: _____

Tree owner phone #: (____)_____

Name of person applying for the permit: _____

Company name: _____

Address: _____

Phone #: (____)_____ **Email:**_____

If you are a tree cutting company please provide the following:

ISA Certified Arborists # or ISA Certified Tree Workers #:_____
California State Licensed Tree Service (C-61 Specialty with a D-49 "Tree Service" Classification)_____
California State Licensed Landscaping Contractor (C-27)_____

Tree Pruning Being Requested:

ID #	Type/species of tree:	Trunk diameter at 4.5 feet off of ground:	Tree Location: front yard, parking lot	Reason for pruning: remove dead, weight reduction, corrective, etc.

Tree Removal Being Requested:

ID #	Type/species of tree:	Trunk diameter at 4.5 feet off of ground:	Tree Location: front yard, parking lot	Reason for removal:
7590	Blue Oak	13"	South bank	Project scope/facilitation
			above pipe	
			crossing	

Sketch of Tree(s) Location:

*include landmarks such as buildings, streets, pools,

Please refer to the Tree Location Exhibit found within the accompanying Arborist

Report. Project Site 7 / Crossing #8 / Sutter Avenue/

Please provide photographs of the following:

- the tree(s) to be removed or pruned.
- take photo of tree from distance (50 ft), of trunk 10 ft away
- take photo of defective tree part, etc)
- If tree is damaging property take photos of damaged property (i.e. sidewalk, driveway, foundation, etc)

Sacramento County Tree Permit Application Form

There are multiple ways to apply for a permit:

- Online:
  - Go to https://apsonline.saccounty.net/citizenAccess/
  - Or enter the following search request into an internet browser (such as Google or Bing) "Sacramento County tree removal permit"
- In person (by appointment only): Apply in person at the Building Assistance Center at 827 7th Street, Room 102, Sacramento;
- In a letter or email: Or In a letter or email which describes the basic request with information following the application form outline (trees@saccounty.net).
- The permit applicant can be mailed to Attn: Tree Coordinator 827 7th Street, Room 102, Sacramento; CA 95814

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Form for applying for a tree permit:

(Warning---if the tree is located on a neighboring property, we will require a signed letter from the owner stating: the neighbor's name, address, and phone number, authorizing you, your name (or tree company name), your address and your phone number, to trim or remove the tree in question, including its diameter, location, and any limitations or conditions, signed and dated)

Address Where Tree is Located: Campfire Way, Citrus Heights, CA 95608

Name of Tree Owner: _____

Tree owner phone #: (____)_____

Name of person applying for the permit: _____

Company name: _____

Address: _____

Phone #: (____)_____ **Email:**_____

If you are a tree cutting company please provide the following:

ISA Certified Arborists # or ISA Certified Tree Workers #:_____
California State Licensed Tree Service (C-61 Specialty with a D-49 "Tree Service" Classification)_____
California State Licensed Landscaping Contractor (C-27)_____

Tree Pruning Being Requested:

ID #	Type/species of tree:	Trunk diameter at 4.5 feet off of ground:	Tree Location: front yard, parking lot	Reason for pruning: remove dead, weight reduction, corrective, etc.

Tree Removal Being Requested:

ID #	Type/species of tree:	Trunk diameter at 4.5 feet off of ground:	Tree Location: front yard, parking lot	Reason for removal:
7573	Valley Oak	25"	South bank	Project scope/facilitation
	nterior li e oa	ste	above pipe	
			crossing	

Sketch of Tree(s) Location:

*include landmarks such as buildings, streets, pools,

Please refer to the Tree Location Exhibit found within the accompanying Arborist Report.

Project Site 8 / Crossing #9 / Campfire Way / Asset #36529

Please provide photographs of the following:

- the tree(s) to be removed or pruned.
- take photo of tree from distance (50 ft), of trunk 10 ft away
- take photo of defective tree part, etc)
- If tree is damaging property take photos of damaged property (i.e. sidewalk, driveway, foundation, etc)

APPENDIX E

BIOLOGICAL RESOURCES ASSESSMENT



BIOLOGICAL RESOURCES ASSESSMENT

SACRAMENTO AREA SEWER DISTRICT CREEK CROSSING PROJECT
SACRAMENTO COUNTY, CA

MAY 2022

PREPARED FOR:
Sacramento Area Sewer District
10060 Goethe Road
Sacramento, CA 95827
(916) 876-6000

PREPARED BY:
Montrose Environmental
1801 7th Street, Suite 100
Sacramento, CA 95811
(916) 447-3479
www.analyticalcorp.com

BIOLOGICAL RESOURCES ASSESSMENT

SACRAMENTO AREA SEWER DISTRICT CREEK CROSSING PROJECT
SACRAMENTO COUNTY, CA

MAY 2022

PREPARED FOR:
Sacramento Area Sewer District
10060 Goethe Road
Sacramento, CA 95827
(916) 876-6000

PREPARED BY:
Montrose Environmental
1801 7th Street, Suite 100
Sacramento, CA 95811
(916) 447-3479
www.analyticalcorp.com

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Attachment C Special-Status Species Lists

1.0 INTRODUCTION

This Biological Resources Assessment analyzes the 11-acre Sacramento Area Sewer District (SASD) study area found within the City of Citrus Heights and the unincorporated areas of Fair Oaks and Carmichael, California (Study Area). The SASD Creek Crossing Project (Proposed Project) includes the modification, replacement, or realignment of 12 existing sewer pipe segments located within creeks and intermittent drainages across 10 distinct locations (Project Sites). These pipe segments are at risk of physical damage from impact with debris and/or the results of erosive forces. A biological resources survey of the Project Site was conducted on June 7 through 10 and December 21, 2021. Survey methodologies, potentially occurring sensitive biological resources, and survey results are discussed herein.

1.1 PROJECT LOCATION

Twelve sewer mainline segments at creek crossings would be realigned, replaced, and/or rehabilitated at ten distinct Project Site locations within the City of Citrus Heights and the unincorporated areas of Carmichael and Fair Oaks, within Sacramento County (Figure 1 of **Attachment A**). The twelve segments occur within ten distinct Project Sites, as two of the pipeline crossings occur within the same Project Site (see **Table 1** and Figure 2 of **Attachment A**). The Study Area encompasses the entirety of all 10 Project Sites, which totals approximately 11 acres. An aerial photograph of each Project Site is presented in Figure 3a - j of **Attachment A**. Additional Project Site information is provided below in **Table 1**.

TABLE 1

Project Site Data

Project Site	Pipeline Segment Crossing #	SASD Pipe Segment #	Name/Road Landmark	APNs Within Project Site	Acreage	Attachment A Figure Number
1	1	59646	Hope Lane	5	0.61	3a
2	2	48368	Winding Way	5	2.05	3b
3	3 and 4	49894 & 41018	Arcade Creek Park / Garfield & Thousand Oaks	6	3.59	3c
4	5	50528	Concho Court	3	0.43	3d
5	6	44327	Gina Court	4	0.54	3e
6	7	170877	San Lorenzo Way	3	0.17	3f
7	8	78865	Sutter Avenue	7	1.04	3g
8	9	78531	Campfire Way	1	0.39	3h
9	10	68559 & 239693	Indian River Drive	3	0.47	3i
10	11 and 12	36529	Dietz Way / Hegseth Court	9	1.79	3j
				Total:	**11.08 Acres**	

The Study Area is composed varyingly of gently rolling terrain, sharply to gently eroded drainage channels, and riparian forest of varying species composition, both native and non-native. The Study Area is situated at elevations that range from approximately 80 feet to 115 feet (24 to 35 meters) above mean sea level. Unnamed tributaries to Arcade Creek, unnamed tributaries to the American River, Arcade Creek proper, and Cripple Creek flow through the various Project Sites.

1.2 PROJECT DESCRIPTION

The Proposed Project includes the reinforcement, enhancement, or replacement of 12 existing sewer pipe segments located within creeks and intermittent drainages. These pipe segments are at risk of physical damage from impact with debris and/or the results of erosive forces that may be present during seasonal water flows or high-flow/flood events. Methods for pipe reinforcement, enhancement, or replacement include the techniques and structure placements listed below:

- Pier, concrete, cobble, and/or sandbag removal;
- Backfilling eroded banks, bank stabilization through the anchoring of vegetative turf, and the placement of rock slope protection;
- Installing manholes, concrete pipe encasements, and drilled piers;
- Pipe rerouting and installation of transition and flexible couplings;

A majority of the replacement work will be conducted near and within the ordinary high-water mark (OHWM) of intermittent drainage channels. Project Sites occur primarily within residential property backyards but also within parks and roadsides. Project components are shown in **Attachment B**.

2.0 METHODOLOGY

2.1 PRELIMINARY DATA REVIEW

Prior to conducting the biological survey, biological information for the Study Area was obtained from the following sources, included in **Attachment C**:

- U.S. Fish and Wildlife Service (USFWS) list of special-status species with the potential to occur on and near the Project Site (USFWS, 2022a);
- California Natural Diversity Database (CNDDB) query of special-status species with the potential to occur within the Sacramento East, Carmichael, Citrus Heights, and Rio Linda U.S. Geological Survey quadrangles (quads) (CDFW, 2022);
- California Native Plant Society (CNPS) query of special-status species known to occur in the quads (CNPS, 2022); and
- Custom Soil Report from the Natural Resources Conservation Service (NRCS) (NRCS, 2022).

2.2 SURVEY TECHNIQUES

A biological resources survey of the Study Area was conducted on June 7 through 10 and December 21, 2021. The survey was conducted by walking meandering transects throughout and around the Project Sites with focused surveys being conducted in and around drainage channels and riparian corridors given the nature of the in-channel work associated with the project. Data was collected via a Trimble TDC150 hand-held GPS receiver with sub-meter accuracy. Survey goals consisted of identifying habitat types, sensitive habitats, wetlands and waters of the U.S. (WOTUS), plant and wildlife species, special-status species, wildlife corridors, and Project Site-specific mitigation recommendations. Habitat requirements of special-status species were compared to habitats present on and adjacent to the Project Site based on the biological survey, aerial photographs, and information included in **Attachment C**. Species observed were identified to the lowest taxonomical level possible. Binoculars were utilized as needed, such as to identify birds in flight. Evidence of wildlife such as dens, nests, or burrows were noted, if present.

Surveys were conducted consistent with the California Department of Fish and Wildlife (CDFW) *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities* (CDFW, 2018). Plants were identified using *The Jepson Manual: Vascular Plants of California* (Hickman, 1993), and *The Jepson Manual: Vascular Plants of California, Second Edition* (Baldwin et al., 2012). Additionally, *A Manual of California Vegetation: Second Editio*n (Sawyer et al., 2009), *Preliminary Descriptions of the Terrestrial Communities of California* (Holland, 1986), and *A Guide to Wildlife Habitats of California* (Mayer and Laudenslayer, 1988) were consulted.

3.0 ENVIRONMENTAL SETTING

3.1 SOIL TYPES

According to the U.S. Department of Agriculture (USDA) National Resources Conservation Service (NRCS) online Soil Survey of Sacramento County, California, there are eight soil types mapped within the Study Area (Figures 4a -j of **Attachment A**). The Study Area largely consists of the Liveoak-Urban land complex, 0 to 2 percent slopes and is found within Project Sites 2-5 covering 55 percent of the Study Area. The Liveoak series, a component of this complex, is moderately well drained with negligible to low runoff and moderate permeability. The second most abundant soil type within the Study Area is the Orangevale-Kaseberg-Urban land complex, 8 to 25 percent slopes and covers 16 percent of the Study Area. This soil type is located solely in Project Site 10. Other soil types found within the Study Area at single-digit percent coverages listed in order of descending coverage are Kaseberg-Fiddyment-Urban land complex, 2 to 15 percent slopes (9.7%), Fiddyment-Urban land complex, 1 to 8 percent slopes (7.8%), Urban land-Xerarents-Fiddyment complex, 0 to 8 percent slopes (6.4%), Fiddyment fine sandy loam, 1 to 8 percent slopes (3.5%), and Xerolls, 30 to 70 percent slopes (1.3%).

3.2 HABITAT TYPES

Habitat types observed on the Project Site include annual grassland, mixed oak woodland, lawn, mixed riparian, and ruderal/developed. A habitat map is included in Figures 5a-j of **Attachment A**, and site photographs are included in Figures 6a and 6b of **Attachment A**. Habitat types are discussed further below.

ANNUAL GRASSLAND

Annual grassland encompasses a large majority of the habitat type coverage in Project Site 7 and is present sporadically throughout some of the other Project Sites. Trees are largely absent within this habitat type and it is generally dominated by non-native annual grasses and forbs. Native plants occurred in greater abundance in some of the less disturbed Project Sites. Forbs and grasses found commonly in annual grassland areas included ripgut brome (*Bromus diandrus*), soft chess (*Bromus hordeaceus*), red brome (*Bromus rubens*), seaside barley (*Hordeum marinum*), Italian ryegrass (*Lolium perenne*), Johnsongrass (*Sorghum halepense*), bulbous canary grass (*Phalaris aquatica*), and annual bluegrass (*Poa annua*). Forbs commonly observed were curly dock (*Rumex crispus*), knotweed (*Persicaria lapathifolia*), field bindweed (*Convolvulus arvensis*), wild radish (*Raphanus raphanistrum*), filaree (*Erodium* sp.), rough cocklebur (*Xanthium strumarium*), and poison oak (*Toxicodendron diversilobum*).

MIXED RIPARIAN

Mixed riparian habitat occurs along and surrounding a majority of the drainages that were mapped within the Study Area. Plant species observed in the tree layer of this habitat include Valley oak (*Quercus lobata*), interior live oak (*Quercus wislizeni*), privet (*Lingustrum* sp.), box elder (*Acer negundo*), northern catalpa (*Catalpa speciose*), California bay laurel (*Umbellularia californica*), coast redwood (*Sequoia sempervirens*), and Fremont's cottonwood (*Populus fremontii*). The dominant plant species observed within the shrub/vine layer of this community was often Himalayan blackberry (*Rubus armeniensis*) especially in areas of steep gradient and within Project Sites 7 and 9. Grape (*Vitis* sp.), periwinkle (*Vinca major*), and English ivy (*Hedera helix*) were also variably present within the shrub and vine layer and these species outcompeted others within this vegetative layer much like Himalayan blackberry. Other plant species observed within the herbaceous layer of this community include Italian thistle (*Carduus pycnocephalus*), swamp smartweed (*Polygonum hydropiperoides*), English plantain (*Plantago lanceolata*), tall flatsedge (*Cyperus eragrostis),* and young or shrub-form California bay laurel, oaks, and red willow (*Salix laevigata*). Bare ground and vegetation management areas were also variably present within the understory of these riparian areas, as landowners continually upkeep these areas for aesthetic and fuel reduction reasons.

MIXED OAK WOODLAND

The overstory of this habitat type is composed of mature blue oak (*Quercus douglasii*), valley oak, and interior live oak. Understory vegetation consisted of annual grassland species and species such as smilo grass (*Stipa miliacea*), hedge nettle (*Stachys ajugoides)*, orchard grass (*Dactylis glomerate*), and poison oak. Oaks within this habitat type are often well spaced with little canopy overlap. Mixed oak woodland tends to occur at the margins of mixed riparian habitat within the Study Area and is present in greatest abundance within Project Site 3.

LAWN

The lawn habitat type within the Project Site denotes areas with maintained, planted, and mowed areas of non-native turf grasses for use in private landscaping and parks. The plant species composition observed was mainly a monoculture of Bermuda grass (*Cynodon dactylon*), bentgrass (*Agrostis* sp.), or other non-native turf and lawn grass mix. Other weedy forbs present in annual grassland habitat are also sparsely present within this habitat type in its understory vegetation layer.

RUDERAL/DEVELOPED

The areas classified as ruderal/developed habitat within the Project Site include all existing residences and structures, any landscaped areas, roads/parking areas, and otherwise disturbed regions. Non-native landscape plants observed in these areas included Japanese maples (*Acer palmatum*), English ivy (*Hedera helix*), Eucalyptus (*Eucalyptus* sp.), fig (*Ficus carica*), olive (*Elaeagnus sp.*), apple (*Malus* species), periwinkle (*Vinca major*). Weedy forbs and assorted annual grassland species are also present within this habitat type along its margins and disturbed border areas of landscaping such as sidewalks, paths, and roads.

3.3 SPECIAL-STATUS SPECIES

Preliminary data review and special-status species searches list six special-status plant species and 22 special-status animal species with the potential to occur in the Study Area (**Attachment C**). Additionally, there are recorded CNDDB occurrences of VELB, bank swallow (*Riparia riparia*), steelhead - Central

Valley DPS (*Oncorhynchus mykiss* irideus pop. 11), and Swainson's hawk (*Buteo swainsoni*), all within 4 miles of the Study Area. The name, regulatory status, distribution, habitat requirements, period of identification, and potential to occur within the Study Area for each special-status species are listed in **Table 2**. Species with no potential to occur were ruled out based on site characteristics such as lack of suitable habitat, soils, elevation, or necessary substrate. No special-status species were observed on the Project Site during the survey. The host plant for valley elderberry longhorn beetle (VELB), elderberry (*Sambucus* sp.), was observed within Project Site 2 of the Study Area.

3.4 CRITICAL HABITAT

No USFWS proposed or designated Critical Habitat occurs within the Study Area. The nearest Critical Habitat, for valley elderberry longhorn beetle (VELB) (*Desmocerus californicus dimorphus*), is located approximately 0.6 miles from Project Sites 6 and 7 and found along the banks of the American River (USFWS, 2022b).

3.5 WETLANDS AND WATERS OF THE U.S.

One seasonal wetland was observed within the Study Area during surveys and is present within the northern portion of Project Site 2, within annual grassland habitat. Potential waters of the U.S. or state within the Study Area included five unnamed intermittent drainages (Project Sites 1, 3, 4-7, 10), Arcade Creek (Project Sites 2, 9), and Cripple Creek (Project Site 8). The unnamed intermittent drainages found within Project Sites 7 and 9 are not USGS blueline streams. The remaining named creeks and unnamed intermittent drainages are considered USGS blueline streams (Figures 5a-j of **Attachment A**). Unnamed intermittent drainages are direct water contributing tributaries of the American River or are tributaries of Arcade Creek. Cripple Creek is a named tributary of Arcade Creek. Arcade Creek contributes water to Steelhead Creek thence the American River. A National Wetlands Inventory (NWI) map is provided in Figures 7a-j of **Attachment A**.

All drainages contained some vegetation within the channel, though levels of vegetation varied widely due to unconsolidated drainage beds/bottoms. Arcade Creek was the most deeply channeled and shelved feature and possessed the widest channel. Bridges provide vehicle and foot traffic access over some of these drainage features. Flowing water was not present within any drainage feature, however, standing water was observed variably.

3.6 ESSENTIAL FISH HABITAT

The National Marine Fisheries Service (NMFS) Essential Fish Habitat (EFH) for the Chinook salmon (*Desmocerus californicus dimorphus*), is listed within each of the Project Sites (USFWS, 2022b). Field survey results conclude that suitable habitat for this species is only found within Project Site 10 at pipeline crossings 11 and 12 (Figure 3j of **Attachment A**).

Suitable habitat for the steelhead trout (*Oncorhynchus mykiss irideus pop. 11*) is located at pipeline crossings 11 and 12, located within Project Site 10. The stream within this Project Site contains a perennial flow regime of cool water. The stream channel along these crossings is characterized by a well-shaded riparian area, and the streambed is composed of gravel and cobble with little siltation. Due to the perennial flow of the stream and lack of passage barriers from the American River, Project Site 10 may host salmonids, in particular the steelhead trout.

TABLE 2

REGIONALLY OCCURRING SPECIAL-STATUS SPECIES

SCIENTIFIC NAME **COMMON NAME**	**FEDERAL/STATE /CNPS STATUS**	**DISTRIBUTION**	**HABITAT REQUIREMENTS**	**PERIOD OF IDENTIFICATION**	**POTENTIAL TO OCCUR ON PROJECT SITE**
PLANTS					
Downingia pusilla Dwarf downingia	--/--/2B.2	Known to occur in Sacramento, Fresno, Merced, Napa, Placer, San Joaquin, Solano, Sonoma, Stanislaus, Tehama, and Yuba counties. Also occurs in South America.	Annual herb found in valley and foothill grassland (mesic) and vernal pools. Elevations range from 1-445 meters.	March-May	**No**. The Project Site does not contain suitable habitat.
Gratiola heterosepala Boggs Lake hedge-hyssop	--/CE/1B.2	Known to occur in Sacramento, Fresno, Lake, Lassen, Madera, Mendocino, Merced, Modoc, Placer, San Joaquin, Shasta, Siskiyou, Solano, Sonoma, and Tehama counties. Also occurs in Oregon.	Annual herb found on clay soils along the lake margins of marshes and swamps and vernal pools. Elevations range from 10 to 2,375 meters.	April-August	**No**. The Project Site does not contain suitable habitat.
Juncus leiospermus var. ahartii Ahart's dwarf rush	--/--/1B.2	Known to occur in Sacramento, Butte, Calaveras, Placer, Tehama, and Yuba counties.	Annual herb found in mesic valley and foothill grassland. Elevations range from 30 to 229 meters	March-May	**No**. The Project Site does not contain suitable habitat.
Legenere limosa Legenere	--/--/1B.1	Known to occur in Sacramento, Alameda, Lake, Monterey, Napa, Placer, San Joaquin, San Mateo, Shasta, Solano, Sonoma, Stanislaus, Tehama, and Yuba counties. Presumed extirpated in Stanislaus county.	Annual herb found in vernal pools. Elevations range from 1-880 meters.	April-June	**No**. The Project Site does not contain suitable habitat.
Orcuttia viscida Sacramento Orcutt grass	FE/CE/1B.1	Known to occur in Sacramento county.	Annual herb found in vernal pools. Elevations range from 30-100 meters.	April-July (September)	**No**. The Project Site does not contain suitable habitat.
Sagittaria sanfordii Sanford's arrowhead	--/--/1B.2	Known to occur in Sacramento, Butte, Del Norte, El Dorado, Fresno, Madera, Marin, Mariposa, Merced, Napa, San Bernardino, San Joaquin, Shasta, Solano, Sutter, Tehama, Tulare, Ventura, and Yuba counties. Presumed extirpated in Ventura county.	Emergent perennial rhizomatous herb found in shallow, freshwater marshes and swamps. Elevations range from 0-650 meters.	May-October (November)	**No**. The Project Site does not contain suitable habitat.
ANIMALS					
Mammals					
Taxidea taxus American badger	--/CSC/--	Found throughout most of California in suitable habitat.	Suitable habitat occurs in the drier open stages of most shrub, forest, and herbaceous habitats with friable soils. Badgers are generally associated with treeless regions, prairies, parklands, and cold desert areas.	All Year	**No**. The Project Site does not contain suitable habitat.

SCIENTIFIC NAME COMMON NAME	FEDERAL/STATE /CNPS STATUS	DISTRIBUTION	HABITAT REQUIREMENTS	PERIOD OF IDENTIFICATION	POTENTIAL TO OCCUR ON PROJECT SITE
Birds					
Agelaius tricolor Tricolored blackbird	--/CT, CSC/--	California and Baja California, Mexico.	Nests in dense thickets of cattails, tules, willow, blackberry, wild rose, and other tall herbs near fresh water. Habitats include: marshes, wetland, and swamps.	All Year	**No**. The Project Site does not contain suitable habitat.
Aquila chrysaetos Golden eagle	--/FP/--	Known to occur in Alameda, Colusa, Contra Costa, El Dorado*, Fresno, Humboldt, Kern, Lake, Lassen, Los Angeles , Madera, Merced, Modoc, Mono, Monterey, Napa, Orange, Riverside, Sacramento, San Bernardino, San Diego, San Joaquin, San Luis Obispo, Santa Clara, Siskiyou, Solano, Stanislaus, Trinity, Tulare, and Ventura counties.	Found in open country, in prairies, arctic and alpine tundra, open wooded country, and barren areas, especially in hilly or mountainous regions.	February-March	**No**. The Project Site does not contain suitable habitat.
Athene cunicularia Burrowing owl	--/CSC/--	Formerly common within the described habitats throughout the state except the northwest coastal forests and high mountains.	Yearlong resident of open, dry grassland and desert habitats, as well as in grass, forb and open shrub stages of pinyon-juniper and ponderosa pine habitats.	All Year	**No**. The Project Site does not contain suitable habitat.
Buteo regalis Ferruginous hawk	--/WL/--	Found throughout California.	Found in grasslands, agricultural areas, sagebrush flats, desert scrub, low foothills surrounding valleys, and fringes of pinyon-juniper habitats. Feeds on ground mammals, reptiles, amphibians, and other birds. No breeding records in California	September-April	**No**. The Project Site does not contain suitable habitat.
Buteo swainsoni Swainson's hawk	--/CT/--	In California, breeds in the Central Valley, Klamath Basin, Northeastern Plateau, Lassen County, and Mojave Desert. Very limited breeding reported from Lanfair Valley, Owens Valley, Fish Lake Valley, Antelope Valley, and in eastern San Luis Obispo County.	Breeds in stands with few trees in juniper-sage flats, riparian areas, and in oak savannah. Requires adjacent suitable foraging areas such as grasslands, alfalfa, or grain fields supporting rodent populations.	March – October	**Yes.** This species may nest within trees on the Project Sites, however on-site and adjacent land offer sub-optimal foraging.
Coccyzus americanus occidentalis Western yellow-billed cuckoo	FT/CE/--	In California, breeding populations of greater than five pairs which persist every year in California are currently limited to the Sacramento River from Red Bluff to Colusa and the South Fork Kern River from Isabella Reservoir to Canebrake Ecological Reserve.	Prefer isolated wooded riparian corridors surrounded by extensive arid uplands.	May - October	**No**. The Project Site does not contain suitable habitat.
Elanus leucurus White-tailed kite	--/FP/--	Permanent resident of coastal and Valley lowlands.	Habitats include: savannah, open woodland, marshes and swamps,	All Year	**Yes.** This species may nest within trees on

SCIENTIFIC NAME COMMON NAME	FEDERAL/STATE /CNPS STATUS	DISTRIBUTION	HABITAT REQUIREMENTS	PERIOD OF IDENTIFICATION	POTENTIAL TO OCCUR ON PROJECT SITE
			partially cleared lands and cultivated fields. Mostly found in lowland habitats. Open groves, river valleys, marshes, grasslands. Nesting occurs in trees. Found in a wide variety of open habitats in North America, including open oak grassland, desert grassland, farm country, and marshes. Main requirements are trees for perching and nesting and open ground with high populations of rodents.		the Project Site, however on-site and adjacent land offer sub-optimal foraging.
Melospiza melodia Song sparrow "Modesto" population	--/CSC/--	Known to occur historically in Butte, Colusa, and Sutter counties; Colusa, Colusa County; Sacramento, Sacramento County; Stockton, San Joaquin County; and the confluence of the San Joaquin and Tuolumne rivers, Stanislaus County.	Common resident below 200 feet in elevation. Habitat includes emergent freshwater marshes dominated by tules (*Scirpus* spp.) and cattails (*Typha* spp.) as well as riparian willow (*Salix* spp.) thickets. These Song Sparrows also nest in riparian forests of Valley Oak (*Quercus lobata*) with a sufficient understory of blackberry (*Rubus* spp.), along vegetated irrigation canals and levees, and in recently planted Valley Oak restoration sites.	All Year	**No**. The Project Site does not contain suitable habitat.
Progne subis Purple martin	--/CSC/--	Local summer resident in wooded low-elevation habitats throughout California; rare migrant in spring and fall, absent in winter. In the south, now only a rare and local breeder on the coast and in interior mountain ranges.	Inhabits open forests, woodlands, and riparian areas in breeding season. Found in a variety of open habitats during migration, including grassland, wet meadow, and fresh emergent wetland, usually near water. Nests in conifer stands, often in woodpecker holes. Uses valley foothill and montane hardwood and conifer, and riparian habitats.	March-August	**No**. The Project Site does not contain suitable habitat.

SCIENTIFIC NAME COMMON NAME	FEDERAL/STATE /CNPS STATUS	DISTRIBUTION	HABITAT REQUIREMENTS	PERIOD OF IDENTIFICATION	POTENTIAL TO OCCUR ON PROJECT SITE
Riparia Bank swallow	--/CT/--	About 50-60 colonies remain along the middle Sacramento River and 15-25 colonies occur along lower Feather River where the rivers meanders still in a mostly natural state. Other colonies persist along the central coast from Monterey to San Mateo counties, and northeastern California in Shasta, Siskiyou, Lassen, Plumas, and Modoc counties.	Colonial nester; nests primarily in riparian scrub, riparian woodland, and other lowland habitats west of the desert. Requires vertical banks/cliffs with fine-textured/sandy soils near streams, rivers, lakes, or ocean to dig nesting holes.	All year	**No**. The Project Site does not contain suitable habitat.
Amphibians					
Spea hammondii western spadefoot toad	--/CSC/--	Known to occur from the north end of California's great central valley near Redding, south, east of the Sierras and the deserts, into northwest Baja California.	Found in aquatic and terrestrial habitat. Aquatic habitat consists of: vernal pools, temporary wetlands, rivers creeks, or temporary rain pools. Terrestrial habitat consists of: lowland habitats such as washes, river floodplains, alluvial fans, playas, alkali flats, foothills, or mountains. Mostly below 3,000 feet in elevation. Exhibit preference for sandy or gravelly soil with open vegetation and short grasses (often in valley and foothill grasslands, open chaparral, and pine-oak woodland) (Butte HCP, 2011).	November-March	**No**. The Project Site does not contain suitable habitat.
Rana draytonii California red-legged frog	FT/CSC/--	Known to occur along the Coast from Mendocino County to Baja California, and inland through the northern Sacramento Valley into the foothills of the Sierra Nevada mountains, south to eastern Tulare County, and possibly eastern Kern County. Currently accepted range excludes the Central Valley.	Found in permanent and temporary pools of streams, marshes, and ponds with dense grassy and/or shrubby vegetation. Elevations range from 0-1160 meters.	November – March (breeding) June - August (non-breeding)	**No**. The Project Site does not contain suitable habitat.
Ambystoma californiense California tiger salamander	FT/CT/--	Occurs in Alameda, Butte, Contra Costa, Fresno, Glenn, Kern, Madera, Merced, Monterey, Sacramento, San Benito, San Joaquin, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Solano, Sonoma, Stanislaus, Tulare, and Yolo counties.	Found in vernal pools, ephemeral wetlands, and seasonal ponds, including constructed stockponds, in grassland and oak savannah plant communities. Elevations range from 0-460 meters.	November-February (adults) March 15-May15 (larvae)	**No**. The Project Site does not contain suitable habitat.

SCIENTIFIC NAME COMMON NAME	FEDERAL/STATE /CNPS STATUS	DISTRIBUTION	HABITAT REQUIREMENTS	PERIOD OF IDENTIFICATION	POTENTIAL TO OCCUR ON PROJECT SITE
Reptiles					
Emys marmorata Western pond turtle	--/CSC/--	Distribution ranges from Washington to northern Baja California.	Inhabit rivers, streams, lakes, ponds, reservoirs, stock ponds, and permanent wetland habitats with basking sites.	Year-round	**No**. The Project Site does not contain suitable habitat.
Thamnophis gigas Giant garter snake	FT/CT/--	Endemic to the San Joaquin and Sacramento Valley floors. Counties include Butte, Colusa, Contra Costa, Fresno, Glenn, Kern, Madera, Merced, Sacramento, San Joaquin, Solano, Sutter, Yolo, and Yuba.	Inhabits agricultural wetlands and other waterways such as irrigation and drainage canals, sloughs, ponds, small lakes, low gradient streams, and adjacent uplands. Requires adequate water during its active season (early spring through mid-fall) to provide food and cover, emergent, herbaceous wetland vegetation for foraging and cover, grassy banks and openings in waterside vegetation for basking, and higher elevation uplands for cover and refuge from flood waters during its dormant season (winter). Inhabits small mammal burrows and other soil crevices with sunny exposure along south and west facing slopes, above prevailing flood elevations when dormant.	March-October	**No**. The Project Site does not contain suitable habitat.
Invertebrates					
Branchinecta lynchi Vernal pool fairy shrimp	FT/--/--	Vernal pool fairy shrimp are known from a total of 32 populations located in an area extending from Shasta County through most of the length of the Central Valley to Tulare County, and along the central coast range from northern Solano County to Pinnacles in San Benito County. Five additional, disjunctive populations exist near Soda Lake in San Luis Obispo County, in the mountain grasslands of northern Santa Barbara County, on the Santa Rosa Plateau in Riverside County, near Rancho California in Riverside County.	Found in vernal pools in the Central Valley, coast ranges, and a limited number of sites in the Transverse Ranges and Riverside County, California.	December-May	**No**. The Project Site does not contain suitable habitat.
Branchinecta conservatio Conservancy fairy shrimp	FE/--/--	The species is currently known from several disjunct populations: the Vina Plains in Tehama County, south of Chico in Butte County, the Jepson Prairie Preserve and surrounding area in Solano County, Sacramento	Found in vernal pools in the northern two-thirds of the Central Valley.	December-May	**No**. The Project Site does not contain suitable habitat.

SCIENTIFIC NAME COMMON NAME	FEDERAL/STATE /CNPS STATUS	DISTRIBUTION	HABITAT REQUIREMENTS	PERIOD OF IDENTIFICATION	POTENTIAL TO OCCUR ON PROJECT SITE
		National Wildlife Refuge in Glenn County, Mapes Ranch west of Modesto, San Luis National Wildlife Refuge and the Haystack Mountain/Yosemite Lake area in Merced County, and two locations on the Los Padres National Forest in Ventura County.			
Desmocerus californicus dimorphus Valley elderberry longhorn beetle (VELB)	FT/--/--	Restricted to the Central Valley from Redding to Bakersfield. Counties include Amador, Butte, Calaveras, Colusa, El Dorado, Fresno, Glenn, Kern, Madera, Mariposa, Merced, Napa, Placer, Sacramento, San Joaquin, Shasta, Solano, Stanislaus, Sutter, Tehama, Tulare, Yolo, and Yuba counties; 0-762 meters elevation.	Found in riparian forest communities. Exclusive host plant is elderberry (*Sambucus* species), which must have stems ≥ 1-inch diameter for the beetle.	Year-round	**Yes**. The Project Site does contain suitable habitat and a host plant within Project Site 2.
Lepidurus packardi Vernal pool tadpole shrimp	FE/--/--	Known from 18 populations in the Central Valley, ranging from east of Redding in Shasta County south to the San Luis National Wildlife Refuge in Merced County, also from a single vernal pool complex on the San Francisco Bay National Wildlife Refuge in the City of Fremont.	Life cycle within vernal pools and valley foothill grassland swales.	December-May	**No**. The Project Site does not contain suitable habitat.
Fish					
Oncorhynchus mykiss irideus pop. 11 [Steelhead-Central Valley DPS]	FT/--/--	Spawn in the Sacramento and San Joaquin rivers and tributaries before migrating to the Delta and Bay Area.	Found in cool, clear, fast-flowing permanent streams and rivers with riffles and ample cover from riparian vegetation or overhanging banks. Spawning: streams with pool and riffle complexes. For successful breeding, require cold water and gravelly streambed.	Consult Agency	**Yes**. Suitable habitat is located within Project Site 10.
Hypomesus transpacificus Delta smelt	FT/CE/--	Occurs almost exclusively in the Sacramento-San Joaquin estuary, from the Suisun Bay upstream through the Delta in Contra Costa, Sacramento, San Joaquin, Solano, and Yolo counties. May also occur in the San Francisco Bay.	Estuarine waters. Majority of life span is spent within the freshwater outskirts of the mixing zone (saltwater-freshwater interface) within the Delta.	Consult Agency	**No.** The Project Site does not contain suitable habitat.

SOURCE: CNPS, 2022; USFWS 2022a; CDFW, 2022

STATUS CODES
FEDERAL: United States Fish and Wildlife Service
FE Federally endangered
FT Federally threatened

FC Federal candidate for listing
FP Federally protected

STATE: California Department of Fish and Game
CE California listed endangered
CR California rare
CT California listed threatened
CSC California species of special concern
CCE California Candidate Endangered

CNPS: California Native Plant Society
List 1A Plants presumed extinct in California
List 1B Plants rare, threatened, or endangered in California and elsewhere
List 2 Plants rare, threatened, or endangered in California, but more common elsewhere
List 3 Plants for which more information is needed
List 4 Plants of limited distribution

Threat Ranks
0.1- Seriously threatened in California (high degree/immediacy of threat)
0.2- Fairly threatened in California (moderate degree/immediacy of threat)
0.3- Not very threatened in California (low degree/immediacy of threats or no current threats known)

4.0 RESULTS AND RECOMMENDATIONS

4.1 HABITAT TYPES

Habitat types within the Project Sites consist of annual grassland, mixed riparian, mixed oak woodland, lawn, and ruderal/disturbed. The mixed riparian and mixed oak woodland include an estimated total of 0.83 acres of canopy cover and 2,777 square feet of tree basal area, defined as the sum of cross-sectional area of the tree at DBH, are planned for removal within mixed riparian habitat within the Project Sites. An estimated 0.01 acres of canopy cover and 38 square feet of basal area are planned for removal within mixed oak woodland habitat. An estimated 0.02 acres of canopy cover are planned for removal within ruderal developed habitat, with no basal area to be removed. No canopy or basal area impacts occur within annual grassland habitat. Impacts associated with project disturbance are expected to result in groundcover vegetation and ground disturbance including 0.42 acres of mixed riparian, 0.03 acres of mixed oak woodland, 0.02 acres of ruderal/developed, and 0.17 acres of annual grassland habitats. Equipment and foot access is planned to occur predominantly within annual grassland and ruderal/developed habitat.

One seasonal wetland and seven intermittent drainages considered Waters of the U.S. occur within the Project Sites. Oak trees occur within Project Site boundaries, particularly within mixed oak woodland and mixed riparian habitats, and eight oaks are prescribed for removal. These oaks are protected under Sacramento County's Tree Preservation and Protection Code and are detailed in **Table 3** below (Tree Preservation Ordinance; County of Sacramento, 2022).

Table 3
Heritage, Protected Oaks, and Protected Non-Heritage Native Trees Prescribed for Removal

Tree Tag #	Common Name	*Scientific Name*	Diameter Total (in.)	Individual Stem Diameter Max & Min (in.), Stem Count			Root Protection Zone Radius (ft.)	Tree Canopy Area/RPZ (sq. ft.)	Note	Study Project Site
7652	Valley oak	*Quercus lobata*	43	22	21	2	35	3847	Heritage	2
7650	Valley oak	*Quercus lobata*	41	24	17	2	35	3847	Heritage	2
7651	Interior live oak	*Quercus wislizeni*	8	8	0	1	0	2826	Protected Non-Heritage Oak	2
7522	California buckeye	*Aesculus californica*	10	10	0	1	0	0	Protected Non-Heritage Native, Dead	6
7520	Valley oak	*Quercus lobata*	25	25	0	1	24	1809	Heritage, Severe Structural Defect	6
7590	Blue oak	*Quercus douglasii*	13	13	0	1	0	0	Protected Non-Heritage Oak	7
7577	Interior live oak	*Quercus wislizeni*	8	4	4	2	14	615	Protected Non-Heritage Oak	8
7573	Valley Oak	*Quercus lobata*	25	25	0	1	38	4534	Heritage	8

One dead California buckeye (*Aescalus californica*), and two un-protected privets and two un-protected fan palms are prescribed for removal. Four small clusters of brush measuring below the DBH size threshold for protection under the County Tree Preservation Ordinance are prescribed for removal as well. Removal of trees and trenching within the riparian corridor may be considered a significant impact to sensitive habitats. A tree removal permit will need to be acquired from and approved by Sacramento County to proceed with their removal and mitigation for the impacts associated with the Proposed Project. **Recommended Mitigation Measure 1** is recommended to reduce impacts to sensitive habitats.

Recommended Mitigation Measure 1

- Restore banks and riparian habitats to baseline conditions. Mitigation may include a combination of measures such as invasive plant removal, bank stabilization, revegetation, trash removal, and native willow plantings on each project site per disturbance and impact level.
- Prior to construction and tree removal, SASD shall obtain tree removal permits and/or conditions of permit approval from Sacramento County.

- SASD shall pay mitigation fees according to County specifications for removed oak trees on a price per DBH inch determined by the County as part of the conditions of the tree removal permit.
- Any soil disturbance (scraping, grading, trenching, and excavation) is to be avoided within the driplines of oak trees. As this type of disturbance is necessary for a majority of the Project Sites, an ISA Certified Arborist will provide specifications for this work, including methods for root pruning during trenching, backfill techniques, and irrigation management guidelines if needed.
- In the instance where temporary equipment or vehicle access over the dripline of oaks is necessary, install 4-inches of new mulch and cover the mulch with metal plates or ¾ inch plywood as feasible.

4.2 SPECIAL-STATUS SPECIES

Based on survey results and the review of regionally occurring special-status species and associated habitat requirements, the Project Sites do not provide suitable habitat for any special-status plant species. The treed habitats on the Project Sites may provide suitable habitat for Swainson's hawk and white-tailed kite. Should tree removal or construction occur during the general nesting season for Swainson's hawk and white-tailed kite (February 15 to September 15), **Recommended Mitigation Measures 2** and **4** are recommended to reduce potential impacts to special-status raptors. Project Site 2 contains suitable habitat for valley elderberry longhorn beetle, and an elderberry shrub with boreholes and stems of qualifying diameter to host VELB was observed approximately 90 feet east of the pipeline within Project Site 2 (Figure 5b of **Attachment A**). The Proposed Project would not affect special-status species with the implementation of **Recommended Mitigation Measures 2** through **4**.

Recommended Mitigation Measure 2

- Prior to construction commencement, all construction personnel shall participate in environmental awareness training regarding identification, descriptions, behavior, and habitat indicators for all special-status species with the potential to be found within the Project Sites. If new construction personnel are added, they must receive the mandatory training prior to initiating work. As part of the training, an environmental awareness handout shall be distributed to all personnel that describes and illustrates all special-status animal species with the potential to occur within the Project Sites. In addition, information on general measures that will be taken to protect these species as they relate to the Proposed Project, the penalties for non-compliance, and the boundaries of the Project Sites will be included. The handout shall also list any applicable permit conditions provided by each regulatory agency. Upon completion of training, employees will sign a form stating that they attended the training and understand all the conservation and protection measures.

Recommended Mitigation Measure 3

- Activities that may damage or kill an elderberry shrub (e.g., trenching, paving, etc.) shall have a buffer of at least 6 meters (20 feet) from the drip line, depending on the type of activity. All areas to be avoided during construction activities will be fenced and/or flagged as close to construction limits as feasible.
- All areas to be avoided during construction activities will be fenced and/or flagged as close to construction limits as feasible.

- A qualified biologist will provide training for all contractors, work crews, and any onsite personnel on the status of the VELB, its host plant and habitat, the need to avoid damaging the elderberry shrubs, and the possible penalties for noncompliance.
- Mechanical weed removal within the drip-line of the shrub will be limited to the season when adults are not active (August - February) and will avoid damaging the elderberry. If needed, erosion control will be implemented and the affected area will be re-vegetated with appropriate native plants.
- Elderberry trimming and implementation of insecticides or herbicides shall not be utilized as a part of the project scope of the Proposed Project.

4.3 NESTING MIGRATORY BIRDS

Nesting birds and raptors are protected by the federal Migratory Bird Treaty Act as well as California Fish and Game Code. Should land clearing or construction occur during the nesting season (February 15 to September 15), **Recommended Mitigation Measure 4** is recommended to reduce potential impacts to nesting migratory birds and raptors on or in the vicinity of the Project Sites.

Recommended Mitigation Measure 4

- Should construction activities associated with the Proposed Project occur during the general nesting season (February 15 to September 15), a preconstruction nesting bird survey shall be conducted no more than 7 days prior to the start of ground disturbing activities. Areas within 500 feet of construction shall be surveyed for active nests.
- Should an active nest be identified, an avoidance buffer shall be established based on the needs of the species identified. Avoidance buffers may vary in size depending on habitat characteristics, project-related activities, and disturbance levels.
- Construction fencing or flagging shall be applied along the outermost perimeter of the avoidance buffer. Avoidance buffers and construction fencing shall remain in place until the end of the general nesting season or upon determination that the nest has become vacant.
- Should work activity cease for 7 days or greater during the breeding season, surveys shall be repeated to ensure birds have not established nests during inactivity.

4.4 CRITICAL HABITAT

No designated critical habitat occurs within the Project Sites (USFWS, 2022b). The Proposed Project would not affect critical habitat.

4.5 ESSENTIAL FISH HABITAT

Suitable habitat for salmonid species including the Chinook salmon and steelhead trout is found within Project Site 10. Fish species and their habitats are protected under the Magnuson-Stevens Act, Endangered Species Act, and the California Fish and Game Code. As the Proposed Project may disturb the habitats of these species, **Recommended Mitigation Measure 5** is recommended to reduce the potential impacts to salmonids and their habitats on or within the vicinity of Project Site 10.

Recommended Mitigation Measure 5

- To the extent feasible, removal and replacement of the existing pipeline at Project Site 10 shall occur between September 1 and October 15, when the flows in the American River are at their lowest seasonal levels (typically between 500 and 1,500 cfs) and after Central Valley steelhead egg and fry life stages are completed and therefore will not be adversely affected by removal of the existing pipeline.
- Consultation with NMFS, CDFW, and the Central Valley Regional Water Quality Control Board (RWQCB) shall occur to determine the Best Management Practices (BMPs) required to minimize disturbance and mobilization of sediment during the pipeline removal. BMPs may include but are not limited to moveable silt or sediment containment curtains and cofferdams.
- The pipeline to be removed shall be cut where it emerges from the banks and will either be lifted by crane or chained and dragged from the river channel to a staging area. To the extent feasible, no equipment will be operated within the wetted channel. To help ensure that work in the immediate vicinity of the bank does not result in sediment discharge into the creek, coffer dams may be utilized during the pipeline and debris removal activities.
- All equipment refueling and maintenance shall occur off-site or in an approved staging area outside of the riparian zone, and an agency-approved spill prevention plan will be implemented by the contractor.
- The pipeline removal shall be covered under the SWPPP prepared for the project, and BMPs shall be implemented to minimize the potential for sediments or other pollutants to enter aquatic habitats during pipeline removal.
- The removal and replacement of the pipeline shall require permits from USACE, Central Valley RWQCB, and CDFW, and all terms of those permits, in addition to those specified in this BRA, shall be followed.

4.6 WETLANDS AND WATERS OF THE U.S.

Approximately 0.07 acres of a seasonal wetland is found within Project Site 2. Per the site plans provided in **Attachment B**, temporary impacts to the seasonal wetland resulting from the use of the annual grassland habitat found north of pipe crossing in Project Site 2 is expected. **Recommended Mitigation Measure 6** is recommended to further reduce impacts to the seasonal wetland at Project Site 2. Seven intermittent drainages likely considered Waters of the U.S., two being the named Arcade and Cripple Creeks, are present within all Project Sites. The Proposed Project may result in permanent and temporary impacts to Waters of the U.S.

Recommended Mitigation Measure 6

- Prior to construction, SASD shall obtain the following permits: CDFW Section 1602 permit, a USACE Section 404 permit, and a RWQCB Section 401 permit. All conditions within the issued permits shall be adhered to.
- All in-stream construction activities and the access path over the seasonal wetland to access Project Site 2 shall be performed and used during the dry season, defined as the timeframe between May 1 and October 15, or the first significant rainfall, whichever comes first. This period coincides with the time of year when the intermittent drainages have reduced flow or are dry and the seasonal wetland would contain the least soil saturation. The required permits are anticipated to include provisions for any required in-stream work, ensuring any

dewatering does not impact the stream, removal of fill within the stream, and sediment control during and immediately after the work. If the worksite needs to be temporarily dewatered by pumping, water will be released or pumped downstream at an appropriate rate to maintain downstream flows during construction. Upon completion of construction activities, any diversion or barriers to flow will be removed in a manner that would allow flow to resume with the least disturbance to the substrate.

- Installation of streambank stabilization measures will adhere to project BMPs and conditions listed within the issued permits.
- Before the end of construction, any work done pertaining to the pipe crossing work within intermittent stream channels shall be restored to a condition allowing for connectivity of the OHWM and the bed and bank between the upstream and downstream sections of the pipe crossing disturbance areas. All temporarily disturbed areas shall be returned to pre-project conditions upon completion of construction, including habitat contours. These areas will be properly protected from washout and erosion using appropriate erosion control devices including anchoring vegetative turf, hydroseeding, and revegetation. The un-impacted areas above and below the work areas will serve as a baseline for restoration evaluation.
- Staging areas, access routes, and construction areas shall be located outside of riparian areas to the maximum extent practicable.
- Riparian corridor enhancement is recommended to mitigate permanent and temporary impacts to Waters of the U.S. Mitigation would occur along the riparian corridors where Himalayan blackberry and other invasive plant species such as English ivy are prevalent. Invasive species are present along portions of the riparian corridors within all 10 of the Project Sites. Invasive species would be removed in an area at a 3:1 ratio for the area of disturbance within Waters of the U.S. Areas cleared of invasive species would be replaced with native willows and other native plant covers. Proposed plantings and invasive plant removal will be focused outside of the ordinary high-water mark of the intermittent drainages and in areas where Waters of the U.S. are disturbed as a result of the Proposed Project. Trash, if present within the Project Site's intermittent drainage channels, will be removed as well.

5.0 REFERENCES

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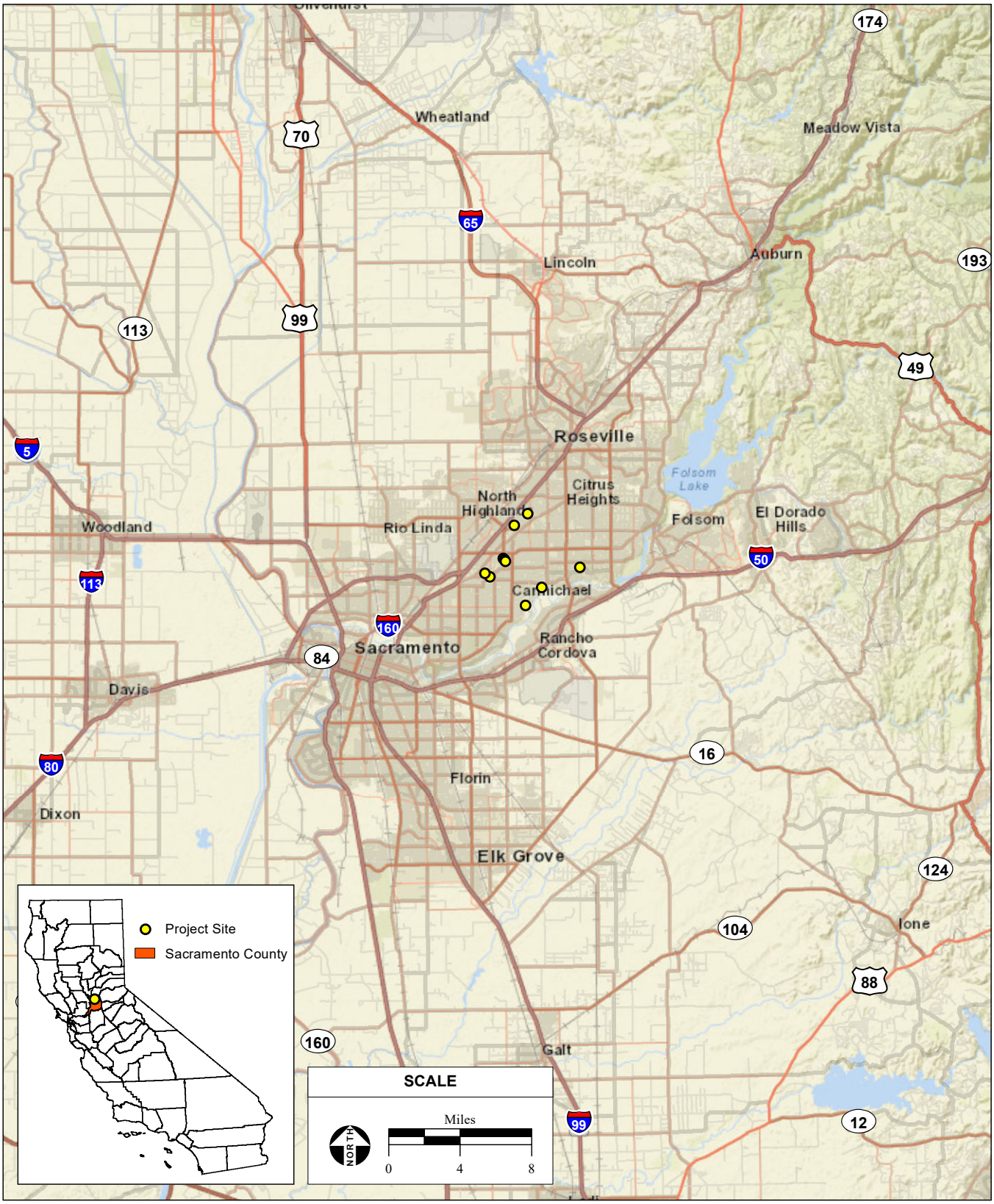
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ATTACHMENTS

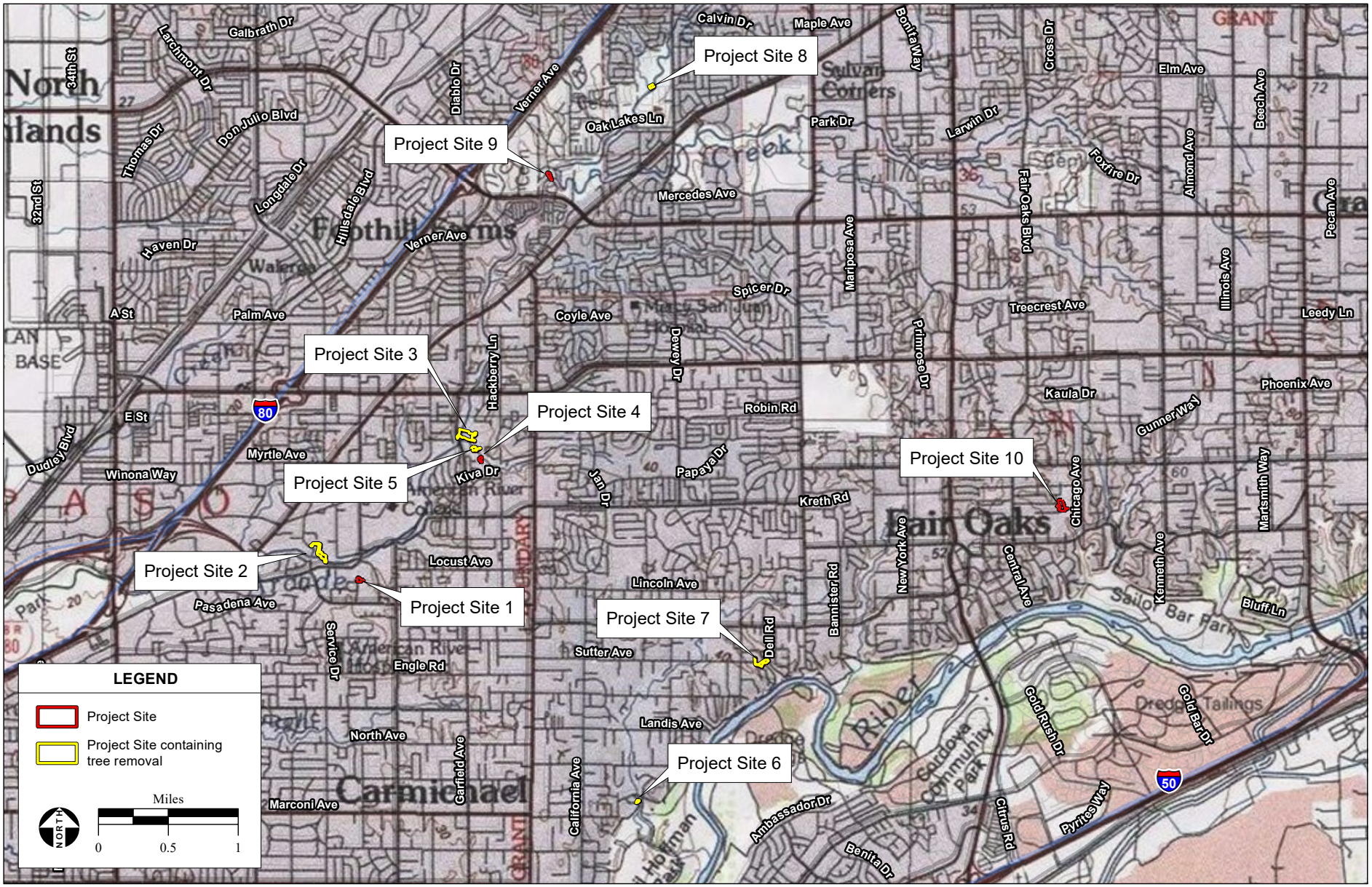
ATTACHMENT A

SUPPORTING FIGURES



SOURCE: ESRI, 2022; Montrose, 2/22/2022

Figure 1
Regional Location



SOURCE: "Sacramento, CA" USGS 100k Topographic Quadrangle, T10N R6E, T9N R6E, Unsectioned Area of Carmichael and Citrus Heights; ESRI 2021; AES, 7/8/2022

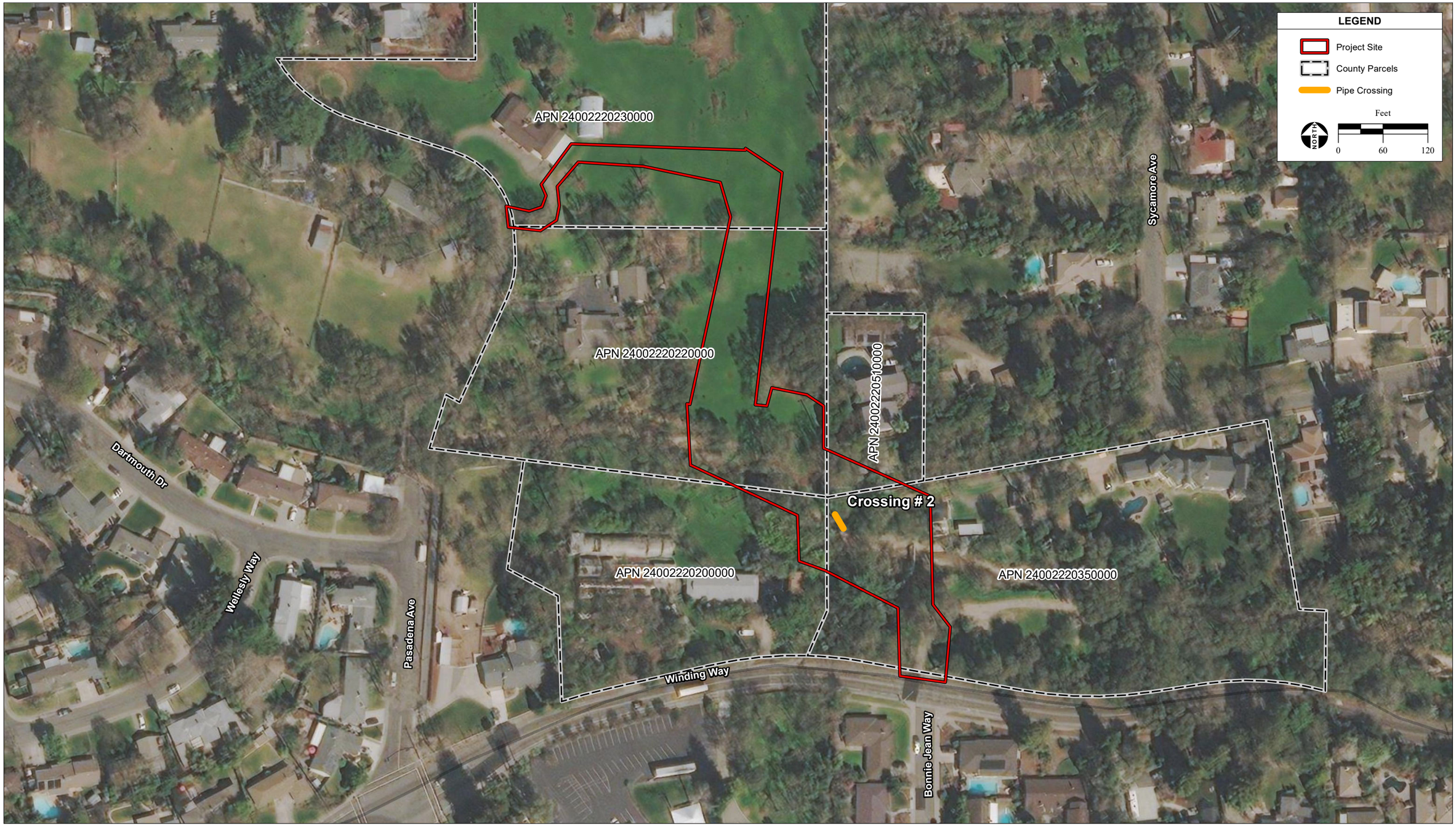
Figure 2
Site and Vicinity



SOURCE: Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/10/2022

Figure 3a

Project Site 1 / Crossing #1 / Hope Ln / Asset #59646



SOURCE: Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/10/2022

Figure 3b

Project Site 2 / Crossing #2 / Winding Way / Asset #48368



SOURCE: Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/10/2022

Figure 3c

Project Site 3 / Crossing #3 / Arcade Creek / Asset #49894
Crossing #4 / Garfield Ave & Thousand Oaks Ct / Asset #44327



SOURCE: Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/10/2022

Figure 3d

Project Site 4 / Crossing #5 / Concho Ct / Asset #41018



SOURCE: Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/10/2022

Figure 3e

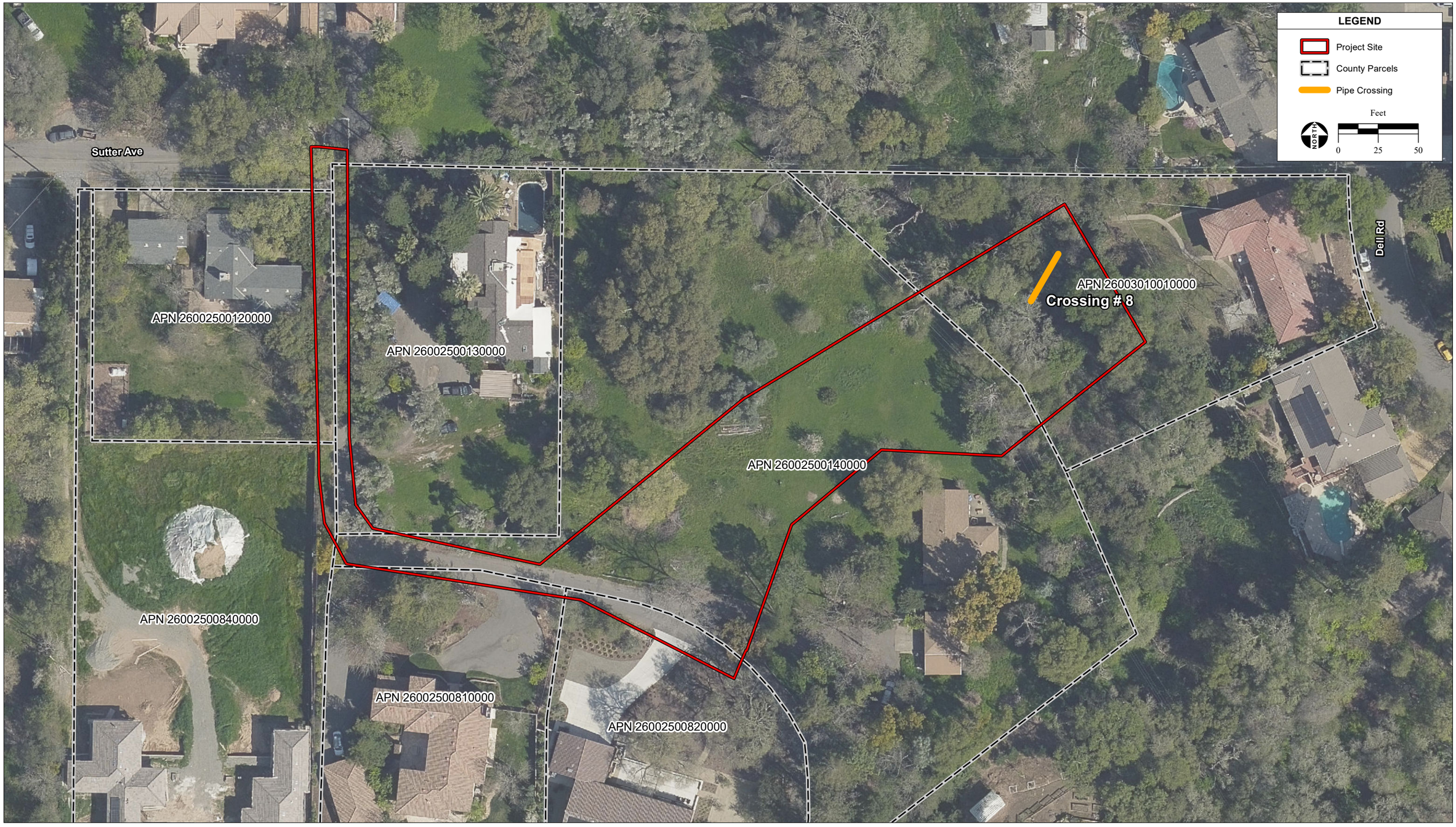
Project Site 5 / Crossing #6 / Gina Ct / Asset #50528



SOURCE: Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/10/2022

Figure 3f

Project Site 6 / Crossing #7 / San Lorenzo Way / Asset #170877



SOURCE: Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/10/2022

Figure 3g

Project Site 7 / Crossing #8 / Sutter Ave / Asset #78865



SOURCE: Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/10/2022

Figure 3h

Project Site 8 / Crossing #9 / Campfire Way / Asset #36529



SOURCE: Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/10/2022

Figure 3i

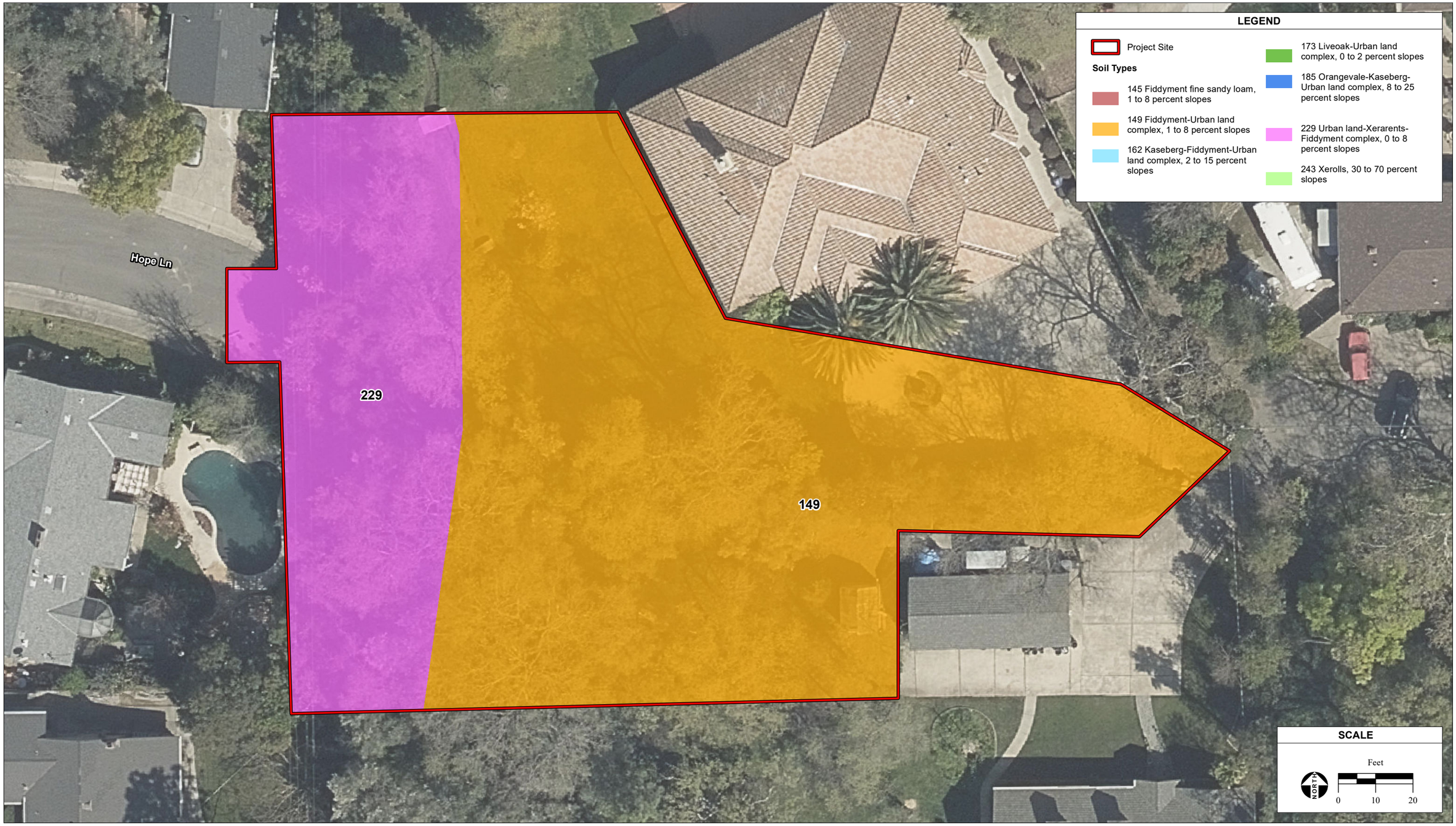
Project Site 9 / Crossing #10 / Indian River Drive / Asset #78531



SOURCE: Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/10/2022

Figure 3j

Project Site 10 / Crossing #11 / Hegseth Ct / Asset #68559
Crossing #12 / Dietz Way / Asset #239693



SOURCE: USDA NRCS Soil Survey of Sacramento County, 2021; Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/10/2022

Figure 4a

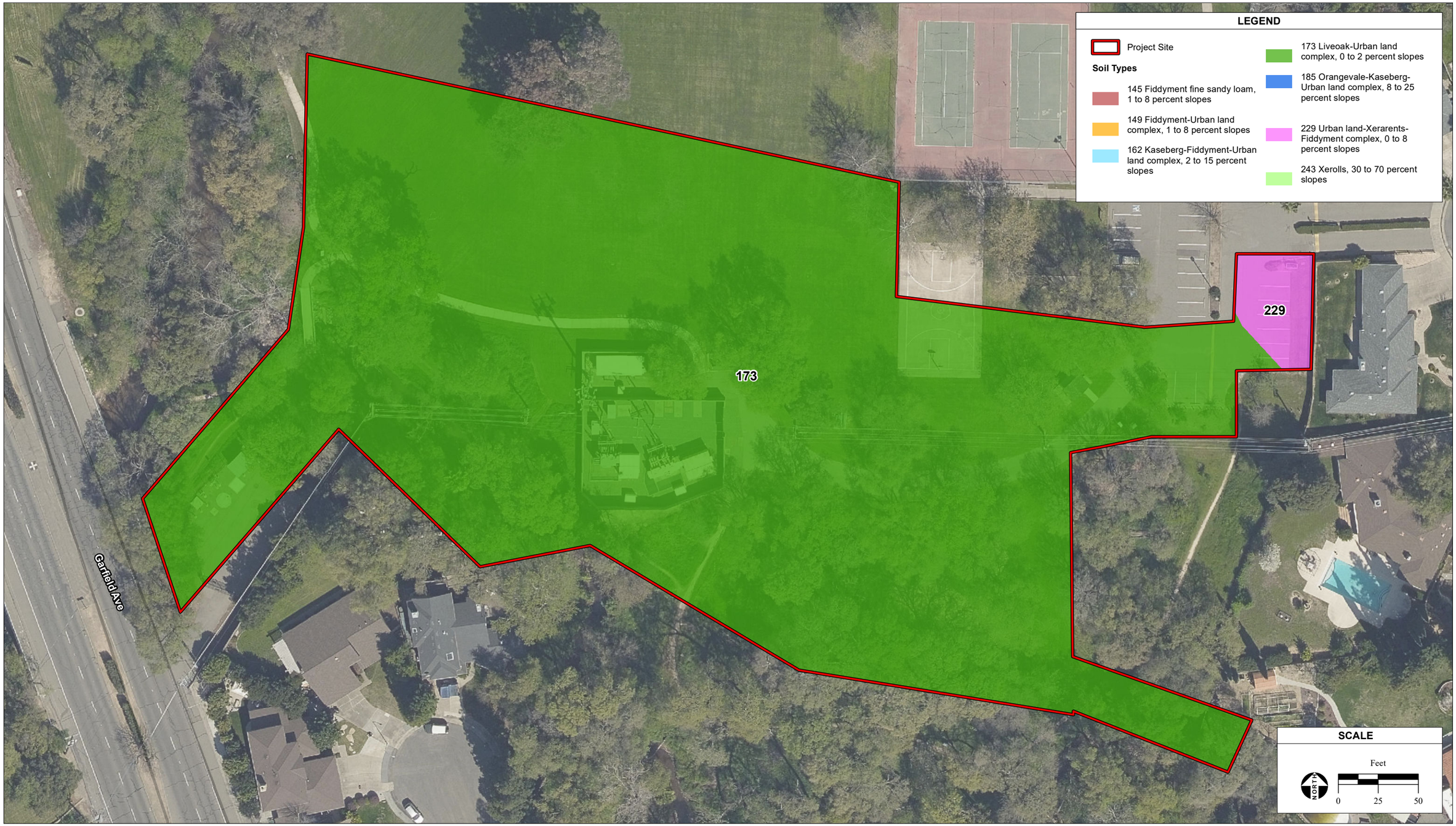
Soil Types - Project Site 1 / Crossing #1 / Hope Ln / Asset #59646



SOURCE: USDA NRCS Soil Survey of Sacramento County, 2021; Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/10/2022

Figure 4b

Soil Types - Project Site 2 / Crossing #2 / Winding Way / Asset #48368



SOURCE: USDA NRCS Soil Survey of Sacramento County, 2021; Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/10/2022

Figure 4c

Soil Types - Project Site 3 / Crossing #3 / Arcade Creek / Asset #49894
Crossing #4 / Garfield Ave & Thousand Oaks Ct / Asset #44327



SOURCE: USDA NRCS Soil Survey of Sacramento County, 2021; Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/10/2022

Figure 4d

Soil Types - Project Site 4 / Crossing #5 / Concho Ct / Asset #41018



SOURCE: USDA NRCS Soil Survey of Sacramento County, 2021; Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/10/2022

Figure 4e

Soil Types - Project Site 5 / Crossing #6 / Gina Ct / Asset #50528



SOURCE: USDA NRCS Soil Survey of Sacramento County, 2021; Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/10/2022

Figure 4f

Soil Types - Project Site 6 / Crossing #7 / San Lorenzo Way / Asset #170877



SOURCE: USDA NRCS Soil Survey of Sacramento County, 2021; Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/10/2022

Figure 4g

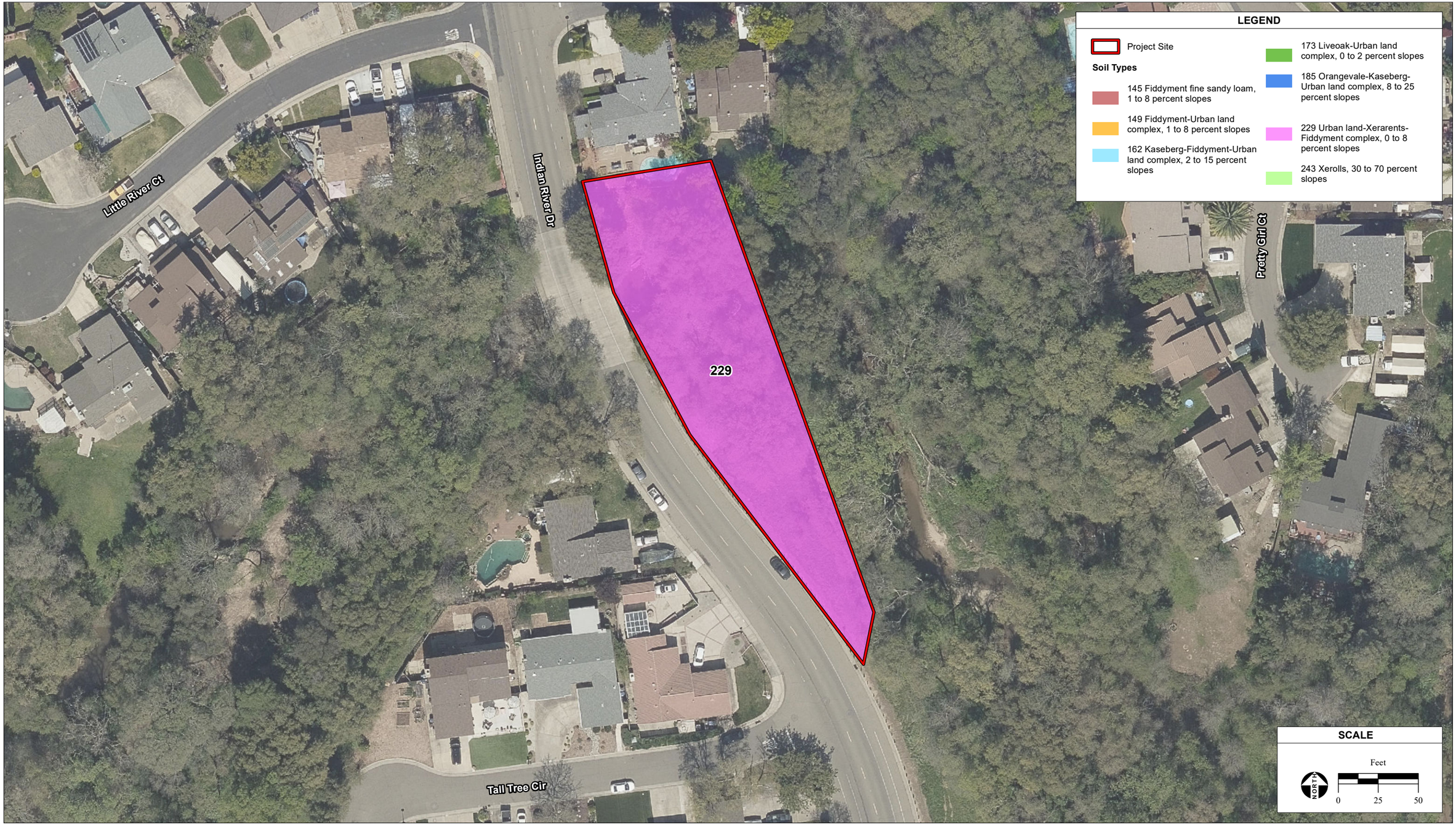
Soil Types - Project Site 7 / Crossing #8 / Sutter Ave / Asset #78865



SOURCE: USDA NRCS Soil Survey of Sacramento County, 2021; Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/10/2022

Figure 4h

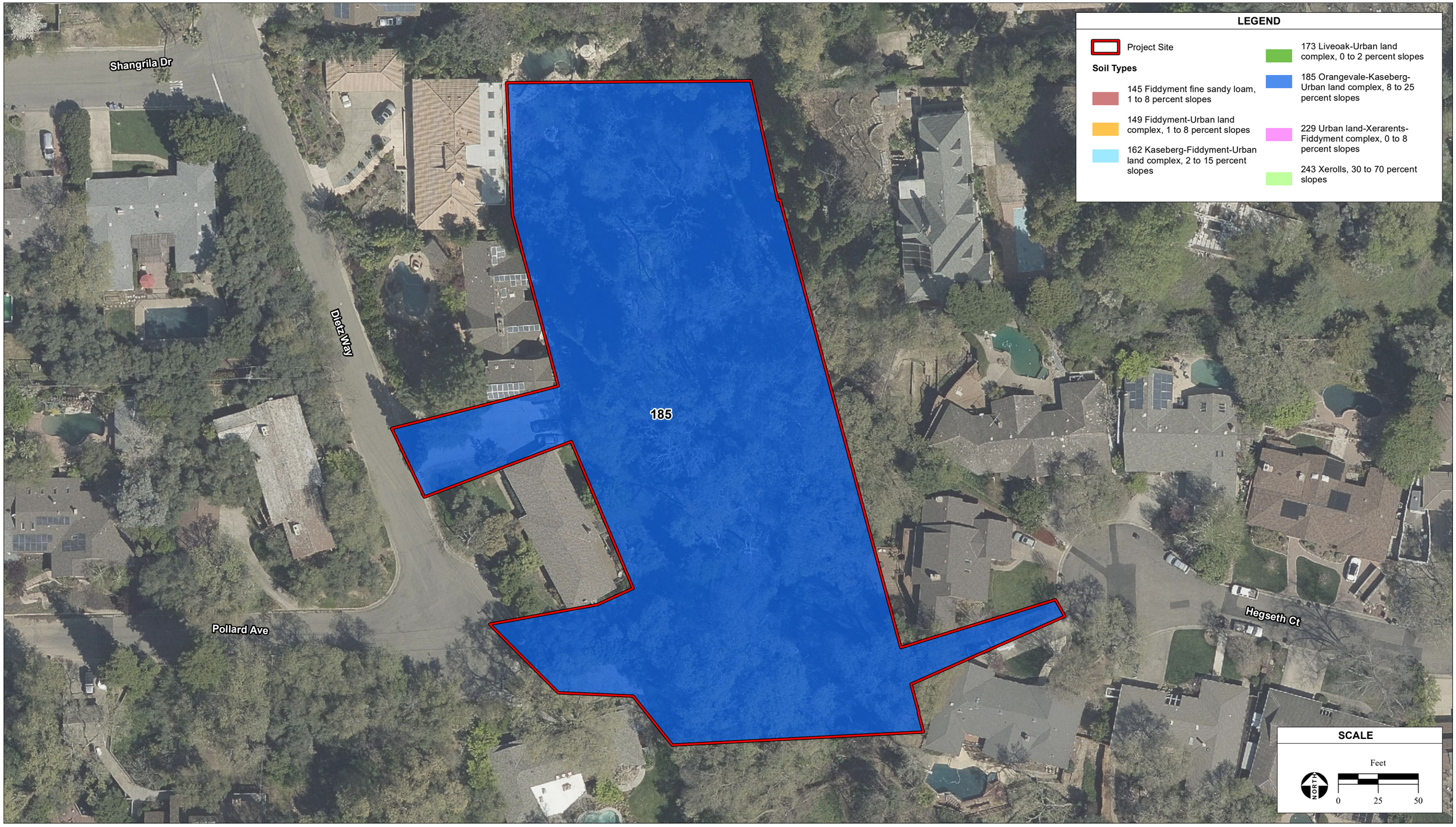
Soil Types - Project Site 8 / Crossing #9 / Campfire Way / Asset #36529



SOURCE: USDA NRCS Soil Survey of Sacramento County, 2021; Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/10/2022

Figure 4i

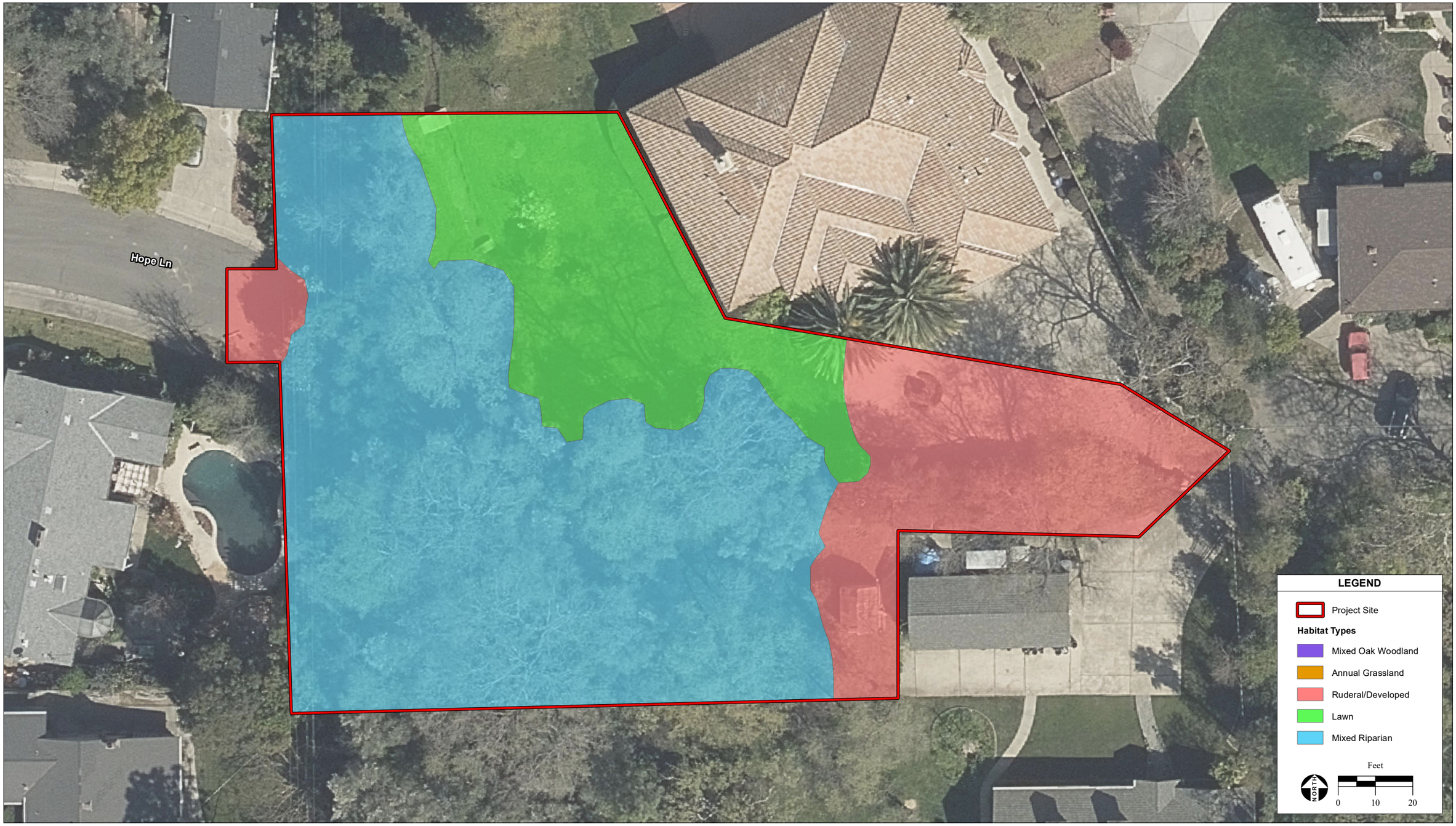
Soil Types - Project Site 9 / Crossing #10 / Indian River Drive / Asset #78531



SOURCE: USDA NRCS Soil Survey of Sacramento County, 2021; Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/10/2022

Figure 4j

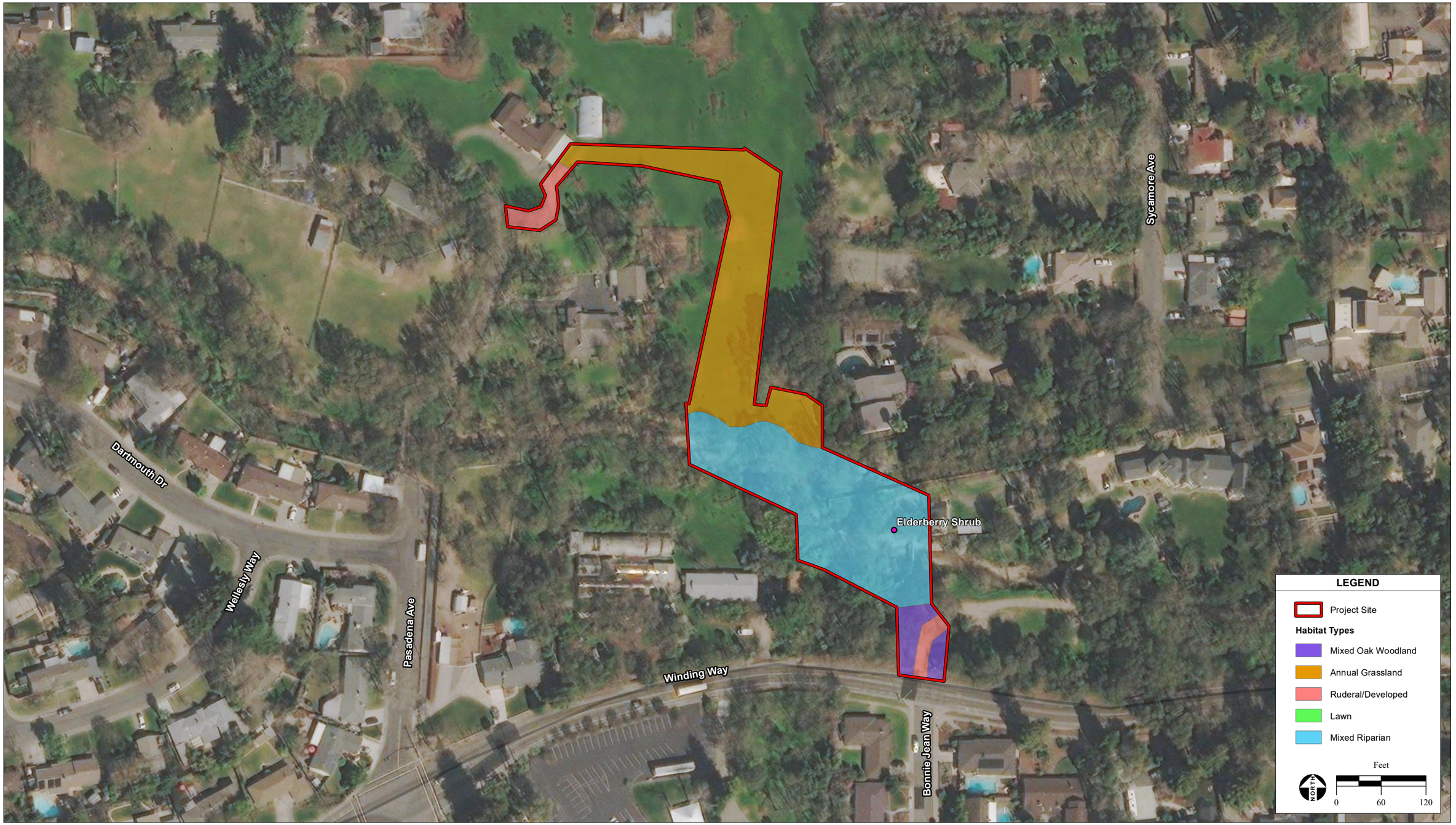
Soil Types - Project Site 10 / Crossing #11 / Hegseth Ct / Asset #68559
Crossing #12 / Dietz Way / Asset #239693



SOURCE: Sacramento County parcel data, 2022; Metro Maxar aerial photography, 3/4/2021; ESRI 2021; Montrose, 5/20/2022

Figure 5a

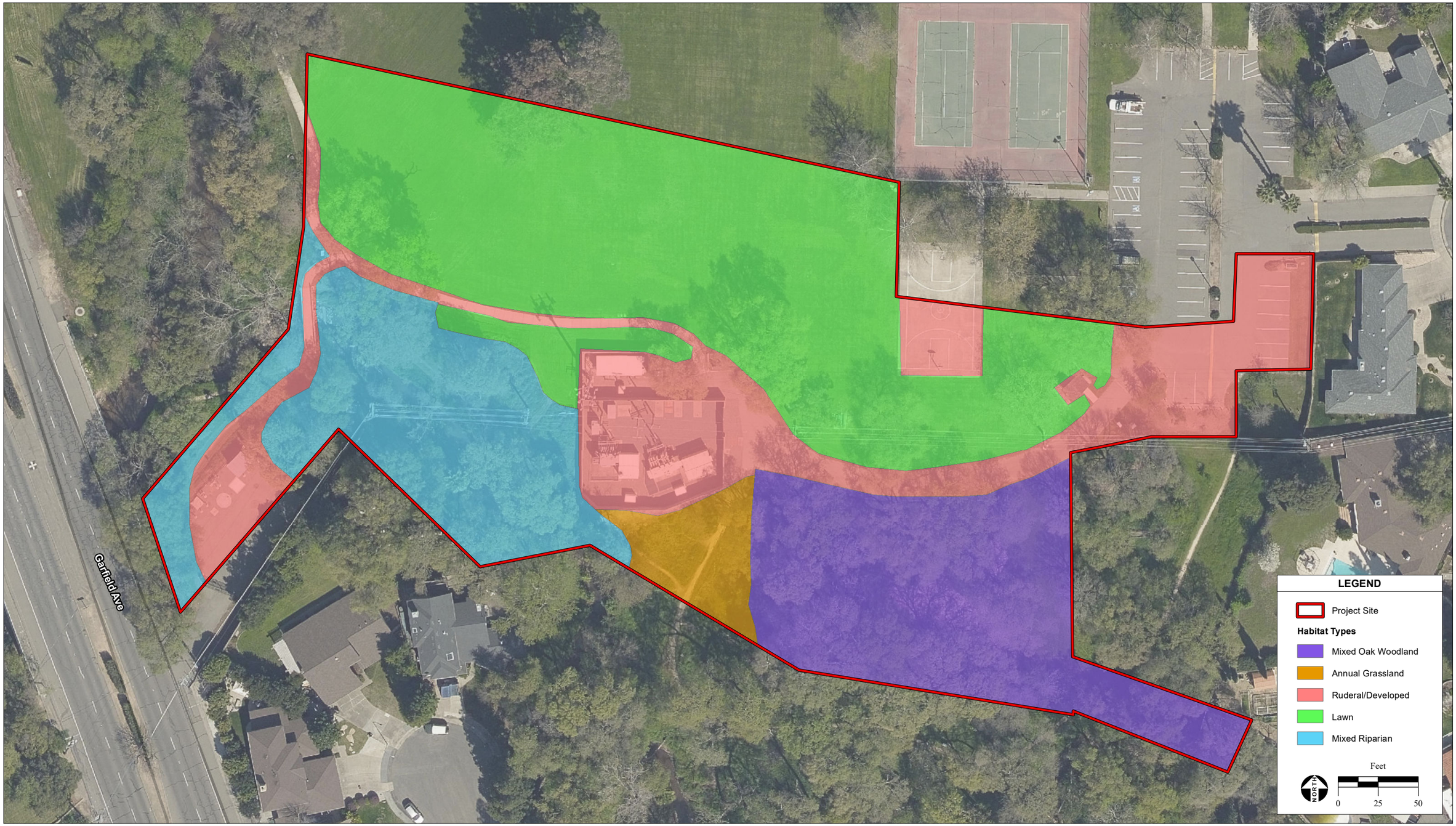
Habitat Types - Project Site 1 / Crossing #1 / Hope Ln / Asset #59646



SOURCE: Sacramento County parcel data, 2022; Metro Maxar aerial photography, 3/4/2021; ESRI 2021; Montrose, 5/20/2022

Figure 5b

Habitat Types - Project Site 2 / Crossing #2 / Winding Way / Asset #48368



SOURCE: Sacramento County parcel data, 2022; Metro Maxar aerial photography, 3/4/2021; ESRI 2021; Montrose, 5/20/2022

Figure 5c

Habitat Types - Project Site 3 / Crossing #3 / Arcade Creek / Asset #49894
Crossing #4 / Garfield Ave & Thousand Oaks Ct / Asset #44327



SOURCE: Sacramento County parcel data, 2022; Metro Maxar aerial photography, 3/4/2021; ESRI 2021; Montrose, 5/20/2022

Figure 5d

Habitat Types - Project Site 4 / Crossing #5 / Concho Ct / Asset #41018



SOURCE: Sacramento County parcel data, 2022; Metro Maxar aerial photography, 3/4/2021; ESRI 2021; Montrose, 5/20/2022

Figure 5e

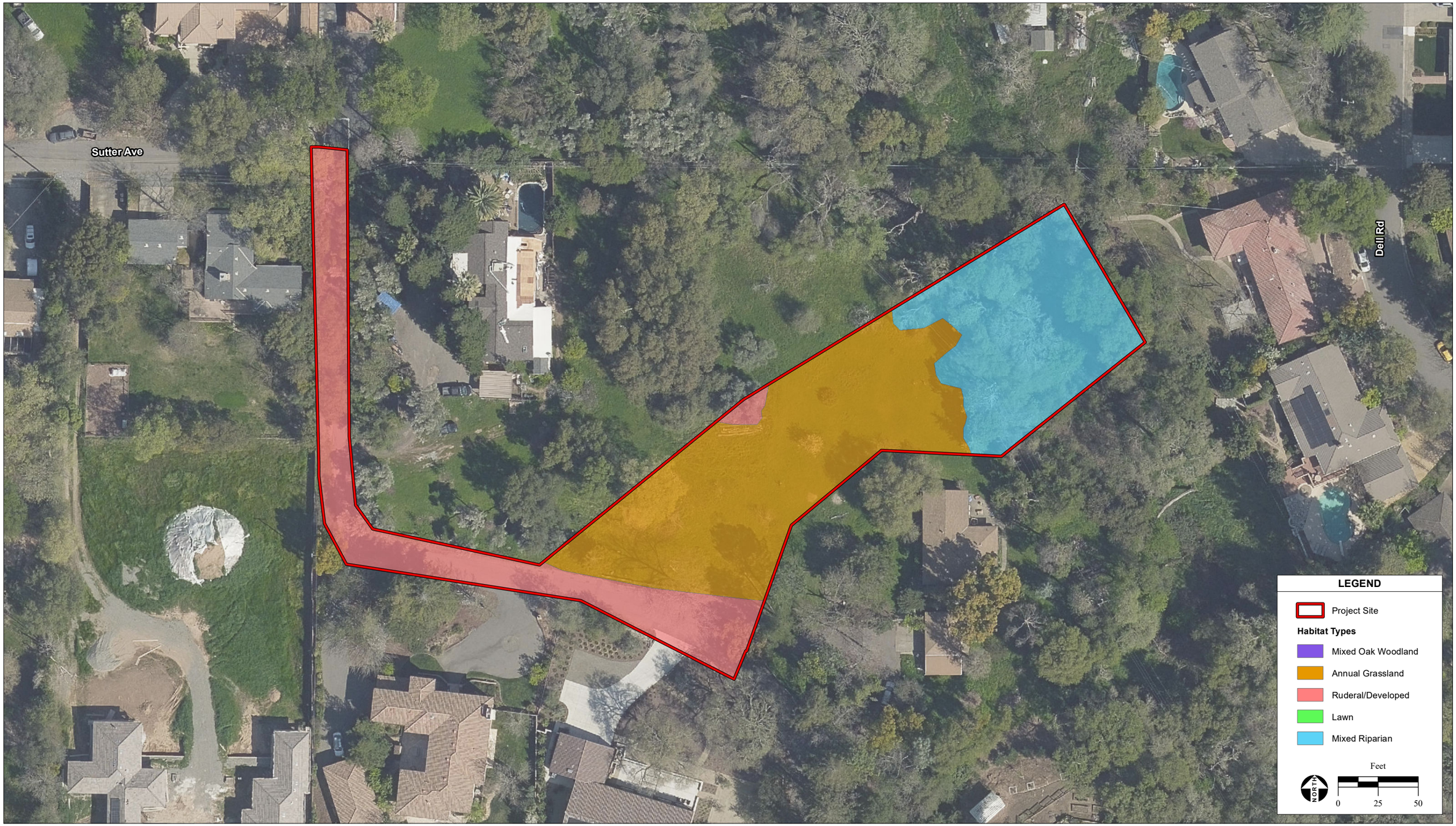
Habitat Types - Project Site 5 / Crossing #6 / Gina Ct / Asset #50528



SOURCE: Sacramento County parcel data, 2022; Metro Maxar aerial photography, 3/4/2021; ESRI 2021; Montrose, 5/20/2022

Figure 5f

Habitat Types - Project Site 6 / Crossing #7 / San Lorenzo Way / Asset #170877



SOURCE: Sacramento County parcel data, 2022; Metro Maxar aerial photography, 3/4/2021; ESRI 2021; Montrose, 5/20/2022

Figure 5g

Habitat Types - Project Site 7 / Crossing #8 / Sutter Ave / Asset #78865



SOURCE: Sacramento County parcel data, 2022; Metro Maxar aerial photography, 3/4/2021; ESRI 2021; Montrose, 5/20/2022

Figure 5h

Habitat Types - Project Site 8 / Crossing #9 / Campfire Way / Asset #36529



SOURCE: Sacramento County parcel data, 2022; Metro Maxar aerial photography, 3/4/2021; ESRI 2021; Montrose, 5/20/2022

Figure 5i

Habitat Types - Project Site 9 / Crossing #10 / Indian River Drive / Asset #78531



SOURCE: Sacramento County parcel data, 2022; Metro Maxar aerial photography, 3/4/2021; ESRI 2021; Montrose, 5/20/2022

Figure 5j

Habitat Types - Project Site 10 / Crossing #11 / Hegseth Ct / Asset #68559
Crossing #12 / Dietz Way / Asset #239693



PHOTO 1: South-facing view of the intermittent drainage in Project Site 1 with lawn and mixed riparian habitats



PHOTO 2: View of pipe crossing and large channel within Project Site 2 with annual grassland habitat located out of frame photo left



PHOTO 3: East-facing view of pipe-crossing and intermittent drainage within riparian habitat in Project Site 3

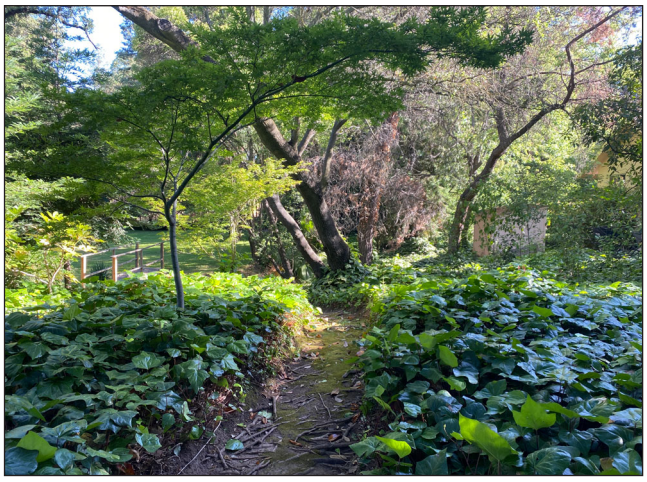


PHOTO 4: North-facing view landscaping within mixed riparian and lawn habitats in Project Site 4



PHOTO 5: View of vegetation management within mixed riparian habitat of Project Site 5

SOURCE: Montrose, 3/16/2020

Figure 6a
Site Photographs



PHOTO 6: South-facing view of intermittent drainage and annual grassland species in Project Site 6



PHOTO 8: Channel and bank view of Project Site 8



PHOTO 10: South-facing view of pipe-crossing, bridge, and intermittent drainage in Project Site 10



PHOTO 7: North-facing view of pipe-crossing in Project Site 7



PHOTO 9: West-facing view of Arcade Creek and Indian River Drive bridge in Project Site 9

SOURCE: Montrose, 3/16/2020

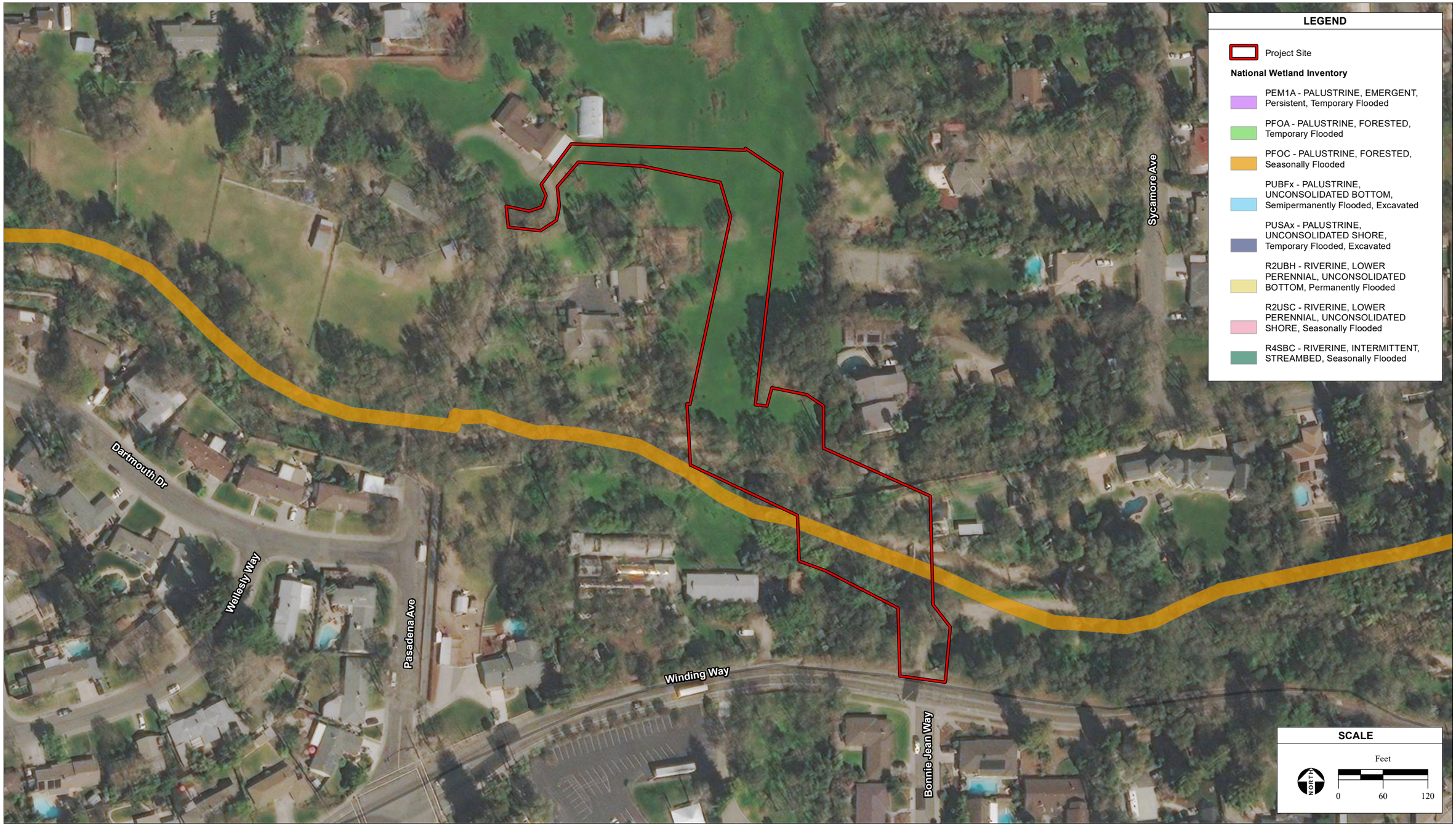
Figure 6b
Site Photographs



SOURCE: USFWS National Wetland Inventory for "'Sacramento, CA" USGS 100k Topographic Quadrangle, 1975, 1976, 1977"; Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/10/2022

Figure 7a

National Wetland Inventory - Project Site 1 / Crossing #1 / Hope Ln / Asset #59646



SOURCE: USFWS National Wetland Inventory for "'Sacramento, CA" USGS 100k Topographic Quadrangle, 1975, 1976, 1977"; Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/10/2022

Figure 7b

National Wetland Inventory - Project Site 2 / Crossing #2 / Winding Way / Asset #48368



SOURCE: USFWS National Wetland Inventory for "'Sacramento, CA" USGS 100k Topographic Quadrangle, 1975, 1976, 1977"; Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/10/2022

Figure 7c

National Wetland Inventory - Project Site 3 / Crossing #3 / Arcade Creek / Asset #49894
Crossing #4 / Garfield Ave & Thousand Oaks Ct / Asset #44327



SOURCE: USFWS National Wetland Inventory for "'Sacramento, CA" USGS 100k Topographic Quadrangle, 1975, 1976, 1977"; Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/10/2022

Figure 7d

National Wetland Inventory - Project Site 4 / Crossing #5 / Concho Ct / Asset #41018



SOURCE: USFWS National Wetland Inventory for "'Sacramento, CA" USGS 100k Topographic Quadrangle, 1975, 1976, 1977"; Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/10/2022

Figure 7e

National Wetland Inventory - Project Site 5 / Crossing #6 / Gina Ct / Asset #50528



SOURCE: USFWS National Wetland Inventory for "'Sacramento, CA" USGS 100k Topographic Quadrangle, 1975, 1976, 1977"; Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/10/2022

Figure 7f

National Wetland Inventory - Project Site 6 / Crossing #7 / San Lorenzo Way / Asset #170877



SOURCE: USFWS National Wetland Inventory for "'Sacramento, CA" USGS 100k Topographic Quadrangle, 1975, 1976, 1977"; Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/10/2022

Figure 7g

National Wetland Inventory - Project Site 7 / Crossing #8 / Sutter Ave / Asset #78865



SOURCE: USFWS National Wetland Inventory for "'Sacramento, CA" USGS 100k Topographic Quadrangle, 1975, 1976, 1977"; Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/10/2022

Figure 7h

National Wetland Inventory - Project Site 8 / Crossing #9 / Campfire Way / Asset #36529



SOURCE: USFWS National Wetland Inventory for "'Sacramento, CA" USGS 100k Topographic Quadrangle, 1975, 1976, 1977"; Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/10/2022

Figure 7i

National Wetland Inventory - Project Site 9 / Crossing #10 / Indian River Drive / Asset #78531



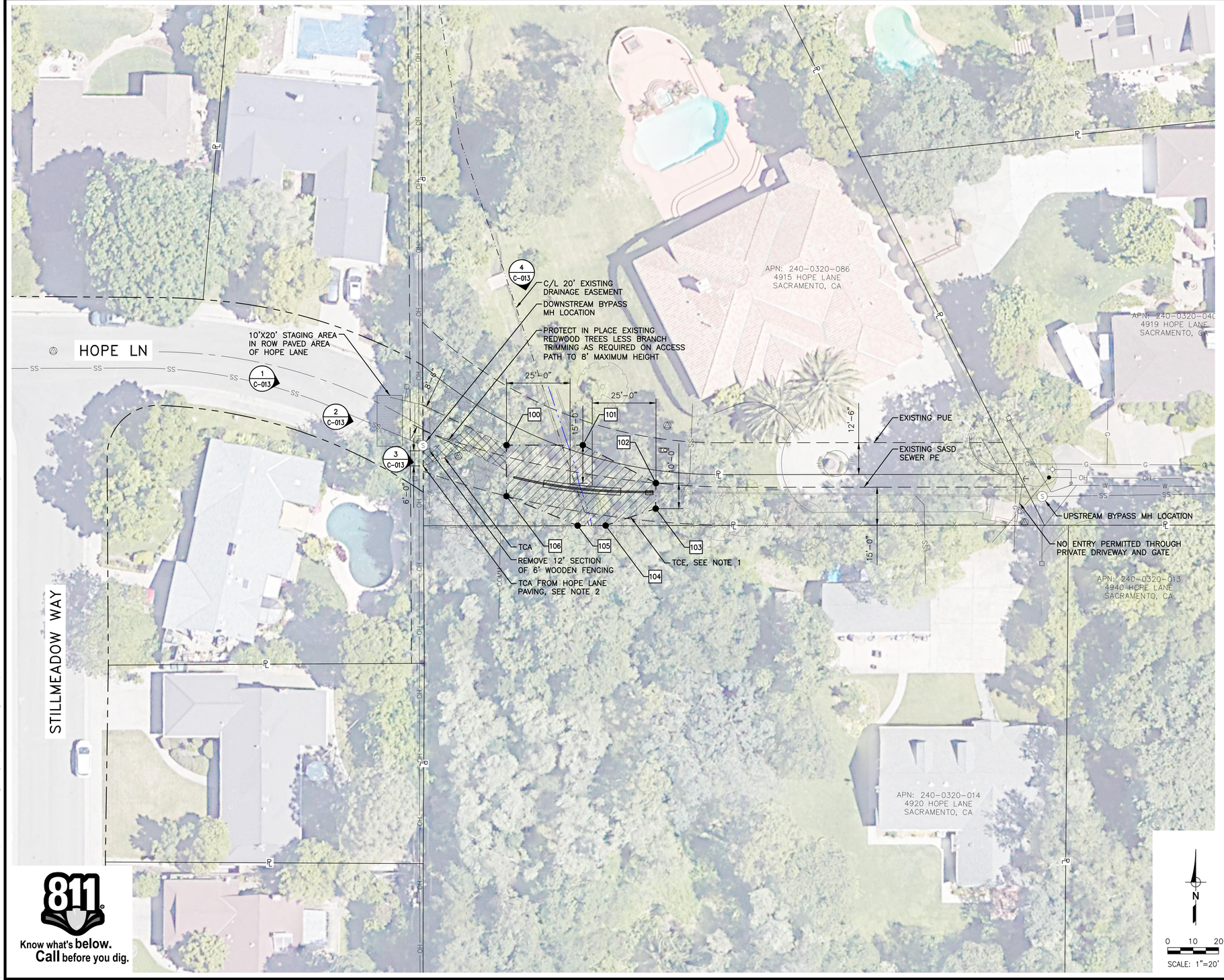
SOURCE: USFWS National Wetland Inventory for "'Sacramento, CA" USGS 100k Topographic Quadrangle, 1975, 1976, 1977"; Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/10/2022

Figure 7j

National Wetland Inventory - Project Site 10 / Crossing #11 / Hegseth Ct / Asset #68559
Crossing #12 / Dietz Way / Asset #239693

ATTACHMENT B

SITE PLANS



NOTES

1. SEE DWG G-005 FOR TCE COORDINATES.
2. ACCESS TO CROSSING BEYOND THIS POINT IS VIA HOMEOWNER LANDSCAPED AREA INCLUDING MATURE TREES AND SHRUBS. CONTRACTOR TO SUBMIT PROPERTY PROTECTION PLAN PRIOR TO EQUIPMENT OR MATERIALS BEING BROUGHT BEYOND THIS POINT. SEE CROSSING PHOTOS FOR PATH DETAILS. CONTRACTOR SHALL NOT DAMAGE LANDSCAPING ON PRIVATE PROPERTY.
3. STAGING SHALL BE LIMITED TO THE AREA SHOWN ON THE PLAN.
4. PRUNING OF TREES WILL REQUIRE APPROVAL FROM SASD AND SHALL BE PERFORMED UNDER THE OVERSIGHT OF A CERTIFIED ARBORIST.

LEGEND

- ACCESS PATH TO SITE
- WORK AREA GROUND DISTURBANCE LIMITS
- STAGING AREA

811 Know what's below. Call before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT G. NAYOLI NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

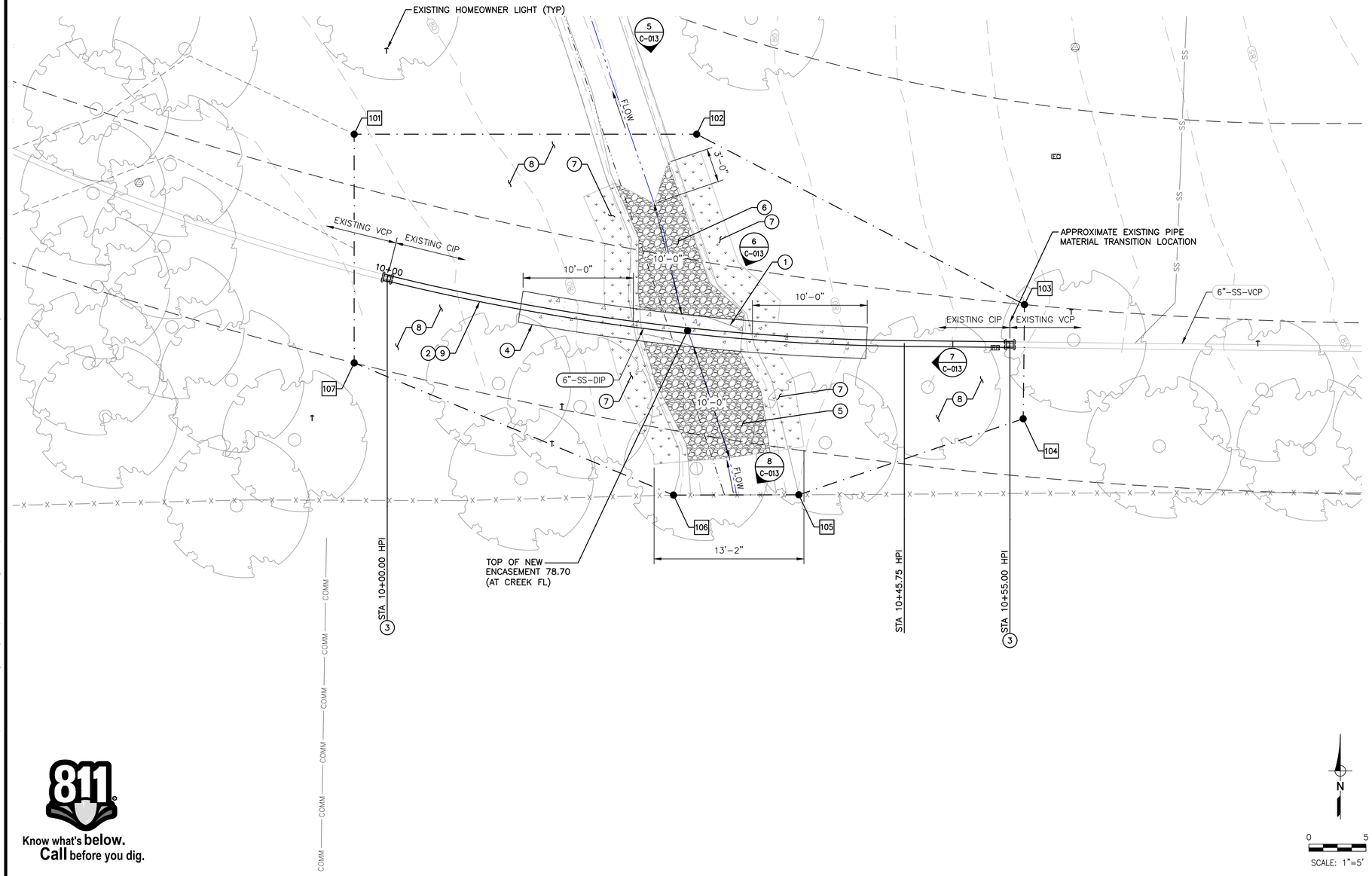
WSC
2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827
APPROVED:
POSITION DATE

SASD CREEK CROSSING PROJECT
CROSSING 01 - HOPE LANE
SITE ACCESS PLAN

DRAWING C-010
SHEET 7 OF --
PROJECT # –

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 - 3:49 AM CADD User: Chris Durbin



SHEET KEY NOTES

1. REMOVE EXISTING COBBLES
2. DEMOLISH EXISTING SS AND ENCASEMENT TO EXTENTS OF PIPE REPLACEMENT. INSTALL SS PIPE AS SAME INVERT AND ALIGNMENT, SEE SHEET C-012
3. FLEXIBLE COUPLINGS AND TRANSITION COUPLING PER SASD STANDARD 402.1.2 TO CONNECT TO EXISTING PIPING, TYP. EACH END
4. INSTALL NEW CONCRETE ENCASEMENT PER SASD STANDARD 202.12.2, 30' L X 33" W X 20" H
5. INSTALL UPSTREAM CLASS I RIPRAP. SLOPE FROM TOP OF ENCASEMENT TO CHANNEL AT 5:1 (RUN:RISE) MAXIMUM SLOPE. EXTEND 10-FT UP CHANNEL FROM ENCASEMENT
6. INSTALL DOWNSTREAM CLASS I RIPRAP. SLOPE FROM TOP OF ENCASEMENT TO CHANNEL AT 5:1 (RUN:RISE) MAXIMUM SLOPE
7. INSTALL ANCHORED VEGETATED TURF REINFORCED MAT OVER SLOPES FOR EXTENTS SHOWN. CUT SLOPES BACK TO 1:1 MAXIMUM
8. RESTORE PRIVATE PROPERTY, INSTALL SOD IN IMPACTED LAWN AREAS. REPLANT AND RESEED ACCESS PATHS TO MATCH EXISTING QUANTITY AND TYPE OF PLANTS
9. CENTER MANUFACTURER'S NOMINAL LAY LENGTH OF DIP ON CROSSING

TREE REMOVAL

NO TREE REMOVAL FOR HOPE LANE SITE

811 Know what's below. Call before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT G. NAVOLI NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

WSC
2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

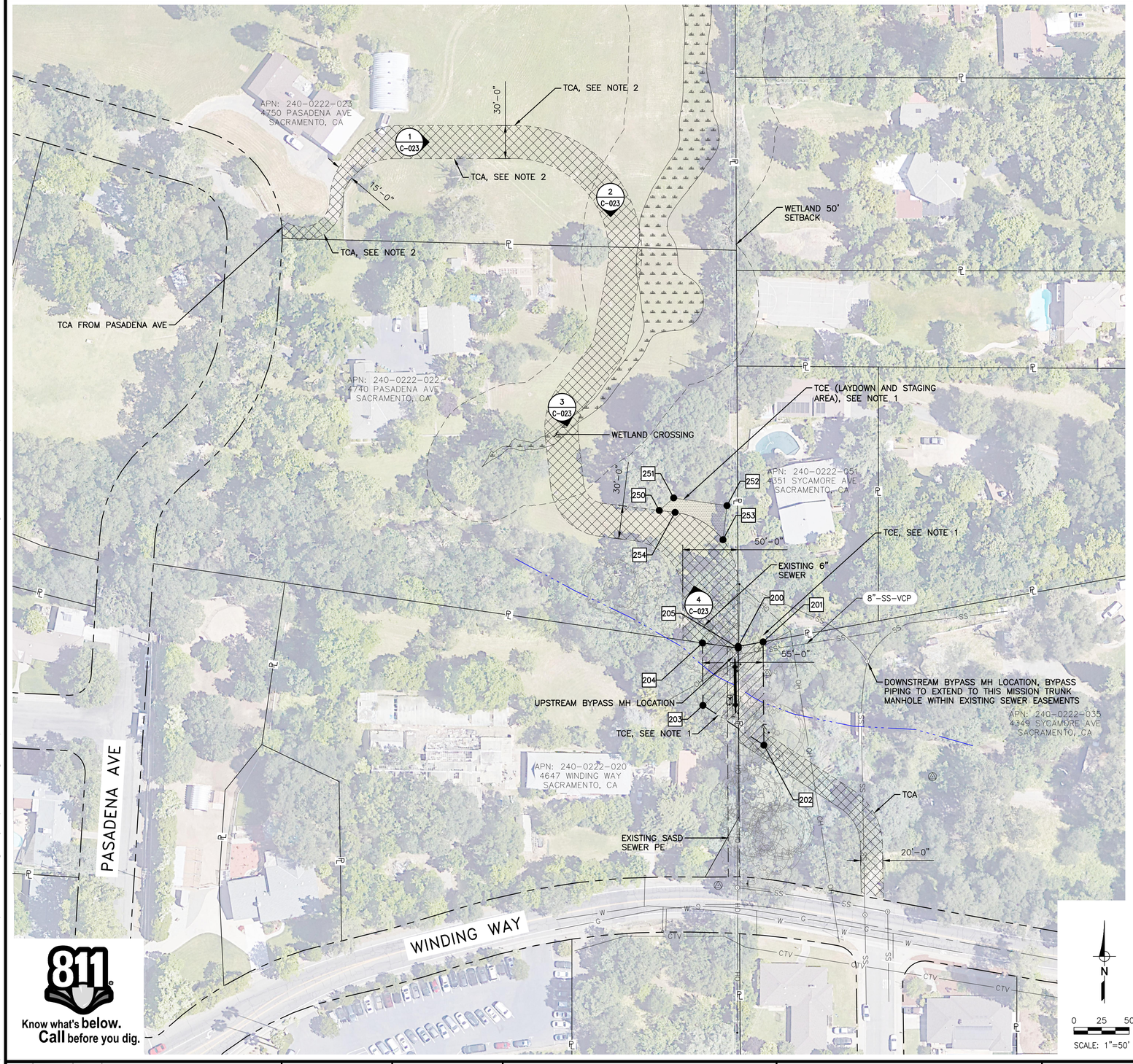
SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
POSITION DATE

SASD CREEK CROSSING PROJECT
CROSSING 01 - HOPE LANE
SITE PLAN

DRAWING C-011
SHEET 8 OF --
PROJECT # –

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 - 3:51 AM CADD User: Chris Durbin



811 Know what's below. Call before you dig.

NOTES

1. SEE DWG G-005 FOR TCE COORDINATES.
2. ACCESS TO CROSSING BEYOND THIS POINT IS VIA HOMEOWNER PRIVATE DRIVEWAY AND FIELD INCLUDING FENCING, GATES, AND MATURE TREES AND SHRUBS. CONTRACTOR TO SUBMIT PROPERTY PROTECTION PLAN PRIOR TO EQUIPMENT OR MATERIALS BEING BROUGHT BEYOND THIS POINT. SEE CROSSING PHOTOS FOR PATH DETAILS. CONTRACTOR SHALL NOT DAMAGE LANDSCAPING ON PRIVATE PROPERTY.
3. STAGING SHALL BE LIMITED TO THE AREA SHOWN ON THE PLAN.
4. REMOVAL AND PRUNING OF TREES WILL REQUIRE APPROVAL FROM SASD AND SHALL BE PERFORMED UNDER THE OVERSIGHT OF A CERTIFIED ARBORIST.

LEGEND

- ACCESS PATH TO SITE
- WORK AREA GROUND DISTURBANCE LIMITS
- STAGING AREA
- WETLANDS

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT C. NAJOLI NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

WSC
2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

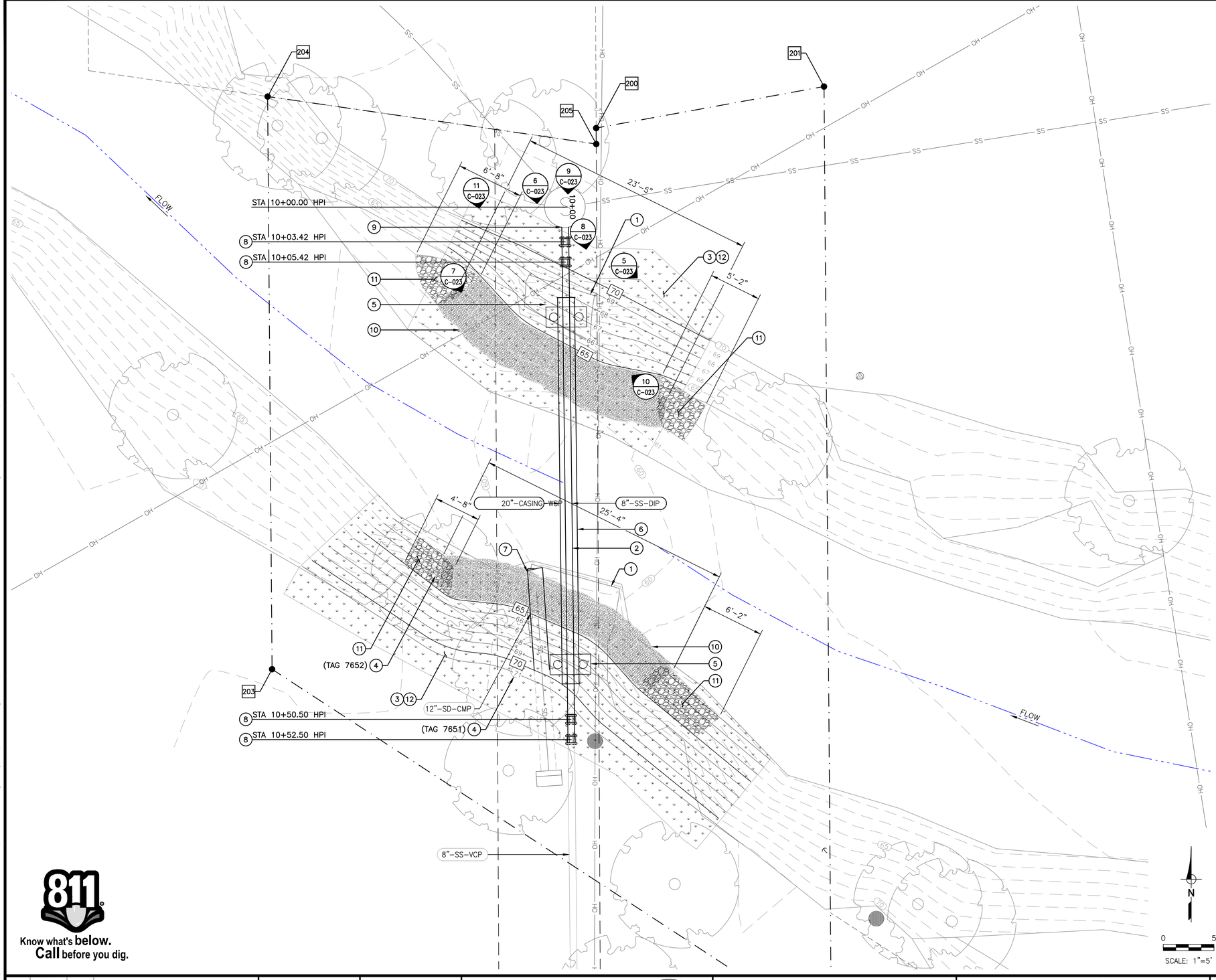
SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
POSITION DATE

SASD CREEK CROSSING PROJECT
CROSSING 02 - WINDING WAY
SITE ACCESS PLAN

DRAWING C-020
SHEET 11 OF --
PROJECT # _

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 - 3:54 AM CADD User: Chris Durbin



SHEET KEY NOTES

1. REMOVE EXISTING SLOPE PROTECTION
2. REMOVE EXISTING SS PIPE AND PIERS PER DETAIL 1, SHEET C-022. REMOVE PIPE FROM EXISTING MANHOLE. REPLACE WITH SS ON SAME ALIGNMENT. REPLACEMENT ELEVATIONS PER SHEET C-022
3. INSTALL ANCHORED VEGETATED TURF REINFORCEMENT MAT ON BOTH BANKS TO EXTENTS SHOWN. EMBED INTO ENGINEERED BANK STABILIZATION SYSTEM. INSTALL ON SLOPES SHOWN (MAX 1:1). MATCH EXISTING SLOPES
4. REMOVE EXISTING TREE AS NOTED ON PLANS
5. INSTALL (2) 8" DIAMETER DRILLED MICROPILES TO A DEPTH OF 24' BATTERED AT 15 DEGREES
6. INSTALL 20" EPOXY COATED WSP CASING PIPE IN ACCORDANCE WITH SASD STANDARD 202.12.4
7. REMOVE EXISTING 12" CMP STORM DRAIN AS NECESSARY TO COMPLETE WORK. INSTALL 12" HDPE STORM DRAIN (MIN 10' OR AS NECESSARY TO COMPELTE WORK), ADS N-12 OR APPROVED EQUAL. EXTEND THROUGH IMPROVED BANK AND MATCH EXISTING SLOPE. CONNECT TO EXISTING CMP USING MARMAC DP COUPLER OR APPROVED EQUAL.
8. INSTALL DOUBLE 8" FLEXIBLE JOINTS PER SASD STANDARD 312.3
9. CONNECT TO EXISTING MANHOLE PER SASD DETAIL MH-03
10. INSTALL ANCHORED ENGINEERED BANK STABILIZATION SYSTEM PER DETAILS
11. MINIMIZE BANK DISTURBANCE AT EDGES OF ENGINEERED BANK STABILIZATION SYSTEM. COVER DISTURBED AREAS WITH CLASS III RIP-RAP UP TO ELEVATION OF TOP TIER (MIN EL 65.0)
12. HYDROSEED ALL DISTURBED AREAS INCLUDING TURF REINFORCEMENT MAT

TREE REMOVAL

8IN DEAD	TAG 7651
48IN X 30FT OAK	TAG 7652

Know what's below. Call before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT C. NAITOLI NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

WSC
2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
_____ – _____– POSITION DATE

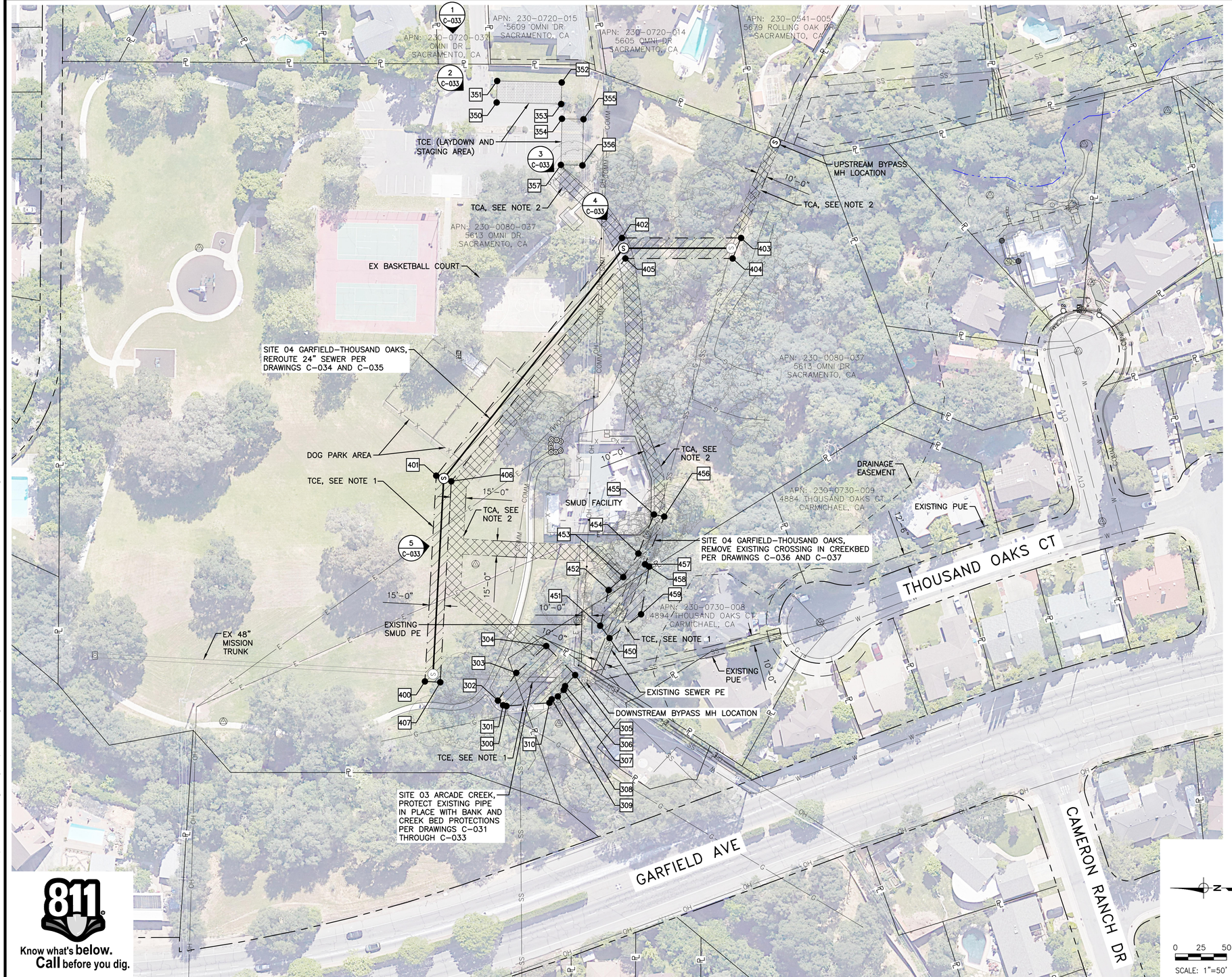
SASD CREEK CROSSING PROJECT

CROSSING 02 - WINDING WAY

SITE PLAN

DRAWING C-021
SHEET 12 OF --
PROJECT # –

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 - 3:56 AM CADD User: Chris Durbin



NOTES:

1. SEE DWG G-005 FOR TCE COORDINATES.
2. ACCESS TO CROSSINGS 03 AND 04 IS VIA ARCADE CREEK PARK INCLUDING OPEN FIELDS, ACCESS ROADS, FENCING, GATES, AND MATURE TREES AND SHRUBS. CONTRACTOR TO SUBMIT PROPERTY PROTECTION PLAN PRIOR TO EQUIPMENT OR MATERIALS BEING BROUGHT INTO THE PARK PROPERTY. SEE CROSSING PHOTOS FOR PATH DETAILS. CONTRACTOR SHALL NOT DAMAGE PARK AND SMUD PROPERTY. ALL GRASS AREAS SHALL BE RESEEDED AND RESTORED. SEE C-034 AND C-035 FOR RESTORATION OF DOG PARK AREA.
3. STAGING SHALL BE LIMITED TO THE AREA SHOWN ON THE PLAN.
4. REMOVAL AND PRUNING OF TREES WILL REQUIRE APPROVAL FROM SASD AND SHALL BE PERFORMED UNDER THE OVERSIGHT OF A CERTIFIED ARBORIST.
5. LIMIT IMPACTS TO DOG PARK AREA TO A MAXIMUM OF 3 WEEKS. IF ADDITIONAL TIME IS NEEDED CONTRACTOR TO ERECT TEMPORARY FENCING ALONG TCE/TCA TO ALLOW ACCESS TO DOG PARK.
6. ACCESS PATHS THROUGH ARCADE CREEK PARK ARE PRELIMINARY AND PENDING DISTRICT COORDINATION WITH THE PARKS DISTRICT.

LEGEND

- ACCESS PATH TO SITE
- WORK AREA GROUND DISTURBANCE LIMITS
- STAGING AREA

Know what's below. Call before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT G. NAYOLI NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

WSC
2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
POSITION DATE

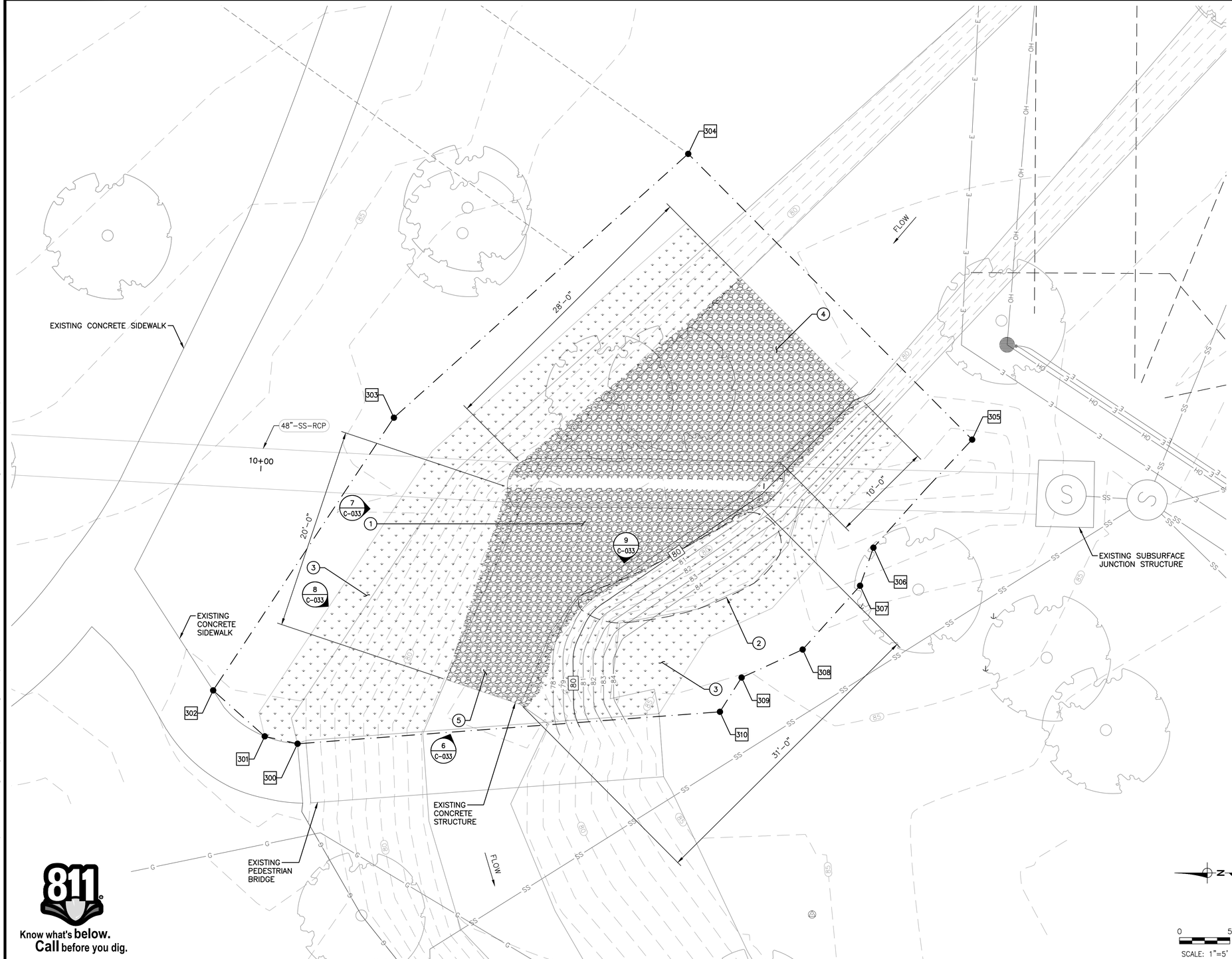
SASD CREEK CROSSING PROJECT

CROSSING 03 & 04 - ARCADE CREEK & GARFIELD THOUSAND OAKS

SITE ACCESS PLAN

DRAWING C-030
SHEET 15 OF --
PROJECT # --

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 - 3:59 AM CADD User: Chris Durbin



SHEET KEY NOTES

1. REMOVE EXISTING BED PROTECTION
2. BACKFILL TO RESTORE BANK
3. INSTALL ANCHORED VEGETATED TURF REINFORCEMENT MAT TO EXTENTS SHOWN. INSTALL ON BOTH BANKS AND ACROSS CHANNEL BENEATH RIP RAP. INSTALL ON SLOPES SHOWN (MAX 1:1)
4. INSTALL UPSTREAM CLASS III RIP RAP AND BEDDING PER DETAILS. SLOPE FROM TOP OF ENCASEMENT TO CHANNEL AT 5:1 (RUN:RISE) MAXIMUM SLOPE
5. INSTALL DOWNSTREAM CLASS III RIP RAP AND BEDDING PER DETAILS. SLOPE FROM TOP OF EXISTING PIPE TO CONCRETE STRUCTURE LOCATED UPSTREAM OF EXISTING BRIDGE
6. HYDROSEED ALL DISTURBED AREAS INCLUDING TURF REINFORCEMENT MAT

TREE REMOVAL

NO TREE REMOVAL FOR ARCADE CREEK SITE

Know what's below. Call before you dig.

SCALE: 1"=5'

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT G. NAPOLI NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

WSC
2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
POSITION DATE

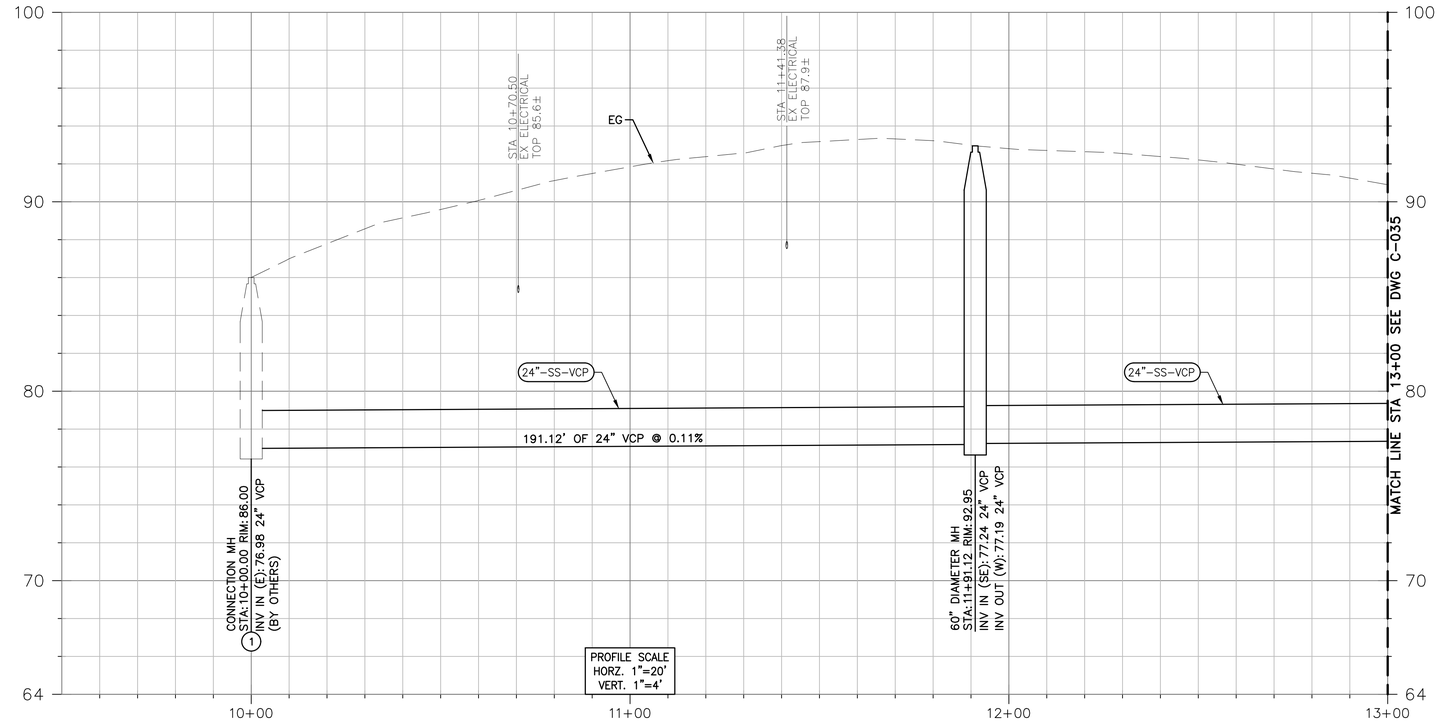
SASD CREEK CROSSING PROJECT

CROSSING 03 & 04 - ARCADE CREEK & GARFIELD THOUSAND OAKS

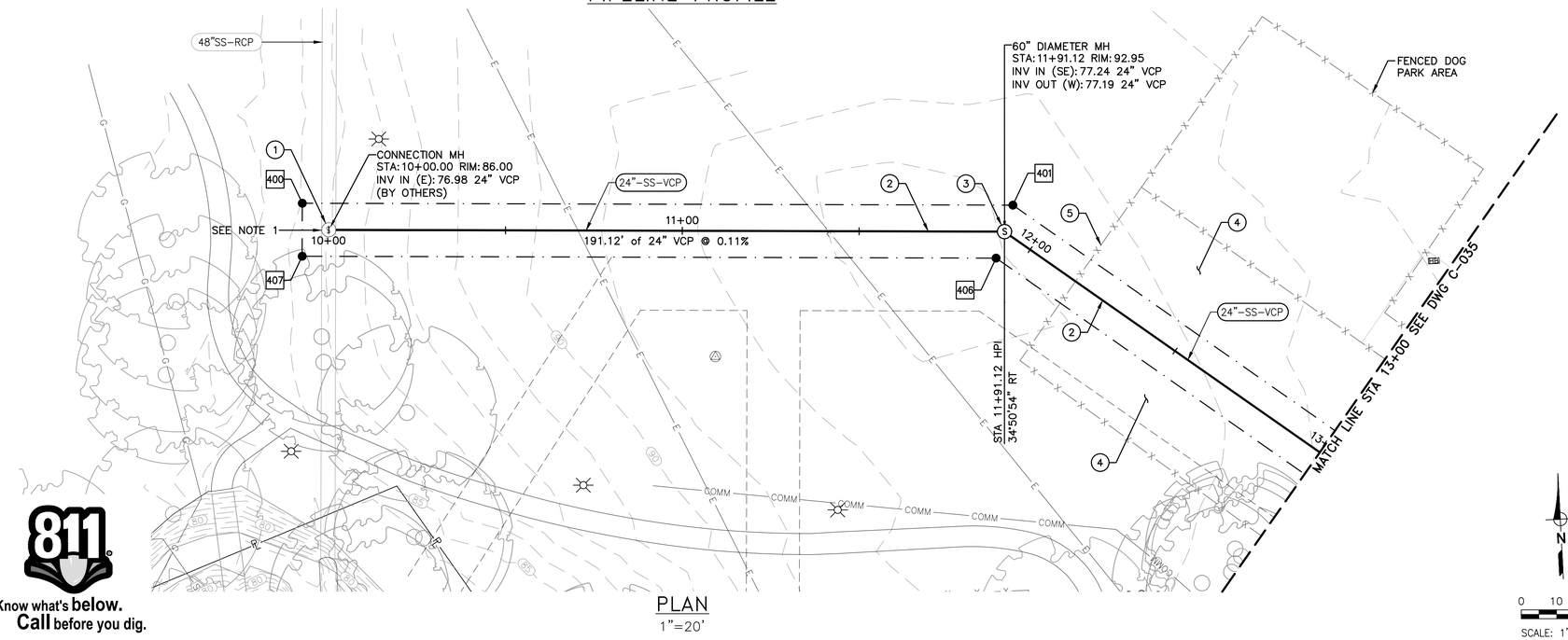
SITE PLAN - ARCADE CREEK

DRAWING C-031
SHEET 16 OF --
PROJECT # –

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 - 5:38 AM CADD User: Chris Durbin



PIPELINE PROFILE



PLAN
1"=20'

SHEET KEY NOTES

1. CONNECT TO EXISTING SS MH
2. INSTALL SS PIPE TO SLOPE AND INVERT SHOWN ON PLAN
3. INSTALL MANHOLE PER SASD STANDARD DETAIL MH-03
4. REPLACE IMPACTED AREAS WITHIN DOG PARK WITH SOD
5. REMOVE AND REPLACE EXISTING DOG FENCING IMPACTED BY ALIGNMENT, MATCH EXISTING

NOTES:

1. APPROXIMATE INVERT OF 48" RCP AT CONNECTION LOCATION IS 75.24±

Know what's **below.** **Call** before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT C. NAVOLI NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

WSC
2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
_____ - _____ - POSITION DATE

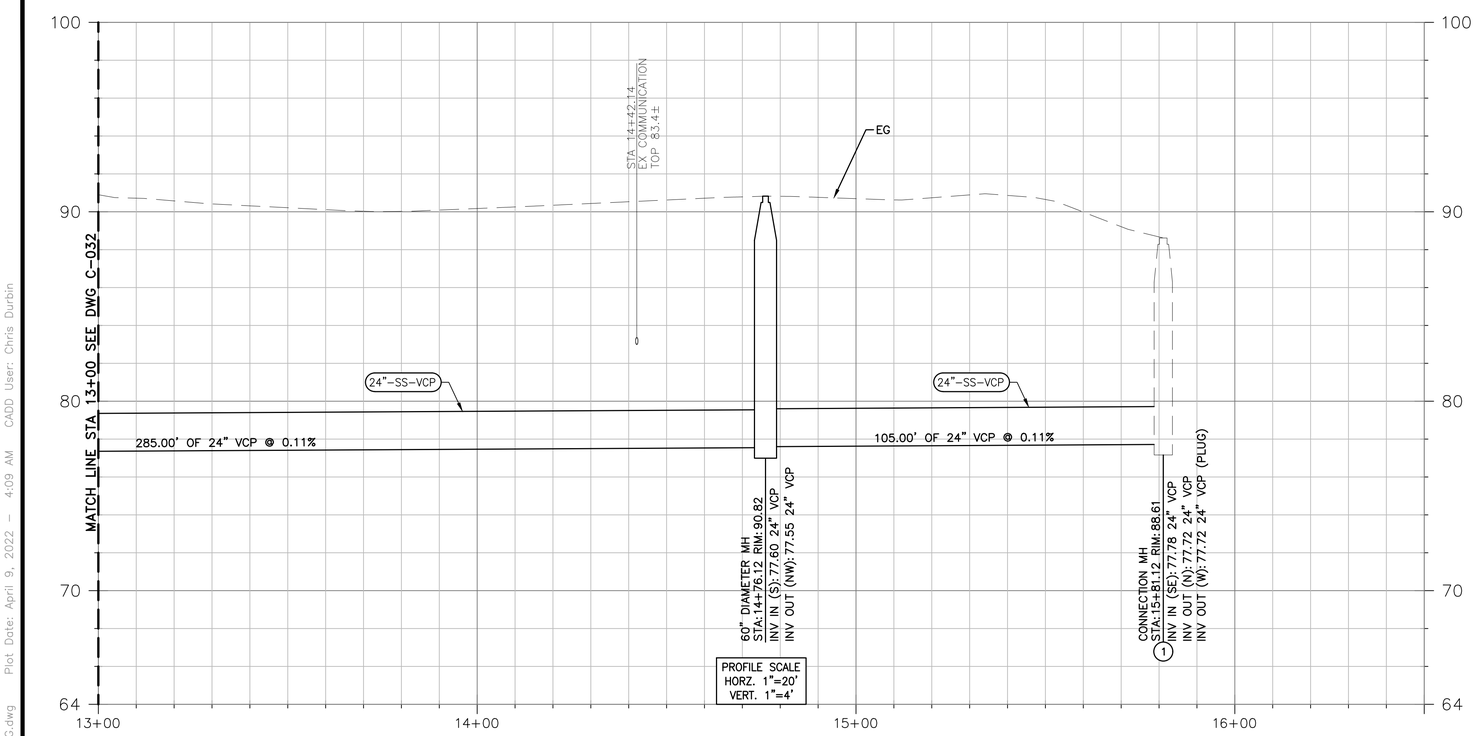
SASD CREEK CROSSING PROJECT

CROSSING 03 & 04 - ARCADE CREEK & GARFIELD THOUSAND OAKS

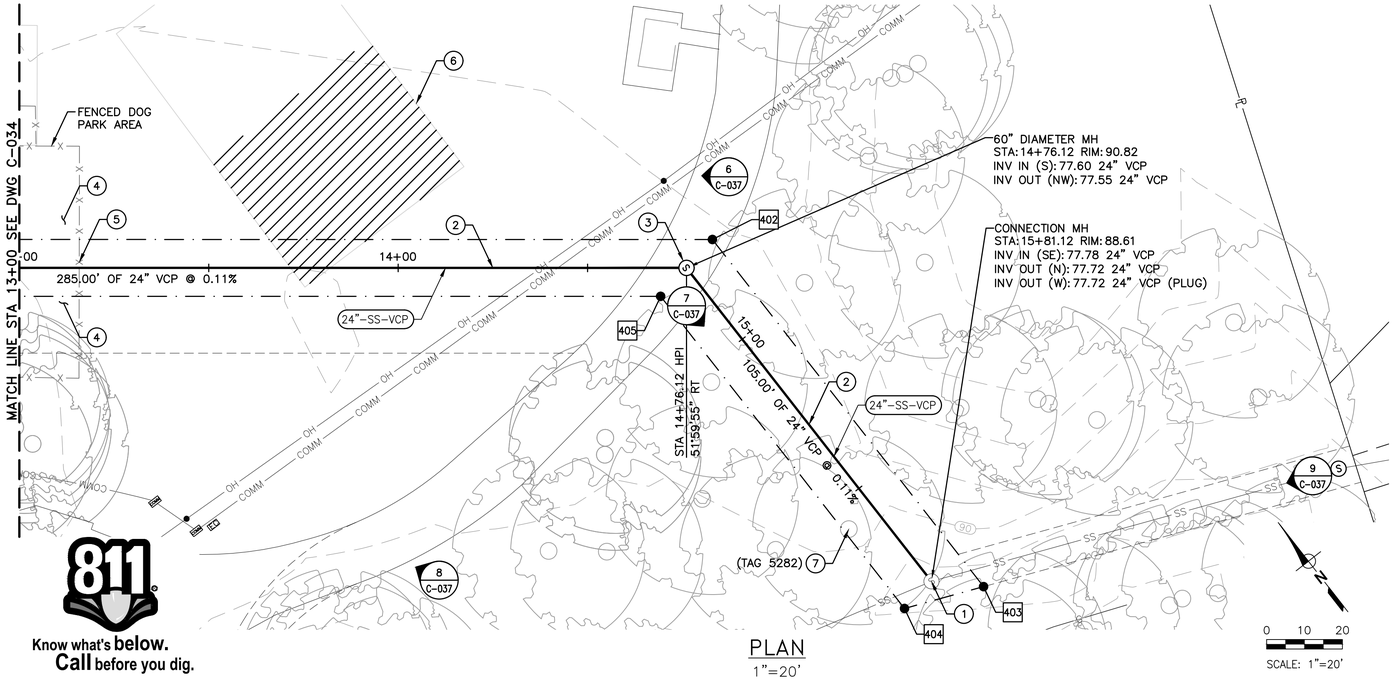
NEW 24" SS PLAN AND PROFILE
STA 10+00 TO STA 13+00

DRAWING
C-034
SHEET 19 OF --
PROJECT # _

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 - 4:06 AM CADD User: Chris Durbin



PIPELINE PROFILE



PLAN
1"=20'

SHEET KEY NOTES

1. CONNECT TO EXISTING SS MH
2. INSTALL SS PIPE TO SLOPE AND INVERT SHOWN ON PLAN
3. INSTALL MANHOLE PER SASD STANDARD DETAIL MH-03
4. REPLACE IMPACTED AREAS WITHIN DOG PARK WITH SOD
5. REMOVE AND REPLACE EXISTING DOG FENCING IMPACTED BY ALIGNMENT, MATCH EXISTING
6. REMOVE AND REPAVE HALF OF EXISTING ASPHALT BASKETBALL COURT. MATCH EXISTING DEPTH OF AC
7. REMOVE EXISTING TREE AS NOTED ON PLANS

TREE REMOVAL

N/A	TAG 5282

LEGEND

PAVEMENT EXTENTS, SEE SPECIFICATIONS FOR AC PAVEMENT REQUIREMENTS

Know what's **below.** **Call** before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT C. NAJOLI NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

WSC
2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
_____ - _____ POSITION DATE

SASD CREEK CROSSING PROJECT

CROSSING 03 & 04 - ARCADE CREEK & GARFIELD THOUSAND OAKS

NEW 24" SS PLAN AND PROFILE
STA 13+00 TO STA 15+81±

DRAWING
C-035
SHEET 20 OF --
PROJECT # _

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 - 4:09 AM CADD User: Chris Durbin

SHEET KEY NOTES

1. CAP AND ABANDON EXISTING 24" VCP PER SASD STANDARDS
2. ABANDON EXISTING MANHOLE PER SASD STANDARDS
3. REMOVE EXISTING 24" VCP FROM CREEK AND 5' INTO BANKS (TYP BOTH SIDES)
4. BACKFILL AND RESTORE CREEK BED AND BANKS
5. INSTALL ANCHORED VEGETATED TURF REINFORCEMENT MAT ON SLOPES DISTURBED BY WORK
6. REMOVE EXISTING TREES AS NOTED ON PLANS

TREE REMOVAL

REMOVE TWO TREE CLUSTERS INDICATED IN CREEK. CLUSTERS ARE BELOW TAGGED TREE DIAMETER SIZES.

ABANDON TO UPSTREAM MANHOLE OF REROUTED SEWER, SEE PLAN BELOW RIGHT FOR UPSTREAM EXTENT

ABANDON TO DOWNSTREAM MANHOLE (ADJACENT TO CREEK) SEE PLAN ABOVE LEFT FOR DOWNSTREAM EXTENT

24"-SS-VCP

5'-0"

10'-0"

5'-0"

10'-0"

SCALE: 1"=10'

Know what's below. Call before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
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DESIGNED MJG
DRAWN CJD
CHECKED RGN
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PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT G. NAYOLI NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

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SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
POSITION DATE

SASD CREEK CROSSING PROJECT

CROSSING 03 & 04 - ARCADE CREEK & GARFIELD THOUSAND OAKS

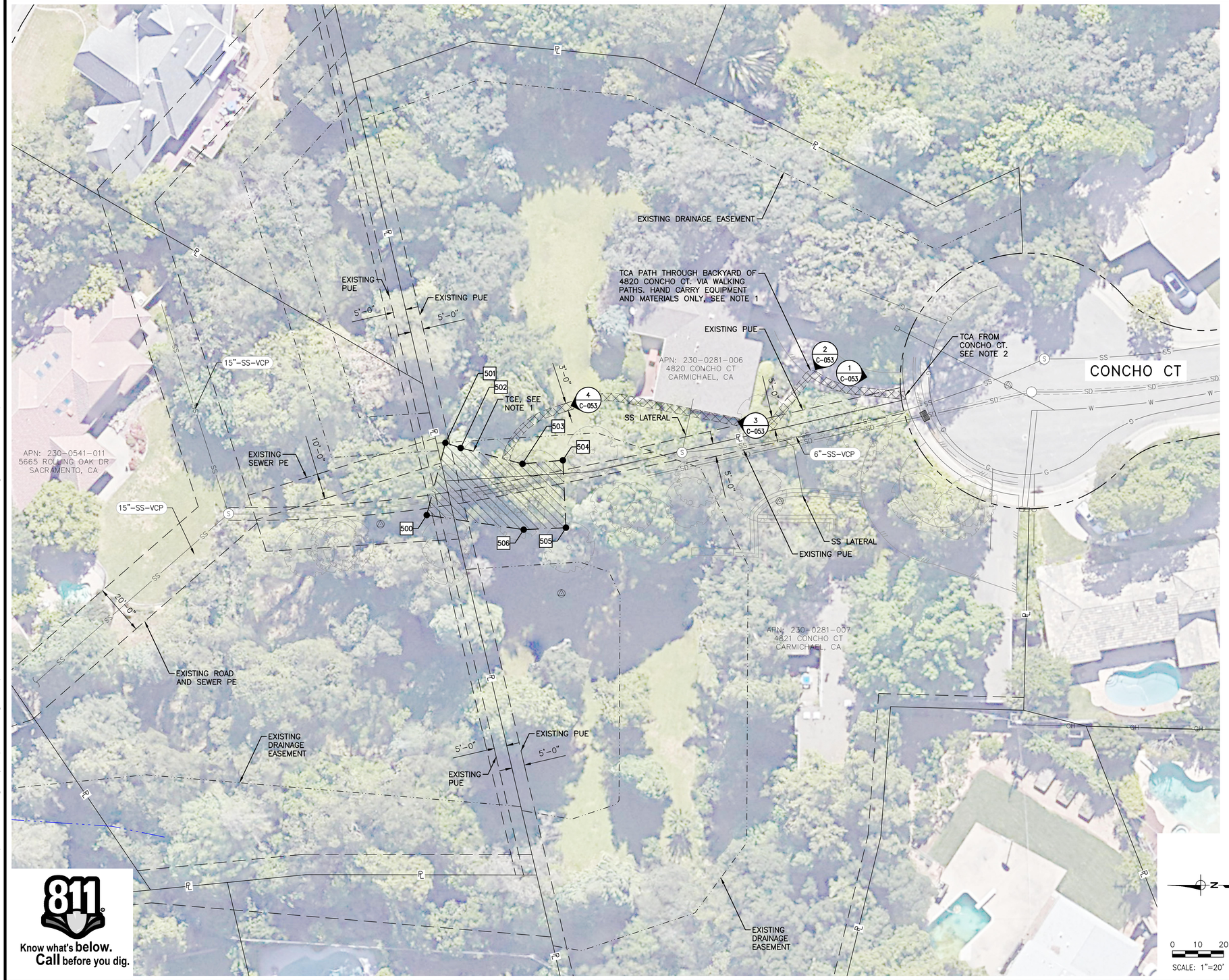
DEMOLITION PLAN

DRAWING C-036

SHEET 21 OF --

PROJECT # --

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 - 4:13 AM CADD User: Chris Durbin



NOTES:

1. SEE DWG G-005 FOR TCE COORDINATES.
2. ACCESS TO CROSSING BEYOND THIS POINT IS VIA HOMEOWNER DRIVEWAY, PATHWAYS, AND OPEN SPACE WITH MATURE TREES AND SHRUBS. CONTRACTOR TO SUBMIT PROTECTION PLAN PRIOR TO EQUIPMENT OR MATERIALS BEING BROUGHT BEYOND THIS POINT. SEE CROSSING PHOTOS FOR PATH DETAILS.
3. CONTRACTOR RESPONSIBLE FOR PROVIDING THEIR OWN STAGING AREA.
4. REMOVAL AND PRUNING OF TREES WILL REQUIRE APPROVAL FROM SASD AND SHALL BE PERFORMED UNDER THE OVERSIGHT OF A CERTIFIED ARBORIST.

LEGEND

- ACCESS PATH TO SITE
- WORK AREA GROUND DISTURBANCE LIMITS
- STAGING AREA

811 Know what's below. Call before you dig.

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REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
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DESIGNED MJG
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SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

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2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
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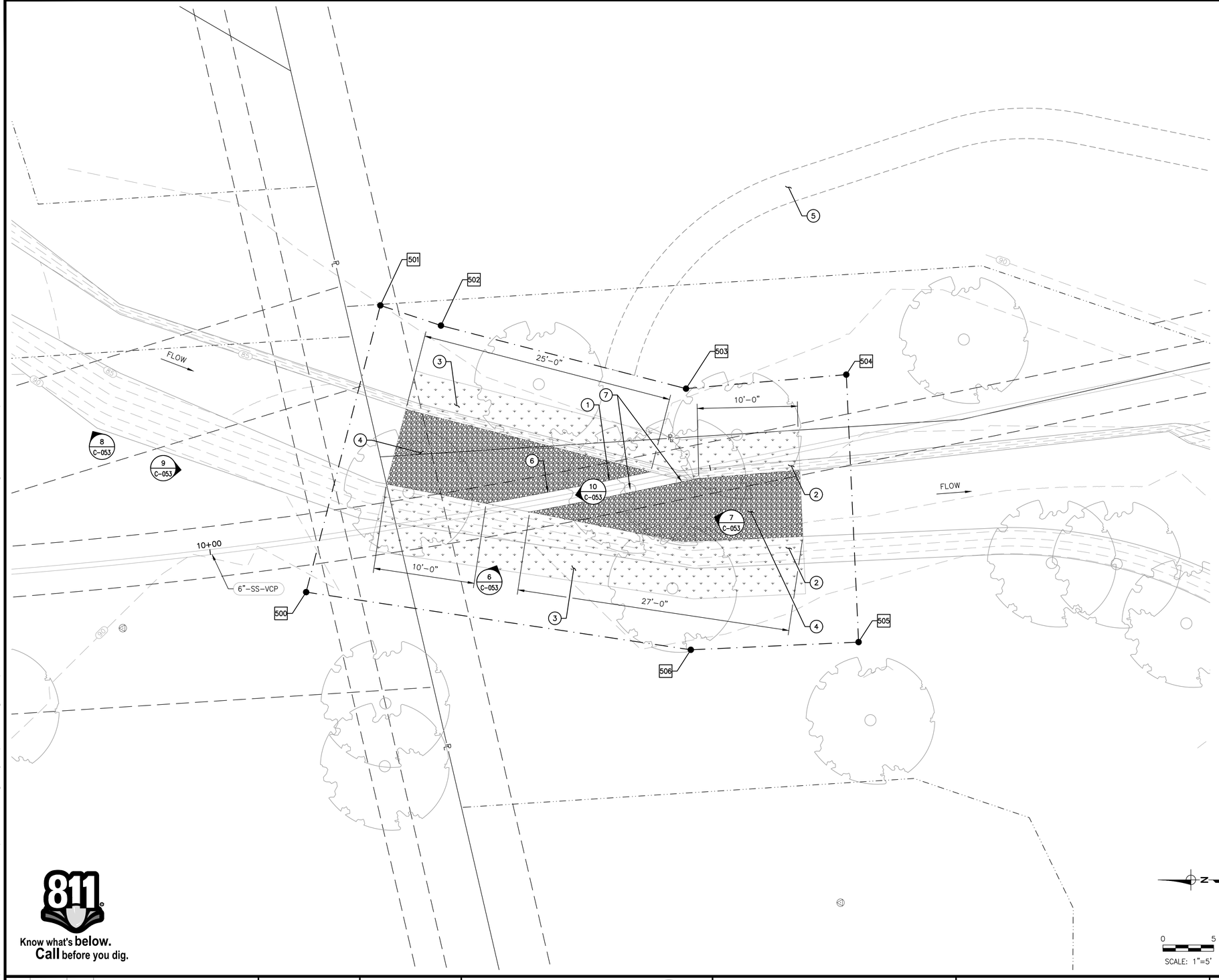
SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
_____ _____ – POSITION DATE

SASD CREEK CROSSING PROJECT
CROSSING 05 - CONCHO COURT
SITE ACCESS PLAN

DRAWING
C-050
SHEET 23 OF --
PROJECT #
–

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 – 4:15 AM CADD User: Chris Durbin



SHEET KEY NOTES

1. REMOVE EXISTING COBBLES FROM CREEK BED ADJACENT TO CROSSING
2. WHERE GRADES EXCEEDS 1:1 IN TURF REINFORCED MAT AREAS, PREPARE GRADE WITH STABILIZING FILL MATERIAL
3. INSTALL ANCHORED VEGETATED TURF REINFORCED MAT OVER SLOPES TO EXTENTS SHOWN
4. INSTALL 12" THICK ENGINEERED MATTRESS SYSTEM
5. RESTORE PRIVATE PROPERTY, INSTALL SOD IN IMPACTED LAWN AREAS. RESTORE ACCESS PATHS AND HOMEOWNER HARDSCAPE AND LANDSCAPING TO MATCH EXISTING CONDITIONS. SEE ACCESS PLANS FOR TCA ROUTE
6. PROTECT EXISTING 6" SS IN CONCRETE ENCASEMENT IN PLACE. DIMENSIONS AND EXTENT OF CONCRETE ENCASEMENT UNKNOWN. CONTRACTOR SHALL FIELD VERIFY AND SUPPORT AS NECESSARY FOR WORK
7. REMOVE EXISTING TREES AS NOTED ON PLANS

TREE REMOVAL

REMOVE TWO TREE CLUSTERS INDICATED IN CREEK. CLUSTERS ARE BELOW TAGGED TREE DIAMETER SIZES.

N

0 5
SCALE: 1"=5'

811 Know what's below. Call before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
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DESIGNED MJG
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

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2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
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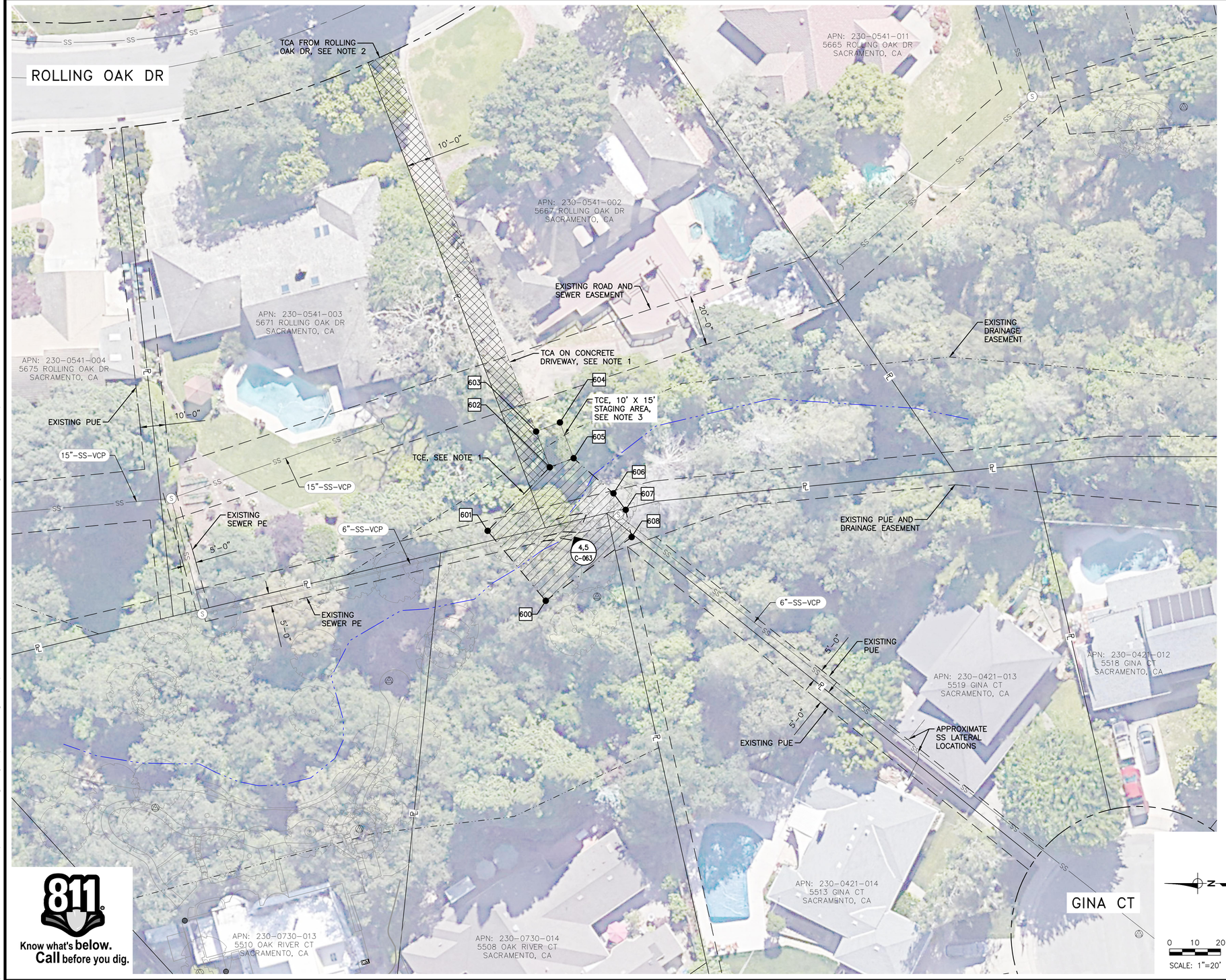
SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
_____ – _____– POSITION DATE

SASD CREEK CROSSING PROJECT
CROSSING 05 - CONCHO COURT
SITE PLAN

DRAWING
C-051
SHEET 24 OF --
PROJECT # –

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 – 4:16 AM CADD User: Chris Durbin



NOTES:

1. SEE DWG G-005 FOR TCE COORDINATES.
2. ACCESS TO CROSSING BEYOND THIS POINT IS VIA HOMEOWNER DRIVEWAY, PATHWAYS, AND OPEN SPACE WITH MATURE TREES AND SHRUBS. CONTRACTOR TO SUBMIT PROTECTION PLAN PRIOR TO EQUIPMENT OR MATERIALS BEING BROUGHT BEYOND THIS POINT. SEE CROSSING PHOTOS FOR PATH DETAILS.
3. STAGING SHALL BE LIMITED TO THE AREA SHOWN ON THE PLAN. CONTRACTOR TO COORDINATE ADDITIONAL STAGING ALONG ROLLING OAK DRIVE IN THE PAVED RIGHT OF WAY TO FACILITATE WORK.
4. REMOVAL AND PRUNING OF TREES WILL REQUIRE APPROVAL FROM SASD AND SHALL BE PERFORMED UNDER THE OVERSIGHT OF A CERTIFIED ARBORIST.

LEGEND

- ACCESS PATH TO SITE
- WORK AREA GROUND DISTURBANCE LIMITS
- STAGING AREA

N

0 10 20
SCALE: 1"=20'

811 Know what's below. Call before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
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DESIGNED MJG
DRAWN CJD
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SCALE AS NOTED

PREPARED BY:
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REGISTERED PROFESSIONAL ENGINEER ROBERT C. NAVOLI NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

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PHONE: (916) 778-4288 FAX:(805) 888-2764

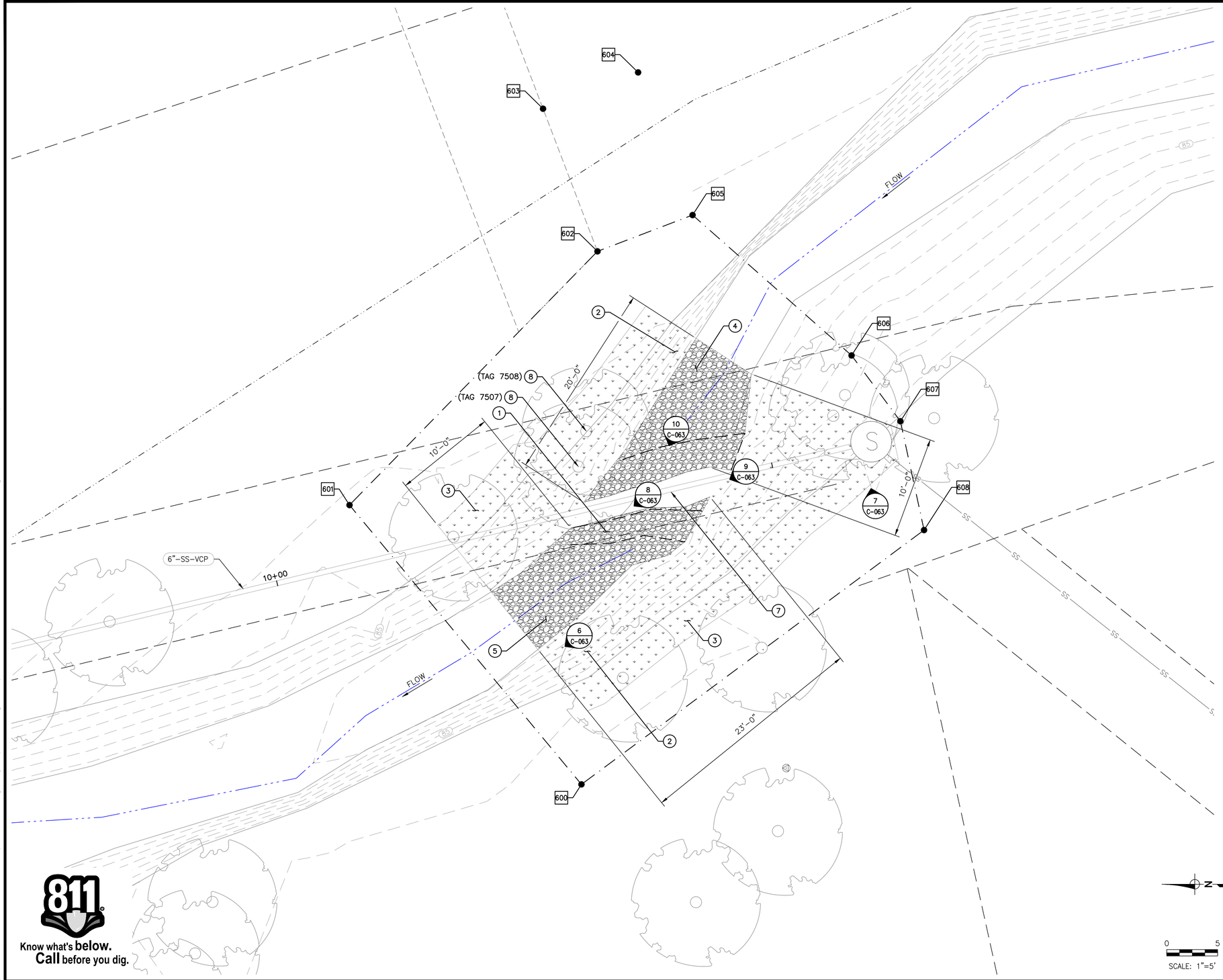
SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
_____ – _____– POSITION DATE

SASD CREEK CROSSING PROJECT
CROSSING 06 - GINA COURT
SITE ACCESS PLAN

DRAWING
C-060
SHEET 27 OF --
PROJECT #
–

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 – 5:46 AM CADD User: Chris Durbin



SHEET KEY NOTES

1. REMOVE EXISTING SASD INSTALLED COBBLES ADJACENT TO CROSSING CONCRETE ENCASEMENT
2. WHERE GRADES EXCEEDS 1:1 IN TURF REINFORCED MAT AREAS, PREPARE GRADE WITH STABILIZING FILL MATERIAL
3. INSTALL ANCHORED VEGETATED TURF REINFORCED MAT OVER SLOPES AND ACROSS THE CREEK BED TO EXTENTS SHOWN
4. INSTALL UPSTREAM AND DOWNSTREAM CLASS I RIPRAP. SLOPE FROM TOP OF ENCASEMENT TO CHANNEL BED AT 5:1 (RUN:RISE) MAXIMUM SLOPE. INSTALL TURF REINFORCEMENT MAT BELOW RIPRAP.
5. INSTALL DOWNSTREAM CLASS I RIPRAP. SLOPE FROM TOP OF ENCASEMENT TO CHANNEL BED AT 5:1 (RUN:RISE) MAXIMUM SLOPE. INSTALL TURF REINFORCEMENT MAT BELOW RIPRAP.
6. RESTORE PRIVATE PROPERTY. RESTORE ACCESS PATHS TO MATCH EXISTING CONDITIONS. SEE ACCESS PLANS FOR ROUTE.
7. PROTECT EXISTING 6" SS IN CONCRETE ENCASEMENT IN PLACE. DIMENSIONS AND EXTENT OF CONCRETE ENCASEMENT UNKNOWN. CONTRACTOR SHALL FIELD VERIFY AND SUPPORT AS NECESSARY FOR WORK
8. REMOVE EXISTING TREES AS NOTED ON PLANS

TREE REMOVAL

12IN X 15FT DEC	TAG 7508
3-4IN+6IN X 12FT DEC	TAG 7507

811 Know what's **below.** **Call** before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
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DESIGNED MJG
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT C. NAJOLI NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

WSC
2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

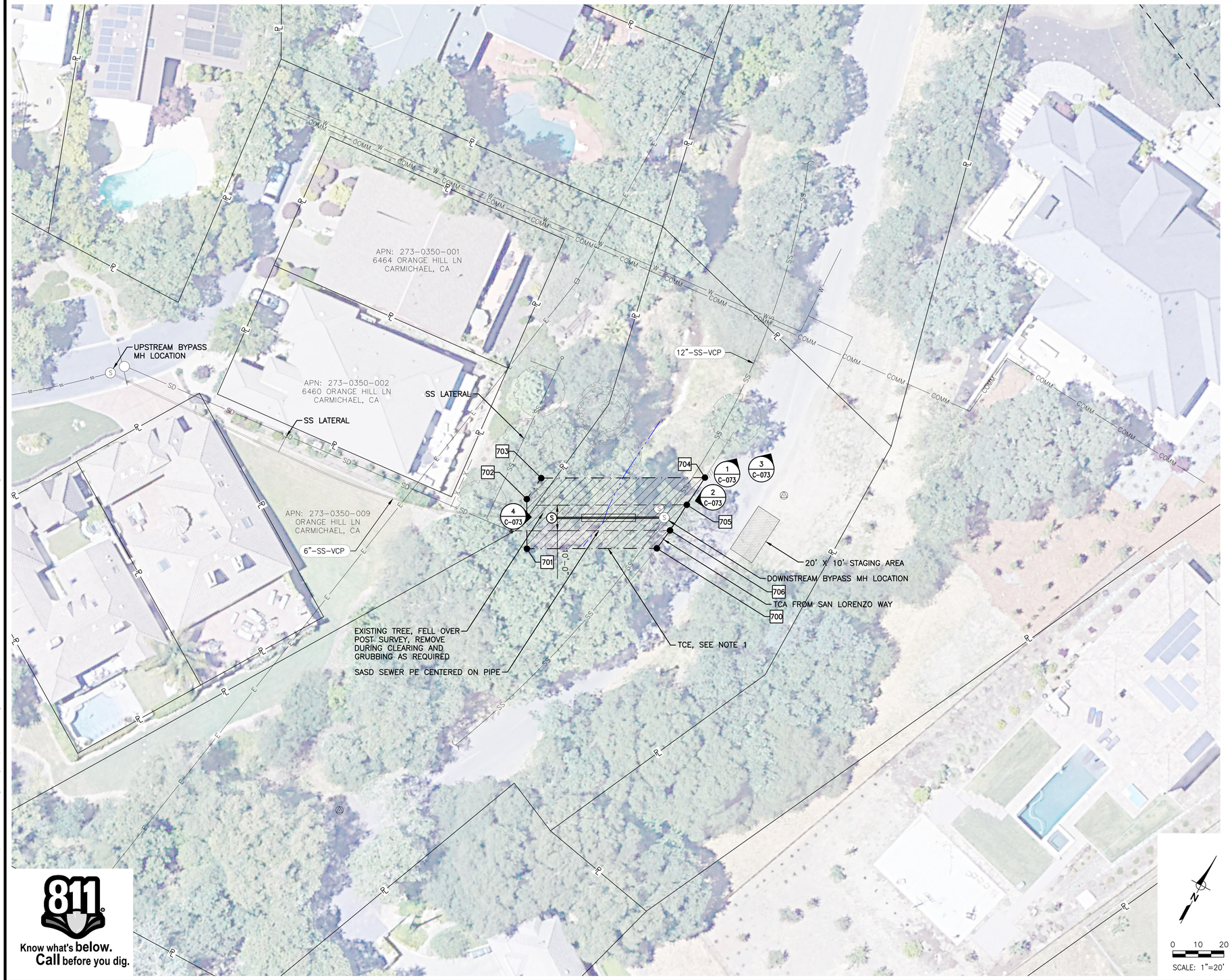
SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
POSITION DATE

SASD CREEK CROSSING PROJECT
CROSSING 06 - GINA COURT
SITE PLAN

DRAWING
C-061
SHEET 28 OF --
PROJECT # _

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 - 4:21 AM CADD User: Chris Durbin



NOTES:

1. SEE DWG G-005 FOR TCE COORDINATES.
2. SEE CROSSING PHOTOS FOR ACCESS. CONTRACTOR SHALL NOT DAMAGE LANDSCAPING OR HARDSCAPING ON PRIVATE PROPERTY OR IN RIGHT OF WAY.
3. PRUNING OF TREES WILL REQUIRE APPROVAL FROM SASD AND SHALL BE PERFORMED UNDER THE OVERSIGHT OF A CERTIFIED ARBORIST.

LEGEND

- ACCESS PATH TO SITE
- WORK AREA GROUND DISTURBANCE LIMITS
- STAGING AREA

Know what's below. Call before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT G. NATOLI NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

WSC
2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

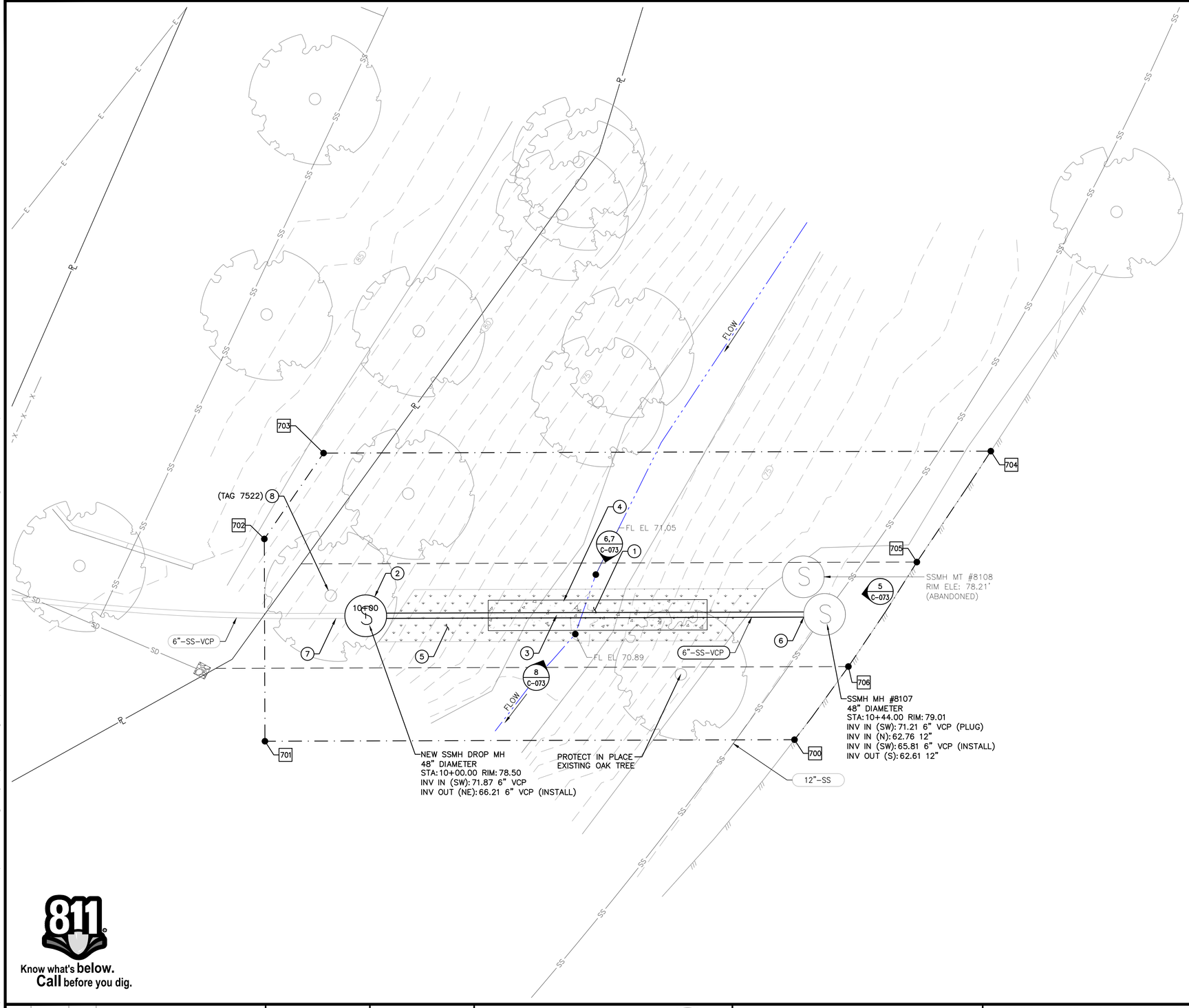
SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
_____ _____ POSITION DATE

SASD CREEK CROSSING PROJECT
CROSSING 07 - SAN LORENZO WAY
SITE ACCESS PLAN

DRAWING
C-070
SHEET 31 OF --
PROJECT # --

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 - 4:25 AM CADD User: Chris Durbin



SHEET KEY NOTES

1. REMOVE EXISTING COBBLES FROM CREEK
2. INSTALL 48" MANHOLE PER SASD STANDARD DETAIL MH–03. INSTALL INSIDE DROP CONNECTION PER SASD DETAIL MH–07 AND UPSTREAM 1' AND 2' SEGMENTS FOR FLEXIBILITY PER SASD DETAIL MH–03
3. REMOVE EXISTING 6"–SS, REPLACE AT LOWER INVERT BELOW CREEK, ALONG THE SAME ALIGNMENT, SEE SHEET C–072
4. INSTALL CONCRETE ENCASEMENT AROUND BURIED PIPE UNDER CREEK. ENCASEMENT DIMENSIONS TO BE 35" W X 35" H X 21'–0" L
5. INSTALL TRM OVER DISTURBED AREA UP TO ELEVATION 77.5–FT. HYDROSEED DISTRUBED AREAS ABOVE 77.5–FT ELEVATION
6. PLUG AND SEAL EXISTING MANHOLE CONNECTION. CORE MANHOLE AND INSTALL LINK SEAL FOR NEW SS PENETRATION
7. CONTRACTOR TO POTHOLE TO FIELD VERIFY EXISTING 6" SS MATERIAL, DEPTH, AND LOCATION PRIOR TO MANHOLE SUBMITTAL. FINAL MANHOLE LOCATION TO BE COORDINATED WITH AND APPROVED BY OWNER
8. REMOVE EXISTING TREE AS NOTED ON PLANS

TREE REMOVAL

10IN X 15FT DEC	TAG 7522

** NOTE THAT TREE FELL OVER SINCE SURVEY, TREE AND STUMP TO BE REMOVED FROM SITE.

Know what's below. Call before you dig.

0 5
SCALE: 1"=5'

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT C. NAYLOR NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

WSC
2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778–4288 FAX:(805) 888–2764

SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
_____ – _____– POSITION DATE

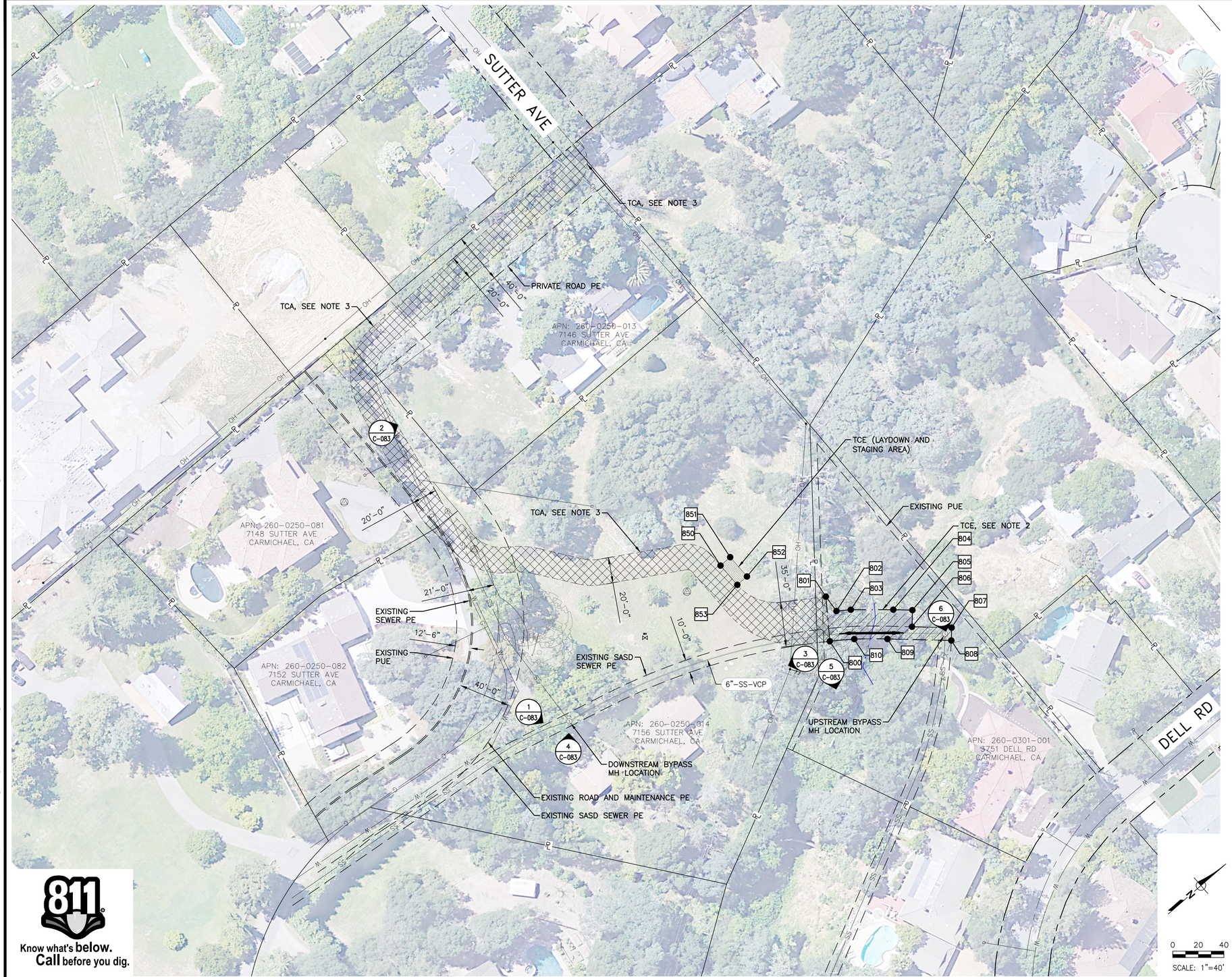
SASD CREEK CROSSING PROJECT

CROSSING 07 - SAN LORENZO WAY

SITE PLAN

DRAWING
C-071
SHEET 32 OF ––
PROJECT # –

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD–CREEK CROSSING.dwg Plot Date: April 9, 2022 – 4:27 AM CADD User: Chris Durbin



NOTES:

1. THE SEWER EASEMENT IN THIS AREA IS RECORDED INCORRECTLY. THE SASD ARCPAD MAPS FOR THIS AREA SHOW THE EASEMENT DIFFERENTLY THAN AS RECORDED ON THE RECORD DRAWINGS FOR THIS STRETCH OF PIPE.
2. SEE DWG G-005 FOR TCE COORDINATES.
3. ACCESS TO CROSSING BEYOND THIS POINT IS VIA HOMEOWNER PRIVATE PROPERTY AND FIELD INCLUDING FENCING, GATES, AND MATURE TREES AND SHRUBS. CONTRACTOR TO SUBMIT PROPERTY PROTECTION PLAN PRIOR TO EQUIPMENT OR MATERIALS BEING BROUGHT BEYOND THIS POINT. SEE CROSSING PHOTOS FOR PATH DETAILS. CONTRACTOR SHALL NOT DAMAGE LANDSCAPING ON PRIVATE PROPERTY.
4. STAGING SHALL BE LIMITED TO THE AREA SHOWN ON THE PLAN.
5. REMOVAL AND PRUNING OF TREES WILL REQUIRE APPROVAL FROM SASD AND SHALL BE PERFORMED UNDER THE OVERSIGHT OF A CERTIFIED ARBORIST.

LEGEND

- ACCESS PATH TO SITE
- WORK AREA GROUND DISTURBANCE LIMITS
- STAGING AREA

0 20 40
SCALE: 1"=40'

Know what's below. Call before you dig.

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WARNING
0 1/2 1
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RCE No.: #####

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2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

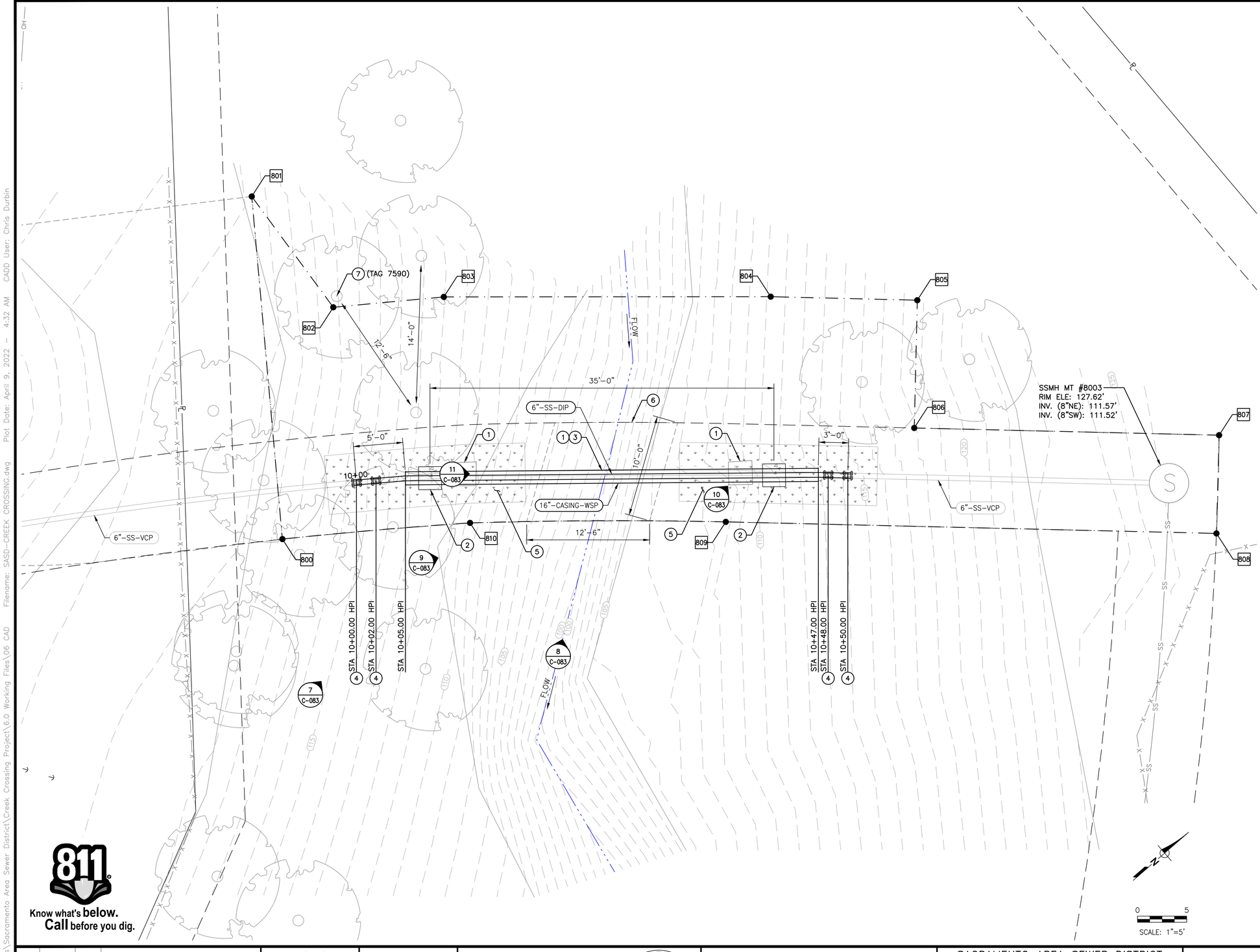
SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
_____ – POSITION DATE

SASD CREEK CROSSING PROJECT
CROSSING 08 - SUTTER AVENUE
SITE ACCESS PLAN

DRAWING
C-080
SHEET 35 OF --
PROJECT # –

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 – 4:30 AM CADD User: Chris Durbin



SHEET KEY NOTES

1. REMOVE EXISTING ALUMINUM PIPE AND CONCRETE PIERS
2. INSTALL NEW CONCRETE SUPPORTS PER STRUCTURAL DETAILS, SET INTO BANKS FOR STABILITY PER ELEVATIONS SHOWN ON SHEET C-082
3. INSTALL SS PIPE CROSSING WITH 16"-WELDED STEEL SCH. 40 CASING. 6" SS PIPE ALIGNMENT, ELEVATION AND SLOPE TO MATCH EXISTING 6" PIPE BEING REMOVED, REPLACEMENT ELEVATIONS PER SHEET C-082
4. INSTALL DOUBLE 6" FLEXIBLE JOINTS PER DETAILS. INSTALL BEYOND CASING AND SUPPORTS
5. HYDROSEED DISTURBED SLOPE AREAS
6. CONTRACTOR MAY GRADE TEMPORARY PAD 12'-6" BY 10' TO MAXIMUM EL 106.00. REMOVE MATERIAL AND RESTORE ORIGINAL CREEK BED ELEVATIONS PER PROFILE
7. REMOVE EXISTING TREE AS NOTED ON PLANS

TREE REMOVAL

DEAD TREE	TAG 7590

Know what's **below.** **Call** before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
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DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
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RCE No.: #####

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SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
_____ – _____– POSITION DATE

SASD CREEK CROSSING PROJECT
CROSSING 08 - SUTTER AVENUE
SITE PLAN

DRAWING
C-081
SHEET 36 OF --
PROJECT #
–

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 – 4:32 AM CADD User: Chris Durbin



NOTES:

1. SEE DWG G-005 FOR TCE COORDINATES.
2. ACCESS TO CROSSING BEYOND THIS POINT IS VIA OPEN SPACE WITH MATURE TREES AND SHRUBS. CONTRACTOR TO SUBMIT PROTECTION PLAN PRIOR TO EQUIPMENT OR MATERIALS BEING BROUGHT BEYOND THIS POINT. SEE CROSSING PHOTOS FOR PATH DETAILS.
3. STAGING AREA ANTICIPATED TO BE IN CAMPFIRE WAY RIGHT OF WAY IN PAVED AREA. MAXIMUM AREA OF 10-FT X 25-FT ANTICIPATED.
4. REMOVAL AND PRUNING OF TREES WILL REQUIRE APPROVAL FROM SASD AND SHALL BE PERFORMED UNDER THE OVERSIGHT OF A CERTIFIED ARBORIST.

LEGEND

- ACCESS PATH TO SITE
- WORK AREA GROUND DISTURBANCE LIMITS
- STAGING AREA

N

0 10 20
SCALE: 1"=20'

811 Know what's below. Call before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
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DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

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2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

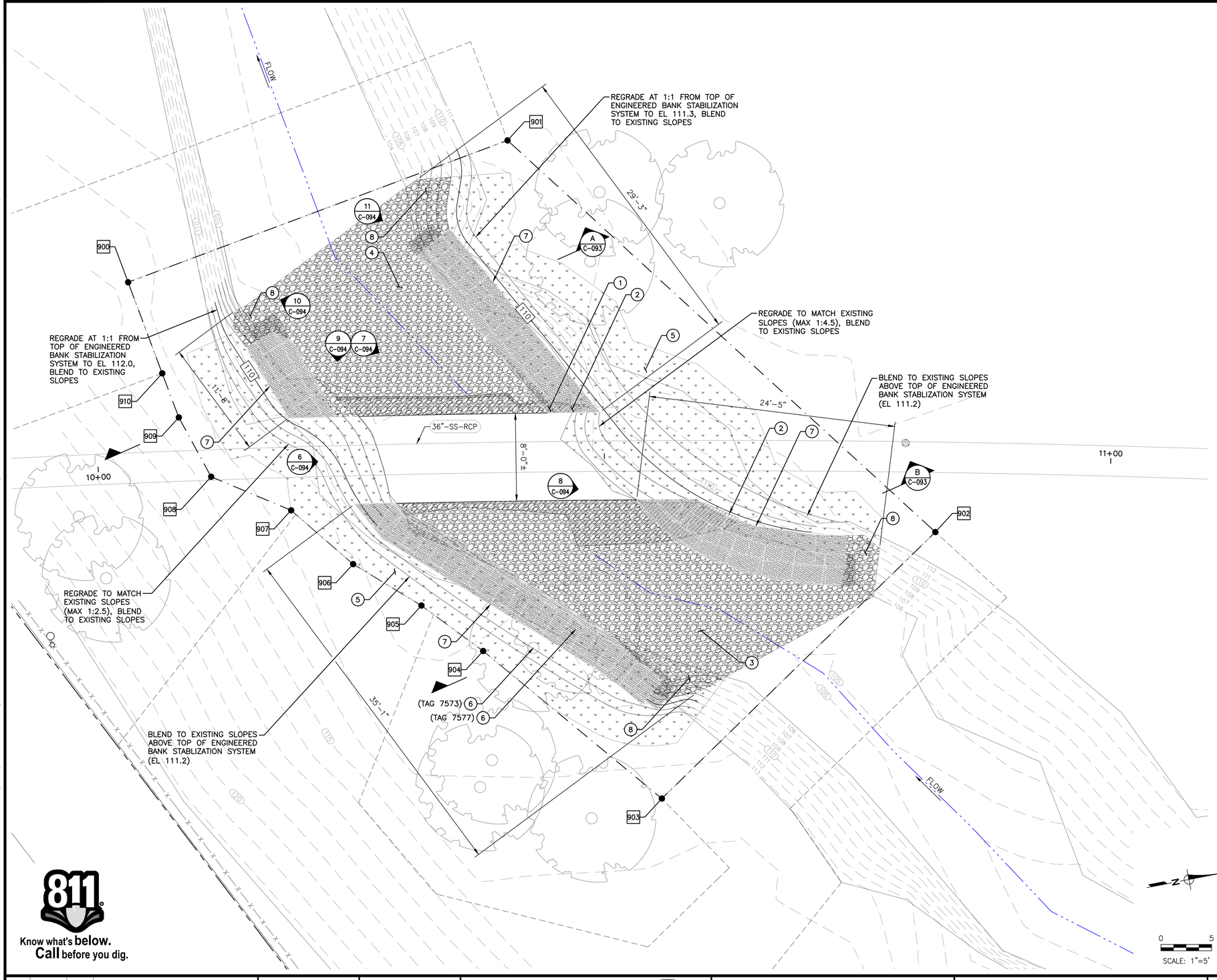
SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
_____ - _____ - POSITION DATE

SASD CREEK CROSSING PROJECT
CROSSING 09 - CAMPFIRE WAY
SITE ACCESS PLAN

DRAWING C-090
SHEET 39 OF --
PROJECT # -

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 - 4:35 AM CADD User: Chris Durbin

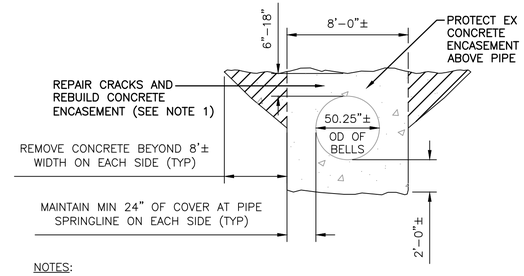


SHEET KEY NOTES

1. REMOVE EXISTING SANDBAGS AND COBBLES
2. REMOVE AND REPAIR EXISTING CONCRETE ENCASEMENT PER DETAIL 1, THIS SHEET
3. INSTALL UPSTREAM CLASS III RIP RAP AND BEDDING PER DETAILS. SLOPE FROM TOP OF ENCASEMENT TO CHANNEL AT 5:1 (RUN:RISE) MAXIMUM SLOPE
4. INSTALL DOWNSTREAM CLASS III RIP RAP AND BEDDING PER DETAILS. SLOPE FROM TOP OF ENCASEMENT TO CHANNEL AT 5:1 (RUN:RISE) MAXIMUM SLOPE
5. INSTALL ANCHORED VEGETATED TURF REINFORCED MAT OVER SLOPES TO EXTENTS SHOWN. EMBED INTO ENGINEERED BANK STABILIZATION SYSTEM AND EXISTING CONCRETE CAP. INSTALL ON SLOPES SHOWN (MAX 1:1)
6. REMOVE EXISTING TREE AS NOTED ON PLANS
7. INSTALL ANCHORED ENGINEERED BANK STABILIZATION SYSTEM PER DETAILS
8. MINIMIZE BANK DISTURBANCE AT EDGES OF ENGINEERED BANK STABILIZATION SYSTEM. COVER DISTURBED AREAS WITH CLASS III RIP-RAP UP TO ELEVATION OF TOP TIER (MIN 111.0)
9. HYDROSEED ALL DISTURBED AREAS INCLUDING TURF REINFORCEMENT MAT

TREE REMOVAL

2-5IN DEC	TAG 7577
30IN OAK	TAG 7573



NOTES:

1. AREAS WHERE CONCRETE ENCASEMENT DOES NOT PROVIDE MIN ENCASEMENT SHOWN FILL WITH CLSM
2. PERFORM CRACK REPAIR WITH INJECTION GROUTING

CONCRETE ENCASEMENT DETAIL — 1 / –
NOT TO SCALE

Know what's **below.** **Call** before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED	MJG
DRAWN	CJD
CHECKED	RGN
SCALE	AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT C. NAIVALT NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

WSC
2330 EASST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
_____ – _____– POSITION DATE

SASD CREEK CROSSING PROJECT
CROSSING 09 - CAMPFIRE WAY
SITE PLAN

DRAWING C-091
SHEET 40 OF ––
PROJECT # –

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 - 6:43 AM CADD User: Michael Goymerac

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 - 4:44 AM CADD User: Chris Durbin

APN: 211-0720-055
6430 INDIAN RIVER DR
CITRUS HEIGHTS, CA

APN: 211-0710-016
6433 INDIAN RIVER DR
CITRUS HEIGHTS, CA

APN: 211-0710-048
TALL TREE CIR
CITRUS HEIGHTS, CA

INDIAN RIVER DR

TALL TREE CIR

TCE (LAYDOWN AND STAGING AREA, SEE NOTE 3)

TCE, SEE NOTE 1

TCA, SEE NOTE 2

TCA FROM INDIAN RIVER DR, SEE NOTE 2

SEWER PE CENTERED ON PIPE

10"-SS-VCP

6"-SS-VCP

UPSTREAM BYPASS MH LOCATION

DOWNSTREAM BYPASS MH LOCATION

15'-0"

10'-0"

3 C-103

1 C-103

2 C-103

110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129

NOTES:

1. SEE DWG G-005 FOR TCE COORDINATES.
2. ACCESS TO CROSSING 10 IS VIA PARKS DISTRICT PROPERTY INCLUDING OPEN FIELDS, BOLLARDS, AND MATURE TREES AND SHRUBS. CONTRACTOR TO SUBMIT PROPERTY PROTECTION PLAN PRIOR TO EQUIPMENT OR MATERIALS BEING BROUGHT INTO THE PARK PROPERTY. SEE CROSSING PHOTOS FOR PATH DETAILS. CONTRACTOR SHALL NOT DAMAGE PARK. ALL GRASS AREAS SHALL BE RESEEDED AND RESTORED.
3. STAGING SHALL BE LIMITED TO THE AREA SHOWN ON THE PLAN.
4. REMOVAL AND PRUNING OF TREES WILL REQUIRE APPROVAL FROM SASD AND SHALL BE PERFORMED UNDER THE OVERSIGHT OF A CERTIFIED ARBORIST.

LEGEND

- ACCESS PATH TO SITE
- WORK AREA GROUND DISTURBANCE LIMITS
- STAGING AREA

0 10 20
SCALE: 1"=20'

811 Know what's below. Call before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY: MJG
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT C. NAIOLI NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

WSC
2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
_____ – _____– POSITION DATE

SASD CREEK CROSSING PROJECT

CROSSING 10 - INDIAN RIVER DRIVE

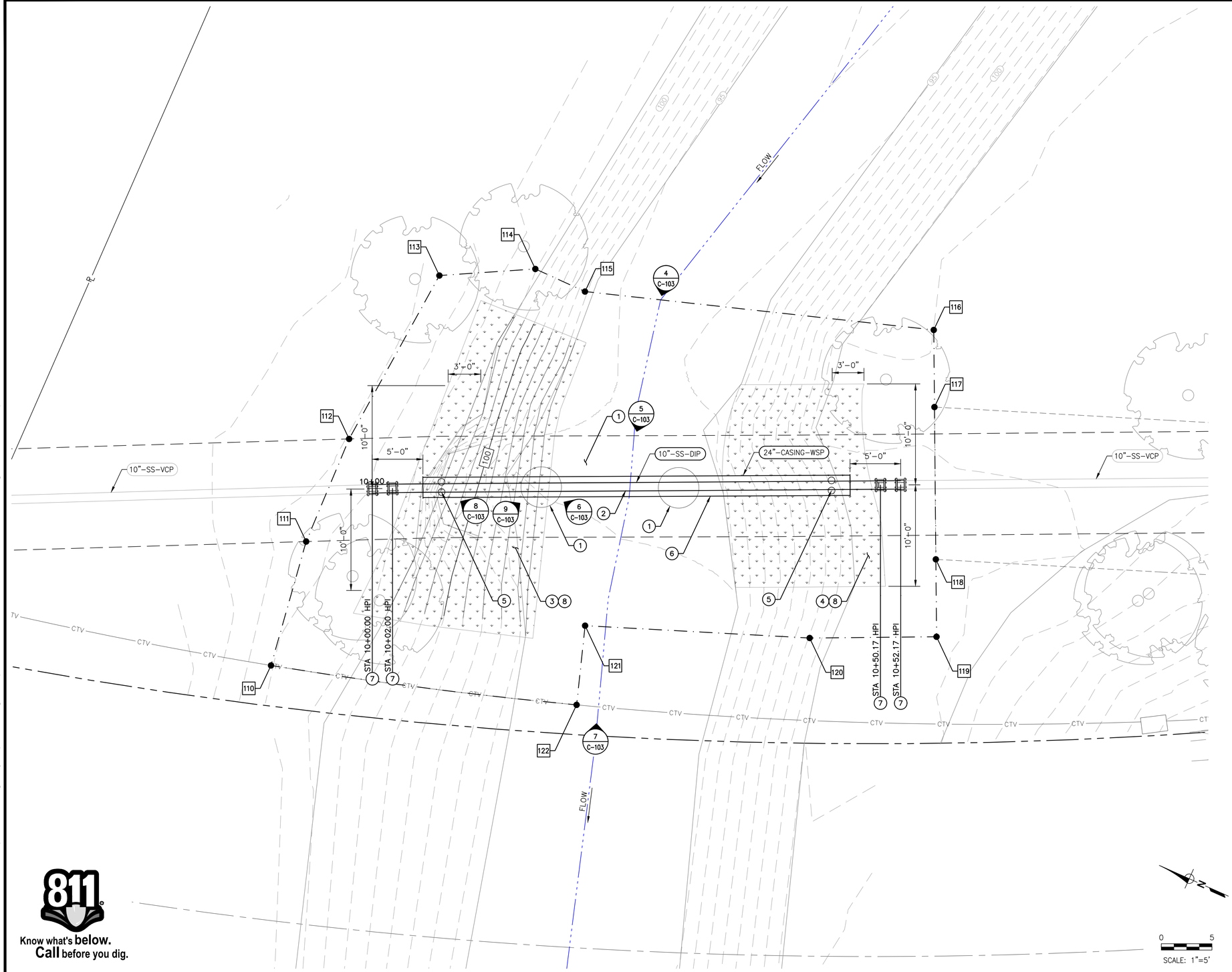
SITE ACCESS PLAN

DRAWING C-100
SHEET 44 OF --
PROJECT # –

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 - 4:45 AM CADD User: Chris Durbin

SHEET KEY NOTES

1. REMOVE EXISTING BED PROTECTION AND CONCRETE PIERS
2. REMOVE EXISTING SS PIPE AND PIERS. REPLACE WITH SS ON SAME ALIGNMENT. REPLACEMENT ELEVATIONS PER SHEET C-102
3. BACKFILL AND RESTORE NORTH BANK TO MATCH SURROUNDING GRADES. INSTALL ANCHORED VEGETATED TURF REINFORCEMENT MAT. SEE FINISH GRADES IN PROFILE PER SHEET C-102
4. INSTALL ANCHORED VEGETATED TURF REINFORCEMENT MAT ON SOUTH BANK. MATCH EXISTING SLOPES
5. 8" DIAMETER MIRCOPILES AT 15 DEGREE BATTER
6. INSTALL 24" EPOXY COATED WSP CASING
7. INSTALL DOUBLE 10" FLEXIBLE JOINTS PER DETAILS FOR TRANSITION FROM DIP TO VCP
8. HYDROSEED ALL DISTURBED AREAS INCLUDING TURF REINFORCEMENT MAT



0 5
SCALE: 1"=5'

Know what's below. Call before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT C. NAYLOR NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

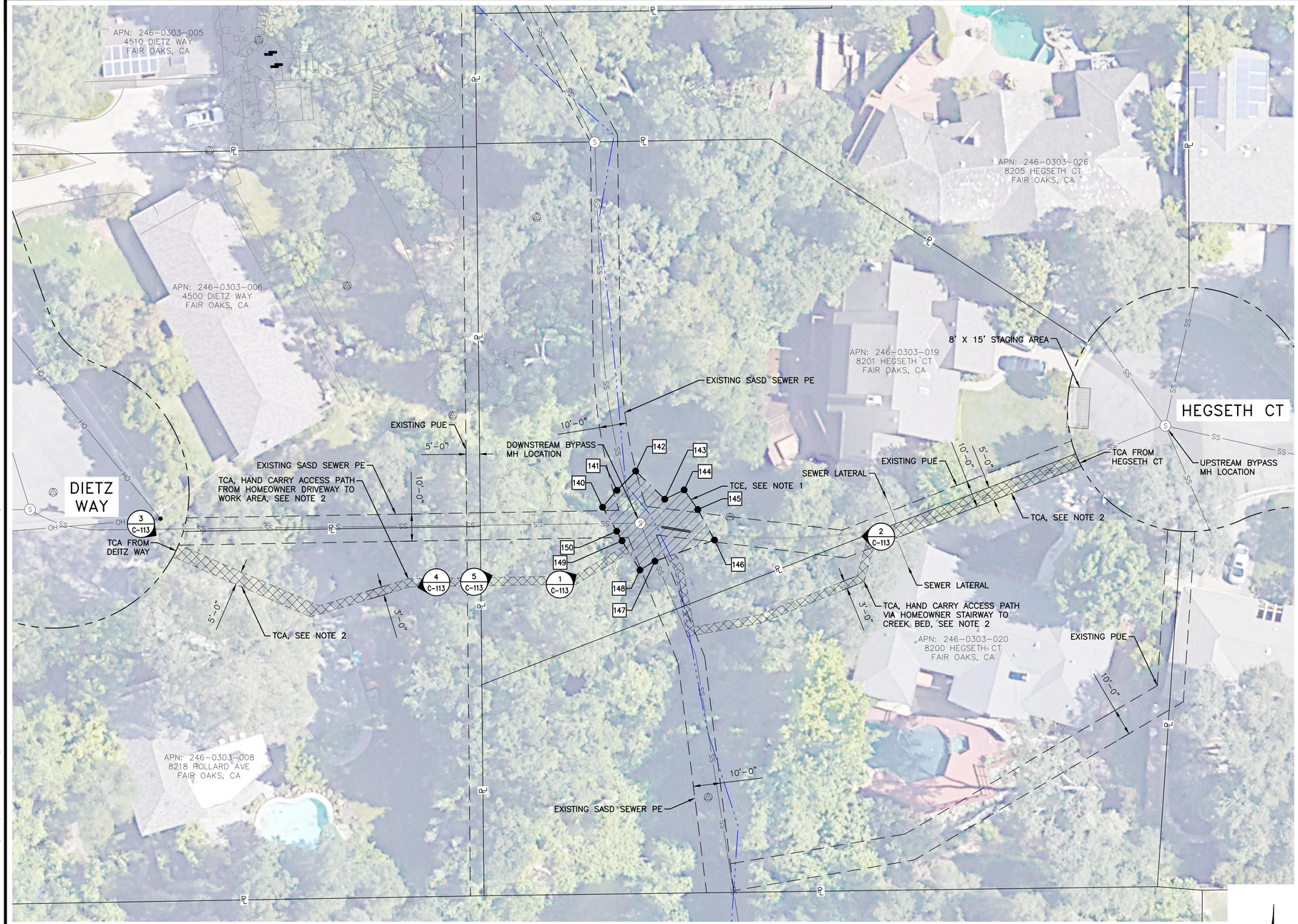
WSC
2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
_____ - _____ POSITION DATE

SASD CREEK CROSSING PROJECT
CROSSING 10 - INDIAN RIVER DRIVE
SITE PLAN

DRAWING
C-101
SHEET 45 OF --
PROJECT #
-



NOTES:

1. SEE DWG G-005 FOR TCE COORDINATES.
2. SEE CROSSING PHOTOS FOR ACCESS PATH DETAILS. CONTRACTOR SHALL NOT DAMAGE LANDSCAPING OR HARDSCAPING ON PRIVATE PROPERTY.
3. REMOVAL AND PRUNING OF TREES WILL REQUIRE APPROVAL FROM SASD AND SHALL BE PERFORMED UNDER THE OVERSIGHT OF A CERTIFIED ARBORIST.
4. SITE WORK LIMITED TO HAND CARRY TOOLS AND MATERIALS ONLY. NO MOTORIZED EQUIPMENT SHALL BE ALLOWED ON TCA'S AND TCE'S.

LEGEND

- ACCESS PATH TO SITE
- WORK AREA GROUND DISTURBANCE LIMITS
- STAGING AREA

N

0 10 20

SCALE: 1"=20'

811 Know what's **below.** **Call** before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT C. NAJOLI NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

WSC
2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
_____ _____ POSITION DATE

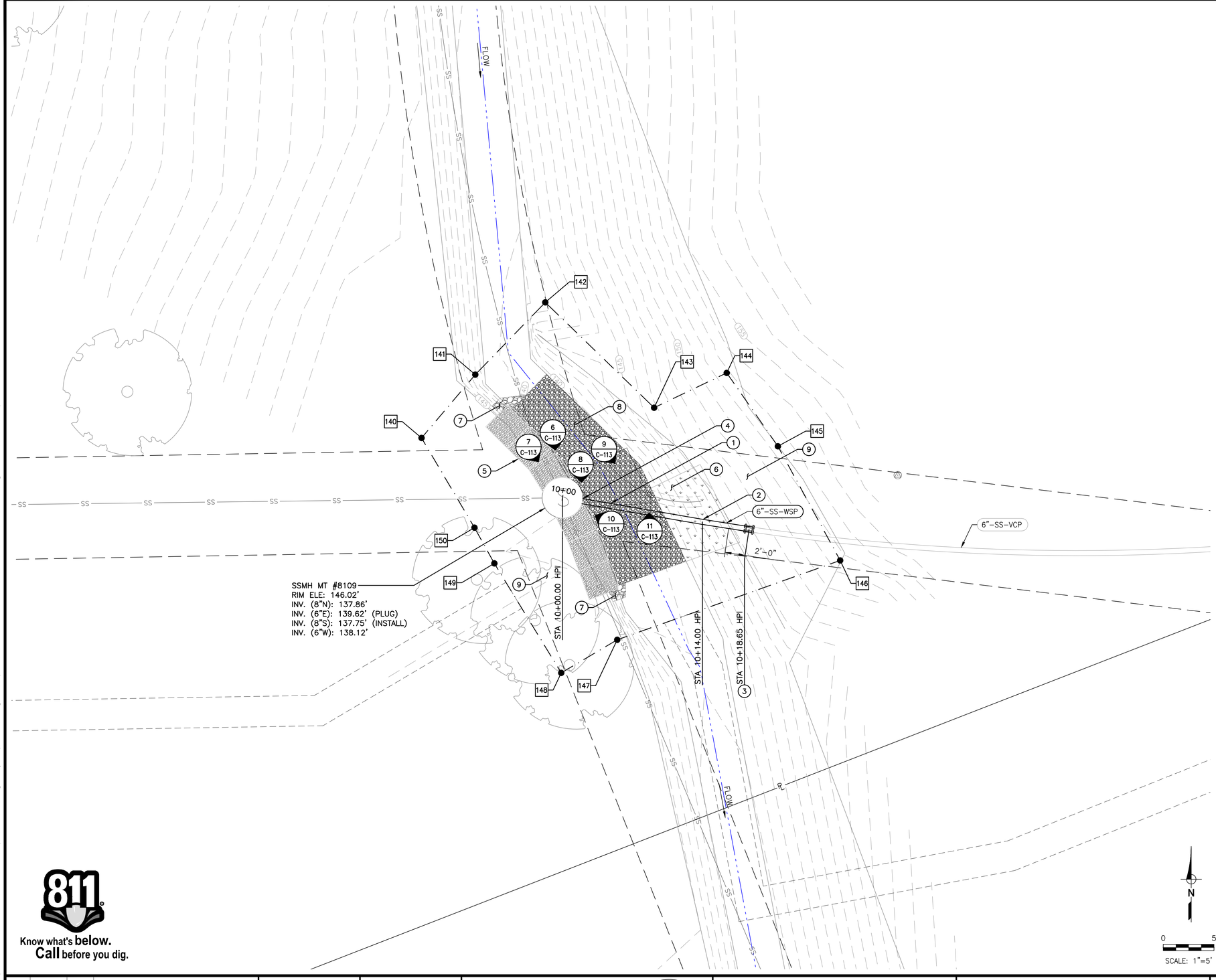
SASD CREEK CROSSING PROJECT

CROSSING 11 - HEGSETH COURT

SITE ACCESS PLAN

DRAWING C-110
SHEET 48 OF --
PROJECT # _

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 - 4:49 AM CADD User: Chris Durbin



SHEET KEY NOTES

1. REMOVE EXISTING COBBLES AND SANDBAGS IN CREEK BED
2. REMOVE EXISTING SS PIPE. REPLACE WITH WSP SS ON SAME ALIGNMENT. REPLACEMENT ELEVATIONS PER SHEET C-112
3. INSTALL 6" TRANSITION COUPLING WSP TO VCP
4. SEAL EXISTING 6" VCP MANHOLE PENETRATION. INSTALL NEW PENETRATION AT LOWER ELEVATION AND GROUT ANNULAR SPACE, SEE SHEET C-112
5. INSTALL ENGINEERED BANK STABILIZATION SYSTEM. FIELD LOCATE EXISTING SS MAIN LINE PRIOR TO ANCHORING
6. INSTALL ANCHORED VEGETATED TURF REINFORCEMENT MAT OVER DISTURBED EAST CREEK BANK AREA FOR SEWER LINE REPLACEMENT.
7. MINIMIZE BANK DISTURBANCE AT EDGES OF ENGINEERED BANK STABILIZATION SYSTEM. COVER DISTURBED AREAS WITH CLASS III RIP-RAP UP TO ELEVATION 144.0
8. INSTALL 12" THICK ENGINEERED MATTRESS SYSTEM IN CREEK BED
9. HYDROSEED DISTURBED AREAS ABOVE ELEVATION 144.0

TREE REMOVAL

NO TREE REMOVAL FOR HEGSETH COURT SITE

Know what's **below.** **Call** before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT C. NAYLOR NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

WSC
2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

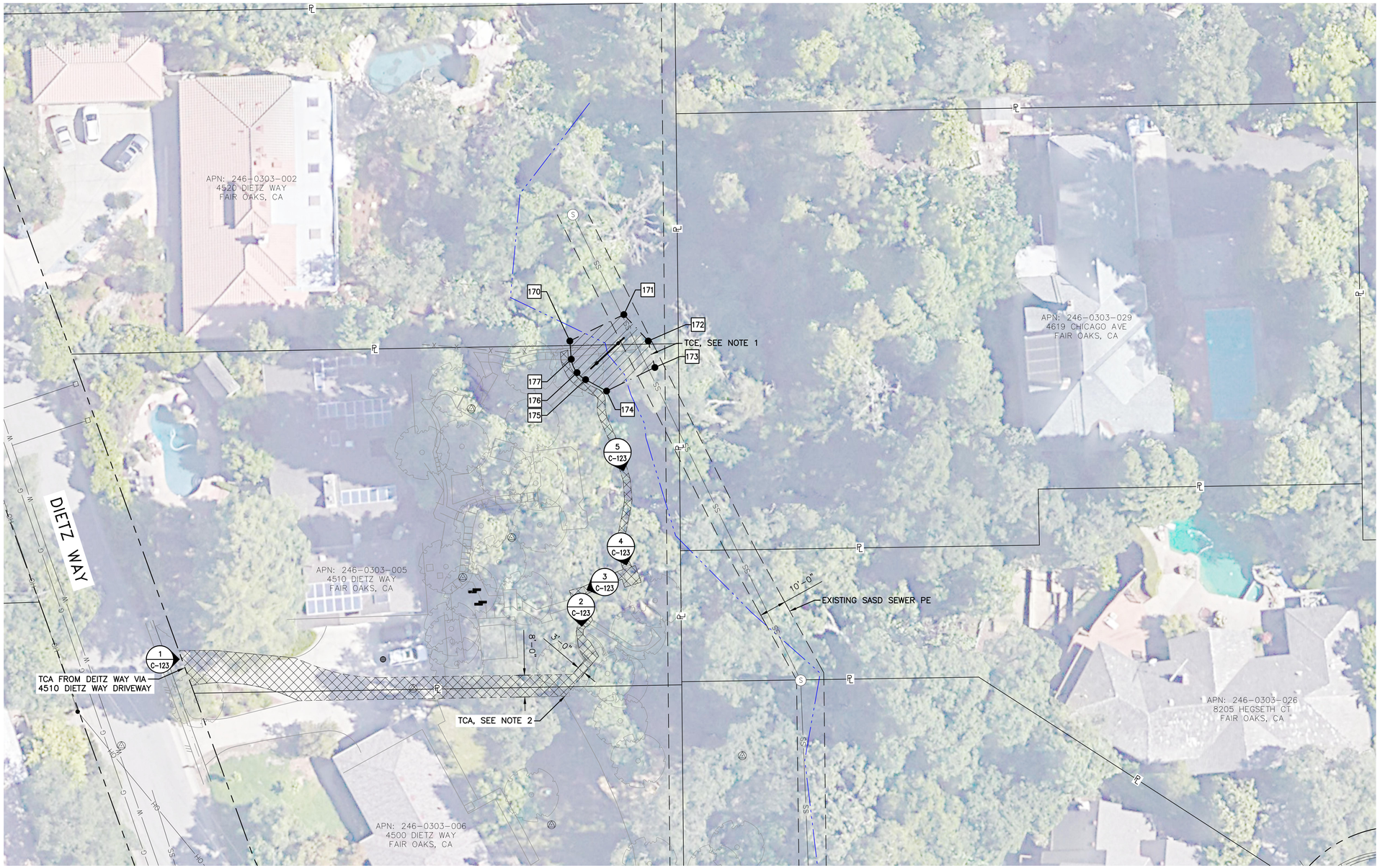
SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
_____ – _____– POSITION DATE

SASD CREEK CROSSING PROJECT
CROSSING 11 - HEGSETH COURT
SITE PLAN

DRAWING C-111
SHEET 49 OF --
PROJECT # –

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 – 4:50 AM CADD User: Chris Durbin



NOTES:

1. SEE DWG G-005 FOR TCE COORDINATES.
2. ACCESS TO CROSSING BEYOND THIS POINT IS VIA HOMEOWNER TREX DECKING, BRICK, AND CONCRETE PATHWAYS. CONTRACTOR TO SUBMIT PROPERTY PROTECTION PLAN PRIOR TO EQUIPMENT OR MATERIALS BEING BROUGHT BEYOND THIS POINT. SEE CROSSING PHOTOS FOR PATH DETAILS. CONTRACTOR SHALL NOT DAMAGE LANDSCAPING OR HARDSCAPING ON PRIVATE PROPERTY.
3. CONTRACTOR RESPONSIBLE TO FIND THEIR OWN STAGING AREA FOR DEITZ WAY CROSSING.
4. REMOVAL AND PRUNING OF TREES WILL REQUIRE APPROVAL FROM SASD AND SHALL BE PERFORMED UNDER THE OVERSIGHT OF A CERTIFIED ARBORIST.
5. SITE WORK LIMITED TO HAND CARRY TOOLS AND MATERIALS ONLY. NO MOTORIZED EQUIPMENT SHALL BE ALLOWED ON TCA'S AND TCE'S.
6. CONTRACTOR SHALL LIMIT SHUTDOWN OF SERVICES TO 4510 DIETZ WAY TO 6 HOURS MAXIMUM. TEMPORARILY RECONNECT LATERAL AT END OF EACH WORK DAY AS NECESSARY TO COMPLETE WORK.

LEGEND

- ACCESS PATH TO SITE
- WORK AREA GROUND DISTURBANCE LIMITS
- STAGING AREA

N

0 10 20

SCALE: 1"=20'

811 Know what's below. Call before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT G. NAYLOR NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

WSC
2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
_____ _____ POSITION DATE

SASD CREEK CROSSING PROJECT

CROSSING 12 - DIETZ WAY

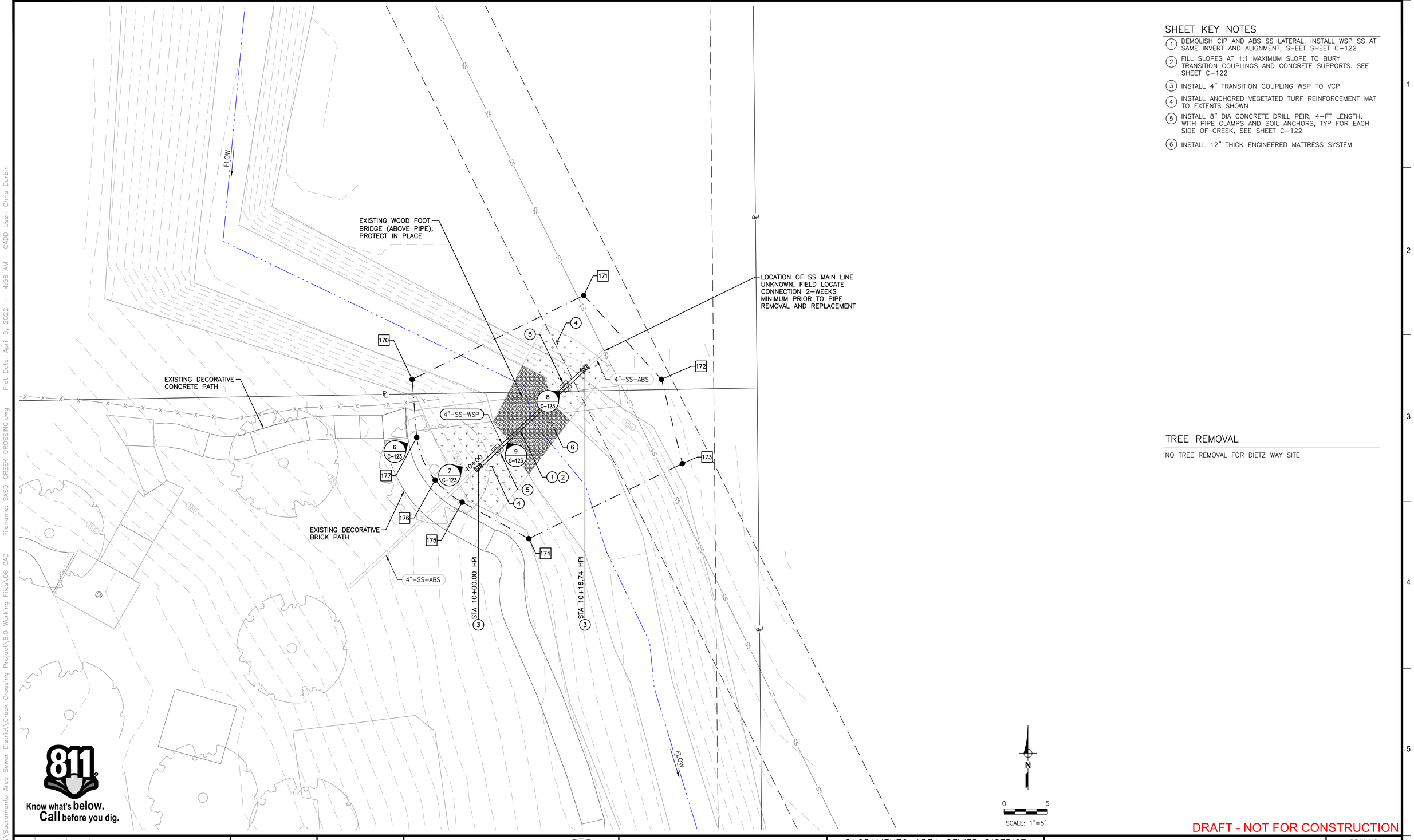
SITE ACCESS PLAN

DRAWING C-120

SHEET 52 OF --

PROJECT # --

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 - 4:54 AM CADD User: Chris Durbin



SHEET KEY NOTES

1. DEMOLISH CIP AND ABS SS LATERAL. INSTALL WSP SS AT SAME INVERT AND ALIGNMENT, SHEET SHEET C-122
2. FILL SLOPES AT 1:1 MAXIMUM SLOPE TO BURY TRANSITION COUPLINGS AND CONCRETE SUPPORTS. SEE SHEET C-122
3. INSTALL 4" TRANSITION COUPLING WSP TO VCP
4. INSTALL ANCHORED VEGETATED TURF REINFORCEMENT MAT TO EXTENTS SHOWN
5. INSTALL 8" DIA CONCRETE DRILL PEIR, 4-FT LENGTH, WITH PIPE CLAMPS AND SOIL ANCHORS, TYP FOR EACH SIDE OF CREEK, SEE SHEET C-122
6. INSTALL 12" THICK ENGINEERED MATTRESS SYSTEM

TREE REMOVAL

NO TREE REMOVAL FOR DIETZ WAY SITE

811 Know what's below. Call before you dig.

DRAFT - NOT FOR CONSTRUCTION

REV	DATE	BY	DESCRIPTION

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED MJG
DRAWN CJD
CHECKED RGN
SCALE AS NOTED

PREPARED BY:
ENGINEER NAME DATE
RCE No.: #####

REGISTERED PROFESSIONAL ENGINEER ROBERT C. NAYLOR NO. 78271 Exp. 9/30/23 CIVIL STATE OF CALIFORNIA

WSC
2330 EAST BIDWELL STREET, SUITE 110 FOLSOM, CA 95630
PHONE: (916) 778-4288 FAX:(805) 888-2764

SACRAMENTO AREA SEWER DISTRICT
10060 GOETHE RD
SACRAMENTO, CA 95827

APPROVED:
_____ – _____– POSITION DATE

SASD CREEK CROSSING PROJECT
CROSSING 12 - DIETZ WAY
SITE PLAN

DRAWING C-121
SHEET 53 OF --
PROJECT # –

Path: W:\3.0 Projects\Sacramento Area Sewer District\Creek Crossing Project\6.0 Working Files\06 CAD Filename: SASD-CREEK CROSSING.dwg Plot Date: April 9, 2022 – 4:56 AM CADD User: Chris Durbin

ATTACHMENT C

SPECIAL-STATUS SPECIES SEARCHES

United States Department of the Interior

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

In Reply Refer To:
Project Code: 2022-0006370
Project Name: SASD

February 10, 2022

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

To Whom It May Concern:

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

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

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

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)

(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

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

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

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts see https://www.fws.gov/birds/policies-and-regulations.php.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures see https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds.php.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/birds/policies-and-regulations/executive-orders/e0-13186.php.

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

Attachment(s):

- Official Species List

Official Species List

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

This species list is provided by:

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

Project Summary

Project Code: 2022-0006370
Event Code: None
Project Name: SASD
Project Type: Commercial Development
Project Description: Development
Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@38.614414350000004,-121.32531144060857,14z



Counties: Sacramento County, California

Endangered Species Act Species

There is a total of 11 threatened, endangered, or candidate species on this species list.

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

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

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

---

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

Reptiles

NAME	STATUS
Giant Garter Snake *Thamnophis gigas*	Threatened

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/4482

Amphibians

NAME	STATUS
California Red-legged Frog *Rana draytonii*	Threatened

There is **final** critical habitat for this species. The location of the critical habitat is not available.
Species profile: https://ecos.fws.gov/ecp/species/2891

California Tiger Salamander *Ambystoma californiense*	Threatened

Population: U.S.A. (Central CA DPS)
There is **final** critical habitat for this species. The location of the critical habitat is not available.
Species profile: https://ecos.fws.gov/ecp/species/2076

Fishes

NAME	STATUS
Delta Smelt *Hypomesus transpacificus*	Threatened

There is **final** critical habitat for this species. The location of the critical habitat is not available.
Species profile: https://ecos.fws.gov/ecp/species/321

Insects

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate
Valley Elderberry Longhorn Beetle *Desmocerus californicus dimorphus* There is **final** critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/7850	Threatened

Crustaceans

NAME	STATUS
Conservancy Fairy Shrimp *Branchinecta conservatio* There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/8246	Endangered
Vernal Pool Fairy Shrimp *Branchinecta lynchi* There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/498	Threatened
Vernal Pool Tadpole Shrimp *Lepidurus packardi* There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/2246	Endangered

Flowering Plants

NAME	STATUS
Sacramento Orcutt Grass *Orcuttia viscida* There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/5507	Endangered
Slender Orcutt Grass *Orcuttia tenuis* There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/1063	Threatened

Critical habitats

There is 1 critical habitat wholly or partially within your project area under this office's jurisdiction.

NAME	STATUS
Valley Elderberry Longhorn Beetle *Desmocerus californicus dimorphus* https://ecos.fws.gov/ecp/species/7850#crithab	Final

IPaC User Contact Information

Name: Caitlin Wright
Address: 1801 7th St #100
City: Sacramento
State: CA
Zip: 95811
Email cawright@montrose-env.com
Phone: 9164473479

Selected Elements by Scientific Name

California Department of Fish and Wildlife

California Natural Diversity Database

Query Criteria: Quad IS (Sacramento East (3812154) OR Rio Linda (3812164) OR Carmichael (3812153) OR Citrus Heights (3812163))

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Accipiter cooperii Cooper's hawk	ABNKC12040	None	None	G5	S4	WL
Agelaius tricolor tricolored blackbird	ABPBXB0020	None	Threatened	G1G2	S1S2	SSC
Andrena subapasta An andrenid bee	IIHYM35210	None	None	G1G2	S1S2	
Aquila chrysaetos golden eagle	ABNKC22010	None	None	G5	S3	FP
Ardea alba great egret	ABNGA04040	None	None	G5	S4	
Ardea herodias great blue heron	ABNGA04010	None	None	G5	S4	
Athene cunicularia burrowing owl	ABNSB10010	None	None	G4	S3	SSC
Branchinecta lynchi vernal pool fairy shrimp	ICBRA03030	Threatened	None	G3	S3	
Branchinecta mesovallensis midvalley fairy shrimp	ICBRA03150	None	None	G2	S2S3	
Buteo regalis ferruginous hawk	ABNKC19120	None	None	G4	S3S4	WL
Buteo swainsoni Swainson's hawk	ABNKC19070	None	Threatened	G5	S3	
Coccyzus americanus occidentalis western yellow-billed cuckoo	ABNRB02022	Threatened	Endangered	G5T2T3	S1	
Desmocerus californicus dimorphus valley elderberry longhorn beetle	IICOL48011	Threatened	None	G3T2	S3	
Downingia pusilla dwarf downingia	PDCAM060C0	None	None	GU	S2	2B.2
Dumontia oregonensis hairy water flea	ICBRA23010	None	None	G1G3	S1	
Elanus leucurus white-tailed kite	ABNKC06010	None	None	G5	S3S4	FP
Elderberry Savanna Elderberry Savanna	CTT63440CA	None	None	G2	S2.1	
Emys marmorata western pond turtle	ARAAD02030	None	None	G3G4	S3	SSC
Fritillaria agrestis stinkbells	PMLIL0V010	None	None	G3	S3	4.2

Selected Elements by Scientific Name

California Department of Fish and Wildlife

California Natural Diversity Database

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Gonidea angulata western ridged mussel	IMBIV19010	None	None	G3	S1S2	
Gratiola heterosepala Boggs Lake hedge-hyssop	PDSCR0R060	None	Endangered	G2	S2	1B.2
Hydrochara rickseckeri Ricksecker's water scavenger beetle	IICOL5V010	None	None	G2?	S2?	
Juncus leiospermus var. ahartii Ahart's dwarf rush	PMJUN011L1	None	None	G2T1	S1	1B.2
Legenere limosa legenere	PDCAM0C010	None	None	G2	S2	1B.1
Lepidurus packardi vernal pool tadpole shrimp	ICBRA10010	Endangered	None	G4	S3S4	
Linderiella occidentalis California linderiella	ICBRA06010	None	None	G2G3	S2S3	
Melospiza melodia song sparrow ("Modesto" population)	ABPBXA3010	None	None	G5	S3?	SSC
Northern Claypan Vernal Pool Northern Claypan Vernal Pool	CTT44120CA	None	None	G1	S1.1	
Northern Hardpan Vernal Pool Northern Hardpan Vernal Pool	CTT44110CA	None	None	G3	S3.1	
Northern Volcanic Mud Flow Vernal Pool Northern Volcanic Mud Flow Vernal Pool	CTT44132CA	None	None	G1	S1.1	
Oncorhynchus mykiss irideus pop. 11 steelhead - Central Valley DPS	AFCHA0209K	Threatened	None	G5T2Q	S2	
Orcuttia viscida Sacramento Orcutt grass	PMPOA4G070	Endangered	Endangered	G1	S1	1B.1
Progne subis purple martin	ABPAU01010	None	None	G5	S3	SSC
Riparia riparia bank swallow	ABPAU08010	None	Threatened	G5	S2	
Sagittaria sanfordii Sanford's arrowhead	PMALI040Q0	None	None	G3	S3	1B.2
Spea hammondii western spadefoot	AAABF02020	None	None	G2G3	S3	SSC
Taxidea taxus American badger	AMAJF04010	None	None	G5	S3	SSC
Thamnophis gigas giant gartersnake	ARADB36150	Threatened	Threatened	G2	S2	

Record Count: 38

CNPS Rare Plant Inventory

California Native Plant Society

Search Results

8 matches found. Click on scientific name for details

Search Criteria: Quad is one of [**3812164:3812154:3812153:3812163**]

▲ SCIENTIFIC NAME	COMMON NAME	FAMILY	LIFEFORM	BLOOMING PERIOD	FED LIST	STATE LIST	GLOBAL RANK	STATE RANK	CA RARE PLANT RANK
Brodiaea rosea ssp. *vallicola*	valley brodiaea	Themidaceae	perennial bulbiferous herb	Apr-May(Jun)	None	None	G5T3	S3	4.2
Downingia pusilla	dwarf downingia	Campanulaceae	annual herb	Mar-May	None	None	GU	S2	2B.2
Fritillaria agrestis	stinkbells	Liliaceae	perennial bulbiferous herb	Mar-Jun	None	None	G3	S3	4.2
Gratiola heterosepala	Boggs Lake hedge-hyssop	Plantaginaceae	annual herb	Apr-Aug	None	CE	G2	S2	1B.2
Juncus leiospermus var. *ahartii*	Ahart's dwarf rush	Juncaceae	annual herb	Mar-May	None	None	G2T1	S1	1B.2
Legenere limosa	legenere	Campanulaceae	annual herb	Apr-Jun	None	None	G2	S2	1B.1
Orcuttia viscida	Sacramento Orcutt grass	Poaceae	annual herb	Apr-Jul(Sep)	FE	CE	G1	S1	1B.1
Sagittaria sanfordii	Sanford's arrowhead	Alismataceae	perennial rhizomatous herb (emergent)	May-Oct(Nov)	None	None	G3	S3	1B.2

Showing 1 to 8 of 8 entries

Suggested Citation:
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Quad Name **Citrus Heights**
Quad Number **38121-F3**

ESA Anadromous Fish

SONCC Coho ESU (T) -
CCC Coho ESU (E) -
CC Chinook Salmon ESU (T) -
CVSR Chinook Salmon ESU (T) - **X**
SRWR Chinook Salmon ESU (E) - **X**
NC Steelhead DPS (T) -
CCC Steelhead DPS (T) -
SCCC Steelhead DPS (T) -
SC Steelhead DPS (E) -
CCV Steelhead DPS (T) - **X**
Eulachon (T) -
sDPS Green Sturgeon (T) -

ESA Anadromous Fish Critical Habitat

SONCC Coho Critical Habitat -
CCC Coho Critical Habitat -
CC Chinook Salmon Critical Habitat -
CVSR Chinook Salmon Critical Habitat -
SRWR Chinook Salmon Critical Habitat -
NC Steelhead Critical Habitat -
CCC Steelhead Critical Habitat -
SCCC Steelhead Critical Habitat -
SC Steelhead Critical Habitat -
CCV Steelhead Critical Habitat - **X**
Eulachon Critical Habitat -
sDPS Green Sturgeon Critical Habitat -

ESA Marine Invertebrates

Range Black Abalone (E) -
Range White Abalone (E) -

ESA Marine Invertebrates Critical Habitat

Black Abalone Critical Habitat -

ESA Sea Turtles

East Pacific Green Sea Turtle (T) -
Olive Ridley Sea Turtle (T/E) -
Leatherback Sea Turtle (E) -
North Pacific Loggerhead Sea Turtle (E) -

ESA Whales

Blue Whale (E) -
Fin Whale (E) -
Humpback Whale (E) -
Southern Resident Killer Whale (E) -
North Pacific Right Whale (E) -
Sei Whale (E) -
Sperm Whale (E) -

ESA Pinnipeds

Guadalupe Fur Seal (T) -
Steller Sea Lion Critical Habitat -

Essential Fish Habitat

Coho EFH -
Chinook Salmon EFH - **X**
Groundfish EFH -
Coastal Pelagics EFH -
Highly Migratory Species EFH -

MMPA Species (See list at left)

ESA and MMPA Cetaceans/Pinnipeds

See list at left and consult the NMFS Long Beach office 562-980-4000

MMPA Cetaceans -
MMPA Pinnipeds -

Quad Name **Carmichael**
Quad Number **38121-E3**

ESA Anadromous Fish

SONCC Coho ESU (T) -
CCC Coho ESU (E) -
CC Chinook Salmon ESU (T) -
CVSR Chinook Salmon ESU (T) - **X**
SRWR Chinook Salmon ESU (E) - **X**
NC Steelhead DPS (T) -
CCC Steelhead DPS (T) -
SCCC Steelhead DPS (T) -
SC Steelhead DPS (E) -
CCV Steelhead DPS (T) - **X**
Eulachon (T) -
sDPS Green Sturgeon (T) -

ESA Anadromous Fish Critical Habitat

SONCC Coho Critical Habitat -
CCC Coho Critical Habitat -
CC Chinook Salmon Critical Habitat -
CVSR Chinook Salmon Critical Habitat -
SRWR Chinook Salmon Critical Habitat -
NC Steelhead Critical Habitat -
CCC Steelhead Critical Habitat -
SCCC Steelhead Critical Habitat -
SC Steelhead Critical Habitat -
CCV Steelhead Critical Habitat - **X**
Eulachon Critical Habitat -
sDPS Green Sturgeon Critical Habitat -

ESA Marine Invertebrates

Range Black Abalone (E) -
Range White Abalone (E) -

ESA Marine Invertebrates Critical Habitat

Black Abalone Critical Habitat -

ESA Sea Turtles

East Pacific Green Sea Turtle (T) -
Olive Ridley Sea Turtle (T/E) -
Leatherback Sea Turtle (E) -
North Pacific Loggerhead Sea Turtle (E) -

ESA Whales

Blue Whale (E) -
Fin Whale (E) -
Humpback Whale (E) -
Southern Resident Killer Whale (E) -
North Pacific Right Whale (E) -
Sei Whale (E) -
Sperm Whale (E) -

ESA Pinnipeds

Guadalupe Fur Seal (T) -
Steller Sea Lion Critical Habitat -

Essential Fish Habitat

Coho EFH -
Chinook Salmon EFH - **X**
Groundfish EFH -
Coastal Pelagics EFH -
Highly Migratory Species EFH -

MMPA Species (See list at left)

ESA and MMPA Cetaceans/Pinnipeds

See list at left and consult the NMFS Long Beach office 562-980-4000

MMPA Cetaceans -
MMPA Pinnipeds -

APPENDIX F

JURISDICTIONAL DELINEATION



JURISDICTIONAL DELINEATION

SACRAMENTO AREA SEWER DISTRICT CREEK CROSSING PROJECT
SACRAMENTO COUNTY, CA

MAY 2022

PREPARED FOR:
Sacramento Area Sewer District
10060 Goethe Road
Sacramento, CA 95827
(916) 876-6000

PREPARED BY:
Montrose Environmental
1801 7th Street, Suite 100
Sacramento, CA 95811
(916) 447-3479
www.analyticalcorp.com

JURISDICTIONAL DELINEATION

SACRAMENTO AREA SEWER DISTRICT CREEK CROSSING PROJECT
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EXECUTIVE SUMMARY

SACRAMENTO AREA SEWER DISTRICT CREEK CROSSING PROJECT JURISDICTIONAL DELINEATION

The Sacramento Area Sewer District (SASD) proposes to realign, replace, and/or rehabilitate twelve sewer mainline segments that cross waterways throughout Sacramento County at ten distinct Project Site locations (Study Area).[1] The twelve pipeline crossings have been identified by SASD as part of their Sewer System Management Plan (2021) for improvement due to degrading site conditions such as structural failure and support failure due to erosion, undermining, or exposure. Additionally, the majority of the pipeline crossings have been in place for more than 40 years and are beyond their expected useful life.

A wetland delineation has been conducted within the 11-acre SASD Study Area, which resulted in the identification of seven intermittent drainages, two being named creeks, totaling appoximately 2,106 linear feet, and one seasonal wetland, totaling approximately 0.07 acres.

This jurisdictional delineation report has been prepared in accordance with the *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory, 1987), *Minimum Standards for Acceptance of Aquatic Resources Delineation Reports* (USACE, 2016), *Field Guide to Wetland Delineation* (Wetland Training Institute, Inc., 1995), the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)* (USACE, 2008a), the *U.S. Army Corps of Engineers Jurisdictional Determination Form Instructional Guidebook* (USACE and EPA, 2007), *A Field Guide to the Identification of the Ordinary High Water Mark* (OHWM) *in the Arid West Region of the Western United States* (USACE, 2008b), and the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al., 1979).

A signed statement from the property owner allowing USACE personnel to enter the property and to collect samples during normal business hours is included in **Appendix F**.

[1] See Table 1 of this Jurisdictional Delineation that indicates which of the Project Site locations includes two crossings.

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ACRONYMS

EPA	U.S. Environmental Protection Agency
NRCS	Natural Resources Conservation Service
NWI	National Wetland Inventory
NWPR	Navigable Waters Protection Rule
OHWM	Ordinary High Water Mark
PEM	Palustrine Emergent
SR	State Route
TNW	Traditionally Navigable Waterway
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

SECTION 1.0

Introduction

A wetland delineation was conducted on June 7 through 10 and December 21, 2021, within the approximately 11-acre Study Area, which includes 10 distinct Project Site locations within the City of Citrus Heights and the unincorporated areas of Carmichael and Fair Oaks, within Sacramento County, California. This wetland delineation report (Report) describes wetlands and other waters of the U.S. identified within the Study Area that may be subject to regulation by the U.S. Army Corps of Engineers (USACE) pursuant to Section 404 of the Clean Water Act (CWA). Information presented in this Report provides data required by the USACE Sacramento District *Minimum Standards for Acceptance of Aquatic Resources Delineation Reports* (USACE, 2016). Wetlands discussed in this Report represent a calculated estimate of features within the Study Area and are subject to modification following the USACE verification process.

1.1 APPLICANT AND AGENT INFORMATION

Applicant
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Sacramento Area Sewer District
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Phone: (916) 875-6730

Agent
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SECTION 2.0

Location

Twelve sewer mainline segments at creek crossings would be realigned, replaced, and/or rehabilitated at ten distinct Project Site locations within the City of Citrus Heights and the unincorporated areas of Carmichael and Fair Oaks, within Sacramento County (Figure 1 of **Appendix A**). The twelve segments occur within ten distinct Project Sites, as two of the pipeline crossings occur within the same Project Site (see **Table 1** and Figure 2 of **Appendix A**). The Study Area encompasses the entirety of all 10 Project Sites, which totals approximately 11 acres . An aerial photograph of each Project Site is presented in Figure 3a - j of **Appendix A**. Additional Project Site information is provided below in **Table 1**.

TABLE 1
Project Site Data

Project Site	Pipeline Segment Crossing #	SASD Pipe Segment #	Name/Road Landmark	APNs Within Project Site	Acreage	Attachment A Figure Number
1	1	59646	Hope Lane	5	0.61	3a
2	2	48368	Winding Way	5	2.05	3b
3	3 and 4	49894 and 41018	Arcade Creek Park / Garfield & Thousand Oaks	6	3.59	3c
4	5	50528	Concho Court	3	0.43	3d
5	6	44327	Gina Court	4	0.54	3e
6	7	170877	San Lorenzo Way	3	0.17	3f
7	8	78865	Sutter Avenue	7	1.04	3g
8	9	36529	Campfire Way	1	0.39	3h
9	10	78531	Indian River Drive	3	0.47	3i
10	11 and 12	68559 and 239693	Dietz Way / Hegseth Court	9	1.79	3j
					Total: 11.08 Acres	

The Study Area center is approximately centered on latitude 38° 39' 12.72" N, longitude 121° 20' 0.61" W. The Study Area is within Township 10N, Range 6E and Township 9N, Range 6E in an Unsectioned Area of Carmichael and Citrus Heights, Mount Diablo Baseline Meridian (MDBM) in the "Citrus Heights, CA" U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (quad) and the "Carmichael, CA" USGS 7.5-minute quadrangles (ESRI, 2021) (Figure 2 of **Appendix A**). The Study Area is within the Sacramento Valley, north of the American River, within the Lower American Watershed, Hydrologic Unit Code #180201110202 (USGS, 1978).

2.1 DRIVING DIRECTIONS

The Study Area writ-large is located adjacent to and primarily southeast of Auburn Boulevard and accessed via US-80, and is located within the City of Citrus Heights and the unincorporated areas of

Carmichael and Fair Oaks, within Sacramento County. Auburn Boulevard provides primary access to the Study Area's main thoroughfares and some Project Sites. From Sacramento, take Interstate 5 (I-5) North towards Redding, California. Proceed on I-5 for approximately 3.5 miles to the US-80 interchange, exiting onto the US-80 East exit towards Reno. Proceed on US-80 East for approximately 9.5 miles exiting and turning right onto Madison Avenue via Exit 96. Winding Way, Auburn Boulevard, and Fair Oaks Boulevard provide the main access roads for the individual Project Sites of the Study Area.

SECTION 3.0

Methodology

3.1 REGULATORY FRAMEWORK

This report has been prepared in accordance with the Minimum Standards for Acceptance of Aquatic Resources Delineation Reports (USACE, 2016), the Corps of Engineers Wetland Delineation Manual (Environmental Laboratory, 1987), Field Guide to Wetland Delineation (Wetland Training Institute, Inc., 1995), the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0) (USACE, 2008), the U.S. Army Corps of Engineers Jurisdictional Determination Form Instructional Guidebook (USACE and EPA, 2007), and the Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et al., 1979).

Navigable Waters Protection Rule; June 22, 2020

The U.S. Environmental Protection Agency (USEPA) and the USACE published the Navigable Waters Protection Rule (NWPR) in the Federal Register on April 21, 2020. This resulted in the finalization of a revised definition of "waters of the United States" under the Clean Water Act. The NWPR became effective on June 22, 2020 (EPA, 2020).

Navigable Waters Protection Rule; August 30, 2021

On August 30, 2021, the USEPA and USACE halted implementation of the 2020 NWPR upon receiving an order vacating and remanding the NWPR at the direction of the U.S. District Court for the District of Arizona in the case of Pascua Yaqui Tribe v. USEPA. The USEPA and USACE are currently interpreting "waters of the United States" consistent with the pre-2015 regulatory regime until further notice. The 2015 rules and supporting materials govern the current application and interpretation of waters of the U.S. and guide the determination of waters of the U.S. within this report. The agencies continue to review the order and consider the next steps.

3.2 SURVEY METHODOLOGY

Field surveys were conducted on June 7 through 10 and December 21, 2021, by Montrose biologists Joshua Goodwin, Kathleen Sholty, and Jedidiah Dowell. Prior to the surveys, background records searches were conducted using the following sources:

- Satellite imagery of the Study Area and vicinity (Google Earth, 2022). A satellite image of the Study Area and its Project Sites can be seen in Figures 3a - j of **Appendix A**. Color satellite imagery from Google Earth was reviewed dating back to 2003 and a black and white Google satellite image from 1993.
- Soil survey maps and unit descriptions from the Natural Resources Conservation Service (NRCS) (NRCS, 2022a) (Figure 4a - j of **Appendix A**)
- Hydric soil information (NRCS, 2022b)
- U.S. Fish and Wildlife Service (USFWS), National Wetlands Inventory, Wetlands Mapper (USFWS, 2022) (Figure 5a - j of **Appendix A**)

During the survey, biologists walked transects throughout the Study Area to determine locations of jurisdictional wetlands and other waters of the U.S. Surveys primarily involved the identification of drainage ordinary high water mark (OHWM) which were recorded with a GPS unit. Surveys also included mapping paired sample point sets to evaluate whether the three-parameter criteria (vegetation, soil, and hydrology) supported a wetland or upland determination at the paired sample point locations. One point was situated outside the limits of the estimated wetland area and the other point was situated within the estimated wetland area.

A global positioning systems handheld unit (Trimble TDC 150™) with sub-meter accuracy was used in the field to collect sample points and to demarcate wetlands and other water features such as OHWM. A compilation of wetland delineation data sheets (**Appendix E**) was used in the preparation of this report.

3.3 DETERMINATION METHODS

Wetlands and Other Waters of the U.S.

Locations of wetlands within the Study Area were determined based on the following three-parameter criteria, as described in the Arid West Regional Guide (USACE, 2008):

- The majority of dominant plant species are wetland associated species;
- Hydric soils are present; and
- Hydrologic conditions exist that result in periods of flooding, ponding, or saturation during the growing season.

These three criteria are used as evidence that an area experiences saturated conditions during the growing season for a minimum of two weeks in an average year. The boundaries of wetlands and other waters of the U.S. were delineated through aerial photograph interpretation and standard field methodologies (i.e., paired data set analyses), and all wetland data were recorded on Wetland Determination Data Forms- Arid West Region. A color aerial photograph was used in the field to assist with this assessment. Munsell Soil Color Charts (Munsell, 2010) were used in the field to identify hydric soil features.

Potential stream locations were also examined to determine whether diagnostic characteristics of streams, including OHWMs, bed and bank, and evidence of ongoing water-driven erosion and deposition were evident at locations. The OHWM is defined, in 33 Code of Federal Regulations (CFR) Part 329.11, as the line on the shore established by the fluctuations of water, and indicated by a clear, natural line impressed on the bank, shelving, changes in soil character, destruction of terrestrial vegetation, or the presence of litter and debris. Other characteristics that were noted, where possible, include a description of the hydrologic feature type and length. USACE regulations (33 CFR Part 328) were consulted to determine whether these water bodies constitute waters of the U.S.

Vegetation

Hydrophytic vegetation is defined as the cumulative total of macrophytic plant life that occurs in areas where the frequency and duration of inundation or soil saturation produce permanently or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present (Environmental Laboratory, 1987).

Prevalent vegetation is characterized by the dominant plant species comprising the plant community

(Wetland Training Institute, Inc., 1995). The dominance test is the basic hydrophytic vegetation indicator and was utilized at each sample point location. The "50/20 rule" was used to select the dominant plant species from each stratum of the vegetation community. The rule states that for each stratum in the community, dominant plant species are the most abundant species (when ranked in descending order of coverage and cumulatively totaled) that immediately exceed 50 percent of the total coverage for the stratum, plus any additional plant species that individually comprise 20 percent or more of the total in the stratum (USACE, 2008).

Dominant plant species observed at each sample point were classified according to their indicator status (i.e., probability of occurring in a wetland) (**Table 2**), according to the 2018 Wetland Plant List (Lichvar et al, 2018). If the majority (greater than 50 percent) of the dominant vegetation on-site are classified as obligate (OBL), facultative wetland (FACW), or facultative (FAC), then the site was considered to be dominated by hydrophytic vegetation. Pursuant to the Arid West Supplement (USACE, 2008), plus (+) and minus (-) modifiers were not used (i.e., FAC- and FAC+ plant species are all considered FAC) and plant species not listed in the National Wetland Plant List (Lichvar et al, 2018) were assumed to be upland (UPL) species (Lichvar et al, 2016).

TABLE 2
CLASSIFICATION OF WETLAND-ASSOCIATED PLANT SPECIES

Plant Species Classification	Abbreviation	Probability of Occurring in Wetlands
Obligate	OBL	>99%
Facultative Wetland	FACW	66-99%
Facultative	FAC	33-66%
Facultative Upland	FACU	1-33%
Upland	UPL	1%
No indicator status	NI	Information insufficient to determine indicator status
SOURCE: Lichvar et al, 2018		

Soils

Hydric soils are defined as soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (NRCS, 2012). Frequently observed indicators of hydric soils include (but are not limited to) histosols, histic epipedon, hydrogen sulfide, stratified layers, depleted below dark surface, depleted matrix, redox dark surface, depleted dark surface, redox depressions, vernal pools, etc. Soil pits are excavated to the depth necessary to observe and document hydric soils indicators, to confirm the absence of indicators, or until refusal. Soils were very low in moisture content and difficult to mechanically manipulate. However, all sampling points were able to have soil sampling pits dug despite the severe drought conditions throughout the Study Area and sample points. The soils at each data point were examined for the presence/absence of indicators. The colors of the examined soils were determined while the soils were moist using the Munsell Soil Color Charts.

Hydrology

Wetlands are seasonally or perennially inundated or saturated at or near (within 12 inches of) the soil surface. Primary indicators of wetland hydrology include (but are not limited to) visual observation of

surface water, high water table, saturation, water-marks (nonriverine), sediment deposits (nonriverine), drift deposits (nonriverine), surface soil cracks, inundation visible on aerial imagery, water-stained leaves, salt crust, biotic crust, aquatic invertebrates, hydrogen sulfide odor, oxidized rhizospheres paralleling living roots, etc. Secondary indicators of wetland hydrology include water marks (riverine), sediment deposits (riverine), drainage patterns, dry-season water table, livestock foot/hoof prints, crayfish burrows, etc. Observation of at least one primary indicator or two secondary indicators is required to confirm the presence of wetland hydrology.

SECTION 4.0

EXISTING CONDITIONS

The Study Area is located in north-central Sacramento County, within the Sacramento Valley north of the American River and found in the City of Citrus Heights or in the unincorporated areas of Carmichael and Fair Oaks, within Sacramento County. Sacramento County has a Mediterranean climate regime characterized by hot, dry, sunny summers and cool, rainy winters. Tule fog from the Pacific Ocean can occur in the western areas of Sacramento County. Evening temperatures are frequently cooler than midday temperatures and winters can prompt Tule fog and frost in lower elevations. The mean annual temperature range near the City of Carmichael, CA in Sacramento, CA is approximately 50° to 73° Fahrenheit (F). The average annual precipitation near Carmichael, CA in Sacramento, CA is approximately 18 inches, with a maximum of approximately 3.7 inches during the month of January. This climate data was collected from 1877 to 2016 (WRCC, 2022).

The Lower American Watershed falls within California Climate Zone 12. Climate Zone 12 includes inland areas with some oceanic or other cold air influence. This climate zone is a roughly rectangular region that encompasses a region east of the Bay Area and cities of Merced, Stockton, Sacramento, Concord, and Lafayette. The local and regional geology is located within the Great Valley geomorphic province and is characterized by grasslands, highly arable land, alluvial deposits, mixed-hardwood forests, and moderate rainfall. This geomorphic province occurs within the greater California Floristic Province (Ca-FP), and thus is equivalent to "cismontane" as often cited in other scientific texts (Hickman, 1993).

4.1 LANDSCAPE SETTING

The Study Area is composed varyingly of gently rolling terrain, sharply eroded drainage channels, and riparian forest of varying species composition both native and non-native, and is situated at elevations that range from approximately 80 feet to 115 feet (24 to 35 meters) above mean sea level. Unnamed tributaries to Arcade Creek, unnamed tributaries to the American River, Arcade Creek, and Cripple Creek flow through the various Project Sites of the Study Area (Figure 5a - j of **Appendix A**). The American River is located southeast of the Study Area and is closest in proximity to Project Site 7 occurring approximately 0.12 miles to the southeast of Project Site 7, thence the Sacramento River occurring approximately 10 miles west to southwest of the Study Area.

The Study Area is situated in a suburban residential setting within the unicorporated areas of Carmichael and Fair Oaks, and the City of Citrus Heights. Specific surrounding land uses include residential and commercial uses. The Study Area is predominantly developed or encompasses riparian habitats. Existing residences and other associated buildings are located within the majority of the Project Sites or are located in close proximity within adjacent parcels.

4.2 SOIL TYPES

According to the U.S. Department of Agriculture (USDA) National Resources Conservation Service (NRCS) online Soil Survey of Sacramento County, California, there are eight soil types mapped within the Study Area (**Table 3**). A map that illustrates the extent of the soil types within the Study Area is provided in Figure 4a- j of **Appendix A**.

Soils include (145) Fiddyment fine sandy loam, 1 to 8 percent slopes, 15 to 30 percent slopes; (149)

Fiddyment-Urban land complex, 1 to 8 percent slopes, (162) Kaseberg-Fiddyment-Urban land complex, 2 to 15 percent slopes, (173) Liveoak-Urban land complex, 0 to 2 percent slopes, (185) Orangevale-Kaseberg-Urban land complex, 8 to 25 percent slopes, (229) Urban land-Xerarents-Fiddyment complex, 0 to 8 percent slopes, and (243) Xerolls, 30 to 70 percent slopes (NRCS, 2021a). These soil types are not considered Hydric.

TABLE 3
STUDY AREA SOILS

Map Unit Symbol	Map Unit Name	Acres in Study Area	Percent in Study Area
145	Fiddyment fine sandy loam, 1 to 8 percent slopes	0.39	3.52
149	Fiddyment-Urban land complex, 1 to 8 percent slopes	0.86	7.77
162	Kaseberg-Fiddyment-Urban land complex, 2 to 15 percent slopes	1.07	9.67
173	Liveoak-Urban land complex, 0 to 2 percent slopes	6.11	55.19
185	Orangevale-Kaseberg-Urban land complex, 8 to 25 percent slopes	1.79	16.17
229	Urban land-Xerarents-Fiddyment complex, 0 to 8 percent slopes	0.71	6.41
243	Xerolls, 30 to 70 percent slopes	0.14	1.26
	Total	11.07	-
SOURCE: NRCS, 2022a			

145: The Fiddyment fine sandy loam (145) soil series is found in 3.52 percent (0.39 acres) of the Study Area. This soil is found within Project Site 8. This is a well-drained soil formed in alluvial material typically on 0 to 15 percent slopes. It has slow to medium runoff and very slow permeability and is derived from material weathered from consolidated sediments of mixed rock.

149: Fiddyment-Urban land complex (149) soil series is found in 7.77 percent (0.86 acres) of the Study Area. The complex is found in Project Sites 1 and 2. This complex is formed from parent material weathered from consolidated sandstone or siltstone. It is a well-drained soil with low permeability and has traits of the Fiddyment soil series.

162: Kaseberg-Fiddyment-Urban land complex (162) found in 9.67 percent (1.07 acres) of the Study Area. This complex is found in Project Sites 6 and 7. It is a well-drained soil with traits similar to those of the Fiddyment-Urban land complex. The Kaseberg series, a component of this complex, is well-drained with slow or medium runoff and moderate permeability. The Kaseburg series is derived from material weathered from consolidated sediments of mixed rock sources.

173: The Liveoak-Urban land complex (173) soil series is found in 55.19 percent (6.11 acres) of the Study Area. This complex is found in Project Sites 2 through 5 and is the most abundant soil type. The Liveoak series, a component of this complex, is moderately well drained with negligible to low runoff and moderate permeability.

185: Orangevale-Kaseberg-Urban land complex (185) soil series is found in 16.17 percent (1.79 acres) of the Study Area. This complex is found solely in Project Site 10. The Orangevale series, a component of

this complex along with the Kaseburg series, is well-drained with slow to rapid runoff and moderate permeability. The Orangevale series is derived from granitic rock.

229: Urban land-Xerarents-Fiddyment complex (229) soil series is found in 6.41 percent (0.71 acres) of the Study Area. This complex is found in the entirety of Project Site 9 and the eastern edge of Project Site 3. Drainage is variable and may have impervious components. It is derived from material weathered from consolidated sandstone or siltstone and may include fill material.

243: The Xerolls (243) soil series is found in 1.26 percent (0.14 acres) of the Study Area. This soil is found solely in the channel and slope area of Project Site 7. Xerolls consist of colluvium derived from granite and are well-drained.

4.3 TERRESTRIAL HABITATS

A habitat map is shown in Figure 6a-j of **Appendix A,** and representative photographs are shown in **Appendix C**. A list of plant species observed within the Study Area is included in **Appendix D**. No special-status plants were observed during the 2021 delineation. Five terrestrial habitats were identified on-site including annual grassland, mixed oak woodland, lawn, mixed riparian, and ruderal/developed. A map that illustrates the terrestrial habitat types within the Study Area is presented in Figure 6a - j of **Appendix A.** Terrestrial habitat types are further discussed below. Aquatic habitat types are discussed in Section 5.0.

Annual Grassland

Annual grassland encompasses a large majority of the habitat type coverage in Project Site 7 especially and is present sporadically throughout some of the other Project Sites. Trees are largely absent within this habitat type and it is generally dominated by non-native annual grasses and forbs. Native plants occurred in greater abundance in some of the less disturbed Project Sites. Forbs and grasses found commonly in annual grassland areas included ripgut brome (*Bromus diandrus*), soft chess (*Bromus hordeaceus*), red brome (*Bromus rubens*), seaside barley (*Hordeum marinum*), Italian ryegrass (*Lolium perenne*), Johnsongrass (*Sorghum halepense*), bulbous canary grass (*Phalaris aquatica*), and annual bluegrass (*Poa annua*). Forbs commonly observed were curly dock (*Rumex crispus*), knotweed (*Persicaria lapathifolia*), field bindweed (*Convolvulus arvensis*), wild radish (*Raphanus raphanistrum*), filaree (*Erodium* sp.), rough cocklebur (*Xanthium strumarium*), and poison oak (*Toxicodendron diversilobum*).

Mixed Riparian

Mixed riparian habitat occurs along and surrounding a majority of the drainages that were mapped within the Project Sites. Plant species observed in the tree layer of this habitat include Valley oak (*Quercus lobata*), interior live oak (*Quercus wislizeni*), privet (*Ligustrum* sp.), box elder (*Acer negundo*), northern catalpa (*Catalpa speciose*), California bay laurel (*Umbellularia californica*), coast redwood (*Sequoia sempervirens*), and Fremont's cottonwood (*Populus fremontii*). The dominant plant species observed within the shrub/vine layer of this community was often Himalayan blackberry especially in areas of steep gradient and within Project Sites 7 and 9. Grape (*Vitis* sp.), periwinkle (*Vinca major*), and English ivy (*Hedera helix*) were also variably present within the shrub and vine layer and these species outcompeted others within this vegetative layer much like Himalayan blackberry. Other plant species observed within the herbaceous layer of this community include Italian thistle (*Carduus pycnocephalus*), swamp smartweed (*Polygonum hydropiperoides*), English plantain (*Plantago lanceolata*), tall flatsedge

(*Cyperus eragrostis),* and young or shrub-form California bay laurel, oaks, and red willow (*Salix laevigata*). Bare ground and vegetation management areas were also variably present within the understory of these riparian areas, as landowners continually upkeep these areas for aesthetic and fuel reduction reasons.

Mixed Oak Woodland

The overstory of this community is composed of mature blue oak (*Quercus douglasii*), valley oak, and interior live oak. Understory vegetation consisted of annual grassland species and species such as smilo grass (*Stipa miliacea*), hedge nettle (*Stachys ajugoides)*, orchard grass (*Dactylis glomerate*), and poison oak. Oaks within this habitat type are often well spaced with little canopy overlap. Mixed oak woodland tends to occur at the margins of mixed riparian habitat within the Study Area and is present in greatest abundance within Project Site 3.

Lawn

The lawn habitat type within the Project site denotes areas with maintained, planted, and mowed areas of non-native turf grasses for use in landscaping and parks. The plant species composition is mainly a monoculture of Bermuda grass (*Cynodon dactylon*), bentgrass (*Agrostis* sp.), or other non-native turf and lawn grass mix. Other weedy forbs present in annual grassland habitat are also sparsely present within this habitat type.

Ruderal/Developed

The areas classified as ruderal/developed habitat within the Project site include all existing residences and structures, any landscaped areas, roads/parking areas, and otherwise disturbed regions. Non-native landscape plants observed in these areas included Japanese maples (*Acer palmatum*), English ivy (*Hedera helix*), Eucalyptus (*Eucalyptus* sp.), fig (*Ficus carica*), olive (*Elaeagnus sp.*), apple (*Malus* species), periwinkle (*Vinca major*). Weedy forbs and assorted annual grassland species are also present within this habitat type along its margins and disturbed border areas of landscaping such as sidewalks, paths, and roads.

SECTION 5.0

RESULTS

The Aquatic Resources Delineation Map of the Study Area is included in **Appendix B**. A total of approximately 0.07 acres of likely jurisdictional wetlands and 2106 linear feet of other waters of the U.S. were mapped within the Study Area (**Appendix B**). One aquatic feature type, intermittent drainage, was identified in all 10 Project Sites of the Study Area, though named intermittent creeks/drainages were also identified in Project Sites 2, 9, and 8 (**Table 4**). The wetland delineation data forms completed for the Study Area are included in **Appendix E**. A list of plant species observed within the Study Area is included in **Appendix D**. A discussion of the wetlands and other waters mapped on-site is presented below.

TABLE 4
OBSERVED WETLANDS AND WATERS OF THE U.S.

Feature Type	Acreage[1]	Length (Linear Feet) [1]
Wetlands		
Seasonal Wetlands	0.07	N/A
Other Waters		
Intermittent Drainages	N/A	1495
Arcade Creek	N/A	443
Cripple Creek	N/A	168
Total	**0.07**	**2106**

NOTE[1]: Acreages and linear feet represent a calculated estimation and are subject to modification following USACE verification.

The USFWS National Wetlands Inventory (USFWS, 2022) and USGS National Hydrological Dataset (USGS, 2022) were referenced to identify known or previously mapped wetlands or other water features within the Study Area to provide a baseline for site-specific evaluations. NWI Information is shown in Figure 5 of **Appendix A**.

5.1 SEASONAL WETLANDS

No standing water was observed within any wetlands within the Study Area during the site visit, however, wetland features were delineated through vegetation patterns, hydric indicators, and low-lying depression features. Although the site visit that resulted in wetland identification was conducted in June, soil pit data points were able to be excavated and assessed. One seasonal wetland was identified in Project Site 2, totaling 0.07 acres.

Wetlands are classified as palustrine emergent wetlands (PEM), in accordance with the *Cowardin Classification of Wetlands and Deepwater Habitats* (Cowardin et al., 1979). A summary of wetland features within the Study Area is shown in **Table 5**. These features can be seen in **Appendix B** and are tabulated in the Aquatic Resources Excel Sheets found in **Appendix G**. Mapped drainages within the Study Area are shown in **Appendix B**. Datasheets for wetland sample points are included in **Appendix E**.

TABLE 5
SEASONAL WETLANDS IDENTIFIED IN STUDY AREA

Aquatic Resource Name	Aquatic Resource Classification			
	Cowardin	**Location (lat/long) & Project Site (#)**	**Data Sheet**	**Acres**
SW-1	PEM2E	38.644872°/ -121.355419°; Project Site 2	1A/1B	0.07
			Total	**0.07**

SW-1

SW-1 is an isolated seasonal wetland feature that receives water input through a combination of sheet flow and direct rainfall. SW-1 has no apparent surface or groundwater connectivity to potentially jurisdictional wetlands or other waters of the U.S. SW-1 is located within Project Site 2. The surveys were conducted during the dry period, however, vegetation was identifiable with hydrologic indicators present. Vegetation makeup was dominated by common stork's-bill (*Erodium cicutarium*) and Bermuda grass (*Cynodon dactylon*). Though these species are FACUP to UPL, other component vegetation included English plantain (*Plantago lanceolata*) and seaside barley (*Hordeum marinum*) which influenced the vegetation determination towards vegetation being classified as hydric. The prevalence index was used for this determination. Hydric soil indicators consisted of depleted matrix. Hydrology indicators observed within this feature consisted of either oxidized rhizospheres, saturation visible from aerial, and local testimony of seasonal water flow present within the seasonal wetland in winter. Hydrology and soils were stronger indicators of wetland status than those of vegetation. A photo of this feature can be found in Figure 1b of **Appendix C**, Photo 11.

5.2 INTERMITTENT DRAINAGES

A total of 5 unnamed intermittent drainage features were identified within the Study Area across Project Sites 1, 3, 4, 5, 6, 7, and 10 and total 1494.44 linear feet (**Table 6**). Named intermittent creek features are discussed in **Section 5.3** and **Section 5.4**. Standing water was found within some of these drainages at the time of the surveys. These features contained the required diagnostic features according to the USACE guidance on identifying streams, including an OHWM, bed and bank, a change in vegetation, evidence of sediment sorting, erosion, and deposition driven by water.

Intermittent drainages are classified as riverine, intermittent, with an unconsolidated bottom (R4UB), in accordance with the *Cowardin Classification of Wetlands and Deepwater Habitats* (Cowardin et al., 1979). A summary of intermittent drainage features within the Study Area is shown in **Table 6**. These features can be seen in **Appendix B** and are tabulated in the Aquatic Resources Excel Sheets found in **Appendix G**. Mapped drainages within the Study Area are presented in **Appendix B**.

TABLE 6
INTERMITTENT DRAINAGES IN STUDY AREA

Aquatic Resource Name	Aquatic Resource Classification		
	Cowardin	Location (lat/long) & Project Site (#)	Linear Feet
ID-1	R4UB	38.64114°/-121.350399°; Project Site 1	170.43
ID-2	R4UB	38.656083°/-121.336665°; Project Site 3 38.654666°/-121.334853°; Project Site 5 38.653664°/-121.334204°; Project Site 4	279.56 204.67 154.38
ID-3	R4UB	38.61791°/-121.313706°; Project Site 6	103.65
ID-4	R4UB	38.632483°/-121.324946°; Project Site 7	105.84
ID-5	R4UB	38.648579°/-121.25739°; Project Site 10	475.91
		Total	**1494.44**

ID-1

ID-1 initiates in the southern end of the Study Area in Project Site 1 and conveys water from the surrounding uplands, landscaped areas, lawns, open-space, and residential areas surrounding Project Site 1. This feature is defined by a clearly established bed and bank with a majority of the channel being non-vegetated, undercut banks, exposed roots, and sediment sorting with the top of bank being in line with the OHWM. This feature's OHWM and top of bank measures an average of 6.5 feet wide. Channel depth is approximately 1 foot deep. Vegetation associated with the feature lines the top of bank of the channel with some very sparse vegetation interspersed within the channel. Species lining the top of bank included tall flatsedge, hedge parsley, assorted grasses, and dallisgrass. Within channel included curly doc and orchard grass. Upland vegetation was a maintained lawn. This feature measures 170.43 linear feet and flows to the north near residential properties, under a Winding Way bridge, and eventually into Arcade Creek and thence the American River. A representative photograph of ID-1 can be found in Figure 1a of **Appendix C**, Photo 1.

ID-2

Within the study area, this feature is defined by a sparsely vegetated channel, bank undercuts, drift deposits with overhanging vegetation, exposed roots, and sediment deposits. This feature's OHWM ranges in measurement from 9 to 15 feet wide and top-of-bank width measurements between 14 and 28 feet. Channel depth is approximately 2 feet deep. This feature's sections total 638.61 linear feet and flows generally westward eventually entering into Arcade Creek and thence the American River.

Project Site 3

ID-2 initiates in the southern boundary of Project Site 3 and conveys water from the surrounding grassy and forested park, parking lot, roads, and residential areas surrounding Project Site 3. Vegetation within the stream bed was absent and substrate consisted of a bare-bottom channel with no cobbles, but flat sedge was present along channel margins. Vegetation overstory consisted of

valley oak, redwood, palm, privet, blue oak, and California walnut. Understory vegetation consisted of Himalayan blackberry, canary grass, hedge parsley, and barley, with inclusion of knotweed and tall flatsedge. This section of ID-2 measures 279.56 linear feet and flows to the south near, roads, oak savanna, and a golf course. A representative photograph of ID-2 in Project Site 3 can be found in **Appendix C**, Photo 3.

Project Site 4

ID-2 initiates in the northern boundary of Project Site 4 and conveys water from the surrounding forested open-space/yards, roads, and residential areas surrounding Project Site 4. Vegetation within the stream bed and channel was absent. Vegetation on the bank and surroundings consisted of periwinkle, English ivy, assorted ornamentals, and California bay laurel. This section of ID-2 measures 204.67 linear feet and flows to the north towards Project Site 5. A representative photograph of ID-2 in Project Site 5 can be found in Figure 1a of **Appendix C**, Photo 5.

Project Site 5

ID-2 initiates in the southeastern corner of Project Site 5 and conveys water from the surrounding uplands, forested open-space/yards, and residential areas surrounding Project Site 5. Vegetation within the stream bed consisted of mostly a bare-bottom channel with some flatsedge. Vegetation on the bank consisted of assorted ornamentals, redwood, eucalyptus, and oaks. This section of ID-2 measures 154.38 linear feet and flows to the north near residential properties and a contiguously dense riparian corridor. A representative photograph of ID-2 in Project Site 5 can be found in Figure 1a of **Appendix C**, Photo 4.

ID-3

ID-3 initiates in the northern boundary of Project Site 6 and conveys water from the surrounding lawn and forested riparian corridor, roads, and residential areas surrounding Project Site 6. This feature's OHWM measures an average of 9 feet wide and top-of-bank width averages 18 feet. Vegetation within the stream bed was absent and the substrate consisted of a bare-bottom channel with no cobbles. Vegetation on the bank consisted of rip gut brome, ryegrass, orchard grass, privet, and Himalayan blackberry. This section of ID-2 measures 103.65 linear feet and flows to the south near, roads, oak savanna, and a golf course as an unnamed tributary to the American River. A representative photograph of ID-3 in Project Site 6 can be found in Figure 1a of **Appendix C**, Photo 6.

ID-4

ID-4 initiates in the northern corner of the Study Area in Project Site 7 and conveys water from the surrounding uplands, forested riparian corridor, and some dispersed residences surrounding Project Site 1. This feature is defined by a clearly established bed and bank with slight undercutting with exposed roots and leafy and woody debris deposits. This feature's OHWM measures an average of 4.5 feet wide and top-of-bank width averages 14.5 feet, though top of bank is not well defined due to the adjacent hillslope. Channel depth is approximately 3 feet deep. Vegetation associated with the feature primarily lines the top of bank of the channel. Minimal vegetation occurred within the channel due to organic matter deposition, but Himalayan blackberry was present. Overstory Vegetation along the bank was dominated by interior live oak, blue oak, privet, and stone-fruit trees. Himalayan blackberry, periwinkle, English ivy, Italian thistle, shrub-form California bay, barley, ripgut brome, hedge parsley, poison oak compose a majority of the herbaceous layer. This feature measures 105.84 linear feet and

flows to the south along a dense riparian corridor into the nearby American River. A representative photograph of ID-4 can be found in Figure 1b of **Appendix C**, Photo 7.

ID-5

ID-5 initiates in the northern end of the Study Area in Project Site 10 and conveys water from the surrounding uplands, forested and landscaped areas, open-space, and residential areas surrounding Project Site 10. This feature is defined by a clearly established bed and bank with incision, slight undercuts, exposed roots, and sediment sorting. The northern portion of the feature is situated in a deep "V" shaped canyon-like feature with steep slopes on either side of the creek channel while the southern section is situated in a much more gradual topography. This feature's OHWM measures approximately 11 to 7 feet wide across its length in the Study Area and top-of-bank width averages 16 feet. Vegetation associated with the feature primarily lines the top of bank of the channel. Minimal to no vegetation occurred within the channel. Understory vegetation along the banks consisted of Himalayan blackberry, grape, fig saplings, privet, and English ivy. Overstory vegetation along banks consisted of Himalayan blackberry, privet, fig, ornamental redwood, valley oak, and large ornamental fern. This feature measures 475.91 linear feet and flows to the south near residential properties and eventually into the American River. A representative photograph of ID-5 can be found in Figure 1b of **Appendix C**, Photo 9.

5.3 ARCADE CREEK

Arcade Creek was identified within the Study Area and totals 443.46 linear feet across Project Sites 2 and 9 (**Table 7**). Arcade Creek occurs within Project Sites 2 and 9. Standing water was found within this creek at the time of the surveys, but there was no flowing water observed. Arcade Creek clearly contained the required diagnostic features according to the USACE guidance on identifying streams, including an OHWM, bed and bank, a change in vegetation, evidence of sediment sorting, erosion, and deposition driven by water.

Arcade Creek was classified as riverine, intermittent, with an unconsolidated bottom (R4UB), in accordance with the *Cowardin Classification of Wetlands and Deepwater Habitats* (Cowardin et al., 1979). A summary of Arcade Creek's sections within the Study Area is shown in **Table 7**. This creek can be seen in Appendix B and is tabulated in the Aquatic Resources Excel Sheets found in Appendix G. Mapped creeks within the Study Area are presented in Figure 1a (Photo 2) and 1b (Photo 8) of **Appendix C**.

TABLE 7
ARCADE CREEK SEGMENTS WITHIN STUDY AREA

Aquatic Resource Name	Aquatic Resource Classification		
	Cowardin	**Location (lat/long) & Project Site (#)**	**Linear Feet**
Arcade Creek	R4UB	38.643623°/-121.355258°; Project Site 2 38.683134°/-121.324946°; Project Site 9	356.09 87.37
		Total	**443.46**

Arcade Creek

Within the Study Area, this feature is defined by a clearly established bed and bank with undercuts, exposed roots, and sediment sorting, with the top of bank being in line with the OHWM or slightly deviated from it for a majority of its Study Area length. This feature's OHWM measures between 21 to 29 feet wide and top-of-bank width averages 31 to 36 feet wide across the Study Area. Channel depth is approximately 7 to 9 feet deep across the Study Area. Arcade Creek flows westward to Steelhead Creek, a tributary of the American River.

Project Site 2

Arcade Creek initiates in the eastern boundary of Project Site 2 and conveys water from the surrounding uplands, forested open-space/yards, roads, and residential areas surrounding Project Site 2. Vegetation within the stream bed consisted of low-growing red willow, *Acacia* sp., tall flatsedge, smartweed, cocklebur, and water primrose. Vegetation on the bank consisted of Virginia creeper, lemon balm, hedge nettle, mugwort, Phalaris aquatica, Oregon ash, California bay laurel, Himalayan blackberry, California buckeye, and fig. This section of Arcade Creek measures 356.09 linear feet and flows to the west near roads, fields, and residential properties. A representative photograph of Arcade Creek in Project Site 2 can be found in Figure 1a of **Appendix C**, Photo 2.

Project Site 9

Arcade Creek initiates in the eastern boundary of Project Site 9 and conveys water from the surrounding uplands, forested open-space/yards, roads, and residential areas surrounding Project Site 2. The channel was largely void of vegetation and included mostly sand with inclusions of debris deposits. Beneath the bridge, rock slope protection lined the banks. Understory vegetation included Himalayan blackberry, Vinca major, smilo grass, hedge nettle, orchard grass, tall flats edge, Virginia creeper, and American bugleweed. Overstory vegetation consisted of Oregon ash, valley oak. Privet, box elder, northern catalpa, and interior live oak with fairly dense canopy cover. This section of Arcade Creek measures 87.37 linear feet and flows to the west near, roads, fields, and residential properties. A representative photograph of Arcade Creek in Project Site 9 can be found in Figure 1b of **Appendix C**, Photo 8.

5.4 CRIPPLE CREEK

Cripple Creek was identified within the Study Area and measures 168.09 linear feet (**Table 8**). Cripple Creek occurs within Project Site 8. Standing water was found within this creek at the time of the surveys, but there was no flowing water observed. Cripple Creek contained the required diagnostic features according to the USACE guidance on identifying streams, including an OHWM, bed and bank, a change in vegetation, evidence of sediment sorting, erosion, and deposition driven by water.

Cripple Creek was classified as riverine, intermittent, with an unconsolidated bottom (R4UB), in accordance with the Cowardin Classification of Wetlands and Deepwater Habitats (Cowardin et al., 1979). A summary of Cripple Creek's section found within the Study Area is shown in **Table 8**. This creek can be seen in Appendix B and is tabulated in the Aquatic Resources Excel Sheets found in Appendix G. Mapped creeks within the Study Area are presented in **Appendix B**.

TABLE 8
CRIPPLE CREEK SEGMENT IN STUDY AREA

Aquatic Resource Name	Aquatic Resource Classification		
	Cowardin	**Location (lat/long) & Project Site (#)**	**Linear Feet**
Cripple Creek	R4UB	38.692119°/-121.311149°; Project Site 8	168.09
		Total	**168.09**

Cripple Creek

Cripple Creek initiates in the northeast-most corner of the Study Area in Project Site 8 and conveys water from the surrounding uplands, forested open-space, and residential areas surrounding Project Site 8. Within the Study Area, this feature is defined by a clearly established bed and bank with undercuts, exposed roots, and sediment sorting, with the top of bank being in line with the OHWM or slightly deviated from it. This feature's OHWM measures an average of 21 feet wide and top-of-bank width averages 26 feet. Channel depth is approximately 7 feet deep. Vegetation associated with the feature primarily lines the top of bank of the channel. Minimal vegetation occurred within the channel but consisted of swamp smartweed, common cocklebur, acacia sp., orchard grass, and Virginia creeper. Understory vegetation along the banks consisted of Italian thistle, wild radish, orchard grass, rip-gut brome, wild lettuce, red brome, and chicory. Overstory vegetation along banks consisted of a relatively open canopy dominated by interior live oak, northern catalpa, Oregon ash, and valley oak. This creek measures 168.09 linear feet and flows to the southwest near residential properties and eventually into Arcade Creek, thence Steelhead Creek, thence the American River. A representative photograph of Cripple Creek can be found in Figure 1b of **Appendix C**, Photo 10.

SECTION 6.0

DISCUSSION AND ANALYSIS

6.1 JURISDICTIONAL FEATURES

Identified seasonal wetlands, intermittent drainages, Arcade Creek, and Cripple Creek, were determined to be likely jurisdictional. Wetlands were identified and verified using the three-parameter approach meeting USACE standards for determining a wetland through means of hydrology, vegetation, and hydric soils (USACE, 2008a). The likelihood of jurisdictionality was based on characteristics identified in *A Field Guide to the Identification of the Ordinary High Water Mark in the Arid West Region of the Western United States* (USACE, 2008b). These drainage features contained indicating factors such as a clear natural line of scour, bank erosion, and the presence of litter and debris.

SECTION 7.0

CONCLUSION

Montrose conducted a survey of wetlands within the approximately 11-acre Study Area on June 7 through 10 and December 21, 2021. A total of one seasonal wetland and seven intermittent drainages, two of which are Arcade and Cripple Creeks, totaling approximately 0.07 acres and 2106 linear feet were identified. Features identified in the Study Area during the 2021 study are summarized in **Table 9.**

TABLE 9
SUMMARY TABLE

Aquatic Resource Classification						
Category	**Feature Name**	**Cowardin**	**Location (lat/long) & Project Site (#)**	**Acres**	**Linear Feet**	**Contiguity**
Wetlands –Likely Jurisdictional						
Seasonal Wetlands	SW-1	PEM2E	38.644872°/ -121.355419°; Project Site 2	0.07	-	No
Other Waters – Likely Jurisdictional						
Intermittent Drainage	ID-1	R4UB	38.64114°/-121.350399°; Project Site 1	-	170.43	Yes
Intermittent Drainage	ID-2	R4UB	38.656083°/-121.336665°; Project Site 3 38.654666°/-121.334853°; Project Site 5 38.653664°/-121.334204°; Project Site 4	-	638.61	Yes
Intermittent Drainage	ID-3	R4UB	38.61791°/-121.313706°; Project Site 6	-	103.65	Yes
Intermittent Drainage	ID-4	R4UB	38.632483°/-121.324946°; Project Site 7	-	105.84	Yes
Intermittent Drainage	ID-5	R4UB	38.648579°/-121.25739° Project Site 10	-	475.91	Yes
Intermittent Drainage	Arcade Creek	R4UB	38.643623°/-121.355258°; Project Site 2 38.683134°/-121.324946°; Project Site 9	-	443.46	Yes
Intermittent Drainage	Cripple Creek	R4UB	38.692119°/-121.311149°; Project Site 8	-	168.09	Yes
			TOTAL	**0.07**	**2106**	**-**

SECTION 8.0

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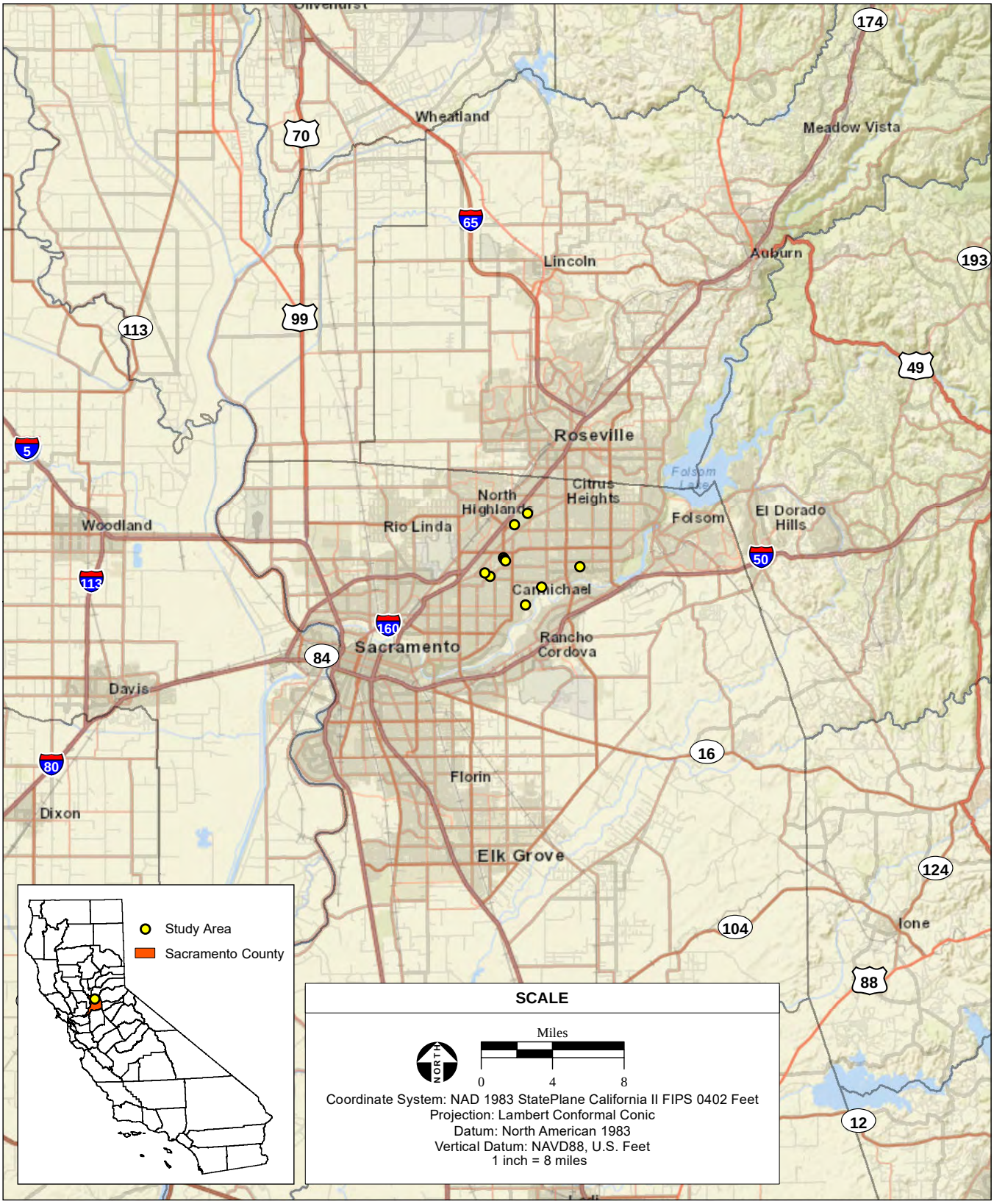
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APPENDICES

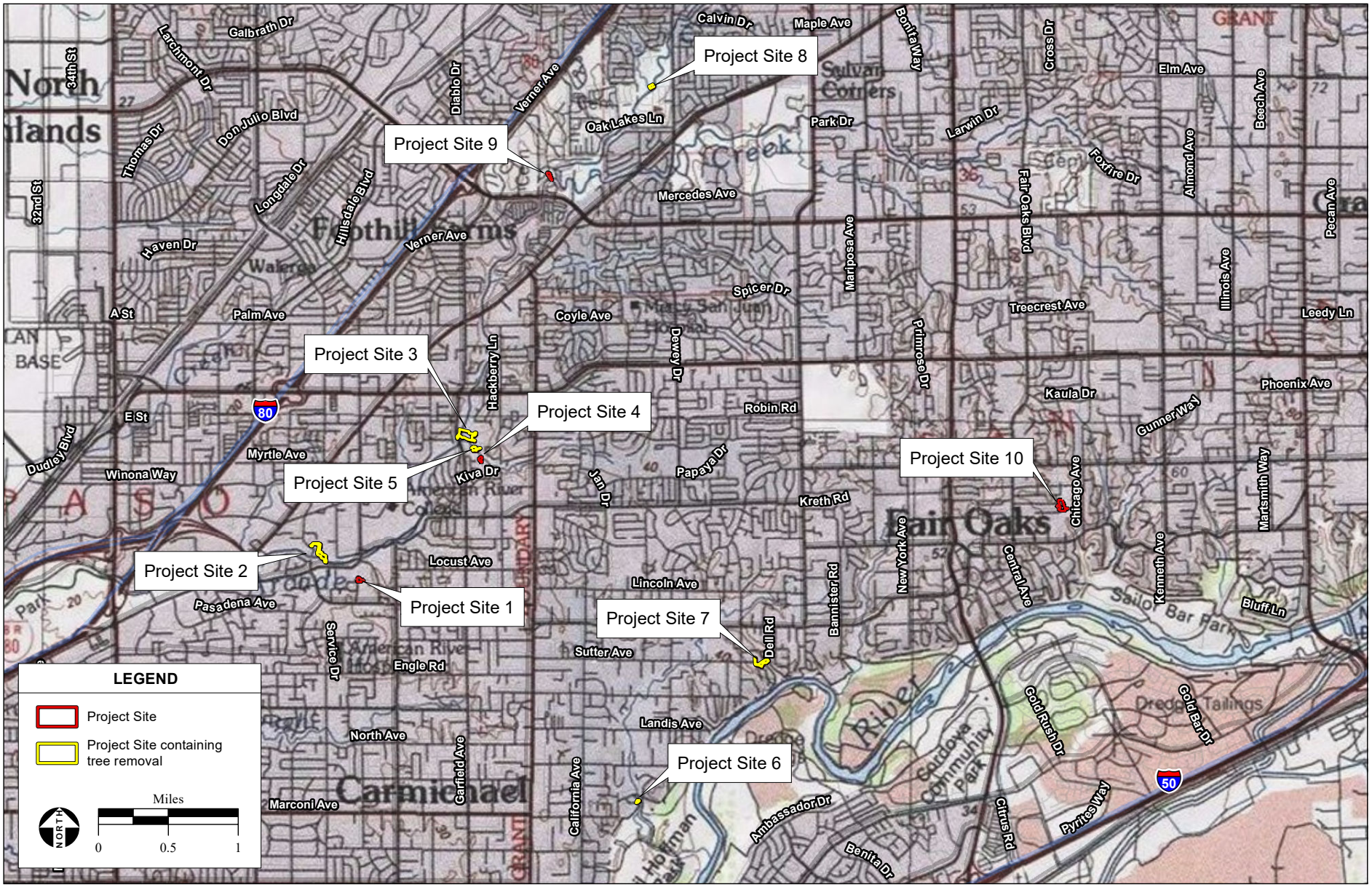
APPENDIX A

SUPPORTING FIGURES



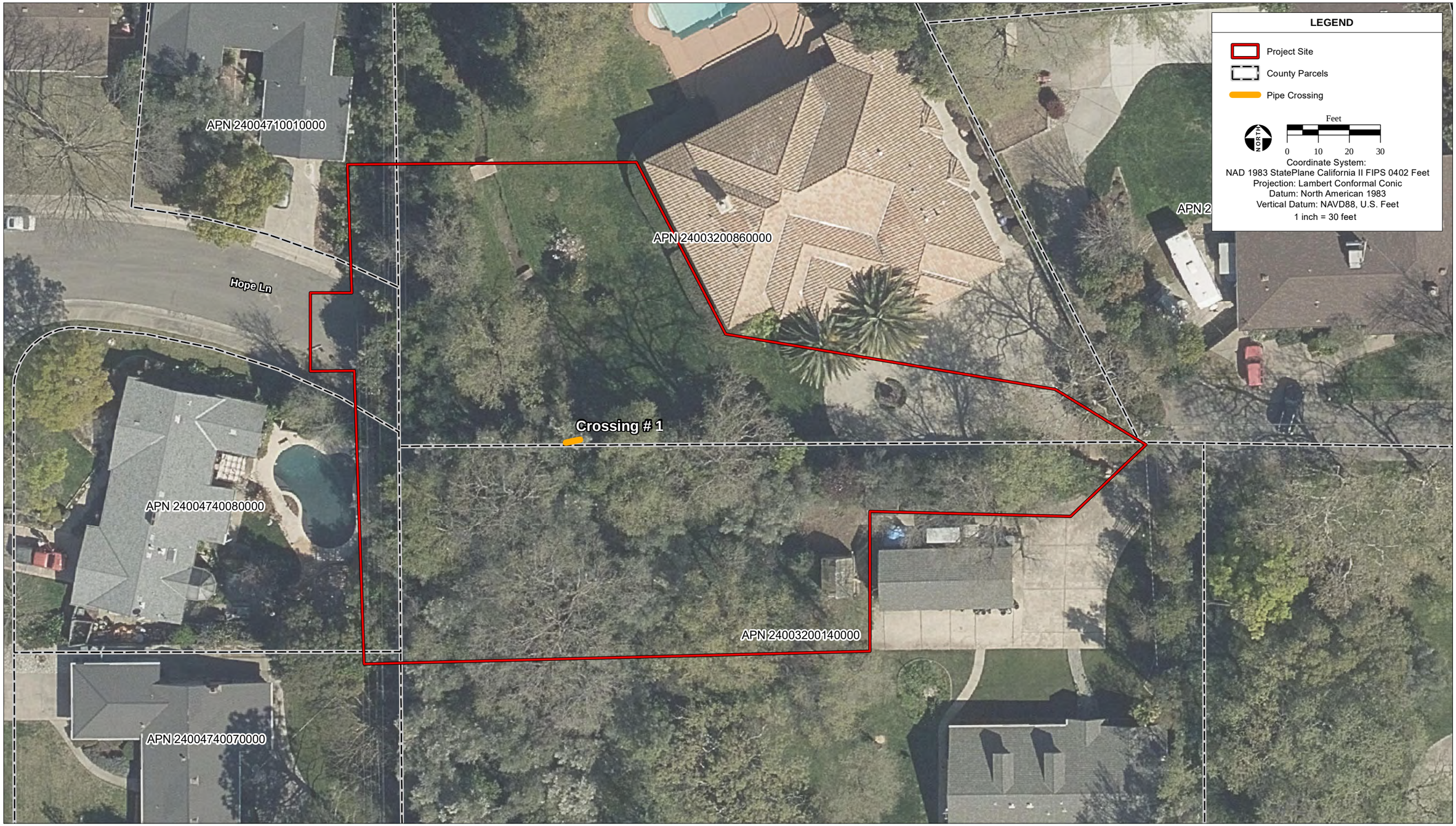
SOURCE: ESRI, 2022; Montrose, 3/15/2022

Appendix A - Figure 1
Regional Location



SOURCE: "Sacramento, CA" USGS 100k Topographic Quadrangle, T10N R6E, T9N R6E, Unsectioned Area of Carmichael and Citrus Heights; ESRI 2021; AES, 7/8/2022

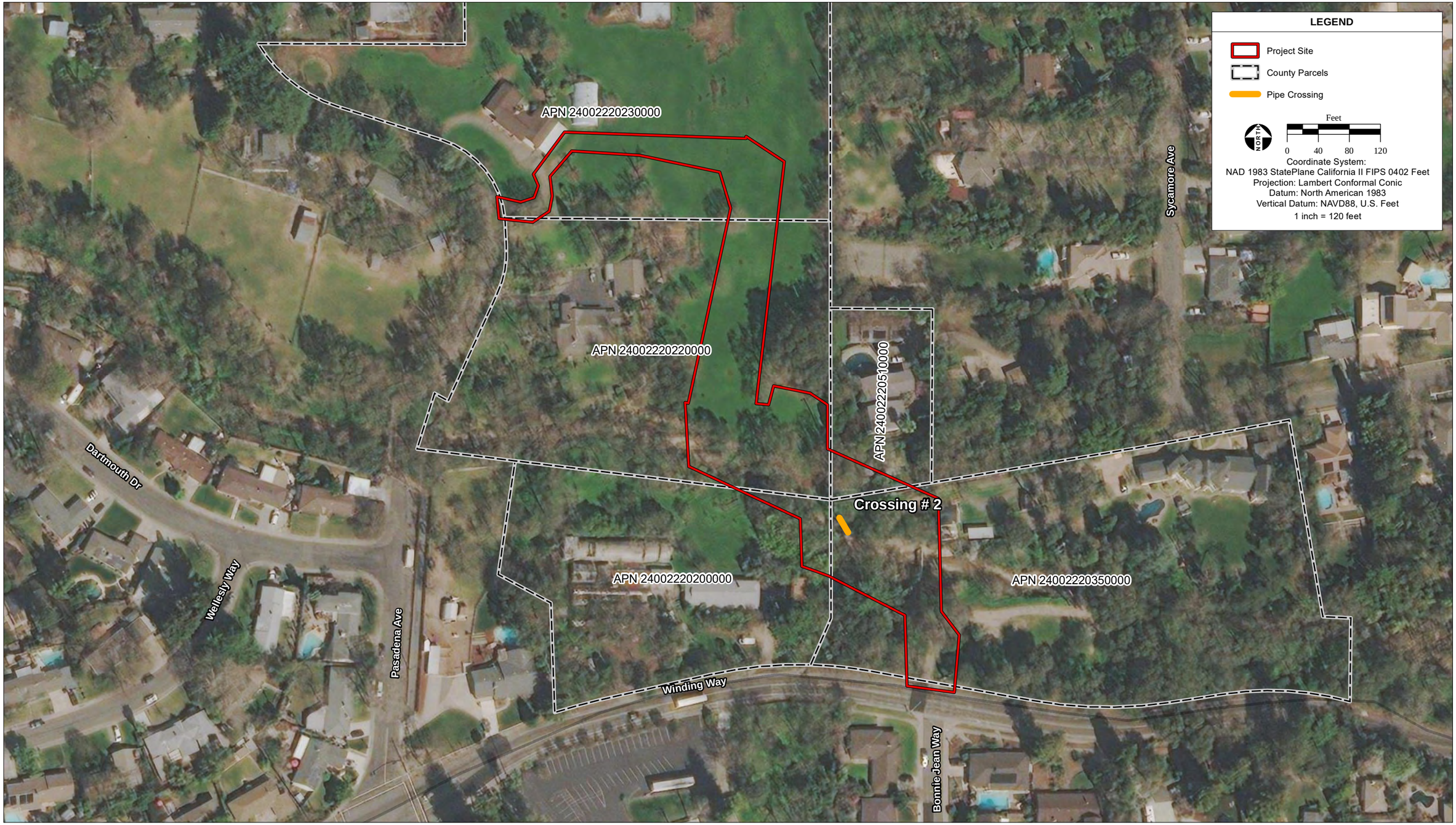
Figure 2
Site and Vicinity



SOURCE: Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/16/2022

Appendix A - Figure 3a

Aerial Photograph - Project Site 1 / Crossing #1 / Hope Ln / Segment #59646



SOURCE: Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/16/2022

Appendix A - Figure 3b

Aerial Photograph - Project Site 2 / Crossing #2 / Winding Way / Segment #48368



SOURCE: Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/16/2022

Appendix A - Figure 3c

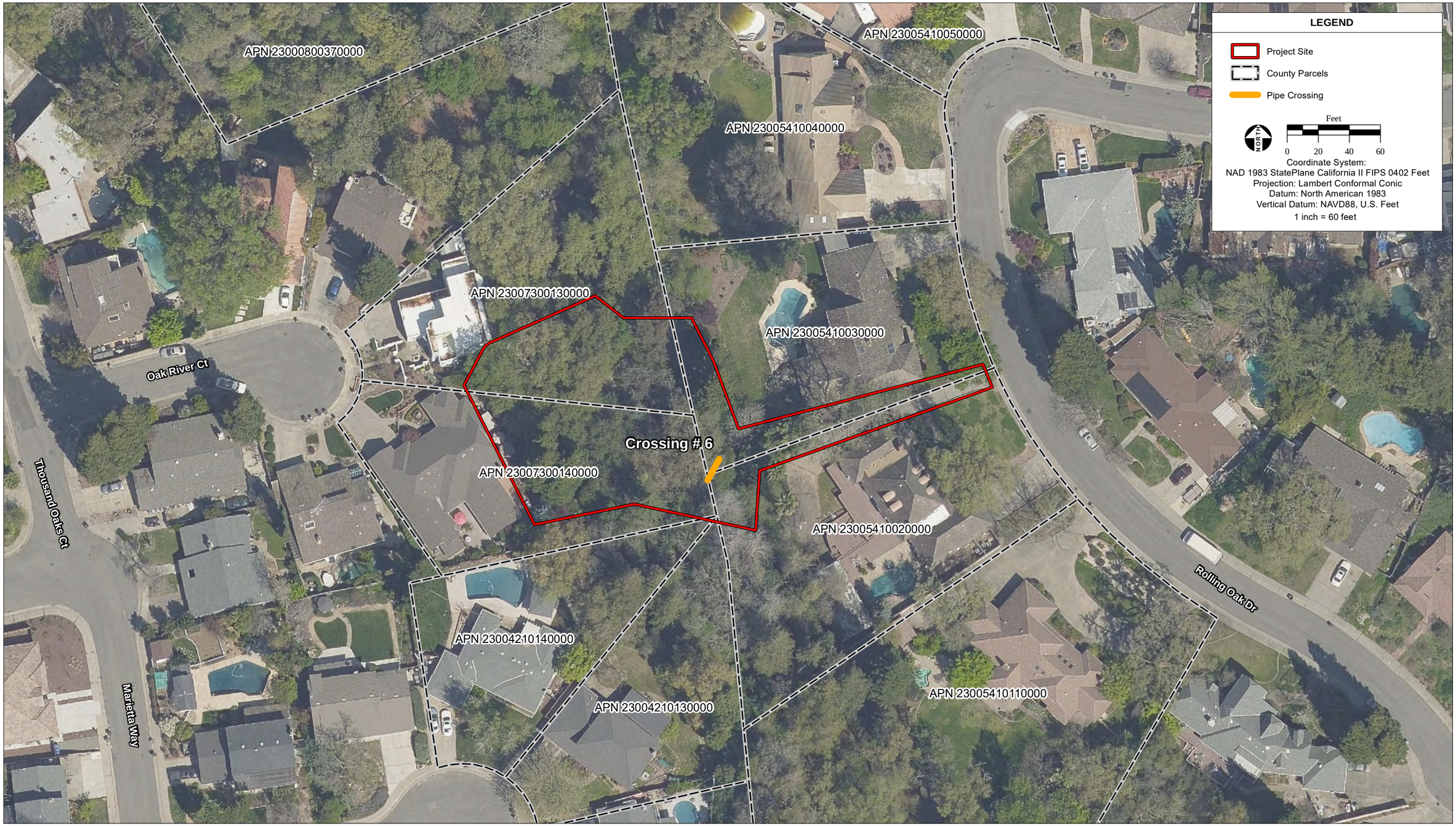
Aerial Photograph - Project Site 3 / Crossing #3 / Arcade Creek / Segment #49894
Crossing #4 / Garfield Ave & Thousand Oaks Ct / Segment #44327



SOURCE: Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/16/2022

Appendix A - Figure 3d

Aerial Photograph - Project Site 4 / Crossing #5 / Concho Ct / Segment #41018



SOURCE: Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/16/2022

Appendix A - Figure 3e

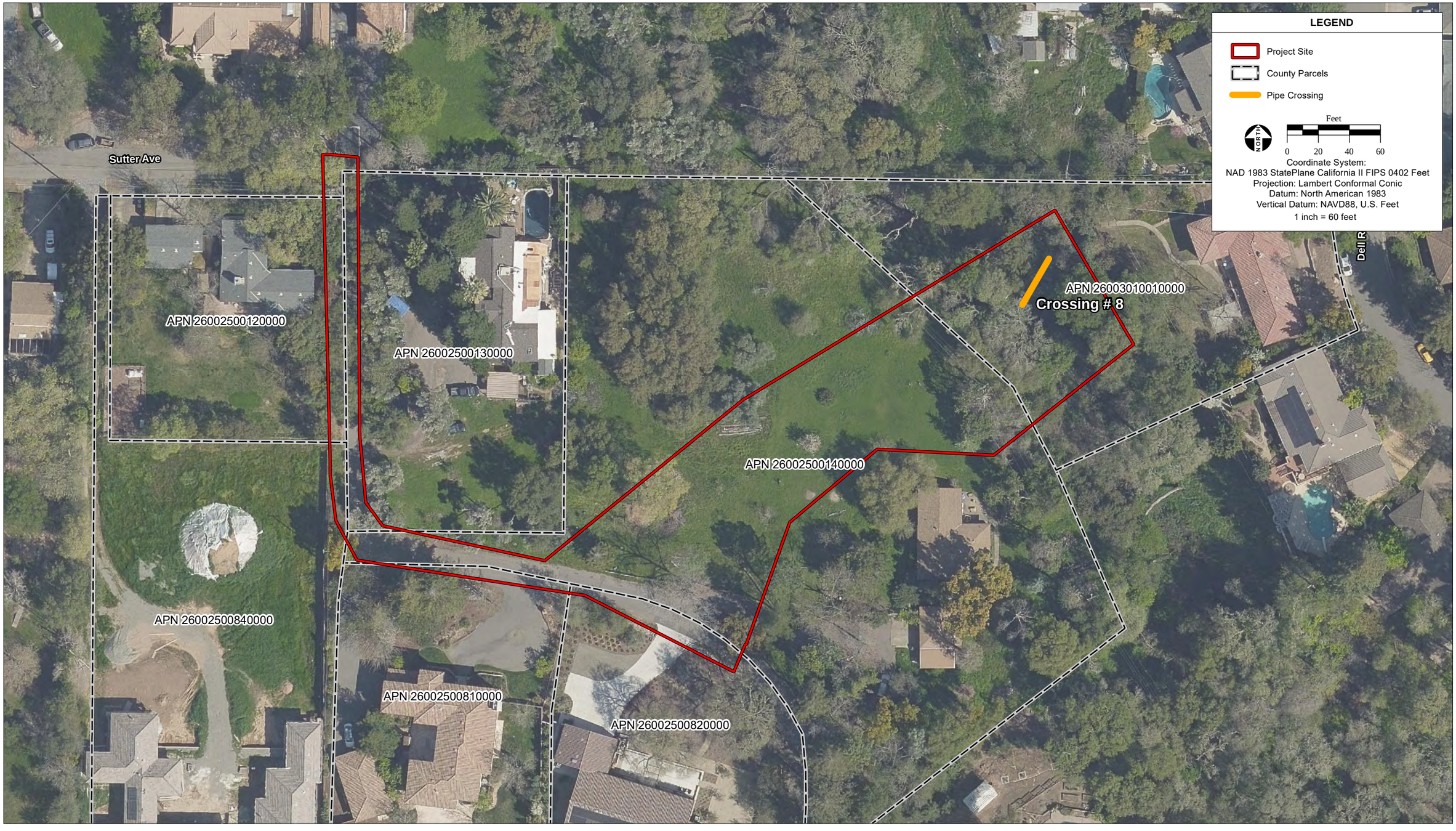
Aerial Photograph - Project Site 5 / Crossing #6 / Gina Ct / Segment #50528



SOURCE: Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/16/2022

Appendix A - Figure 3f

Aerial Photograph - Project Site 6 / Crossing #7 / San Lorenzo Way / Segment #170877



SOURCE: Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/16/2022

Appendix A - Figure 3g

Aerial Photograph - Project Site 7 / Crossing #8 / Sutter Ave / Segment #78865



SOURCE: Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/16/2022

Appendix A - Figure 3h

Aerial Photograph - Project Site 8 / Crossing #9 / Campfire Way / Segment #36529



SOURCE: Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/16/2022

Appendix A - Figure 3i

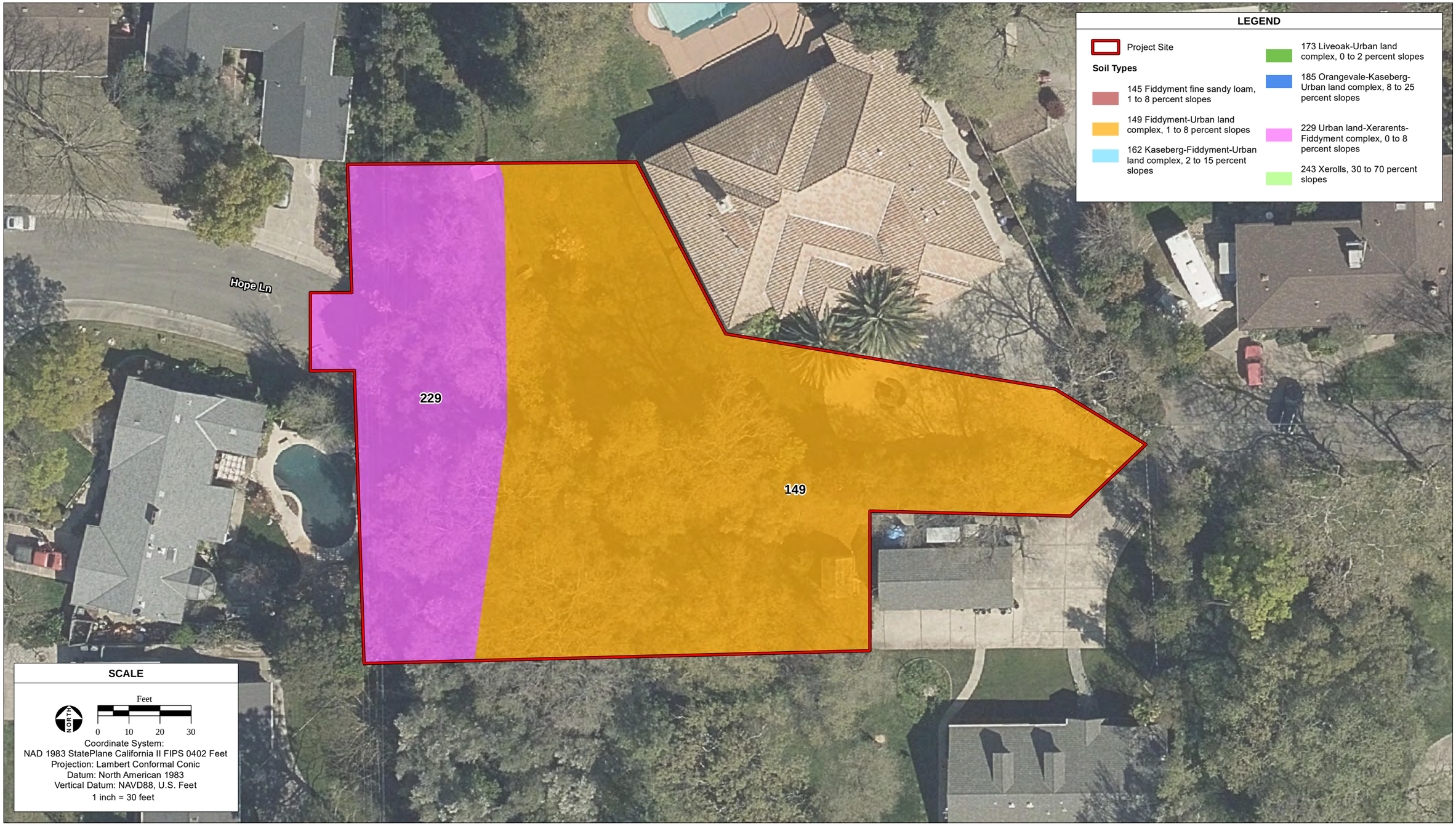
Aerial Photograph - Project Site 9 / Crossing #10 / Indian River Drive / Segment #78531



SOURCE: Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/16/2022

Appendix A - Figure 3j

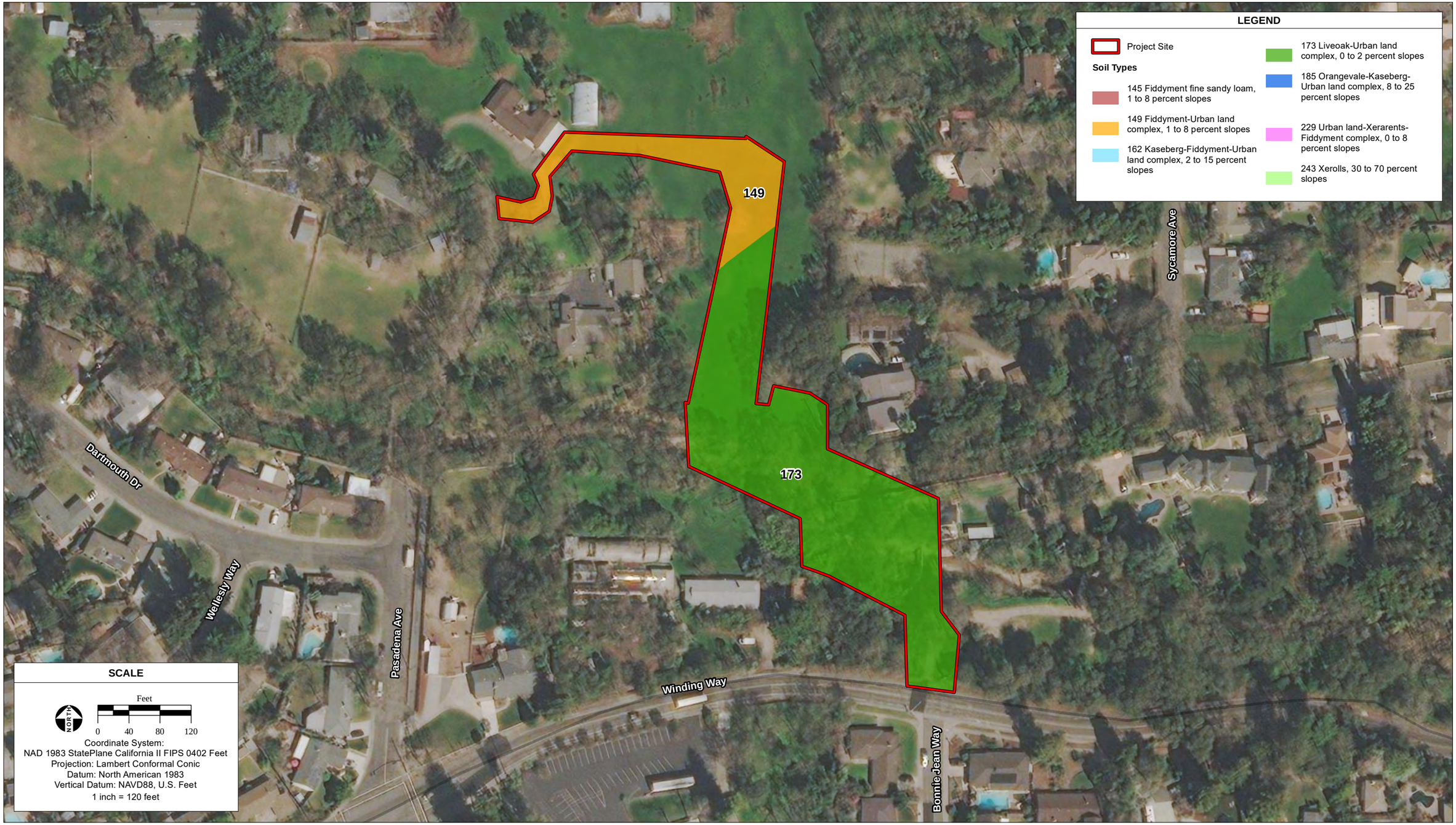
Aerial Photograph - Project Site 10 / Crossing #11 / Hegseth Ct / Segment #68559
Crossing #12 / Dietz Way / Segment #239693



SOURCE: USDA NRCS Soil Survey of Sacramento County, 2021; Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/16/2022

Appendix A - Figure 4a

Soil Types - Project Site 1 / Crossing #1 / Hope Ln / Segment #59646



SOURCE: USDA NRCS Soil Survey of Sacramento County, 2021; Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/16/2022

Appendix A - Figure 4b

Soil Types - Project Site 2 / Crossing #2 / Winding Way / Segment #48368



SOURCE: USDA NRCS Soil Survey of Sacramento County, 2021; Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/16/2022

Appendix A - Figure 4c

Soil Types - Project Site 3 / Crossing #3 / Arcade Creek / Segment #49894
Crossing #4 / Garfield Ave & Thousand Oaks Ct / Segment #44327



SOURCE: USDA NRCS Soil Survey of Sacramento County, 2021; Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/16/2022

Appendix A - Figure 4d

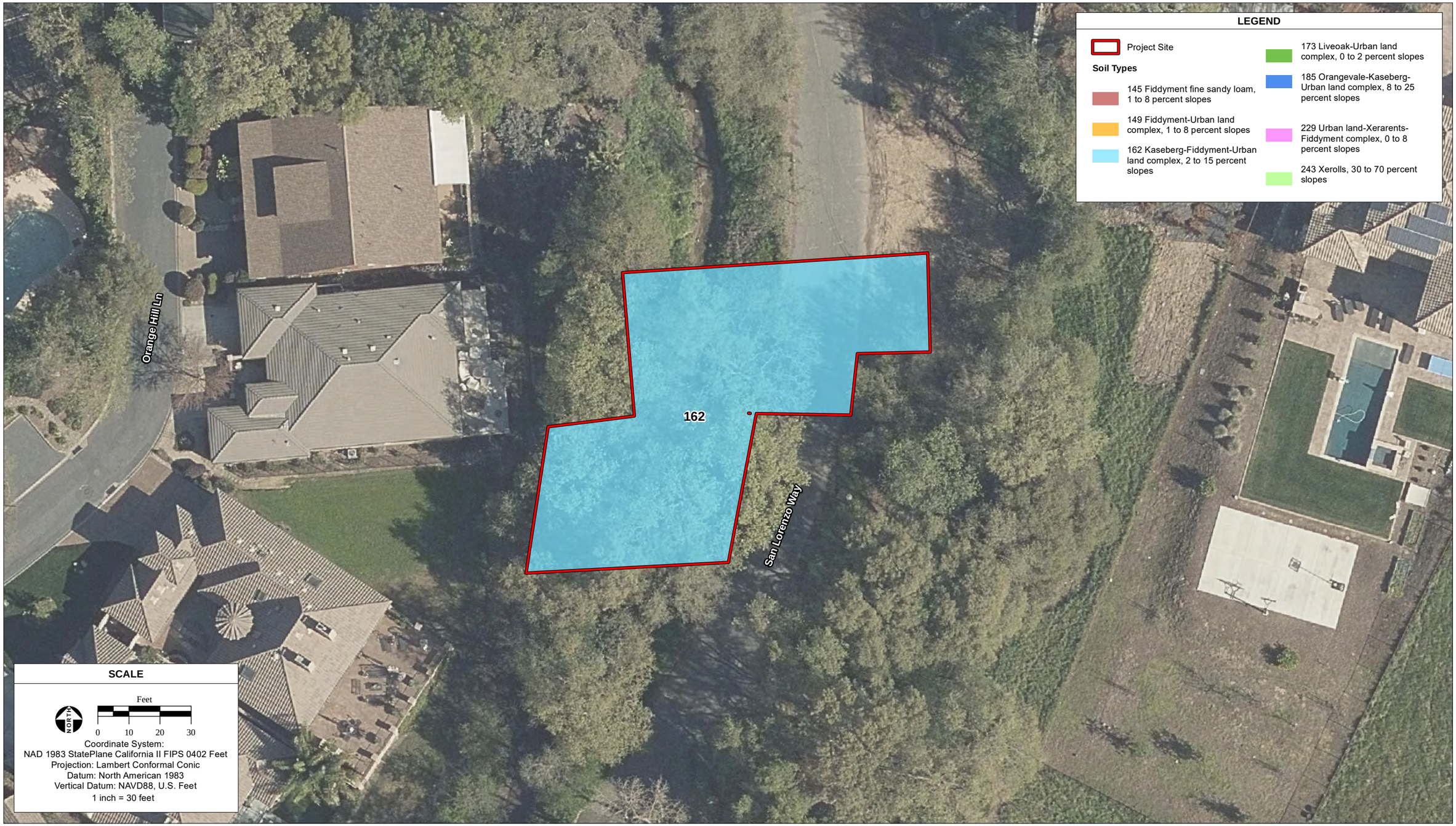
Soil Types - Project Site 4 / Crossing #5 / Concho Ct / Segment #41018



SOURCE: USDA NRCS Soil Survey of Sacramento County, 2021; Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/16/2022

Appendix A - Figure 4e

Soil Types - Project Site 5 / Crossing #6 / Gina Ct / Segment #50528



SOURCE: USDA NRCS Soil Survey of Sacramento County, 2021; Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/16/2022

Appendix A - Figure 4f

Soil Types - Project Site 6 / Crossing #7 / San Lorenzo Way / Segment #170877



SOURCE: USDA NRCS Soil Survey of Sacramento County, 2021; Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/16/2022

Appendix A - Figure 4g

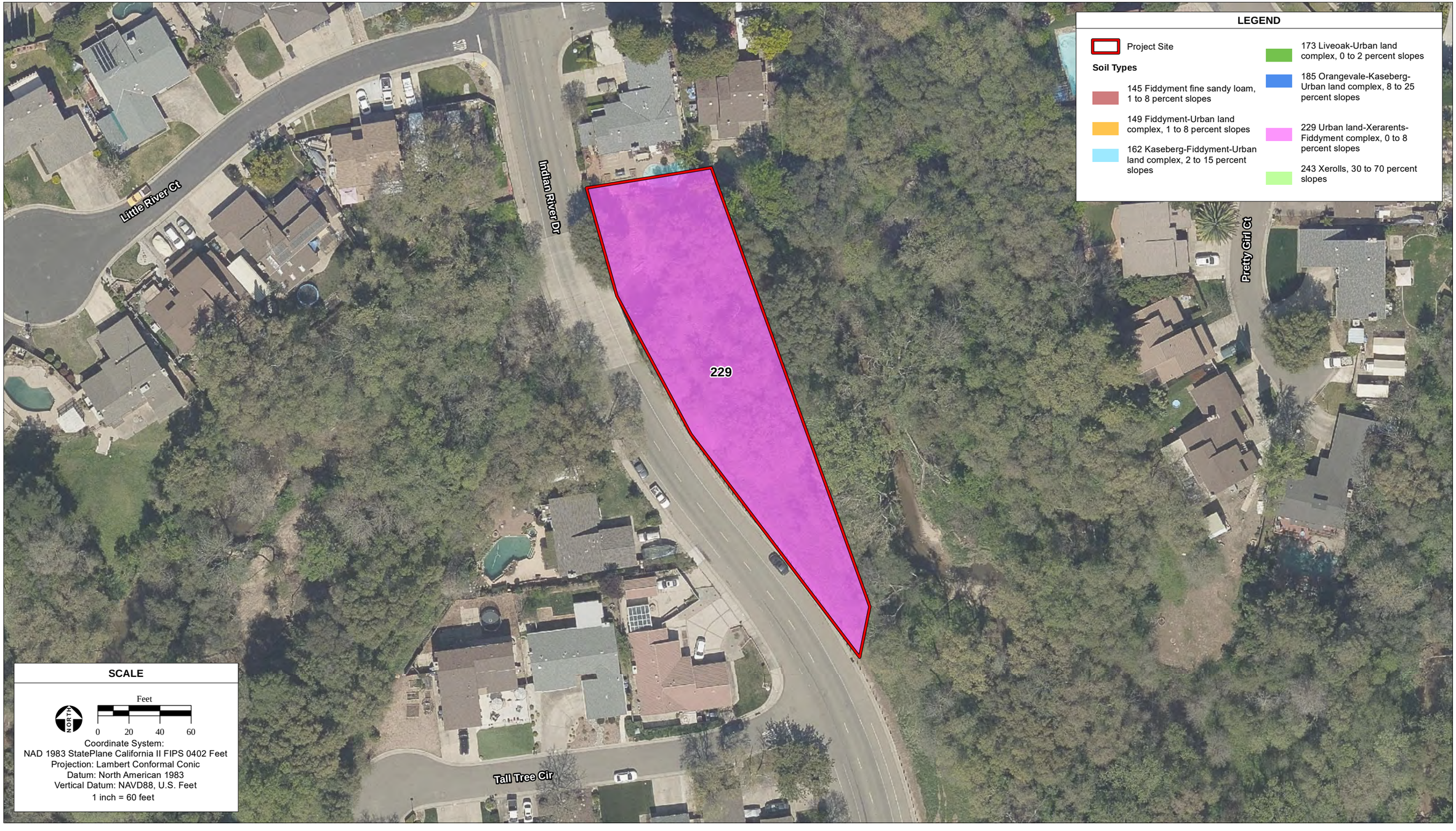
Soil Types - Project Site 7 / Crossing #8 / Sutter Ave / Segment #78865



SOURCE: USDA NRCS Soil Survey of Sacramento County, 2021; Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/16/2022

Appendix A - Figure 4h

Soil Types - Project Site 8 / Crossing #9 / Campfire Way / Segment #36529



SOURCE: USDA NRCS Soil Survey of Sacramento County, 2021; Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/16/2022

Appendix A - Figure 4i

Soil Types - Project Site 9 / Crossing #10 / Indian River Drive / Segment #78531



SOURCE: USDA NRCS Soil Survey of Sacramento County, 2021; Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/16/2022

Appendix A - Figure 4j

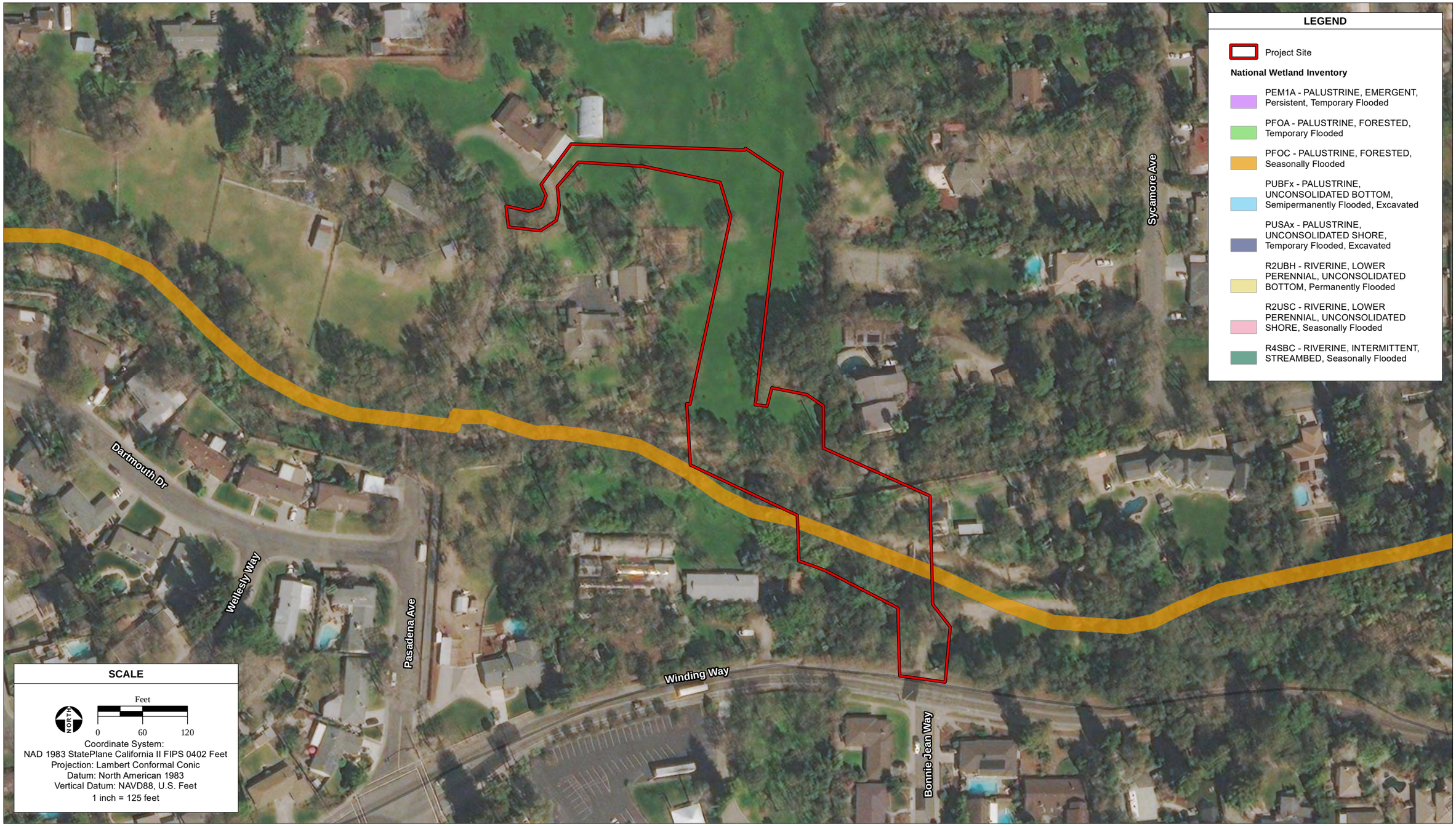
Soil Types - Project Site 10 / Crossing #11 / Hegseth Ct / Segment #68559
Crossing #12 / Dietz Way / Segment #239693



SOURCE: USFWS National Wetland Inventory for "'Sacramento, CA" USGS 100k Topographic Quadrangle, 1975, 1976, 1977"; Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/15/2022

Appendix A - Figure 5a

National Wetland Inventory - Project Site 1 / Crossing #1 / Hope Ln / Segment #59646



SOURCE: USFWS National Wetland Inventory for "'Sacramento, CA" USGS 100k Topographic Quadrangle, 1975, 1976, 1977"; Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/15/2022

Appendix A - Figure 5b

National Wetland Inventory - Project Site 2 / Crossing #2 / Winding Way / Segment #48368



SOURCE: USFWS National Wetland Inventory for "'Sacramento, CA" USGS 100k Topographic Quadrangle, 1975, 1976, 1977"; Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/15/2022

Appendix A - Figure 5c

National Wetland Inventory - Project Site 3 / Crossing #3 / Arcade Creek / Segment #49894
Crossing #4 / Garfield Ave & Thousand Oaks Ct / Segment #44327



SOURCE: USFWS National Wetland Inventory for "'Sacramento, CA" USGS 100k Topographic Quadrangle, 1975, 1976, 1977"; Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/15/2022

Appendix A - Figure 5d

National Wetland Inventory - Project Site 4 / Crossing #5 / Concho Ct / Segment #41018



SOURCE: USFWS National Wetland Inventory for "'Sacramento, CA" USGS 100k Topographic Quadrangle, 1975, 1976, 1977"; Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/15/2022

Appendix A - Figure 5e

National Wetland Inventory - Project Site 5 / Crossing #6 / Gina Ct / Segment #50528



SOURCE: USFWS National Wetland Inventory for "'Sacramento, CA" USGS 100k Topographic Quadrangle, 1975, 1976, 1977"; Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/15/2022

Appendix A - Figure 5f

National Wetland Inventory - Project Site 6 / Crossing #7 / San Lorenzo Way / Segment #170877



SOURCE: USFWS National Wetland Inventory for "'Sacramento, CA" USGS 100k Topographic Quadrangle, 1975, 1976, 1977"; Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/15/2022

Appendix A - Figure 5g

National Wetland Inventory - Project Site 7 / Crossing #8 / Sutter Ave / Segment #78865



SOURCE: USFWS National Wetland Inventory for "'Sacramento, CA" USGS 100k Topographic Quadrangle, 1975, 1976, 1977"; Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/15/2022

Appendix A - Figure 5h

National Wetland Inventory - Project Site 8 / Crossing #9 / Campfire Way / Segment #36529



SOURCE: USFWS National Wetland Inventory for "'Sacramento, CA" USGS 100k Topographic Quadrangle, 1975, 1976, 1977"; Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/15/2022

Appendix A - Figure 5i

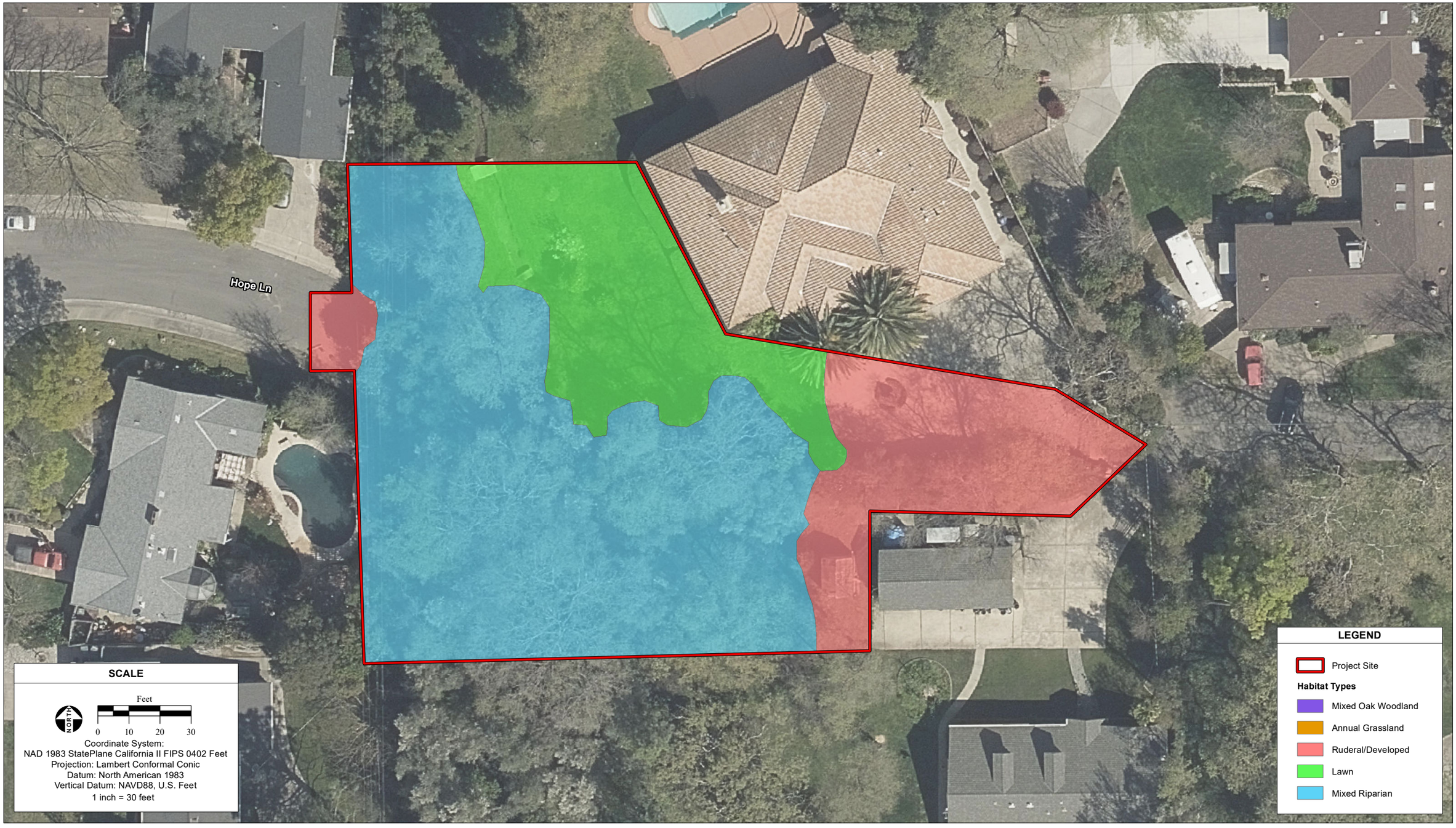
National Wetland Inventory - Project Site 9 / Crossing #10 / Indian River Drive / Segment #78531



SOURCE: USFWS National Wetland Inventory for "'Sacramento, CA" USGS 100k Topographic Quadrangle, 1975, 1976, 1977"; Sacramento County aerial photography, 3/26/2018; ESRI 2021; Montrose, 3/15/2022

Appendix A - Figure 5j

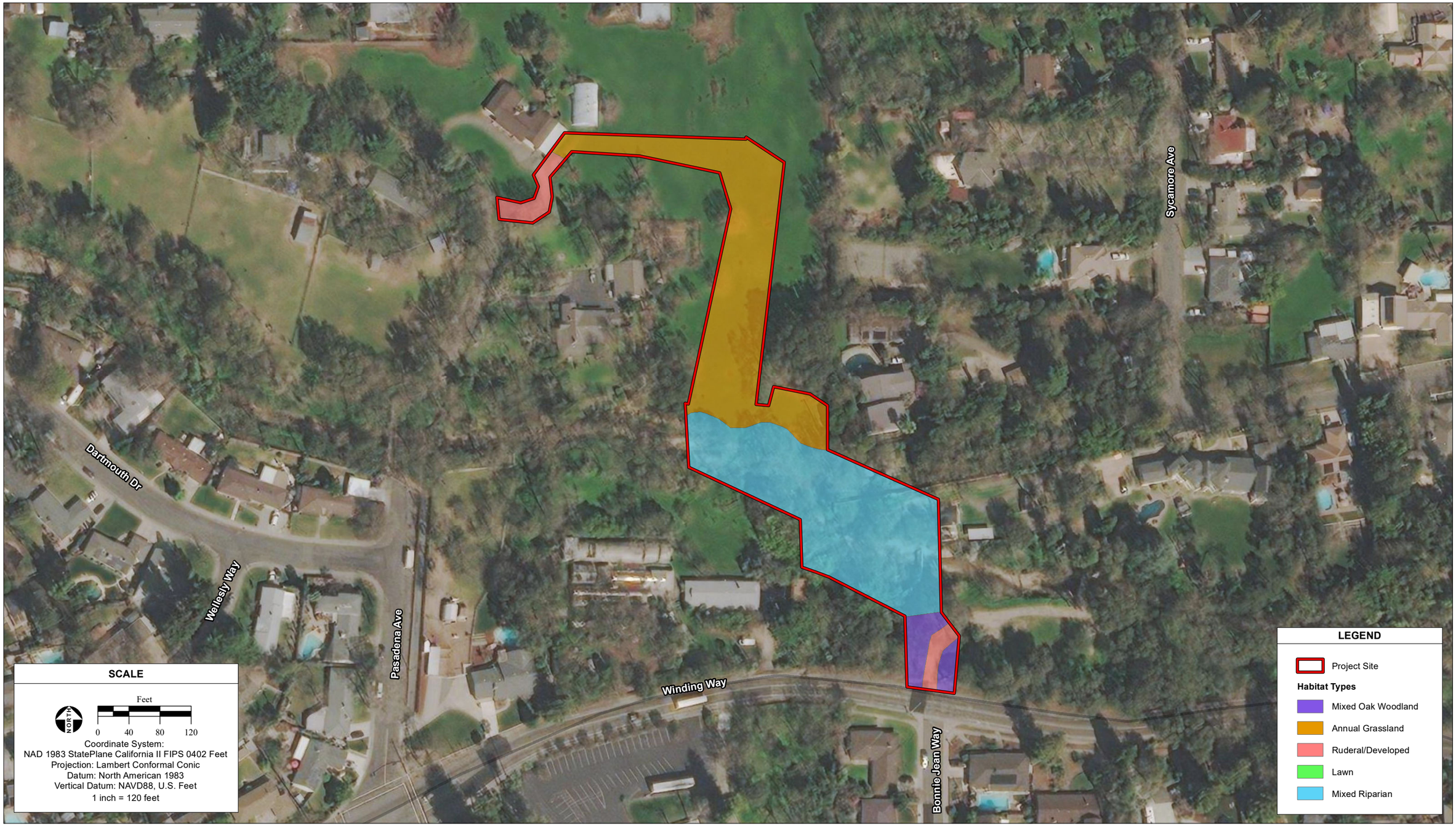
National Wetland Inventory - Project Site 10 / Crossing #11 / Hegseth Ct / Segment #68559
Crossing #12 / Dietz Way / Segment #239693



SOURCE: Sacramento County parcel data, 2022; Metro Maxar aerial photography, 3/4/2021; ESRI 2021; Montrose, 5/20/2022

Appendix A - Figure 6a

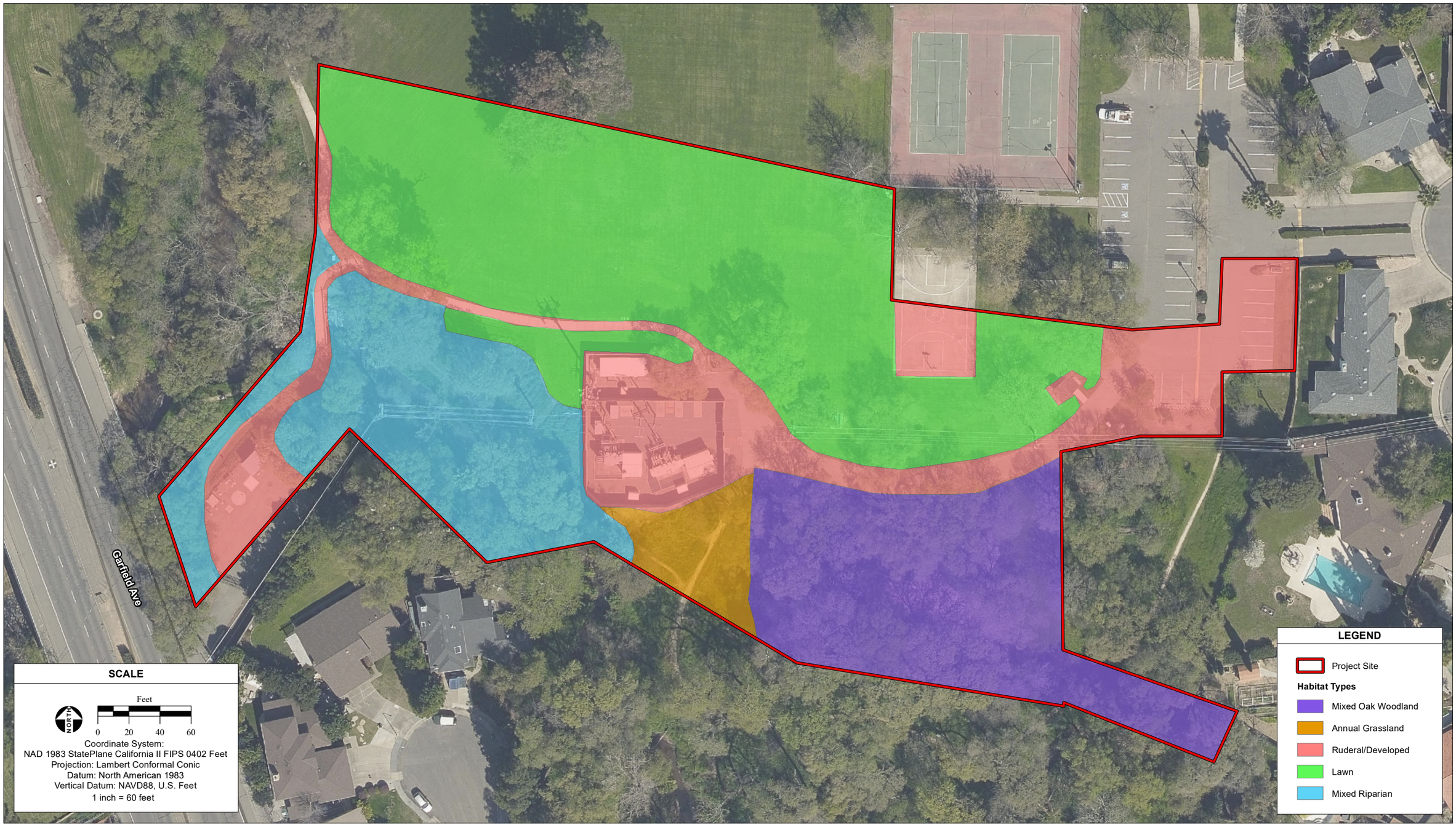
Habitat Types - Project Site 1 / Crossing #1 / Hope Ln / Segment #59646



SOURCE: Sacramento County parcel data, 2022; Metro Maxar aerial photography, 3/4/2021; ESRI 2021; Montrose, 5/20/2022

Appendix A - Figure 6b

Habitat Types - Project Site 2 / Crossing #2 / Winding Way / Segment #48368



SOURCE: Sacramento County parcel data, 2022; Metro Maxar aerial photography, 3/4/2021; ESRI 2021; Montrose, 5/20/2022

Appendix A - Figure 6c

Habitat Types - Project Site 3 / Crossing #3 / Arcade Creek / Segment #49894
Crossing #4 / Garfield Ave & Thousand Oaks Ct / Segment #44327



SOURCE: Sacramento County parcel data, 2022; Metro Maxar aerial photography, 3/4/2021; ESRI 2021; Montrose, 5/20/2022

Appendix A - Figure 6d

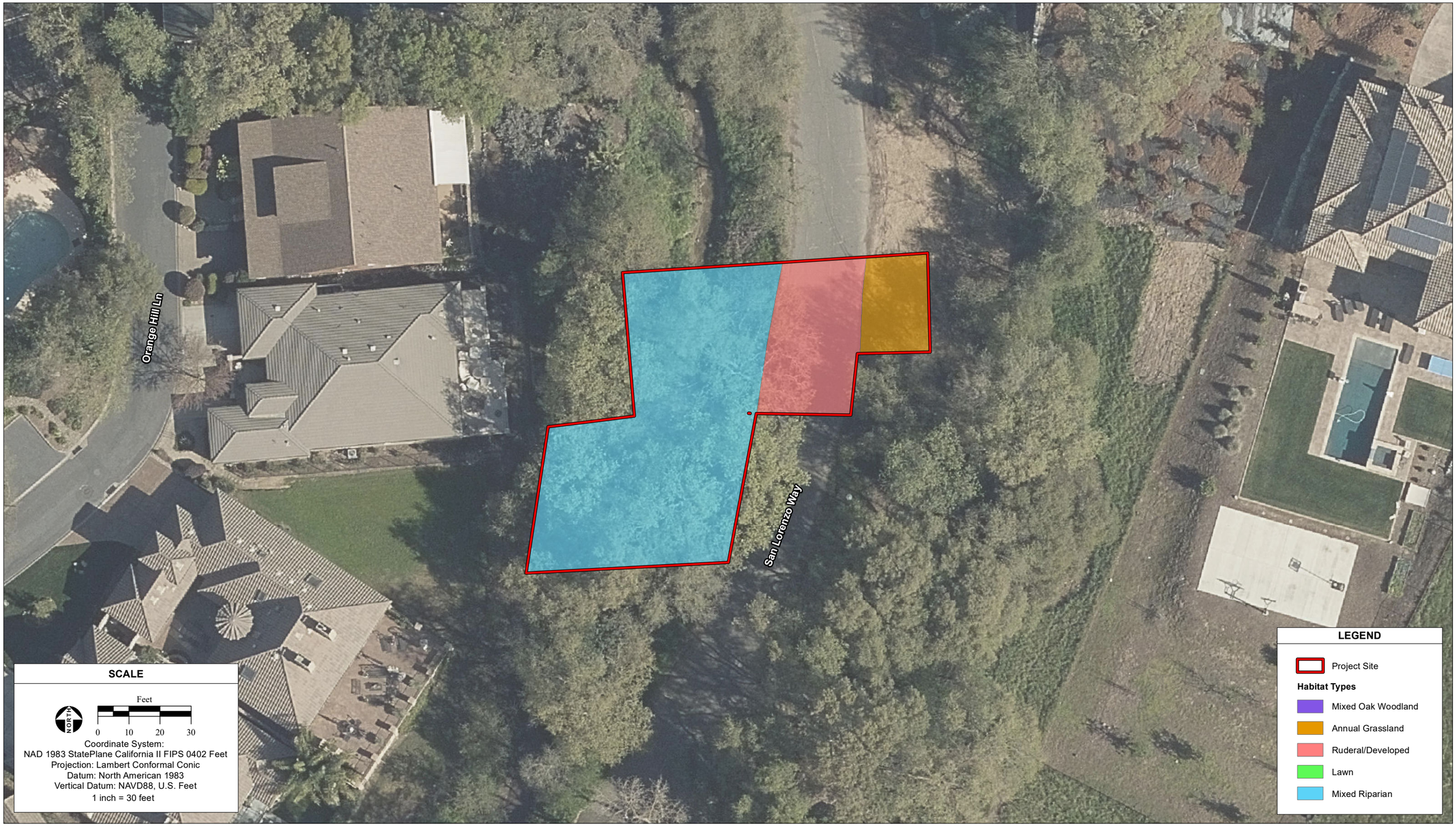
Habitat Types - Project Site 4 / Crossing #5 / Concho Ct / Segment #41018



SOURCE: Sacramento County parcel data, 2022; Metro Maxar aerial photography, 3/4/2021; ESRI 2021; Montrose, 5/20/2022

Appendix A - Figure 6e

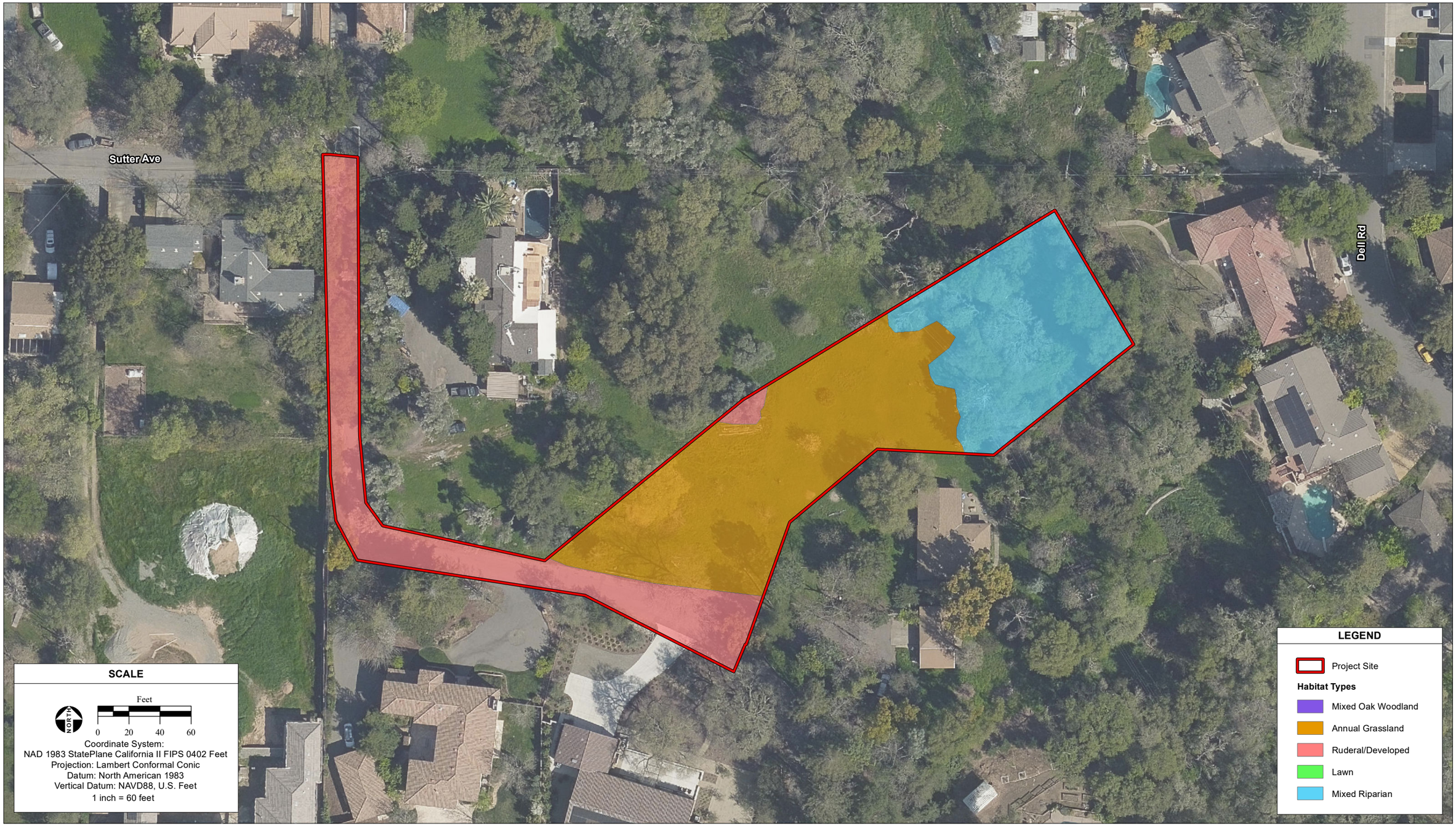
Habitat Types - Project Site 5 / Crossing #6 / Gina Ct / Segment #50528



SOURCE: Sacramento County parcel data, 2022; Metro Maxar aerial photography, 3/4/2021; ESRI 2021; Montrose, 5/20/2022

Appendix A - Figure 6f

Habitat Types - Project Site 6 / Crossing #7 / San Lorenzo Way / Segment #170877



SOURCE: Sacramento County parcel data, 2022; Metro Maxar aerial photography, 3/4/2021; ESRI 2021; Montrose, 5/20/2022

Appendix A - Figure 6g

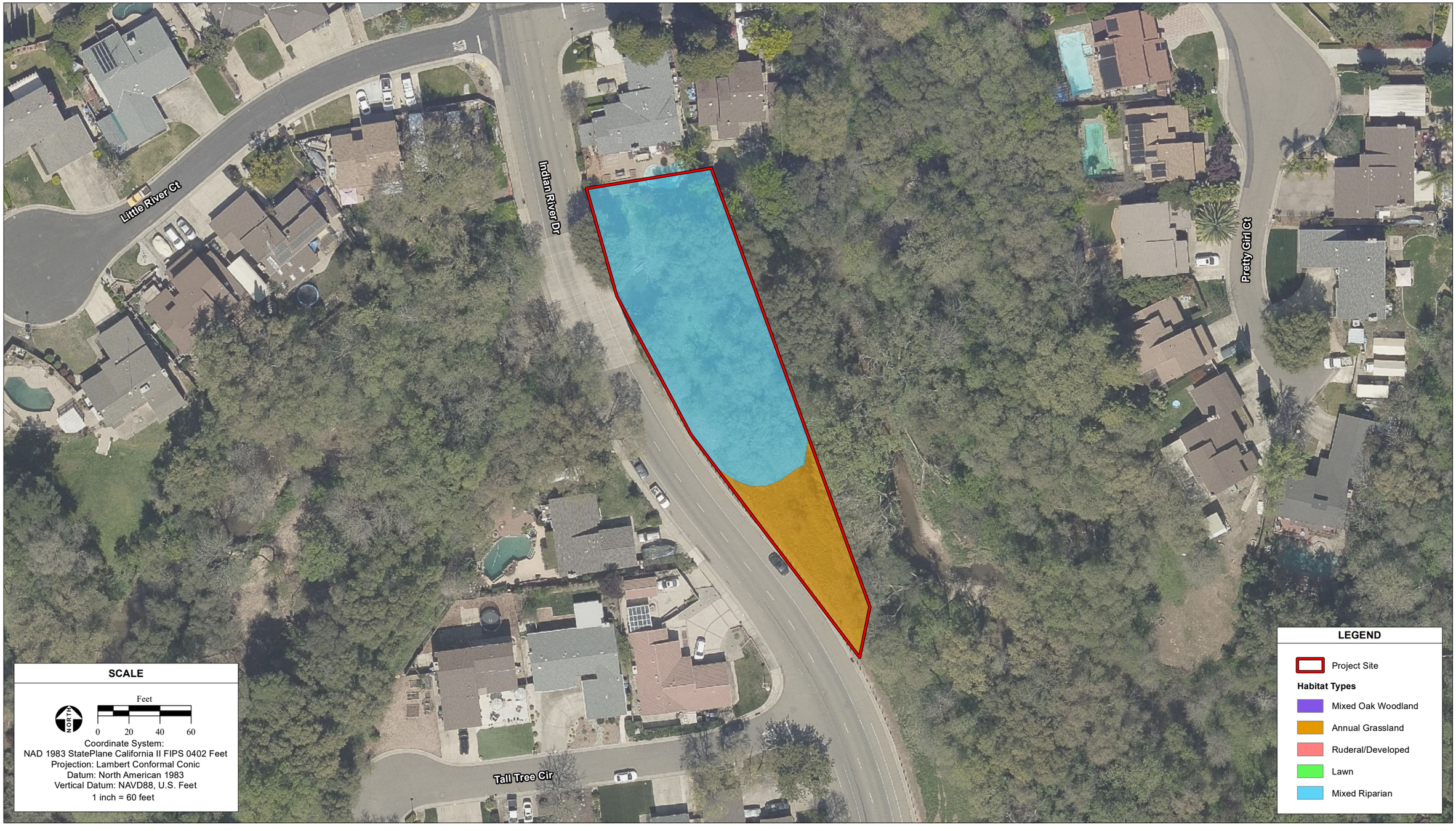
Habitat Types - Project Site 7 / Crossing #8 / Sutter Ave / Segment #78865



SOURCE: Sacramento County parcel data, 2022; Metro Maxar aerial photography, 3/4/2021; ESRI 2021; Montrose, 5/20/2022

Appendix A - Figure 6h

Habitat Types - Project Site 8 / Crossing #9 / Campfire Way / Segment #36529



SOURCE: Sacramento County parcel data, 2022; Metro Maxar aerial photography, 3/4/2021; ESRI 2021; Montrose, 5/20/2022

Appendix A - Figure 6i

Habitat Types - Project Site 9 / Crossing #10 / Indian River Drive / Segment #78531



SOURCE: Sacramento County parcel data, 2022; Metro Maxar aerial photography, 3/4/2021; ESRI 2021; Montrose, 5/20/2022

Appendix A - Figure 6j

Habitat Types - Project Site 10 / Crossing #11 / Hegseth Ct / Segment #68559
Crossing #12 / Dietz Way / Segment #239693

APPENDIX B

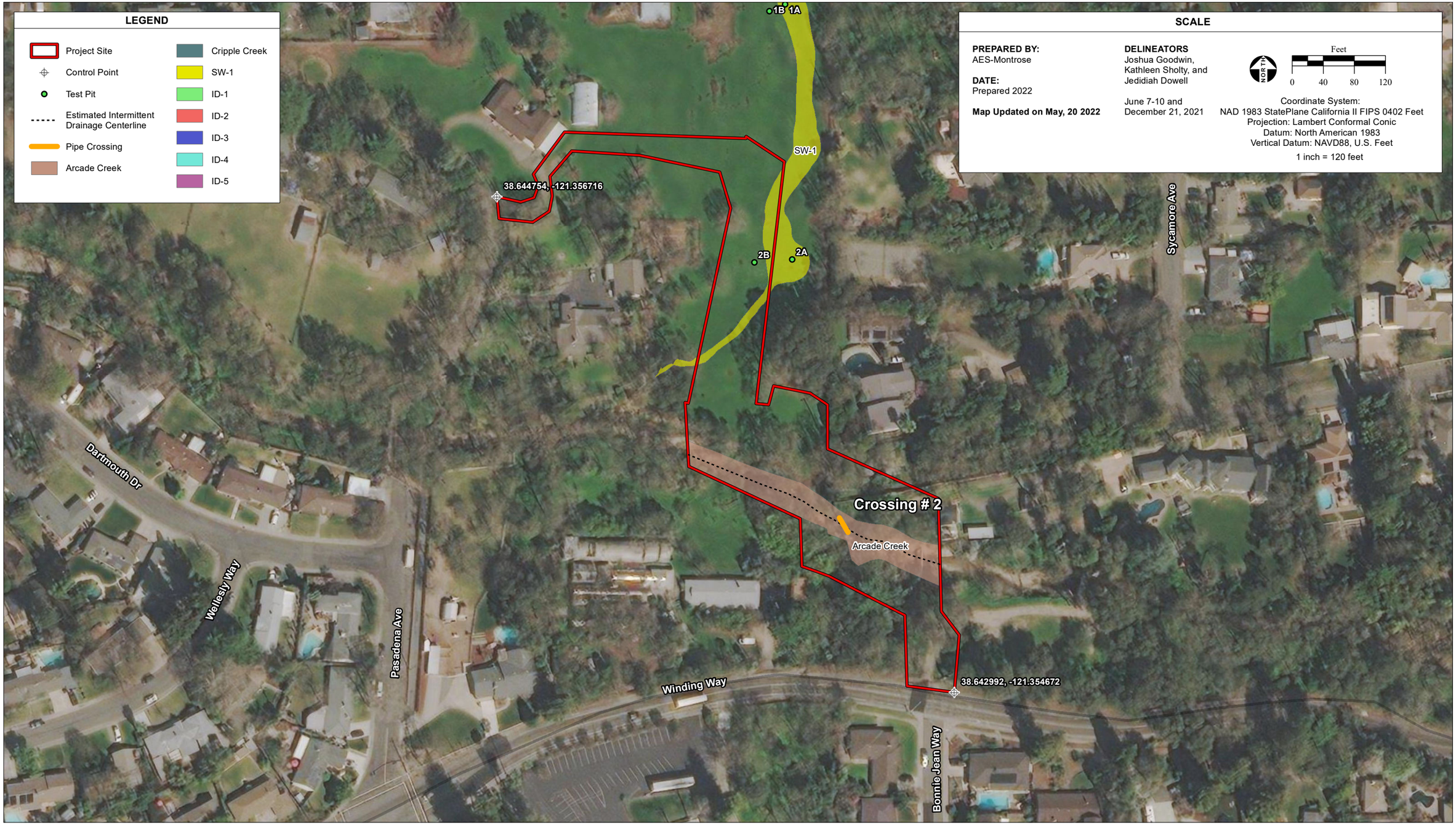
AQUATIC RESOURCE DELINEATION MAP



SOURCE: Metro Maxar aerial photography, 3/4/2021; ESRI 2021; Montrose, 5/20/2022

Appendix B - Figure 1a

Aquatic Resources Delineation Map - Project Site 1 / Crossing #1 / Hope Ln / Segment #59646



SCALE

PREPARED BY:
AES-Montrose

DATE:
Prepared 2022

Map Updated on May, 20 2022

DELINEATORS
Joshua Goodwin, Kathleen Sholty, and Jedidiah Dowell

June 7-10 and December 21, 2021

NORTH

Feet
0 40 80 120

Coordinate System:
NAD 1983 StatePlane California II FIPS 0402 Feet
Projection: Lambert Conformal Conic
Datum: North American 1983
Vertical Datum: NAVD88, U.S. Feet

1 inch = 120 feet

SOURCE: Metro Maxar aerial photography, 3/4/2021; ESRI 2021; Montrose, 5/20/2022

Appendix B - Figure 1b
Aquatic Resources Delineation Map - Project Site 2 / Crossing #2 / Winding Way / Segment #48368



SOURCE: Metro Maxar aerial photography, 3/4/2021; ESRI 2021; Montrose, 5/20/2022

Appendix B - Figure 1c

Aquatic Resources Delineation Map - Project Site 3 / Crossing #3 / Arcade Creek / Segment #49894
Crossing #4 / Garfield Ave & Thousand Oaks Ct / Segment #44327



SOURCE: Metro Maxar aerial photography, 3/4/2021; ESRI 2021; Montrose, 5/20/2022

Appendix B - Figure 1d

Aquatic Resources Delineation Map - Project Site 4 / Crossing #5 / Concho Ct / Segment #41018



SOURCE: Metro Maxar aerial photography, 3/4/2021; ESRI 2021; Montrose, 5/20/2022

Appendix B - Figure 1e

Aquatic Resources Delineation Map - Project Site 5 / Crossing #6 / Gina Ct / Segment #50528



SOURCE: Metro Maxar aerial photography, 3/4/2021; ESRI 2021; Montrose, 5/20/2022

Appendix B - Figure 1f

Aquatic Resources Delineation Map - Project Site 6 / Crossing #7 / San Lorenzo Way / Segment #170877



SOURCE: Metro Maxar aerial photography, 3/4/2021; ESRI 2021; Montrose, 5/20/2022

Appendix B - Figure 1g

Aquatic Resources Delineation Map - Project Site 7 / Crossing #8 / Sutter Ave / Segment #78865



SOURCE: Metro Maxar aerial photography, 3/4/2021; ESRI 2021; Montrose, 5/20/2022

Appendix B - Figure 1h

Aquatic Resources Delineation Map - Project Site 8 / Crossing #9 / Campfire Way / Segment #36529



SOURCE: Metro Maxar aerial photography, 3/4/2021; ESRI 2021; Montrose, 5/20/2022

Appendix B - Figure 1i

Aquatic Resources Delineation Map - Project Site 9 / Crossing #10 / Indian River Drive / Segment #78531



SOURCE: Metro Maxar aerial photography, 3/4/2021; ESRI 2021; Montrose, 5/20/2022

Appendix B - Figure 1j

Aquatic Resources Delineation Map - Project Site 10 / Crossing #11 / Hegseth Ct / Segment #68559
Crossing #12 / Dietz Way / Segment #239693

APPENDIX C

ON-SITE PHOTOGRAPHS



PHOTO 1: South-facing view of intermittent drainage ID-1 in Project Site 1.



PHOTO 2: Top of bank view of Arcade Creek in Project Site 2.



PHOTO 3: East-facing view of pipe-crossing and intermittent drainage ID-2 in Project Site 3.



PHOTO 4: Change caption to "North-facing view of intermittent drainage ID-2 in Project Site 5.



PHOTO 5: North-facing view of rock protection on pipe-crossing and intermittent drainage ID-2 in Project Site 4.



PHOTO 6: South-facing view of intermittent Drainage ID-3 in Project Site 6.

SOURCE: Montrose, 3/16/2022

Figure 1a
Site Photographs



PHOTO 7: North-facing view of pipe-crossing and intermittent drainage ID-4 in Project Site 7.



PHOTO 9: South-facing view of pipe-crossing, bridge, and intermittent drainage ID-5 in Project Site 10.



PHOTO 11: View of seasonal wetland SW-1 north of Arcade Creek in Project Site 2.



PHOTO 8: West-facing view of Arcade Creek and Indian River Drive bridge in Project Site 9.



PHOTO 10: Northwest-facing view of standing water in Cripple Creek in Project Site 8.

SOURCE: Montrose, 3/16/2022

Figure 1b
Site Photographs

APPENDIX D

PLANT LIST

Appendix D: Vascular Plant Species Observed Within the Study Area & Wetland Indicator Status[1]

Scientific Name	Common Name	WIS[1]
Amaranthaceae		
*Amaranth blitoides**	Prostrate pigweed	FACU
Apocynaceae		
Vinca major	Bigleaf periwinkle	FACU
Aralianceae		
Hedera helix	English ivy	FACU
Arecaceae	Palms	
Washingtonia robusta	Fan palm	
Asteraceae		
*Artemisia douglasiana**	California mugwort	FAC
Carduus pycnocephalus	Italian thistle	UPL
Centaurea solstitalis	Yellow star thistle	UPL
Cichorium intybus	Chicory	FACU
Lactuca saligna	Willowleaf lettuce	UPL
Lactuca serriola	Prickly lettuce	FACU
*Xanthium strumarium**	Rough cocklebur	FAC
Brassicaceae		
Raphanus raphanistrum	Wild radish	UPL
Centromadia		
Centromadia sp.	Spike weed	
Cupressaceae		
*Sequoiadendron giganteum**	Giant sequoia	UPL
*Sequoia sempervirens**	Coast redwood	UPL
Bignoniaceae		
Catalpa speciosa	Northern catalp	FAC
Convolvulaceae		
Convolvulus arvensis	Field bindweed	UPL
Cyperaceae		
Cyperus eragrostis	Tall flat sedge	FACW
Elaeagnaceae		
Elaeagnus sp.	Olive	
Euphorbiaceae		
Tridica sebifera	Chinese tallow tree	UPL
Fabaceae		
Acacia sp.	Acacia	UPL
Vicia sativa	Spring vetch	FACU
Fagaceae		
Quercus douglasii	Blue oak	UPL
*Quercus lobata**	Valley oak	FACU
*Quercus wislizeni**	Interior live oak	UPL
Faxinus		
Fraxinus latifolia	Oregon ash	FACW
Geraniaceae		
Erodium cicutarium	Redstem filaree	UPL
Juglandaceae		
*Juglans hindsii**	Northern California black walnut	FAC

Lauraceae		
*Umbellularia californica**	Bay laurel	FAC
Lamiaceae		
Lycopus americanus	American water horehound	OBL
*Stachys ajugoides**	Hedge nettle	OBL
Melissa officinalis	Lemon balm	UPL
Malvacea		
Malva parviflora	Cheeseweed mallow	UPL
Moraceae		
Morus alba	White mulberry	FACU
Ficus carica	Common fig	FACU
Myrtaceae		
Eucalyptus sp.	Gum tree	UPL
Oleaceae		
Lingustrum sp.	Privet	UPL
Onagraceae		
Ludwigia peploides	Floating water primrose	OBL
Parthenocissus		
Parthenocissus quinquefolia	Virginia creeper	FAC
Plantaginaceae		
Plantago lanceolate	English plantain	UPL
Phytolaccaceae		
Phytolacca americana	American pokeweed	FAC
Poaceae		
Agrosits sp.	Bentgrass	UPL
Bromus diandrus	Ripgut brome	UPL
Bromus hordeaceus	Soft chess	FACU
Bromus rubens	Red brome	UPL
Cynodon dactylon	Bermuda grass	FACU
Dactylis glomerate	Orchard grass	UPL
Lollium perenne	Italian rye grass	FAC
Hordeum marinum	Seaside barley	FAC
Paspalum dilatatum	Dallis grass	FAC
Phalaris aquatica	Bulbous canary grass	FACU
Phyllostachys sp.	Bamboo	UPL
Poa annua	Annual blue grass	FAC
Sorghum halepense	Johnsongrass	FACU
Stipa miliacea	Smilo grass	
Polygonaceae		
*Persicaria lapathifolia**	Common knotweed	FACW
Polygonum hydropiperoides	Swamp smartweed	
Rumex crispus	Curly doc	FAC
Ranunculaceae		
Ranunculus muricatus	Spinyfruit buttercup	FACW
Rosaceae		
Malus sp.	Apple	
Salicaceae		
*Populus fremontii**	Fremont cottonwood	

Salix laevigata	Red willow	FACW
Sapindaceae		
Acer negundo	Boxelder	FACW
Acer palmatum	Japanese maple	UPL
*Aesculus californica**	California buckeye	UPL
Portulacaceae		
Portulaca oleracea	Common purslane	FAC
Ulmaceae		
Ulmus sp.	Elm	
Vitaceae		
Vitis californica	California grape	FACU

[1]2020 Arid West Regional Wetland Plant List - Wetland Indicator Status (WIS)

* = Native to California

Plant species not listed within the Arid West National Plant List are considered UPL for wetland delineation purposes.

OBL = Occurs in aquatic resources >99% of time

FACW = Occurs in aquatic resources 67-99% of time

FACU = Occurs in aquatic resources 34-66% of time

UPL = Occurs in aquatic resources 1-33% of time

APPENDIX E

WETLAND DELINEATION DATA SHEETS

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: 4721 WINDING WAY ~~4721~~ 48368 City/County: SACRAMENTO Sampling Date: 6/8/21

Applicant/Owner: Sacramento Sewer District easment State: CA Sampling Point: 1A

Investigator(s): JOSH GOODWIN, KATHLEEN SHOLTY Section, Township, Range: T9N, R6E

Landform (hillslope, terrace, etc.): HILLSLOPE Local relief (concave, convex, none): Concave Swale Slope (%): 2-3

Subregion (LRR): mediterranean CA LRR C Lat: 38.645468 Long: -121.355503 Datum: NAD 83

Soil Map Unit Name: 149 Riddyment-urban land complex 1 to 8% slopes NWI classification: N/A

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

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

Are Vegetation ~~Yes~~, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Remarks:

EXTENSIVE DROUGHT YEAR. SURROUNDING EPHEMERAL DRAINAGE FEATURE. GRASSES ARE ROUTINELY MOWED. GRASS HEIGHT AT TIME OF SURVEY (1-3 IN). WITHIN DRAINAGE MARGINS VEG IS GREEN, SURROUNDING GRASSES ARE BROWN + DYING. ~~recently mowed~~ recently mowed.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
	____ = Total Cover		
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
	____ = Total Cover		
Herb Stratum (Plot size: 3' x 3')			
1. LOLIUM FESTUCA	2%	N	FAC
2. CYNODON DACTYLON	70%	Y	FACUP
3. PLANTEGO LANCEOLETA	5%	Y	FAC
4. LACETUCA SERRIOLA	5%	Y	FACUP
5. BRASSICA NIGRA	2%	N	~~UPL~~ UP
6. LACTUCA SALIGNA	2%	N	FACUP
7. MALVA PARVIFLORA	2%	N	~~UPL~~ UP
8. HORDEUM MURINUM	1%	N	FAC
ERODIUM CICITARIUM	2%	~~UPL~~ N	~~UPL~~ UP
	91 % = Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust 0

Dominance Test worksheet:

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

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.33 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species 3	x 3 = 9
FACU species ~~2~~ 4	x 4 = 16
UPL species 3	x 5 = 15
Column Totals: 10 (A)	40 (B)

Prevalence Index = B/A = 4

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? Yes X No ____

Remarks:

NO DISTINCT BED OR BANK. NO LINE OF SCOUR. VEGETATIVE SWALE.

SOIL

Sampling Point: 1A

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-1"	7.5YR 2.5/1	100					CLAY LOAM	ORGANIC LAYER
1-6"	7.5 YR 4/2	80	7.5 YR 4/6	20			CLAY LOAM	PORE LINING, MOTTLED FEATURES

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ___

Remarks: redox observed.

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)
- X Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- X 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)
- X Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

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

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

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

Wetland Hydrology Present? Yes X No ___

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

Remarks: SPOKE TO NEIGHBOR - WATER COLLECTS FLOWS THROUGH DRAINAGE IN WINTER - water confined to gentle sloped grassy swale

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: 4721 WINDING WAY (48368) City/County: SACRAMENTO Sampling Date: ~~6/8/21~~ 6/8/21

Applicant/Owner: Sacramento Sewer District easement State: CA Sampling Point: 1B

Investigator(s): JOSH GOODWIN, KATHLEEN SMITH Section, Township, Range: T9N, R6E

Landform (hillslope, terrace, etc.): HILLSLOPE Local relief (concave, convex, none): _____ Slope (%): 2-3

Subregion (LRR): Mediterranean CA LRR C Lat: 38.645372 Long: -121.35512 Datum: NAD 83

Soil Map Unit Name: 149 Fiddyment-urban land complex 1 to 8% slopes NWI classification: N/A

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

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

Are Vegetation NO, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Remarks:
EXTENSIVE DROUGHT YEAR.
vegetation recently mowed

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 3'x3')			
1. BRASSICA NIGRA	2%		UPL
2. ERODIUM CICUTARIUM	2		UPL
3. CENTAUREA SOLSTITIALIS	10		UPL
4. POA SPP.	60		
5.			
6.			
7.			
8.			
	74 = Total Cover		
Woody Vine Stratum (Plot size: 100')			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 30 % Cover of Biotic Crust 0

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

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

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

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

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes _____ No _____

Remarks:
IRRIGATED FIELD; ROUTINELY MOWED. VEG HEIGHT 0-3". ALL UPLAND VEG IS DEAD/DYING.
Adjacent to grassy swale feature.

SOIL

Sampling Point: 1B

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6"	7.5YR 2.5/2	100					CLAY LOAM	

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks: no hydric soil indicators present

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

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

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

Wetland Hydrology Present? Yes _____ No X

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

Remarks: no hydrology indicators

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: 4721 WINDING WAY (48368) City/County: SAC Sampling Date: 6/28/21

Applicant/Owner: Sacramento Sewer District Easement State: CA Sampling Point: 2A

Investigator(s): JOSH GOODWIN, KATHLEEN SHOLTY Section, Township, Range: T9N, R6E

Landform (hillslope, terrace, etc.): HILLSLOPE Local relief (concave, convex, none): Concave Swale Slope (%): 2-3

Subregion (LRR): Mediterranean CA LRR C Lat: 38.644654 Long: -121.355535 Datum: NAD 83

Soil Map Unit Name: 173 Live oak - urban land complex, 0-2% slopes NWI classification: N/A

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

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

Are Vegetation NO, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Remarks: Extensive drought year. This area has recently been mowed.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 3'x3')			
1. LACTUCA SERIOLA	15		~~FACU~~ UPL
2. BROMUS CATHARTICUS	65		UPL
3. BRASSICA NIGRA	1		UPL
4.			
5.			
6.			
7.			
8.			
	81 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 19 % Cover of Biotic Crust 0

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

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

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

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

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes _____ No X

Remarks:

- NO DISTINCT BED OR BANK. NO LINE OF SCOUR. VEGETATIVE SWALE
- Shallow depression

SOIL

Sampling Point: 2A

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	7.5YR 4/2	80	7.5YR 4/6	20			CLAY LOAM	

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks: redox observed

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)
- X Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- X 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)
- X Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

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

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

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

Wetland Hydrology Present? Yes X No _____

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

Remarks:

- SPOKE TO NEIGHBOR - WATER COLLECTS / FLOWS IN WINTER
- water confined to gentle sloped grassy swell

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: 4721 WINDING WAY (48368) City/County: SAC Sampling Date: 6/8/21

Applicant/Owner: Sacramento Sewer District easment State: CA Sampling Point: 2B

Investigator(s): JOSH GOODWIN, KATHLEEN SHOLTY Section, Township, Range: T9, R6

Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): — Slope (%): 2-3

Subregion (LRR): Mediterranean LRRC Lat: 38.644571 Long: -121.355566 Datum: NAD83

Soil Map Unit Name: 173 Live Oak-urban Land complex, 0-2% slopes NWI classification: N/A

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

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

Are Vegetation NO, Soil NO, or Hydrology NO naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Remarks: Extensive drought year vegetation recently mowed.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	____ = Total Cover		
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
	____ = Total Cover		
Herb Stratum (Plot size: 3'x3')			
1. POA SPP	20		
2. ERODIUM CICUTARIUM	40		UPL
3. LACETUCA SALIGNA	5		~~FACU~~ UPL
4.			
5.			
6.			
7.			
8.			
	65 = Total Cover		
Woody Vine Stratum (Plot size: 3x3')			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum 35 % Cover of Biotic Crust 0

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

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

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

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

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: IRRIGATED FIELD; ROUTINELY MOWED. VEG HEIGHT 0-3" UPLAND VEG IS DEAD/DYING

SOIL

Sampling Point: 2B

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	7.5 yr 4/2	100					Clay loam	

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks: no hydric soil indicators present

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

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

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

Wetland Hydrology Present? Yes _____ No X

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

Remarks: no hydrology indicators

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Hegseth CT.-68559 City/County: Fair Oak, Sac County Sampling Date: 6/10/2021

Applicant/Owner: Sacramento Sewer District State: _____ Sampling Point: 1A

Investigator(s): Josh Goodwin, Kathleen Stolty Section, Township, Range: T9N, R7E

Landform (hillslope, terrace, etc.): flat area adjacent to stream. Local relief (concave, convex, none): flat Slope (%): 0-1%

Subregion (LRR): Mediterranean CA LRR C Lat: 38.6447944 Long: -121.257221 Datum: NAD83

Soil Map Unit Name: 185 orangevale-Kasberg-urban land complex 8-25% slopes NWI classification: N/A

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

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

Are Vegetation NO, Soil NO, or Hydrology NO naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Remarks: Extreme drought year

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 10x10)	Absolute % Cover	Dominant Species?	Indicator Status
1. Ficus sp. (fig)	2		FACU
2. Ligustrum sp. (privet)	2%		FAC
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 3x3)			
1. Carex barbarae	80%	Y	FAC
2. ~~Carex~~ (Carex texensis)			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 15% % Cover of Biotic Crust _____

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species 80	x 3 = 240
FACU species 4	x 4 = 16
UPL species _____	x 5 = _____
Column Totals: 84 (A)	256 (B)

Prevalence Index = B/A = 32%

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

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

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes _____ No X

Remarks: Failed Dominance and prevalence index.
- Carex was dominant, but area appears to be leveled due to presence of adjacent sewer line spanning creek. ~~area~~ terraced areas with Carex appears to be leveled for ease of access for maintenance.
- High flow years adjacent creek tops bank and inundates area temporarily.

SOIL

Sampling Point: VA

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	7.5yR 3/1	100%					Sandy/clay/loam	very dry and crumbly

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks: soil very dry and crumbly, no stratification of soil. one soil type throughout. no redox feature present or oxidized Rhizospheres along living roots

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

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

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

Wetland Hydrology Present? Yes _____ No X

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

Remarks: no indications of hydrology are present.

APPENDIX F

SIGNED STATEMENT FROM THE PROPERTY OWNER ALLOWING ACCESS

REQUEST FOR AQUATIC RESOURCES DELINEATION VERIFICATION

OR JURISDICTIONAL DETERMINATION

A separate jurisdictional determination (JD) is not necessary to process a permit. An Approved Jurisdictional Determination (AJD) is required to definitively determine the extent of waters of the U.S. and is generally used to disclaim jurisdiction over aquatic resources that are not waters of the U.S., in cases where the review area contains no aquatic resources, and in cases when the recipient wishes to challenge the water of the U.S. determination on appeal. Either an Aquatic Resources Delineation Verification or a Preliminary Jurisdictional Determination (PJD) may be used when the recipient wishes to assume that aquatic resources are waters of the U.S. for the purposes of permitting. In some circumstances an AJD may require more information, a greater level of effort, and more time to produce. If you are unsure which product to request, please speak with your project manager or call the Sacramento District's general information line at (916) 557-5250.

I am requesting the product indicated below from the U.S. Army Corps of Engineers, Sacramento District, for the review area located at:

Street Address: Assorted, see SASD Jurisdictional Delineation City: Carmichael, Fair Oaks County: Sacramento
State: CA Zip: 95841, 95628, various Section: Unsectioned Township: 10N, 9N Range: 6E, 6E
Latitude (decimal degrees): 38.653664 Longitude (decimal degrees): -121.334204
The approximate size of the review area for the JD is 11 acres. **(Please attach location map)**

Choose one:
- ○ I own the review area
- ◉ I hold an easement or development rights over the review area
- ○ I lease the review area
- ○ I plan to purchase the review area
- ○ I am an agent/consultant acting on behalf of the requestor
- ○ Other: _____

Choose one product:
- ○ I am requesting an Aquatic Resources Delineation Verification
- ◉ I am requesting an Approved JD
- ○ I am requesting a Preliminary JD
- ○ I am requesting additional information to inform my decision about which product to request

Reason for request: (check all that apply)
- ☐ I need information concerning aquatic resources within the review area for planning purposes.
- ☐ I intend to construct/develop a project or perform activities in this review area which would be designed to avoid all aquatic resources.
- ☐ I intend to construct/develop a project or perform activities in this review area which would be designed to avoid those aquatic resources determined to be waters of the U.S.
- ☑ I intend to construct/develop a project or perform activities in this review area which may require authorization from the Corps; this request is accompanied by my permit application.
- ☐ I intend to construct/develop a project or perform activities in a navigable water of the U.S. which is included on the district's list of navigable waters under Section 10 of the Rivers and Harbors Act of 1899 and/or is subject to the ebb and flow of the tide.
- ☐ My lender, insurer, investors, local unit of government, etc. has indicated that an aquatic resources delineation verification is inadequate and is requiring a jurisdictional determination.
- ☐ I intend to contest jurisdiction over particular aquatic resources and request the Corps confirm that these aquatic resources are or are not waters of the U.S.
- ☐ I believe that the review area may be comprised entirely of dry land.
- ☐ Other: _____

Attached Information:
- ☑ Maps depicting the general location and aquatic resources within the review area consistent with Map and Drawing Standards for the South Pacific Division Regulatory Program (Public Notice February 2016, http://www.spd.usace.army.mil/Missions/Regulatory/Public-Notices-and-References/Article/651327/updated-map-and-drawing-standards/)
- ☑ Aquatic Resources Delineation Report, if available, consistent with the Sacramento District's Minimum Standards for Acceptance (Public Notice January 2016, http://1.usa.gov/1V68IYa)

By signing below, you are indicating that you have the authority, or are acting as the duly authorized agent of a person or entity with such authority, to and do hereby grant Corps personnel right of entry to legally access the review area. Your signature shall be an affirmation that you possess the requisite property rights for this request on the subject property.

*Signature: _____ Date: _____
Name: _____ Company name: Sacramento Area Sewer District
Address: _____

Telephone: _____ Email: _____

***Authorities:** Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413; Regulatory Program of the U.S. Army Corps of Engineers; Final Rule for 33 CFR Parts 320-332.
Principal Purpose: The information that you provide will be used in evaluating your request to determine whether there are any aquatic resources within the project area subject to federal jurisdiction under the regulatory authorities referenced above.
Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public, and may be made available as part of a public notice as required by federal law. Your name and property location where federal jurisdiction is to be determined will be included in the approved jurisdictional determination (AJD), which will be made available to the public on the District's website and on the Headquarters USACE website.
Disclosure: Submission of requested information is voluntary; however, if information is not provided, the request for an AJD cannot be evaluated nor can an AJD be issued.

APPENDIX G

AQUATIC RESOURCES EXCEL SHEET

Waters_Name	State	Cowardin_Code	HGM_Code	Meas_Type	Amount	Units	Waters_Type	Latitude	Longitude
ID-1	CALIFORNIA	R4		Linear	170.43	FOOT	NRPW	38.64114	-121.350399
ID-2	CALIFORNIA	R4		Linear	638.61	FOOT	NRPW	38.656083	-121.33667
ID-3	CALIFORNIA	R4		Linear	101.52	FOOT	NRPW	38.61791	-121.31371
ID-4	CALIFORNIA	R4		Linear	105.84	FOOT	NRPW	38.632483	-121.32495
ID-5	CALIFORNIA	R4		Linear	443.85	FOOT	NRPW	38.648579	-121.25739
Arcade Creek	CALIFORNIA	R4		Linear	443.46	FOOT	NRPW	38.643623	-121.35525800
Cripple Creek	CALIFORNIA	R4		Linear	168.09	FOOT	NRPW	38.692119	-121.31114900
SW-1	CALIFORNIA	PEM		Area	0.07	ACRE	ISOLATE	38.644872	-121.355419

APPENDIX G

CONSTRUCTION NOISE ASSESSMENT

Construction Noise Assessment

SASD Creek Crossings Rehabilitation

Sacramento County, California

June 9, 2022

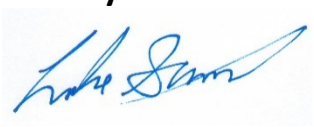
Project #211207

Prepared for:

Montrose Environmental Solutions
1801 7th Street, Suite 100
Sacramento, CA 95811

Prepared by:

Saxelby Acoustics LLC





Luke Saxelby, INCE Bd. Cert.
Principal Consultant
Board Certified, Institute of Noise Control Engineering (INCE)

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Roseville, CA 95678

INTRODUCTION

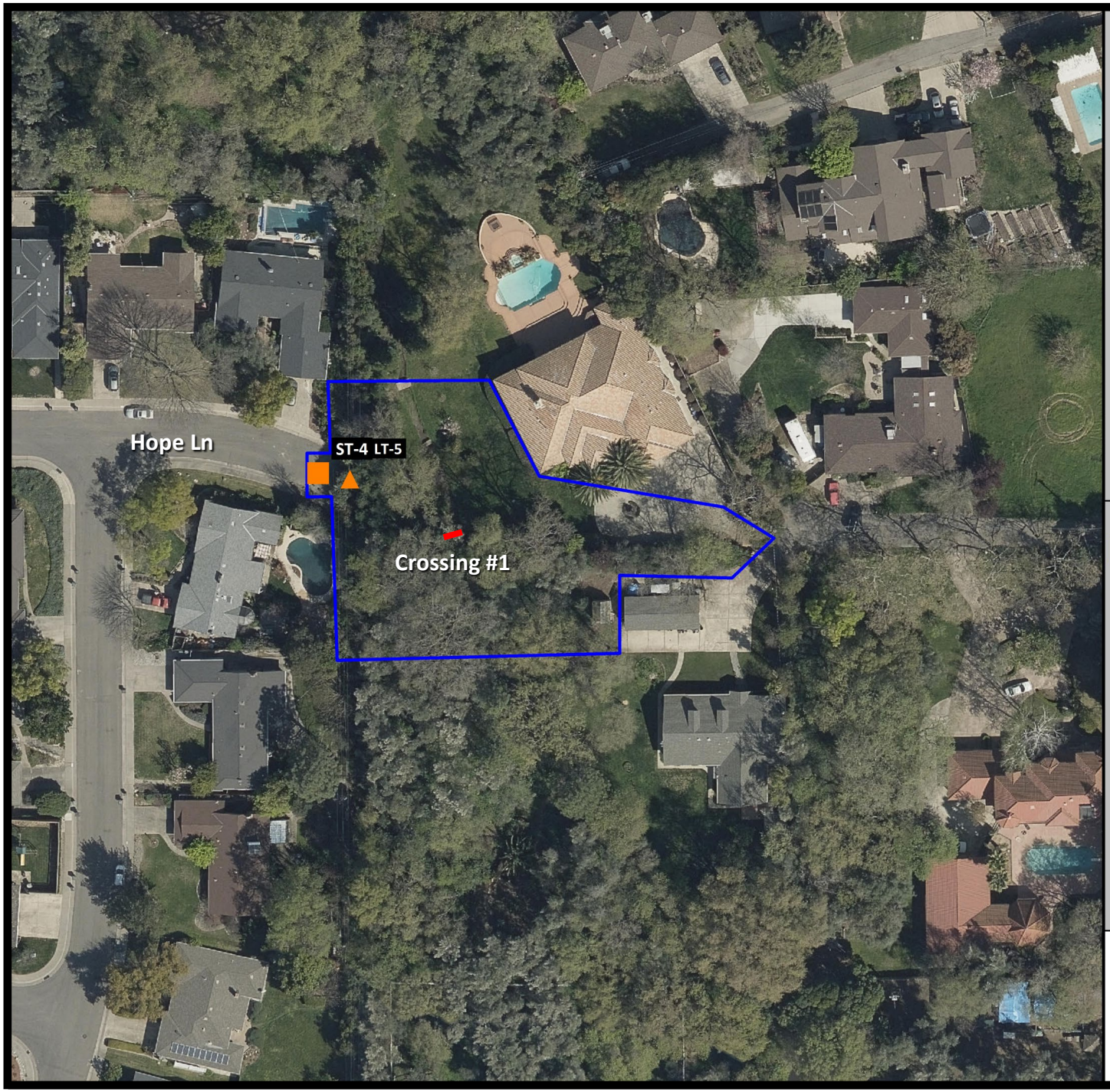
This report describes sound levels associated with construction operations for the proposed Sacramento Area Sewer District (SASD) Creek Crossing Rehabilitation project. The project includes the rehabilitation of 12 sewer line crossings within the jurisdictions of Sacramento County and the City of Citrus Heights. This noise reduction plan will outline the control of noise on the site based on a preliminary construction schedule, the list of noise producing equipment anticipated to be used on site, and the proximity of the site to neighboring properties.

Noise levels produced by noise generating equipment on site are predicted at the nearest receptors to determine expected noise levels during construction and practical recommendations are provided to mitigate noise transmission.

Figure 1 shows the proposed project site plan.

PROJECT SETTING

The proposed project sites and surrounding properties are shown on **Figures 1-1** through **1-9**. The sites are located generally within the jurisdictions of Sacramento County or the City of Citrus Heights.



SASD Crossing #1

Sacramento County, California

Figure 1-1

Noise Measurement Sites

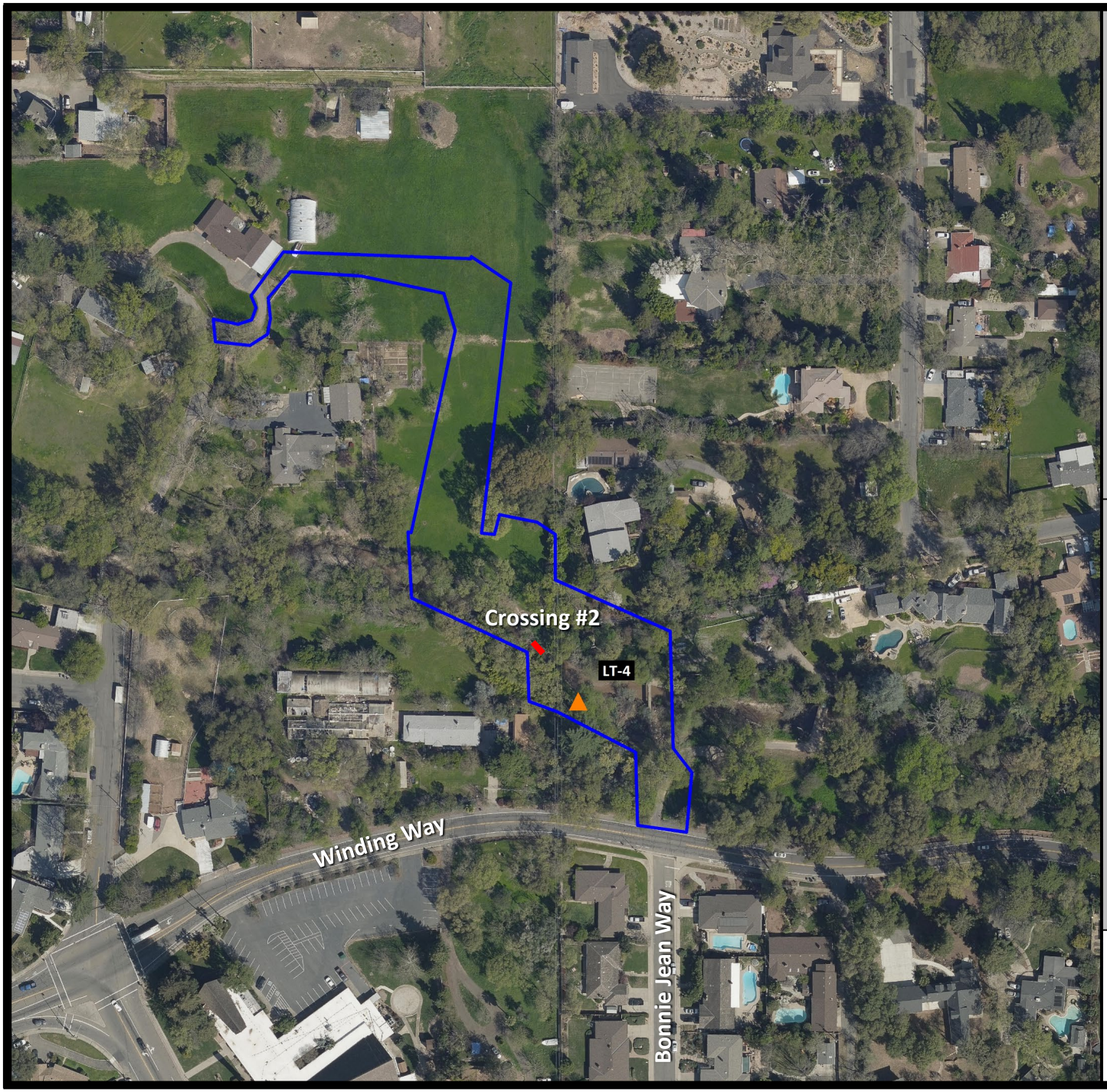
Legend

- Project Site
- Noise Measurement - Long Term
- Noise Measurement Site - Short Term
- Approx. Crossing Location

0 m 15 m 30 m 45 m

Projection: State Plane (California Zone 2) / NAD83 / feet
Rev. Date: 03/29/2022

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SASD Crossing #2

Sacramento County, California

Figure 1-2

Noise Measurement Sites

Legend

- Project Site
- Noise Measurement - Long Term
- Approx. Crossing Location

0 m 30 m 60 m 90 m

Projection: State Plane (California Zone 2) / NAD83 / feet
Rev. Date: 03/29/2022

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SASD Crossing #3 & #4

Sacramento County, California

Figure 1-3

Noise Measurement Sites

Legend

- Project Site
- Noise Measurement - Long Term
- Noise Measurement Site - Short Term
- Approx. Crossing Location

0 m 20 m 40 m 60 m 80 m

Projection: State Plane (California Zone 2) / NAD83 / feet
Rev. Date: 03/29/2022

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SASD Crossing #5 & 6

Sacramento County, California

Figure 1-4

Noise Measurement Sites

Legend

- Project Site
- Noise Measurement Site - Short Term
- Approx. Crossing Location

10 m 30 m 50 m 70 m

Projection: State Plane (California Zone 2) / NAD83 / feet
Rev. Date: 03/29/2022

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SASD Crossing #7

Sacramento County, California

Figure 1-5

Noise Measurement Sites

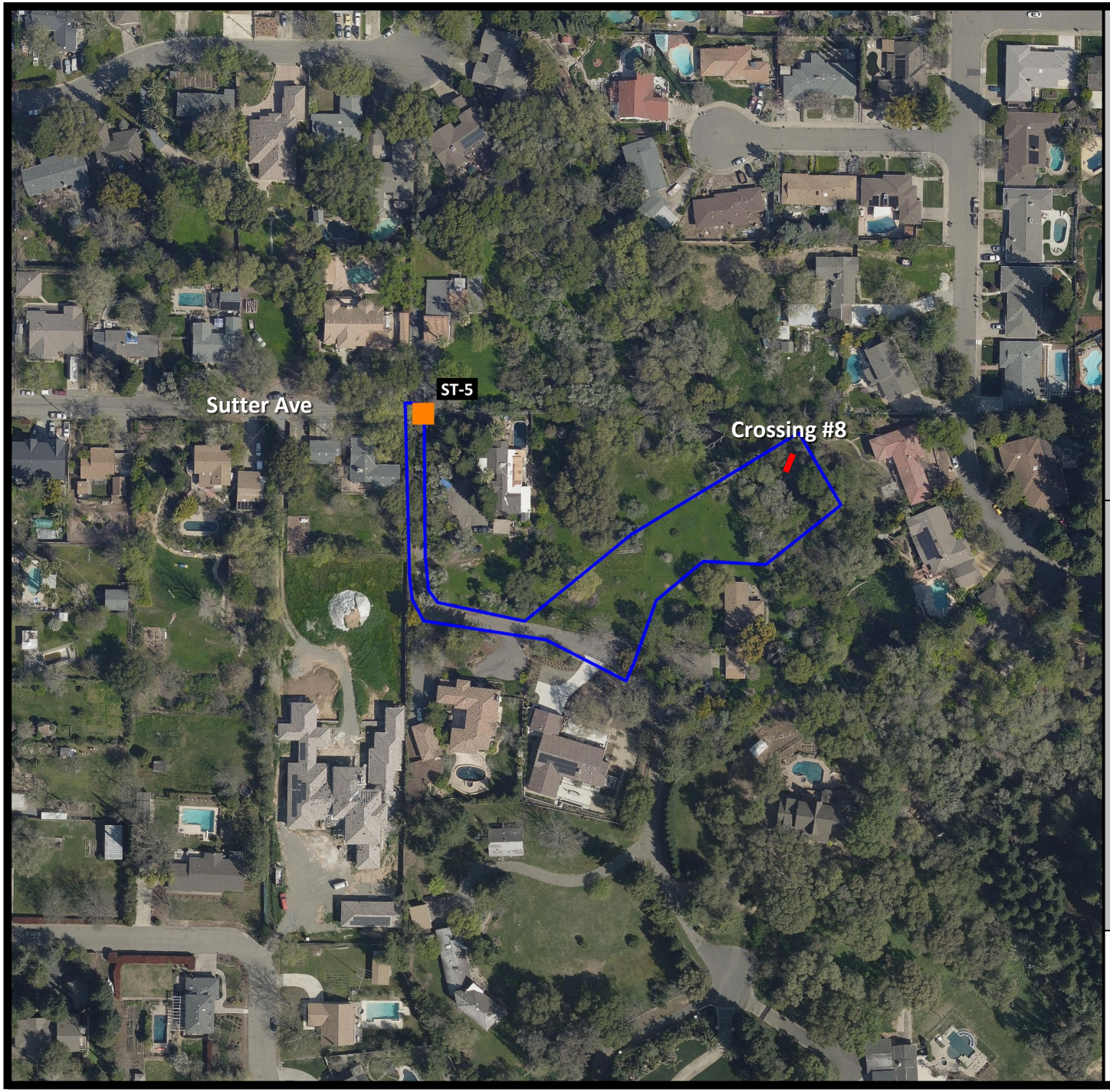
Legend

- Project Site
- Noise Measurement - Long Term
- Approx. Crossing Location

0 m 10 m 25 m 40 m

Projection: State Plane (California Zone 2) / NAD83 / feet
Rev. Date: 03/29/2022

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SASD Crossing #8

Sacramento County, California

Figure 1-6

Noise Measurement Sites

Legend

- Project Site
- Noise Measurement Site - Short Term
- Approx. Crossing Location

0 m 30 m 60 m 90 m

Projection: State Plane (California Zone 2) / NAD83 / feet
Rev. Date: 03/29/2022

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SASD Crossing #9

Sacramento County, California

Figure 1-7

Noise Measurement Sites

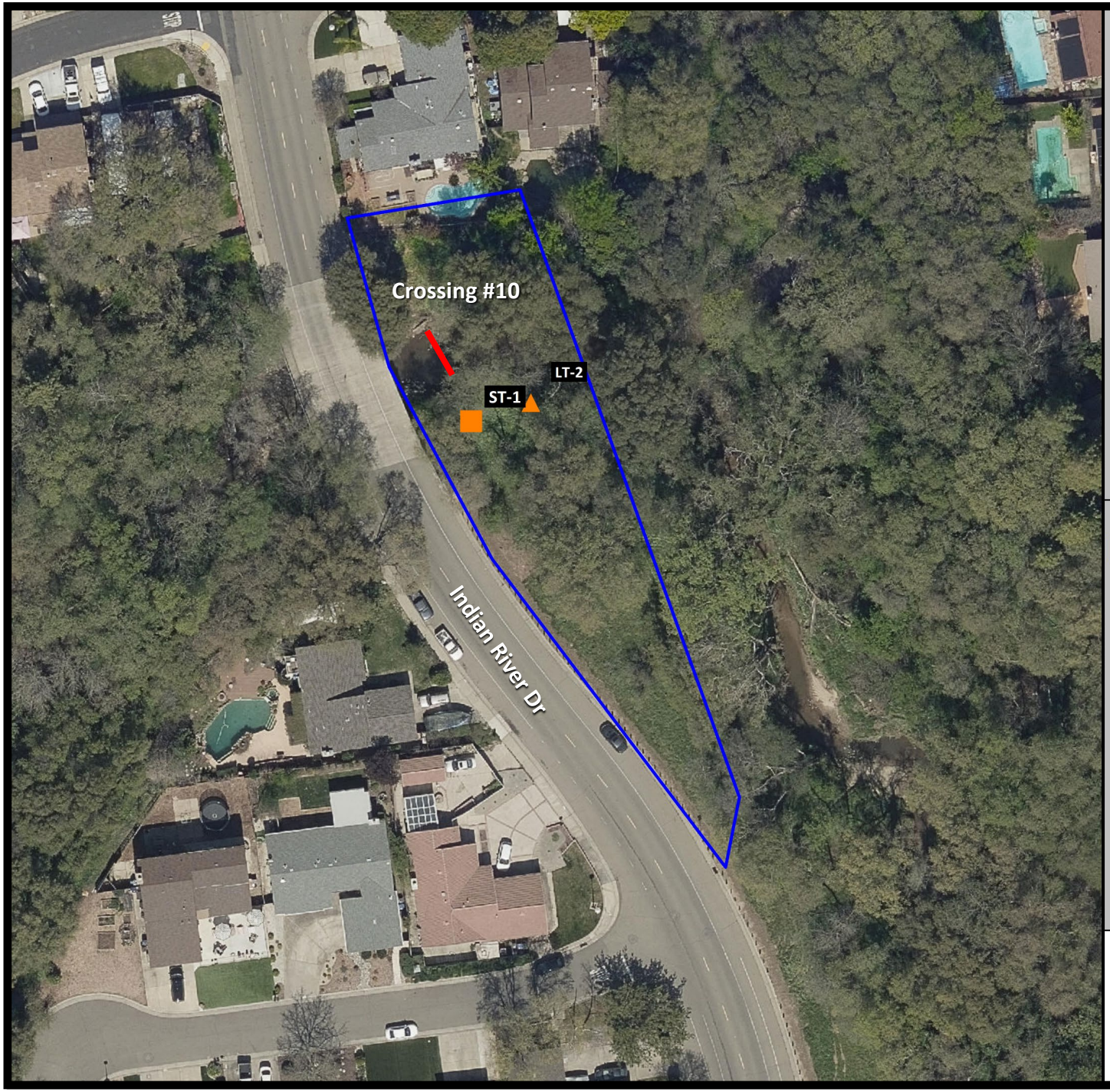
Legend

- Project Site
- Noise Measurement - Long Term
- Approx. Crossing Location

10 m 30 m 50 m

Projection: State Plane (California Zone 2) / NAD83 / feet
Rev. Date: 03/29/2022

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SASD Crossing #10

Sacramento County, California

Figure 1-8

Noise Measurement Sites

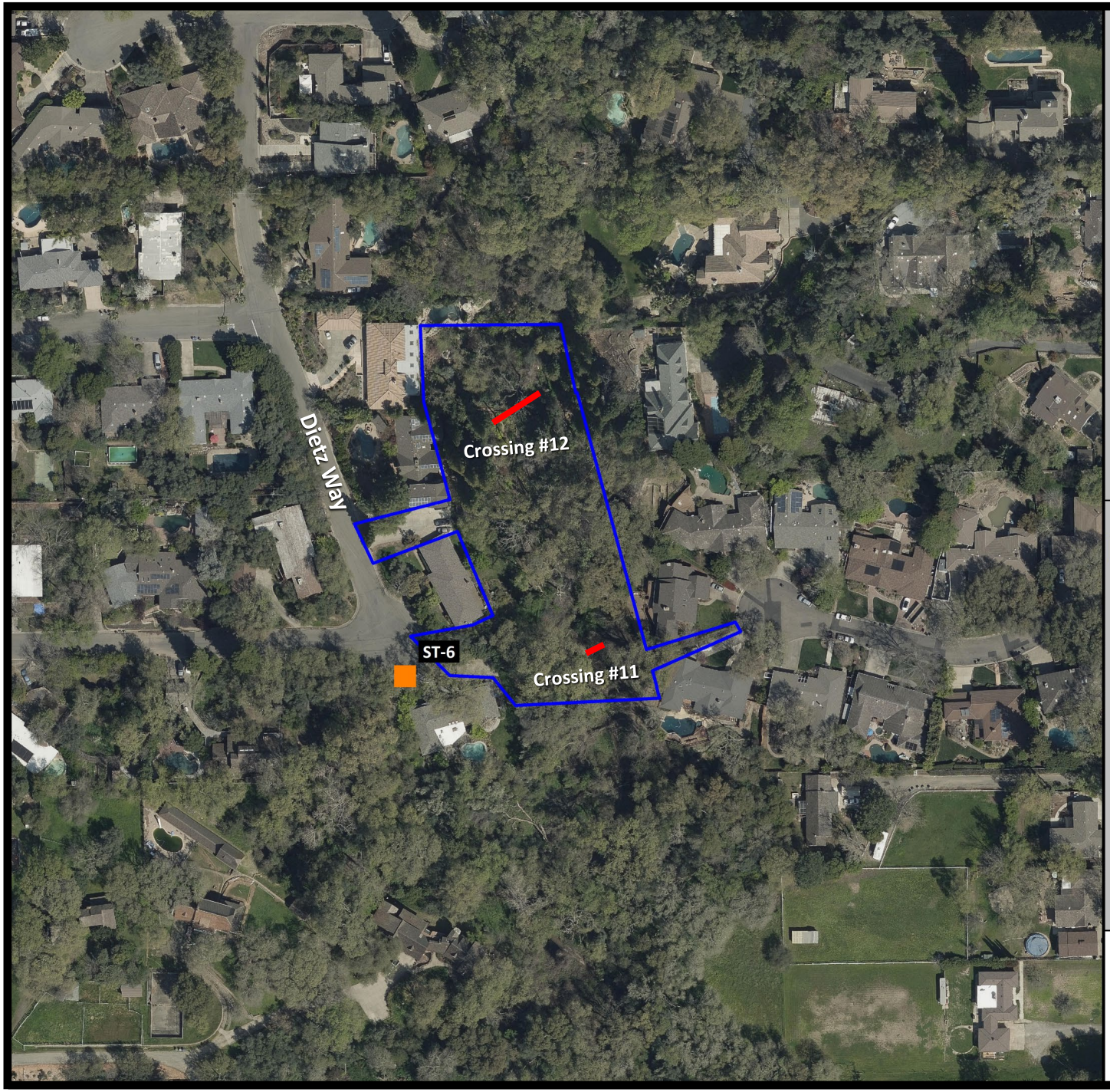
Legend

- Project Site
- Noise Measurement - Long Term
- Noise Measurement Site - Short Term
- Approx. Crossing Location

5 m 15 m 25 m 35 m

Projection: State Plane (California Zone 2) / NAD83 / feet
Rev. Date: 03/29/2022

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SASD Crossing #11 & #12

Sacramento County, California

Figure 1-9

Noise Measurement Sites

Legend

- Project Site
- Noise Measurement Site - Short Term
- Approx. Crossing Location

0 m 20 m 50 m 80 m

Projection: State Plane (California Zone 2) / NAD83 / feet
Rev. Date: 03/29/2022

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BACKGROUND INFORMATION ON NOISE

Fundamentals of Acoustics

Acoustics is the science of sound. Sound may be thought of as mechanical energy of a vibrating object transmitted by pressure waves through a medium to human (or animal) ears. If the pressure variations occur frequently enough (at least 20 times per second), then they can be heard and are called sound. The number of pressure variations per second is called the frequency of sound, and is expressed as cycles per second or Hertz (Hz).

Noise is a subjective reaction to different types of sounds. Noise is typically defined as (airborne) sound that is loud, unpleasant, unexpected or undesired, and may therefore be classified as a more specific group of sounds. Perceptions of sound and noise are highly subjective from person to person.

Measuring sound directly in terms of pressure would require a very large and awkward range of numbers. For example, the typical decibel range of environmental noise studies is approximately 20 dBA to 100 dBA. This would require use of numbers ranging from 100 to 10,000,000,000 and a typical noise level standard of 45 dBA would be expressed as 31,623. To avoid use of overly large or awkward numbers the decibel scale was devised. The decibel scale uses the hearing threshold (20 micropascals), as a point of reference, defined as 0 dB. Other sound pressures are then compared to this reference pressure, and the logarithm is taken to keep the numbers in a practical range. Therefore, the decibel scale allows a million-fold increase in pressure to be expressed as 120 dB, and changes in levels (dB) correspond closely to human perception of relative loudness.

The perceived loudness of sounds is dependent upon many factors, including sound pressure level and frequency content. However, within the usual range of environmental noise levels, perception of loudness is relatively predictable, and can be approximated by A-weighted sound levels. There is a strong correlation between A-weighted sound levels (expressed as dBA) and the way the human ear perceives sound. For this reason, the A-weighted sound level has become the standard tool of environmental noise assessment. All noise levels reported in this section are in terms of A-weighted levels, but are expressed as dB, unless otherwise noted.

The decibel scale is logarithmic, not linear. In other words, two sound levels 10-dB apart differ in acoustic energy by a factor of 10. When the standard logarithmic decibel is A-weighted, an increase of 10-dBA is generally perceived as a doubling in loudness. For example, a 70-dBA sound is half as loud as an 80-dBA sound, and twice as loud as a 60 dBA sound.

Community noise is commonly described in terms of the ambient noise level, which is defined as the all-encompassing noise level associated with a given environment. A common statistical tool is the average, or equivalent, sound level (L_{eq}), which corresponds to a steady-state A weighted sound level containing the same total energy as a time varying signal over a given time period (usually one hour). The L_{eq} is the foundation of the composite noise descriptor, L_{dn}, and shows very good correlation with community response to noise.

The day/night average level (L_{dn}) is based upon the average noise level over a 24-hour day, with a +10-decibel weighing applied to noise occurring during nighttime (10:00 p.m. to 7:00 a.m.) hours. The nighttime penalty is based upon the assumption that people react to nighttime noise exposures as though

they were twice as loud as daytime exposures. Because L_{dn} represents a 24-hour average, it tends to disguise short-term variations in the noise environment.

Table 1 lists several examples of the noise levels associated with common situations. Appendix A provides a summary of acoustical terms used in this report.

TABLE 1: TYPICAL NOISE LEVELS

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	--110--	Rock Band
Jet Fly-over at 300 m (1,000 ft.)	--100--	
Gas Lawn Mower at 1 m (3 ft.)	--90--	
Diesel Truck at 15 m (50 ft.), at 80 km/hr. (50 mph)	--80--	Food Blender at 1 m (3 ft.) Garbage Disposal at 1 m (3 ft.)
Noisy Urban Area, Daytime Gas Lawn Mower, 30 m (100 ft.)	--70--	Vacuum Cleaner at 3 m (10 ft.)
Commercial Area Heavy Traffic at 90 m (300 ft.)	--60--	Normal Speech at 1 m (3 ft.)
Quiet Urban Daytime	--50--	Large Business Office Dishwasher in Next Room
Quiet Urban Nighttime	--40--	Theater, Large Conference Room (Background)
Quiet Suburban Nighttime	--30--	Library
Quiet Rural Nighttime	--20--	Bedroom at Night, Concert Hall (Background)
	--10--	Broadcast/Recording Studio
Lowest Threshold of Human Hearing	--0--	Lowest Threshold of Human Hearing
Source: Caltrans, Technical Noise Supplement, Traffic Noise Analysis Protocol. September, 2013.		

Effects of Noise on People

The effects of noise on people can be placed in three categories:

- Subjective effects of annoyance, nuisance, and dissatisfaction
- Interference with activities such as speech, sleep, and learning
- Physiological effects such as hearing loss or sudden startling

Environmental noise typically produces effects in the first two categories. Workers in industrial plants can experience noise in the last category. There is no completely satisfactory way to measure the subjective effects of noise or the corresponding reactions of annoyance and dissatisfaction. A wide variation in individual thresholds of annoyance exists and different tolerances to noise tend to develop based on an individual's past experiences with noise.

Thus, an important way of predicting a human reaction to a new noise environment is the way it compares to the existing environment to which one has adapted: the so-called ambient noise level. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by those hearing it.

With regards to increases in A-weighted noise level, the following relationships occur:

- Except in carefully controlled laboratory experiments, a change of 1-dBA cannot be perceived;
- Outside of the laboratory, a 3-dBA change is considered a just-perceivable difference;
- A change in level of at least 5-dBA is required before any noticeable change in human response would be expected; and
- A 10-dBA change is subjectively heard as approximately a doubling in loudness, and can cause an adverse response.

Stationary point sources of noise – including stationary mobile sources such as idling vehicles – attenuate (lessen) at a rate of approximately 6-dB per doubling of distance from the source, depending on environmental conditions (i.e. atmospheric conditions and either vegetative or manufactured noise barriers, etc.). Widely distributed noises, such as a large industrial facility spread over many acres, or a street with moving vehicles, would typically attenuate at a lower rate.

REGULATORY CONTEXT

SACRAMENTO COUNTY CONSTRUCTION NOISE STANDARDS

Chapter 6.68.090 of the Sacramento County Municipal Code exempts construction noise between the hours of 6:00 am to 8:00 pm on weekdays and 7:00 am to 8:00 pm on weekends. The relevant standards from the municipal code have been reproduced below:

The following activities shall be exempted from the provisions of this chapter:

e. Noise sources associated with construction, repair, remodeling, demolition, paving or grading of any real property, provided said activities do not take place between the hours of eight p.m. and six a.m. on weekdays and Friday commencing at eight p.m. through and including seven a.m. on Saturday; Saturdays commencing at eight p.m. through and including seven a.m. on the next following Sunday and on each Sunday after the hour of eight p.m. Provided, however, when an unforeseen or unavoidable condition occurs during a construction project and the nature of the project necessitates that work in process be continued until a specific phase is completed, the contractor or owner shall be allowed to continue work after eight p.m. and to operate machinery and equipment necessary until completion of the specific work in progress can be brought to conclusion under conditions which will not jeopardize inspection acceptance or create undue financial hardships for the contractor or owner;

CITY OF CITRUS HEIGHTS CONSTRUCTION NOISE STANDARDS

Sec. 34-88 of the City of Citrus Heights Municipal Code exempts construction noise between the hours of 6:00 am to 8:00 pm on weekdays and 7:00 am to 8:00 pm on weekends. The relevant standards from the municipal code have been reproduced below:

The following activities shall be exempted from this article:

(5) Noise sources associated with construction, repair, remodeling, demolition, paving or grading of any real property, provided the activities do not take place between the hours of 8:00 p.m. and 6:00 a.m. on weekdays and Friday commencing at 8:00 p.m. through and including 7:00 a.m. on Saturday, Saturdays commencing at 8:00 p.m. through and including 7:00 a.m. on the next following Sunday, and on each Sunday after the hour of 8:00 p.m. However, when an unforeseen or unavoidable condition occurs during a construction project and the nature of the project necessitates that work in process be continued until a specific phase is completed, the contractor or owner shall be allowed to continue work after 8:00 p.m. and to operate machinery and equipment necessary until completion of the specific work in progress can be brought to conclusion under conditions which will not jeopardize inspection acceptance or create undue financial hardships for the contractor or owner.

EXISTING NOISE CONDITIONS

Noise monitoring was conducted to establish existing ambient noise levels around the project site. **Figures 1-1 through 1-9** show the locations of the ambient noise survey points. **Table 2** provides a summary of the collected ambient noise readings and **Appendix B** provides the complete results of the ambient noise survey.

The sound level meters were programmed to record the maximum, median, and average noise levels at each site during the survey. The maximum value, denoted L_{max}, represents the highest noise level measured. The average value, denoted L_{eq}, represents the energy average of all of the noise received by the sound level meter microphone during the monitoring period. The median value, denoted L_{50}, represents the sound level exceeded 50 percent of the time during the monitoring period.

A Larson Davis Laboratories (LDL) Model 831 precision integrating sound level meter was used for the ambient noise level measurement survey. The meter was calibrated before and after use with a LDL CAL200 acoustical calibrator to ensure the accuracy of the measurements. The equipment used meets all pertinent specifications of the American National Standards Institute for Type 1 sound level meters (ANSI S1.4).

TABLE 2: SUMMARY OF EXISTING BACKGROUND NOISE MEASUREMENT DATA

Site	Crossing #	Date	L_{dn}	Daytime L_{eq}	Daytime L_{50}	Daytime L_{max}	Nighttime L_{eq}	Nighttime L_{50}	Nighttime L_{max}
LT-1	9	3/16/22	62	56	54	70	56	54	64
LT-2	10	3/16/22	58	57	54	74	50	49	62
LT-3	3 & 4	3/16/22	57	54	52	67	50	47	62
LT-4	2	3/16/22	54	52	49	69	47	45	57
LT-5	1	3/16/22	58	56	54	69	51	46	63
LT-6	7	3/16/22	53	50	44	72	46	44	54
ST-1	10	3/14/22	N/A	51	46	65	N/A	N/A	N/A
ST-2	3 & 4	3/14/22	N/A	47	46	56	N/A	N/A	N/A
ST-3	5 & 6	3/14/22	N/A	48	46	61	N/A	N/A	N/A
ST-4	1	3/14/22	N/A	44	40	58	N/A	N/A	N/A
ST-5	8	3/14/22	N/A	53	52	62	N/A	N/A	N/A
ST-6	11 & 12	3/14/22	N/A	47	42	63	N/A	N/A	N/A

Notes:

- *All values shown in dBA*
- *Daytime hours: 7:00 a.m. to 10:00 p.m.*
- *Nighttime Hours: 10:00 p.m. to 7:00 a.m.*
- *LT = Long Term*
- *ST = Short Term*
- *Source: Saxelby Acoustics 2022*

CONSTRUCTION SCHEDULE AND ANTICIPATED EQUIPMENT

Construction of the project will occur at 12 separate sites throughout Sacramento County. Construction at each site may fall into one of three categories based on expected equipment to be utilized. The following is an explanation of expected construction activities:

1. Category 1
    a. Definition: limited access, hand carry tools only, typically in residential areas with access through backyards and existing landscaping.
    b. Applicable sites: Concho, Gina, Hegseth, Dietz.
    a. Equipment: work truck, water buffalo/water truck, electric hand tools, gas/diesel powered hand tools, stand-on-skid-steers, concrete truck (Dietz only).
2. Category 2
    b. Definition: 15' wide access/TCEs, equipment needed for work (excavator, skid steer, etc.), some of these may have some fairly large rip rap placement.
    c. Appliable sites: Hope, Arcade Creek, Garfield Thousand Oaks, San Lorenzo, Campfire.
    d. Equipment: work truck, water buffalo/water truck, electric hand tools, gas/diesel powered hand tools, excavator, skid steer, crane, temporary diesel-powered bypass pumps (Hope, Garfield Thousand Oaks, and San Lorenzo only).
3. Category 3
    a. Definition: 15-30' wide access/TCEs, these sites need a drill rig for pier install and concrete work.
    b. Applicable sites: Winding, Sutter, Indian River.
    c. Equipment: work truck, water buffalo/water truck, electric hand tools, gas/diesel powered hand tools, excavator, skid steer, crane, drill rig, concrete truck, concrete pump truck, temporary diesel-powered bypass pumps.

None of the sources identified above are expected to be "extreme" noise generators under typical operating conditions at nominal distances of 50 ft. or greater from the equipment. "Extreme" noise generators are defined as those generating maximum noise levels above 90 dBA.

CONSTRUCTION NOISE ANALYSIS

The Federal Highway Administration's (FHWA) Roadway Construction Noise Model (RCNM) was used to predict noise levels for standard construction equipment used for roadway improvement projects. The assessment of potential significant noise effects due to construction is based on the standards and procedures described in the Federal Transit Authority (FTA) guidance manual and FHWA's RCNM.

The RCNM is a Windows-based noise prediction model that enables the prediction of construction noise levels for a variety of construction equipment based on a compilation of empirical data and the application of acoustical propagation formulas. It enables the calculation of construction noise levels in more detail than the manual methods, which eliminates the need to collect extensive amounts of project-specific input data. RCNM allows for the modeling of multiple pieces of construction equipment working either independently or simultaneously, the character of noise emission, and the usage factors for each piece of equipment.

Construction noise varies depending on the construction process, type of equipment involved, location of the construction site with respect to sensitive receptors, the schedule proposed to carry out each task (e.g., hours and days of the week), and the duration of the construction work.

Noise sources in the RCNM database include actual noise levels and equipment usage percentages. This source data was used in this construction noise analysis. **Table 3** shows predicted construction noise levels for each of the project construction phases.

TABLE 3: CONSTRUCTION EQUIPMENT NOISE LEVELS FOR PRIMARY CONSTRUCTION PHASES

Equipment	Quantity	Usage (%)	Maximum, Lmax (dBA at 50 feet)	Hourly Average, Leq (dBA at 50 feet)
Category 1				
Pickup Truck	1	40	75	71
Flat Bed / Water Truck	1	40	74	70
Gas/Diesel/Electric Tools	1	50	85	82
Stand-on-skid	1	40	79	75
Concrete Mixer Truck	1	40	79	75
			Total:	**84**
Category 2				
Pickup Truck	1	40	75	71
Flat Bed / Water Truck	1	40	74	70
Gas/Diesel/Electric Tools	1	50	85	82
Excavator	1	40	81	77
Stand-on-skid	1	40	79	75
Crane	1	16	81	73
Pumps	2	50	81	81
			Total:	**86**
Category 3				
Pickup Truck	1	40	75	71
Flat Bed / Water Truck	1	40	74	70
Gas/Diesel/Electric Tools	1	50	85	82
Excavator	1	40	81	77
Stand-on-skid	1	40	79	75
Crane	1	16	81	73
Drill Rig Truck	1	100	79	79
Concrete Mixer Truck	1	40	79	75
Concrete Pump Truck	1	20	81	74
Pumps	2	50	81	81
			Total:	**87**

Source: FHWA, Roadway Construction Noise Model (RCNM), January 2006.

Based upon the **Table 3** data, construction noise is predicted to range between 84 to 87 dBA at 50 feet. It should be noted that these estimates are based on the worst-case scenario of all equipment being used in a busy hour and are likely conservative estimates of noise levels that would be expected throughout the project construction.

A summary of the noise prediction results for each construction site are shown in **Table 4**.

TABLE 4: CONSTRUCTION NOISE LEVEL AT ADJACENT SENSITIVE RECEPTORS

Crossing #	Site Name	Distance to nearest home (ft.)	Approximate Daytime Ambient Noise (Leq)	Construction Noise Level at 50 feet, dBA Leq	Construction Noise Level at Nearest Home, dBA Leq	Noise Level at Nearest Home with Shielding	Change, dBA	Change with Shielding, dBA
1	LT-5	55	56	86	85	80	29	24
2	LT-4	85	52	87	82	77	30	25
3	LT-3	75	54	86	82	77	28	23
4	LT-3	140	54	86	77	72	23	18
5	ST-3	85	48	84	79	74	31	26
6	ST-3	65	48	84	82	77	34	29
7	LT-6	65	50	86	84	79	34	29
8	ST-5	100	53	87	81	76	28	23
9	LT-1	175	56	86	75	70	19	14
10	LT-2	90	57	87	82	77	25	20
11	ST-6	70	47	84	81	76	34	29
12	ST-6	90	47	84	79	74	32	27

As can be seen from the results outlined in **Table 4,** noise levels from the loudest phases of construction could substantially exceed existing ambient noise levels by up to 34 dBA at the nearest residential receptors. If the loudest pieces of equipment were able to be shielded by plywood site fencing, or other temporary shrouds, a 5 dBA reduction would be expected. In this case predicted noise levels would be reduced but would still likely exceed ambient noise levels by up to 29 dBA at the nearest homes.

NOISE REDUCTION MEASURES

To reduce construction noise, the following measures are recommended:

- Construction activities should be limited to between 6:00 a.m. and 8:00 p.m. Monday through Friday.
- Construction activities are limited to between 7:00 a.m. and 8:00 p.m. on Saturday and Sunday.
- Equipment and trucks used for project construction shall utilize the best available noise control techniques (e.g., improved mufflers, equipment redesign, use of intake silencers, ducts, engine enclosures and acoustically attenuating shields or shrouds) wherever feasible.
- Except as provided herein. impact tools (e.g., jack hammers, pavement breakers, and rock drills) used for project construction shall be hydraulically or electrically powered to avoid noise associated with compressed air exhaust from pneumatically powered tools. However, where use of pneumatic tools is unavoidable, an exhaust muffler on the compressed air exhaust shall be used; this muffler can lower noise levels from the exhaust by up to about 10 dBA. External jackets on the tools themselves shall be used, if such jackets are commercially available, and this could achieve a reduction of 5 dBA. Quieter procedures shall be used, such as drills rather than impact equipment, whenever such procedures are available and consistent with construction procedures.
- Contractors shall use best-available quiet technology generators where feasible and generators should be placed as far from sensitive receptors as possible. Use of temporary shielding of the generator(s) should be employed where additional noise control may be required.
- Stationary noise sources shall be located as far from adjacent properties as possible, and they shall be muffled and enclosed within temporary sheds, incorporate insulation barriers, or use other measures as determined as feasible to provide equivalent noise reduction.
- Pumps or generators used for bypass pumping shall be housed in sound attenuation enclosures and the bypass staging area should be shielded with acoustic site fencing consisting of ½" plywood (1.45 lb/sf^2) [1] or minimum STC 27 sound curtains.
- Bypass pumping noise should be monitored at startup by an acoustic engineer to ensure that the noise control measures are property installed and achieving the best possible noise control.
- The noise and safety enforcement manager for the project shall ensure responsive and corrective action to complaints within the same working day if the complaint is received during the noise-related incident and from sensitive receptors residing within the adjacent residential building.

[1] The minimum ½" plywood (1.45 lb./sf^2) is predicted to provide a sound transmission loss of approximately 22 dBA at 500 hertz. 500 hertz is the typical center frequency of construction equipment. The predicted sound wall is predicted to achieve a minimum 4-12 dBA overall noise reduction. Therefore, the sound transmitted through the ½" plywood would be approximately 10-18 dB quieter than the sound coming over the top of the barrier and would not result in degradation of the 5-12 dBA noise reduction provided by the barrier.

CONCLUSIONS

Based on noise levels for the anticipated construction activity on site, and operational assumptions of the equipment, construction noise levels have been predicted at the surrounding sensitive receptors. The proposed construction has the potential to substantially exceed ambient noise conditions at the nearest noise-sensitive receptors. Based upon the loudest-hour predictions, construction noise may exceed ambient conditions by up 34 dBA. Daytime construction noise would be exempt from regulation under the day and times outlined in the Sacramento County and City of Citrus Heights noise ordinances. The outlined construction noise reduction measures are predicted to reduce noise levels by at least 5 dBA. However, this could still result in substantial increases in ambient noise conditions at the nearest homes and construction activities should occur during daytime hours as much as feasible. Bypass pumping noise should be monitored at startup by an acoustic engineer to ensure that the noise control measures are property installed and achieving the best possible noise control.

Appendix A: Acoustical Terminology

Acoustics	The science of sound.
Ambient Noise	The distinctive acoustical characteristics of a given space consisting of all noise sources audible at that location. In many cases, the term ambient is used to describe an existing or pre-project condition such as the setting in an environmental noise study.
ASTC	Apparent Sound Transmission Class. Similar to STC but includes sound from flanking paths and correct for room reverberation. A larger number means more attenuation. The scale, like the decibel scale for sound, is logarithmic.
Attenuation	The reduction of an acoustic signal.
A-Weighting	A frequency-response adjustment of a sound level meter that conditions the output signal to approximate human response.
Decibel or dB	Fundamental unit of sound, A Bell is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A Decibel is one-tenth of a Bell.
CNEL	Community Noise Equivalent Level. Defined as the 24-hour average noise level with noise occurring during evening hours (7 - 10 p.m.) weighted by +5 dBA and nighttime hours weighted by +10 dBA.
DNL	See definition of Ldn.
IIC	Impact Insulation Class. An integer-number rating of how well a building floor attenuates impact sounds, such as footsteps. A larger number means more attenuation. The scale, like the decibel scale for sound, is logarithmic.
Frequency	The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz (Hz).
Ldn	Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.
Leq	Equivalent or energy-averaged sound level.
Lmax	The highest root-mean-square (RMS) sound level measured over a given period of time.
L(n)	The sound level exceeded a described percentile over a measurement period. For instance, an hourly L50 is the sound level exceeded 50% of the time during the one-hour period.
Loudness	A subjective term for the sensation of the magnitude of sound.
NIC	Noise Isolation Class. A rating of the noise reduction between two spaces. Similar to STC but includes sound from flanking paths and no correction for room reverberation.
NNIC	Normalized Noise Isolation Class. Similar to NIC but includes a correction for room reverberation.
Noise	Unwanted sound.
NRC	Noise Reduction Coefficient. NRC is a single-number rating of the sound-absorption of a material equal to the arithmetic mean of the sound-absorption coefficients in the 250, 500, 1000, and 2,000 Hz octave frequency bands rounded to the nearest multiple of 0.05. It is a representation of the amount of sound energy absorbed upon striking a particular surface. An NRC of 0 indicates perfect reflection; an NRC of 1 indicates perfect absorption.
RT60	The time it takes reverberant sound to decay by 60 dB once the source has been removed.
Sabin	The unit of sound absorption. One square foot of material absorbing 100% of incident sound has an absorption of 1 Sabin.
SEL	Sound Exposure Level. SEL is a rating, in decibels, of a discrete event, such as an aircraft flyover or train pass by, that compresses the total sound energy into a one-second event.
SPC	Speech Privacy Class. SPC is a method of rating speech privacy in buildings. It is designed to measure the degree of speech privacy provided by a closed room, indicating the degree to which conversations occurring within are kept private from listeners outside the room.
STC	Sound Transmission Class. STC is an integer rating of how well a building partition attenuates airborne sound. It is widely used to rate interior partitions, ceilings/floors, doors, windows and exterior wall configurations. The STC rating is typically used to rate the sound transmission of a specific building element when tested in laboratory conditions where flanking paths around the assembly don't exist. A larger number means more attenuation. The scale, like the decibel scale for sound, is logarithmic.
Threshold of Hearing	The lowest sound that can be perceived by the human auditory system, generally considered to be 0 dB for persons with perfect hearing.
Threshold of Pain	Approximately 120 dB above the threshold of hearing.
Impulsive	Sound of short duration, usually less than one second, with an abrupt onset and rapid decay.
Simple Tone	Any sound which can be judged as audible as a single pitch or set of single pitches.

Appendix B: Continuous and Short-Term Ambient Noise Measurement Results

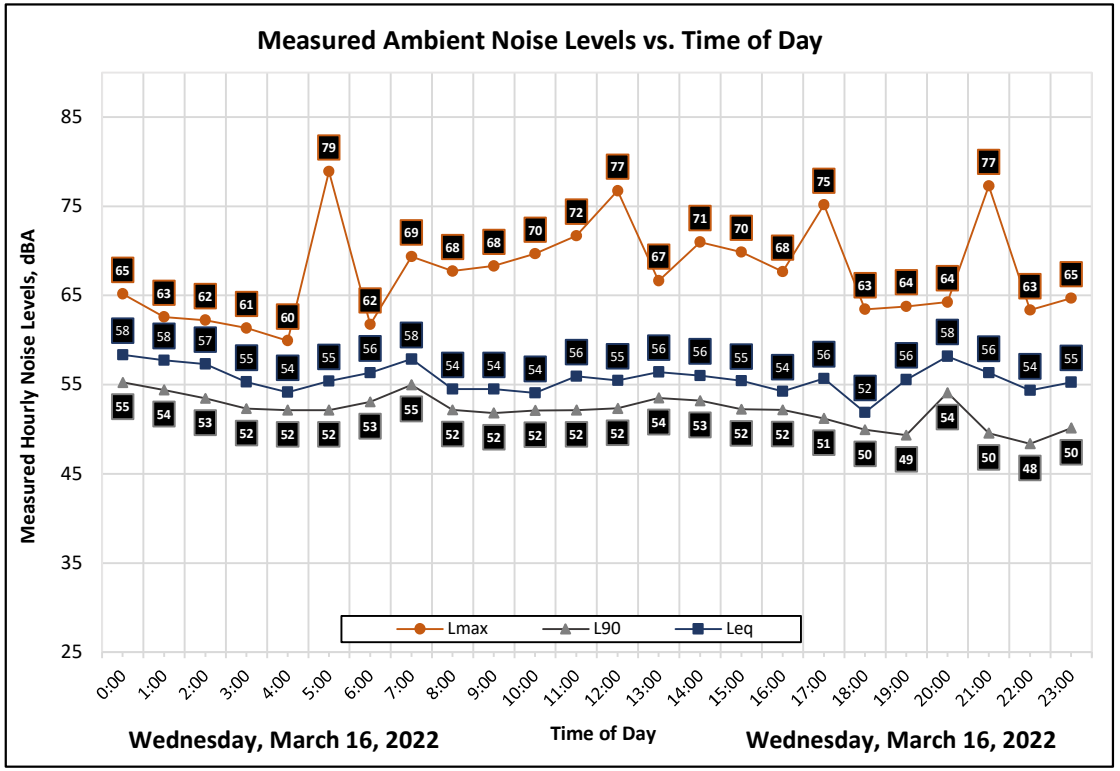


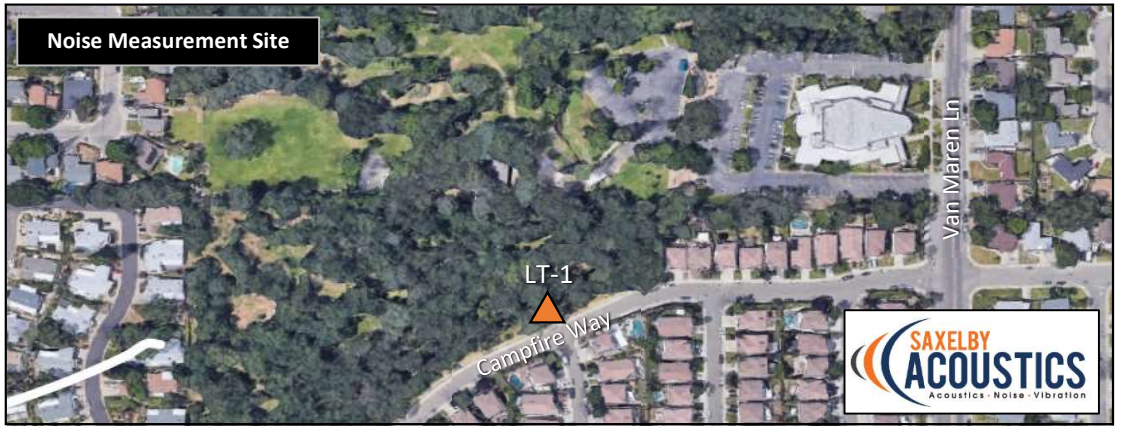
Appendix B1: Continuous Noise Monitoring Results

Site: LT-1
Project: SASD Stream Crossing
Meter: LDL 820-1
Location: Crossing #9 (Campfire & Ranch House Road)
Calibrator: CAL200
Coordinates: 38.6920805°, -121.3110881°

Date	Time	Measured Level, dBA			
		L_{eq}	L_{max}	L_{50}	L_{90}
Wednesday, March 16, 2022	0:00	58	65	58	55
Wednesday, March 16, 2022	1:00	58	63	56	54
Wednesday, March 16, 2022	2:00	57	62	55	53
Wednesday, March 16, 2022	3:00	55	61	53	52
Wednesday, March 16, 2022	4:00	54	60	53	52
Wednesday, March 16, 2022	5:00	55	79	53	52
Wednesday, March 16, 2022	6:00	56	62	56	53
Wednesday, March 16, 2022	7:00	58	69	57	55
Wednesday, March 16, 2022	8:00	54	68	53	52
Wednesday, March 16, 2022	9:00	54	68	53	52
Wednesday, March 16, 2022	10:00	54	70	53	52
Wednesday, March 16, 2022	11:00	56	72	54	52
Wednesday, March 16, 2022	12:00	55	77	54	52
Wednesday, March 16, 2022	13:00	56	67	56	54
Wednesday, March 16, 2022	14:00	56	71	55	53
Wednesday, March 16, 2022	15:00	55	70	54	52
Wednesday, March 16, 2022	16:00	54	68	53	52
Wednesday, March 16, 2022	17:00	56	75	53	51
Wednesday, March 16, 2022	18:00	52	63	51	50
Wednesday, March 16, 2022	19:00	56	64	53	49
Wednesday, March 16, 2022	20:00	58	64	58	54
Wednesday, March 16, 2022	21:00	56	77	53	50
Wednesday, March 16, 2022	22:00	54	63	51	48
Wednesday, March 16, 2022	23:00	55	65	54	50

Statistics	Leq	Lmax	L50	L90
Day Average	56	70	54	52
Night Average	56	64	54	52
Day Low	52	63	51	49
Day High	58	77	58	55
Night Low	54	60	51	48
Night High	58	79	58	55
Ldn	62	Day %		61
CNEL	63	Night %		39



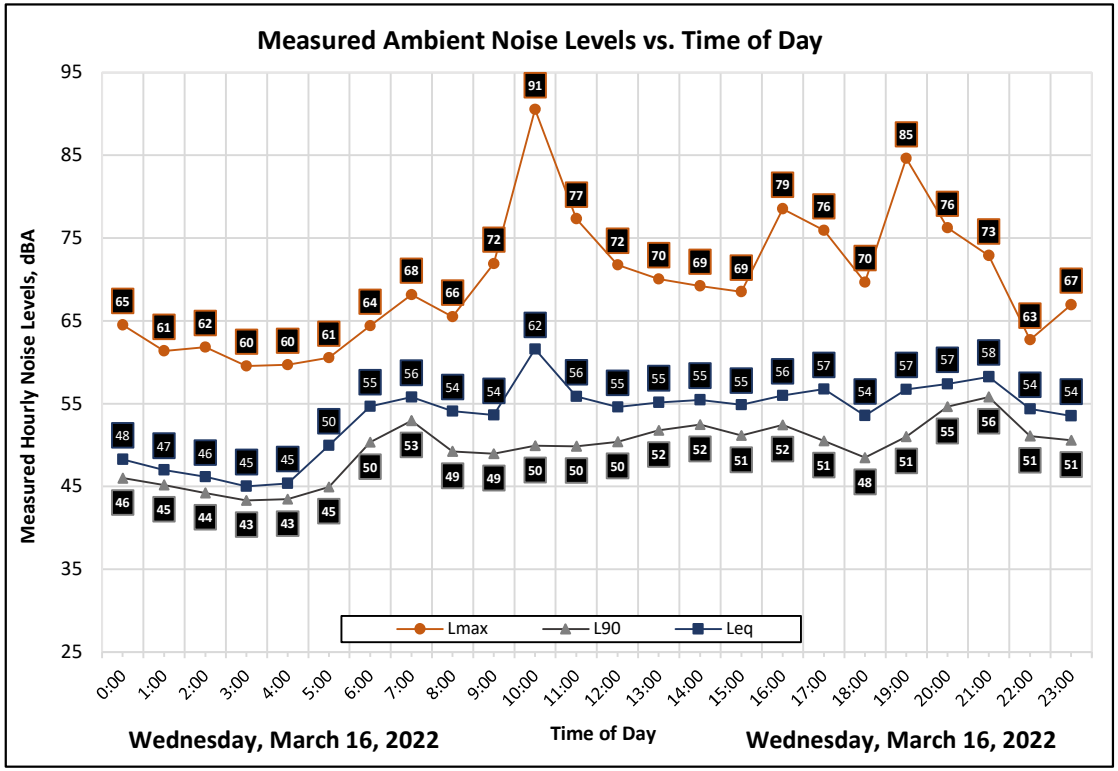


Appendix B2: Continuous Noise Monitoring Results

Site: LT-2
Project: SASD Stream Crossing
Location: Crossing #10 (Indian River Road)
Coordinates: 38.6830590°, -121.3248475°
Meter: LDL 820-2
Calibrator: CAL200

Date	Time	Measured Level, dBA			
		L_{eq}	L_{max}	L_{50}	L_{90}
Wednesday, March 16, 2022	0:00	48	65	47	46
Wednesday, March 16, 2022	1:00	47	61	46	45
Wednesday, March 16, 2022	2:00	46	62	45	44
Wednesday, March 16, 2022	3:00	45	60	44	43
Wednesday, March 16, 2022	4:00	45	60	45	43
Wednesday, March 16, 2022	5:00	50	61	49	45
Wednesday, March 16, 2022	6:00	55	64	54	50
Wednesday, March 16, 2022	7:00	56	68	55	53
Wednesday, March 16, 2022	8:00	54	66	52	49
Wednesday, March 16, 2022	9:00	54	72	51	49
Wednesday, March 16, 2022	10:00	62	91	54	50
Wednesday, March 16, 2022	11:00	56	77	52	50
Wednesday, March 16, 2022	12:00	55	72	53	50
Wednesday, March 16, 2022	13:00	55	70	54	52
Wednesday, March 16, 2022	14:00	55	69	54	52
Wednesday, March 16, 2022	15:00	55	69	53	51
Wednesday, March 16, 2022	16:00	56	79	54	52
Wednesday, March 16, 2022	17:00	57	76	53	51
Wednesday, March 16, 2022	18:00	54	70	51	48
Wednesday, March 16, 2022	19:00	57	85	55	51
Wednesday, March 16, 2022	20:00	57	76	56	55
Wednesday, March 16, 2022	21:00	58	73	57	56
Wednesday, March 16, 2022	22:00	54	63	54	51
Wednesday, March 16, 2022	23:00	54	67	53	51

Statistics	Leq	Lmax	L50	L90
Day Average	57	74	54	51
Night Average	50	62	49	47
Day Low	54	66	51	48
Day High	62	91	57	56
Night Low	45	60	44	43
Night High	55	67	54	51
Ldn	58	Day %		89
CNEL	59	Night %		11



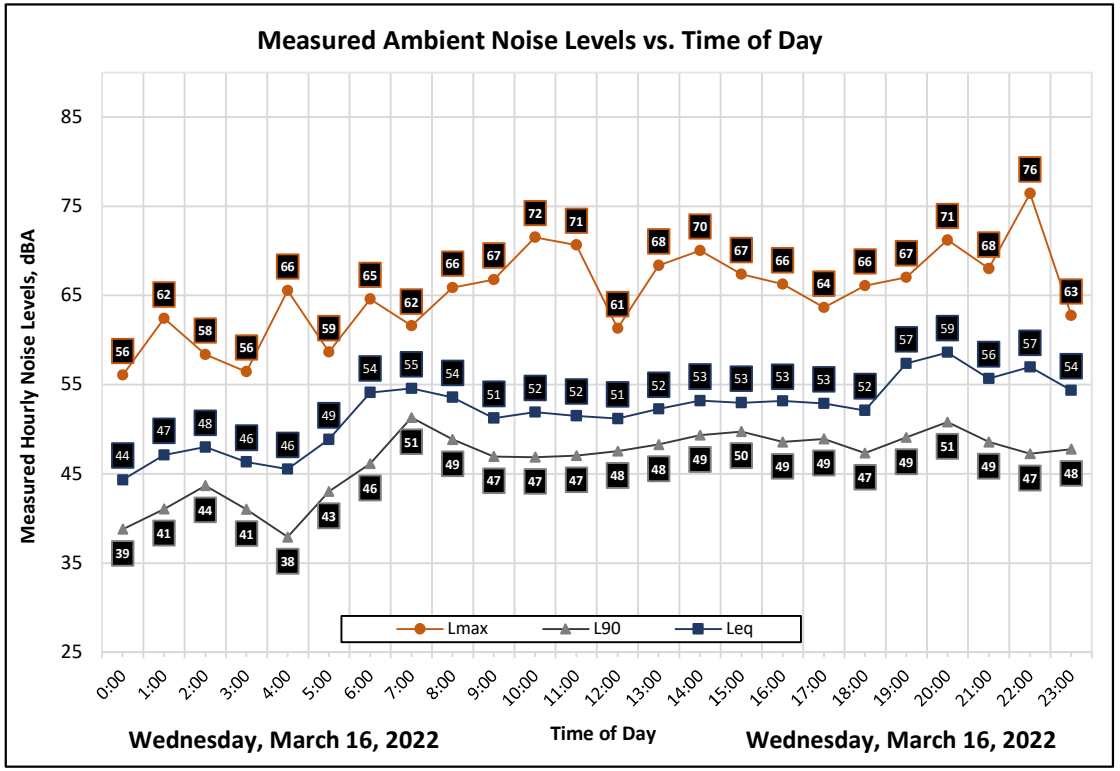


Appendix B3: Continuous Noise Monitoring Results

Site: LT-3
Project: SASD Stream Crossing
Meter: LDL 820-3
Location: Crossing #3 & #4 (Arcade Creek Park)
Calibrator: CAL200
Coordinates: 38.6558924°, -121.3363559°

Date	Time	Measured Level, dBA			
		L_{eq}	L_{max}	L_{50}	L_{90}
Wednesday, March 16, 2022	0:00	44	56	43	39
Wednesday, March 16, 2022	1:00	47	62	45	41
Wednesday, March 16, 2022	2:00	48	58	46	44
Wednesday, March 16, 2022	3:00	46	56	44	41
Wednesday, March 16, 2022	4:00	46	66	41	38
Wednesday, March 16, 2022	5:00	49	59	47	43
Wednesday, March 16, 2022	6:00	54	65	51	46
Wednesday, March 16, 2022	7:00	55	62	54	51
Wednesday, March 16, 2022	8:00	54	66	53	49
Wednesday, March 16, 2022	9:00	51	67	50	47
Wednesday, March 16, 2022	10:00	52	72	50	47
Wednesday, March 16, 2022	11:00	52	71	50	47
Wednesday, March 16, 2022	12:00	51	61	50	48
Wednesday, March 16, 2022	13:00	52	68	51	48
Wednesday, March 16, 2022	14:00	53	70	52	49
Wednesday, March 16, 2022	15:00	53	67	52	50
Wednesday, March 16, 2022	16:00	53	66	52	49
Wednesday, March 16, 2022	17:00	53	64	52	49
Wednesday, March 16, 2022	18:00	52	66	51	47
Wednesday, March 16, 2022	19:00	57	67	54	49
Wednesday, March 16, 2022	20:00	59	71	56	51
Wednesday, March 16, 2022	21:00	56	68	53	49
Wednesday, March 16, 2022	22:00	57	76	52	47
Wednesday, March 16, 2022	23:00	54	63	50	48

Statistics	Leq	Lmax	L50	L90
Day Average	54	67	52	49
Night Average	50	62	47	43
Day Low	51	61	50	47
Day High	59	72	56	51
Night Low	44	56	41	38
Night High	54	76	52	48
Ldn	57	Day %		82
CNEL	58	Night %		18



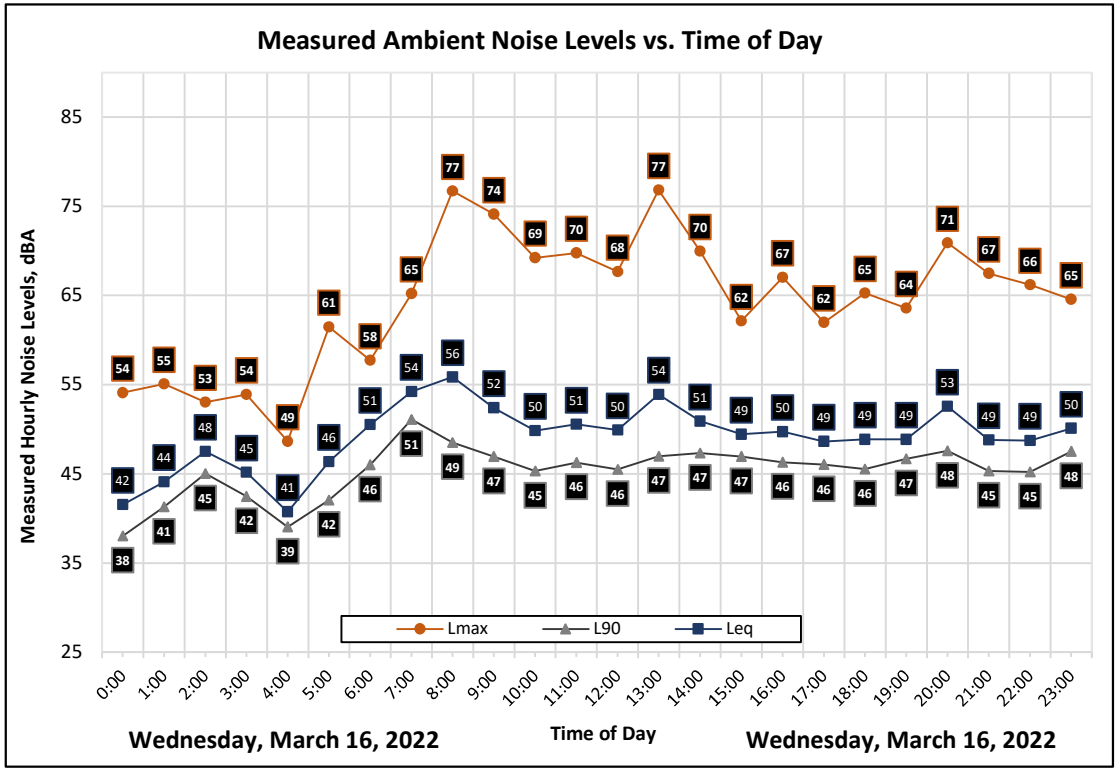


Appendix B4: Continuous Noise Monitoring Results

Site: LT-4
Project: SASD Stream Crossing
Meter: LDL 820-6
Location: Crossing #2 (Winding Way)
Calibrator: CAL200
Coordinates: 38.6434410°, -121.3551394°

Date	Time	Measured Level, dBA			
		L_{eq}	L_{max}	L_{50}	L_{90}
Wednesday, March 16, 2022	0:00	42	54	40	38
Wednesday, March 16, 2022	1:00	44	55	43	41
Wednesday, March 16, 2022	2:00	48	53	47	45
Wednesday, March 16, 2022	3:00	45	54	44	42
Wednesday, March 16, 2022	4:00	41	49	40	39
Wednesday, March 16, 2022	5:00	46	61	45	42
Wednesday, March 16, 2022	6:00	51	58	49	46
Wednesday, March 16, 2022	7:00	54	65	53	51
Wednesday, March 16, 2022	8:00	56	77	53	49
Wednesday, March 16, 2022	9:00	52	74	49	47
Wednesday, March 16, 2022	10:00	50	69	47	45
Wednesday, March 16, 2022	11:00	51	70	49	46
Wednesday, March 16, 2022	12:00	50	68	47	46
Wednesday, March 16, 2022	13:00	54	77	49	47
Wednesday, March 16, 2022	14:00	51	70	49	47
Wednesday, March 16, 2022	15:00	49	62	49	47
Wednesday, March 16, 2022	16:00	50	67	48	46
Wednesday, March 16, 2022	17:00	49	62	47	46
Wednesday, March 16, 2022	18:00	49	65	47	46
Wednesday, March 16, 2022	19:00	49	64	48	47
Wednesday, March 16, 2022	20:00	53	71	50	48
Wednesday, March 16, 2022	21:00	49	67	47	45
Wednesday, March 16, 2022	22:00	49	66	47	45
Wednesday, March 16, 2022	23:00	50	65	49	48

Statistics	Leq	Lmax	52.49	L90
Day Average	52	69	49	47
Night Average	47	57	45	43
Day Low	49	62	47	45
Day High	56	77	53	51
Night Low	41	49	40	38
Night High	51	66	49	48
Ldn	54	Day %		84
CNEL	55	Night %		16



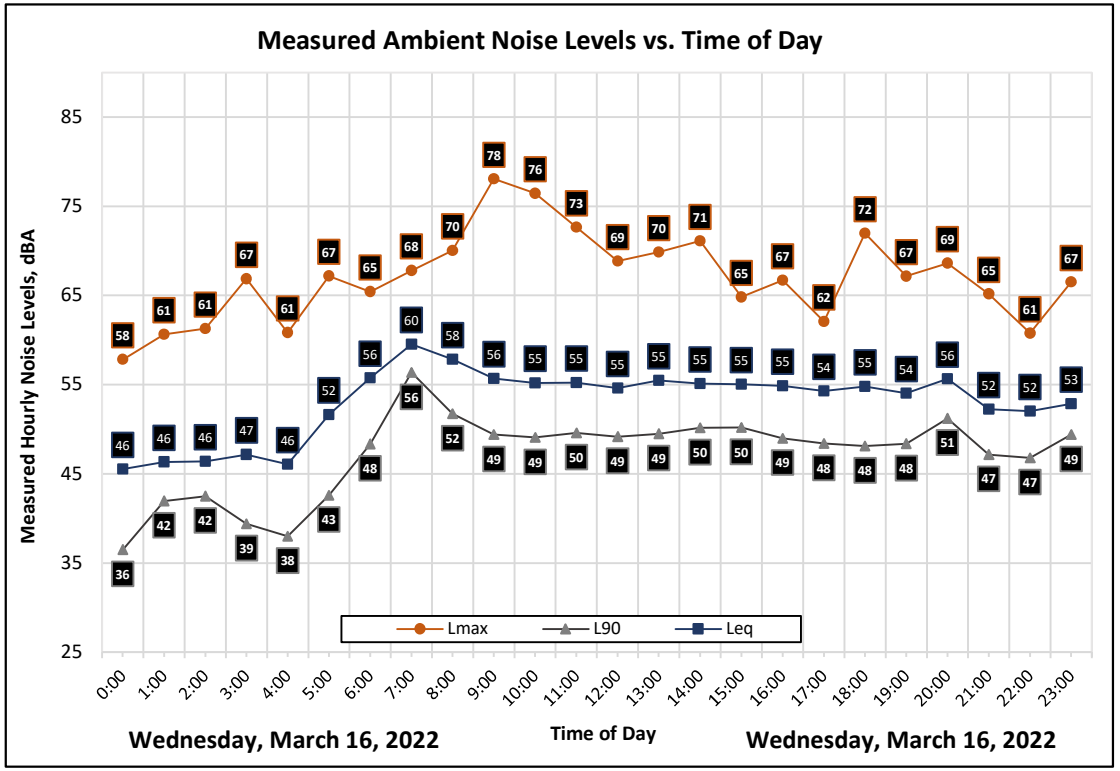


Appendix B5: Continuous Noise Monitoring Results

Site: LT-5
Project: SASD Stream Crossing
Location: Crossing #1 (Hope Lane)
Coordinates: 38.6412381°, -121.3505870°
Meter: LDL 820-5
Calibrator: CAL200

Date	Time	Measured Level, dBA			
		L_{eq}	L_{max}	L_{50}	L_{90}
Wednesday, March 16, 2022	0:00	46	58	40	36
Wednesday, March 16, 2022	1:00	46	61	45	42
Wednesday, March 16, 2022	2:00	46	61	45	42
Wednesday, March 16, 2022	3:00	47	67	42	39
Wednesday, March 16, 2022	4:00	46	61	40	38
Wednesday, March 16, 2022	5:00	52	67	47	43
Wednesday, March 16, 2022	6:00	56	65	55	48
Wednesday, March 16, 2022	7:00	60	68	59	56
Wednesday, March 16, 2022	8:00	58	70	57	52
Wednesday, March 16, 2022	9:00	56	78	54	49
Wednesday, March 16, 2022	10:00	55	76	53	49
Wednesday, March 16, 2022	11:00	55	73	54	50
Wednesday, March 16, 2022	12:00	55	69	53	49
Wednesday, March 16, 2022	13:00	55	70	54	49
Wednesday, March 16, 2022	14:00	55	71	54	50
Wednesday, March 16, 2022	15:00	55	65	54	50
Wednesday, March 16, 2022	16:00	55	67	54	49
Wednesday, March 16, 2022	17:00	54	62	53	48
Wednesday, March 16, 2022	18:00	55	72	53	48
Wednesday, March 16, 2022	19:00	54	67	52	48
Wednesday, March 16, 2022	20:00	56	69	55	51
Wednesday, March 16, 2022	21:00	52	65	50	47
Wednesday, March 16, 2022	22:00	52	61	51	47
Wednesday, March 16, 2022	23:00	53	67	52	49

Statistics	Leq	Lmax	L50	L90
Day Average	56	69	54	50
Night Average	51	63	46	43
Day Low	52	62	50	47
Day High	60	78	59	56
Night Low	46	58	40	36
Night High	56	67	55	49
Ldn	58	Day %		86
CNEL	58	Night %		14



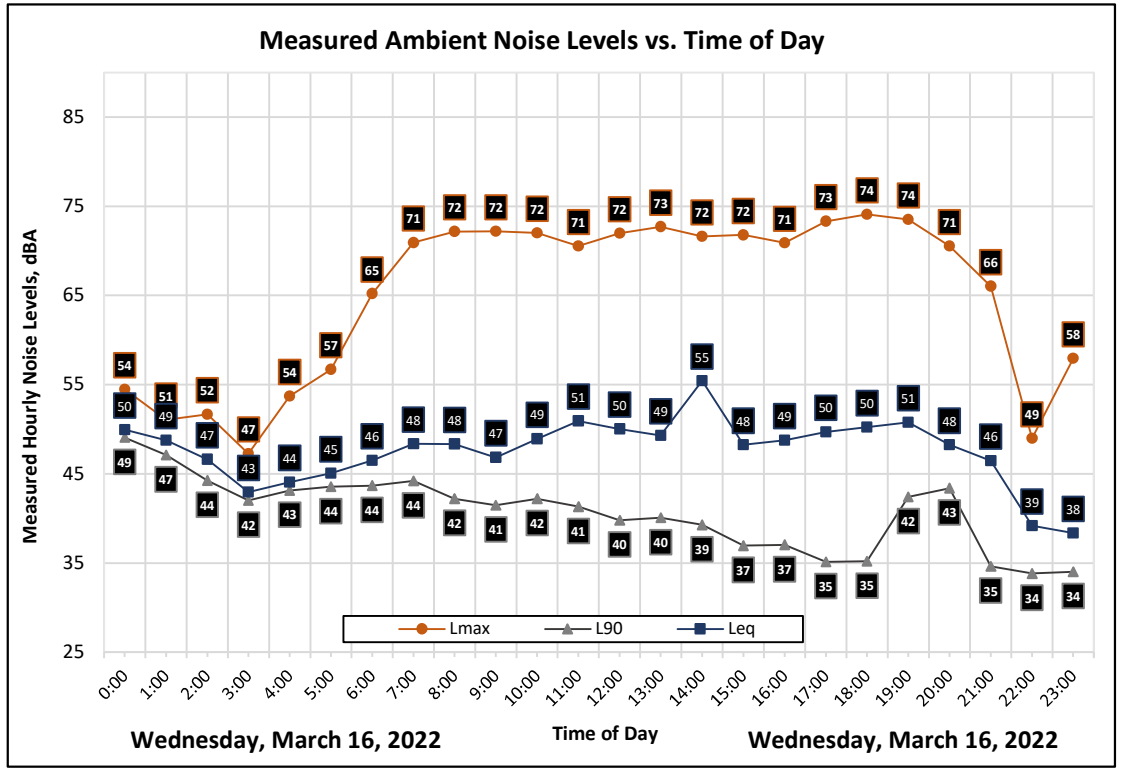


Appendix B6: Continuous Noise Monitoring Results

Site: LT-6
Project: SASD Stream Crossing
Location: Crossing #7 (San Lorenzo Way)
Coordinates: 38.6172663°, -121.3140416°
Meter: LDL 820-7
Calibrator: CAL200

Date	Time	Measured Level, dBA			
		L_{eq}	L_{max}	L_{50}	L_{90}
Wednesday, March 16, 2022	0:00	50	54	50	49
Wednesday, March 16, 2022	1:00	49	51	49	47
Wednesday, March 16, 2022	2:00	47	52	47	44
Wednesday, March 16, 2022	3:00	43	47	43	42
Wednesday, March 16, 2022	4:00	44	54	44	43
Wednesday, March 16, 2022	5:00	45	57	45	44
Wednesday, March 16, 2022	6:00	46	65	45	44
Wednesday, March 16, 2022	7:00	48	71	47	44
Wednesday, March 16, 2022	8:00	48	72	45	42
Wednesday, March 16, 2022	9:00	47	72	44	41
Wednesday, March 16, 2022	10:00	49	72	45	42
Wednesday, March 16, 2022	11:00	51	71	46	41
Wednesday, March 16, 2022	12:00	50	72	45	40
Wednesday, March 16, 2022	13:00	49	73	44	40
Wednesday, March 16, 2022	14:00	55	72	43	39
Wednesday, March 16, 2022	15:00	48	72	40	37
Wednesday, March 16, 2022	16:00	49	71	41	37
Wednesday, March 16, 2022	17:00	50	73	39	35
Wednesday, March 16, 2022	18:00	50	74	39	35
Wednesday, March 16, 2022	19:00	51	74	47	42
Wednesday, March 16, 2022	20:00	48	71	47	43
Wednesday, March 16, 2022	21:00	46	66	44	35
Wednesday, March 16, 2022	22:00	39	49	36	34
Wednesday, March 16, 2022	23:00	38	58	36	34

Statistics	Leq	Lmax	L50	L90
Day Average	50	72	44	40
Night Average	46	54	44	42
Day Low	46	66	39	35
Day High	55	74	47	44
Night Low	38	47	36	34
Night High	50	65	50	49
Ldn	53	Day %		81
CNEL	54	Night %		19





Appendix B7 : Short Term Noise Monitoring Results

Site: ST-1
Project: SASD Street Crossing
Location: Crossing #10 (Indiana River Dr.)
Coordinates: 38.6830229 °, -121.3248663°

Meter: LDL 831-2
Calibrator: CAL200

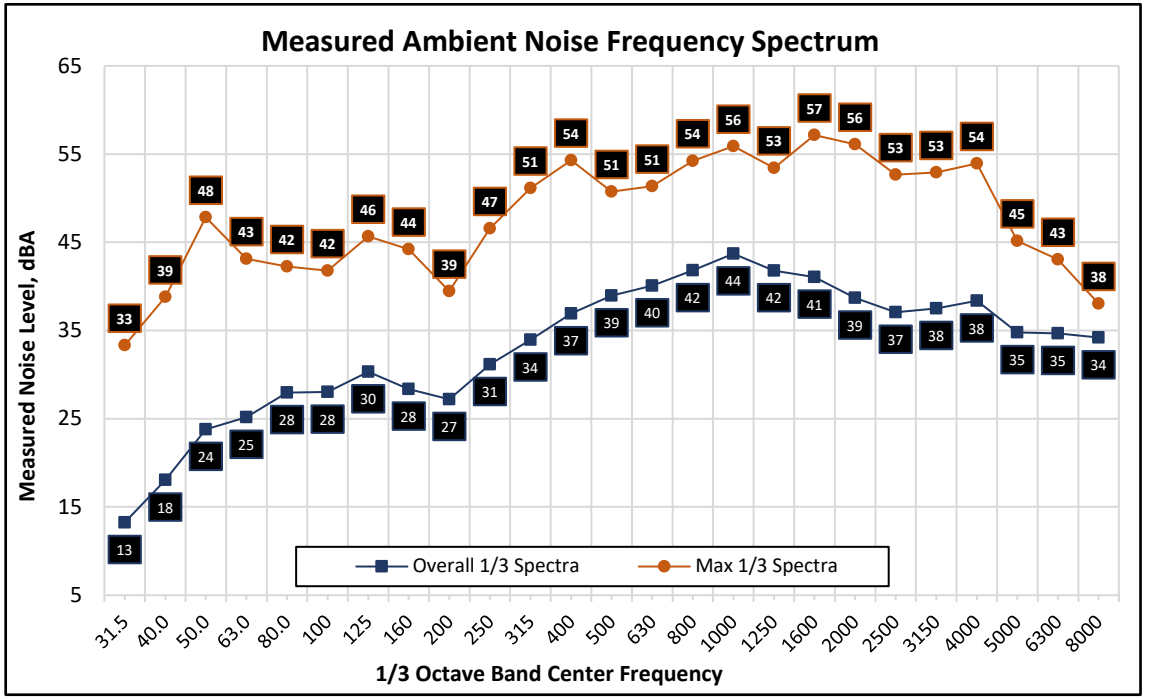
Start: 2022-03-14 09:50:37
Stop: 2022-03-14 10:00:37
SLM: Model 831
Serial: 3141

Measurement Results, dBA

Duration:	0:10
L_{eq}:	51
L_{max}:	65
L_{min}:	39
L_{50}:	46
L_{90}:	42

Notes

Primary noise sources include natural sounds such as birds and animals, traffic on Indian River Drive





Appendix B8 : Short Term Noise Monitoring Results

Site: ST-2
Project: SASD Stream Crossing
Location: Crossing #3 & #4 (Arcade Creek Park)
Coordinates: 38.6556539°, -121.3363069°

Meter: LDL 831-2
Calibrator: CAL200

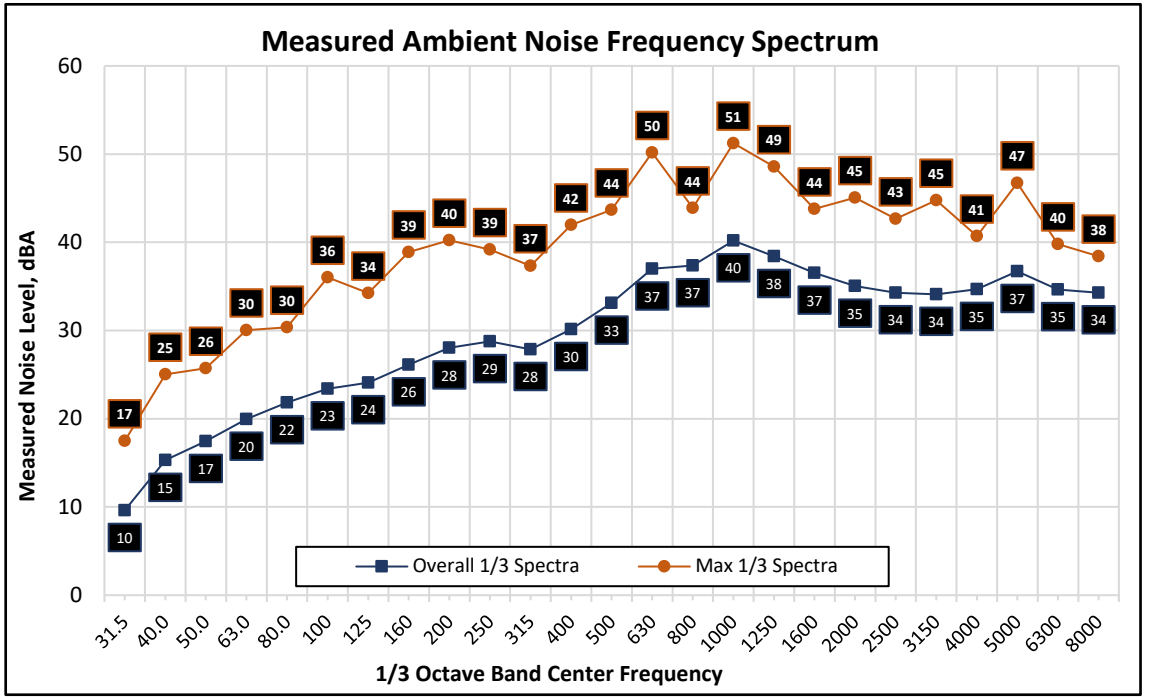
Start: 2022-03-14 10:38:23
Stop: 2022-03-14 10:48:23
SLM: Model 831
Serial: 3141

Measurement Results, dBA

Duration:	0:10
L_{eq}:	47
L_{max}:	56
L_{min}:	39
L_{50}:	46
L_{90}:	42

Notes

Primary noise sources include nature sounds (such as birds and small animals) and nearby dog park





Appendix B9 : Short Term Noise Monitoring Results

Site: ST-3
Project: SASD Street Crossing
Location: Crossing #3 & #4 (Rolling Oak Dr)
Coordinates: 38.6540518°, -121.3330501°

Meter: LDL 831-2
Calibrator: CAL200

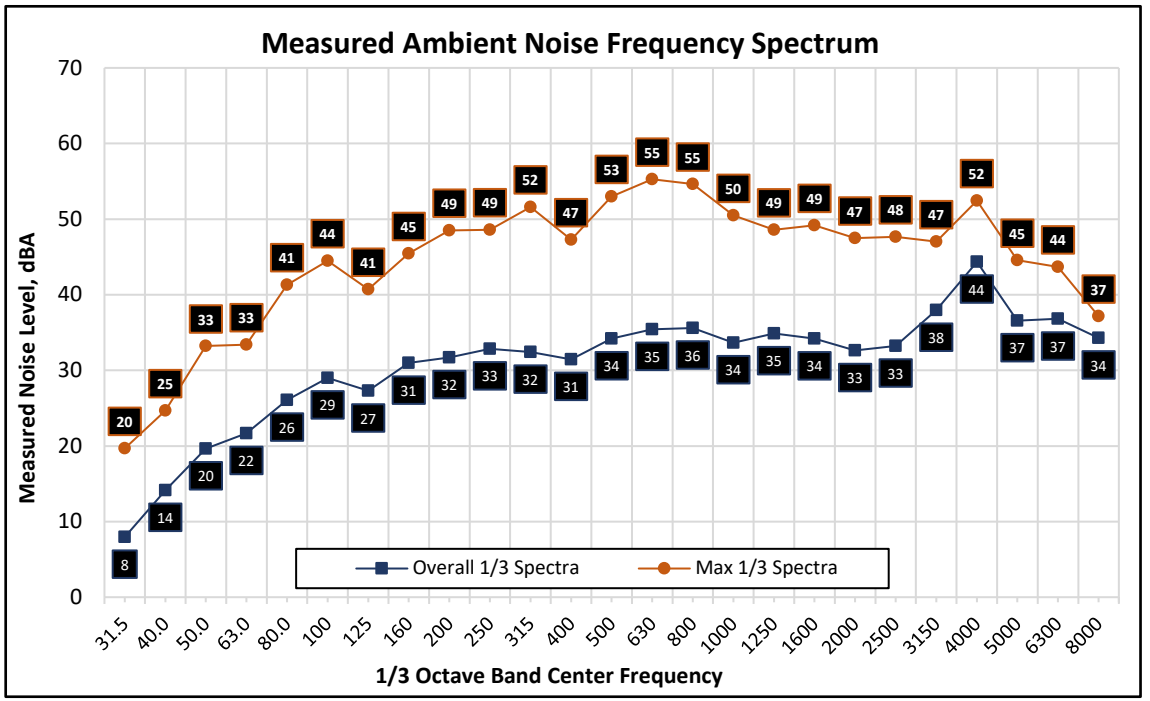
Start: 2022-03-14 10:58:19
Stop: 2022-03-14 11:08:19
SLM: Model 831
Serial: 3141

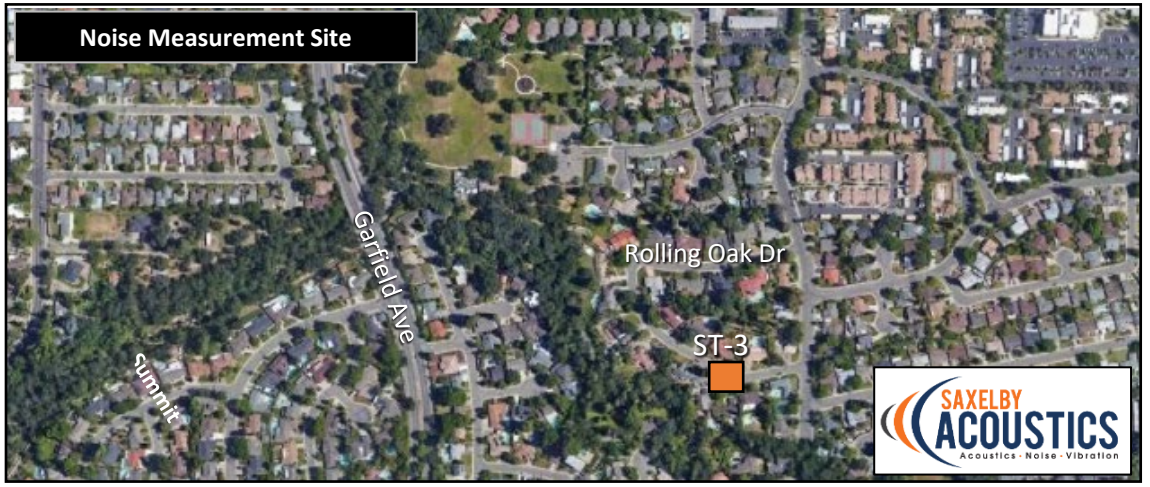
Measurement Results, dBA

Duration:	0:10
L_{eq}:	48
L_{max}:	61
L_{min}:	36
L_{50}:	46
L_{90}:	40

Notes

Primary noise sources include animal sounds such as birds and locals talking





Appendix B10 : Short Term Noise Monitoring Results

Site: ST-4
Project: SASD Stream Crossing
Location: Crossing #1 (Hope Lane)
Coordinates: 38.6412219°, -121.3506122°

Meter: LDL 831-2
Calibrator: CAL200

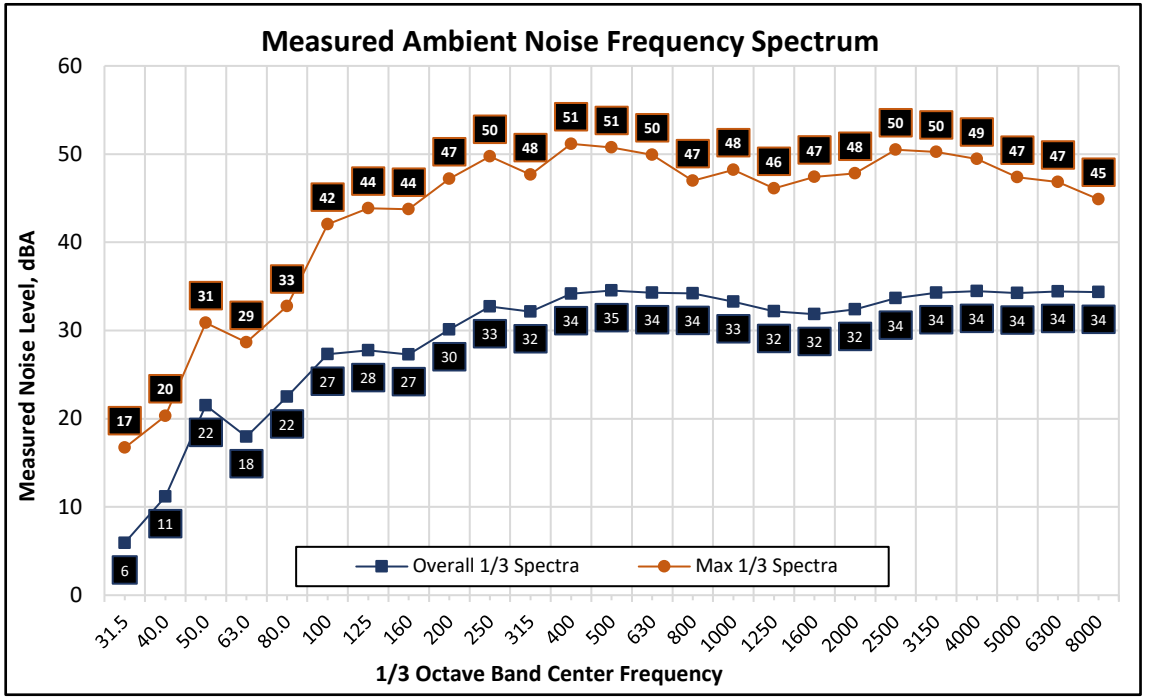
Start: 2022-03-14 11:45:15
Stop: 2022-03-14 11:55:15
SLM: Model 831
Serial: 3141

Measurement Results, dBA

Duration:	0:10
L_{eq}:	44
L_{max}:	58
L_{min}:	37
L_{50}:	40
L_{90}:	38

Notes

Primary sounds sources include dog barking and traffic on Hope Lane





Appendix B11 : Short Term Noise Monitoring Results

Site: ST-5
Project: SASD Street Crossing
Location: Crossing #8 (Sutter Ave)
Coordinates: 38.6327167°, -121.2980134°

Meter: LDL 831-2
Calibrator: CAL200

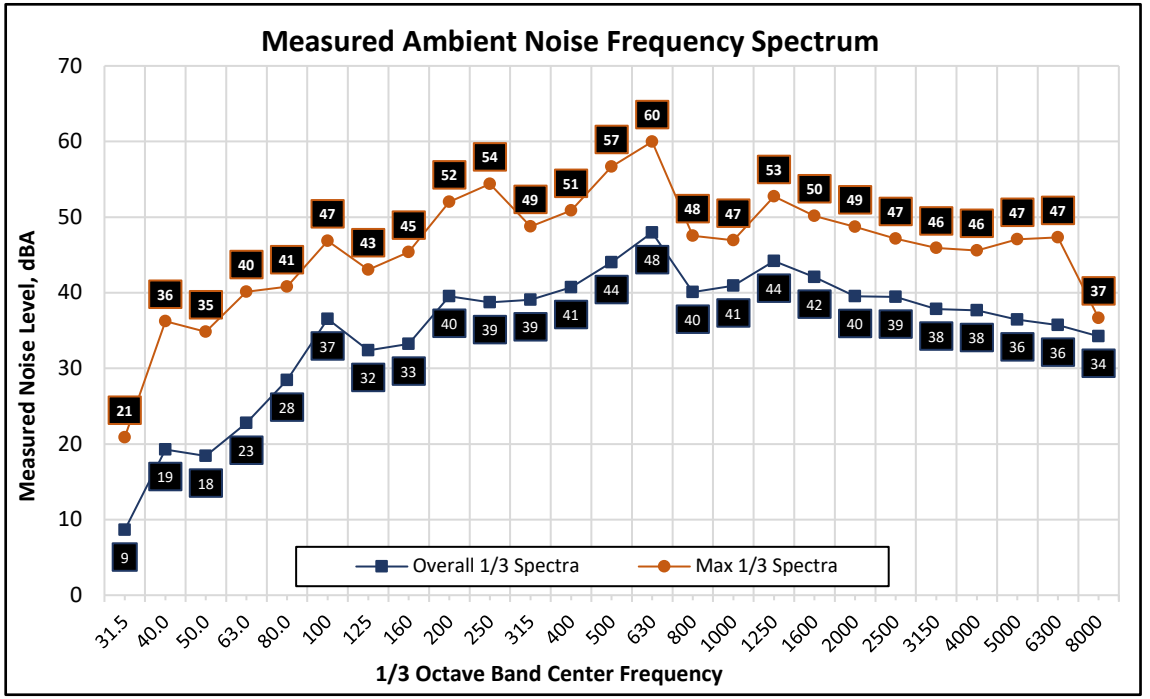
Start: 2022-03-14 12:58:10
Stop: 2022-03-14 13:08:10
SLM: Model 831
Serial: 3141

Measurement Results, dBA

Duration:	0:10
L_{eq}:	53
L_{max}:	62
L_{min}:	39
L_{50}:	52
L_{90}:	45

Notes

Primary sounds sources include nature sounds such as birds and traffic on Sutter Ave





Appendix B12 : Short Term Noise Monitoring Results

Site: ST-6
Project: SASD Street Crossing
Meter: LDL 831-2
Location: Crossing #11 & #12 (Pollard Ave & Dietz Way)
Calibrator: CAL200
Coordinates: 38.6479263°, -121.2579234°

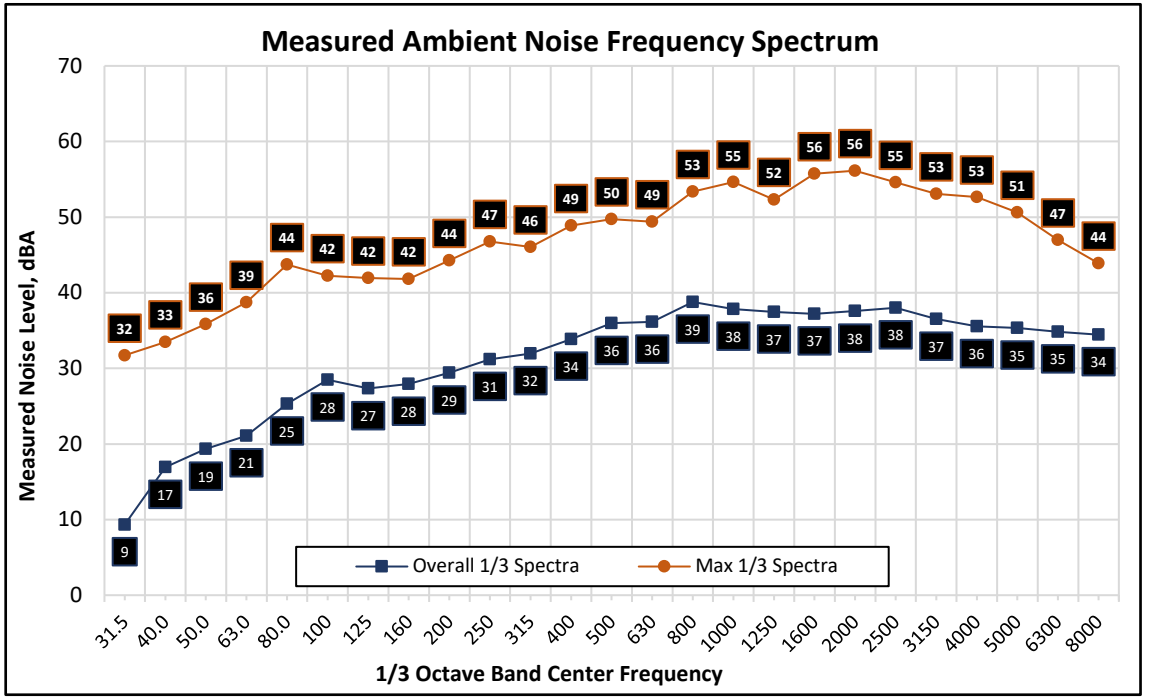
Start: 2022-03-14 13:19:40
Stop: 2022-03-14 13:29:40
SLM: Model 831
Serial: 3141

Measurement Results, dBA

Duration:	0:10
L_{eq}:	47
L_{max}:	63
L_{min}:	35
L_{50}:	42
L_{90}:	36

Notes

Primary noise source include nature sounds such as birds and turkeys and pedestrians





APPENDIX H

CULTURAL RESOURCES STUDY

APPENDIX H

Cultural Resources Survey for the

Sacramento Area Sewer District Creek Crossing Project

Sacramento County, California

Confidential

Sensitive archaeological material may have been removed from this Initial Study. The legal authority to restrict cultural resource information can be found in California Government Code sections 6254.10 and 6254®; California Code of Regulations Section 15120(d); and Section 304 of the National Historic Preservation Act of 1966.

APPENDIX I

AIR QUALITY AND GHG MODEL RUNS

Road Construction Emissions Model, Version 9.0.0

Daily Emission Estimates for -> SASD Sewer Line

Project Phases (Pounds)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	SOx (lbs/day)	CO2 (lbs/day)	CH4 (lbs/day)	N2O (lbs/day)	CO2e (lbs/day)
Grubbing/Land Clearing	1.26	11.85	12.15	0.68	0.67	0.00	0.57	0.57	0.00	0.03	2,815.27	0.40	0.10	2,855.69
Grading/Excavation	1.26	11.79	11.66	0.66	0.66	0.00	0.57	0.57	0.00	0.03	2,586.86	0.40	0.07	2,616.58
Drainage/Utilities/Sub-Grade	1.24	11.72	11.44	0.65	0.64	0.00	0.55	0.55	0.00	0.03	2,578.34	0.40	0.07	2,607.84
Paving	1.20	11.64	11.53	0.63	0.63	0.00	0.53	0.53	0.00	0.03	2,788.76	0.39	0.10	2,828.45
Maximum (pounds/day)	1.26	11.85	12.15	0.68	0.67	0.00	0.57	0.57	0.00	0.03	2,815.27	0.40	0.10	2,855.69
Total (tons/construction project)	0.23	2.13	2.11	0.12	0.12	0.00	0.10	0.10	0.00	0.00	478.62	0.07	0.01	484.46

Notes:

Project Start Year ->	2023
Project Length (months) ->	17
Total Project Area (acres) ->	0
Maximum Area Disturbed/Day (acres) ->	0
Water Truck Used? ->	No

	Total Material Imported/Exported Volume (yd^3/day)		Daily VMT (miles/day)			
Phase	Soil	Asphalt	Soil Hauling	Asphalt Hauling	Worker Commute	Water Truck
Grubbing/Land Clearing	31	31	60	60	840	1
Grading/Excavation	8	8	30	30	840	1
Drainage/Utilities/Sub-Grade	9	9	30	30	840	1
Paving	21	21	60	60	840	1

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns G and H. Total PM2.5 emissions shown in Column I are the sum of exhaust and fugitive dust emissions shown in columns J and K.

CO2e emissions are estimated by multiplying mass emissions for each GHG by its global warming potential (GWP), 1 , 25 and 298 for CO2, CH4 and N2O, respectively. Total CO2e is then estimated by summing CO2e estimates over all GHGs.

Total Emission Estimates by Phase for -> SASD Sewer Line

Project Phases (Tons for all except CO2e. Metric tonnes for CO2e)	ROG (tons/phase)	CO (tons/phase)	NOx (tons/phase)	Total PM10 (tons/phase)	Exhaust PM10 (tons/phase)	Fugitive Dust PM10 (tons/phase)	Total PM2.5 (tons/phase)	Exhaust PM2.5 (tons/phase)	Fugitive Dust PM2.5 (tons/phase)	SOx (tons/phase)	CO2 (tons/phase)	CH4 (tons/phase)	N2O (tons/phase)	CO2e (MT/phase)
Grubbing/Land Clearing	0.02	0.22	0.22	0.01	0.01	0.00	0.01	0.01	0.00	0.00	51.10	0.01	0.00	47.02
Grading/Excavation	0.09	0.86	0.85	0.05	0.05	0.00	0.04	0.04	0.00	0.00	187.81	0.03	0.00	172.33
Drainage/Utilities/Sub-Grade	0.08	0.74	0.73	0.04	0.04	0.00	0.04	0.04	0.00	0.00	163.79	0.03	0.00	150.29
Paving	0.03	0.32	0.31	0.02	0.02	0.00	0.01	0.01	0.00	0.00	75.92	0.01	0.00	69.86
Maximum (tons/phase)	0.09	0.86	0.85	0.05	0.05	0.00	0.04	0.04	0.00	0.00	187.81	0.03	0.00	172.33
Total (tons/construction project)	0.23	2.13	2.11	0.12	0.12	0.00	0.10	0.10	0.00	0.00	478.62	0.07	0.01	439.50

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns G and H. Total PM2.5 emissions shown in Column I are the sum of exhaust and fugitive dust emissions shown in columns J and K.

CO2e emissions are estimated by multiplying mass emissions for each GHG by its global warming potential (GWP), 1 , 25 and 298 for CO2, CH4 and N2O, respectively. Total CO2e is then estimated by summing CO2e estimates over all GHGs.

The CO2e emissions are reported as metric tons per phase.