Draft

NORTH MARIN LINE STABILIZATION PROJECT

Supplemental Initial Study/Mitigated Negative Declaration

Prepared for
Marin Municipal Water District

October 2025

ESA

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[Additional info, if needed]

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TABLE OF CONTENTS

North Marin Line Stabilization Project – Supplemental Initial Study/Mitigated Negative Declaration

Page

Chapter 1, Background and Purpose of the Supplemetal IS/MND 1-1
1.1 Background 1-1
1.2 Purpose of This Supplemental IS/MND 1-4

Chapter 2, Project Description 2-1
2.1 Summary of Previously Approved Project 2-1
2.2 Modified Project Components 2-1
2.3 Construction 2-4
2.4 Operations 2-7
2.5 Required Permits and Approvals 2-7

Chapter 3, Initial Study and Environmental Checklist 3-1
3.1 Aesthetics 3-3
3.2 Agriculture and Forestry 3-5
3.3 Air Quality 3-6
3.4 Biological Resources 3-10
3.5 Cultural Resources 3-20
3.6 Energy 3-22
3.7 Geology and Soils 3-24
3.8 Greenhouse Gas Emissions 3-27
3.9 Hazards and Hazardous Materials 3-30
3.10 Hydrology and Water Quality 3-33
3.11 Land Use and Planning 3-40
3.12 Mineral Resources 3-41
3.13 Noise 3-42
3.14 Population and Housing 3-45
3.15 Public Services 3-46
3.16 Recreation 3-47
3.17 Transportation 3-48
3.18 Tribal Cultural Resources 3-52
3.19 Utilities and Service Systems 3-54
3.20 Wildfire 3-56
3.21 Mandatory Findings of Significance 3-59

Chapter 4, Report Preparers 4-1

Appendices

A 2016 IS/MND A-1
B Standard Environmental Protection Measures....B-1
C Air Quality Supporting Information C-1

List of Figures

1-1 Existing Conditions (Site 1) 1-2
1-2 Existing Conditions (Site 2) 1-3
2-1 Project Components.... 2-3
3-1 CNDDB Plant Occurrences 3-13
3-2 CNDDB Wildlife Occurrences.... 3-14

List of Tables

2-1 North Marin Line Stabilization Project Components 2-2
2-2 Estimated Construction Schedule and Equipment 2-5
3-1 BAAQMD Air Quality Thresholds – Criteria Air Pollutants 3-7
3-2 Average Daily Criteria Pollutant Emissions from Project Construction 3-7
3-3 Special-Status Species with Potential to Occur in the Project Area 3-12

CHAPTER 1
Background and Purpose of the Supplemental IS/MND

1.1 Background

Marin Municipal Water District (Marin Water or the District) was chartered in April 1912 as California's first municipal water district. Today, Marin Water supplies water to more than 191,000 customers in central and southern Marin County through about 61,700 active service connections. Water is stored in the District's seven local reservoirs: Alpine, Bon Tempe, Kent, Lagunitas, Nicasio, Phoenix, and Soulajule.

The North Marin Line (NML) was constructed in 1957 to convey raw water from Marin Water's Kent Lake and Nicasio Reservoir to the San Geronimo Treatment Plant. The pipeline's alignment generally follows an old railroad grade, and portions of it are aging, leak prone, and seismically deficient. The NML's two crossings of San Geronimo Creek are 34-inch American Concrete Cylinder Pipe, with unrestrained bell and spigot joints (refer to **Figures 1-1** and **1-2** for site photos). The pipe is supported on concrete trestles installed in the creek bottom and emerges from the ground through the San Geronimo Creek banks, approximately 2-4 feet below the top of bank. District engineers have determined that the two crossings are seismically unsound in the event of a significant event, thereby jeopardizing the flow of raw water for treatment and subsequent distribution to the over 191,000 people who reside within the district's service boundaries. These two creek crossing are also identified for replacement by the County of Marin's Fire Chief Association and are part of the District's Fire Flow Improvement Program.

Marin Water documented replacement of the aging pipeline in the North Marin Line Stabilization Project Initial Study/Mitigated Negative Declaration (2016 IS/MND), which was published in April 2016 and adopted by Marin Water's Board of Directors (Board) in June 2016 (refer to **Appendix A** for the 2016 IS/MND).[1] The IS/MND evaluated potential environmental impacts that could occur as a result of implementing the Project, and provided applicable mitigation to reduce the intensity of potential environmental impacts. The original Project was to replace two existing San Geronimo Creek pipeline crossings with seismically resistant crossings.

Subsequent to adoption of the 2016 IS/MND, the Project has undergone further development. Chapter 2 of this Supplemental IS/MND presents an updated description of the Project. Chapter 3 presents an evaluation of the environmental impacts that have changed since those disclosed in the 2016 IS/MND and Chapter 4 lists the report preparers.

[1] Marin Municipal Water District, North Marin Line Stabilization Project Initial Study/Mitigated Negative Declaration, April 2016.







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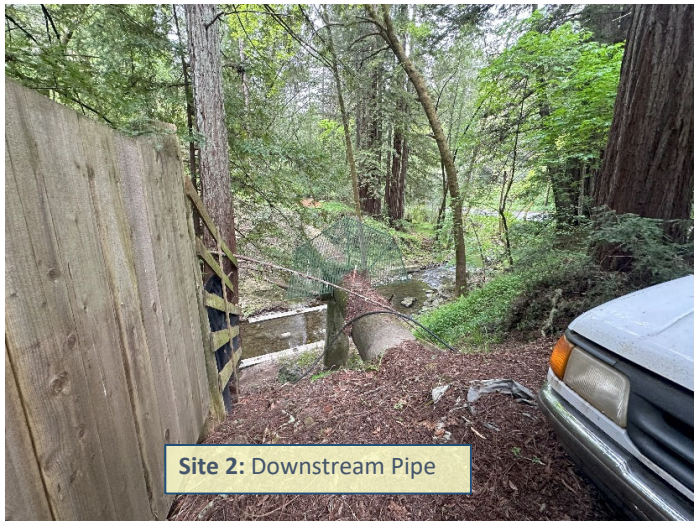
SOURCE: Marin Water, April 16, 2025

North Marin Line Stabilization Project

Figure 1-1
Existing Conditions (Site 1)

ESA







D201900090.17 - North Marin Line/05 Graphics-GIS-Modeling/Illustrator

SOURCE: Marin Water, April 16, 2025

North Marin Line Stabilization Project

Figure 1-2
Existing Conditions (Site 2)

ESA

1.2 Purpose of This Supplemental IS/MND

This supplement to the 2016 IS/MND is being prepared consistent with CEQA Sections 15162 (Subsequent EIRs and Negative Declarations) and 15163 (Supplement to an EIR). While Section 15163 specifically mentions supplements to Environmental Impact Reports (EIRs), the underlying principles regarding supplemental environmental review under CEQA can also apply to Negative Declarations and Mitigated Negative Declarations through CEQA Section 15162, which deals with subsequent EIRs and Negative Declarations.

The CEQA Guidelines Section 15163 allow a lead agency to prepare a supplement to a previously adopted IS/MND if:

- "Any of the conditions described in Section 15162 [subsequent EIRs and Negative Declarations] would require the preparation of a subsequent [document], and
- Only minor additions or changes would be necessary to make the previous [document] adequately apply to the project in the changed situation."

When compared to the original project contemplated in the 2016 IS/MND, Marin Water determined that the potential environmental impacts of the revised Project disclosed in this evaluation would be different (i.e., new significant environmental impacts or a substantial increase in the severity of previously identified significant impacts) than those impacts disclosed in the 2016 IS/MND. However, the potential impacts of the revised Project were found to not be of a level of significance that they could not be reduced below current significance thresholds with adequate and feasible mitigation measures (i.e., no significant and unavoidable impacts). Therefore, Marin Water has determined that this Supplemental IS/MND is the appropriate means under CEQA to document and disclosed the revised Project's impacts on the environment and the mitigative actions that would reduce those impacts to the less-than-significant level. Consistent with Section 15163, this supplement to the 2016 IS/MND:

1. Need contain only the information necessary to make the previous [document] adequate for the project as revised.
2. Shall be given the same kind of notice and public review as is given to a draft [negative declaration under Section 15073].
3. May be circulated by itself without recirculating the previous draft or final [document].
4. When the agency decides whether to approve the project, the decision-making body shall consider the previous [IS/MND] as revised by the supplemental EIR.

Public Review Period

Publication of this Supplemental IS/MND marks the beginning of a 30-day public review and comment period. During this period, the Supplemental IS/MND will be available to local, state, and federal agencies and to interested organizations and individuals for review. Written comments concerning the environmental review contained in this IS/MND should be submitted by 5:00 p.m. on Monday, November 17, 2025 to:

Carly Blanchard, Environmental Planner
Marin Water
220 Nellen Ave.
Corte Madera, CA 94925
415.945.1528
carly.blanchard@marinwater.org

Consideration of the IS/MND and Project

Following the conclusion of the public review period, the Board will consider the adoption of this Supplemental IS/MND for the Project at a regularly scheduled meeting. The Board shall consider the IS/MND together with any comments received during the public review process. Upon adoption of the MND, Marin Water may proceed with Project approval actions.

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CHAPTER 2
Project Description

2.1 Summary of Previously Approved Project

The Project analyzed in the 2016 IS/MND proposed to replace the existing 34-inch ACCP trestle-supported pipeline crossings with 36-inch welded steel pipes installed within single span (without the need for mid-span trestle support) steel trusses. The replacement pipes were proposed to emerge from the ground approximately 20-feet back of the creek's top-of-bank and rise approximately 2-3-feet above the adjacent ground surface before crossing the creek. Construction was anticipated to take three months to complete the following phases:

- Install piers for new pipeline crossings;
- Install steel truss and new pipeline at each crossing;
- Connect new pipeline segments to the existing north Marin Line;
- Remove the existing pipeline segments; and
- General site clean-up.

2.2 Modified Project Components

Following adoption of the 2016 IS/MND, Marin Water proceeded with design of the Project, resulting in modifications. **Table 2-1** summarizes key features of the Project described in the 2016 IS/MND as well as proposed changes to the Project, which are described and evaluated in this document. Refer to **Figure 2-1** for location of Project components.

TABLE 2-1
NORTH MARIN LINE STABILIZATION PROJECT COMPONENTS

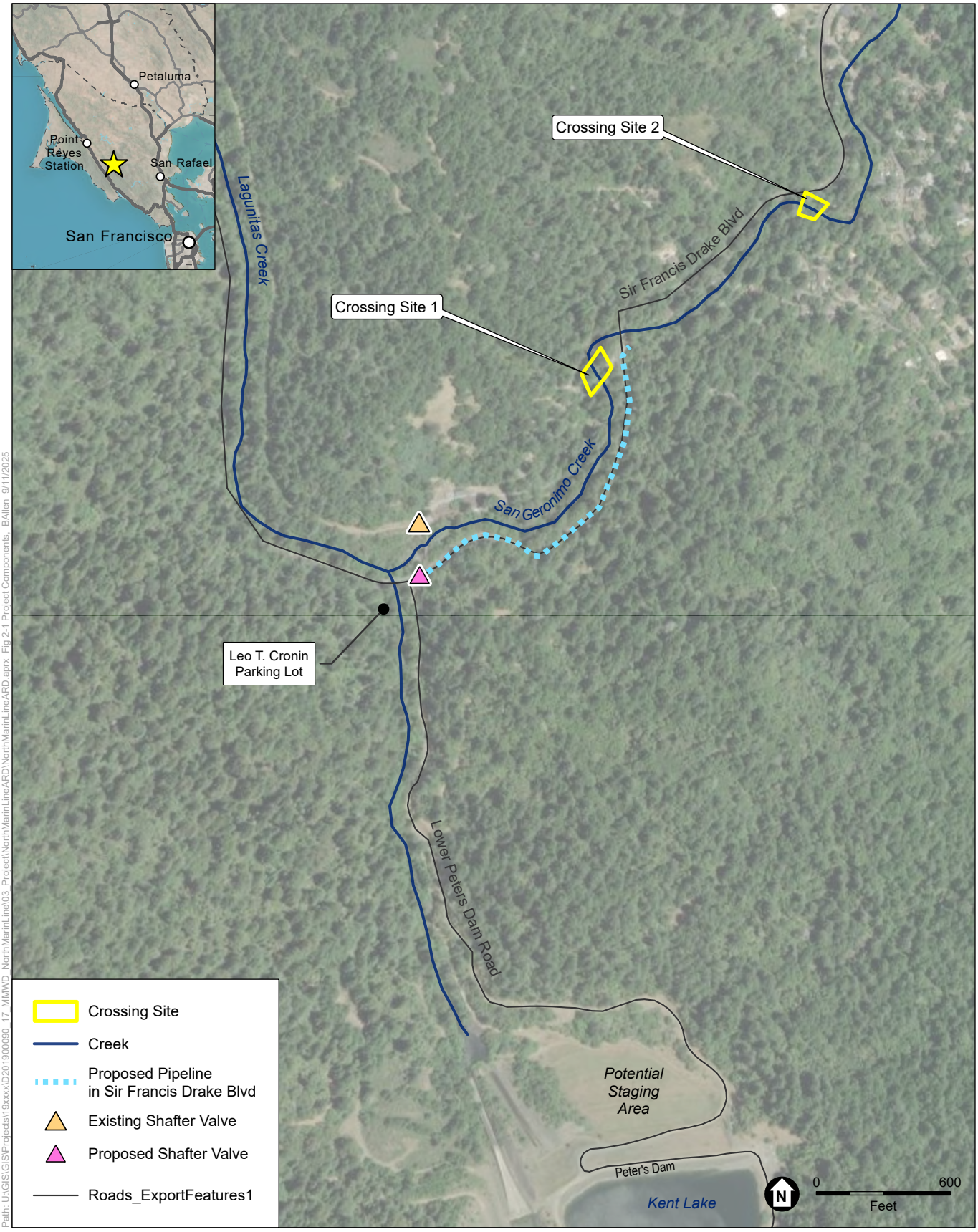
Project Component	Summary of Previous Project from 2016 IS/MND	Summary of Modified Project
Replacement Pipeline	• Replace existing 34-inch ACCP trestle-supported pipeline crossings at Sites 1 and 2 with 36-inch welded steel pipes • New pipelines would emerge from the ground approximately 20-feet back of the creek's top-of-bank and rise approximately 2-3-feet above the adjacent ground surface before crossing the creek. • New pipelines would be aligned with an offset several feet from the existing pipes to allow the new pipes to be installed without needing to first take the existing crossings out of service, except for the final tie-in of the new to the existing pipeline.	• Same as approved Project at crossing Site 2 only • Instead of crossing San Geronimo Creek at Site 1, an approximately 1,700-foot segment of pipeline would be installed within Sir Francis Drake Boulevard. Pipeline installation would include relocation of Marin Water's Shafter Valve.
Replacement Trusses/Piers	• Install single span steel trusses supported on drilled piers • Drilled piers would be approximately 3-5-feet back of top-of-bank, 20- to 30-feet deep below the ground surface, and extend 6 inches above the surrounding ground surface.	• Same as approved Project at crossing Site 2 only
Removal of Existing Pipeline	• Cut and removal existing pipeline after installation of replacement pipeline	• Same as approved Project
Removal of Existing Piers	• Not included	• Cut and remove existing piles in San Geronimo Creek at Sites 1 and 2
Temporary Creek Dewatering	• Not included	• Dewatering upstream and downstream to 'dry' out work area in order to construct and remove project components per drawings and provide safe access to work areas.

Replacement Pipeline, Trusses, and Infrastructure

As indicated in Table 2-1, the design of the proposed new pipelines and steel trusses would be the same as described in the 2016 IS/MND for crossing Site 2. Instead of replacing the pipeline at crossing Site 1, a new 36-inch welded steel pipeline would be installed within Sir Francis Drake Boulevard (refer to Figure 2-1). The proposed replacement alignment would begin near the intersection of Sir Francis Drake Boulevard and Lower Peters Dam Road downstream of Kent Lake (Peters Dam). From which, the alignment would continue easterly in Sir Francis Drake Boulevard for approximately 1,700 feet, at which point the pipeline would tie-in to the existing North Marin Line.

The Project also includes replacement of Marin Water's Shafter Valve, which is currently located near the Shafter Bridge in Lagunitas.[1] The valve would be relocated onto Marin Water property, south of Sir Francis Drake Boulevard at the intersection of San Geronimo Ridge Road (refer to Figure 2-1). The existing valve would likely be removed and replaced with new pipe/fitting.

[1] San Geronimo Treatment Plant receives raw water from either Kent Lake or Nicasio Lake independently or in a seasonal blend. The Shafter Valve provides Marin Water the ability to isolate flow dependent on the desired source water at the San Geronimo Treatment Plant. The valve is currently on privately owned land and requires frequent maintenance.



SOURCE: Maxar, 2024; Marin Co., 2024; Esri, 2025; ESA, 2025

Figure 2-1
Project Components

ESA

Removal of Existing Pipeline and Piers

As indicated in Table 2-1, removal of the existing pipeline at Site 2 would be the same as described in the 2016 IS/MND. At Site 1, the existing pipeline that crosses above San Geronimo Creek would be demolished after the new pipeline segment in Sir Francis Drake Boulevard is constructed and tied into, at which time the remaining existing pipeline segment that would no longer be utilized and would be capped and abandoned in place.

Since adoption of the 2016 IS/MND, removal of the existing piles within San Geronimo Creek has been added to the Project. The piles would be removed in a top-down fashion, cutting the piles into smaller pieces for easier removal. Pile removal was added to the Project because Marin Water identified the piles as a potential debris collection hazard that could threaten the new pipeline and its operation. In recent years, a large tree washed downstream and was pinned between one of the piles and the creek bank. As a result, debris traveling downstream accumulates in this area. During larger storm events, large debris could travel downstream and continue to become similarly pinned and/or accumulate, which could threaten the new pipeline should material accumulate to the point that it could strike and damage the new pipeline.

Additional Details

The 2016 IS/MND assumed that tree removal would not be anticipated as part of the Project. However, based on a May 2025 site visit, it was determined that tree removal may be necessary in order to safely access work areas and accommodate construction equipment. Construction could require the removal of approximately one to three trees, trimming of branches, and removal and trimming of other existing vegetation around the top of bank at each crossing site. As indicated in the 2016 IS/MND, installation of the new pipe crossing at Site 2 would not require general surface grading.

2.3 Construction

Construction Schedule, Hours, and Work Force

Project construction is expected to occur over approximately three and a half months between August and November 2026. Pursuant to **Mitigation Measure 4-3** in the 2016 IS/MND, all work would be conducted during the period of August 1 through January 31, which is outside of the northern spotted owl nesting season. If work were to occur before August 1, Marin Water would commission two surveys for nesting northern spotted owls during the months of April and May preceding the commencement of construction. At a minimum, the survey area would include all suitable nesting habitats within 0.25-mile of the Project site. If, following the first or second survey it can be conclusively determined that there are nesting northern spotted owls, construction activities that are within 0.25-mile of an identified active nest would not begin prior to August 1 unless the young have fledged, at which time construction or staging may begin no earlier than July 10. Construction activities occurring within San Geronimo Creek would be limited to the 'dry-construction' season, April 1 to October 15, unless an extension is approved by the regulatory agencies.

Table 2-2 shows the currently anticipated construction schedule and equipment for each Project component. Pursuant to **Mitigation Measure 11-1** in the 2016 IS/MND, construction will be limited to

between the hours of 7:00 a.m. and 6:00 p.m., Mondays through Fridays, and 9:00 a.m. to 5:00 p.m. on Saturdays; no nighttime, Sunday, or holiday construction would occur. Generally, four to eight workers would be working at a construction site at any given time. Approximately eight construction truck trips are anticipated per day.

Staging and Access

Construction and material staging would occur in the same locations as indicated in the 2016 IS/MND, at the crossing sites and within Marin Water's 20-foot-wide pipeline easement. Construction and material staging for the proposed alignment in Sir Francis Drake Boulevard would occur at Kent Lake (Peters Dam) or Leo T. Cronin parking lot, both of which are located on Marin Water property and in close proximity to the proposed alignment (refer to Figure 2-1 for the location of the potential staging area). Construction access would still be from Sir Francis Drake Boulevard.

TABLE 2-2
ESTIMATED CONSTRUCTION SCHEDULE AND EQUIPMENT

Project Component/ Construction Phase	Approximate Duration	Estimated Schedule	Potential Construction Equipment
Mobilize	1 week	August 2026	
Install new pipeline in Sir Francis Drake Boulevard	8 weeks	August – October 2026	Excavator, backhoe, dump trucks, compactor, pneumatic tools
Relocate Shafter Valve	4 weeks	August – September 2026	Excavator, dump truck, compactor, pneumatic and hand tools
Install piers, streel truss, and new pipeline crossing at Site 2	3 weeks	September 2026	Drill-rig, excavator, crane, haul trucks, pneumatic tools, temporary construction scaffolding
Connect new pipeline segments to existing North Marin Line	2 weeks	September – October 2026	Welding equipment, pneumatic tools, excavator, telehandler, boom truck, temporary construction scaffolding
Remove existing pipeline segments	3 weeks	September – October 2026	Pneumatic tools, excavator, telehandler, boom truck, temporary construction scaffolding, haul trucks
Cut existing in-channel piles	3 weeks	September – October 2026	Pneumatic tools, excavator, telehandler, boom truck, temporary construction scaffolding, haul trucks
Repave Sir Francis Drake Boulevard	2 weeks	October - November 2026	Dump Trucks, asphalt paver, compactor
General Site Clean-up	1 week	November 2026	
Note: Construction activities occurring within San Geronimo Creek would be limited to the 'dry-construction' season, April 1 to October 15, unless an extension is approved by the regulatory agencies.			

Excavation

Consistent with the 2016 IS/MND, excavation during Project construction would include:

- Vertically drilling holes behind the top-of-bank for installation of pier foundations to support the steel trusses; and
- Excavation to expose the existing 34-inch ACCP pipe behind the top-of-bank to install pipe bends to bring the pipe out of the ground to the elevation necessary to ensure the pipe and steel trusses are above the projected 100-year storm flows of San Geronimo Creek.

As indicated above, installation of approximately 1,700 linear feet of new 36-inch welded steel pipeline in Sir Francis Drake Boulevard has been added to the Project since adoption of the 2016 IS/MND. Pipeline installation would include excavation along Sir Francis Drake Boulevard, which would be backfilled per Marin County's 2018 Uniform Construction Standards.

In total, the excavations are anticipated to produce approximately 1,700-cubic yards of material that would be hauled offsite for disposal (increased from the approximately 100 cubic yards that was noted in the 2016 IS/MND).

Construction in Sir Francis Drake Boulevard

Pipeline installation in Sir Francis Drake Boulevard would generally be conducted using open trench construction, except at culvert crossings where jack and bore installation would be used to install the pipeline under the existing culverts. One lane of Sir Francis Drake Boulevard would be closed during pipeline installation, and Marin Water would repave the road after pipeline installation in accordance with Marin County's 2018 Uniform Construction Standards. The relocated Shafter Valve would be installed within the pipeline's open trench.

Pipeline Removal

Removal of the existing pipeline at each creek crossing would likely occur using one of the following methods:

- *Method 1:* Contractors may use a boom lift, tele-handler, or long-reach excavator to cut and remove sections of pipe. Equipment would operate from top of banks.
- *Method 2:* Contractors may install temporary construction scaffolding within the creek channel, and utilize boom lift, tele-handler or long-reach excavator to cut and remove sections of pipe.

Pile Cutting

Cutting of the existing piles would be performed with no excavation in a top-down manner. During demolition/removal of overwater features, temporary platforms or other suitable means, such as debris netting, would be installed beneath the work area to capture and prevent debris from falling into the creek. Any debris that accidentally falls into the creek would be removed. To further reduce the risk of contamination associated with demolition activities, silt curtains, or other suitable means identified in the approved environmental permits could be deployed in the creek or along the creek banks. The curtain(s) would be of sufficient length to enclose work area and pile removal equipment.

Pipeline Dewatering

As indicated in the 2016 IS/MND, prior to connecting the new pipeline crossing and in-road segment to the North Marin Line, the pipeline would be dewatered. Marin Water maintains a dewatering valve near the confluence of San Geronimo and Lagunitas Creeks. The rate of dewatering flow from that valve would be metered to ensure there is no scouring or turbidity within the creeks.

Creek Dewatering

Dewatering of adjacent segments of San Geronimo Creek may be necessary to install the proposed structures and cut the existing piles. Temporary creek dewatering structures would be installed at upstream and downstream locations for each creek crossing and would include use of the following materials: gravel access ramps, timber crane mats, cofferdams, pipes, pump(s), and screens to convey creek flow through the work area. A Creek Dewatering Plan would be prepared by the construction contractor and submitted to Marin Water for review prior to performing any creek dewatering activities. Debris racks and fish screens would be installed upstream of inlets at each crossing, and the downstream sections would include energy dissipaters of conveyed water prior to re-entering the creek beds in order to minimize scouring. Flow monitoring would occur before Project implementation in order to establish base line creek flow and to appropriately size conveyance equipment, and throughout construction to maintain seasonal flows through the Project area.

Standard Environmental Protection Measures

Marin Water has adopted a list of standard environmental protection measures that contractors must follow during construction, including S01000 Environmental Protection High Fire Danger Alerts and Closures, S01800 Environmental Protection, and S02200 Earthwork (refer to **Appendix B**). These measures would help to minimize impacts related to biological and cultural resources, wildfire risks, and release of hazardous materials into the watershed. This environmental analysis presented in Chapter 3 assumes these measures would be implemented.

Additionally, the 2016 IS/MND (included as Appendix A) identifies mitigation measures that apply to the Project and were adopted by the Marin Water Board of Directors on June 21, 2016. For the purposes of this Supplemental IS/MND, the mitigation measures in the 2016 IS/MND are considered part of the Project.

2.4 Operations

Once construction is complete, the pipeline would operate as it currently does, providing water to Marin Water customers. No additional staff would be hired to operate the pipeline, and no additional operational or maintenance vehicle trips are anticipated.

2.5 Required Permits and Approvals

The permits and approvals required for the Project include the following listed in Section 10 of the 2016 IS/MND Environmental Checklist Form (page 17):

- California Department of Fish and Wildlife California Fish and Game Code Section 1602 Lake or Streambed Alternation Notification
- San Francisco Bay Regional Water Quality Control Board Clean Water Act Section 401 Water Quality Certification
- U.S. Army Corps of Engineers Clean Water Act Section 404 Nationwide Permit

In addition to the permits noted in the 2016 IS/MND, construction of the new pipeline in Sir Francis Drake Boulevard would require an encroachment permit from Marin County.

CHATER 3
Initial Study and Environmental Checklist

1. **Project Title:** North Marin Line Stabilization Project
2. **Lead Agency Name and Address:** Marin Municipal Water District, 220 Nellen Avenue, Corte Madera, California 94925
3. **Contact Person and Phone Number:** Carly Blanchard, 415-945-1528
4. **Project Location:** Unincorporated Marin County, San Geronimo Creek and Sir Francis Drake Boulevard between Lagunitas Road and Lower Peters Dam Road
5. **Project Sponsor's Name and Address:** Marin Municipal Water District, 220 Nellen Avenue, Corte Madera, California 94925
6. **General Plan Designation(s):** Tax Exempt, Single Residential, Multiple Residential
7. **Zoning:** Residential Single Family
8. **Description of Project: (Describe the whole action involved, including but not limited to later phases of the project, and any secondary, support, or off-site features necessary for its implementation. Attach additional sheets if necessary.)**

   Refer to Chapter 2, *Project Description*.

9. **Surrounding Land Uses and Setting. (Briefly describe the project's surroundings.)**

   The project sites are situated in the unincorporated community of Lagunitas. The general area is sparsely developed with residential uses.

10. **Other public agencies whose approval is required (e.g., permits, financing approval, or participation agreement.)**

    Refer to Section 2.5, Permits and Approvals, in Chapter 2, *Project Description*.

11. **Have California Native American tribes traditionally and culturally affiliated with the project area requested consultation pursuant to Public Resources Code section 21080.3.1? If so, is there a plan for consultation that includes, for example, the determination of significance of impacts to tribal cultural resources, procedures regarding confidentiality, etc.?**

    Representatives from Federated Indians of Graton Rancheria were contacted on August 11, 2025 regarding the Project. Buffy McQuillen, Tribal Historic Preservation Officer, responded on August 19, 2025 with a request for a consultation meeting. Marin Water sent follow-up emails with additional Project details and meeting information on August 22, 2025 and September 19, 2025. No responses were received.

Environmental Factors Potentially Affected

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

☐ Aesthetics	☐ Agriculture and Forestry 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

DETERMINATION: (To be completed by the Lead Agency)

On the basis of this initial study:

☐ 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 project have been made by or agreed to by the 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 (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Signature

10/13/2025
Date

Environmental Checklist

3.1 Aesthetics

Issues (and Supporting Information Sources):		*New Potentially Significant Impact*	*New Less Than Significant Impact with Mitigation Incorporated*	*New Less Than Significant Impact*	*Same Impact as Approved Project*
I.	**AESTHETICS —** Except as provided in Public Resources Code Section 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 non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings?	☐	☐	☒	☐
d)	Create a new source of substantial light or glare which would adversely affect daytime or nighttime views in the area?	☐	☐	☐	☒

Findings of 2016 IS/MND

The 2016 IS/MND identified the following impacts related to aesthetics:

- No impact related to damaging scenic resources, degrading the existing visual character or quality of public views of the site and its surrounding, and creating a new source of light or glare.
- Less-than-significant impacts related to adversely affecting a scenic vista.

Discussion

a) The Marin Countywide Plan, amended in January 2023, identifies county-operated park and recreation facilities, including several vista points located throughout Marin County. None of these designated vista points are located within six miles of the Project site. The Project is located in a rural, unincorporated area of Marin County characterized by dense vegetation and hilly terrain. These natural features obstruct views into the site from surrounding areas, including potential scenic vantage points. Additionally, the Project is small in scale and would not introduce visually prominent features into the landscape. Due to the Project's distance from designated vistas, limited visibility, and minimal visual changes to the landscape, **no impact** to scenic vistas would occur.

b) The setting related to state scenic highways has not changed since the 2016 IS/MND. For the reasons described in the 2016 IS/MND, there would be **no impact** (Caltrans, 2018).

c) The visual baseline condition of Site 1 and Site 2 of the Project includes the existing San Geronimo Creek pipeline crossings. As noted in Table 2-1, an approximately 1,700-foot segment of pipeline would be installed within Sir Francis Drake Boulevard instead of crossing San Geronimo Creek at Site 1.

The Project site is located within an area designated by the Marin Countywide Plan as an Inland Rural Corridor, which is intended to support agricultural uses, preserve existing rural communities,

and maintain a low-density development pattern (Marin County Community Development Agency, 2023). As described under criterion (a), the visual character of the Project area is defined by its rural setting, consisting of hilly terrain, dense vegetation, and scattered single-family residences. This natural and relatively undeveloped landscape contributes to the area's overall rural appearance.

There is an existing Ridge Trail (San Geronimo Ridge Road) and the Gary Giacomini Open Space Preserve directly adjacent to the Project study area, both of which contribute to the visual sensitivity of the area for recreational users. Additionally, because Project construction would occur within and near Sir Francis Drake Boulevard, visual quality may also be temporarily affected for motorists traveling along this route.

Temporary visual impacts would result from the presence of construction equipment, materials, and associated activities during the Project's approximately 3.5-month construction period. These activities would include excavation, equipment staging, and the use of trucks and machinery, all of which could introduce visually unappealing elements into the existing landscape. These disruptions may temporarily diminish the rural and natural visual character of the area, particularly within and immediately adjacent to the Project area. However, these impacts would be short-term and would cease upon the completion of construction. The road surface would be restored to its original condition and the water line and appurtenances would not be visible. This would not permanently change the visual quality and character of the Project area.

The Project area is surrounded by dense vegetation and hilly terrain, which provides a natural visual buffer that limits views into the site from surrounding areas. As a result, views of construction activities would primarily be limited to individuals in the immediate vicinity, such as passing motorists or recreational users on nearby trails. This natural screening reduces the extent and intensity of potential visual impacts.

Given the temporary nature of the construction activities and the limited visibility of the Project site from public viewpoints, the Project would not result in a substantial degradation of the existing visual quality of the site or its surroundings. Impacts would be **less than significant**.

d) The Project does not include the installation of lighting or reflective materials or finishes not contemplated in 2016 IS/MND and would not change the impact finding from that of the 2016 IS/MND. Project impacts with regard to light and glare would remain **less than significant**.

References

Caltrans, 2018. List of Eligible and Officially Designated State Scenic Highways. Available: https://caltrans.maps.arcgis.com/apps/webappviewer/index.html?id=465dfd3d807c46cc8e8057116f1aacaa. Accessed July 20, 2025.

Marin County Community Development Agency, Marin Countywide Plan, amended January 24, 2023.

3.2 Agriculture and Forestry Resources

Issues (and Supporting Information Sources):	*New Potentially Significant Impact*	*New Less Than Significant Impact with Mitigation Incorporated*	*New Less Than Significant Impact*	*Same Impact as Approved Project*
II. AGRICULTURE AND FORESTRY RESOURCES — 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 Dept. 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?	☐	☐	☐	☒

Findings of 2016 IS/MND

The 2016 IS/MND identified no impacts for all issues related to agriculture and forestry resources.

Discussion

a-e) The Project setting related to agriculture and forestry resources has not changed since the 2016 IS/MND. The project sites and surrounding lands are designated as Urban and Built-Up Land by the Marin County Important Farmland map compiled and published by the California Department of Conservation's Farmland Mapping and Monitoring Program (California DOC, 2025). Additionally, the sites are not encumbered by Williamson Act contracts nor are they zoned for forest land as defined by Public Resources Code Section 12220(g), for timberland as defined by Public Resources Code Section 4526, or for timberland production as defined by Government Code Section 51104(g). Therefore, there would be **no impact**.

References

California Department of Conservation (DOC), 2025. California Important Farmland Finder. Available online https://maps.conservation.ca.gov/DLRP/CIFF/. Accessed July 11, 2025.

3.3 Air Quality

Issues (and Supporting Information Sources):	*New Potentially Significant Impact*	*New Less Than Significant Impact with Mitigation Incorporated*	*New Less Than Significant Impact*	*Same Impact as Approved Project*
III. AIR QUALITY — 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?	☐	☐	☐	☒

Findings of 2016 IS/MND

The 2016 IS/MND identified the following impacts related to air quality:

- No impact related to conflicting with or obstructing implementation of the applicable air quality plan.
- Less-than-significant impacts related to resulting 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, exposing sensitive receptors to substantial pollutant concentrations, and creating objectionable odors affecting a substantial number of people.
- Less-than-significant impacts with mitigation related to violating any air quality standard or contributing to an existing or projected air quality violation.

Discussion

a) The most recent Bay Area Air Quality Management District (BAAQMD) air quality plan has been updated since the 2016 IS/MND. The plan was updated in 2017 and is entitled *2017 Clean Air Plan: Spare the Air, Cool the Climate* (BAAQMD 2017). Similar to the 2010 Clean Air Plan referenced in the 2016 IS/MND, the 2017 Clean Air Plan includes a wide range of control measures designed to decrease emissions of particulate matter, ozone, and toxic air contaminants. Many of these measures are focused on reducing vehicle emissions and promoting energy efficiency in new and existing buildings.

   The changes to the Project would not facilitate an increase in population in the air basin nor would it generate housing or employment opportunities leading to increased population or vehicle miles traveled in the region. As such, the changes to the Project would be consistent with the 2017 Clean Air Plan, and there would remain **no impact** related to conflicting with or obstructing implementation of the plan.

b) The conclusion of the 2016 IS/MND was based on a qualitative analysis of air pollutant emissions increases from construction and operation of the Project. This analysis has been updated to quantify not only the changes to the Project, but the total emissions from all activity that would occur under the updated Project.

Construction of the Project would involve the use of offroad equipment that would emit criteria pollutants (NO_x, ROG, PM_{10}, and $PM_{2.5}$). The BAAQMD provides emissions significance thresholds in its CEQA Air Quality Guidelines, which are presented in **Table 3-1** (BAAQMD, 2023).

TABLE 3-1
BAAQMD AIR QUALITY THRESHOLDS – CRITERIA AIR POLLUTANTS

Pollutant	Construction Emissions Average Daily (pounds per day)	Operational Emissions	
		Average Daily (pounds per day)	Maximum Annual (tons per year)
NOx	54	54	10
ROG	54	54	10
PM_{10}	82 (Exhaust)	82	15
$PM_{2.5}$	54 (Exhaust)	54	10
Fugitive Dust	Construction Dust Ordinance or other Best Management Practices	None	

Note: NOx = oxides of Nitrogen; ROG = reactive organic gases; PM_{10} = particulate matter with a diameter less than or equal to 10 microns; $PM_{2.5}$ = particulate matter with a diameter less than or equal to 2.5 microns

SOURCE: BAAQMD, 2023. *2022 CEQA Guidelines,* updated April 2023. Available at: https://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa-guidelines-2022/ceqa-guidelines-chapter-3-thresholds_final_v2-pdf.pdf?rev=a976830cce0c4a6bb624b020f72d25b3. Accessed July 24, 2025.

Construction of the Project would involve the equipment listed in Table 2-2 of Chapter 2, *Project Description*. For diesel-powered off-road construction equipment, emissions were calculated using methods and tools using the California Air Resources Board (CARB) OFFROAD2017 model, assuming the state average construction fleet for the year 2026. The emission factors are based on the equipment type and horsepower. Refer to **Table 3-2** for the average daily criteria pollutant emissions calculated for Project construction. As shown in Table 3-2, emissions from construction activities would not exceed BAAQMD's thresholds. Emissions calculation details are included in **Appendix C**.

TABLE 3-2
AVERAGE DAILY CRITERIA POLLUTANT EMISSIONS FROM PROJECT CONSTRUCTION

Construction Year	Average Daily Emissions (pounds per day)			
	ROG	NOx	Exhaust PM_{10}	Exhaust $PM_{2.5}$
2026	0.75	6.65	0.23	0.21
BAAQMD Threshold	*54*	*54*	*82*	*54*
Exceed Threshold?	No	No	No	No

NOTES: Annual emissions are divided over the number of construction workdays in the year to determine the average daily emissions.
SOURCE: Table compiled by ESA in 2025 based on Appendix C

. Fugitive dust (PM_{10} and $PM_{2.5}$) emissions would also be generated from ground-disturbing activities. However, the BAAQMD's approach to significance of fugitive dust emissions is the use of best management practices to minimize fugitive dust rather than a quantitative threshold against which to measures calculated emissions. Implementation of adopted Mitigation Measure 3-1 (presented in Appendix A), which requires the construction contractor(s) to implement a dust abatement program that includes BAAQMD-recommended measures, would reduce potential impacts related to fugitive dust. With implementation of Mitigation Measure 3-1, and because construction emissions would be below BAAQMD thresholds, the impact related to resulting 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 would be **less than significant**.

c) Sensitive receptors are typically defined as the segment of the population most susceptible to air quality effects including children, the elderly, and the sick, as well as land uses such as schools, hospitals, parks, and residential communities. Sensitive receptors located in the vicinity of the Project sites include single family residences on Sir Francis Drake Boulevard and Spring Avenue. There are no schools, daycares or hospitals within 1,000 feet of the Project sites. During Project construction there would be localized air emissions of criteria pollutants from construction vehicles and equipment powered by internal combustion engines, as well as from earth moving activities.

The potential for the Project to expose sensitive receptors to substantial pollutant concentrations of toxic air contaminants (TACs) is associated mainly with construction activities, which involve diesel combustion in construction equipment, generating diesel particulate matter, or DPM. DPM is considered as a TAC by CARB with cancer and chronic non-cancer risks from exposure (CARB 2025). The Office of Environmental Health Hazard Assessment (OEHHA) recommends conducting a health risk assessment to evaluate potential exposure to sensitive receptors if TAC-emitting activities in one location would last two or more months in duration (OEHHA 2015). The Project activities at Sites 1 and 2 would be fewer than two months in duration (refer to Table 2-2 for the construction schedule). Pipeline installation activities within Sir Francis Drake Boulevard would last at least two months, but the construction work would progress in a linear fashion and not expose nearby sensitive receptors for the entire duration of pipeline installation. Additionally, as discussed under checklist item b), construction emissions would be minimal and well below the BAAQMD thresholds.

The Project would not include any operational sources of TACs. For these reasons, the impact related to exposing sensitive receptors to substantial pollutant concentration would be **less than significant**.

d) Diesel equipment used during project construction may emit objectionable odors associated with combustion of diesel fuel. However, these emissions would be temporary and intermittent in nature, and the Project area has a minimal number of residents within the general vicinity of where construction activities would occur. For these reasons, the Project would not result in other emissions (such as those leading to odors) adversely affecting a substantial number of people, and the impact would be **less than significant**.

References

Bay Area Air Quality Management District (BAAQMD), 2017. *Final 2017 Clean Air Plan*, adopted April 19, 2017.

BAAQMD, 2023. *BAAQMD 2022 CEQA Guidelines*, revised April 20, 2023.

California Air Resources Board (CARB). 2025. *CARB Identified Toxic Air Contaminants*. Available at: https://ww2.arb.ca.gov/resources/documents/carb-identified-toxic-air-contaminants. Accessed September 2025.

Office of Environmental Health Hazard Assessment (OEHHA), 2015. Risk Assessment Guidelines: Guidance Manual for Preparation of Health Risk Assessments. February 2015.

3.4 Biological Resources

Issues (and Supporting Information Sources):	*New Potentially Significant Impact*	*New Less Than Significant Impact with Mitigation Incorporated*	*New Less Than Significant Impact*	*Same Impact as Approved Project*
IV. BIOLOGICAL RESOURCES — 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 Game 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 Game 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?	☐	☐	☐	☒

Findings of 2016 IS/MND

The 2016 IS/MND identified the following impacts related to biological resources:

- No impact related to conflicting with any local policies or ordinances protecting biological resources and conflicting 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 impacts related to having 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; having a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act through direct removal, filling, hydrological interruption, or other means; and interfering substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impeding the use of native wildlife nursery sites.

- Less-than-significant impacts with mitigation implemented related to having 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 Game, U.S. Fish and Wildlife Service, or NOAA – Fisheries.

Discussion

a) The setting related to biological resources has changed since the 2016 IS/MND. Updated database searches of the California Natural Diversity Database (CNDDB), California Native Plant Society (CNPS) and U.S. Fish and Wildlife Service (USFWS) species list were conducted within a 5-mile radius of the project sites to identify reported occurrences of special-status species and their potential to occur onsite (refer to **Table 3-3** and **Figures 3-1** and **3-2**) (CDFW 2025; CNPS 2025; USFWS 2025). A reconnaissance-level field survey was conducted by ESA biologists on May 9, 2025 to characterize current conditions and evaluate the potential for the occurrence of special-status species. No special-status plant or wildlife species were observed during the 2025 field survey, and no special-status plants are considered likely to occur at the project sites.

The riparian setting at San Geronimo Creek was as described in the 2016 IS/MND, based on an aquatic resource delineation that was conducted in 2015 (2015 Delineation) (Vollmar 2015). A confirmation of the aquatic resource delineation was conducted in 2025 (2025 Delineation) (ESA 2025) to identify any potential riparian, wetland, and waters not previously evaluated. The 2025 Delineation did not identify any riparian, wetland, or stream habitat that was not identified in the 2015 Delineation or 2016 IS/MND. The aquatic resources along and adjacent to Sir Francis Drake Boulevard, where approximately 1,700 feet of new pipeline would now be installed via a combination of open trenching and jack-and-bore methods, were also evaluated in the 2025 Delineation. The 2025 Delineation identified ephemeral channels that are conveyed under Sir Francis Drake Boulevard at four locations via culvert crossings but did not identify any sensitive habitat is present in the roadway, nor in staging areas in adjacent disturbed habitat.

As discussed in the 2016 IS/MND, Marin Water would implement the following mitigation measures, which are presented in Appendix A, to reduce potential significant impacts on special-status species to a less-than significant-level:

- **Mitigation Measure 4-1** for biological resources sensitivity training for on-site construction personnel
- **Measure Measures 4-2** for preconstruction surveys of California red-legged frog and other special-status wildlife species
- **Mitigation Measure 4-3** for seasonal avoidance of work within 0.25-mile of northern spotted owl nests
- **Mitigation Measure 4-4** for protection of roosting bats, and
- **Mitigation Measure 4-5** for protection of nesting birds.

TABLE 3-3
SPECIAL-STATUS SPECIES WITH POTENTIAL TO OCCUR IN THE PROJECT AREA

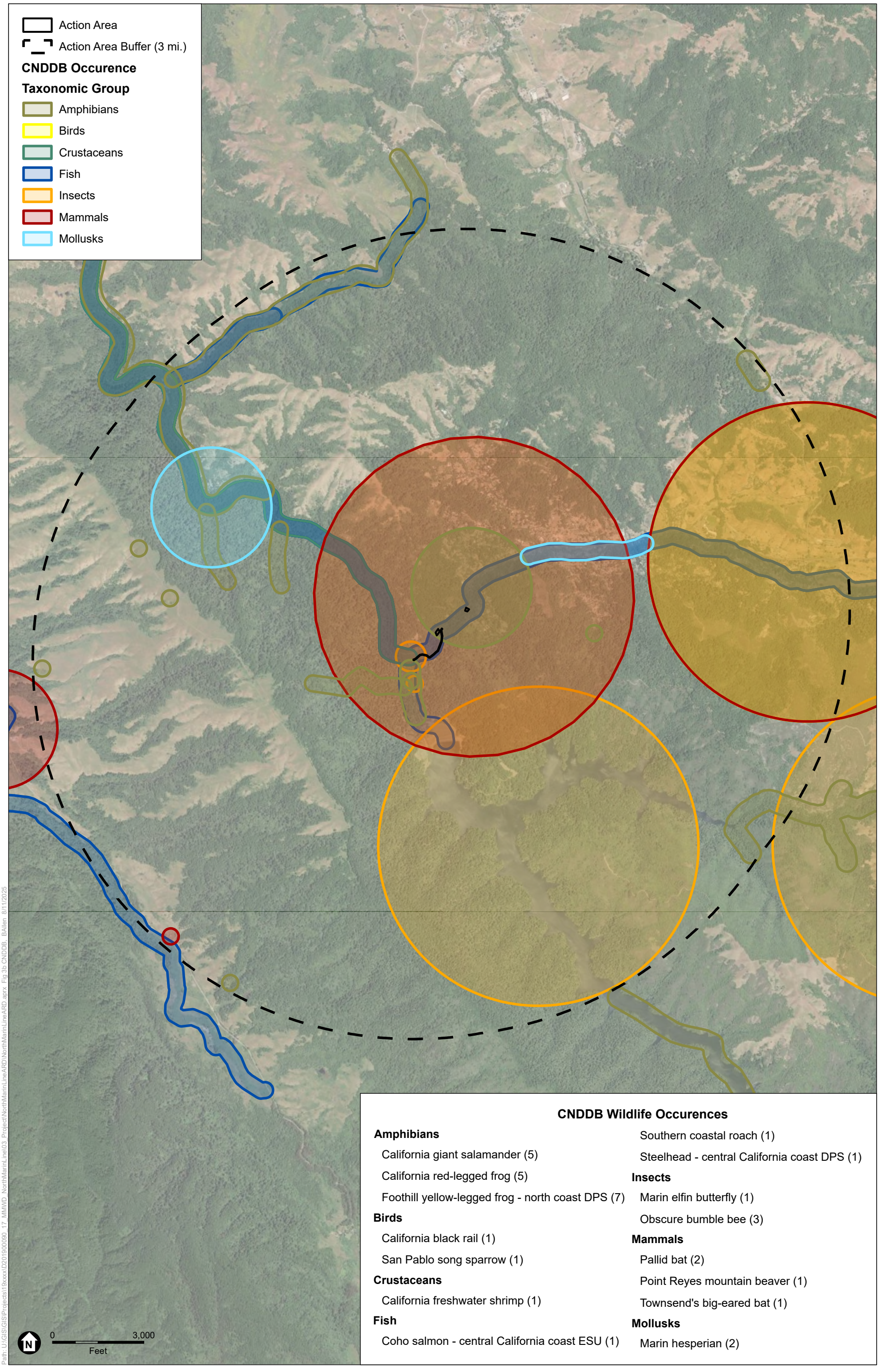
Common Name *(Scientific Name)*	Listing Status	Updates Since 2016 IS/MND and Potential
Same Listing Status as 2016 IS/MND		
California red-legged frog (*Rana draytonii*)	Federal Threatened Species State Species of Special Concern	No new records in Lagunitas Creek system since 2016. **Moderate potential** to occur in transit.
Coho salmon (*Oncorhynchus kisutch*)	Central California Coast ESU Federal and State Endangered Species	Detected in San Geronimo Creek in 2024 (Marin Water 2025). Assumed **present** in San Geronimo Creek.
Steelhead (*Oncorhynchus mykiss*)	Federal Threatened Species	Detected in San Geronimo Creek in 2024 (Marin Water 2025). Assumed **present** in San Geronimo Creek.
California freshwater shrimp (*Syncaris pacifica*)	Federal and State Endangered Species	No new records in Lagunitas Creek system since 2016. **Moderate potential** to occur at site.
Northern spotted owl (*Strix occidentalis caurina*)	Federal Threatened Species State Species of Special Concern	New nesting records in the mature redwood and Douglas-fir forest adjacent to project sites: four current northern spotted owl activity centers within one mile: three south of San Geronimo Creek, one north of Lagunitas Creek downstream (CDFW 2025). Assumed **present** nesting in vicinity.
Foothill yellow-legged frog (*Rana boylii*)	State Species of Special Concern	Several new records upstream of Kent Lake, in Nicasio Creek and other nearby Marin creeks (CDFW 2025). **Moderate potential** to occur at site.
Tomales roach (*Lavinia symmetricus* ssp.)	State Species of Special Concern	Detected downstream in Lagunitas Creek in 2024 (Marin Water 2025). **High potential** to occur at site.
Pallid bat (*Antrozous pallidus)*	State Species of Special Concern	No new records in Lagunitas Creek system since 2016. **Moderate potential** to roost in vicinity of site.
Listing Status Differs from 2016 IS/MND		
Northwestern pond turtle (*Actinemys marmorata*)	Federal Proposed Threatened Species State Species of Special Concern	No new CNDDB records in Lagunitas Creek system since 2016 but iNaturalist observations (research-grade) in San Geronimo Creek upstream of the action area, and crossing the road near the junction with Lagunitas Creek in 2024 (iNaturalist 2025). **High potential** to occur at site.
Not Included in 2016 IS/MND		
California giant salamander (*Dicamptodon ensatus*	State Species of Special Concern	Recorded both upstream and downstream of project sites along San Geronimo and Lagunitas Creeks (CDFW 2025). **High potential** to occur at site.



SOURCE: Maxar, 2024; CNDDB, 2025; Marin Co., 2024; Esri, 2025; ESA, 2025

Figure 3-1
CNDDB Plant Occurrences

ESA



SOURCE: Maxar, 2024; CNDDB, 2025; Marin Co., 2024; Esri, 2025; ESA, 2025

Figure 3-2
CNDDB Wildlife Occurrences

ESA

The Project design now includes installation of pipe in Sir Francis Drake Boulevard in addition to in-channel work on San Geronimo Creek at Sites 1 and 2. The roadway pipe installation would not directly impact any sensitive species, but construction noise has the potential to disturb nearby nesting northern spotted owl. Adopted Mitigation Measure 4-3 was considered during preparation of the construction schedule presented in Table 2-2 to ensure that work is either: 1) conducted outside of the nesting season; or 2) surveys are completed to determine owl presence/absence. Implementation of adopted Mitigation Measure 4-3 would reduce potential impacts to northern spotted owl to a less-than-significant level.

Because the Project design has changed from that described in the 2016 IS/MND to include in-channel work to cut the existing piles (refer to Sections 2.2 and 2.3 for descriptions of pile cutting), the Project has new potential to impact amphibian and fish species directly through injury, mortality, or loss of habitat, or indirectly through disturbance or diminished water quality. To address these potential impacts, Marin Water would implement **Mitigation Measures BIO-1** and **BIO-2** to reduce impacts on sensitive reptiles, amphibians and aquatic species (fish and California freshwater shrimp) to a less-than-significant level.

Mitigation Measure BIO-1: Install and Monitor Wildlife Exclusion Fencing. Before ground-disturbing activity occurs in suitable habitat for aquatic species, the contractor shall install temporary exclusion/silt barrier fencing around the perimeter of the work area. Fencing shall be installed to the extent necessary to exclude amphibian species and turtles from the construction area and minimize impacts to natural habitat. Fencing material shall provide for wildlife exclusion as well as maintenance of water quality. Construction personnel and construction activity shall avoid areas outside the fencing. The need for and exact location of the fencing shall be determined by a qualified biologist, with the goal of protecting sensitive biological habitat and water quality. The fencing shall be checked at regular intervals (e.g., weekly) by the biological monitor (see adopted Mitigation Measure 4-1) and maintained until construction is complete at individual work sites.

Mitigation Measure BIO-2: Dewatering and Relocation Plan for Sensitive Aquatic Species. If necessary, fish and California freshwater shrimp will be captured and relocated to avoid injury and mortality and minimize disturbance. The following guidelines will apply:

- For sites that will be dewatered, the channel will be blocked by placing fine-meshed nets or screens above and below the work area to prevent state or federally listed from re-entering the work area. To minimize entanglement, mesh diameter will not exceed 1/8 inch. The bottom edge of the net or screen will be secured to the channel bed to prevent fish from passing under the screen. Exclusion screening will be placed in low velocity areas to minimize impingement. Screens will be checked twice a day by a qualified biologist and cleaned of debris to permit free flow of water. Block nets will remain in place in order to prevent fish from re-entering the Project area following relocation.
- Before removal and relocation begins, a qualified biologist will identify the most appropriate release location(s). In general, release locations should have water temperatures similar to (<3.6°F difference) the capture location and offer ample habitat (e.g., depth, velocity, cover, connectivity) for released fish, and should be selected to minimize the likelihood of reentering the work area or becoming impinged on exclusion nets or screens. Suitable habitat is defined as creek sections that will remain wet over the summer and where banks are structurally diverse with undercut banks, exposed fine root systems, overhanging woody debris, or overhanging vegetation.

- The means of fish capture will depend on the nature of the work site and will be selected by a qualified biologist. Complex stream habitat may require the use of electrofishing equipment, whereas in outlet pools, aquatic vertebrates and invertebrates may be captured by pumping down the pool and then seining or dipnetting. Electrofishing will be used only as a last resort; if electrofishing is necessary, it will be conducted only by properly trained personnel following the NMFS guidelines dated June 2000 (NMFS 2000).
- California freshwater shrimp will be captured by hand-held nets [e.g., heavy-duty aquatic dip nets (12" D-frame net) or small minnow dip nets] and relocated out of the work area in the net or placed in buckets containing stream water and then moved directly to the nearest suitable habitat in the same branch of the creek.
- When feasible, initial relocation efforts will be performed several days prior to the scheduled start of construction. To the extent feasible, dewatering and species relocation will be performed during morning periods. The qualified biologist will survey the exclosures or cofferdams throughout the dewatering effort to verify that no state or federally listed fish or aquatic invertebrates are present. Afternoon pumping activities should generally not occur and pumping should be limited to days when ambient air temperatures are not expected to be high. Air and water temperatures will be measured periodically, and dewatering and species relocation activities will be suspended if temperatures exceed the limits allowed by NMFS guidelines.
- Handling of fish and aquatic invertebrates will be minimized. When handling is necessary, personnel will wet hands or nets before touching them.
- Prior to translocation, any state or federally listed species that are collected during surveys will be temporarily held in cool, aerated, shaded water using a five-gallon container with a lid. Overcrowding in containers will be avoided; at least two containers will be used and no more than 25 fish will be kept in each bucket. Aeration will be provided with a battery-powered external bubbler. Fish will be protected from jostling and noise and will not be removed from the container until the time of release. A thermometer will be placed in each holding container and partial water changes will be conducted as necessary to maintain a stable water temperature. Special-status species will not be held more than 30 minutes. If water temperature reaches or exceeds NMFS limits, the fish and other aquatic species will be released and relocation operations will cease.
- No California freshwater shrimp will be placed in buckets containing other aquatic species. Handling will be minimized, as feasible.
- If state or federally listed fish or California freshwater shrimp are abundant, capture will cease periodically to allow release and minimize the time spent in holding containers.
- Reports on relocation activities will be submitted to USFWS, CDFW and NMFS in a timely fashion.
- If mortality during relocation exceeds five percent, relocation will cease and USFWS, CDFW and NMFS will be contacted immediately or as soon as feasible.

b) As described above, the 2025 Delineation confirmed that the riparian setting at San Geronimo Creek has not changed since the 2016 IS/MND. The Project sites contain San Geronimo Creek, in-stream wetlands, riparian habitat, and four ephemeral drainages conveyed under Sir Francis Drake Boulevard via culverts. No sensitive natural communities were identified within the Project sites.

The 2016 IS/MND determined that there would be less-than-significant impacts related to sensitive natural communities, including riparian areas, because there previously was no in-water Project work proposed. The Project design has since changed to include work within the channel to remove existing piles and to install isolated temporary creek dewatering structures at select pile cutoff locations. Construction activities associated with the in-channel work could result in new permanent and temporary impacts on aquatic habitat.

Permanent impacts would occur from the removal of existing in-water piles that support existing pipelines that span San Geronimo Creek above the top of bank. However, this impact is expected to result in an overall environmental uplift through the permanent removal of in-stream structures. No heavy equipment would be used in San Geronimo Creek, and the in-stream structures would be removed in a top-down fashion using hand tools. Overall, the permanent impacts would not have significant adverse effects to riparian or aquatic resources habitat.

Site access and isolated dewatering would be temporary and would not have significant adverse effects on riparian or aquatic resources habitat. In addition, Marin Water would apply standard environmental protection measures from S01800, Environmental Protection, including 3.1 (Protection of Natural Resources) to restore natural resources in the Project boundary to an equivalent or improved condition upon completion of the work; minimize the size of the work area; protect trees, water quality, and wildlife; and reduce the spread of invasive species, and 3.5 (Erosion and Sediment Transport Control) to limit erosion and sediment transport (refer to Appendix B). Consistent with these measures, following completion of pile removal and dewatering, the work area that was temporarily disturbed would be restored to an equivalent or improved condition. There would be no impacts related to operation of the pipeline. Following restoration, the impact of project construction on riparian habitat or sensitive natural communities would be **less than significant**.

c) The 2016 IS/MND determined that there would be less-than-significant impacts related to jurisdictional resources, including waters and wetlands, because Project work was proposed to be conducted outside the top-of-bank and would avoid these resources. The 2025 Delineation (ESA 2025) identified in-stream wetlands on gravel bars within the perennial channel of San Geronimo Creek and ephemeral waters entering the stream via culvert. Because the Project design has changed to include work within the channel, there would be a new temporary impact on jurisdictional waters and potentially to in-stream wetlands during construction from site access and new permanent impacts from the removal of the in-stream structures. The ephemeral waters would be avoided, if possible.

In order to reduce potential impacts on jurisdictional resources, Marin Water would comply with all regulatory permit requirements and implement standard environmental protection measures from S01800, Environmental Protection, including 3.1 (Protection of Natural Resources) and 3.5 (Erosion and Sediment Transport Control) (refer to Appendix B). Consistent with these measures, following completion of pile removal, any affected resources that were temporarily disturbed would be restored to an equivalent or improved condition, and monitored in accordance with regulatory permit requirements to ensure no adverse effects to jurisdictional aquatic resources or habitat result from the Project. There would be no impacts related to operation of the pipeline. Therefore, the

impacts of Project construction on state or federally protected wetlands would be **less than significant**.

d) The 2016 IS/MND determined that there would be less-than-significant impacts related to wildlife movement corridors and nursery sites because the Project construction was not proposed within the riparian corridor. Because the Project design has changed to include work within the channel (including temporary dewatering), there is potential to temporarily interfere with the movement of wildlife, such as fish, amphibians, and small mammals, using San Geronimo Creek for movement. While there would be potential to impact spawning or rearing fish or breeding amphibians within the channel, this impact would be minimized by restricting work to the summer or early fall (dry season) when few fish are present and no spawning or egg-laying is anticipated. Furthermore, the impact on movement would be transitory and limited to the duration of in-channel work (anticipated to occur over 3 weeks in September/October, refer to Table 2-2 for the construction schedule). For these reasons, the impact related to substantially interfering with the movement of migratory fish or wildlife species or with migratory wildlife corridors remains **less than significant** with no mitigation required.

e) The 2016 IS/MND identified no impact related to conflicting with local ordinances, including tree protection ordinances, because no tree removal was anticipated. Because Marin Water is a municipal utility, it is exempt from Chapters 22.27 and 22.62 of the Marin County Municipal Code, which detail Native Tree Protection and Preservation and Tree Removal Permits.[1] However, Marin Water strives to be consistent with the performance standards embodied in the Municipal Code wherever feasible. Because tree removal (one to three trees) is now anticipated (Vrba 2025), to the extent feasible, Marin Water would comply with Municipal Code requirements, including tree replacement, sheltering existing trees within the watershed to meet tree protection guidance, or payment of an in-lieu fee to the County; or a combination of these strategies. Additionally, Marin Water would their apply standard environmental protection measures from S01800, Environmental Protection, including 3.1 (Protection of Natural Resources) which includes measures to protect trees during construction. Adherence to Marin County Municipal Code tree removal/replacement performance standards and Marin Water's standard environmental protection measures wherever feasible would reduce potential impacts related to conflicting with local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance, to **less than significant**.

f) Circumstances related to conflicting with an existing habitat conservation plan have not changed since the 2016 IS/MND. For the reasons described in the 2016 IS/MND, there would be **no impact**.

References

California Department of Fish and Wildlife (CDFW), 2025. California Natural Diversity Data Base (CNDDB) search of the following USGS 7.5-minute quads: San Geronimo, San Rafael, Novato, Petaluma, Petaluma River, Inverness, Point Reyes NE, Double Point, Bolinas. https://wildlife.ca.gov/Data/CNDDB/Maps-and-Data

[1] Under California Government Code Section 53091, municipal utilities like the Marin Water are exempt from certain local building and zoning ordinances.

California Native Plant Society (CNPS). 2025. Inventory or Rare, Threatened and Endangered Plants of California search of the following USGS 7.5-minute quads: San Geronimo, San Rafael, Novato, Petaluma, Petaluma River, Inverness, Point Reyes NE, Double Point, Bolinas. http://www.rareplants.cnps.org/

Environmental Science Associates (ESA). 2025. North Marin Line Stabilization Project Aquatic Resources Delineation Report. July. Draft.

Marin Water. 2025. ADULT SALMONID MONITORING IN THE LAGUNITAS CREEK WATERSHED 2023-2024. January.

NMFS 2000. Guidelines for Electrofishing Waters Containing Salmonids Listed Under the Endangered Species Act. https://media.fisheries.noaa.gov/dam-migration/electro2000.pdf

U.S. Fish and Wildlife Service (USFWS). 2025. Information for Planning and Conservation. USFWS Official Species List. https://ecos.fws.gov/ipac/. June.

Vollmar Natural Lands Consulting (Vollmar), 2015. Delineation of Potential Jurisdictional Waters of the United States, North Marin Line Stabilization Project, Marin County, California. December.

Vrba B. 2025. Marin Water NML Tree Survey Notes. August 6.

3.5 Cultural Resources

Issues (and Supporting Information Sources):	*New Potentially Significant Impact*	*New Less Than Significant Impact with Mitigation Incorporated*	*New Less Than Significant Impact*	*Same Impact as Approved Project*
V. CULTURAL RESOURCES — 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?	☐	☐	☐	☒

Findings of 2016 IS/MND

The 2016 IS/MND identified the following impacts related to cultural resources:

- No impact related to causing a substantial adverse change in the significance of a historical resource as defined in §15064.5.
- Less-than-significant impacts with mitigation related to causing a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5 and disturbing any human remains, including those interred outside of formal cemeteries.

Discussion

a) Based on an updated records search conducted at the Northwest Information Center of the California Historical Resources Information System on July 29, 2025 (File No. 25-0152), the setting related to historical resources has not changed since the 2016 IS/MND. For the reasons described in the 2016 IS/MND, there would be **no impact**.

b) The Northwest Information Center records search did not identify any newly documented archaeological resources and the setting related to archaeological resources has not changed since the 2016 IS/MND. As described in the 2016 IS/MND, Marin Water would implement adopted **Mitigation Measure 5-1** (Protect Archaeological Resources Identified during Construction), presented in Appendix A, which requires Marin Water and its contractors to adhere to appropriate procedures and protocols for minimizing impacts on previously unrecorded and buried archaeological resources in the event that a possible archaeological resource is discovered during construction. With implementation of adopted Mitigation Measure 5-1, impacts related to archaeological resources would be reduced to less than significant.

c) The setting related to human remains has not changed since the 2016 IS/MND. As described in the 2016 IS/MND, Marin Water would implement adopted **Mitigation Measure 5-2** (Protect Human Remains Identified during Construction), presented in Appendix A. This mitigation measure requires Marin Water to adhere to appropriate excavation, removal, recordation, analysis, custodianship, and final disposition protocols if buried human remains and associated or unassociated funerary objects are accidentally discovered during construction activities. With

implementation of adopted Mitigation Measure 5-2, impacts related to human remain would be reduced to less than significant.

References

Northwest Information Center (NWIC), 2025. California Historical Resources Information System. July 29, 2025 (File No. 25-0152). On file, ESA.

3.6 Energy

Issues (and Supporting Information Sources):	*New Potentially Significant Impact*	*New Less Than Significant Impact with Mitigation Incorporated*	*New Less Than Significant Impact*	*No Impact*
VI. ENERGY — 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?	☐	☐	☐	☒

Findings of 2016 IS/MND

Energy was not addressed in the 2016 IS/MND.

Discussion

a) Project construction would involve both direct and indirect use of energy, primarily in the form of fossil fuels and electricity. Diesel fuel would be used in the construction equipment; the use of electricity in construction equipment, if any, would be very minimal in comparison to the quantities of diesel used.

The volume of diesel fuel that would be consumed during construction was calculated based on the estimated carbon dioxide (CO_2) emissions for Project construction and the diesel CO_2 emission factors from The Climate Registry (TCR, 2023). Project construction is estimated to consume a total of approximately 5,866 gallons of diesel fuel over the construction period. Fuel use during construction would represent approximately 0.1 percent of diesel sold in Marin County in 2023 (CEC, 2023a). Overall, the fuel use during construction would be minimal in comparison to the overall fuel use within Marin County. See Appendix C for the diesel fuel use calculations and diesel fuel sales in Marin County.

Project construction would comply with state and local regulations such as 13 CCR Sections 2485 and 2449, which require equipment and commercial vehicle operators to limit idling to no more than 5 minutes; this would ensure that fuel energy consumed in the construction phase would not be wasted through unnecessary idling. In addition, all vehicles used during construction and operation would be required to comply with Corporate Average Fuel Economy standards.

Once construction is complete, the pipeline would operate as it currently does, providing water to Marin Water customers. No additional staff would be hired to operate the pipeline, and no additional operational vehicle trips are anticipated. Therefore, energy use would not be wasteful, inefficient, or unnecessary during the construction or operation of the Project and the impact would be **less than significant**.

b) As discussed above, Project construction would require the use of off-road construction equipment. Construction activities would comply with state and local requirements designed to minimize idling and associated emissions, which would also minimize the use of fuel. Specifically, pursuant to 13

CCR Sections 2485 and 2449, idling of commercial vehicles over 10,000 pounds and off-road equipment over 25 horsepower would be limited to a maximum of 5 minutes. Fuel use for Project construction would be consistent with typical practices as well as with energy standards such as the Energy Policy Acts of 1975 and 2005, which promote strategic planning and building standards that reduce consumption of fossil fuels, increase use of renewable resources, and enhance energy efficiency. Project implementation would not conflict with or obstruct a state or local plan for renewable energy or energy efficiency, and there would be **no impact**.

References

California Energy Commission (CEC). 2023a. *California Annual Retail Fuel Outlet Report Results (CEC-A15)*. Available at: https://www.energy.ca.gov/data-reports/energy-almanac/transportation-energy/california-retail-fuel-outlet-annual-reporting. Accessed July 30, 2025.

The Climate Registry (TCR). 2023. *2023 Default Emission Factors*. Available at: https://theclimateregistry.org/wp-content/uploads/2023/06/2023-Default-Emission-Factors-Final.pdf. Accessed November 2023.

3.7 Geology and Soils

Issues (and Supporting Information Sources):	*New Potentially Significant Impact*	*New Less Than Significant Impact with Mitigation Incorporated*	*New Less Than Significant Impact*	*Same Impact as Approved Project*
VII. GEOLOGY AND SOILS — 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?	☐	☐	☐	☒

Findings of 2016 IS/MND

The 2016 IS/MND identified the following impacts related to geology and soils:

- No impact related to having 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 and directly or indirectly destroying a unique paleontological resource or site or unique geologic feature.[2]

- Less-than-significant impacts related to being located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property.

- Less-than-significant impacts with mitigation related to exposing people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, strong seismic ground shaking, seismic-related ground failure (including

[2] Note that paleontological resources were addressed under *Cultural Resources* in the 2016 IS/MND.

liquefaction, and landslides; resulting in substantial soil erosion or the loss of topsoil; and being 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

Discussion

a.i, a.ii) The geologic setting related to earthquake faults and seismic ground shaking is the same as that described in the 2016 IS/MND. Adopted **Mitigation Measure 6-1** presented in Appendix A would be implemented to reduce potentially significant impacts related to strong rupture of a known earthquake fault and strong seismic ground shaking to a less-than-significant level.

a.iii, a.iv, c) The geologic setting related to seismic-related ground failure (including liquefaction) and landslides at crossing Sites 1 and 2 is the same as described in the 2016 IS/MND and the 2014 Geotechnical Investigation completed for the Project (included as Appendix C of the 2016 IS/MND). The entire Project area, including Sir Francis Drake Boulevard where the new pipeline would be installed, has high liquefaction and landslide susceptibility (County of Marin, 2023; USGS, 2025). Implementation of adopted **Mitigation Measure 6-2** presented in Appendix A would reduce impacts discussed in the 2016 IS/MND related to installation of the new trestle abutments at Site 2. Additionally, **Mitigation Measures GEO-1** would be implemented to reduce the potential for liquefaction- and landslide-related impacts during and after pipeline installation in Sir Francis Drake Boulevard. Pile cutting at both Sites 1 and 2 would be above ground and is not anticipated to cause substantial adverse effects related to seismic-related ground failure or landslides.

With implementation of Mitigation Measures 6-1 and GEO-1, potential impacts associated with seismic-related ground failure and landslides would be reduced to **less than significant**.

Mitigation Measure GEO-1: Liquefaction and Landslide Risk Reduction for Pipeline Construction

The following measures would be implemented to reduce the risk of seismic-related ground failure and landslides during pipeline construction:

1. **Geotechnical Investigation**: Prior to construction, a site-specific geotechnical investigation shall be conducted by a licensed geotechnical engineer for Project sites not analyzed in the 2014 Geotechnical Investigation. The geotechnical investigation shall identify slope stability conditions, soil characteristics, groundwater levels, and potential landslide hazards along the pipeline alignment.

2. **Engineering Design Controls**: Based on the geotechnical findings, the pipeline design shall incorporate appropriate engineering controls, which may include:

    - Deep trenching with slope stabilization (e.g., retaining walls, soil nails, or geogrid reinforcement).
    - Flexible pipeline materials or joints to accommodate minor ground movement.
    - Drainage improvements to reduce surface and subsurface water infiltration.

3. **Construction Best Management Practices**: Construction best management practices such as limiting grading and vegetation removal to the minimum area necessary, avoiding construction during or immediately following heavy rainfall, and ceasing work if active movement or instability is detected until corrective measures are implemented under the direction of the geotechnical engineer shall be implemented.

b) The geologic setting related to soil erosion or the loss of topsoil at crossing Sites 1 and 2 is the same as described in the 2016 IS/MND. Implementation of adopted **Mitigation Measure 6-3** presented in Appendix A would reduce impacts discussed in the 2016 IS/MND related to installation of the new trestle abutments at Site 2. Due to the nature of construction activities, pipeline installation within Sir Francis Drake Boulevard and pile cutting at Sites 1 and 2 are not anticipated to result in substantial soil erosion or the loss of topsoil. With implementation of adopted Mitigation Measure 6-3, the impact would be reduced to **less than significant**.

d) As indicated in the 2016 IS/MND, the Geotechnical Investigation completed for the Project in 2014 did not specifically identify any of the soils at or near the sites as expansive. Soil along Sir Francis Drake Boulevard in the project area is not rated for parameters related to expansive soils (NRCS, 2025). The additional Geotechnical Investigation conducted as part of Mitigation Measure GEO-1 would analyze areas new Project components are proposed, including determining soil characteristics, and include design recommendations to reduce risk associated with expansive soils. With implementation of Mitigation Measure GEO-1, the impact would be **less than significant**.

e) As indicated in the 2016 IS/MND, the Project does not include uses or activities that would generate waste water, nor involve the construction, modification, or demolition of septic tanks or alternative waste water systems. There would be **no impact**.

f) The 2016 IS/MND did not identify any unique paleontological resources or sites or unique geologic features, and indicated that the Late Holocene alluvium underlying the Project area has a low potential to contain paleontological resources, and the Franciscan Complex volcanic rocks underlying these areas has low to no potential to contain paleontological resources, resulting in **no impact**.

References

County of Marin, 2023. Liquefaction, updated March 13, 2023. Available online at https://gisopendata.marincounty.gov/datasets/marincounty::liquefaction-1/explore?location=38.008272%2C-122.704953%2C15.53. Accessed July 31, 2025.

Natural Resources Conservation Service, Web Soil Survey, Plasticity Index-Marin County, California. Accessed August 14, 2025. https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

United States Geologic Survey (USGS), 2025. U.S. Landslide Inventory and Susceptibility, 2025. Available online at https://usgs.maps.arcgis.com/apps/webappviewer/index.html?id=ae120962f459434b8c904b456c82669d. Accessed July 31, 2025.

3.8 Greenhouse Gas Emissions

Issues (and Supporting Information Sources):	*New Potentially Significant Impact*	*New Less Than Significant Impact with Mitigation Incorporated*	*New Less Than Significant Impact*	*Same Impact as Approved Project*
VIII. GREENHOUSE GAS EMISSIONS — 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?	☐	☐	☐	☒

Findings of 2016 IS/MND

The 2016 IS/MND identified the following impacts related to greenhouse gas emissions:

- No impact related to generating greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.
- Less-than-significant impacts with mitigation related to conflicting with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

Discussion

a) The changes to the Project since the 2016 IS/MND would generate greenhouse gas (GHG) emissions from temporary construction activities, including from mobile equipment, site preparation, excavation, and backfilling. BAAQMD has not adopted a GHG emissions threshold with respect to construction-related GHGs. In lieu of specific guidance from BAAQMD regarding significance thresholds for construction-related GHG emissions, significance is assessed by a consideration of the scope and duration of construction-related emissions. Given that the Project construction activities would be temporary in nature and would occur intermittently over the construction timeframe described earlier, the Project is not expected to result in an ongoing burden to regional or global GHG inventories.

Projected carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) emissions from off-road construction equipment were also derived from the criteria pollutant emissions calculations presented in Table 3-2 (refer to Section 3.3, Air Quality). N_2O and CH_4 emissions were multiplied by their respective Global Warming Potentials (GWPs)[3] (25 and 298) and added to the CO_2 emissions to obtain carbon dioxide equivalent emissions. This results in carbon dioxide equivalent emissions in the amount of 51.1 metric tons. As there are no numeric thresholds for construction GHG emissions, this data is for informational purposes. Since some amount of GHG emissions would result from Project construction, the impact related to generating greenhouse gas emissions would be **less than significant**.

[3] GWP is a metric that compares the warming effect of different GHGs to that of CO_2, which is used as the reference with a GWP of 1. It quantifies how much a given mass of a gas contributes to warming over a specific time period, typically 100 years. A higher GWP indicates a gas is more effective at trapping heat than CO_2.

b) In response to Assembly Bill 32 (also known as the California Global Warming Solutions Act of 2006) GHG reduction goals, CARB adopted the Climate Change Scoping Plan, which outlined a framework for achieving the emission reduction goals. The Climate Change Scoping Plan was most recently updated in 2022 (2022 Scoping Plan; CARB, 2022) to address California's 2030 GHG target and identifies how the State can reach the 2030 climate target established by SB 32 while making substantial advancements to achieve carbon neutrality by 2045 toward the 2050 climate goal established by Executive Order S-3-05 (2005).

In 2020, Marin County developed and adopted their Climate Action Plan 2030, which, consistent with Senate Bill 32, is aimed at meeting a county-wide GHG emissions target by 2030. Climate Action Plan 2030 also supports California's long term goal, established by Executive Order B-30-15, to reduce emissions 80 percent below 1990 levels by 2050 (Marin County, 2020). Strategies in the Climate Action Plan 2030 that are applicable to the Project include:

- **WR-C3: Construction & Demolition Debris and Self-Haul Waste.** Require all loads of construction & demolition debris and self-haul waste to be processed for recovery of materials as feasible.

The Marin Countywide Plan (Marin County, 2023) also includes goals and recommended programs and policies to reduce GHG emissions generated within the County. Relevant policies and programs in the Countywide Plan include:

- **AIR-4.1 Reduce Greenhouse Gas Emissions**. Adopt practices that promote improved efficiency and energy management technologies; shift to low-carbon and renewable fuels and zero emission technologies.
- **AIR-4.h Evaluate the Carbon Emissions Impacts of Proposed Developments**. Incorporate a carbon emissions assessment into land use plans and the environment impact report for projects.
- **AIR-4.o Implement Proposed State Programs to Reduce Greenhouse Gas Emissions**. Implement proposed State programs to reduce greenhouse gas emissions, including the Renewable Portfolio Standards, California Fuel Efficiency standards, and carbon cap and trade program.
- **EN-3.1 Initiate Green Building Initiatives**. Encourage and over time increasingly require sustainable resource use and construction with nontoxic materials.
- **EN-3.c Divert Construction Waste**. Continue to implement and improve the Construction and Demolition Waste Recovery Ordinance, requiring building projects to recycle or reuse a minimum of 50% of unused or leftover building materials.

GHG emissions would primarily be generated from construction activities. The 2022 Scoping Plan Update contains a measure that requires that 25 percent of energy demand from construction equipment be electrified by 2030 and 75 percent be electrified by 2045, which the Project would be consistent with as construction would be completed before 2030. The Project would also be consistent with the policies and programs in the Climate Action Plan 2030 and Marin Countywide Plan to reduce waste and GHG emissions. All vehicles would be required to comply with California Fuel Efficiency standards as well as the Advanced Clean Cars Program and Mobile Source Strategy. Therefore, the Project would be consistent with all applicable plans, policies, and

regulations adopted for the purpose of reducing GHG emissions. This impact would remain the same as the 2016 IS/MND finding, which is **less than significant**.

References

BAAQMD, 2023. BAAQMD CEQA Guidelines. Available at: https://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa-guidelines-2022/ceqa-guidelines-chapter-6-Project-climate-impacts_final-pdf.pdf?rev=ce3ba3fe9d39448f9c15bbabd8c36c7f&sc_lang=en. Accessed November 2023.

CARB, 2022. 2022 Scoping Plan for Achieving Carbon Neutrality, December 2022.

Marin County, 2023. Marin Countywide Plan, adopted November 6, 2007, revised on January 24, 2023.

Marin County, 2020. Marin County Unincorporated Area Climate Action Plan 2030, December 2020

3.9 Hazards and Hazardous Materials

Issues (and Supporting Information Sources):	*New Potentially Significant Impact*	*New Less Than Significant Impact with Mitigation Incorporated*	*New Less Than Significant Impact*	*Same Impact as Approved Project*
IX. HAZARDS AND HAZARDOUS MATERIALS — 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 Section 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?	☐	☐	☐	☒

Findings of 2016 IS/MND

The 2016 IS/MND identified the following impacts related to hazards and hazardous materials:

- No impact related to emitting hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within ¼ mile of an existing or proposed school; being located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, creating a significant hazard to the public or the environment; 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, resulting in a safety hazard for people residing or working in the project area; for a project within the vicinity of a private airstrip, resulting in a safety hazard for people residing or working in the project area; impairing implementation of or physically interfering with an adopted emergency response plan or emergency evacuation plan.

- Less-than-significant impacts related to creating a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials; creating 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 impacts with mitigation related to exposing people or structures to a significant risk of loss, injury or death involving wildland fires.

Discussion

a-b) The in-channel work and construction of the pipeline in Sir Francis Drake Boulevard would involve the use of similar materials and equipment as those described in the 2016 IS/MND. For the reasons described in the 2016 IS/MND, the impact would be **less than significant**.

c-e) The Project sites are not within ¼ mile of a school, on a list of hazardous materials sites, or within an airport land use plan or within 2 miles of a public airport or public use airport. For the reasons described in the 2016 IS/MND, there would be **no impact.**

f) As indicated in Chapter 2, *Project Description*, the Project now includes installation of approximately 1,700 feet of pipeline in Sir Francis Drake Boulevard. The proposed replacement alignment would begin near the intersection of Sir Francis Drake Boulevard and Lower Peters Dam Road downstream of Kent Lake (Peters Dam). One lane of Sir Francis Drake Boulevard would be closed during pipeline installation (expected to take approximately 8 weeks) and roadway repaving (expected to take approximately 2 weeks), which could result in delays in emergency response.

The Marin County Fire Department prepared the 2023 Marin County Unit Strategic Fire Plan & Community Wildfire Protection Plan (CWPP), which "identifies and prioritizes pre-fire and post fire management strategies and tactics meant to reduce the loss of assets at risk within Marin County" (MCFD, 2023). Additionally, Fire Safe Marin "in collaboration with Marin fire agencies, cities, towns, and other partners, has developed and published wildfire evacuation maps for several of Marin's wildland urban interface communities", including the Lagunitas and Forest Knolls neighborhoods adjacent to the Project sites (Fire Safe Marin, 2025a). The map for Lagunitas indicates that the portion of Sir Francis Drake Boulevard where pipeline would be installed is designated as an evacuation route for surrounding areas (Fire Safe Marin, 2025b).

Because a lane of Sir Francis Drake Boulevard, an evacuation route, would be temporarily closed, construction of the Project could impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan. **Mitigation Measure TRA-1** (refer to Section 3.17, Transportation) would require that Marin Water prepare and implement a Traffic Control Plan, coordinate with local emergency services, and distribute public notifications regarding construction activities. Additionally, as noted in Section 2.5 of Chapter 2, *Project Description*, construction of the pipeline in Sir Francis Drake Boulevard would require an encroachment permit from Marin County. Specific details regarding traffic control and lane closure measures would be determined in consultation with Marin Water and Marin County during the encroachment permit process. With implementation of Mitigation Measure TRA-1, impacts related to impairment or physical interference of an emergency response or evacuation plan would be reduced to **less than significant**.

g) For the reasons described in the 2016 IS/MND, impacts related to exposing people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires

would be reduced to less-than-significant with implementation of adopted **Mitigation Measures 8-1** and **8-2** (presented in Appendix A). In addition to implementing Mitigation Measures 8-1 and 8-2, as indicated in Section 2.3, Construction, construction contractors are required to comply with measures detailed in Marin Water's adopted standard environmental protection measure S01000 Environmental Protection High Fire Danger Alerts and Closures (refer to Appendix B). Refer also to Section 3.20, Wildlife, for a full analysis of Project impacts related to wildfire.

References

Fire Safe Marin, 2025a. Evacuation Maps, 2025. Available online at https://firesafemarin.org/prepare-yourself/evacuation-guide/evacuation-maps/. Accessed July 30, 2025.

Fire Safe Marin, 2025b. San Geronimo, Zone Area 1: Lagunitas, 2025. Available online at https://cdn.qr-code-generator.com/account9351681/10549941_2.pdf?Expires=1753998659&Signature=kjtzu3ISpygmfGy~C-K7DDza5yu1isUFU-zf6tWmcpUoKu~Un-Iwn6WxfmnH0dNX5Hvite~MUYoR5PUh3A8Foo3AI7bBt3kjzmqqwrcL9CGRc3XrGyh60i~~jVDu9hvGYFwzo2nnR57Hu4lGvF~Tf8~lJ1RExyjC-39IhxytycqvUzPqfyrIzzIzTsYCuKICMjlHNvHXRq6CXLnBZt2Yn5T~~92iDzLJ33-EIOaJIQJ~rMbALVdNnG2S2K0EHcBuNgqjaoIIZMYgJhpXrZjEfH263VgTzANo3E90mm8A~4ff9Qx9EDarRDHHkKadDYK6JEqZ52vD~EiKLAz~GbdhYA__&Key-Pair-Id=KKMPOJU8AYATR. Accessed July 30, 2025.

Marin County Fire Department (MCFD), 2023. 2023 Marin County Unit Strategic Fire Plan & Community Wildfire Protection Plan (CWPP), May 1, 2023.

3.10 Hydrology and Water Quality

Issues (and Supporting Information Sources):	*New Potentially Significant Impact*	*New Less Than Significant Impact with Mitigation Incorporated*	*New Less Than Significant Impact*	*Same Impact as Approved Project*
X. HYDROLOGY AND WATER QUALITY — 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 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?	☐	☒	☐	☐

Findings of 2016 IS/MND

The 2016 IS/MND identified no impacts for all issues related to hydrology and water quality, which included the potential for the Project to:

- Violate any water standards or waste discharge requirements;
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local ground water table level;
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site;
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site;

- Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff;
- Otherwise substantially degrade water quality;
- Place housing within a 100-year flood-hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map;
- Place within a 100-year flood-hazard area structures which would impede or redirect flood flows;
- Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam; and/or
- Inundation by seiche, tsunami, or mudflow.

Discussion

a) Project construction activities would involve site clearing, earthmoving, excavation, soil stockpiling, and temporary storage and use of chemicals, such as fuel. Excavations necessary for underground facilities could intercept shallow or perched groundwater, requiring temporary localized dewatering to create a dry work area and facilitate construction. New pipelines or connections between existing and new pipelines would need to be drained and disinfected prior to service, requiring the management and disposal of pipeline disinfection discharges.

As indicated in the 2016 IS/MND, prior to connecting the new pipeline crossing and in-road segment to the existing North Marin Line, the pipeline would be dewatered. Marin Water maintains a dewatering valve near the confluence of San Geronimo and Lagunitas Creeks. The rate of dewatering flow from that valve would be metered to ensure there is no scouring or turbidity within the creeks.

Dewatering of adjacent segments of San Geronimo Creek may be necessary to install the proposed structures and cut the existing piles. Work within San Geronimo Creek could release sediment and other construction-related substances into the creek. San Geronimo Creek is listed as impaired for dissolved oxygen and bacteria (SWRCB, 2024). As described in Section 2.3 in Chapter 2, *Project Description*, temporary creek dewatering structures would be installed at upstream and downstream locations for each creek crossing and would include use of the following materials: gravel access ramps, timber crane mats, cofferdams, pipes, pump(s), and screens to convey creek flow through the work area. A Creek Dewatering Plan would be prepared by the construction contractor and submitted to Marin Water for review prior to performing any creek dewatering activities. Debris racks and fish screens would be installed upstream of inlets at each crossing, and the downstream sections would include energy dissipaters of conveyed water prior to re-entering the creek beds in order to minimize scouring. Flow monitoring would occur before Project implementation in order to establish base line creek flow and to appropriately size conveyance equipment, and throughout construction to maintain seasonal flows through the Project area. Implementation of **Mitigation Measure HYD-1**, which provides details regarding the Creek Dewatering Plan and additional

protection measures, would prevent the release of sediment and water quality contaminants into San Geronimo Creek.

Soil disturbing activities, such as excavation and site clearing, could cause soil erosion and initiate the migration of soil and sediment in stormwater runoff to downgradient water bodies and storm drains. If not properly managed, sediment from stockpiled spoils could migrate off site during rain events and could increase sedimentation in downstream receiving waters bodies. Construction activities could also result in the accidental release of hazardous construction chemicals such as adhesives, solvents, fuels, and petroleum lubricants that, if not managed appropriately, could adhere to soil particles, become mobilized by rain or runoff, and degrade water quality. The Project areas combined, including crossing Sites 1 and 2 and approximately 17,000 square feet in Sir Francis Drake Boulevard (assuming a 10-foot-wide construction corridor along the approximately 1,700 linear foot pipeline alignment), would be approximately 1 acre. Therefore, the Project would be subject to the requirements of the NPDES Construction General Permit (CGP; SWRCB, 2022). Under the CGP requirements, a Legally Responsible Person (LRP) is identified for permit coverage. The Applicant's contractor can be designated as the LRP's approved signatory. As required under the CGP, a SWPPP would be prepared by a Qualified SWPPP Developer and a Qualified SWPPP Practitioner would oversee its implementation. The SWPPP, which would include specific measures and conditions to reduce or eliminate stormwater flow that transport pollutants or sediment from the related construction activities, would be implemented throughout the duration of construction activities. At a minimum, the SWPPP must include the following:

- A description of construction materials, practices, and equipment storage and maintenance;
- A list of pollutants likely to contact stormwater and site-specific erosion and sedimentation control practices;
- A list of provisions to eliminate or reduce discharge of materials to stormwater;
- BMPs for fuel and equipment storage;
- Non-stormwater management measures to manage pollutants generated by activities such as paving operations and vehicle and equipment washing and fueling;
- The requirement that the appropriate equipment, materials, and workers be available to respond rapidly to spills and/or emergencies. All corrective maintenance or BMPs must be performed as soon as possible, depending upon worker safety; and
- On-site post-construction controls.

Examples of typical construction BMPs include scheduling or limiting certain activities to dry periods of the year, installing sediment barriers such as silt fencing and fiber rolls, maintaining equipment and vehicles used for construction, and tracking controls such as stabilization of construction access points.

Construction general permit Attachment J, Dewatering Requirements, includes the requirements for construction dewatering discharges covered by the construction general permit. Dewatering released into the permitted stormwater collection system from construction areas must be absent of pollutants in quantities that threaten to cause pollution or nuisance and must not take place in an

area where existing soil and/or groundwater contamination could cause an exceedance of receiving water limitations. The groundwater must be analyzed for pH and turbidity and its release must cease if limits on these pollutants are exceeded. As discussed in Section 3.9, Hazards and Hazardous Materials, the Project site is not on a site with known soil or groundwater contamination.

Mandatory compliance with the water quality protection requirements of the CGP and the accompanying regulatory process, including preparation and implementation of a SWPPP by a Qualified SWPPP Developer and a Qualified SWPPP Practitioner, implementation of monitoring and reporting by the LRP for compliance, and the application of corrective actions and additional control measures to ensure continued compliance based on monitoring results, would ensure that Project construction is consistent with the governing regulatory requirements, plans, and policies. Because the CGP regulatory requirements are non-discretionary, the Project cannot acquire construction permits without providing a SWPPP and a construction project that does not comply with the implementation of required BMPs, monitoring and reporting would be subject to a cease-and-desist order and fines.

Consistent with Section 28.18.093 of the Marin County Municipal Code, which requires implementation of construction-phase best management practices designed to protect water quality, disturbed areas would be protected with specified erosion control measures (e.g., jute, straw, coconut fiber erosion control fabric, coir logs, straw, silt fencing) throughout the staging areas and planting sites during construction. Implementation of the construction best management practices would reduce the risk of construction-related erosion of sediments and other pollutants from entering San Geronimo Creek.

The Project would result in a net reduction of facilities located below top of bank in San Geronimo Creek, and would restore the existing grade and paved surface of Sir Francis Drake Boulevard after pipeline construction. The Project would not create new sources of polluted runoff or otherwise include operational activities that could impair water quality. Therefore, with implementation of Mitigation Measure HYD-1, the Project's impact related to water quality standards or degrading water quality would be **less than significant with mitigation**.

Mitigation Measure HYD-1: Creek Dewatering Plan

For in-channel dewatering during construction, Marin Water or its contractor(s) shall prepare a Creek Dewatering Plan. The Creek Dewatering Plan shall identify best management practices (BMPs) that ensure construction activities meet water quality objectives. In addition, Marin Water shall implement the measures below, or whatever more stringent water quality protection measures are imposed by the RWQCB.

1. All work performed in-water shall be completed in a manner that meets the water quality objectives to ensure the protection of beneficial uses as specified in the Basin Plan
2. All dewatering and diversion methods shall be installed such that natural flow is maintained upstream and downstream of the Project area.
3. Any temporary dams or diversion shall be installed such that the diversion does not cause sedimentation, siltation, or erosion upstream or downstream of the Project area.

4. Screened pumps shall be used in accordance with CDFW's fish screening criteria and in accordance with the NMFS Fish Screening Criteria for Anadromous Salmonids and the Addendum for Juvenile Fish Screen Criteria for Pump Intakes
5. Cofferdams shall remain in place and functional throughout the in-stream construction or maintenance periods.
6. Disturbance of protected riparian vegetation shall be limited or avoided entirely.

b) As indicated in the 2016 IS/MND and the Geotechnical Investigation report, the Project does not include design, construction, or operational features that would deplete groundwater supplies or interfere substantially with groundwater recharge. The proposed action does not overlie a delineated groundwater basin (DWR, 2022). There would be **no impact**.

c.i) The Project would not increase impervious surface area or increase the volume of runoff from the sites. Removal of the abutments and pipeline at Site 1 and shifting the abutments at Site 2 to locations above top of bank would remove structures that are currently in the creek. The Project would reduce the amount of development altering drainage patterns in the Project area. The Project would result in a net reduction of facilities located below top of bank in San Geronimo Creek and would restore the existing grade and paved surface of Sir Francis Drake Boulevard after pipeline construction. As discussed in item a), Project construction would adhere to the requirements of the CGP. The CGP requires that non-stormwater discharges from construction sites be eliminated or reduced to the maximum extent practicable; a SWPPP that governs construction activities for the Project be developed and implemented; and, routine inspections be performed for all stormwater pollution prevention BMPs and control practices being used at the site, including inspections before and after storm events. These requirements are standard construction practice and have been proven effective at preventing erosion and/or siltation both on- and off-site during construction activities and are specifically designed to manage stormwater within construction zones. Implementation of Mitigation Measure HYD-1 (Creek Dewatering Plan) would further avoid or reduce impacts relating to erosion, siltation, or increased stormwater runoff on and off site due to altered drainage patterns resulting from construction activities. Therefore, impacts related to resulting in substantial erosion or siltation would be **less than significant with mitigation**.

c.ii, c.iii) The Project would not increase impervious surface area or otherwise alter drainage patterns in a manner that would increase the volume of runoff from the site or create or contribute runoff which would exceed the capacity of existing or planned stormwater systems because no new development or new paved area would be created. There would be **no impact**.

c.iv) While the new pipeline in Sir Francis Drake Boulevard would be within a flood hazard zone in some locations (FEMA, 2009), the pipeline would be underground and the ground surface would be restored to preconstruction conditions; therefore, the pipeline in Sir Francis Drake Boulevard would not impede or redirect flood flows. Removal of the abutments and pipeline at Site 1 and shifting the abutments at Site 2 to locations above top of bank would remove structures that are currently in the creek. The pipeline crossing sites are mapped within special flood hazard zone A on the Federal Emergency Management Agency (FEMA) flood insurance rate maps for Marin County (FEMA, 2009). A base flood elevation has not been established by FEMA for San Geronimo Creek.

Appendix Q of the 2016 IS/MND includes peak flow information developed by Marin Water for the Project area. The analysis found that both pipeline crossings are above the simulated 10-year, 25-year, and 100-year flow event water surface elevations in San Geronimo Creek. The bottom elevations of the existing Sites 1 and 2 pipelines are at 202.26 feet and 211.85 feet North American Vertical Datum of 1988 (NAVD88) respectively, which are higher than the simulated 100-year water surface elevations at Site 1 (200.61 feet NAVD88) or Site 2 (210.97 feet NAVD88). The new pipeline at Site 2 would be installed at a higher elevation than the existing pipeline. The piers to be removed are at least partially below these water surface elevations. As shown in Appendix Q, Figure 7 of the 2016 IS/MND, the existing piers/piles have a very small (less than 0.1 foot) backwater effect under existing simulated 100-year flood conditions; therefore, removal of the piers would not substantially impede or redirect flood flows due to the relative size of the piers compared to the cross sectional area of the creek in each location. Therefore, the impact related to impeding or redirecting flood flows would be **less than significant**.

d) San Geronimo Creek and portions of Sir Francis Drake Boulevard in the Project area are within mapped flood hazard zones. As discussed in Section 2.3 in Chapter 2, *Project Description*, construction activities occurring within San Geronimo Creek would be limited to the 'dry-construction' season, April 1 to October 15, unless an extension is approved by the regulatory agencies. As discussed under item a), SWPPP best management practices would be required during construction and implementation of Mitigation Measure HYD-1 (Creek Dewatering Plan) would reduce the risk of releasing sediment or water quality pollutants during construction. The Project does not include the use of potential water quality pollutants during operations. Therefore, impacts associated with the release of pollutants due to Project inundation would be **less than significant with mitigation**.

e) The Project does not overlie a delineated groundwater basin (DWR, 2022). The Project does not overlie a groundwater basin that must be managed in accordance with a groundwater sustainability plan. As discussed under item a), SWPPP best management practices would also be required during construction, and implementation of Mitigation Measure HYD-1 (Creek Dewatering Plan) would reduce the risk of releasing sediment or water quality pollutants during construction. Therefore, implementation of the Project would not conflict with the relevant water quality control plan and the impact would be **less than significant with mitigation**.

References

California Department of Water Resources (DWR), 2022. Bulletin 18 Groundwater Basins, December 9, 2022. Available online at https://sgma.water.ca.gov/webgis/index.jsp?jsonfile=https%3a%2f%2fsgma.water.ca.gov%2fportal%2fresources%2fjs%2fmapconfigs%2fGsaMaster.js. Accessed August 18, 2025.

Federal Emergency Management Agency (FEMA), 2009. Flood Insurance Rate Map, Map Number 06041C0275D. May 4.

State Water Resources Control Board (SWRCB), 2022. General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities, Order WQ 2022-0057-DWQ, 2022,

https://www.waterboards.ca.gov/water_issues/programs/stormwater/construction/general_permit_reissuance.html, accessed August 14, 2025.

State Water Resources Control Board, 2024. 2024 Integrated Report, Listing for San Geronimo Creek. Available online at https://www.waterboards.ca.gov/water_issues/programs/tmdl/2023_2024state_ir_reports/apx-b-factsheets/04463.shtml.

3.11 Land Use and Planning

Issues (and Supporting Information Sources):	*New Potentially Significant Impact*	*New Less Than Significant Impact with Mitigation Incorporated*	*New Less Than Significant Impact*	*Same Impact as Approved Project*
XI. LAND USE AND PLANNING — 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?	☐	☐	☐	☒

Findings of 2016 IS/MND

The 2016 IS/MND identified no impacts for all issues related to land use and planning.

Discussion

a) While the pipeline within Sir Francis Drake Boulevard was not analyzed in the 2016 IS/MND, the pipeline would be constructed within the road right of way and would not divide an established community. The pipeline at Site 2 would be replaced along its existing alignment. Therefore, there would be no impact.

b) As indicated in the 2016 IS/MND, the Project is designed to replace the existing San Geronimo Creek pipeline crossings with seismically resistant pipelines, which would reduce, if not eliminate the chance of a seismically-associated pipeline failure that could result in significant impacts to San Geronimo Creek. The Project area is not part of or near an existing Habitat Conservation Plan or Natural Communities Conservation Plan and construction activities would not conflict with policies in the Marin Countywide Plan (Marin County Community Development Agency, 2023). Refer to Sections 3.3 Air Quality, 3.4 Biological Resources, 3.6 Energy, 3.8 Greenhouse Gas Emissions, 3.13 Noise, and 3.17 Transportation for analyses regarding compliance with adopted plans, policies, and regulations specific to those resources.

References

Marin County Community Development Agency, Marin Countywide Plan, amended January 24, 2023.

3.12 Mineral Resources

Issues (and Supporting Information Sources):	*New Potentially Significant Impact*	*New Less Than Significant Impact with Mitigation Incorporated*	*New Less Than Significant Impact*	*Same Impact as Approved Project*
XII. MINERAL RESOURCES — Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of 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?	☐	☐	☐	☒

Findings of 2016 IS/MND

The 2016 IS/MND identified no impact for all issues related to mineral resources.

Discussion

a) The setting related to mineral resources has not changed since the 2016 IS/MND. For the reasons described in the 2016 IS/MND, there would be **no impact**.

b) The Marin Countywide Plan, amended in January 2023, does not identify the project area as a locally important-mineral resource site. There would be **no impact**.

References

Marin County Community Development Agency, Marin Countywide Plan, amended January 24, 2023.

3.13 Noise

Issues (and Supporting Information Sources):	*New Potentially Significant Impact*	*New Less Than Significant Impact with Mitigation Incorporated*	*New Less Than Significant Impact*	*Same Impact as Approved Project*
XIII. NOISE — 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?	☐	☐	☐	☒

Findings of 2016 IS/MND

The 2016 IS/MND identified the following impacts related to noise and vibration:

- No impact related to the generation of noise levels in excess of standards established in the local general plan or noise ordinance or applicable standards of other agencies; resulting in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project; 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 exposing people residing or working in the project area to excessive noise levels; and for a project within the vicinity of a private airstrip, exposing people residing or working in the project area to excessive noise levels.

- Less-than-significant impacts related to exposing persons to or generating of excessive ground borne vibration or ground borne noise levels.

- Less-than-significant impacts with mitigation related to resulting in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

Discussion

a) Project construction would result in short-term increases in noise levels in vicinity of construction areas and would affect ambient noise levels at existing sensitive receptors. Noise from construction activities would result from the operation of off-road construction equipment and vehicles and is typically regulated through standards in the local general plan and/or municipal code. Construction associated with changes to the Project since the 2016 IS/MND would use similar construction equipment as what was analyzed in the 2016 IS/MND. Sensitive receptors in the form of residences are located along Sir Francis Drake Boulevard with the closest residences approximately 110 feet from the Site 1 San Geronimo Creek crossing, 170 feet from the Site 2 crossing, and 20 feet from the proposed pipeline alignment in Sir Francis Drake Boulevard. There are also residences approximately 170 feet south of Site 2 on Spring Avenue. These receptors would experience an

increase in ambient noise levels during Project construction. However, neither the Marin County General Plan (Marin County, 2007) nor the County's Municipal Code (Marin County, 2025) provide quantitative limits for the evaluation of construction noise. Instead, Marin County Code Section 6.70.030(5)(a) regulates construction noise by restricting construction activities to the less noise-sensitive daytime hours of 7 a.m. to 5 p.m. on weekdays and 9 a.m. to 5 p.m. on Saturdays. Construction is prohibited on Sundays and holidays. Though construction work conducted by public agencies is exempt from these restrictions per Section 6.70.030(5)(b), **Mitigation Measure 11-1** identified in the 2016 IS/MND (presented in Appendix A) would apply to the Project and require that Project construction adhere to the construction hour restrictions in the Marin County Municipal Code. This would ensure that construction activities associated with the Project would not generate noise in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies. This impact would be **less than significant with mitigation** with implementation of Mitigation Measure 11-1.

Upon completion of construction, the pipeline would operate as it currently does. It would not include any new operational noise sources or generate any additional vehicle trips from employees and deliveries. Therefore, there would be **no impact** related to operations.

b) Construction equipment associated with the Project would generate groundborne vibration. Vibration from construction activities would have the potential to impact nearby structures and cause structural or cosmetic building damage. In addition, construction vibration could result in human annoyance impacts primarily through sleep disturbance at night. As construction activities would be limited to the daytime hours through the implementation of Mitigation measure 11-1, the Project would not result in human annoyance impacts.

The Federal Transit Administration (FTA, 2018) has published thresholds for structural damage based on the condition of structures. The threshold for timber and masonry structures such as residential structures is 0.2 inch per second (in/sec) Peak Particle Velocity (PPV). The FTA's building damage threshold for historical structures is 0.12 in/sec, PPV. There are no historical structures in the vicinity of the Project components. As indicated above, the nearest residences are located approximately 110 feet from Site 1, 170 feet from Site 2, and 20 feet from the proposed pipeline alignment in Sir Francis Drake Boulevard.

According to FTA data, the highest vibration generating construction equipment include pile drivers, vibratory rollers, bulldozers, drilling equipment, jackhammers and loaded trucks. As shown in Table 2-2 of the Project Description, the only vibration generating equipment used for Project construction would be a drill rig and loaded trucks. These generate vibration levels of 0.089 and 0.076 in/sec, PPV, respectively at a reference distance of 25 feet. The use of a drill rig is anticipated only at Site 2, which would result in a vibration level of 0.01 in/sec, PPV at the nearest residences 170 feet away. Vibration from loaded trucks along Sir Francis Drake Boulevard would result in a vibration level of 0.11 in/sec at residences located 20 feet away from the pipeline alignment. Because these levels would be below the FTA's threshold of 0.2 in/sec, Project construction would not result in the generation of excessive groundborne vibration or groundborne noise levels. This impact would be **less than significant**.

Once operational, the Project would not include any new sources of groundborne noise or vibration. Therefore, there would be **no impact** related to operations.

c) For the reasons described in the 2016 IS/MND, there would be **no impact.** The Project is not located within the vicinity of a private airstrip or an airport land use plan or within two miles of a public airport or public use airport.

References

Federal Transit Administration, 2018. Transit Noise and Vibration Impact Assessment Manual, September 2018. Available online at: https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf. Accessed August 2025.

Marin County, 2007. Marin Countywide Plan, November 6, 2007. Available online at: www.naco.org/sites/default/files/documents/Marin%20County%20CA%20Countywide%20Plan.pdf. Accessed August 2025.

Marin County, 2025. Marin County Code of Ordinances, Tile 6 Public Peace, Safety, and Morals. Available online at: http://marincounty-ca.elaws.us/code/coor_title6_ch6.70_sec6.70.030. Accessed August 2025.

3.14 Population and Housing

Issues (and Supporting Information Sources):	*New Potentially Significant Impact*	*New Less Than Significant Impact with Mitigation Incorporated*	*New Less Than Significant Impact*	*Same Impact as Approved Project*
XIV. POPULATION AND HOUSING — 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?	☐	☐	☐	☒

Findings of 2016 IS/MND

The 2016 IS/MND identified no impacts for all issues related to population and housing.

Discussion

a-b) For the reasons described in the 2016 IS/MND, there would be **no impact** related to population and housing.

3.15 Public Services

Issues (and Supporting Information Sources):	*New Potentially Significant Impact*	*New Less Than Significant Impact with Mitigation Incorporated*	*New Less Than Significant Impact*	*Same Impact as Approved Project*
XV. PUBLIC SERVICES —				
a) 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 following public services:				
i) Fire protection?	☐	☐	☐	☒
ii) Police protection?	☐	☐	☐	☒
iii) Schools?	☐	☐	☐	☒
iv) Parks?	☐	☐	☐	☒
v) Other public facilities?	☐	☐	☐	☒

Findings of 2016 IS/MND

The 2016 IS/MND identified no impacts for all issues related to public services.

Discussion

a.i-v) For the reasons described in the 2016 IS/MND, there would be **no impact** related to public services.

3.16 Recreation

Issues (and Supporting Information Sources):	*New Potentially Significant Impact*	*New Less Than Significant Impact with Mitigation Incorporated*	*New Less Than Significant Impact*	*Same Impact as Approved Project*
XVI. RECREATION —				
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?	☐	☐	☐	☒

Findings of 2016 IS/MND

The 2016 IS/MND identified no impacts for all issues related to recreation.

Discussion

a-b) For the reasons described in the 2016 IS/MND, there would be **no impact** related to recreation.

3.17 Transportation

Issues (and Supporting Information Sources):	*New Potentially Significant Impact*	*New Less Than Significant Impact with Mitigation Incorporated*	*New Less Than Significant Impact*	*Same Impact as Approved Project*
XVII. TRANSPORTATION — Would the project:				
a) Conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	☐	☒	☐	☐
b) Would the project conflict or be inconsistent with CEQA Guidelines section 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?	☐	☒	☐	☐

Findings of 2016 IS/MND

The 2016 IS/MND identified no impact for all issues related to transportation, which included the following:

- Conflicting with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit;
- Conflicting with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?
- Resulting in a change in air traffic patterns;
- Substantially increasing hazards due to a design feature or incompatible uses;
- Resulting in inadequate emergency access; and
- Conflicting with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities.

Discussion

Senate Bill 743 was implemented in 2018 and designates vehicle miles traveled (VMT) as the performance metric to be used for the analysis of transportation impacts in documents prepared pursuant to the CEQA. VMT is a measure of the total number of miles driven to or from a development and is sometimes expressed as an average per trip or per person. This focus on VMT aligns transportation impact analyses and mitigation outcomes with the state's goals to reduce GHG emissions, encourage infill development, and improve public health through the development of multimodal transportation networks. Pursuant to Senate Bill 743, CEQA Guidelines Section 15064.3 includes modifications geared toward the effects of long-term VMT (i.e., project operations) rather than short-term VMT (i.e., project construction), providing a framework for evaluating the former while stating that "…a qualitative analysis of

construction traffic may be appropriate." The Governor's Office of Planning and Research[4] *Technical Advisory on Evaluating Transportation Impacts in CEQA* provides technical recommendations regarding assessment of VMT, thresholds of significance, mitigation measures, and estimation methods for analyzing a project's VMT (OPR, 2018). Since the significance criteria have changed since the 2016 IS/MND, the Project will be analyzed under these new criteria.

a) The Project is in unincorporated Marin County and within the sphere of influence of the Marin Countywide Plan. The Transportation Section of the Marin Countywide Plan contains goals, policies, and programs to support adequate traffic circulation, as well as maintain and promote alternative modes of transportation such as public transit, bicycle routes, and pedestrian trails (Marin County Community Development Agency, 2023). Access to the Project sites would be off Sir Francis Drake Boulevard which is categorized as a "Principal Arterial" roadway in the Marin Countywide Plan (Marin County Community Development Agency, 2005). The Transportation Authority of Marin and Caltrans designate Sir Francis Drake Boulevard as an existing Class III bikeway/bike route[5] (TAM, 2025).

Project construction would occur over an approximately 3.5-month period, with an estimated four to eight workers on-site at any given time. In addition to worker trips and deliveries of materials and equipment (about eight truck trips per day), traffic impacts would result from temporary lane closures during periods of active construction along Sir Francis Drake Boulevard, a principal arterial. One lane would be closed for approximately 10 weeks total to install the new pipeline and repave the road, resulting in a portion of the Class III bikeway along Sir Francis Drake Boulevard to also be closed, requiring cyclists to merge with vehicle traffic. These temporary traffic changes could cause localized delays but would be minor in the context of overall traffic volumes. Additionally, to reduce potentially significant impacts, **Mitigation Measures TRA-1** would require that Marin Water prepare and implement a Traffic Control Plan, coordinate with local emergency services, and distribute public notifications regarding construction activities. Because the construction period is relatively short, and any interference with the flow of traffic on a principal arterial and existing bicycle route would be temporary, and because Marin Water would implement Mitigation Measures TRA-1, the impact related to conflicting with a program plan, ordinance, or policy addressing the circulation system would be reduced to **less than significant**.

Mitigation Measure TRA-1: Traffic Control Plan and Emergency Access Management

To minimize traffic impacts on motorists and cyclists and ensure continued emergency access during construction, Marin Water and its contractor shall implement the following measures:

1. **Traffic Control Plan:** Prior to the start of construction, Marin Water and its contractor shall prepare and submit a detailed Traffic Control Plan for review and approval by the local planning and transportation authorities and emergency services (e.g., Marin County

[4] The Office of Planning and Research has been renamed the Governor's Office of Land Use and Climate Innovation since publication of the *Technical Advisory on Evaluating Transportation Impacts in CEQA* in April 2018.

[5] Caltrans classifies a Class III Bikeway (Bike Route) as shared facilities which serve either to: (a) provide continuity to other bicycle facilities (usually Class II bikeways); or (b) designate preferred route though high demand corridors. (Caltrans, 2025)

Fire Department, Marin County Sheriff's Department, and local emergency managers). The Traffic Control Plan shall include, but not be limited to, the following measures:

- Temporary signage and flagging operations.
- Lane closure schedules avoiding peak evacuation risk periods (e.g., red flag warnings).
- Use of temporary traffic signals or pilot cars to manage alternating one-way traffic flow of motorists and cyclists.
- Potential detour routes in the event of an emergency.
- Identification of a traffic control supervisor to monitor traffic conditions during construction.
- Provisions for maintaining access for emergency vehicles at all times.
- Provisions for covering trenches and quickly removing barriers, cones, and/or equipment to restore traffic flow in the event of an evacuation order.

2. **Coordination with Emergency Services:** The applicant shall coordinate with local fire, police, and emergency management agencies to ensure that emergency response times are not adversely affected. This includes:
   - Providing 24-hour contact information for the construction supervisor and Marin Water Project Manager in the event the construction supervisor cannot be reached.
   - Ensuring that emergency responders are informed of lane closures and detour routes in advance.
   - Ensuring that construction crews have the necessary equipment onsite to maintain the ability to quickly cover trenches and restore traffic flow in the event of an evacuation order.
3. **Public Notification:** The applicant shall notify affected residents, businesses, and the general public at least 14 days prior to the start of construction. Notification shall include:
   - Description of the construction activity and expected duration.
   - Maps of detour routes and contact information for inquiries.
   - Information on how emergency access will be maintained.
4. **Construction Timing:** To the extent feasible, construction requiring lane closures shall be scheduled during off-peak hours, unless otherwise approved by the local planning and transportation authorities.
5. **Monitoring and Adjustment:** Marin Water's contractor shall monitor traffic conditions during construction and adjust traffic control measures as needed to minimize delays and maintain safety. A traffic control supervisor shall be on-site during active construction hours

b) Project construction is anticipated to occur between August and November 2026 and would involve a maximum of four to eight workers on the Project site at any one time. The standards set forth in the *Technical Advisory on Evaluating Transportation Impacts in CEQA* address a project's additional permanent automobile trips or vehicle miles traveled in lieu of an existing model or method (OPR, 2018). Because Project construction would be temporary, construction activities do not necessitate analysis under CEQA Guidelines Section 15064.3(b). Additionally,

as indicated in Section 2.4, once construction is complete, no additional staff would be hired to operate the pipeline, and no additional operational vehicle trips are anticipated. Therefore, there would be **no impact** related to conflicting or being inconsistent with CEQA Guidelines section 15064.3, subdivision (b).

c) The Project would involve pipeline installation within Sir Francis Drake Boulevard and closure of one lane, potentially increasing roadway hazards during construction, such as vehicle queuing, proximately to active construction equipment, etc. Implementation of Mitigation Measures TRA-1 would include traffic control measures to maintain the flow of traffic and reduce hazards during construction. The Project would not introduce a geometric design feature or incompatible uses. With implementation of Mitigation Measures TRA-1, this impact would be **less than significant**.

d) Refer to Impact f) in Section 3.9, Hazards and Hazardous Materials, for a full analysis of emergency access impacts related to constructing approximately 1,700 linear feet of pipeline in Sir Francis Drake Boulevard, a designated evacuation route. Because a lane of Sir Francis Drake Boulevard would be temporarily closed, construction of the Project could result in inadequate emergency access. Mitigation Measure TRA-1 would require that Marin Water prepare and implement a Traffic Control Plan, coordinate with local emergency services, and distribute public notifications regarding construction activities. Additionally, as noted in Section 2.5 of Chapter 2, *Project Description*, construction of the pipeline in Sir Francis Drake Boulevard would require an encroachment permit from Marin County. Specific details regarding traffic control and lane closure measures would be determined in consultation with Marin Water and Marin County during the encroachment permit process. With implementation of Mitigation Measure TRA-1, the impact related to resulting in inadequate emergency access would be reduced to **less than significant**.

References

California Department of Transportation (Caltrans), 2025. Highway Design Manual, Chapter 1000 – Bicycle Transportation Design, January 1, 2025.

California Governor's Office of Planning and Research (OPR), 2018. Technical Advisory on Evaluating Transportation Impacts in CEQA, April. Available online at: https://opr.ca.gov/docs/20190122-743_Technical_Advisory.pdf

Marin County Community Development Agency, 2005. Marin Countywide Plan, Map 3-8, Roadway Network of Marin County, August 1, 2005.

Marin County Community Development Agency, 2023. Marin Countywide Plan, amended January 24, 2023.

Transportation Authority of Marin, 2025. Interactive GIS Bicycle and Pedestrian Map. Available online at https://www.tam.ca.gov/bikepedmap/. Accessed July 30, 2025.

3.18 Tribal Cultural Resources

Issues (and Supporting Information Sources):	*New Potentially Significant Impact*	*New Less Than Significant Impact with Mitigation Incorporated*	*New Less Than Significant Impact*	*No Impact*
XVIII. TRIBAL CULTURAL RESOURCES —				
a) Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 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 Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	☐	☒	☐	☐

Findings of 2016 IS/MND

Tribal cultural resources were not addressed in the 2016 IS/MND aside from a brief discussion under *Cultural Resources*.

During preparation of the 2016 IS/MND, Marin Water contacted the Native American Heritage Commission (NAHC) by letter on September 23, 2015. A search of the Sacred Lands File housed at the NAHC did not indicate the presence of any Native American cultural resources in the vicinity of the project. In the response dated October 7, 2015, the NAHC also provided a list of individuals to contact from the Federated Indians of Graton Rancheria (FIGR) for further information regarding local knowledge of sacred lands. Letters and associated maps were sent to these individuals (Greg Sarris and Gene Buvelot) on January 4, 2016. Marin Water met with FIGR on February 23, 2016 to further discuss the Project details and request Project review; at which time FIGR requested a copy of the technical report. A copy of the technical report was emailed to Buffy McQuillen, Tribal Historic Preservation Officer, on March 1, 2016. On March 31, 2016, Marin Water sent follow up letters to FIGR. On April 4, 2016, Buffy McQuillen emailed Marin Water and stated that based on a review of the Project and cultural resources technical report there are no concerns regarding impacts to tribal cultural resources.

Discussion

a.i/ii) On July 29, 2025, ESA sent an updated request to the NAHC for a search of the Sacred Lands File and list of Native American tribes with interest in the project area. The NAHC response on July 29, 2025 stated that there are no documented Sacred Lands in the Project vicinity. On August 11, 2025, Marin Water sent an updated request for consultation to FIGR via certified mail and email. Buffy McQuillen, Tribal Historic Preservation Officer, responded on August 19, 2025 with a request for a consultation meeting. Marin Water sent follow-up emails with additional Project

details and meeting information on August 22, 2025 and September 19, 2025. No responses were received. Based on the results of consultation, there are no tribal cultural resources in the Project sites, and any potential impacts on tribal cultural resources would be reduced to **less-than-significant** levels with implementation of Mitigation Measure 5-1 (Protect of Archaeological Resources Identified during Construction) and Mitigation Measure 5-2 (Protect Human Remains Identified during Construction) (refer to Appendix A for the full text of Mitigation Measures 5-1 and 5-2).

3.19 Utilities and Service Systems

Issues (and Supporting Information Sources):	*New Potentially Significant Impact*	*New Less Than Significant Impact with Mitigation Incorporated*	*New Less Than Significant Impact*	*Same Impact as Approved Project*
XIX. UTILITIES AND SERVICE SYSTEMS — 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 wastewater 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?	☐	☐	☐	☒

Findings of 2016 IS/MND

The 2016 IS/MND identified no impacts for all issues related to utilities and service systems.

Discussion

a-c) While the Project includes construction of pipeline to replace existing aging water infrastructure, it would not require or result in the relocation or construction of additional new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities. The Project would have no effect on Marin Water's water supplies, and the environmental effects related to construction of the Project are addressed throughout this document and the 2016 IS/MND.

d-e) The California Integrated Waste Management Act of 1989 established the goal of diverting at least 75 percent of generated waste (based on per capita disposal rates) in California by 2020. In addition, the 2019 California Green Building Code (adopted by reference by Marin County) requires all construction and demolition projects to reuse or recycle at least 65 percent of materials generated, and Zero Waste Marin[6] ensures Marin County's compliance with state recycling mandates and provides residents and businesses with information on household hazardous waste collection, recycling, composting, and waste disposal.

[6] Zero Waste Marin is the informal name for the Marin Hazardous and Solid Waste Joint Powers Authority, which provides education and information to residents and businesses about recycling, reducing solid waste, and safely disposing of hazardous materials (Zero Waste Marin, 2023). The Authority also ensures compliance with California Integrated Waste Management Act and its waste reduction mandates.

As indicated in Section 2.3, Construction, excavations are anticipated to produce approximately 1,700-cubic yards of material that would be hauled offsite for disposal (increased from the approximately 100 cubic yards that was noted in the 2016 IS/MND). As noted in the 2016 IS/MND, the construction debris (including the existing pipeline segments) would be removed from the site for reuse, recycling, or disposal in a suitable landfill and would comply with local management and reduction statutes related to solid waste.

The Redwood Landfill and Recycling Center, a Class III landfill located north of the City of Novato, is the landfill nearest to the project site. The landfill is permitted to operate until January 1, 2036, can accept 2,300 cubic yards of materials daily, and is permitted for all types of waste that would be generated by Project construction (CalRecycle, 2025). As of 2024, there was an estimated 3,983,000 cubic yards of remaining capacity at Redwood Landfill (Redwood Landfill, Inc., 2024). There are also numerous landfills in the San Francisco Bay Area that would be expected to be able to accommodate the Project's solid waste volume, allowing the choice of landfill to be the discretion of the project contractor.

For these reasons, the impact related to generating solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, and complying with federal, state, and local management and reduction statutes and regulations related to solid waste would be **less than significant**.

References

CalRecycle, 2025. SWIS Facility/Site Activity Details, Redwood Landfill (21-AA-0001). Available at: https://www2.calrecycle.ca.gov/SolidWaste/SiteActivity/Details/3054?siteID=1727. Accessed August 14, 2025.

Redwood Landfill, Inc., 2024. Correspondance re: 2024 Aerial Survey Results for Redwood Landfill. October 18, 2024.

Zero Waste Marin, 2025. About Zero Waste Marin - Zero Waste Marin. Available at: https://zerowastemarin.org/who-we-are/about-zero-waste-marin/. Accessed August 14, 2025.

3.20 Wildfire

Issues (and Supporting Information Sources):	*New Potentially Significant Impact*	*New Less Than Significant Impact with Mitigation Incorporated*	*New Less Than Significant Impact*	*No Impact*
XX. WILDFIRE — 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?	☐	☒	☐	☐

Findings of 2016 IS/MND

Wildfire was not addressed in the 2016 IS/MND aside from a brief discussion under *Hazards and Hazardous Materials* impact (h).

Discussion

The Project sites are within a State Responsibility Area and are mostly zoned as Moderate fire hazard severity zone (FHSZ) with a small portion along Sir Francis Drake Boulevard zoned as High FHSZ (CAL FIRE, 2024). The Project is a component of Marin Water's Fire Flow Improvement Program, a program that brings together Marin Water and local fire agencies to identify fire flow[7] projects that are then implemented to improve the capacity or seismic reliability of water supply to hydrants for fire-fighting operations (Marin Water, 2023).

a) As discussed in Impact f) in Section 3.9, Hazards and Hazardous Materials, and Impact d) in Section 3.17, Transportation, construction of pipeline in Sir Francis Drake Boulevard could impair implementation of an adopted emergency response plan or emergency evacuation plan. **Mitigation Measure TRA-1** would require that Marin Water prepare and implement a Traffic Control Plan, coordinate with local emergency services, and distribute public notifications regarding construction activities. With implementation of Mitigation Measure TRA-1, impacts related to impairing implementation of an adopted emergency response or emergency evacuation plan would be reduced to **less than significant**.

b) Project construction would require construction crews to be within and adjacent to San Geronimo Creek and along Sir Francis Drake Boulevard. As indicated in the 2016 IS/MND, construction of

[7] "Fire flow" is the term firefighters use to describe how much water can be delivered by a water system through one or more hydrants to fight a fire at a specific location.

the Project would require a variety of activities often referred to as "hot work," such as welding. The sites are situated within a flammable vegetated environment.

Chapter 26 of the California Fire Code (California Code of Regulations, Title 24, Part 9) establishes provisions for safety and care during construction activities defined as hot work. In brief, the Code requires that specific measure be taken during construction to minimize the potential ignition of a wildland fire in areas susceptible to such events, which includes the project sites and surrounding lands.

Adopted **Mitigation Measures 8-1 and 8-2** from the 2016 IS/MND **(**presented in Appendix A) would require compliance with Chapter 26 of the California Fire Code and would not allow hot work on red flag days. In addition to implementing Mitigation Measures 8-1 and 8-2, construction contractors are required to comply with measures detailed in Marin Water's adopted standard environmental protection measure S01000 Environmental Protection High Fire Danger Alerts and Closures (refer to Appendix B). Implementation of adopted mitigation measures would reduce the potential to exacerbate wildfire risks, and the impact would be **less than significant with mitigation**.

c) The Project would not 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. There would be **no impact**.

d) The Project is designed to replace the existing San Geronimo Creek pipeline crossings with seismically resistant pipelines, which would reduce, if not eliminate the chance of a seismically-associated pipeline failure that could result in significant impacts to San Geronimo Creek and nearby people and structures.

As indicated in the 2016 IS/MND under *Geology and Soils*, weak soils and bedrock on moderate to steep slopes can move downslope due to gravity. Slope instability is often initiated or accelerated from soil saturation and groundwater pressure, though may also be aggravated by grading activity, such as removal of toe support by excavation or by addition of new loads, such as fill placement. Loss of toe support may also be a result of creek erosion and scour. The 2016 IS/MND documented that the creek crossing sites are located in an area that is generally susceptible to landsliding and that the steep banks along the San Geronimo Creek channel may also be susceptible to smaller-scale sloughing, raveling, and sliding. Additionally, removal of toe support by channel scour and erosion may accelerate or exacerbate bank instability. Adopted **Mitigation Measure 6-2** presented in Appendix A would be implemented to support design of new trestle abutments and reduce impacts related to slope stability and landslides.

As described in Section 10, Hydrology and Water Quality, the Project would not result in changes in runoff or drainage. Therefore, the impact related to exposing 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 would be **less than significant with mitigation**.

References

California Department of Forestry and Fire Protection (CAL FIRE), 2024. State Responsibility Area Fire Hazard Severity Zones, Marin County. Map dated September 29, 2023, effective April 1, 2024.

Marin Water, 2023. Construction and Infrastructure. Available online at https://www.marinwater.org/CIP#:~:text=Marin%20Water's%20Fire%20Flow%20Improvements,hydrants%20for%20fire%2Dfighting%20operations. Accessed on August 18, 2025.

3.21 Mandatory Findings of Significance

Issues (and Supporting Information Sources):	*New Potentially Significant Impact*	*New Less Than Significant Impact with Mitigation Incorporated*	*New Less Than Significant Impact*	*Same Impact as Approved Project*
XXI. MANDATORY FINDINGS OF SIGNIFICANCE —				
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?	☐	☒	☐	☐

Discussion

a) As indicated in Chapter 2, *Project Description*, the Project now includes installation of approximately 1,700 feet of pipeline in Sir Francis Drake Boulevard, the removal of existing piles within San Geronimo Creek, and dewatering. The addition of these Project components since design has progressed would result in impacts beyond those discussed in the 2016 IS/MND.

The Project has the potential to degrade the quality of the environment. As described above in Sections 3.1 through 3.20, the Project has the potential to cause significant impacts related to biological resources, cultural resources, geology and soils, hazards and hazardous materials, hydrology and water quality, noise, transportation, and wildfire. Mitigation measures have been identified to reduce these potential impacts to less than significant levels. No further mitigation would be required, and the Project would not degrade the quality of the environment (see Sections 3.1 through 3.20 above, for detailed analysis).

The Project has the potential to impact biological resources. As discussed above in Section 3.4, Biological Resources, the Project could result in impacts during construction related to affecting habitat for special-status fish and wildlife species by altering flows or disturbing habitat. However, implementation adopted Mitigation Measures 4-1 through 4-5 and new Mitigation Measures BIO-1 and BIO-2 would ensure that impacts on biological resources would be **less than significant**.

b) A cumulative impact refers to the combined effect of "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts" (CEQA Guidelines Section 15355). As defined by the State of California, cumulative impacts reflect "the change in the environment which results from the incremental impact of the Project when added to other closely related past, present, and reasonably foreseeable future projects.

Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time" (CEQA Guidelines Section 15355[b]).

Planned projects or areas anticipated for future build-out within the vicinity include the following residential development projects located in the Lagunitas-Forest Knolls neighborhood, approximately 1 mile east of crossing Site 2:

- *Demson Tree Removal Permit, Site Plan Review, and Design Review (P5570) (P5571):* Requesting approvals to remove Protected and Heritage trees and to construct a primary residential structure (i.e., single-family residence) and associated infrastructure on a vacant lot (County of Marin, 2025a).

- *Leo A. & Barbara J. Den Ouden Trust Et al Design Review (P4236) and Site Plan Review (P4336):* Requesting approval to develop 648 square feet of structures on a 14,192 square foot lot (County of Marin, 2025b).

Regional access to the Project work sites would likely occur from U.S. Route 101 and local access would occur via various roads, including Sir Franics Drake Boulevard. While the two residential projects in Forest Knolls would most likely rely on Sir Francis Drake Boulevard for direct construction and worker access, access to the sites would be east of the road portion affected by Project construction. Because Sir Francis Drake Boulevard is designated by Marin County as a "Principal Arterial" and the Project is expected to generate a limited number of construction-related trips (approximately eight haul trips per day over the approximately 3.5-month construction period), the resulting change in traffic volume near the Lagunitas-Forest Knolls neighborhood would likely be imperceptible to the average motorist. For these reasons, the Project's contribution to cumulative traffic impacts in the area would not be cumulatively considerable.

The Project would not have impacts on agriculture or forestry resources, land use and planning, mineral resources, population and housing, public services, or recreation that would combine with other projects. The Project could have impacts with respect to aesthetics, air quality, biological and cultural resources, energy, geology and soils, greenhouse gas emissions, hazards and hazardous materials, hydrology and water quality, noise, transportation, tribal cultural resources, utilities and service systems, and wildfire. However, such impacts would generally be limited to the Project sites and, where necessary, standard environmental protection measures described in Section 2.3 and included in Appendix B and mitigation measures described throughout this chapter would be implemented such that they would not substantially combine with other off-site impacts.

The Project's potential construction impacts with respect to air quality and GHG emissions could extend beyond the site to combine with impacts from other projects. As described in Sections 3.3, Air Quality, and 3.8, Greenhouse Gas Emissions, BAAQMD considered the emission levels at which a project's individual emissions would be cumulatively considerable in developing its CEQA significance thresholds. BAAQMD considers projects that result in emissions that exceed its CEQA significance thresholds to result in individual impacts that are cumulatively considerable and significant. As discussed in these sections, the Project's emissions would be limited to the construction period and to routine maintenance activities during operations and would be below BAAQMD's cumulatively considerable threshold.

Therefore, consideration of past, present, and reasonably foreseeable projects in the Project area and vicinity indicate that impacts resulting from the Project would not be cumulatively considerable, and the impact would be **less than significant with mitigation** presented in the individual resource sections.

c) As discussed in sections throughout this chapter (e.g., Sections 3.3, Air Quality, 3.9, Hazards and Hazardous Materials, 3.13, Noise, and 3.20, Wildfire) construction and operation of the Project would not have environmental effects that would cause substantial adverse effects on human beings, either directly or indirectly. The impact would be **less than significant with mitigation** presented in the individual resource sections.

References

County of Marin, 2025a. Demson Tree Removal Permit, Site Plan Review, and Design Review (P5570)(P5571), July 22, 2025.

County of Marin, 2025b. Leo A. & Barbara J. Den Ouden Trust Et al Design Review (P4236) and Site Plan Review (P4336), July 24, 2025.

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CHAPTER 4
Report Preparers

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Appendix A
2016 IS/MND





North Marin Line Stabilization Project

Lagunitas

Initial Study/Mitigated Negative Declaration

April 2016

Prepared by:

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MARIN MUNICIPAL WATER DISTRICT

North Marin Line Stabilization Project

Lagunitas

Initial Study/Mitigated Negative Declaration

April 2016

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Table of Contents

Draft Mitigated Negative Declaration 1

Project Description 1

Negative Declaration Mitigation Measures 1

Review Period 5

Contact Person 5

Environmental Checklist Form 7

1. Project Title 7
2. Lead Agency Name and Address 7
3. Contact Person and Phone Number 7
4. Project Location 7
5. Project Sponsor's Name and Address 7
6. General Plan Designation 7
7. Zoning 7
8. Description of Project 7
9. Surrounding Land Uses and Setting 17
10. Other Public Agencies whose Approval is Required 17

Environmental Factors Potentially Affected 18

Determination 18

Environmental Analysis 19

1. Aesthetics 19
2. Agricultural and Forestry Resources 21
3. Air Quality 22
4. Biological Resources 26
5. Cultural Resources 38
6. Geology and Soils 41
7. Greenhouse Gas Emissions 44
8. Hazards and Hazardous Materials 45

9. Hydrology and Water Quality 48
10. Land Use and Planning 50
11. Mineral Resources 51
12. Noise 51
13. Population and Housing 54
14. Public Services 54
15. Recreation 55
16. Traffic and Transportation 55
17. Utilities and Services Systems 57
18. Mandatory Findings of Significance 59

Information Sources 60

List of Preparers 62

List of Figures

Figure 1: Location Map 8

Figure 2: Assessor Parcel Map Site 1 9

Figure 3: Assessor Parcel Map Site 2 10

Figure 4: Assessor Parcel Map Site 2 11

Figure 5: Existing North Marin Crossing Site 1 12

Figure 6: Existing North Marin Crossing ite 2 12

Figure 7: Proposed North Marin Line Stabilization Plan (Site 1) 15

Figure 8: Proposed North Marin Line Stabilization Plan (Site 2) 16

List of Tables

Table 1: Historic-period Resources Located within the Project Area (Crossings 1 and 2) 39

Table 2: Deterministic Hazard Analysis Estimated Seismic Ground Motions 42

Appendices

Appendix A: North Marin Line Stabilization Project Biological Evaluation Report

Appendix B: Cultural Resources Inventory and Evaluation Report for the Marin Municipal Water District North Marin Line Stabilization Project

Appendix C: Geotechnical Investigation, San Geronimo Creek, North Marin Line Stabilization Project

Appendix D: Hydraulic Analysis of San Geronimo Creek to Determine Water Surface Elevations at the Two Crossing Locations of MMWD's Raw Water Transmission Line

List of Acronyms and Definitions

APN	Assessor Parcel Number
ASDC	Average Summer Day Consumption
AWWA	American Water Works Association
BAAQMD	Bay Area Air Quality Management District
BMPs	Best Management Practices
CAP	Clean Air Plan
CBC	California Building Code
CDMG	California Division of Mines and Geology
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
dBA	A single-number noise measurement based on the decibel, but weighted to approximate the response of the human ear with respect to frequencies
District	Marin Municipal Water District
EPA	United States Environmental Protection Agency
GGNRA	Golden Gate National Recreation Area
GPM	Gallons per minute
HDPE	High-density polyethylene
L_{eq}	Equivalent Sound Level: The steady A-weighted sound level over any specified period (not necessarily 24 hours) that has the same acoustic energy as the fluctuating noise during that period (with no consideration of nighttime weighting). It is a measure of cumulative acoustical energy.
MMWD	Marin Municipal Water District
MSL	Mean Sea Level
NAHC	Native American Heritage Commission
NGVD	National Geodetic Vertical Datum
RWQCB	Regional Water Quality Control Board

San Francisco Bay Area	The area encompassed by the counties of San Francisco, San Mateo, Santa Clara, Alameda, Contra Costa, Marin, Sonoma, Napa, and Solano.
SCADA	Supervisory Control and Data Acquisition
USFWS	U.S. Fish & Wildlife Service
USGS	U. S. Geological Survey

MARIN MUNICIPAL WATER DISTRICT

Draft Mitigated Negative Declaration

Project Description

The proposed project would replace two existing water transmission pipeline crossings over San Geronimo Creek near the unincorporated community of Lagunitas.

1. **Applicant:** Marin Municipal Water District
   220 Nellen Ave.
   Corte Madera, CA 94925

2. **Location:** The proposed project would be located at two existing pipeline crossings of San Geronimo Creek in Lagunitas, California, APNs (Site 1, near 7440 Sir Francis Drake Boulevard) 168-222-06, 168-222-01, 168-222-02, 168-222-04, and 168-222-09 and (Site 2, near 7349 Sir Francis Drake Boulevard) 170-062-17, 170-062-25 and 170-041-09 (**Figures 1 - 4**).

3. **Proposed Action:** Award of a construction contract to replace two existing water transmission pipeline crossings over San Geronimo Creek.

Negative Declaration Mitigation Measures

Air Quality

Mitigation Measure 3-1. During construction activities, MMWD shall require the construction contractor(s) to implement a dust abatement program that includes, but is not necessarily limited to, the following BAAQMD-recommended measures as needed, to control dust:

a. All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
b. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping shall be prohibited.
c. All vehicle speeds on unpaved roads shall be limited to 15 miles per hour.
d. Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to five minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]).
e. All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications.

Biological Resources

Mitigation Measure 4-1. A qualified biologist shall conduct a biological resources sensitivity training for all on-site construction personnel. Focuses of the training will include California red-legged frog, steelhead, coho salmon, California freshwater shrimp, western pond turtle, and foothill yellow-legged frog. Training components will include training on appropriate avoidance methods including species identification, daily pre-construction surveys, the importance of protecting creek habitats, and protocols for contacting the appropriate personnel in the event of a sighting. Handouts will be prepared and provided to all construction personnel including color photographs for species identification, protocols, and contact phone numbers.

Following the completion of the training, a member of the construction team will be appointed to serve as the biological monitor and to conduct daily clearance surveys for sensitive wildlife species. As necessary, additional training will be provided to the appointed monitor on how to conduct the daily clearance survey and the procedures to implement in the event that a sensitive wildlife species is observed. Construction activities will be immediately halted should a federally listed species occur within the construction area.

Mitigation Measure 4-2. A qualified biologist will conduct a preconstruction clearance survey for California red-legged frog and other special-status wildlife species immediately before the commencement of construction activities. The survey area will include the construction/staging areas and adjacent areas. Construction activities will not commence until the construction/staging areas are found to be clear of special-status wildlife. The USFWS will be immediately contacted in the event that a federally listed species is observed in the project's disturbance footprint.

Mitigation Measure 4-3. All work may be conducted during the period of August 1 through January 31, which is outside of the northern spotted owl nesting season. Alternatively, MMWD shall commission two surveys for nesting northern spotted owls during the months of April and May preceding the commencement of construction. At a minimum, the survey area shall include all suitable nesting habitats within 0.25 mile of the project site. If, following the first or second survey it can be conclusively determined that there are nesting northern spotted owls, construction activities that are within 0.25-mile of an identified active nest shall not begin prior to August 1 unless the young have fledged, at which time construction or staging may begin no earlier than July 10. Regardless of nesting locations, construction shall conclude no later than January 31 (prior to the beginning of the mating and nesting season).

Mitigation Measure 4-4. A qualified biologist shall conduct a roosting bat habitat evaluation prior to the commencement of construction activities. The evaluation shall determine which (if any) trees near the work sites provide potential bat roosting habitat. If suitable roost trees are identified, then potential project-related impacts to use of these trees by roosting bats will be evaluated taking into consideration the following: (1) the project timing; (2) spatial and temporal aspects of potential noise/vibration impacts; and (3) susceptibility of each potential roost tree to disturbance given its specific location and other characteristics. If it is determined that roosting bats could be disturbed,

then a site-specific bat protection plan shall be developed by the qualified biologist to prevent disturbance of an active maternity or hibernation roost; the plan would be subject to California Department of Fish and Wildlife (CDFW) approval.

Mitigation Measure 4-5. If construction activities would commence anytime during the nesting/breeding season of native bird species potentially nesting on the site (typically February through August in the project region), a pre-construction survey for nesting birds should be conducted by a qualified biologist within two weeks of the commencement of construction activities.

If active nests are found in areas that could be directly affected or are within 300 feet of construction and would be subject to prolonged construction-related noise, a no-disturbance buffer zone should be created around active nests during the breeding season or until a qualified biologist determines that all young have fledged. The size of the buffer zones and types of construction activities restricted within them should be determined by taking into account factors such as the following:

- Noise and human disturbance levels at the construction site at the time of the survey and the noise and disturbance expected during the construction activity;
- Distance and amount of vegetation or other screening between the construction site and the nest; and
- Sensitivity of individual nesting species and behaviors of the nesting birds.

Cultural Resources

Mitigation Measure 5-1: MMWD shall ensure that construction crews shall stop all work within 100 feet of the discovery until a qualified archaeologist can assess the previously unrecorded discovery and provide recommendations. Resources could include subsurface historic features such as artifact-filled privies, wells, and refuse pits, and artifact deposits, along with concentrations of adobe, stone, or concrete walls or foundations, and concentrations of ceramic, glass, or metal materials. Native American archaeological materials could include obsidian and chert flaked stone tools (such as projectile and dart points), midden (culturally derived darkened soil containing heat-affected rock, artifacts, animal bones, and/or shellfish remains), and/or groundstone implements (such as mortars and pestles).

Mitigation Measure 5-2: MMWD shall treat any human remains and associated or unassociated funerary objects discovered during soil-disturbing activities according to applicable State laws. Such treatment includes work stoppage and immediate notification of the Marin County Coroner and qualified archaeologist, and in the event that the Coroner's determination that the human remains are Native American, notification of NAHC according to the requirements in PRC Section 5097.98. NAHC would appoint a Most Likely Descendant (MLD). A qualified archaeologist, MMWD and MLD shall make all reasonable efforts to develop an agreement for the treatment, with appropriate dignity, of any human remains and associated or unassociated funerary objects (CEQA Guidelines Section 15064.5[d]). The agreement would take into consideration the appropriate excavation, removal, recordation, analysis, custodianship, and final disposition of the human remains and associated or unassociated funerary objects. The PRC allows 48 hours to reach agreement on these matters.

Geology and Soils

Mitigation Measure 6-1. Foundations for new structures should be designed in accordance with the latest edition of the California Building Code (2013 CBC), and abutment retaining wall design should consider a seismic surcharge load. Seismic design criteria for new foundations and retaining walls are presented in the Conclusions and Recommendations of the Geotechnical Investigation.

Mitigation Measure 6-2. New trestle abutments should be supported on deep foundations which derive support from competent bedrock beneath any potentially liquefiable deposits (except the eastern crossing's west abutment, which may utilize shallow spread footings bearing on shallow rock). Recommendations and design criteria for new foundations are presented in the Conclusions and Recommendations of the Geotechnical Investigation.

Mitigation Measure 6-3. New trestle: New trestle abutments should be supported on deep foundations which derive support from competent bedrock (except the eastern crossing's west abutment, which may utilize shallow spread footings bearing on shallow rock). Recommendations and design criteria for new foundations are presented in the Conclusions and Recommendations of the Geotechnical Investigation. Erosion-control measures during and after construction should conform to the most recent version of the Erosion and Sediment Control Field Manual (California Regional Water Quality Control Board, 2002) and the project's Stormwater Pollution Prevention Plan (SWPPP). After construction, vegetation should be reestablished and erosion-control measures implemented in disturbed areas.

Hazards and Hazardous Materials

Mitigation Measure 8-1. All applicable requirements of Chapter 26 of the California Fire Code shall be strictly adhered to during the project construction, including but not limited to the following:

a. Hot work areas shall not contain combustibles or shall be provided with appropriate shielding to prevent sparks, slag or heat from igniting exposed combustibles.
b. A fire watch shall be provided during hot work activities and shall continue for a minimum of 30 minutes after the conclusion of the work.
c. Individuals assigned to fire watch duty shall have fire-extinguisher equipment readily available and shall be trained in the use of such equipment.
d. Where fire hoses are required, they shall be connected, charged, and ready for operation.
e. A minimum of one portable fire extinguisher complying with Section 906 and with a minimum 2-A:20-B:C rating shall be readily accessible within 30 feet of the location where hot work is performed.

Mitigation Measure 8-2. There shall be no hot work on red flag days declared by Marin County that cover the areas that encompass the project sites.

Noise

Mitigation Measure 11-1: Construction shall be limited to between the hours of 7:00 AM and 6:00 PM, Mondays through Fridays, and 9:00 AM to 5:00 Pm on Saturdays. Construction on Sundays and holidays is prohibited.

Review Period

All comments regarding the correctness, completeness, or adequacy of this Draft Mitigated Negative Declaration must be received by the Marin Municipal Water District, 220 Nellen Avenue, Corte Madera, California 94925, no later than 4:00 p.m. on May 31, 2016.

Contact Person

Dain Anderson
Environmental Services Coordinator
Marin Municipal Water District
220 Nellen Ave.
Corte Madera, CA 94925
Tel: 415-945-1586
Fax: 415-945-1599
danderson@marinwater.org

MARIN MUNICIPAL WATER DISTRICT

Environmental Checklist Form

1. **Project Title:** North Marin Line Stabilization Project (MMWD Project No. F14003)

2. **Lead Agency Name and Address:** Marin Municipal Water District, 220 Nellen Ave., Corte Madera, California 94925

3. **Contact Person and Phone Number:** Dain Anderson, Environmental Services Coordinator, Marin Municipal Water District 415-945-1586

4. **Project Location:** The proposed project would be located at two existing pipeline crossings of San Geronimo Creek in Lagunitas, CA, APNs (Site 1, near 7440 Sir Francis Drake Boulevard) 168-222-06, 168-222-01, 168-222-02, 168-222-04, and 168-222-09 and (Site 2, near 7349 Sir Francis Drake Boulevard) 170-062-17, 170-062-25 and 170-041-09 (**Figures 1 - 4**).

5. **Project Sponsor's Name and Address:** Marin Municipal Water District, 220 Nellen Ave., Corte Madera, CA 94925

6. **General Plan Designation:** Marin County General Plan – Rural Residential 1-2 Units/Acre (SF4)

7. **Zoning:** Marin County Zoning Ordinance – Residential Single Family 20,000 Sq Ft (R1-B3)

8. **Description of Project:**

The Marin Municipal Water District (district or MMWD) is proposing to replace two existing water transmission pipeline crossings over San Geronimo Creek near the unincorporated community of Lagunitas, California (**Figure 1**).

8.1 Background

The North Marin Line (NML) was constructed in 1957 to convey raw water from the district's Kent Lake and Nicasio Reservoir to the San Geronimo Treatment Plant. The pipeline's alignment generally follows an old railroad grade.

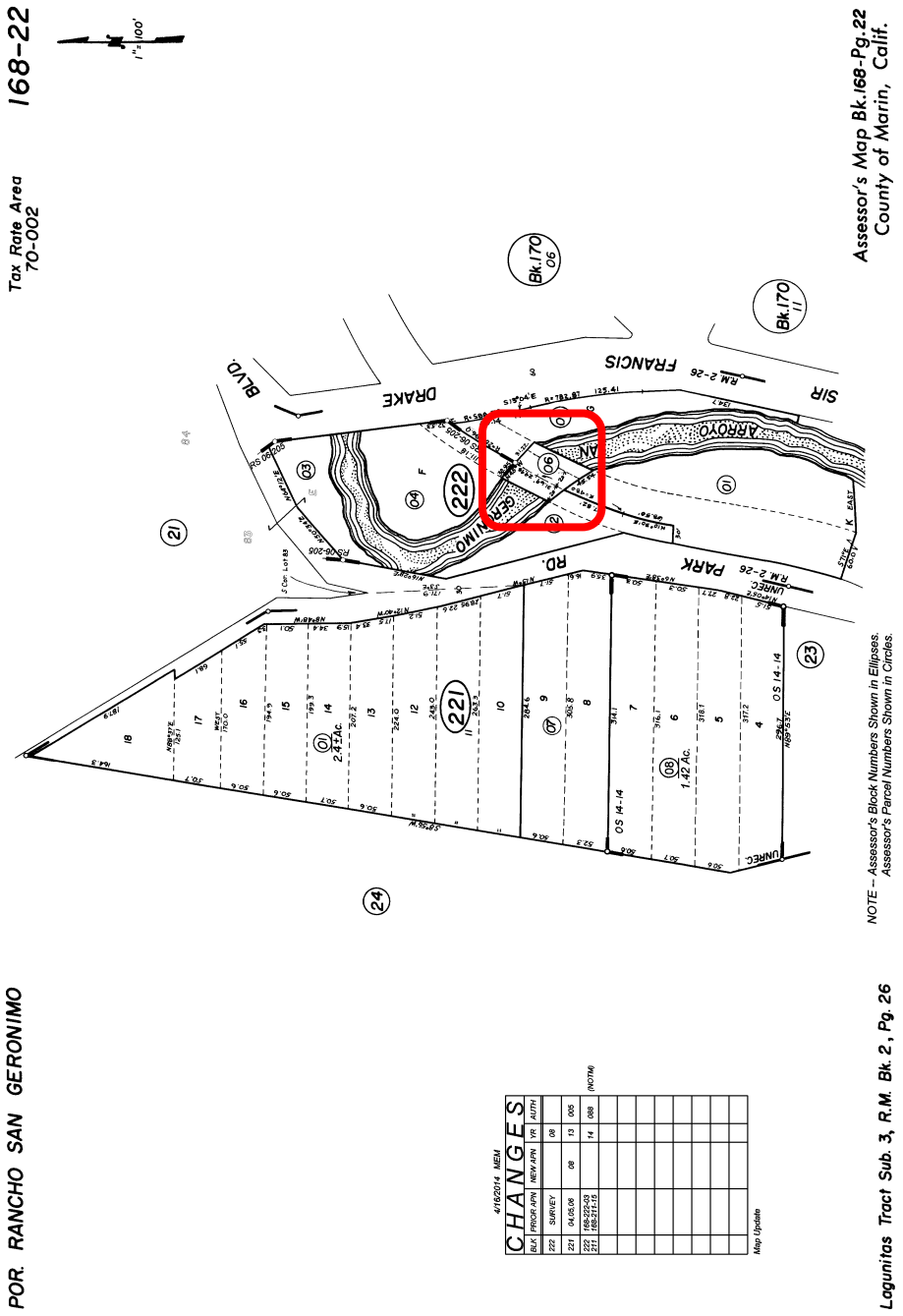
The NML's two crossings of San Geronimo Creek (**Figures 5-6**) are 34-inch American Concrete Cylinder Pipe (ACCP) pipe, with unrestrained bell and spigot joints. The pipe is supported on concrete trestles installed in the creek bottom. District engineers have determined that the two crossings are seismically unsound in the event of a significant event, thereby jeopardizing the flow of raw water for treatment and subsequent distribution to the approximately 190,000 people who reside within the district's service boundaries.

Figure 1: Location Map



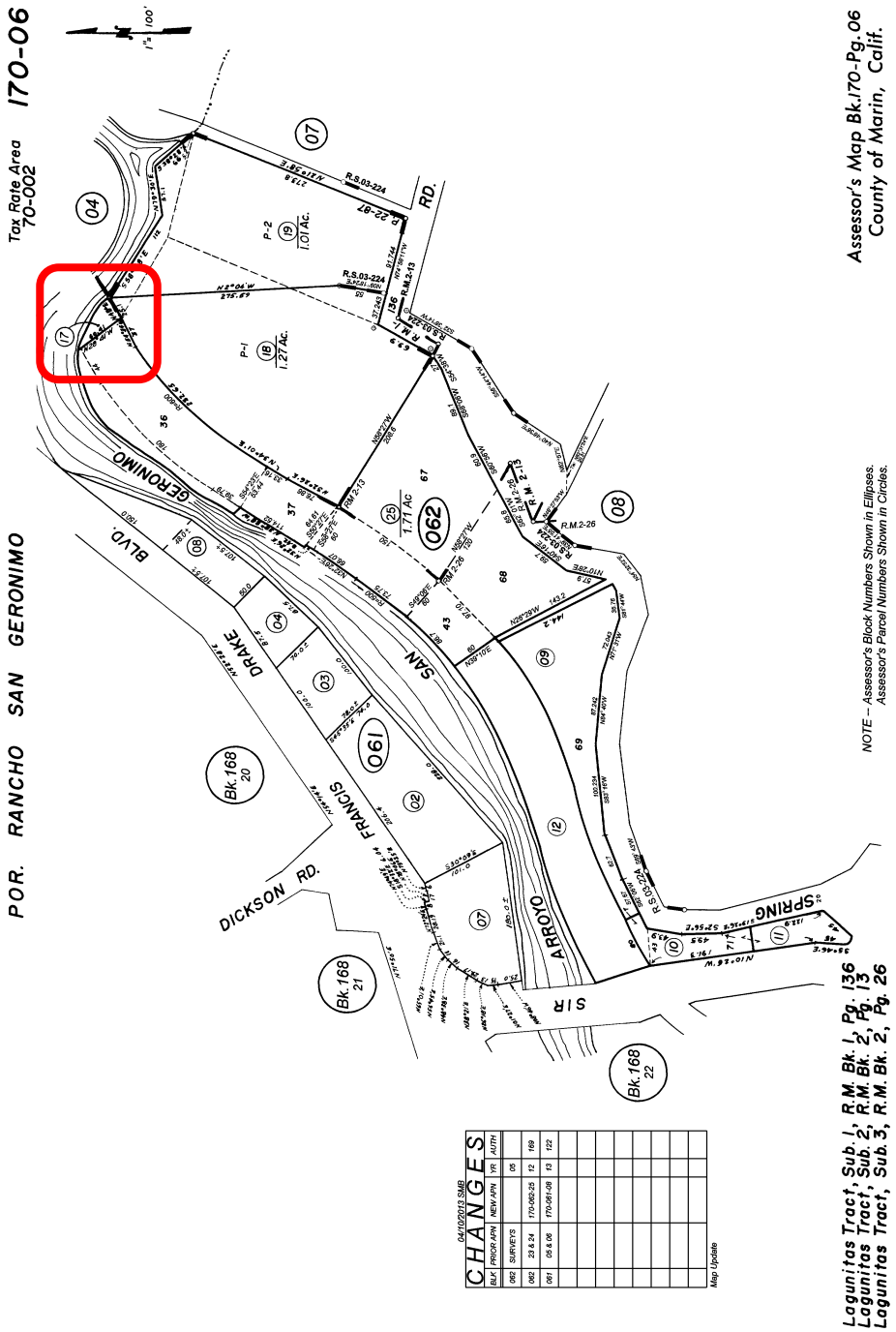
SOURCE: Google Earth/MMWD 2016

Figure 2: Assessor Parcel Map Site 1 (168-222-06)



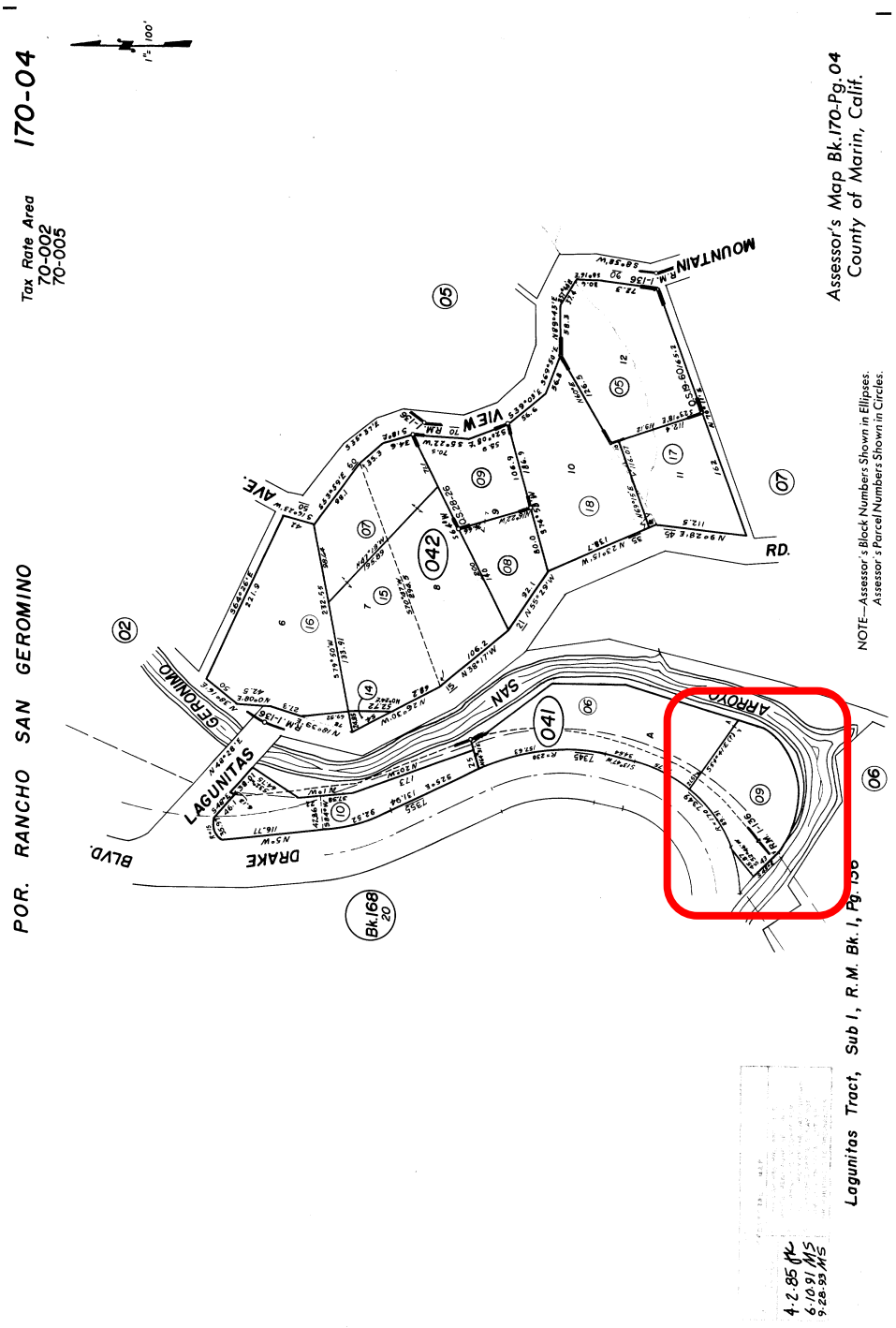
SOURCE: Marin County Assessor 2015

Figure 3: Assessor Parcel Map Site 2 (170-062-17)



SOURCE: Marin County Assessor 2015

Figure 4: Assessor Parcel Map Site 2 (170-041-09)



SOURCE: Marin County Assessor 2015

Figure 5: Existing North Marin Crossing Site 1



SOURCE: Pacific Biology 2016

Figure 6: Existing North Marin Crossing Site 2



SOURCE: Pacific Biology 2016

8.3 Project Objective

The project objective is to replace two existing San Geronimo Creek pipeline crossings with seismically resistant crossings.

8.4 Project Description

The proposed project would replace the existing 34-inch ACCP trestle-supported pipeline crossings with 36-inch welded steel pipes installed within single span (without the need for mid-span trestle support) steel trusses (**Figures 7 -8**).

The existing pipe emerges from the ground through the San Geronimo creek banks, approximately 2-4-feet below the top of bank. The proposed replacement pipes would emerge from the ground approximately 20-feet back of the creek's top-of-bank. The new pipe segments would rise approximately 2-3-feet above the adjacent ground surface before crossing the creek. The intent of elevating the pipeline and steel truss' profile above the top-of-bank is to keep construction activities outside of the creek's top-of-bank.

The new pipes would be aligned with an offset several feet from the existing pipes. The offset is necessary to allow the new pipes to be installed without needing to first take the existing crossings out of service, except for the final tie-in of the new to the existing pipeline.

8.4.1 Excavation

Excavation required for project implementation would include:

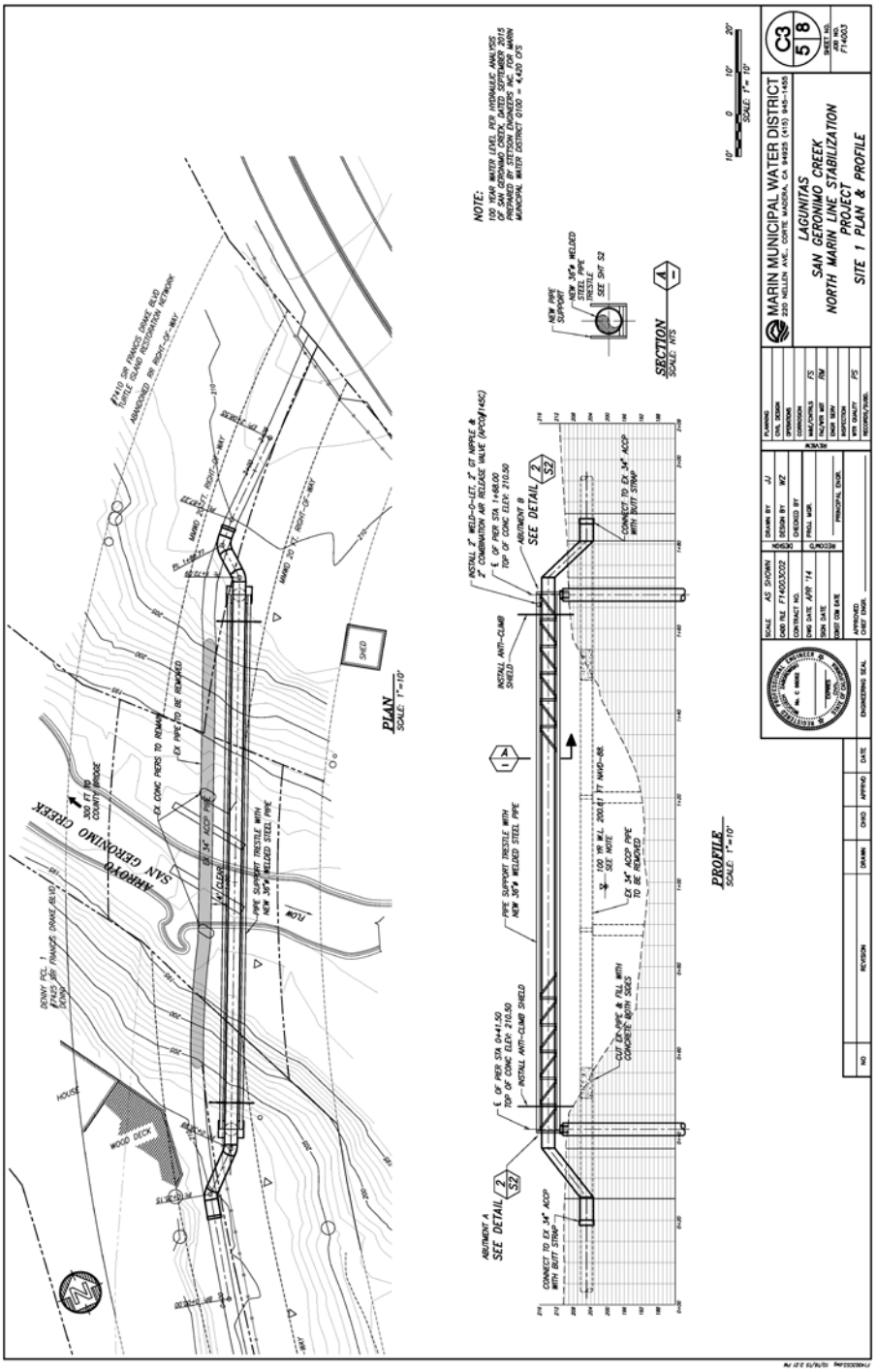
- Vertically drilling holes behind the top-of-bank for installation of pier foundations to support the steel trusses; and
- Excavation to expose the existing 34-inch ACCP pipe behind the top-of-bank to install pipe bends to bring the pipe out of the ground to the elevation necessary to ensure the pipe and steel trusses are above the projected 100-year storm flows of San Geronimo Creek.

In total the excavations are expected to produce approximately 20-cubic yards of material that would be hauled offsite for disposal.

8.4.2 Foundation Piers

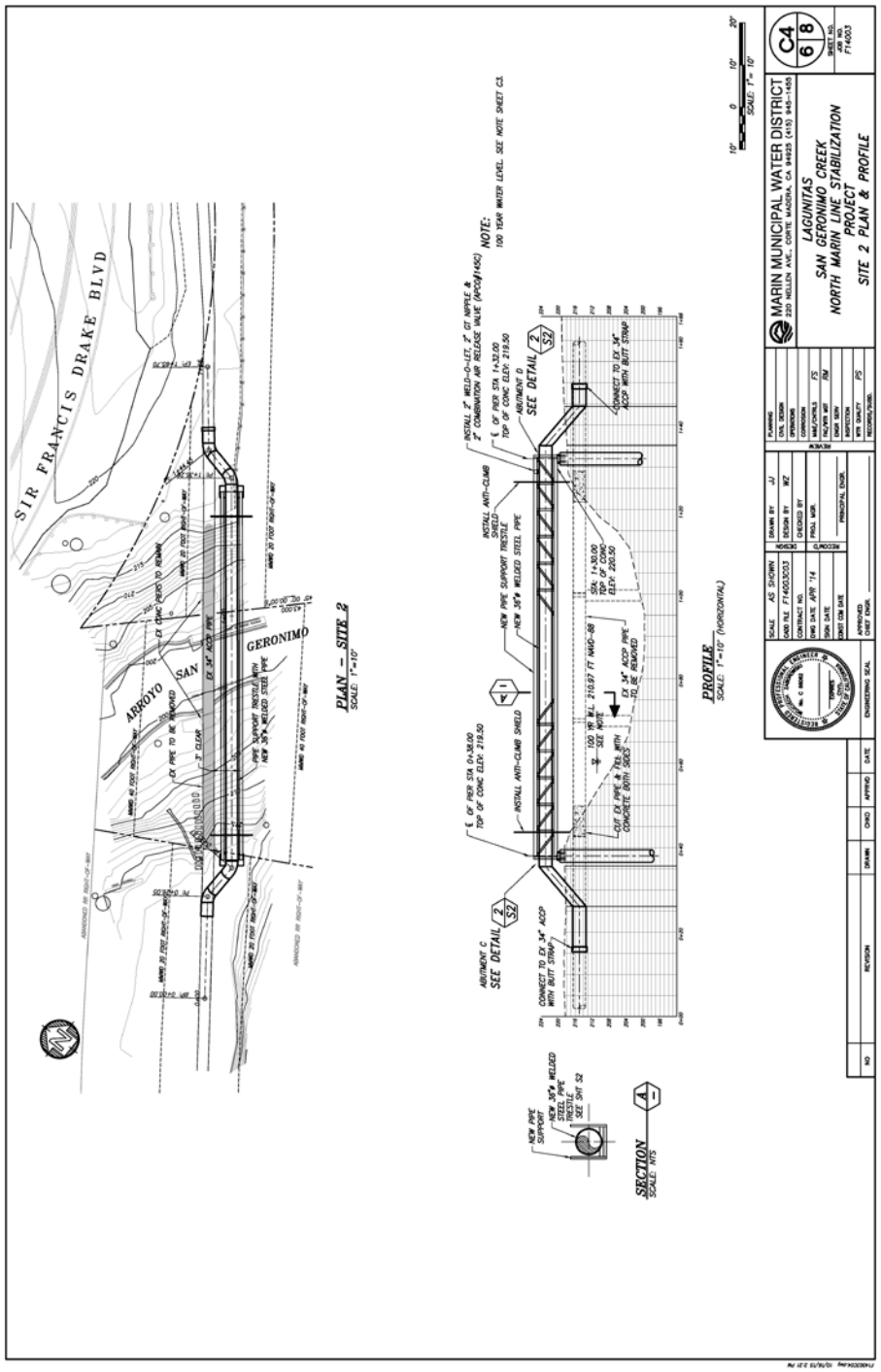
The proposed steel trusses would be supported on drilled piers that would be constructed approximately 3-5-feet back of top-of-bank. The piers are expected to be approximately 20- to 30-feet deep below the ground surface. Once the holes are drilled, pre-formed steel rebar cages would be lowered into the holes, and then concrete poured into the holes. The piers would extend above the surrounding ground surface by approximately 6-inches.

Figure 7: Proposed North Marin Line Stabilization Plan (Site 1)



SOURCE: MMWD 2015

Figure 8: Proposed North Marin Line Stabilization Plan (Site 2)



SOURCE: MMWD 2015

8.4.3 Site Paving and Drainage

The installation of the new pipe crossings would not require any general surface grading. There is no paving associated with the project.

8.4.4 Tree Removal

No trees would be removed as part of the project's implementation.

8.4.8 Construction Access

Construction access would be from Sir Francis Drake Boulevard at both crossing locations. There would be no construction equipment within the San Geronimo Creek channel. All work would be performed behind top-of-bank.

8.4.9 Construction Staging

All construction and material staging would occur at the crossing sites and within the district's 20-foot wide pipeline easement.

8.4.10 Construction Duration and Phasing

The estimated construction time-frame is approximately three months, with construction projected to begin in August, 2016. The anticipated construction phases are:

- Install piers for new pipeline crossings;
- Install steel truss and new pipeline at each crossing;
- Connect new pipeline segments to the existing north Marin Line;
- Remove the existing pipeline segments; and
- General site clean-up.

Prior to connecting the new pipeline crossings to the North Marin Line, the pipeline will be dewatered. The district maintains a dewatering valve near the confluence of San Geronimo and Lagunitas Creeks. The rate of dewatering flow from that valve will be metered to ensure there is no scouring or turbidity within the creeks.

9. Surrounding Land Uses and Setting: The project sites are situated in the unincorporated community of Lagunitas. The general area is sparsely developed with residential uses.

10. Other Public Agencies whose Approval is Required: Because work will occur over San Geronimo Creek, which is considered Waters of the United States and Waters of the State, permits may be required from the California Department of Fish and Wildlife, the San Francisco Bay Regional Water Quality Control Board, and the Army Corps of Engineers.

Environmental Factors Potentially affected

The environmental factors checked below would be potentially affected by this project, involving several impacts that are "Less than Significant with Mitigation Incorporated" as indicated by the checklist on the following pages.

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

Determination

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 project have been made by or agreed to by the 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 (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.	



Signature

April 29 2016

Date

Dain Anderson

Environmental Services Coordinator

Printed Name Title

Environmental Analysis

The following analysis is intended to explain responses outlined in the Environmental Checklist as derived from Appendix G of the California Environmental Quality Act (CEQA) Guidelines.

ENVIRONMENTAL IMPACTS	Potentially Significant Impact	Potentially Significant Impact Unless Mitigation Incorporated	Less Than Significant Impact	No Impact	Sources
1. AESTHETICS. Would the project:					
a) Have a substantial adverse effect on a scenic vista?			√		A, M
b) Substantially damage scenic resources, including but not limited to trees, rock outcroppings, and historic buildings within a state scenic highway?				√	A, G
c) Substantially degrade the existing visual character or quality of the site and its surroundings?				√	A
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?				√	A

a) ***Less Than Significant Impact.*** The two project sites are situated in forested, sparsely populated residential areas of unincorporated Lagunitas. Both existing crossings are set back from the roadway and below the creek's top-of-bank amid mature vegetation. As a result, the existing crossings are largely out of view to passing motorists. Because of lower speeds, they would be more discernible to bicyclists using Sir Francis Drake Boulevard, but at most for no more than 10-15 seconds per site.

The Marin Countywide Plan does not identify the two sites or the immediate area as a significant, distinct visual resource. The Countywide Plan does not establish any specific policies or guidelines regarding the preservation, conservation, or use of the sites from the perspective of protecting a scenic vista or resource. No mitigation is required.

b) ***No Impact.*** There are no existing or eligible State Scenic Highways in the project vicinity or that would afford a view of the sites. Therefore, the proposed project would not damage scenic resources, including but not limited to trees, rock outcroppings, and historic buildings within a state scenic highway.

c) ***No Impact.*** The visual baseline condition of the two sites includes the existing pipeline crossings.

Construction. Construction activities for the new pipeline crossings would be confined to the existing sites. Heavy equipment (drill rig, excavator, and crane) would be used throughout the construction process to bore holes for the new piers (required to support the truss ends) and to install the new steel trusses and pipelines. Materials would be delivered via trucks. The equipment and construction activity would be visible to travelers along Sir Francis Drake Boulevard, due largely to the physical size and likely contrasting colors of the construction equipment within the forested setting.

In the absence of a specific guiding policy or regulation concerning visual impacts of construction activities, the most commonly used threshold that is employed to define construction-related visual impacts is construction activities extending more than one year. The proposed project is expected to be constructed in approximately three months, beginning in August 2016. Due to the short duration of construction activity there would not be a substantial adverse effect on a scenic vista.

Post-Construction. The trusses/pipelines would be installed above the current creek top-of-bank to ensure that they do not interfere with storm flows within the creek. Because the trusses/pipelines would be elevated above the top-of-bank, they would be more visible to travelers along Sir Francis Drake Boulevard than the current below top-of-bank installations. They would still be located back from the edge of the roadway amid mature vegetation and largely not in the direct line of sight of motorists or bicyclists. No mature vegetation or trees would be removed to facilitate the truss/pipeline installations.

The location of the new crossings in the same location as the existing pipe crossings, coupled with the setbacks from Sir Francis Drake Boulevard and the fact that no mature vegetation would be altered by the project results in a less than significant net change to the visual environment. No mitigation is required.

d) ***No Impact.*** The proposed project does not include the installation of lighting. The trusses and pipeline segments would not finished with reflective finishes.

ENVIRONMENTAL IMPACTS	Potentially Significant Impact	Potentially Significant Impact Unless Mitigation Incorporated	Less Than Significant Impact	No Impact	Sources
2. AGRICULTURE AND FORESTRY RESOURCES. 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 Dept. 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?				√	E, L, M
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?				√	L. M, N
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))?				√	N
d) Result in the loss of forest land or conversion of forest land to non-forest use?				√	M
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?				√	M

a) ***No Impact.*** The project sites and surrounding lands are designated as Urban and Built-Up Land[1] by the Marin County Important Farmland map compiled and published by the California Department of Conservation, Farmland Mapping and Monitoring Program. None of the lands adjacent to the proposed project are currently in agricultural production. The proposed project would not convert

[1] Urban and Built-Up Land is occupied by structures with a building density of at least 1 unit to 1.5 acres, or approximately 6 structures to a 10-acre parcel. Common examples include residential, industrial, commercial, institutional facilities, cemeteries, airports, golf courses, sanitary landfills, sewage treatment, and water control structures.

Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use.

b) ***No Impact.*** The Marin Countywide Plan does not designate the sites or immediately adjacent lands for agricultural activities, nor are the sites zoned for agricultural activities. Neither the sites nor adjacent lands are encumbered by Williamson Act contracts. Therefore, the proposed project would not conflict with existing zoning for agricultural use, or a Williamson Act contract.

c) ***No Impact.*** Neither the project sites nor the immediately adjacent lands are zoned for forest land as defined by Public Resources Code Section 12220(g), for timberland as defined by Public Resources Code Section 4526, or for timberland production as defined by Government Code Section 51104(g).

d) ***No Impact.*** The project sites are "developed" with existing pipeline creek crossings. The proposed project would result in replacement of those crossings at the same locations. The proposed project would not require the removal of any trees, and would not affect forest land or represent the conversion of forest land to non-forest use.

e) ***No Impact.*** Neither the project sites nor the immediately adjacent lands are currently or have recently been in agricultural production, and there is no land in agricultural production or suitable for agricultural production in the project vicinity. Therefore, the proposed project would not 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.

ENVIRONMENTAL IMPACTS	Potentially Significant Impact	Potentially Significant Impact Unless Mitigation Incorporated	Less Than Significant Impact	No Impact	Sources
3. AIR QUALITY. Where available, the significance criteria established by the applicable air quality management 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, C
b) Violate any air quality standard or contribute to an existing or projected air quality violation?		√			B, C
c) 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 (including releasing emissions which exceed		√			B, C

ENVIRONMENTAL IMPACTS	Potentially Significant Impact	Potentially Significant Impact Unless Mitigation Incorporated	Less Than Significant Impact	No Impact	Sources
quantitative thresholds for ozone precursors)?					
d) Expose sensitive receptors to substantial pollutant concentrations?			√		B, C
e) Create objectionable odors affecting a substantial number of people?				√	A

a) ***No Impact.*** Regulation of air pollution is achieved through both national and State ambient air quality standards and emission limits for individual sources of air pollutants. As required by the federal Clean Air Act, the U.S. Environmental Protection Agency (USEPA) has identified criteria pollutants and has established the National Ambient Air Quality Standards (NAAQS) to protect public health and welfare. NAAQS have been established for the following pollutants: ozone (O_3); carbon monoxide (CO); nitrogen dioxide (NO_2); sulfur dioxide (SO_2); particulate matter less than 10 microns in diameter (PM_{10}); particulate matter 2.5 microns or less in diameter ($PM_{2.5}$); and lead (Pb). These pollutants are called "criteria" air pollutants because standards have been established for each of them to meet specific public health and welfare criteria. The State of California has also established its own more stringent set of air quality standards commonly referred to as the California Ambient Air Quality Standards (CAAQS). In addition to the criteria pollutants identified above, CAAQS have been established for sulfates, hydrogen sulfide, and vinyl chloride.

The project sites are located within the San Francisco Bay air basin, which is currently designated as a nonattainment area for state and national ozone standards and as a nonattainment area for the state particulate matter (PM_{10} and $PM_{2.5}$) standards. The Bay Area Air Quality Management District (BAAQMD)'s Final Bay Area 2010 Clean Air Plan outlines control strategies to reduce emissions of ozone and ozone precursors to help the Bay Area achieve attainment for the State 1-hour ozone standard.

Since air pollutant emissions are a function of population and human activity, emission reduction strategies set forth in the Bay Area 2010 Clean Air Plan were developed based on regional population, employment, and housing projections. The proposed project would not facilitate an increase in population in the air basin nor would it generate housing or employment opportunities leading to increased population or vehicle miles travelled in the region. As such, the proposed project would be consistent with the assumptions contained within the Bay Area 2010 Clean Air Plan and would not result in an impact.

b) ***Less than Significant with Mitigation.*** Based on the following analysis, construction and operation of the proposed project would not result in a violation of an air quality standard or contribute significantly to an existing or projected air quality violation.

Construction. Construction of the proposed project would include site preparation, installation of the truss structures and new pipeline segments, and removal of the existing pipeline segments. These activities would have the potential to affect air quality through the use of construction equipment, haul trucks for import and export of materials, and vehicles used by workers to travel to and from the construction sites. In addition to exhaust emissions caused by the use of mobile equipment, trenching and earthmoving activities would result in emissions of fugitive dust including PM_{10}, which could be significant.

BAAQMD's approach to CEQA analyses of construction emissions is to emphasize the implementation of control measures rather than require detailed quantification of emissions. BAAQMD recommends implementation of a set of feasible fugitive PM_{10} control measures for construction projects of all sizes. According to BAAQMD, fugitive dust impacts from construction would be considered less than significant if all applicable recommended measures are applied. Inclusion of these measures as part of **Mitigation Measure 3-1** below would reduce construction impacts from fugitive dust emissions to less-than-significant levels.

Project construction would involve the use of equipment and materials that would cause ozone precursor emissions (ROG and NOx) as well as emissions of PM_{10} and $PM_{2.5}$. Construction activities would also result in the emission of other criteria pollutants from equipment exhaust, construction-related vehicular activity, and construction worker vehicle trips. Emission levels for construction activities would vary depending on the number and type of equipment, duration of use, operation schedules, and the number of construction workers. Emissions of ROG and NOx from these sources would incrementally add to the regional atmospheric loading of ozone precursors during project construction.

The BAAQMD' Revised Draft Justification Report on CEQA Thresholds of Significance identifies significance thresholds for criteria pollutant emissions: a threshold of 54 pounds per day for ROG, oxides of nitrogen (NOx) and $PM_{2.5}$ and 82 pounds per day for PM_{10} (construction equipment emissions only, exclusive of fugitive dust). These thresholds are based on the trigger levels for the federal New Source Review Program and BAAQMD's Regulation 2, Rule 2 for new or modified sources, and exceeding the thresholds represent a cumulatively considerable contribution to air quality.

There would be no change in the operations at the sites, hence the project would result in no changes to current operational emissions. No mitigation is required.

> **Mitigation Measure 3-1.** During construction activities, MMWD shall require the construction contractor(s) to implement a dust abatement program that includes, but is not necessarily limited to, the following BAAQMD-recommended measures as needed, to control dust:

a. All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
b. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping shall be prohibited.
c. All vehicle speeds on unpaved roads shall be limited to 15 miles per hour.
d. Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to five minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]).
e. All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications.

c) ***Less than Significant Impact.*** According to the BAAQMD CEQA Guidelines, for a project to have a less-than-significant cumulative impact on air quality it must not have an individually significant operational air quality impact and it must be consistent with the local general plan as well as the regional air quality plan (BAAQMD, 2012). As demonstrated in a) and b) above, the proposed project would be consistent with the adopted Bay Area 2010 Clean Air Plan and would not result in a significant operational air quality impact. Emissions from the proposed construction activities would be below the levels considered by BAAQMD to represent a cumulatively considerable increase. As such, the proposed project would not conflict with an applicable local or regional air quality plan, and the cumulative impacts would be less than significant.

d) ***Less than Significant Impact.*** Sensitive receptors are typically defined as the segment of the population most susceptible to air quality effects including children, the elderly, and the sick, as well as land uses such as schools, hospitals, parks, and residential communities.

During project construction there would be localized air emissions of criteria constituents from construction vehicles and equipment powered by internal combustion engines, as well as from earth moving activities (approximately 20 cubic yards of soil are expected to be removed from the two sites to facilitate construction of the installation of the trusses and pipeline segments). Past MMWD experience in pipeline replacements/installations has demonstrated that the use of vehicles and equipment that emit criteria constituents is intermittent and would not be expected to rise to a level of significance. No mitigation is required.

e) ***Less than Significant Impact.*** Diesel equipment used during project construction may emit objectionable odors associated with combustion of diesel fuel. However, these emissions would be temporary and intermittent in nature, thus odor impacts associated with diesel combustion during construction activities would be less than significant. No mitigation is required.

ENVIRONMENTAL IMPACTS	Potentially Significant Impact	Potentially Significant Impact Unless Mitigation Incorporated	Less Than Significant Impact	No Impact	Sources
4. BIOLOGICAL RESOURCES. 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 Game, U.S. Fish and Wildlife Service, or NOAA - Fisheries?		√			O
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 Game or U.S. Fish and Wildlife Service?			√		O
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal) through direct removal, filling, hydrological interruption, or other means?			√		O
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?			√		O
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?				√	O
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?				√	O

a) **Background Information**

The district commissioned the preparation of the North Marin Line Stabilization Project Biological Evaluation Report (Pacific Biology 2016). The report provides a detailed discussion of the biological resources present on and near the project site and evaluates potential impacts to these resources from the implementation of the proposed project. The report is included in **Appendix A**, and the relevant discussions are summarized and incorporated into the below analysis.

The project site includes two separate sites at two existing pipeline crossings of San Geronimo Creek in Lagunitas (**Appendix A**, **Figure 1**). The project area consists of a mix of mostly natural forest habitats and low-density residential housing. San Geronimo Creek is a 6th order perennial stream within both sites. It flows southwest and joins Lagunitas Creek approximately 0.2 mile downstream (**Appendix A**, **Figure 2**). Lagunitas Creek then flows northwest toward Tomales Bay, which ultimately discharges into the Pacific Ocean (approximately five air miles from the project site). In the project area, San Geronimo Creek supports a mix of riparian trees and coast redwood/Douglas fir forest. These natural habitats are modified by an extensive understory of escaped horticultural plants associated with residential housing that abuts the stream.

All proposed construction activities would occur outside of the creek's top-of bank. However, given that the pipe would cross San Geronimo Creek, and because of the sensitivity of the creek habitats, a detailed discussion of the biological condition of portions of San Geronimo Creek on the project site is provided below.

San Geronimo Creek

Within both sites, similar plant communities occur within and adjacent to San Geronimo Creek. Both sites are within a coast redwood/Douglas fir forest, with coast redwood (*Sequoia sempervirens*), Douglas fir (*Pseudotsuga menziesii*), California bay (*Umbellularia californica*), and big-leaf maple (*Acer macrophyllum*) being the dominant tree species; these trees occur primarily above the active floodplain of the creek. Within the floodplain, both sites are fringed by riparian tree species, including red alder (*Alnus rubra*) and Oregon ash (*Fraxinus latifolia*).

The shrub and vine stratum is mostly along the upper banks of the stream, and features California hazelnut (*Corylus cornuta*) and several invasive species such as French broom (*Genista monspessulana*), Himalayan blackberry (*Rubus armeniacus*), English ivy (*Hedera helix*), and bigleaf periwinkle (*Vinca major*). The herb stratum is sparse below the ordinary high water mark, as most of the active channel and floodplain contain mostly un-vegetated gravel bars, cobbles, and boulders. However, some wetland vegetation occurs in the creek on gravel bars, with the most common herb species being panicled bulrush (*Scirpus microcarpus*), giant horsetail (*Equisetum telmateia* ssp. *Braunii*), dotted smartweed (*Persicaria punctata*), stinging nettle (*Urtica dioica*), and torrent sedge (*Carex nudata*). These wetland plants were interspersed with a lower cover of upland plants, presumably due to the very well-drained gravelly soils and likely in part as a result of the on-going long-term drought in the region—the stream water depth and water table have been exceptionally low in recent years. Upland plants within and topographically above the wetlands include upright veldt grass (*Ehrharta erecta*), forget-me-not (*Myosotis latifolia*), fragrant bedstraw (*Galium triflorum*), and western swordfern (*Polystichum munitum*).

The onsite creek habitats provide excellent habitat for salmonids, with riffles, pools, and runs occurring in the immediate area. At the time of the survey, the deepest pools in immediate area were approximately 2-feet deep.

Equipment Staging and Construction Areas

All construction activities will occur outside of the creeks' top of bank. At Site 1 (west site), this includes a small grassland area adjacent to Sir Francis Drake Blvd that is dominated by annual grasses such as dogtail grass (*Cynosurus echinatus*) and big quaking grass (*Briza maxima*). This area borders riparian vegetation associated with San Geronimo Creek, such as Oregon ash, red alder, and big-leaf maple. Construction would also be staged from the west side of San Geronimo Creek along the old railroad grade easement; this area is within the surrounding coast redwood/Douglas fir forest and groundcover is generally absent. Construction equipment would access the west side of the creek at Site 1 via an existing unpaved access road (i.e., Cross Marin Tail and Park Road); no grading or vegetation removal is required along the access road.

At Site 2 (east site) staging/construction activities will occur in a dirt parking area on the north side of San Geronimo Creek; this area is within the surrounding coast redwood/Douglas fir forest and groundcover is generally absent due to its use as a driveway/parking area. Staging/Construction activities would also occur from the access road on the south side of San Geronimo Creek; this access road would also be used for site access during construction. The access road is within the surrounding coast redwood/Douglas fir forest, but is graded and generally devoid of vegetation.

Special-Status Plant Species

Less than Significant Impact. With the exception of the staging area on the east side of Site 1, all construction equipment would be operated from unpaved and graded access roads. These areas are generally devoid of vegetation and do not provide habitat suitable for locally occurring special-status plant species. The staging area on the east side of Site 1 is dominated by non-native grasses, such as dogtail grass and big quaking grass. This area does not contain habitat types (e.g., serpentinite, wetlands, native grasslands, coastal bluffs, mature chaparral) associated with most local occurrences of rare plants. Additionally, western leatherwood [(*Dirca occidentalis*), CNPS Rare Plant Rank 1.B.2], a perennial species known from the area that is associated with riparian habitats, was not observed during the field survey. Given the above, it is unlikely that special-status plant species occur in the project's disturbance boundary. Therefore, impacts to special-status plant species are less than significant.

Special-Status Wildlife Species

Less than Significant with Mitigation

California Red-Legged Frog

California red-legged frog (*Rana draytonii*) is a federally Threatened species and a California Species of Special Concern. Breeding occurs in streams, deep pools, backwaters within streams and creeks, ponds, marshes, sag ponds, dune ponds, lagoons, and stock ponds. Breeding adults are often associated with deep (greater than 0.7 meter [2 feet]) still or slow moving water and dense, shrubby riparian or emergent vegetation (Hayes and Jennings 1988), but frogs have been observed

in shallow sections of streams and ponds that are devoid of vegetative cover. The species also utilizes non-aquatic habitats for refuge and dispersal.

In May 2006, Eric Ettlinger (MMWD Aquatic Ecologist) observed a single adult California red-legged frog in Lagunitas Creek, approximately 200 feet downstream of Dog Creek (**Appendix A**, **Figure 2**); this location is approximately 0.4 miles from the project site. In September 2010, Mr. Ettlinger observed another adult California red-legged frog in Lagunitas Creek, approximately 500 feet downstream of Shafter Bridge. While breeding by California red-legged frogs has not been observed in Lagunitas Creek and its tributaries, the observation of solitary adult California red-legged frogs on several separate occasions suggests that breeding is occurring at an accessible but unknown location(s) and that Lagunitas Creek and its tributaries are at least occasionally used by dispersing California red-legged frogs. California red-legged frogs have also been documented in other locations in the project vicinity that do not have a direct hydrologic connection to the project site (**Appendix A**, **Figure 2**).

San Geronimo Creek provides suitable habitat for California red-legged frogs. Given the presence of numerous pools, that protocol surveys for California red-legged frogs have not been conducted in San Geronimo Creek, and because individual California red-legged frogs have been observed in Lagunitas Creek and its tributaries, California red-legged frogs could occur in San Geronimo Creek.

Suitable habitat for California red-legged frog occurs in the creek zone of both Sites 1 and 2. However, as all construction activities would occur outside of the creek's top-of-bank, the creek and its banks would not be directly disturbed by construction activities. Additionally, as part of the proposed project, MMWD would implement standard erosion control measures to protect San Geronimo Creek. Therefore, the proposed project would not result in the loss or alteration of potential California red-legged frog habitat. Additionally, given that no work would occur in the creek zone, and that California red-legged frog has only rarely been observed in the Lagunitas Creek watershed, it is unlikely that a California red-legged frog would occur in the construction/staging areas (with includes unpaved access roads and a small grassland area). However, given the rarity of the species, in the absence of avoidance measures, potential impacts are potentially significant. The implementation of **Mitigation Measures 4-1 and 4-2** would ensure that California red-legged frogs are not disturbed during construction activities.

> **Mitigation Measure 4-1.** A qualified biologist shall conduct a biological resources sensitivity training for all on-site construction personnel. Focuses of the training will include California red-legged frog, steelhead, coho salmon, California freshwater shrimp, western pond turtle, and foothill yellow-legged frog. Training components will include training on appropriate avoidance methods including species identification, daily pre-construction surveys, the importance of protecting creek habitats, and protocols for contacting the appropriate personnel in the event of a sighting. Handouts will be prepared and provided to all construction personnel including color photographs for species identification, protocols, and contact phone numbers.

Following the completion of the training, a member of the construction team will be appointed to serve as the biological monitor and to conduct daily clearance surveys for sensitive wildlife species. As necessary, additional training will be provided to the appointed monitor on how to conduct the daily clearance survey and the procedures to implement in the event that a sensitive wildlife species is observed. Construction activities will be immediately halted should a federally listed species occur within the construction area.

Mitigation Measure 4-2. A qualified biologist will conduct a preconstruction clearance survey for California red-legged frog and other special-status wildlife species immediately before the commencement of construction activities. The survey area will include the construction/staging areas and adjacent areas. Construction activities will not commence until the construction/staging areas are found to be clear of special-status wildlife. The USFWS will be immediately contacted in the event that a federally listed species is observed in the project's disturbance footprint.

Coho Salmon

Coho salmon (*Oncorhynchus kisutch*), Central California Coast ESU, is a federally and state Endangered species. Coho salmon migrate up and spawn mainly in streams that flow directly to the ocean or that are tributaries of large rivers. Spawning migrations begin after heavy late fall or winter rains. In short coastal streams of California, most coho return in mid-November through mid-January (Moyle 2002). Females typically choose a spawning site near the head of a riffle, just below a pool, where water changes from smooth to turbulent flow and there is abundant medium to small gravel (Moyle 2002). Juveniles generally stay in freshwater habitats for one year and out-migration to the ocean generally peaks in late April to mid-May (ibid).

Annual juvenile salmonid and salmonid spawner surveys have been conducted in the Lagunitas Creek watershed since 1995 and annual smolt surveys have been conducted since 2006. Coho salmon are known to occur in the mainstem of Lagunitas Creek and its tributaries, including San Geronimo Creek, Devils Gulch, Olema Creek, and Cheda Creek (MMWD 2015). The salmonid surveys regularly conducted by the district include San Geronimo Creek (including the portion of the creek on the project site).

Coho (adult and juvenile) are known to occur in San Geronimo Creek and suitable spawning and rearing habitat occurs in the immediate project area. In the 2014-2015 spawning season, a total of 146 coho redds were observed during spawner surveys in the Lagunitas Watershed; twenty-five (25)% of these redds were observed in San Geronimo Creek (MMWD 2015).

Suitable coho spawning and rearing habitat occurs in the immediate vicinity of both Sites 1 and 2. However, as all construction activities would occur outside of the creek's top-of-bank, the creek and its banks would not be directly disturbed by construction activities. Additionally, as part of the proposed project, MMWD would implement standard erosion control measures to protect San Geronimo Creek. Therefore, the proposed project would not result in the loss or alteration of coho

habitat. Additionally, given that no work would occur in the creek zone, no coho would be directly harmed by construction activities. For these reasons, the proposed project is not expected to harm or otherwise adversely affect coho and related impacts would be less than significant.

The implementation of **Mitigation Measure 4-1** would provide additional assurance that sensitive creek habitats are not disturbed.

Steelhead

Steelhead (*Oncorhynchus mykiss*), Central California Coast ESU, is a federally Threatened species. Steelhead are the anadromous form of *O. mykiss*. *O. mykiss* have a highly flexible life history and may follow a variety of life-history patterns including freshwater residents (non-migratory) at one extreme and individuals that migrate to the open ocean (anadromous) at another extreme. Intermediate life-history patterns include fish that migrate within the stream (potamodromous), fish that migrate only as far as estuarine habitat, and fish that migrate to near-shore ocean areas. California winter steelhead enter coastal streams during December-March, and summer steelhead seem to enter streams as flows taper off in spring and spawn the following winter (Moyle 2002). The female digs a redd in the coarse gravel of the tail of a pool or in a riffle. After spawning, spent steelhead often move gradually downstream and occupy pools for periods of time during the downstream migration (Moyle 2002). Juveniles may occupy riffles, runs, and pools.

Steelhead (adult and juvenile) are known to occur in San Geronimo Creek and suitable spawning and rearing habitat occurs in the immediate project area. In the 2014-2015 spawning season, a total of 167 steelhead redds were observed during spawner surveys in the Lagunitas Watershed; twenty-six (26)% of these redds were observed in San Geronimo Creek (MMWD 2015).

Suitable steelhead spawning and rearing habitat occurs in the immediate vicinity of both Sites 1 and 2. However, as all construction activities would occur outside of the creek's top-of-bank, the creek and its banks would not be directly disturbed by construction activities. Additionally, as part of the proposed project, MMWD would implement standard erosion control measures to protect San Geronimo Creek. Therefore, the proposed project would not result in the loss or alteration of steelhead habitat. Additionally, given that no work would occur in the creek zone, no steelhead would be directly harmed by construction activities. For these reasons, the proposed project is not expected to harm or otherwise adversely affect steelhead and related impacts would be less than significant.

The implementation of **Mitigation Measure 4-1** would provide additional assurance that sensitive creek habitats are not disturbed.

Northern Spotted Owl

The northern spotted owl (*Strix occidentalis caurina*) is a federally Threatened species and a California Species of Special Concern. Northern spotted owls generally inhabit older forested habitats because they contain the structural characteristics required for nesting, roosting, and foraging. Specifically, northern spotted owls require a multi-layered, multi-species canopy with

moderate to high canopy closure. The stands typically contain a high incidence of trees with large cavities and other types of deformities; large snags (standing dead trees); an abundance of large, dead wood on the ground; and open space within and below the upper canopy for spotted owls to fly. In redwood forests along the coast range of California, northern spotted owls may be found in younger forest stands that contain structural characteristics of older forests.

Based on the CNDDB and survey data collected by Point Blue Conservation Science, there are numerous spotted owl territories in the surrounding area (**Appendix A**, **Figure 2**). The closest of these documented territories is approximately 0.2 mile east of Site 2 and 0.4 mile east of Site 1. There is another documented activity center located approximately 0.4 mile southwest of Site 1 and 0.6 mile southwest of Site 2. However, given the presence of suitable habitat, it is possible that a spotted owl activity center or nest location could occur closer to project site in future years.

Coast redwood/Douglas fir forest occurs on and surrounding the project site. In general, the onsite and nearby forest habitats are mature and contain large snags, dead wood on the ground, and other characteristics associated with northern spotted owl occurrences in Marin County. Therefore, the species could nest onsite or in nearby areas, or the site could be part of an activity center.

Northern spotted owl activity centers occur in the project vicinity and suitable nesting and foraging habitat occurs on the project site. No tree removal is required, and therefore, a northern spotted owl nest would not be directly disturbed. However, construction-related activities would temporarily elevate noise levels in areas on and surrounding the construction zones. Should a northern spotted owl nest within 0.25 mile of the project site (including all site access roads to be used), depending on the timing and magnitude of construction-related noise, nesting by the species could be disrupted. Therefore, in the absence of avoidance measures, impacts to northern spotted owl are significant. The implementation of **Mitigation Measure 4-3** would ensure that construction activities do not disturb nesting northern spotted owls.

> **Mitigation Measure 4-3.** All work may be conducted during the period of August 1 through January 31, which is outside of the northern spotted owl nesting season. Alternatively, MMWD shall commission two surveys for nesting northern spotted owls during the months of April and May preceding the commencement of construction. At a minimum, the survey area shall include all suitable nesting habitats within 0.25 mile of the project site. If, following the first or second survey it can be conclusively determined that there are nesting northern spotted owls, construction activities that are within 0.25-mile of an identified active nest shall not begin prior to August 1 unless the young have fledged, at which time construction or staging may begin no earlier than July 10. Regardless of nesting locations, construction shall conclude no later than January 31 (prior to the beginning of the mating and nesting season).

California freshwater shrimp

California freshwater shrimp (*Syncaris pacifica*) is a state and federally Endangered species. The species is found along the edges of stream pools, in areas away from the main current, where there are often undercut banks, and exposed riparian tree roots. Annual freshwater shrimp surveys have been conducted by Larry Serpa in Lagunitas Creek since 1996. California freshwater shrimp are known to occur in the mainstem of Lagunitas Creek, but in recent years have only been found in Lagunitas Creek near and downstream of Devil's Gulch. As of 2010, none had been found in sample sites between Shafter Bridge and the main entrance to Samuel P. Taylor State Park (Serpa 2009 and 2010).

California freshwater shrimp are not known to occur in San Geronimo Creek. The species is known to occur in Lagunitas Creek, but in more recent years has not been documented in the vicinity of San Geronimo Creek. However, as the species occurs in the mainstem of Lagunitas Creek, it is possible that freshwater shrimp could occur in its larger tributaries, including the portion of San Geronimo Creek on and near the project site. As all construction activities would occur outside of the creek's top-of-bank, the creek and its banks would not be directly disturbed by construction activities. Additionally, as part of the proposed project, MMWD would implement standard erosion control measures to protect San Geronimo Creek. Therefore, the proposed project would not result in the loss or alteration of potential freshwater shrimp habitat. Additionally, given that no work would occur in the creek zone, no freshwater shrimp would be directly harmed by construction activities. Therefore, impacts to freshwater shrimp would be less than significant. The implementation of **Mitigation Measure 4-1** would provide additional assurance that sensitive creek habitats are not disturbed.

Western Pond Turtle

Western pond turtle (*Actinemys marmorata*) is a California Species of Special Concern. This turtle primarily inhabits aquatic habitats, including ponds, slow moving streams, lakes, marshes, and canals. The species frequently basks on logs or other objects out of the water. Western pond turtles also require upland oviposition (i.e., egg laying) sites in the vicinity (typically within 200 meters, but as far as 400 meters) of the aquatic site. Mating typically occurs in late April or early May and most oviposition occurs during May and June, although some individuals may deposit eggs as early as late April and as late as early August (Rathbun et al. 1993).

Based on the CNDDB, there are no documented occurrences of western pond turtles in San Geronimo Creek. However, pond turtles have been observed in Lagunitas Creek basking on woody debris in the creek at Swimming Hole Bridge in Samuel P. Taylor Park (Ettlinger pers. comm. 2010). Given the presence of suitable habitat, western pond turtles could occur in San Geronimo Creek, including portions of the creek on and near the project site. All construction activities would occur outside of the creek's top-of-bank, and the creek and its banks would not be directly disturbed by construction activities. Additionally, as part of the proposed project, MMWD would implement standard erosion control measures to protect San Geronimo Creek. Therefore, the proposed

project would not result in the loss or alteration of potential western pond turtle habitat. While no work would occur in the creek zone, there is some potential that a western pond turtle could occur in the project staging/construction areas. Therefore, the proposed project could result in the harm of a pond turtle(s), and in the absence of avoidance measures related impacts are potentially significant.

The implementation of **Mitigation Measures 4-1 and 4-2** would ensure that construction activities do not harm western pond turtles.

Foothill Yellow-Legged Frog

Foothill yellow-legged frog (*Rana boylii*) is a California Species of Special Concern. The species is characteristically found close to water in association with perennial streams and ephemeral creeks that retain perennial pools through the end of summer. Adults preferentially utilize shallow edgewater areas with low water velocities for breeding and egg laying, usually characterized by gravel, cobble, and boulder substrate. Juvenile and non-breeding adult frogs may be found adjacent to riffles, cascades, main channel pools, and plunge-pools that provide escape cover.

Based on the CNDDB, there is a historic record from 1956 of foothill yellow-legged frog in Lagunitas Creek, from a location near Peters Dam (Occurrence #120). The closest known population of foothill yellow-legged frogs is from Big Carson Creek (approximately 2.5 miles from the project site). Given the presence of suitable habitat and that foothill yellow-legged frog has historically occurred in the project area, the species could occur in San Geronimo Creek, including the portion of the creek on and near the project site.

All construction activities would occur outside of the creek's top-of-bank, and therefore, the creek and its banks would not be directly disturbed by construction activities. Additionally, as part of the proposed project, MMWD would implement standard erosion control measures to protect San Geronimo Creek. Therefore, the proposed project would not result in the loss or alteration of potential foothill yellow-legged frog habitat. Additionally, given that no work would occur in the creek zone, and because the species generally does not move far from water, it is unlikely (but not impossible) that foothill yellow-legged frogs would be directly harmed by construction activities. For these reasons, there is a low potential that the proposed project could harm foothill yellow-legged frog and related impacts are potentially significant.

The implementation of **Mitigation Measures 4-1 and 4-2** would ensure that construction activities do not harm foothill yellow-legged frogs.

Tomales Roach

Tomales roach (*Lavinia symmetricus* ssp.) is a California Species of Special Concern that is restricted to tributaries of Tomales Bay. Based on the CNDDB (Occurrence #2), the fish species has been documented in Lagunitas Creek, and therefore, could also occur in San Geronimo Creek. However, as all construction activities would occur outside of the creek's top-of-bank, the creek and its banks would not be directly disturbed by construction activities. Additionally, as part of the proposed

project, MMWD would implement standard erosion control measures to protect San Geronimo Creek. Therefore, the proposed project would not result in the loss or alteration of potential Tomales roach habitat. Additionally, given that no work would occur in the creek zone, no Tomales roach would be directly harmed by construction activities. For these reasons, the proposed project is not expected to harm or otherwise adversely affect Tomales roach and related impacts are less than significant.

The implementation of **Mitigation Measure 4-1** would provide additional assurance that sensitive creek habitats are not disturbed.

Pallid Bat

Pallid bat (*Antrozous pallidus)* is a California Species of Special Concern. This and other tree roosting bat species could use trees on and near the project site for roosting with suitable cavities, crevices, exfoliating bark and/or bark fissures. The proposed project does not include the removal of any trees. However, should an active bat roost be present near a construction area, depending on the extent and magnitude of construction-related noise, roosting by bats could be disrupted. Therefore, related impacts are potentially significant. The implementation of **Mitigation Measure 4-4** would ensure that construction activities do not harm roosting bats.

> **Mitigation Measure 4-4.** A qualified biologist shall conduct a roosting bat habitat evaluation prior to the commencement of construction activities. The evaluation shall determine which (if any) trees near the work sites provide potential bat roosting habitat. If suitable roost trees are identified, then potential project-related impacts to use of these trees by roosting bats will be evaluated taking into consideration the following: (1) the project timing; (2) spatial and temporal aspects of potential noise/vibration impacts; and (3) susceptibility of each potential roost tree to disturbance given its specific location and other characteristics. If it is determined that roosting bats could be disturbed, then a site-specific bat protection plan shall developed by the qualified biologist to prevent disturbance of an active maternity or hibernation roost; the plan would be subject to California Department of Fish and Wildlife (CDFW) approval.

Marin Hesperian

Marin hesperian (*Vespericola marinensis)* is included on the CDFW Special Animals List. This mollusk is found in moist spots in coastal brush fields and chaparral vegetation, and under leaves of cow parsnip, around spring seeps, in leaf mold, and in alder and mixed evergreen forest. The CNDDB contains an occurrence of this species from Lagunitas Creek, approximately 1.5 miles northwest of the project site. The collection date of the specimen is not indicated. All construction activities would occur outside of the creek's top-of-bank, and the creek and its banks would not be directly disturbed by construction activities. Additionally, no seeps are present in the construction/staging areas. Therefore, suitable habitat for this species would not be impacted by the proposed project and related impacts are less than significant.

Point Reyes Mountain Beaver

Point Reyes mountain beaver (*Aplodontia rufa phaea*) is a California Species of Special Concern. This species is only known to occur in western Marin County, almost entirely within Point Reyes National Seashore where it is found on cool, moist, north-facing slopes in moderately dense coastal scrub. This scrub vegetation typically includes coyote brush as well as sword fern, bracken fern, poison oak, California nettle, and cow parsnip, which tend to grow in the moister areas. The project site does not contain the habitat type (*i.e.,* coastal scrub) associated with most occurrences of Point Reyes mountain beaver and there are no documented occurrences of the species within approximately 5 miles of the project site. Therefore, this species is not expected to occur and related impacts are less than significant.

Marin Elfin Butterfly

Marin elfin butterfly (*Callophrys mossi marinensis*) is included on the CDFW Special Animals List. This species generally occurs on north-facing slopes near redwood forests. Based on the CNDDB, one specimen has been recorded from the Mt. Tamalpais watershed in 1971, at the confluence of Lagunitas Creek and San Geronimo Creek. The larval host plant is stonecrop (*Sedum spathulifolium*). Stonecrop was not observed during the site survey. Stone/rock outcrops, which are generally associated with occurrences of the plant, were also not observed in areas to be disturbed by the project. For these reasons, impacts to Marin elfin butterfly would be less than significant.

Cooper's Hawk (and other nesting birds)

Cooper's hawk (*Accipiter cooperii*) is included on the Special Animals List maintained by the California Department of Fish and Wildlife (CDFW) and on this basis could be considered to be of special-status under CEQA. This species was previously a California Species of Special Concern, but its sensitivity status has been downgraded to being a "Watch List" species. Breeding pairs generally select nest sites within dense stands of live oak woodland, riparian habitats, or other wooded areas, but the species is known to occasionally nest in residential areas. The project site and surrounding area provides potential nesting habitat for this and other raptor species. While no tree removal is proposed, loud noise associated with construction activities has the potential to disturb nesting occurring in close proximity to the site and to result in the abandonment of an active nest. It should also be noted that other numerous other bird species could nest on or near the project site and that the active nests of all raptor species and most common bird species are protected by the Migratory Bird Treaty Act and the California Fish and Game Code. Therefore, in the absence of avoidance measures, impacts to nesting birds are potentially significant. The implementation of the **Mitigation Measure 4-5** would ensure that an active nest of a common or special-status bird species is not disturbed during construction activities.

> **Mitigation Measure 4-5.** If construction activities would commence anytime during the nesting/breeding season of native bird species potentially nesting on the site (typically February through August in the project region), a pre-construction survey for nesting birds

should be conducted by a qualified biologist within two weeks of the commencement of construction activities.

If active nests are found in areas that could be directly affected or are within 300 feet of construction and would be subject to prolonged construction-related noise, a no-disturbance buffer zone should be created around active nests during the breeding season or until a qualified biologist determines that all young have fledged. The size of the buffer zones and types of construction activities restricted within them should be determined by taking into account factors such as the following:

- Noise and human disturbance levels at the construction site at the time of the survey and the noise and disturbance expected during the construction activity;
- Distance and amount of vegetation or other screening between the construction site and the nest; and
- Sensitivity of individual nesting species and behaviors of the nesting birds.

b) ***Less than Significant.*** Sensitive plant communities are communities that are of limited distribution statewide or within a county or region and are often vulnerable to environmental effects of projects. The most current version of the CDFW's *List of California Terrestrial Natural Communities* indicates which natural communities are of special status given the current state of the California classification. The project site is located within a redwood/Douglas fir forest; redwood forest is considered to be sensitive plant community (Rank S3). However, the proposed project does not include tree removal and would not result in the loss of redwood forest habitat. Additionally, no removal of riparian vegetation is anticipated. Therefore, impacts to sensitive plant communities will be less than significant.

c) ***Less than Significant.*** Vollmar Natural Lands Consulting conducted a jurisdictional delineation on November 17, 2015 (VNLC 2015). The delineation identified the extent of ACOE, CDFW, and RWQCB jurisdiction on and bordering the project site. All construction activities would occur outside of the creek's top-of-bank, and no fill or disturbance is proposed to habitats under the jurisdiction of the ACOE, CDFW, or RWQCB. The existing footings for the existing pipe (located in the creek channel) will be left in place and no removal of riparian vegetation is anticipated. Therefore, impacts to jurisdictional resources will be less than significant.

d) ***Less than Significant.*** Wildlife corridors are described as pathways or habitat linkages that connect discrete areas of natural open space otherwise separated or fragmented by topography, changes in vegetation, and other natural or manmade obstacles such as urbanization. The proposed project includes the replacement of a water pipe and does not include the placement of any structures that would obstruct wildlife movement. Additionally, construction activities would occur during daylight hours, and consequently, would not interfere with wildlife movement that primarily occurs at night. Therefore, related impacts will be less than significant.

e) ***No Impact.*** The proposed project does not require the removal of any trees. Additionally, the district is exempt from local tree protection ordinances and associated permit requirements under

Section 53091 of the California Government Code. Therefore, the proposed project would not conflict with a local tree protection ordinance or other local ordinance protecting biological resources, and no related impact would occur.

f) ***No Impact.*** The site is not part of or near an existing Habitat Conservation Plan or Natural Communities Conservation Plan or any other local, regional, or state habitat conservation plan. Therefore, the proposed project would not conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan. Therefore, no related impact would occur.

ENVIRONMENTAL IMPACTS	Potentially Significant Impact	Potentially Significant Impact Unless Mitigation Incorporated	Less Than Significant Impact	No Impact	Sources
5. CULTURAL RESOURCES. Would the project:					
a) Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?				√	J
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?			√		J
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?				√	J
d) Disturb any human remains, including those interred outside of formal cemeteries?			√	√	J

The analysis for the CEQA Initial Study was based on a cultural resources and paleontological investigation conducted within the project area. Please reference the technical reports for details regarding background information, archival research, field surveys, and National Register of Historic Places (NRHP) and California Register of Historical Resources (CRHR) eligibility recommendations (DeBaker et al. 2016) (Dang et al. 2016). In addition, MMWD's project consultation contacted the NAHC by letter on September 23, 2015. A search of the Sacred Lands File housed at the NAHC did not indicate the presence of any Native American cultural resources in the vicinity of the project. In the response dated October 7, 2015, the NAHC also provided a list of individuals to contact from the Federated Indians of Graton Rancheria (FIGR) for further information regarding local knowledge of sacred lands. Letters and associated maps were sent to these individuals (Greg Sarris and Gene Buvelot) on January 4, 2016. MMWD met with FIGR on February 23, 2016 to further discuss the project details and request project review; at which time FIGR requested a copy of the technical report. A copy of the technical report was emailed to Buffy McQuillen, Tribal Historic Preservation Officer, on March 1, 2016. On March 31, 2016, MMWD sent follow up letters to FIGR. On April 4, 2016, B. McQuillen emailed MMWD and stated that based on a review of the project and cultural resources technical report there are no concerns regarding impacts to tribal cultural resources (TCR).

The following summary concerning cultural and paleontological resources is derived from the confidential technical reports.

a) ***No Impact:*** Based on the results of the cultural resources investigation conducted for this project (see Appendix B), four historic-period architectural resources over 45 years old are located within the Project Area: North Marin Pipeline, North Coast Pacific Railroad, and Concrete footings, as described in **Table 1**, Historic-period Architectural Resources Located within the Project Area. All of these resources are recommended as ineligible for listing in the NRHP and CRHR (CRHR Status Code 6Z). Therefore, construction and operation for the project would have no impact on historical resources.

Table 1. Historic-period Resources Located within the Project Area (Crossings 1 and 2)

Resource Name	Project Area	Construction Date	Eligibility Recommendation
North Marin Pipeline	Crossing 1 and 2	1957	Recommended as ineligible for listing in the NRHP/CRHR (CHR Status Code 6Z)
North Coast Pacific Railroad (concrete footings)	Crossing 1 and 2	ca. 1875	Recommended as ineligible for listing in the NRHP/CRHR (CHR Status Code 6Z)
Concrete footings	Crossing 2	unknown	Recommended as ineligible for listing in the NRHP/CRHR (CHR Status Code 6Z)

b) ***Less Than Significant:*** Based on the results of the cultural resources investigation conducted for this Project (see **Appendix B**), no prehistoric or historic-period archaeological resources were identified within the Project Area.

Although construction of the Project would have no impact on known archaeological resources, there is a possibility that previously unidentified archaeological resources and subsurface deposits are present within the Project Area. If present, excavation, grading, and movement of heavy construction vehicles and equipment could expose, disturb or damage any such previously unrecorded archaeological resources. Because the possibility of encountering archaeological resources during construction cannot be completely discounted, the impact related to the potential disturbance or damage of previously undiscovered archaeological resources, if present, could be significant.

> **Mitigation Measure 5-1:** MMWD shall ensure that construction crews shall stop all work within 100 feet of the discovery until a qualified archaeologist can assess the previously unrecorded discovery and provide recommendations. Resources could include subsurface historic features such as artifact-filled privies, wells, and refuse pits, and artifact deposits, along with concentrations of adobe, stone, or concrete walls or foundations, and concentrations of ceramic, glass, or metal materials. Native American archaeological materials could include obsidian and chert flaked stone tools (such as projectile and dart points), midden (culturally derived darkened soil containing heat-affected rock, artifacts,

animal bones, and/or shellfish remains), and/or groundstone implements (such as mortars and pestles).

Implementation of **Mitigation Measure 5-1** (Protect of Archaeological Resources Identified during Construction) would reduce impacts on any previously unrecorded and buried archaeological resources to less-than significant-levels by requiring MMWD and its contractors to adhere to appropriate procedures and protocols for minimizing such impacts, in the event that a possible archaeological resource is discovered during construction. Therefore, impacts to previously unidentified archaeological resources within the Project Area would be reduced to a less-than-significant level with mitigation.

After Mitigation: Less than Significant with Mitigation: Following construction, operation of the project would not result in further ground disturbance within the Project Area. Therefore, no operational impacts to archaeological resources would occur.

c) ***No Impact:*** A search of the University Of California Museum Of Paleontology conducted on December 17, 2015 did not yield known fossil localities or unique geologic features within or near the Project Area. No unique geologic features were identified in the archival or field studies. The Late Holocene alluvium underlying the Project Area (Crossings 1 and 2) has a low potential to contain paleontological resources, and the Franciscan Complex volcanic rocks underlying these areas has low to no potential to contain paleontological resources.

d) ***Less Than Significant:*** No evidence of human remains was identified within the Project Area. However, the potential for their presence cannot be entirely ruled out. Construction-related excavation could expose and disturb or damage previously undiscovered human remains. Therefore, the impact related to the potential disturbance of human remains during construction could be significant.

> **Mitigation Measure 5-2:** MMWD shall treat any human remains and associated or unassociated funerary objects discovered during soil-disturbing activities according to applicable State laws. Such treatment includes work stoppage and immediate notification of the Marin County Coroner and qualified archaeologist, and in the event that the Coroner's determination that the human remains are Native American, notification of NAHC according to the requirements in PRC Section 5097.98. NAHC would appoint a Most Likely Descendant (MLD). A qualified archaeologist, MMWD and MLD shall make all reasonable efforts to develop an agreement for the treatment, with appropriate dignity, of any human remains and associated or unassociated funerary objects (CEQA Guidelines Section 15064.5[d]). The agreement would take into consideration the appropriate excavation, removal, recordation, analysis, custodianship, and final disposition of the human remains and associated or unassociated funerary objects. The PRC allows 48 hours to reach agreement on these matters.

Mitigation Measure 5-2 (Protect Human Remains Identified during Construction) would be implemented during project construction to minimize potential impacts on any buried human

remains and associated or unassociated funerary objects that may be accidentally discovered during construction activities to less-than-significant levels by requiring the District to adhere to appropriate excavation, removal, recordation, analysis, custodianship, and final disposition protocols. Therefore, this potential impact on buried human remains would be less than significant with mitigation.

After Mitigation: Less than Significant with Mitigation: Following construction, operation of the proposed project would not result in further ground disturbance within the Project Area. Therefore, no operational impacts to human remains would occur.

ENVIRONMENTAL IMPACTS	Potentially Significant Impact	Potentially Significant Impact Unless Mitigation Incorporated	Less Than Significant Impact	No Impact	Sources
6. GEOLOGY AND SOILS.					
a) Would the project expose people or structures to 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.		√			A, I, P
ii) Strong seismic ground shaking?		√			A, I, P
iii) Seismic-related ground failure, including liquefaction?		√			A, I, P
iv) Landslides?		√			A, I, O
b) Would the project result in substantial soil erosion or the loss of topsoil?			√		A, I
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?		√			I
d) Would the project be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?			√		I
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 waste water?				√	I

The district commissioned the preparation of a geotechnical investigation of the sites as part of its initial design efforts for the project. The report entitled *Geotechnical Investigation San Geronimo North Marin Line stabilization Project, Lagunitas* by Miller Pacific Engineering Group, June 26, 2014, provides the basis for the following analysis (see **Appendix C**).

a, c) ***Less than Significant Impact with Mitigation.***

Fault Rupture. The Geotechnical investigation concluded that the potential for surface rupture at or near the sites was relatively insignificant.

Seismic Ground Shaking. The sites will likely experience strong seismic ground shaking similar to other areas in the seismically active San Francisco Bay Area. Earthquakes along several active faults in the region, as shown on Figure 4, could cause moderate to strong ground shaking at the site. Estimates of peak ground accelerations are based on either deterministic or probabilistic methods.

Deterministic methods use empirical relations developed from data collected during previous earthquakes to provide estimates of median peak ground accelerations. A summary of the active faults that could most significantly affect the site, their maximum credible magnitude, closest distance to the project area, and probable peak accelerations is provided in Table 2.

Table 2. Deterministic Hazard Analysis Estimated Seismic Ground Motions

Fault	Distance		Moment Magnitude[1]	Median Peak Ground Acceleration (g)
	Miles	Kilometers[2]		
San Andres	2.8	4.5	8.0	0.45
San Gregorio	4.4	7	7.2	0.36
Hayward	18	29	7.3	0.17
Rogers Creek	19.9	32	7.3	0.12
Maacama	39.2	63	7.4	0.07

(1) Caltrans (2014), ARS Online V2.3.06 web-based acceleration response spectra calculator, http://dap3.dot.ca.gov/ARS_Online/, accessed June 16, 2014.

(2) Values determined using Vs30 = 560 m/s (1,837 ft/s) used for very dense soil/soft rock profile (Site Class C) per 2013 CBC.

The potential for strong seismic shaking at the project sites is high. The San Andreas Fault is the closest and most likely source for a future earthquake. The most significant adverse impact associated with strong seismic shaking is potential damage to structures and improvements. **Mitigation Measure 6-1** would reduce impacts to a less than significant level.

> **Mitigation Measure 6-1.** Foundations for new structures should be designed in accordance with the latest edition of the California Building Code (2013 CBC), and abutment retaining wall design should consider a seismic surcharge load. Seismic design criteria for new foundations and retaining walls are presented in the Conclusions and Recommendations of the Geotechnical Investigation.

Ground-Failure/Liquefaction. Liquefaction refers to the sudden, temporary loss of soil shear strength during strong ground shaking. This phenomenon can occur where there are saturated,

loose, granular (sandy) deposits subjected to seismic shaking. Liquefaction-related phenomena include settlement and lateral spreading.

Loose granular soils were encountered in Boring 2 at depths between about 2- and 8-feet, and in Boring 4 at depths between about 2- and 9-feet below the ground surface. While these soils were not saturated at the time of our exploration, performed during the summer months following an unusually dry rainy season, saturation is likely throughout the winter months during "normal" rainfall years and following periods of heavy rain. Additionally, these deposits were encountered at elevations above the channel flow line, making them susceptible to lateral spreading in the event of liquefaction. Therefore, the risk of damage to improvements due to liquefaction and related effects (ground surface settlement and lateral spreading) is high. **Mitigation Measure 6-2** would reduce impacts to a less than significant level.

> **Mitigation Measure 6-2.** New trestle abutments should be supported on deep foundations which derive support from competent bedrock beneath any potentially liquefiable deposits (except the eastern crossing's west abutment, which may utilize shallow spread footings bearing on shallow rock). Recommendations and design criteria for new foundations are presented in the Conclusions and Recommendations of the Geotechnical Investigation.

Landslides. Weak soils and bedrock on moderate to steep slopes can move downslope due to gravity. Slope instability is often initiated or accelerated from soil saturation and groundwater pressure, though may also be aggravated by grading activity, such as removal of toe support by excavation or by addition of new loads, such as fill placement. Loss of toe support may also be a result of creek erosion and scour. The primary adverse effect of slope instability is damage to structures and improvements.

Creekbank slopes at both planned trestle locations are generally inclined between about 2:1 (horizontal:vertical) and 1:1. No evidence of "global" slope instability was observed during exploration of the sites; however, the sites are located in an area that is generally susceptible to landsliding and the steep banks along the San Geronimo Creek channel may also be susceptible to smaller-scale sloughing, raveling, and sliding. Additionally, removal of toe support by channel scour and erosion may accelerate or exacerbate bank instability. **Mitigation Measure 6-2** would reduce impacts to a less than significant level.

b) ***Less than Significant Impact with Mitigation.*** Sandy soils on moderate slopes or clayey soils on steep slopes are susceptible to erosion when exposed to concentrated surface water flow. The potential for erosion is increased when established vegetation is disturbed or removed.

Creekbanks at the project sites are generally inclined between about 2:1 and 1:1, with the steeper banks generally at the locations of the left abutment for each trestle. The generally clayey near-surface soils and loose granular soils exposed in the banks will likely be susceptible to erosion. Additionally, scour along the creekbanks, particularly at the right (north) abutment at the western trestle and left (east) abutment of the eastern trestle, may have the potential to undermine

structures founded on shallow foundations. Therefore, the risk of erosion and scour at the sites is moderate to high. **Mitigation Measure 6-3** would reduce impacts to a less than significant level.

> **Mitigation Measure 6-3.** New trestle: New trestle abutments should be supported on deep foundations which derive support from competent bedrock (except the eastern crossing's west abutment, which may utilize shallow spread footings bearing on shallow rock). Recommendations and design criteria for new foundations are presented in the Conclusions and Recommendations of the Geotechnical Investigation. Erosion-control measures during and after construction should conform to the most recent version of the Erosion and Sediment Control Field Manual (California Regional Water Quality Control Board, 2002) and the project's Stormwater Pollution Prevention Plan (SWPPP). After construction, vegetation should be reestablished and erosion-control measures implemented in disturbed areas.

d) ***Less than Significant Impact.*** The Geotechnical investigation did not specifically identify any of the soils at or near the sites as expansive.

e) ***No Impact.*** The proposed project does not include uses or activities that would generate waste water, nor involve the construction, modification, or demolition of septic tanks or alternative waste water systems.

ENVIRONMENTAL IMPACTS	Potentially Significant Impact	Potentially Significant Impact Unless Mitigation Incorporated	Less Than Significant Impact	No Impact	Sources
7. GREENHOUSE GAS EMISSIONS. Would the project:					
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?		√			A, B, C
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?				√	A, B, C

a) ***Less than Significant Impact.*** The proposed project would generate greenhouse gas (GHG) emissions from temporary construction activities, including from mobile equipment, site preparation, excavation, and backfilling. BAAQMD has not adopted a GHG emissions threshold with respect to construction-related GHGs. In lieu of specific guidance from BAAQMD regarding significance thresholds for construction-related GHG emissions, significance is assessed by a consideration of the scope and duration of construction-related emissions. Given that the project activities would be temporary in nature and would occur intermittently over the construction

timeframe described earlier, the proposed project is not expected to result in an ongoing burden to regional or global GHG inventories.

b) ***Less than Significant Impact.*** California has passed several bills and the governor has signed at least three executive orders regarding GHGs. For example, Assembly Bill (AB) 32 (the Global Warming Solutions Act) was passed by the California legislature on August 31, 2006. It requires the state's GHG emissions to be reduced to 1990 levels by 2020. The Marin Countywide Plan includes a number of greenhouse gas reduction policies:

> *Goal AIR-4. Minimization of Contributions to Greenhouse Gases. Prepare policies that promote efficient management and use of resources in order to minimize greenhouse gas emissions. Incorporate sea level rise and more extreme weather information into the planning process.*
> *Policy AIR-4.1. Reduce Greenhouse Gas Emissions. Adopt practices that promote improved efficiency and energy management technologies; shift to low-carbon and renewable fuels and zero emission technologies.*
> *Policy AIR-4.2. Foster the Absorption of Greenhouse Gases. Foster and restore forests and other terrestrial ecosystems that offer significant carbon mitigation potential.*
> *Implementation Program P AIR-4.j. Acquire and Restore Natural Resource Systems. Take and require all technically feasible measures to avoid or minimize potential impacts on existing natural resource systems that serve as carbon sinks.*

None of these measures are applicable to the short-term pipeline creek crossing construction project.

The purpose of the proposed project is to replace two existing pipeline creek crossings and would not conflict with any existing GHG laws, plans, policies, or regulations adopted by the California legislature or the CARB and would be consistent with applicable policies of the Marin Countywide Plan.

ENVIRONMENTAL IMPACTS	Potentially Significant Impact	Potentially Significant Impact Unless Mitigation Incorporated	Less Than Significant Impact	No Impact	Sources
8. HAZARDS AND HAZARDOUS MATERIALS. Would the project:					
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?			√		A, P
b) Create a significant hazard to the public or the environment			√		A, P

ENVIRONMENTAL IMPACTS	Potentially Significant Impact	Potentially Significant Impact Unless Mitigation Incorporated	Less Than Significant Impact	No Impact	Sources
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 ¼ mile of an existing or proposed school?				√	A, L, P
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?				√	F
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 for people residing or working in the project area?				√	A, L, M
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?				√	A, L, M
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?				√	A, L
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?		√			A, L, M

a – b) ***Less than Significant Impact.*** Construction of the proposed project would involve the use of materials that are defined as hazardous, such as paints and other types of coatings, fuels, hydraulic fluids, and coolants for construction equipment, and compressed gasses used in the welding process. All of these materials are common in the construction industry and construction process and their transport, handling, use, and disposal within specifications outlined by their respective manufactures are designed to ensure that there are no environmental effects. Further, many of the manufactures' recommendations are based on regulations promulgated by federal and state government; also with the intent of reducing the potential for accidental upset and environmental effects. After construction there would be no hazardous materials transported to or from the sites on a regular basis. Therefore, operation of the proposed project would not create a significant hazard to the public or the environment.

c) ***No Impact.*** There are no existing or proposed schools located within ¼ mile of the project sites. Therefore, the proposed project would not emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within ¼ mile of an existing or proposed school.

d) ***No Impact.*** California Government Code Section 65962.5(a)(1) requires the California Department of Toxic Substances to compile and update as appropriate a list of all hazardous waste facilities subject to corrective action, all land designated as hazardous waste property or border zone property, all information received by the Department of Toxic Substances Control pursuant to Section 25242 of the Health and Safety Code on hazardous waste disposals on public land, all sites listed pursuant to Section 25356 of the Health and Safety Code, and all sites included in the Abandoned Site Assessment Program. These lists are commonly referred to as the Cortese List. The project sites are not listed on any of the individual lists that comprise the Cortese List, and none of the lands bordering the sites are on the Cortese List.

e) ***No Impact.*** The project sites are not located within an airport land use plan or within 2 miles of a public airport or public use airport, and would not result in a safety hazard for people residing or working in the project area.

f) ***No Impact.*** The project sites are not located within the vicinity of a private airstrip and would not result in a safety hazard for people residing or working in the project area. No mitigation is required.

g) ***No Impact.*** The project sites are situated off of Sir Francis Drake Boulevard in Lagunitas (**Figure 1**). During construction activities equipment and supplies would be delivered along Sir Francis Drake Boulevard. No construction activity or staging would occur on or immediately adjacent to the road. Movement of equipment and materials along the road would not impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.

h) ***Less than Significant Impact with Mitigation.*** Construction of the proposed project would require a variety of activities often referred to as “hot work,” such as welding. The sites are situated within a flammable vegetated environment.

Chapter 26 of the California Fire Code (California Code of Regulations, Title 24, Part 9) establishes provisions for safety and care during construction activities defined as hot work. In brief, the Code requires that specific measure be taken during construction to minimize the potential ignition of a wildland fire in areas susceptible to such events, which includes the project sites and surrounding lands.

Mitigation Measures 8-1 and 8-2 would ensure that the proposed project would not expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.

Mitigation Measure 8-1. All applicable requirements of Chapter 26 of the California Fire Code shall be strictly adhered to during the project construction, including but not limited to the following:

a. Hot work areas shall not contain combustibles or shall be provided with appropriate shielding to prevent sparks, slag or heat from igniting exposed combustibles.
b. A fire watch shall be provided during hot work activities and shall continue for a minimum of 30 minutes after the conclusion of the work.
c. Individuals assigned to fire watch duty shall have fire-extinguisher equipment readily available and shall be trained in the use of such equipment.
d. Where fire hoses are required, they shall be connected, charged, and ready for operation.
e. A minimum of one portable fire extinguisher complying with Section 906 and with a minimum 2-A:20-B:C rating shall be readily accessible within 30 feet of the location where hot work is performed.

Mitigation Measure 8-2. There shall be no hot work on red flag days declared by Marin County that cover the areas that encompass the project sites.

ENVIRONMENTAL IMPACTS	Potentially Significant Impact	Potentially Significant Impact Unless Mitigation Incorporated	Less Than Significant Impact	No Impact	Sources
9. HYDROLOGY AND WATER QUALITY. Would the project:					
a) Violate any water quality standards or waste discharge requirements?				√	A, P
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local ground water table level (for example, the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?				√	A, I, P
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?				√	A, I, P
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on-				√	A, P

ENVIRONMENTAL IMPACTS	Potentially Significant Impact	Potentially Significant Impact Unless Mitigation Incorporated	Less Than Significant Impact	No Impact	Sources
or off-site.					
e) Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff?				√	A, P
f) Otherwise substantially degrade water quality?				√	A, P
g) Place housing within a 100-year flood-hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?				√	K
h) Place within a 100-year flood-hazard area structures which would impede or redirect flood flows?				√	K, Q
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?				√	K
j) Inundation by seiche, tsunami, or mudflow?				√	K

a) ***No Impact.*** The existing pipeline creek crossings do not include operations that would violate any water quality standards nor are there discharge requirements associated with their operation. The same would be true for the proposed pipeline crossings. No mitigation is required.

b) ***No Impact.*** The Geotechnical Investigation reported that ground water was encountered in borings conducted to evaluate subsurface soil conditions immediately adjacent to San Geronimo Creek. The Report further commented that the level of ground water would rise and fall seasonally, depending on rainfall. The proposed project does not include design, construction, or operational features that would deplete groundwater supplies or interfere substantially with groundwater recharge. No mitigation is required.

c – d) ***No Impact.*** The proposed project does not require any land form modification that would alter existing drainage patterns. The only earthwork that will be required for the project is the drilling of holes for the foundation piers beyond the top-of-banks and uncovering a portion of the existing pipeline beyond top-of-bank to install the pipe bends to bring the segment above ground. None of the anticipated work would alter existing drainage patterns, nor would there be any alteration of the San Geronimo Creek bed and banks.

e) ***No Impact.*** The proposed project's footprint is very small; less than 25-square feet at the end of the two trusses for the truss footings, and another 25-square feet at each location where the existing transmission pipeline would rise above the ground to meet the trusses. The small physical

footprints would not create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems nor provide substantial additional sources of polluted runoff.

f) ***No Impact.*** There are no design elements or features of the proposed project that would degrade the quality of waters flowing into or along San Geronimo Creek.

g) ***No Impact.*** The project does not include the construction of housing or other habitable structures..

h) ***No Impact.*** The project sites are located on the Federal Emergency Management Agency (FEMA) Flood Hazard Boundary Map for Marin County, California and Incorporated Areas. FEMA has not established a base flood elevation for San Geronimo Creek. MMWD commissioned a hydraulic analysis of San Geronimo Creek to determine water surface elevations at the two crossing locations to determine the 10-, 25-, and 100-year water surface elevations art the two project sites (Appendix Q). That analysis concluded that the proposed truss structure that would support the new pipeline crossings would be situated above the projected 100-year storm flows within San Geronimo Creek.

i) ***No Impact.*** The project area is not within or adjacent to the floodway of a levee or dam.

j) ***No Impact.*** The project area is situated at a minimum elevation of approximately 210 feet above mean sea level at Site 1 and approximately 218 feet above mean sea level at Site 2, and the project area is not downstream of an active or potential mudflow area.

ENVIRONMENTAL IMPACTS	Potentially Significant Impact	Potentially Significant Impact Unless Mitigation Incorporated	Less Than Significant Impact	No Impact	Sources
10. LAND USE AND PLANNING. Would the project:					
a) Physically divide an established community?				√	A, L, M, P
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?				√	A, L, M, P
c) Conflict with any applicable Habitat Conservation Plan or Natural Community Conservation Plan?				√	A, M

a) ***No Impact.*** The proposed project would replace existing pipeline creek crossings along their same alignments and would not alter the status quo of an established community.

b) ***No Impact.*** The proposed project is designed to replace two existing San Geronimo Creek pipeline crossings with seismically resistant crossings, which would reduce, if not eliminate the chance of a seismically-associated pipeline failure that could result in significant impacts to San Geronimo Creek.

c) ***No Impact.*** The project area is not part of or near an existing Habitat Conservation Plan or Natural Communities Conservation Plan.

ENVIRONMENTAL IMPACTS	Potentially Significant Impact	Potentially Significant Impact Unless Mitigation Incorporated	Less Than Significant Impact	No Impact	Sources
11. MINERAL RESOURCES. Would the project:					
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?				√	H
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?				√	H

a) ***No Impact.*** The California Legislature enacted the Surface Mining and Reclamation Act (SMARA) in 1975 to address the need for a continuing supply of mineral resources, and to prevent or minimize the negative impacts of surface mining to public health, property, and the environment. SMARA requires the California Department of Conservation (CDC), CGS, to conduct Mineral Land Classification surveys. These surveys designate land areas, such as mineral resources zones or aggregate resource zones, depending on the type of resources identified in the area. The CGS has mapped aggregate availability in the state, and no aggregate resource zones have been identified in the project area or surrounding the project area.

b) ***No Impact.*** The Marin Countywide Plan, adopted in 2007, does not identify the project area as a locally important-mineral resource site.

ENVIRONMENTAL IMPACTS	Potentially Significant Impact	Potentially Significant Impact Unless Mitigation Incorporated	Less Than Significant Impact	No Impact	Sources
12. NOISE. Would the project result in:					
a) Exposure of persons to or generation of noise levels in excess				√	A, M, P

ENVIRONMENTAL IMPACTS	Potentially Significant Impact	Potentially Significant Impact Unless Mitigation Incorporated	Less Than Significant Impact	No Impact	Sources
of standards established in the local general plan or noise ordinance or applicable standards of other agencies?					
b) Exposure of persons to or generation of excessive ground borne vibration or ground borne noise levels?			√		A
c) Substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?				√	A
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?		√			A, M
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 expose people residing or working in the project area to excessive noise levels?				√	A, L, P
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?				√	A, L, P

a) ***No Impact.*** The short-term noise that would be generated during project construction is discussed in 12d. Operation of the proposed project would not result in the generation of noise levels that would be different than are currently generated by the existing pipeline crossings.

b) ***Less than Significant Impact.*** Ground borne construction-related vibration or noise is typically associated with earth moving activities or various types of pile driving. Depending on soil type, ground borne vibration can be generated from heavy equipment moving over large expanses of unpaved earth. Typically, most ground borne vibration and noise dissipate rapidly as the distance from the source increases.

Construction. Construction of the pipeline crossings would require minimal excavation at each of the four locations where the existing pipe would be modified to rise above the ground level and to drill for the footings that would support each end of the pipeline crossings. The amount of grading activities would generate ground borne vibration that would rapidly dissipate within a few yards of the site.

Operation. Operation of the proposed project would not result in activities that would generate ground borne vibration or noise, such as from pumps or other machinery.

c) ***No Impact.*** Operation of the new pipeline crossings would not include any activities or operations that would produce noise levels in excess of those associated with operation of the existing crossings.

d) ***Less than Significant Impact with Mitigation.***

Construction. Project construction would result in short-term increases in noise levels in the project area. Noise from construction would be generated by noise producing mechanical equipment used in the construction process. This equipment would include gasoline and diesel powered equipment such as an excavator/backhoe, as well as from hand-held power equipment such as chain saws.

The evaluation of project construction noise is based on typical noise level emissions. The Federal Highway Administration (FHWA) Construction Noise Handbook includes a listing of typical noise levels for construction activities. Average noise levels for the types of construction equipment expected on site are:

- Chain saw – 84 dBA @ 50 feet
- Compressor – 78 dBA @ 50 feet
- Concrete mixer truck – 81 dBA @ 50 feet
- Excavator – 81 dBA @ 50 feet
- Pickup truck – 75 dBA @ 50 feet

This above information is an average value; typically the magnitude of construction noise emission varies over time because construction activity is intermittent and power demands on construction equipment (and the resulting noise output) are cyclical.

Noise can impact adjacent sensitive land uses (residential) and **Mitigation Measure 11-1**, excerpted from Marin County Code Section 6.70.030(5)(a), would reduce that impact to a less than significant level.

> **Mitigation Measure 11-1:** Construction shall be limited to between the hours of 7:00 AM and 6:00 PM, Mondays through Fridays, and 9:00 AM to 5:00 Pm on Saturdays. Construction on Sundays and holidays is prohibited.

Post-Construction. Following completion of project construction there would be no noise generated by the project that would differ from current conditions. No mitigation is required.

e – f) ***No Impact.*** The project sites are not located within an airport land use plan, within two miles of a public use airport, or within the general vicinity of a private airstrip. Further, the proposed project would not include permanent employees or residents following construction completion.

ENVIRONMENTAL IMPACTS	Potentially Significant Impact	Potentially Significant Impact Unless Mitigation Incorporated	Less Than Significant Impact	No Impact	Sources
13. POPULATION AND HOUSING. Would the project:					
a) Induce substantial 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)?				√	A, L, P
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?				√	A, L, P
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?				√	A, L, P

a) ***No Impact.*** The proposed project would replace one two existing pipeline creek crossings with new pipeline creek crossings. The new pipeline crossings would not increase water supply to the MMWD service area.

b – c) ***No Impact.*** There is no housing on or population inhabiting the sites and no housing is associated with the proposed project.

ENVIRONMENTAL IMPACTS	Potentially Significant Impact	Potentially Significant Impact Unless Mitigation Incorporated	Less Than Significant Impact	No Impact	Sources
14. PUBLIC SERVICES. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities or need for new or physical 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?				√	A, L, P
b) Police protection?				√	A, L, P
c) Schools?				√	A, L, P
d) Parks?				√	A, L, P
e) Other public facilities?				√	A, L, P

a – e) ***No Impact.*** The proposed project would replace existing pipeline creek crossings with new pipeline creek crossings and would not result in the generation of additional permanent development or population in the area. The project would not generate demand for additional public services from and/or expansion of public facilities.

ENVIRONMENTAL IMPACTS	Potentially Significant Impact	Potentially Significant Impact Unless Mitigation Incorporated	Less Than Significant Impact	No Impact	Sources
15. RECREATION. Would the project:					
a) 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?				√	A, L, P
b) Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?				√	A, L, P

a) ***No Impact.*** The project sites are not used for recreation. The proposed project is a pipeline replacement project and would not generate additional demand for neighborhood or regional parks or other recreational facilities. There would be no temporary or permanent resident population increase associated with construction of the proposed project, which is typically the factor attributable to increased demand for park and recreational opportunities.

b) ***No Impact.*** The proposed project does not include the construction of recreational facilities, nor does it include the expansion of existing recreational facilities.

ENVIRONMENTAL IMPACTS	Potentially Significant Impact	Potentially Significant Impact Unless Mitigation Incorporated	Less Than Significant Impact	No Impact	Sources
16. TRANSPORTATION/TRAFFIC. Would the project:					
a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?				√	A, L, P

ENVIRONMENTAL IMPACTS	Potentially Significant Impact	Potentially Significant Impact Unless Mitigation Incorporated	Less Than Significant Impact	No Impact	Sources
b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?				√	A, L, P
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location, that results in substantial safety risks?				√	A, L, P
d) Substantially increase hazards due to a design feature (for example, sharp curves or dangerous intersections) or incompatible uses (for example, farm equipment)?				√	A, L, P
e) Result in inadequate emergency access?				√	A, L, P
f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?				√	A, L, P

a – b) ***No Impact.*** Access to the two project sites would be off of Sir Francis Drake Boulevard in Lagunitas.

Construction. During the projected three month construction period there would be a temporary increase in traffic along Sir Francis Drake Boulevard leading to the sites associated with the delivery of construction materials and the transport of construction personnel and equipment. The district estimates that the average number of construction-related vehicles that might utilize the area's roadway network on any one day would be 6 (including construction personnel and equipment and material delivery/removal). The addition of an average of 6 vehicles on any one day of project construction would be marginally discernable within the context of existing traffic volumes on the area's network.

Typical construction days would tend to have construction traffic concentrated at the beginning and end of the workday. Development along the roadway network leading to the project sites is low density residential. The project area's roadway network traffic volumes would not be marginally impacted by construction activities.

Because the construction period is expected to require about three months and is temporary, there would be no conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways,

pedestrian and bicycle paths, and mass transit. Further, there would be no conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways.

Operation. Following construction, the number and frequency of vehicular trips associated with operation and maintenance of the new pipeline segments would not change from existing conditions.

c) ***No Impact.*** The proposed project is not adjacent to or beneath the flight path of any existing airports.

d) ***No Impact.*** The proposed project does not include any modifications to or construction of new public roadways.

e) ***No Impact.***

Construction. Construction vehicles and material deliveries would utilize Sir Francis Drake Boulevard to travel to and from the project sites. There would be no material staging on Sir Francis Drake Boulevard; the project's construction would not impede the movement of emergency vehicles or otherwise hamper emergency response activities. The movement of construction-related vehicles along Sir Francis Drake Boulevard leading to the project sites would have no greater or lesser impact on the movement of emergency vehicles than would any other vehicle on the roadway.

Operation. Following construction, the project area would be visited routinely for inspection and maintenance on the same schedule as the existing pipeline segments. Maintenance vehicles, which are typically large pick-up trucks, would be parked on or near the sites and off of the roadway system. This would not represent a change from current conditions and practices.

f) ***No Impact.*** The proposed project would replace two existing pipeline creek crossings with new, seismically resistant crossings. No element of the existing pipeline segments or the proposed new pipeline segments would affect public transit, or bicycle or pedestrian facilities.

ENVIRONMENTAL IMPACTS	Potentially Significant Impact	Potentially Significant Impact Unless Mitigation Incorporated	Less Than Significant Impact	No Impact	Sources
17. UTILITIES AND SERVICE SYSTEMS. Would the project:					
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?				√	A, P
b) Require or result in the construction of new water or				√	A, P

ENVIRONMENTAL IMPACTS	Potentially Significant Impact	Potentially Significant Impact Unless Mitigation Incorporated	Less Than Significant Impact	No Impact	Sources
wastewater treatment facilities or expansion of existing facilities, the construction or which could cause significant environmental effects?					
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?				√	A, P
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?				√	A, P
e) Result in a determination by the wastewater 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?				√	A, P
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?				√	A
g) Comply with federal, state, and local statutes and regulations related to solid waste?				√	A, P

a – e) ***No Impact.*** The proposed project would generate no wastewater, would not require the construction of new water or wastewater facilities (other than the proposed project), would not require the construction of new storm water drainage facilities, and would have no effect on MMWD's water supplies.

f – g) ***No Impact.*** The existing pipeline segments that would be removed as part of the project's implementation would be removed from the site for reuse or for placement in a suitable landfill.

The Redwood Landfill and Recycling Center, located north of the City of Novato, is the landfill nearest to the project site. There are also numerous landfills in the San Francisco Bay Area. If some or all of the pipeline components are disposed of in a landfill, the choice of landfill would be at the discretion of the project contractor.

The Redwood Landfill and Recycling Center currently has adequate capacity to accommodate Marin County's solid waste disposal needs, including those of the proposed project. As of 2008, the landfill had a remaining capacity of approximately 19.1 million cubic yards of waste and an estimated closure date of 2024. Other Bay Area landfills would also be expected to be able to accommodate the proposed project's solid waste volume.

Because only a small volume of waste would be generated by project construction, existing landfill facilities would be able to accommodate the project's solid waste needs.

ENVIRONMENTAL IMPACTS	Potentially Significant Impact	Potentially Significant Impact Unless Mitigation Incorporated	Less Than Significant Impact	No Impact	Sources
18. MANDATORY FINDINGS OF SIGNIFICANCE. Does the project:					
a) Have the potential to 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, 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) 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 the past projects, the effects of other current projects, and the effects of probable future projects.)			√		
c) Have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?				√	

a) ***Less Than Significant Impact.*** The proposed project would replace existing pipeline creek crossings with new, seismically resistant crossings. There are several protected species having the potential to occur within the project area and mitigation measures have been identified that would reduce project impacts to less than significant levels. Additionally, the project site does not include any structures or buried resources that would be considered an example of major periods of California history or prehistory. No further mitigation is required.

b) ***Less Than Significant Impact.*** The proposed project would generate a series of individual impacts that could be potentially significant, but can be mitigated to less than significant levels with mitigation measures outlined in this Initial Study. Cumulatively, those potential impacts after mitigation would not be expected to combine to generate a potentially significant effect for the project by itself. No further mitigation is required.

c) ***No Impact.*** Construction and operation of the proposed project would not have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly. No further mitigation is required.

Information Sources

The following information sources were used in the preparation of this document and referenced throughout the Initial Study Checklist:

A. Anderson, Dain (MMWD). Project Site Field Inspection. April 8, April 24, and June 9, 2014 and March 4, 2015.

B. Bay Area Air Quality Management District (BAAQMD). *BAAQMD California Environmental Quality Act Air Quality Guidelines*. May 2012.

C. Bay Area Air Quality Management District (BAAQMD). *Final Bay Area Clean Air Plan 2010*. September 15, 2010.

D. California Building Standards Commission. *California Fire Code, California Code of Regulations, Title 24, Part 9*. 2007.

E. California Department of Conservation, Division of Land Resource Protection, Farmland Mapping, and Monitoring Program. *Marin County Important Farmland*. 2006.

F. California Department of Toxic Substances Control "EnvironStor." dtsc.ca.gov. March 2, 2016. http://www.envirostor.dtsc.ca.gov/public. Path: 561 Summit Avenue, Mill Valley, CA.

G. California Department of Transportation "Officially Designated Scenic Highways." dot.ca.gov. March 3, 2016 . http://www.dot.ca.gov/hq/LandArch/scenic/schwy.htm.

H. California Geological Survey. *Aggregate Availability in California, Department of Conservation*. December 2006.

I. Dabanian, Eric and Jewett, Mile, Miller Pacific Engineering Group. Geotechnical Investigation, San Geronimo Creek, North Marin Line (NML) Stabilization Project, Mill Valley. June 26, 2014.

J. DeBaker, Cassidy, M.A., Schultz, Erica, M.H.P, and McWaters, John, Garcia and Associates. Cultural Resources Inventory and Evaluation Report for the Marin Municipal Water District North Marin Line Stabilization Project. April 2016.

K. Federal Emergency Management Agency (FEMA). Flood Insurance Rate Map (FIRM), Marin County, California and Incorporated Areas, Flood Hazard Rate Map Community Panel No. 06041C0275D. May 4, 2009.

L. Marin County Assessor-Recorder.

M. Marin County. *Marin Countywide Plan*. November 6, 2007.

N. Marin County Zoning Ordinance.

O. Phillips, Josh, Pacific Biology. North Marin Line Stabilization Project Biological Evaluation Report. January 2016.

P. Woytek Zaborowski, Marin Municipal Water District. North Marin Line Stabilization Project Avenue Upper Tank and Slide Gulch Pump Station Replacement Project, Mill Valley, CA. July 2013.

Q. Zeng, Xiaoqing, Stetson Engineering, Inc. Hydraulic Analysis of San Geronimo Creek to Determine Water Surface Elevations at the Two Crossing Locations of MMWD's Raw Water Transmission Line. September 2015.

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North Marin Line Stabilization Project

Lagunitas

Initial Study/Mitigated Negative Declaration – Appendix A

Biological Evaluation Report

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NORTH MARIN LINE STABILZATION PROJECT
BIOLOGICAL EVALUATION REPORT

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TABLE OF CONTENTS

EXECUTIVE SUMMARY ii

1.0 INTRODUCTION 1

2.0 PROJECT LOCATION 1

3.0 PROJECT DESCRIPTION 1

4.0 METHODS 4

5.0 EXISTING BIOLOGICAL CONDITIONS 4
- **(i) Plant Communities and Habitats in Study Area** 5

6.0 SPECIAL-STATUS SPECIES 10
- **(i) Special-Status Plant Species** 10
- **(ii) Federally-Listed Wildlife Species** 10
- **(iii) Other Special-Status Wildlife Species** 19

7.0 JURISDICTIONAL RESOURCES 23

8.0 SENSITIVE PLANT COMMUNITIES 24

9.0 WILDLIFE MOVEMENT CORRIDORS 24

10.0 LITERATURE CITED 26

FIGURES:

Figure 1. Regional Location 2
Figure 2. Local CNDDB Map 9

EXECUTIVE SUMMARY

The Marin Municipal Water District (MMWD) is proposing to replace two existing water transmission pipeline crossings over San Geronimo Creek due to seismic concerns. The project has been designed to minimize potential impacts to sensitive biological resources - all construction activities will occur outside of the creek's top-of-bank and jurisdictional waters and wetlands will not be directly affected by the proposed project. Additionally, the existing concrete footings (located in the creek channel) will be left in place as to not cause disturbance to the creek and associated habitat for steelhead, coho salmon, and other special-status wildlife species.

The proposed project will be constructed outside of the nesting season of the northern spotted owl and avoidance measures will be implemented to protect other birds that could be nesting when the project commences in August 2016. Avoidance and minimization measures will also be implemented to address the unlikely event that California red-legged frog, foothill yellow-legged frog, or western pond turtle occurs in the construction/staging areas (which are located in upland habitats outside of the creek corridor). Roosting bats potentially present will also be protected through the implementation of avoidance and minimization measures.

1.0 INTRODUCTION

Pacific Biology conducted a biological habitat evaluation of the North Marin Line Stabilization project site, located in Marin County, California. The evaluation was conducted to identify and characterize onsite and surrounding habitats; to assess the potential of these habitats to support special-status plant and wildlife species; to identify wetlands, riparian areas, or other sensitive habitats present; to evaluate potential project-related impacts to sensitive biological resources; and to identify feasible mitigation and avoidance measures that could be implemented to protect sensitive biological resources.

2.0 PROJECT LOCATION

The project site includes two separate sites at two existing pipeline crossings of San Geronimo Creek in the unincorporated community of Lagunitas, within western central Marin County (**Figure 1**). Site 1 is located near 7440 Sir Francis Drake Boulevard and Site 2 is located near 7349 Sir Francis Drake Boulevard; the sites are approximately 0.2 mile apart from each other. Both sites are mapped on the San Geronimo U.S. Geological Survey (USGS) topographic quadrangle and are approximately five air miles from the Pacific Ocean coastline.

3.0 PROJECT DESCRIPTION

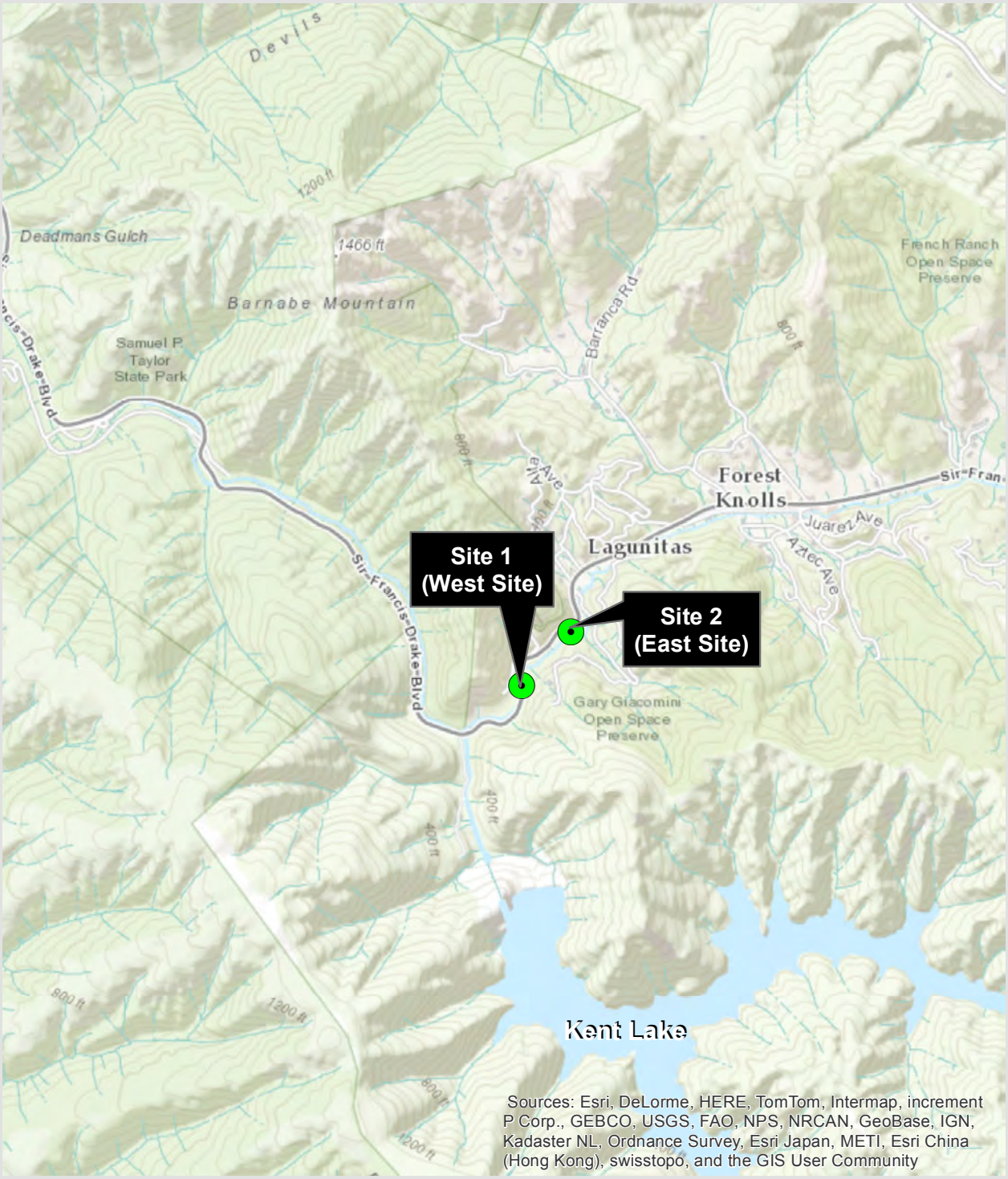
Background and General Project Description

The Marin Municipal Water District (MMWD) is proposing to replace two existing water transmission pipeline crossings over San Geronimo Creek. The North Marin Line (NML) was constructed in 1957 to convey water from MMWD's Kent Lake and Nicasio Reservoir to the San Geronimo Treatment Plant. The pipeline's alignment generally follows an old railroad grade.

The NML's two crossings of San Geronimo Creek are 34-inch American Concrete Cylinder Pipe (ACCP) pipe, with unrestrained bell and spigot joints. The pipe is supported on concrete trestles installed in the creek bottom. MMWD engineers have determined that the two crossings are seismically unsound in the event of a significant event, thereby jeopardizing the flow of water for treatment and subsequent distribution to the approximately 190,000 people who reside within MMWD's service boundaries.

The proposed project would replace the existing 34-inch ACCP trestle-supported pipeline crossings with 36-inch welded steel pipes installed within single span (without the need for mid-span trestle support) steel trusses.

FIGURE 1: REGIONAL LOCATION
North Marin Line Stabilization Project



Pacific Biology, January 2016

0 1 2 Miles

N W E S

Scale 1:40,000

The existing pipe emerges from the ground through the San Geronimo Creek banks, approximately 2-4-feet below the top of bank. The proposed replacement pipes would emerge from the ground approximately 10-feet back from the creek's top-of-bank. The new pipe segments would rise approximately 2-3-feet above the adjacent ground surface before crossing the creek. The intent of elevating the pipeline and steel truss' profile above the top-of-bank is to keep construction activities outside of the creek's top-of-bank.

The new pipes would be aligned with an offset several feet from the existing pipes. The offset is necessary to allow the new pipes to be installed without needing to first take the existing crossings out of service, except for the final tie-in of the new to the old pipeline.

Excavation

Excavation required for project implementation would include:

- Vertically drilling holes behind the top-of-bank for installation of pier foundations to support the ends of the steel trusses; and
- Excavation to expose the existing 34-inch ACCP pipe behind the top-of-bank to install pipe bends to bring the pipe out of the ground to the elevation necessary to ensure the pipe and steel trusses are above the projected 100-year storm flows of San Geronimo Creek.

In total the excavations are expected to produce approximately 20-cubic yards of material that would be hauled offsite for disposal.

Site Grading and Paving

The installation of the new pipe crossings would not require any general surface grading. There is no paving associated with the project.

Construction Staging

All construction and material staging would occur at the crossing sites and within MMWD's 60-foot wide pipeline easement. All construction activities would occur outside of the creek's top-of-bank and will utilize existing access roads.

Construction Duration and Phasing

The estimated construction time-frame is approximately four months, with construction projected to begin in August, 2016. The anticipated construction phases are:

- Install piers (outside of creek's top-of-bank) for new pipeline crossings;

- Install steel truss and new pipeline at each crossing;
- Connect new pipeline segments to the existing North Marin Line;
- Remove the existing pipeline segments; and
- General site clean-up.

4.0 METHODS

Database and Information Review

The latest version of the California Natural Diversity Database (CNDDB) was reviewed for the project area. The intent of the database review was to document all occurrences of special-status species in the project area and to determine their location relative to the project site. A species list was also obtained from the U.S. Fish and Wildlife Service of the federally listed species known from the project region. Biological survey reports provided by MMWD for salmonids and amphibians were also reviewed.

Field Survey

Josh Phillips, Principal Biologist of Pacific Biology, and Jake Schweitzer, Senior Botanist of Vollmar Natural Lands Consulting, conducted a reconnaissance-level field survey on November 17, 2015. The purpose of the field survey was to characterize the biological resources occurring on and near the project site and to evaluate the potential for special-status species to occur based on the suitability of habitat, known range and life history requirements of special-status species occurring in the region, and other factors.

A jurisdictional delineation was also conducted on November 17, 2015. The delineation was conducted in accordance with the U.S. Army Corps of Engineers' (Corps) 1987 and revised 2006 Arid West guidelines.

5.0 EXISTING BIOLOGICAL CONDITIONS

The project area consists of a mix of mostly natural forest habitats and low-density residential housing. San Geronimo Creek is bounded at both sites by Sir Francis Drake Boulevard, a major thoroughfare that connects the cities of eastern Marin County and greater Bay Area with the popular open space recreation areas of western Marin County.

San Geronimo Creek is a 6th order perennial stream within both sites. It flows southwest and joins Lagunitas Creek approximately 0.2 mile downstream (**Figure 2**) of the western-most site. Lagunitas Creek then flows northwest toward Tomales Bay, which ultimately discharges into the

Pacific Ocean. In the project area, San Geronimo Creek supports a mix of riparian trees and coast redwood/Douglas fir forest. These natural habitats are modified by an extensive understory of escaped horticultural plants associated with residential housing that abuts the stream.

(i) Plant Communities and Habitats on the Project Site

As previously discussed, all proposed construction activities would occur outside of the creek's top-of bank. However, given that the pipe would cross San Geronimo Creek, and because of the sensitivity of the creek habitats, a detailed discussion of the biological condition of portions of San Geronimo Creek on the project site is provided below.

San Geronimo Creek

Within both sites, similar plant communities occur within and adjacent to San Geronimo Creek. Both sites are within a coast redwood/Douglas fir forest, with coast redwood (*Sequoia sempervirens*), Douglas fir (*Pseudotsuga menziesii*), California bay (*Umbellularia californica*), and big-leaf maple (*Acer macrophyllum*) being the dominant tree species; these trees occur primarily above the active floodplain of the creek. Within the floodplain, both sites are fringed by riparian tree species, including red alder (*Alnus rubra*) and Oregon ash (*Fraxinus latifolia*).

The shrub and vine stratum is mostly along the upper banks of the stream, and features California hazelnut (*Corylus cornuta*) and several invasive species such as French broom (*Genista monspessulana*), Himalayan blackberry (*Rubus armeniacus*), English ivy (*Hedera helix*), and bigleaf periwinkle (*Vinca major*). The herb stratum is sparse below the ordinary high water mark, as most of the active channel and floodplain contain mostly un-vegetated gravel bars, cobbles, and boulders. However, some wetland vegetation occurs in the creek on gravel bars, with the most common herb species being panicled bulrush (*Scirpus microcarpus*), giant horsetail (*Equisetum telmateia* ssp. *Braunii*), dotted smartweed (*Persicaria punctata*), stinging nettle (*Urtica dioica*), and torrent sedge (*Carex nudata*). These wetland plants were interspersed with a lower cover of upland plants, presumably due to the very well-drained gravelly soils and likely in part as a result of the recent long-term drought in the region—the stream water depth and water table have been exceptionally low in recent years. Upland plants within and topographically above the wetlands include upright veldt grass (*Ehrharta erecta*), forget-me-not (*Myosotis latifolia*), fragrant bedstraw (*Galium triflorum*), and western swordfern (*Polystichum munitum*).

The onsite creek habitats provide excellent habitat for salmonids, with riffles, pools, and runs occurring in the immediate area. At the time of the survey, the deepest pools in immediate area were approximately 2-feet deep.

Representative Photo of Site 1 (East Site)



Representative Photo of Site 2 (West Site)



Equipment Staging and Construction Areas

All construction activities will occur outside of the creek's top of bank. At Site 1 (west site), this includes a small grassland area adjacent to Sir Francis Drake Blvd that is dominated by annual

grasses such as dogtail grass (*Cynosurus echinatus*) and big quaking grass (*Briza maxima*). This area borders riparian vegetation associated with San Geronimo Creek, such as Oregon ash, red alder, and big-leaf maple. Construction would also be staged from the west side of San Geronimo Creek along the old railroad grade easement; this area is within the surrounding coast redwood/Douglas fir forest and groundcover is generally absent. Construction equipment would access the west side of the creek at Site 1 via an existing unpaved access road (i.e., Cross Marin Tail and Park Road); no grading or vegetation removal is required along the access road.

Staging Area at Site 1 - Grassland Area



At Site 2 (east site) staging/construction activities will occur in a dirt parking area on the north side of San Geronimo Creek; this area is within the surrounding coast redwood/Douglas fir forest and groundcover is generally absent due to its use as a driveway/parking area. Staging/Construction activities would also occur from the access road on the south side of San Geronimo Creek; this access road would also be used for site access during construction. The access road is within the surrounding coast redwood/Douglas fir forest, but is graded and generally devoid of vegetation.

Staging Area at Site 2 - Access Road

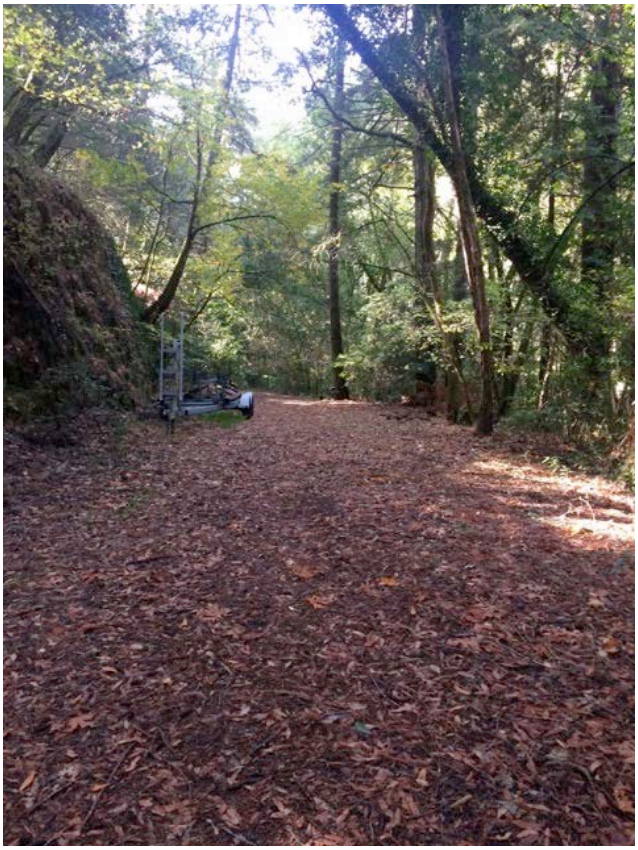


FIGURE 2: Local CNDDB Map
North Marin Line Stabilization Project

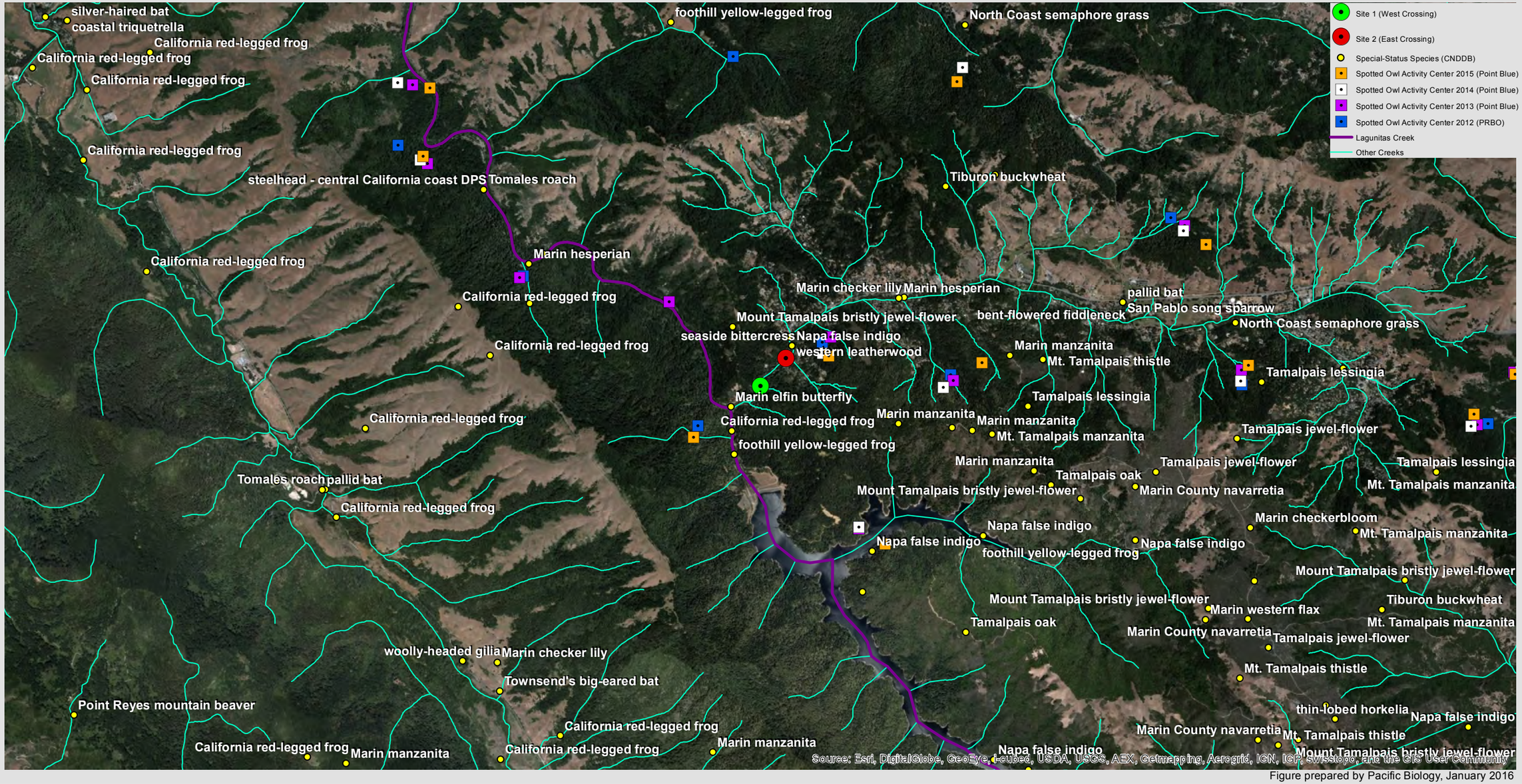


Figure prepared by Pacific Biology, January 2016

0 2 Miles

0 20,000 Feet

N
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S

6.0 SPECIAL-STATUS SPECIES

Figure 2 shows the location of special-status plant and wildlife species that have been documented by the CNDDB in the project area (i.e., within three miles of the project site). The potential occurrence of these and other locally special-status species on and near the project site is discussed below.

(i) Special-Status Plant Species

With the exception of the staging area on the west side of Site 1, all construction equipment would be operated from existing unpaved and graded access roads. These areas are generally devoid of vegetation and do not provide habitat suitable for locally occurring special-status plant species. The staging area on the east side of Site 1 is dominated by non-native grasses, such as dogtail grass and big quaking grass. This area does not contain habitat types associated with most local occurrences of rare plants (e.g., serpentinite, wetlands, native grasslands, coastal bluffs, chaparral). Additionally, western leatherwood [(*Dirca occidentalis*), CNPS Rare Plant Rank 1.B.2.], a perennial species known from the area that is associated with riparian habitats, was not observed during the field survey. Therefore, given the above, it is unlikely that special-status plant species occur in the project's disturbance boundary.

(ii) Federally-Listed Wildlife Species

A discussion of the federally-listed wildlife species known to occur in the project area is provided below. As discussed, the following federally-listed species are known to occur in the project area, and in the absence of avoidance measures, have potential to be affected by the proposed project: California red-legged frog, coho salmon, steelhead, and northern spotted owl. Avoidance and minimization measures are specified below to prevent harm to these species during construction activities.

California red-legged frog

Background Information

California red-legged frog (*Rana draytonii*) is a federally Threatened species and a California Species of Special Concern. The species occurs from sea level to elevations of 1,500 meters (5,200 feet). Breeding occurs in streams, deep pools, backwaters within streams and creeks, ponds, marshes, sag ponds, dune ponds, lagoons, and stock ponds. Breeding adults are often associated with deep (greater than 0.7 meter [2 feet]) still or slow moving water and dense, shrubby riparian or emergent vegetation (Hayes and Jennings 1988), but frogs have been

observed in shallow sections of streams and ponds that are devoid of vegetative cover. The species also utilizes non-aquatic habitats for refuge and dispersal. The species is known to rest and feed in riparian vegetation and it is believed that the moisture and cover of the riparian zone provides foraging habitat and facilitates dispersal. The species has also been documented dispersing through areas with sparse vegetative cover and dispersal patterns are considered to be dependent on habitat availability and environmental conditions (N. Scott and G. Rathbun *in litt*. 1998).

Status in Surrounding Project Vicinity

In 2009, ESA conducted a habitat assessment and protocol-level surveys for California red-legged frog in portions of Lagunitas Creek (between Shafter Bridge and Peters Dam) and in Cheda Creek and McIsaac Creek (both of which are tributaries to Lagunitas Creek); these surveys did not include San Geronimo Creek (which is a tributary to Lagunitas Creek). No California red-legged frogs were observed in Lagunitas Creek or in Cheda Creek, but a single adult California red-legged frog was observed in McIsaac Creek approximately 0.4 mile upstream of Lagunitas Creek. Based on the results of the surveys, ESA concluded that this frog was likely a transient individual from a nearby, though unknown, breeding location, and that California red-legged frogs did not breed in McIsaac Creek during the 2009 breeding season (ESA 2009). The location of the California red-legged frog occurrence in McIsaac Creek is approximately 3 air miles from the project site.

In May 2006, Eric Ettlinger (MMWD Aquatic Ecologist) observed a single adult California red-legged frog in Lagunitas Creek, approximately 200 feet downstream of Dog Creek (**Figure 2**); this location is approximately 0.4 mile from the project site. In September 2010, Mr. Ettlinger observed another adult California red-legged frog in Lagunitas Creek, approximately 500 feet downstream of Shafter Bridge. While breeding by California red-legged frogs has not been observed in Lagunitas Creek and its tributaries, the observation of solitary adult California red-legged frogs on three separate occasions suggests that breeding is occurring at an accessible but unknown location(s) and that Lagunitas Creek and its tributaries are at least occasionally used by dispersing California red-legged frogs. As shown in **Figure 2**, California red-legged frogs have also been documented in other locations in the project vicinity that do not have a direct hydrologic connection to the project site.

Status in San Geronimo Creek

San Geronimo Creek provides suitable habitat for California red-legged frogs. Given the presence of numerous pools, that protocol surveys for California red-legged frogs have not been conducted in San Geronimo Creek, and because individual California red-legged frogs have been observed in Lagunitas Creek and its tributaries, California red-legged frogs could occur in San Geronimo Creek.

Potential Project Impacts

Suitable habitat for California red-legged frog occurs within the creek zone of both Sites 1 and 2. However, as all construction activities would occur outside of the creek's top-of-bank, the creek and its banks would not be directly disturbed by construction activities. Additionally, as part of the proposed project, MMWD would implement standard erosion control measures to protect San Geronimo Creek. Therefore, the proposed project would not result in the loss or alteration of potential California red-legged frog habitat. Additionally, given that no work would occur in the creek zone, and that California red-legged frog has only rarely been observed in the Lagunitas Creek watershed, it is unlikely that a California red-legged frog would occur in the construction/staging areas (which includes unpaved access roads and a small grassland area). However, given the rarity of the species, avoidance measures will be implemented to ensure that the species is not harmed during construction activities.

Recommended Avoidance and Mitigation Measures

BIO-1A: A qualified biologist shall conduct a biological resources sensitivity training for all on-site construction personnel. Focuses of the training will include California red-legged frog, steelhead, coho salmon, California freshwater shrimp, western pond turtle, and foothill yellow-legged frog. Training components will include training on appropriate avoidance methods including species identification, daily pre-construction surveys, the importance of protecting creek habitats, and protocols for contacting the appropriate personnel in the event of a sighting. Handouts will be prepared and provided to all construction personnel including color photographs for species identification, protocols, and contact phone numbers.

Following the completion of the training, a member of the construction team will be appointed to serve as the biological monitor and to conduct daily clearance surveys for sensitive wildlife species. As necessary, additional training will be

provided to the appointed monitor on how to conduct the daily clearance survey and the procedures to implement in the event that a sensitive wildlife species is observed. Construction activities will be immediately halted should a federally listed species occur within the construction area.

BIO-1B: A qualified biologist will conduct a preconstruction clearance survey for California red-legged frog and other special-status wildlife species immediately before the commencement of construction activities. The survey area will include the construction/staging areas and adjacent areas. Construction activities will not commence until the construction/staging areas are found to be clear of special-status wildlife. The USFWS will be immediately contacted in the event that a federally listed species is observed in the project's disturbance footprint.

Significance After Implementation of Avoidance Measures

The implementation of the above avoidance measure would ensure that California red-legged frogs are not disturbed during construction activities.

Coho Salmon

Background Information

Coho salmon (*Oncorhynchus kisutch*), Central California Coast ESU, is a federally and state Endangered species. Coho salmon migrate up and spawn mainly in streams that flow directly to the ocean or that are tributaries of large rivers. Spawning migrations begin after heavy late fall or winter rains. In short coastal streams of California, most coho return in mid-November through mid-January (Moyle 2002). Females typically choose a spawning site near the head of a riffle, just below a pool, where water changes from smooth to turbulent flow and there is abundant medium to small gravel (ibid). Embryos hatch after 8-12 weeks of incubation, and hatchlings remain in the gravel until their yolk sacs have been absorbed, 4-10 weeks after hatching. Juvenile coho are generally at highest densities in deep (>1m) pools with plenty of overhead cover, especially in summer, but they use a wide variety of habitats if cover, depths, temperatures, and velocities are appropriate (ibid). Juveniles generally stay in freshwater habitats for one year and out-migration to the ocean generally peaks in late April to mid-May (ibid).

Status in Surrounding Project Vicinity

Annual juvenile salmonid and salmonid spawner surveys have been conducted in the Lagunitas Creek watershed since 1995 and annual smolt surveys have been conducted since 2006. The juvenile and spawner surveys have been conducted by MMWD biologists; the smolt surveys have been conducted by MMWD biologists as well as biologists from Stillwater Sciences, the California Department of Fish and Wildlife, National Park Service, and the Salmon and Watershed Protection Network.

Coho salmon are known to occur in the mainstem of Lagunitas Creek and its tributaries, including San Geronimo Creek, Devils Gulch, Olema Creek, and Cheda Creek (MMWD 2015). The salmonid surveys regularly conducted by MMWD include San Geronimo Creek (including the portion of the creek on the project site).

Status on Project Site

Coho (adult and juvenile) are known to occur in San Geronimo Creek and suitable spawning and rearing habitat occurs in the immediate project area. In the 2014-2015 spawning season, a total of 146 coho redds were observed during spawner surveys in the Lagunitas Watershed; twenty-five (25)% of these redds were observed in San Geronimo Creek (MMWD 2015).

Potential Project Impacts

Suitable coho spawning and rearing habitat occurs in the immediate vicinity of both Sites 1 and 2. However, as all construction activities would occur outside of the creek's top-of-bank, the creek and its banks would not be directly disturbed by construction activities. Additionally, as part of the proposed project, MMWD would implement standard erosion control measures to protect San Geronimo Creek. Therefore, the proposed project would not result in the loss or alteration of coho habitat. Additionally, given that no work would occur in the creek zone, no coho would be directly harmed by construction activities. For these reasons, the proposed project is not expected to harm or otherwise adversely affect coho.

Recommended Avoidance and Mitigation Measures

No additional avoidance and mitigation measures are required.

Steelhead

Background Information

Steelhead (*Oncorhynchus mykiss*), Central California Coast ESU, is a federally Threatened species. Steelhead are the anadromous form of *O. mykiss*. *O. mykiss* have a highly flexible life history and may follow a variety of life-history patterns including freshwater residents (non-migratory) at one extreme and individuals that migrate to the open ocean (anadromous) at another extreme. Intermediate life-history patterns include fish that migrate within the stream (potamodromous), fish that migrate only as far as estuarine habitat, and fish that migrate to near-shore ocean areas. California winter steelhead enter coastal streams during December-March, and summer steelhead seem to enter streams as flows taper off in spring and spawn the following winter (Moyle 2002). The female digs a redd in the coarse gravel of the tail of a pool or in a riffle. After spawning, spent steelhead often move gradually downstream and occupy pools for periods of time during the downstream migration (Moyle 2002). Juveniles may occupy riffles, runs, and pools.

Status in Project Vicinity

Steelhead are known to occur in the mainstem of Lagunitas Creek and its tributaries, including San Geronimo Creek, Devils Gulch, Olema Creek, and Cheda Creek (MMWD 2015). The salmonid surveys regularly conducted by MMWD include San Geronimo Creek (including the portion of the creek on the project site).

Status on Project Site

Steelhead (adult and juvenile) are known to occur in San Geronimo Creek and suitable spawning and rearing habitat occurs in the immediate project area. In the 2014-2015 spawning season, a total of 167 steelhead redds were observed during spawner surveys in the Lagunitas Watershed; twenty-six (26)% of these redds were observed in San Geronimo Creek (MMWD 2015).

Potential Project Impacts

Suitable steelhead spawning and rearing habitat occurs in the immediate vicinity of both Sites 1 and 2. However, as all construction activities would occur outside of the creek's top-of-bank, the creek and its banks would not be directly disturbed by construction activities. Additionally, as part of the proposed project, MMWD would implement standard erosion control measures to protect San Geronimo Creek. Therefore, the proposed project would not result in the loss or

alteration of steelhead habitat. Additionally, given that no work would occur in the creek zone, no steelhead would be directly harmed by construction activities. For these reasons, the proposed project is not expected to harm or otherwise adversely affect steelhead.

Recommended Avoidance and Mitigation Measures

No additional avoidance and mitigation measures are required.

Northern Spotted Owl

Background Information

The northern spotted owl (*Strix occidentalis caurina*) is a federally Threatened species and a California Species of Special Concern. Northern spotted owls generally inhabit older forested habitats because they contain the structural characteristics required for nesting, roosting, and foraging. Specifically, northern spotted owls require a multi-layered, multi-species canopy with moderate to high canopy closure. The stands typically contain a high incidence of trees with large cavities and other types of deformities; large snags (standing dead trees); an abundance of large, dead wood on the ground; and open space within and below the upper canopy for spotted owls to fly. In redwood forests along the coast range of California, northern spotted owls may be found in younger forest stands that contain structural characteristics of older forests.

Status in Surrounding Project Area

The Marin County population of northern spotted owl, located at the southern limit of the species' range, is one of the densest documented populations. Much of the local forest was logged 50-100 years ago and is now re-growing in permanent public ownership. Based on the CNDDB and survey data collected by Point Blue Conservation Science, there are numerous spotted owl territories in the surrounding area (**Figure 2**). The closest of these documented territories is approximately 0.2 mile east of Site 2 and 0.4 mile east of Site 1. There is another documented activity center located approximately 0.4 mile southwest of Site 1 and 0.6 mile southwest of Site 2. However, given the presence of suitable habitat, it is possible that a spotted owl activity center or nest location could occur closer to project site.

Status in Study Area

Coast redwood/Douglas fir forest occurs on and surrounding the project site. In general, the onsite and nearby forest habitats are mature and contain large snags, dead wood on the ground, and other characteristics associated with northern spotted owl occurrences in Marin County.

Therefore, the species could nest onsite or in nearby areas, or the site could be part of an activity center.

Potential Project Impacts

Northern spotted owl activity centers occur in the project vicinity and suitable nesting and foraging habitat occurs on the project site. No tree removal is required, and therefore, a northern spotted owl nest would not be directly disturbed. However, construction-related activities would temporarily elevate noise levels in areas on and surrounding the construction zones. Therefore, should a northern spotted owl nest within 0.25 mile of the project site (including all site access roads to be used), depending on the timing and magnitude of construction-related noise, nesting by the species could be disrupted.

Recommended Avoidance Measures

Measure 2: All work may be conducted during the period of August 1 though January 31, which is outside of the northern spotted owl nesting season. Alternatively, MMWD shall commission two surveys for nesting northern spotted owls during the months of April and May preceding the commencement of construction. At a minimum, the survey area shall include all suitable nesting habitats within 0.25 mile of the project site. If, following the first or second survey it can be conclusively determined that there are nesting northern spotted owls, construction activities that are within 0.25-mile of an identified active nest shall not begin prior to August 1 unless the young have fledged, at which time construction or staging may begin no earlier than July 10. Regardless of nesting locations, construction shall conclude no later than January 31 (prior to the beginning of the mating and nesting season).

Significance After Implementation of Avoidance Measures

The implementation of the above avoidance measure would ensure that an active northern spotted owl nest is not disturbed during construction activities.

California freshwater shrimp

Background Information

California freshwater shrimp (*Syncaris pacifica*) is a state and federally Endangered species. The species is found along the edges of stream pools, in areas away from the main current, where there are often undercut banks, and exposed riparian tree roots.

Status in Surrounding Project Area

Annual freshwater shrimp surveys have been conducted by Larry Serpa in Lagunitas Creek since 1996. California freshwater shrimp are known to occur in the mainstem of Lagunitas Creek, but in recent years have only been found in Lagunitas Creek near and downstream of Devil's Gulch. As of 2010, none had been found in sample sites between Shafter Bridge and the main entrance to Samuel P. Taylor State Park (Serpa 2009 and 2010).

Status on Project Site

California freshwater shrimp are not known to occur in San Geronimo Creek. The species is known to occur in Lagunitas Creek, but in more recent years has not been documented in the vicinity of San Geronimo Creek. However, as the species occurs in the mainstem of Lagunitas Creek, it is possible that freshwater shrimp could occur in its larger tributaries, including the portion of San Geronimo Creek on and near the project site.

Potential Project Impacts

California freshwater shrimp have potential to occur in the portion of San Geronimo Creek on and near the project site. However, as all construction activities would occur outside of the creek's top-of-bank, the creek and its banks would not be directly disturbed by construction activities. Additionally, as part of the proposed project, MMWD would implement standard erosion control measures to protect San Geronimo Creek. Therefore, the proposed project would not result in the loss or alteration of potential freshwater shrimp habitat. Additionally, given that no work would occur in the creek zone, no freshwater shrimp would be directly harmed by construction activities. For these reasons, the proposed project is not expected to harm or otherwise adversely affect California freshwater shrimp.

Recommended Avoidance Measures

No additional avoidance and mitigation measures are required.

(iii) Other Special-Status Wildlife Species

Western pond turtle (*Actinemys marmorata*) is a California Species of Special Concern. This turtle primarily inhabits aquatic habitats, including ponds, slow moving streams, lakes, marshes, and canals. The species frequently basks on logs or other objects out of the water. Western pond turtles also require upland oviposition (i.e., egg laying) sites in the vicinity (typically within 200 meters, but as far as 400 meters) of the aquatic site. Mating typically occurs in late April or early May and most oviposition occurs during May and June, although some individuals may deposit eggs as early as late April and as late as early August (Rathbun et al. 1993).

Based on the CNDDB, there are no documented occurrences of western pond turtles in San Geronimo Creek. However, pond turtles have been observed in Lagunitas Creek basking on woody debris in the creek at Swimming Hole Bridge in Samuel P. Taylor Park (Ettlinger pers. comm. 2010). Given the presence of suitable habitat, western pond turtles could occur in San Geronimo Creek, including portions of the creek on and near the project site. All construction activities would occur outside of the creek's top-of-bank, and the creek and its banks would not be directly disturbed by construction activities. Additionally, as part of the proposed project, MMWD would implement standard erosion control measures to protect San Geronimo Creek. Therefore, the proposed project would not result in the loss or alteration of potential western pond turtle habitat. While no work would occur in the creek zone, there is some potential that a western pond turtle could occur in the project staging/construction areas. Therefore, the proposed project could result in the harm of a pond turtle(s).

Recommended Avoidance Measures

See BIO-1A and BIO-1B above. No additional avoidance and mitigation measures are required.

Extent of Impact Following Implementation of Avoidance/Mitigation Measures

The implementation of the above measures would ensure that individual western pond turtles are not harmed during construction activities.

Foothill yellow-legged frog (*Rana boylii*) is a California Species of Special Concern. The species is characteristically found close to water in association with perennial streams and ephemeral creeks that retain perennial pools through the end of summer. Adults preferentially utilize shallow edgewater areas with low water velocities for breeding and egg laying, usually characterized by gravel, cobble, and boulder substrate. Juvenile and non-breeding adult frogs

may be found adjacent to riffles, cascades, main channel pools, and plunge-pools that provide escape cover.

Based on the CNDDB, there is a historic record from 1956 of foothill yellow-legged frog in Lagunitas Creek, from a location near Peters Dam (Occurrence #120). The closest known population of foothill yellow-legged frogs is from Big Carson Creek (approximately 2.5 miles from the project site). Given the presence of suitable habitat and that foothill yellow-legged frog has historically occurred in the project area, the species could occur in San Geronimo Creek, including the portion of the creek on and near the project site.

All construction activities would occur outside of the creek's top-of-bank, and therefore, the creek and its banks would not be directly disturbed by construction activities. Additionally, as part of the proposed project, MMWD would implement standard erosion control measures to protect San Geronimo Creek. Therefore, the proposed project would not result in the loss or alteration of potential foothill yellow-legged frog habitat. Additionally, given that no work would occur in the creek zone, and because the species generally does not move far from water, it is unlikely (but not impossible) that foothill yellow-legged frogs would be directly harmed by construction activities. For these reasons, there is a low potential that the proposed project could harm foothill yellow-legged frog.

Recommended Avoidance Measures

See BIO-1A and BIO-1B above. No additional avoidance and mitigation measures are required.

Extent of Impact Following Implementation of Avoidance/Mitigation Measures

The implementation of the above measures would ensure that individual foothill yellow-legged frogs are not harmed during construction activities.

Tomales roach (*Lavinia symmetricus* ssp.) is a California Species of Special Concern that is restricted to tributaries of Tomales Bay. Based on the CNDDB (Occurrence #2), the fish species has been documented in Lagunitas Creek, and therefore, could also occur in San Geronimo Creek. However, as all construction activities would occur outside of the creek's top-of-bank, the creek and its banks would not be directly disturbed by construction activities. Additionally, as part of the proposed project, MMWD would implement standard erosion control measures to protect San Geronimo Creek. Therefore, the proposed project would not result in the loss or alteration of potential Tomales roach habitat. Additionally, given that no work would occur in the creek zone, no Tomales roach would be directly harmed by construction activities. For these

reasons, the proposed project is not expected to harm or otherwise adversely affect Tomales roach.

Recommended Avoidance Measures

No measures are required.

Pallid bat (*Antrozous pallidus)* is a California Species of Special Concern. This and other tree roosting bat species could use trees on and near the project site for roosting with suitable cavities, crevices, exfoliating bark and/or bark fissures. The proposed project does not include the removal of any trees. However, should an active bat roost be present near a construction area, depending on the extent and magnitude of construction-related noise, roosting by bats could be disrupted.

Recommended Avoidance Measures

Measure 3: A qualified biologist shall conduct a roosting bat habitat evaluation prior to the commencement of construction activities. The evaluation shall determine which (if any) trees near the work sites provide potential bat roosting habitat. If suitable roost trees are identified, then potential project-related impacts to use of these trees by roosting bats will be evaluated taking into consideration the following: (1) the project timing; (2) spatial and temporal aspects of potential noise/vibration impacts; and (3) susceptibility of each potential roost tree to disturbance given its specific location and other characteristics. If it is determined that roosting bats could be disturbed, then a site-specific bat protection plan shall developed by the qualified biologist to prevent disturbance of an active maternity or hibernation roost; the plan would be subject to California Department of Fish and Wildlife (CDFW) approval.

Extent of Impact Following Implementation of Avoidance/Mitigation Measures

The implementation of the above measure would ensure that an active bat roost is not disturbed.

Marin hesperian (*Vespericola marinensis)* is included on the CDFW Special Animals List. This mollusk is found in moist spots in coastal brush fields and chaparral vegetation, and under leaves of cow parsnip, around spring seeps, in leaf mold, and in alder and mixed evergreen forest. The CNDDB contains an occurrence of this species from Lagunitas Creek, approximately 1.5 miles northwest of the project site. The collection date of the specimen is not indicated. All

construction activities would occur outside of the creek's top-of-bank, and the creek and its banks would not be directly disturbed by construction activities. Additionally, no seeps are present in the construction/staging areas. Therefore, suitable habitat for this species would not be impacted by the proposed project.

Recommended Avoidance Measures

No measures are required.

Point Reyes mountain beaver (*Aplodontia rufa phaea*) is a California Species of Special Concern. This species is only known to occur in western Marin County, almost entirely within Point Reyes National Seashore where it is found on cool, moist, north-facing slopes in moderately dense coastal scrub. This scrub vegetation typically includes coyote brush as well as sword fern, bracken fern, poison oak, California nettle, and cow parsnip, which tend to grow in the moister areas. The project site does not contain the habitat type (*i.e.,* coastal scrub) associated with most occurrences of Point Reyes mountain beaver and there are no documented occurrences of the species within approximately 5 miles of the project site. Therefore, this species is not expected to occur and would not be impacted by the proposed project.

Recommended Avoidance Measures

No measures are required.

Marin elfin butterfly (*Callophrys mossi marinensis*) is included on the CDFW Special Animals List. This species generally occurs on north-facing slopes near redwood forests. Based on the CNDDB, one specimen has been recorded from the Mt. Tamalpais watershed in 1971, at the confluence of Lagunitas Creek and San Geronimo Creek. The larval host plant is stonecrop (*Sedum spathulifolium*). Stonecrop was not observed during the site survey. Stone/rock outcrops, which are generally associated with occurrences of the plant, were also not observed in areas to be disturbed by the project. For these reasons, Marin elfin butterfly would not be impacted by the proposed project.

Recommended Avoidance Measures

No measures are required.

Active Bird Nests. The forest habitat on and surrounding the project site provides suitable nesting habitat for numerous bird species. Active nests of most native bird species are protected by the Migratory Bird Treaty Act and/or the California Fish and Game Code. Any required tree

removal could result in the loss of an active bird nest. Additionally, an active nest near the project site could be adversely affected by construction-related noise.

Recommended Avoidance Measures

Measure 4: If construction activities will commence anytime during the nesting/breeding season of native bird species potentially nesting on the site (typically February through August in the project region), a pre-construction survey for nesting birds will be conducted by a qualified biologist within two weeks of the commencement of construction activities.

If active nests are found in areas that could be directly affected or are within 300 feet of construction and would be subject to prolonged construction-related noise, a no-disturbance buffer zone should be created around active nests during the breeding season or until a qualified biologist determines that all young have fledged. The size of the buffer zones and types of construction activities restricted within them should be determined through taking into account factors such as the following:

- Noise and human disturbance levels at the construction site at the time of the survey and the noise and disturbance expected during the construction activity;
- Distance and amount of vegetation or other screening between the construction site and the nest; and
- Sensitivity of individual nesting species and behaviors of the nesting birds.

Extent of Impact Following Implementation of Avoidance/Mitigation Measures

The implementation of the above measure would ensure that active bird nests of common and special-status species are not harmed during repair activities.

7.0 JURISDICTIONAL RESOURCES

Wetlands, creeks, streams, and permanent and intermittent drainages are subject to the jurisdiction of the U.S. Army Corps of Engineers (ACOE) under Section 404 of the Federal Clean Water Act (CWA). The California Department of Fish and Wildlife (CDFW) also generally has jurisdiction over these resources, together with other aquatic features that provide an existing fish and wildlife resource pursuant to Sections 1602-1603 of the California Fish and Game Code. The

CDFW asserts jurisdiction to the outer edge of vegetation associated with a riparian corridor. Creeks and wetlands are also subject to regulation of the Regional Water Quality Control Board (RWQCB) under both the federal CWA and the State of California's Porter-Cologne Water Quality Control Act (California Water Code, Division 7).

Vollmar Natural Lands Consulting conducted a jurisdictional delineation on November 17, 2015 (VNLC 2015). The delineation identified the extent of ACOE, CDFW, and RWQCB jurisdiction on and bordering the project site. All construction activities would occur outside of the creek's top-of-bank, and no fill or disturbance is proposed to habitats under the jurisdiction of the ACOE, CDFW, or RWQCB. The existing footings for the exiting pipe (located in the creek channel) will be left in place and no removal of riparian vegetation is anticipated. Therefore, no impacts to jurisdictional resources will occur.

Recommended Avoidance Measures

No measures are required.

8.0 SENSITIVE PLANT COMMUNITIES

Sensitive plant communities are communities that are of limited distribution statewide or within a county or region and are often vulnerable to environmental effects of projects. These communities may or may not contain special-status species or their habitat. The most current version of the CDFW's *List of California Terrestrial Natural Communities* indicates which natural communities are of special status given the current state of the California classification. The project site is located within a redwood/Douglas fir forest; redwood forest is considered to be sensitive plant community (Rank S3). However, the proposed project would not result in the loss of redwood forest habitat. Additionally, no removal of riparian vegetation is anticipated. Therefore, sensitive plant communities will not be affected by the proposed project.

Recommended Avoidance Measures

None required.

9.0 WILDLIFE MOVEMENT CORRIDORS

Wildlife corridors are described as pathways or habitat linkages that connect discrete areas of natural open space otherwise separated or fragmented by topography, changes in vegetation, and other natural or manmade obstacles such as urbanization. San Geronimo Creek is expected to be used by various wildlife species, including mammals, reptiles, amphibians, and fish, as a movement corridor. The proposed project includes the replacement of a water pipe and does not

include the placement of any structures that would obstruct wildlife movement. Additionally, construction activities would occur during daylight hours, and therefore would not interfere with wildlife movement primarily occurring at night.

Recommended Avoidance Measures

No measures are required.

10.0 LITERATURE CITED

California Natural Diversity Data Base (CNDDB). 2015. California Department of Fish and Game's CNDDB Records for Marin County.

ESA 2009. Environmental Science Associates, 2009. California Red-Legged Frog Protocol Level Survey Report, prepared for the Marin Municipal Water District. 2009 Road Drainage Improvement Projects. August 2009.

Ettlinger. E. 2010a. Personal Communication, December 2010. As reported in the Lagunitas Water Quality and Habitat Improvements Project Initial Study/Mitigated Negative Declaration.

Ettlinger. E. 2010b. Personal Communication, December 2010. As reported in the Lagunitas Water Quality and Habitat Improvements Project Initial Study/Mitigated Negative Declaration.

Hayes, M.P. and M.R. Jennings. 1988. *Habitat correlates of distribution of the California red-legged frog (Rana aurora draytonii) and the foothill yellow-legged frog (Rana boylii)*: Implications for management.

Marin Municipal Water District (MMWD). 2011. Lagunitas Water Quality and Habitat Improvements Project, Initial Study/Mitigated Negative Declaration.

Marin Municipal Water District (MMWD) 2015. Adult Salmonid Monitoring in the Lagunitas Creek Watershed 2014-2015.

Moyle, P.B. 2002. *Inland fishes of California*. University of California Press, Berkeley, CA.

Scott, N. G. and Rathbun 1998. *Comments on working draft of California Red-legged Frog Recovery Plan*.

Serpa Larry. 2010. 2009 Survey of the California freshwater shrimp (Syncaris pacifica) in Lagunitas Creek, Marin County, California. Prepared for Marin Municipal Water District. Prepared by Larry Serpa. 26 pp

Rathbun, G.B., M.R. Jennings, T.G. Murphey, and N.R. Siepel. 1993. *Status and Ecology of Sensitive Aquatic Vertebrates in Lower San Simeon and Pico Creeks, San Luis Obispo County, California*. Prepared for the California Department of Parks and Recreation. San Simeon, CA: U.S. Fish and Wildlife Service, National Ecology Research Center.

North Marin Line Stabilization Project

Lagunitas

Initial Study/Mitigated Negative Declaration – Appendix B

Cultural Resources Inventory and Evaluation Report

The Cultural Resources Inventory and Evaluation Report for the Marin Municipal Water District North Marin Line Stabilization Project identifies the locations of cultural resources, which are confidential. As nonrenewable resources, archaeological sites can be significantly impacted by disturbances that can affect their cultural, scientific, and artistic values. Disclosure of this information to the public may be in violation of both federal and state laws. To discourage damage resulting from vandalism and artifact looting, cultural resources locations are kept confidential and the report's distribution restricted. Applicable U.S. laws include, but are not be limited to, Section 304 of the National Historic Preservation Act (16 USC 470w-3) and California state laws that apply include, but are not be limited to, Government Code Sections 6250 et seq. and 6254 et seq.

North Marin Line Stabilization Project

Lagunitas

Initial Study/Mitigated Negative Declaration – Appendix C

Geotechnical Investigation

MILLER PACIFIC ENGINEERING GROUP

June 26, 2014
File: 187.491altr.doc

Marin Municipal Water District
220 Nellen Avenue
Corte Madera, California 94925-1169

Attn: Mr. Woytek Zaborowski, P.E.

Re: Geotechnical Investigation
San Geronimo Creek
North Marin Line (NML) Stabilization Project
Lagunitas, California

Introduction

This letter summarizes the results of our Geotechnical Investigation for the planned San Geronimo Creek/North Marin Line (NML) Stabilization project in Lagunitas, California. The project consists of replacing 2 separate crossings of San Geronimo Creek near 7440 ("western crossing") and 7349 Sir Francis Drake Boulevard ("eastern crossing"), as shown on Figure 1, where the North Marin Line exists within an abandoned railroad right-of-way. The purpose of our services is to evaluate existing geologic and geotechnical conditions and prepare geotechnical recommendations and criteria for use in project planning and design.

The scope of our services is described in our proposal letter dated April 7, 2014, and includes review of readily available geotechnical and geologic reference material, subsurface exploration, laboratory testing, engineering analysis, and preparation of this report. Issuance of our report completes our Phase 1 scope of services. Future phases of work may include plan review, consultation, and construction observation and testing.

Project Description

The project includes replacement of 2 existing trestle structures which support an existing 34-inch American concrete cylinder pipe (ACCP) transmission pipeline across San Geronimo Creek just west of Lagunitas. Preliminary plans indicate that the new trestle structures will place the pipe crossing at higher elevation to clear the anticipated 100-year flood elevation, and existing ACCP pipe segments will be replaced with new 36-inch welded steel pipe. Preliminary plans by MMWD show that new trestles will span the creek at each location, with no intermediate bents. Ancillary work is anticipated to be limited to demolition or abandonment of existing trestles and restoration of any improvements disturbed during construction.

The project team currently includes Marin Municipal Water District (Owner) and ZFA Structural Engineers.

Surface Conditions

The project site is located at the extreme western end of San Geronimo Valley, in a relatively narrow canyon bounded to the north and south by steep ridges rising to elevations of over 1,000-feet MSL. The existing transmission pipeline runs approximately east-west within an

MMWD easement along an abandoned, generally relatively level railroad grade, with 2 separate creek crossings to be reconstructed as part of this project.

The western crossing will be located within the MMWD easement across private property at 7440 Sir Francis Drake Boulevard. Access to the left (south) abutment location is provided by a private vehicle bridge, while the right (north) abutment site is accessible via a chain-link gate at the edge of Sir Francis Drake Boulevard. Adjacent creekbanks are about 20-feet high, inclined at approximately 1.25:1 (south abutment) to 2:1 (north abutment), and heavily overgrown with low grasses, weeds, thistle, and mature redwood and bay trees. Exposed soils typically include clayey and gravelly alluvial and residual soils, with weathered greenstone exposed along the waterline at the base of both creekbanks, as well as within the channel itself. Existing improvements within the MMWD easement are limited to the existing 34-inch water line, although a small shed and some miscellaneous stored or abandoned vehicles and equipment exist near the north abutment.

The eastern crossing is also located within the MMWD easement across private property. The right (southwest) abutment will be located at the end of a portion of abandoned railroad grade currently serving as a private driveway to the residence at 7359 Sir Francis Drake Boulevard. The abutment will be located several hundred feet beyond the residence to the east. The left (northeast) abutment will be located adjacent to the private driveway at 7349 Sir Francis Drake Boulevard, and will be located within a dense grove of mature redwood trees. Adjacent creekbanks at both abutment locations are about 20-feet high and inclined at about 1.5:1. Banks below the right abutment expose weathered greenstone bedrock, while banks near the northeast abutment expose sandy and clayey alluvial soils. Improvements at the southwest abutment location are generally limited to a small iron pipe overhanging the creekbank (possible overflow or pressure-relief?) and a set of wooden stairs accessing the channel. Improvements at the northeast abutment include the private gravel driveway and a wooden privacy fence in front of the adjacent residence.

Regional Geology

The project site lies within the Coast Ranges geomorphic province of California. Regional topography within the Coast Ranges province is characterized by northwest-southeast trending mountain ridges and intervening valleys that parallel the major geologic structures, including the San Andreas Fault System. The province is also generally characterized by abundant landsliding and erosion, owing in part to its typically high levels of precipitation and seismic activity.

The oldest rocks in the region are the sedimentary, igneous, and metamorphic rocks of the Mesozoic-age (225- to 65-million years old) Franciscan Assemblage. Within Marin County, a variety of sedimentary and volcanic rocks of Tertiary (1.8- to 65-million years old) and Quaternary (less than 1.8-million years old) age locally overlie the basement rocks of the Franciscan Assemblage. Tectonic deformation and erosion during late Tertiary and Quaternary time (the last several million years) formed the prominent coastal ridges and intervening valleys typical of the Coast Ranges province. The youngest geologic units in the region are Quaternary-age (last 1.8 million years) sedimentary deposits, including alluvial deposits which partially fill most of the valleys and colluvial deposits which typically blanket the lower portions of surrounding slopes.

Regional geologic mapping[1] indicates the majority of the project site, including both abutment locations at the western crossing and the right (west) abutment of the eastern crossing, is underlain by greenstone bedrock of the Franciscan Complex. Greenstone is a metamorphic rock derived from oceanic basalt which typically exhibits a characteristic dark green to black color where fresh but may be mottled red, brown, or purple where weathered. Fresh rock is typically very hard and strong, while deep weathering results in swelling, clay-rich soils. Remaining portions of the project site, including the left (east) abutment of the eastern crossing, are shown as being underlain by alluvial soils. Alluvium typically consists of relatively unconsolidated, moderately-sorted clay, silt, sand, and gravel deposited in stream channel, terrace, or floodplain environments. A regional geologic map is presented on Figure 3.

Subsurface Exploration and Laboratory Testing

Subsurface exploration at the site consisted of 4 exploratory borings excavated on May 19 and 20, 2014 at the approximate locations shown on Figure 2. Borings were excavated by use of a track-mounted CME-55HT drill rig equipped variously with 4- and 6-inch solid continuous flight augers, 8-inch hollow-stem continuous flight augers, and an HQ-size (2.5-inch insides diameter) wireline rock-coring system. Materials encountered were logged by our Field Geologist and select samples retained for laboratory testing. A brief explanation of the terms and methods used to log materials encountered is presented on Figures A-1 and A-2, Soil and Rock Classification Charts, respectively. Exploratory boring logs are shown on Figures A-3 through A-10.

Laboratory testing included determination of moisture content, dry density, and unconfined compressive strength in general accordance with applicable ASTM procedures. Laboratory test results are presented on the boring logs, and the subsurface exploration and laboratory testing program is discussed in further detail in Appendix A.

Subsurface Conditions

The results of our subsurface exploration generally confirm the regionally-mapped geology. Each of the 4 abutment locations is underlain by variable thicknesses of fill, colluvial, alluvial, and/or residual soils over weathered greenstone bedrock.

Boring 1, located near the planned left (south) abutment at the western trestle location, was drilled with 4-inch solid flight augers and encountered about 6-feet of fill soils composed of medium-dense clayey sand underlain by about 13-feet of colluvial and residual soils composed of medium-stiff clay with gravel and sandy clay with gravel (rock fragments), respectively. At a depth of about 19-feet, Boring 1 encountered hard, strong, crushed, and highly weathered greenstone bedrock. Greenstone rock extended to a depth of 25-feet, 1-inch, where Boring 1 was terminated due to auger and sampler refusal.

Boring 2 was located near the planned right (north) abutment at the western trestle location, and was drilled using 6-inch solid flight augers. Boring 2 encountered about 1.5-feet of coarse, angular, cobble-size greenstone and sandstone fragments, interpreted as old rail ballast.

[1] Smith, T.C. (1976), "Geology of the San Geronimo Valley Area, Marin County, California" *in* Geology for Planning in Central and Southeastern Marin County, California, California Department of Conservation, Division of Mines and Geology Open-File Report 76-2, Plate 1A, Map Scale 1:12,000.

Beneath the ballast, Boring 2 encountered 6-feet of alluvium (point bar or channel deposits) consisting of loose sandy gravel with clay, underlain by floodplain or overbank alluvium composed of medium stiff sandy clay. Due to caving and raveling of the loose sandy gravel unit while trying to sample at a depth of 10-feet, 8-inch hollow-stem augers were utilized below 10-feet. Hard, strong, moderately to highly weathered greenstone bedrock was encountered at a depth of about 18-feet, and Boring 2 was terminated at a maximum explored depth of 26.5-feet due to auger refusal.

Boring 3 was excavated at the planned right (west) abutment at the eastern trestle location using HQ-size rock coring equipment for the full extent of the boring. Boring 3 encountered hard, moderately-strong to strong, closely fractured greenstone bedrock at the ground surface. Bedrock was noted to generally grade harder, stronger, and less fractured/weathered with depth, as supported by rock quality designation (RQD) values[2] ranging from a minimum of 78 (at a depth of 6- to 7-feet) to 100 (at depths from 12.4- to 17.4-feet).

Boring 4 was excavated at the planned left (east) abutment at the eastern trestle location and was drilled using 8-inch hollow-stem augers. Boring 4 encountered about 2-feet of fill soils composed of loose to medium-dense sandy gravel underlain by about 10-feet of loose clayey gravel alluvium with lesser sand and occasional cobbles. Stiff silty clay alluvium was encountered between 12- and 19-feet, and weak to moderately strong, moderately hard, moderately weathered, and crushed/highly sheared greenstone bedrock was encountered at 19-feet. Boring 4 was terminated at a maximum explored depth of 22.6-feet due to auger and sampler refusal.

Groundwater was encountered in Boring 2 at a depth of 19.0-feet, but was not encountered in Borings 1 and 4. We were unable to record a depth to groundwater (if encountered) at Boring 3 due to the drilling fluid required to facilitate wireline rock coring. Since the borings were not left open for an extended period of time, a stabilized depth to groundwater was likely not observed. Based on our exploration and experience with similar projects in similar geologic terrain, groundwater is likely to be encountered at the surface water elevation within San Geronimo Creek or within a few feet of the upper bedrock surface year-round, whichever is shallower. Groundwater will likely be higher during high creek flows, during the winter months, and following periods of heavy rain.

Geologic Hazards Evaluation

We have evaluated commonly-considered geologic hazards which may affect the planned improvements. Based on our review, the primary hazards which may affect the proposed improvements are strong seismic ground shaking, liquefaction, settlement, lurching/ground cracking, erosion/scour, slope instability/landsliding and flooding. Other hazards, such as fault surface rupture, seiche/tsunami, and others are judged relatively insignificant at the site and

[2] Rock Quality Designation (RQD) is a rough quantitative measure of rock integrity and degree of jointing or fracturing. RQD is taken as the sum of recovered core pieces greater than 100mm (4-in.) in length divided by the total core run length, expressed as a percentage. In general, RQD values less than 25 are considered “very poor”; values from 25 to 50 are “poor”, 50 to 75 are “fair”, 75 to 90 are “good”, and values greater than 90 are “excellent”. It should be noted that core run length may vary for a variety of reasons, and that, since run length has a great effect on the calculated RQD value, these values should be considered no more than a “rough” estimation of rock quality for the purpose of this report.

thus are not discussed in detail. Our evaluations and recommended mitigation measures for the "primary" geologic hazards are summarized in detail below:

SEISMIC GROUND SHAKING

The site will likely experience strong seismic ground shaking similar to other areas in the seismically active San Francisco Bay Area. Earthquakes along several active faults in the region, as shown on Figure 4, could cause moderate to strong ground shaking at the site. Estimates of peak ground accelerations are based on either deterministic or probabilistic methods.

Deterministic methods use empirical relations developed from data collected during previous earthquakes to provide estimates of median peak ground accelerations. A summary of the active faults that could most significantly affect the site, their maximum credible magnitude, closest distance to the project area, and probable peak accelerations is provided in Table A.

TABLE A
DETERMINISTIC HAZARD ANALYSIS
ESTIMATED SEISMIC GROUND MOTIONS
North Marin Line Stabilization Project
Lagunitas, California

Fault	Moment Magnitude for Characteristic Earthquake[1]	Closest Estimated Distance (kilometers)[2]	Median Peak Ground Acceleration (g)
San Andreas	8.0	4.5	0.45
San Gregorio	7.2	7	0.36
Hayward	7.3	29	0.13
Rodgers Creek	7.3	32	0.12
Maacama	7.4	63	0.07

(1) Caltrans (2014), ARS Online V2.3.06 web-based acceleration response spectra calculator, http://dap3.dot.ca.gov/ARS_Online/, accessed June 16, 2014.
(2) Values determined using Vs^{30} = 560 m/s (1,837 ft/s) used for very dense soil/soft rock profile (Site Class C) per 2013 CBC.

The potential for strong seismic shaking at the project site is high. The San Andreas Fault is the closest and most likely source for a future earthquake. The most significant adverse impact associated with strong seismic shaking is potential damage to structures and improvements.

Evaluation: *Less than significant with mitigation.*
Mitigation: *Foundations for new structures should be designed in accordance with the latest edition of the California Building Code (2013 CBC), and abutment retaining wall design should consider a seismic surcharge load. Seismic design criteria for new foundations and retaining walls are presented in the Conclusions and Recommendations section of this report.*

LIQUEFACTION AND LATERAL SPREADING

Liquefaction refers to the sudden, temporary loss of soil shear strength during strong ground shaking. This phenomenon can occur where there are saturated, loose, granular (sandy) deposits subjected to seismic shaking. Liquefaction-related phenomena include settlement and lateral spreading.

Loose granular soils were encountered in Boring 2 at depths between about 2- and 8-feet, and in Boring 4 at depths between about 2- and 9-feet below the ground surface. While these soils were not saturated at the time of our exploration, performed during the summer months following an unusually dry rainy season, saturation is likely throughout the winter months during "normal" rainfall years and following periods of heavy rain. Additionally, these deposits were encountered at elevations above the channel flow line, making them susceptible to lateral spreading in the event of liquefaction. Therefore, the risk of damage to improvements due to liquefaction and related effects (ground surface settlement and lateral spreading) is high.

Evaluation: *Less than significant with mitigation.*
Mitigation: *New trestle abutments should be supported on deep foundations which derive support from competent bedrock beneath any potentially liquefiable deposits (except the eastern crossing's west abutment, which may utilize shallow spread footings bearing on shallow rock). Recommendations and design criteria for new foundations are presented in the Conclusions and Recommendations section of this report.*

SETTLEMENT

Settlement of the ground surface may occur where new loads are applied to soft, compressible clay soils. Settlement may also occur in saturated soils as a result of liquefaction, or where dry granular soils are subjected to seismic shaking and are rearranged into a denser matrix.

Soft clayey soils were not observed during our exploration. However, deposits of loose granular soils were encountered in Borings 2 and 4 as noted above, and therefore the risk of seismically-induced settlement, whether the soils are saturated or not, is generally high.

Evaluation: *Less than significant with mitigation.*
Mitigation: *New trestle abutments should be supported on deep foundations which derive support from competent bedrock beneath any settlement-prone horizons (except the eastern crossing's west abutment, which may utilize shallow spread footings bearing on shallow rock). Recommendations and design criteria for new foundations are presented in the Conclusions and Recommendations section of this report.*

LURCHING AND GROUND CRACKING

Lurching and associated ground cracking can occur during strong ground shaking. The ground cracking generally occurs along the tops of slopes where dense/stiff soils are underlain by soft deposits or along steep slopes or channel banks.

Loose soils were encountered in Borings 2 and 4 as discussed above, and were overlain by a relatively thin layer of comparatively stiffer/denser materials. Therefore, the risk of lurching and/or ground cracking during a seismic event is judged moderate to high.

Evaluation: *Less than significant with mitigation.*
Mitigation: *New trestle abutments should be supported on deep foundations which derive support from competent bedrock beneath any potentially liquefiable deposits (except the eastern crossing's west abutment, which may utilize shallow spread footings bearing on shallow rock). Recommendations and design criteria for new foundations are presented in the Conclusions and Recommendations section of this report.*

EROSION AND SCOUR

Sandy soils on moderate slopes or clayey soils on steep slopes are susceptible to erosion when exposed to concentrated surface water flow. The potential for erosion is increased when established vegetation is disturbed or removed.

Creekbanks at the project site are generally inclined between about 2:1 and 1:1, with the steeper banks generally at the locations of the left abutment for each trestle. The generally clayey near-surface soils and loose granular soils exposed in the banks will likely be susceptible to erosion. Additionally, scour along the creekbanks, particularly at the right (north) abutment at the western trestle and left (east) abutment of the eastern trestle, may have the potential to undermine structures founded on shallow foundations. Therefore, the risk of erosion and scour at the site is moderate to high.

Evaluation: *Less than significant with mitigation.*
Mitigation: *New trestle abutments should be supported on deep foundations which derive support from competent bedrock (except the eastern crossing's west abutment, which may utilize shallow spread footings bearing on shallow rock). Recommendations and design criteria for new foundations are presented in the Conclusions and Recommendations section of this report. Erosion-control measures during and after construction should conform to the most recent version of the Erosion and Sediment Control Field Manual (California Regional Water Quality Control Board, 2002) and the project's Stormwater Pollution Prevention Plan (SWPPP). After construction, vegetation should be re-established and erosion-control measures implemented in disturbed areas.*

SLOPE INSTABILITY

Weak soils and bedrock on moderate to steep slopes can move downslope due to gravity. Slope instability is often initiated or accelerated from soil saturation and groundwater pressure, though may also be aggravated by grading activity, such as removal of toe support by excavation or by addition of new loads, such as fill placement. Loss of toe support may also be a result of creek erosion and scour. The primary adverse effect of slope instability is damage to structures and improvements.

Creekbank slopes at both planned trestle locations are generally inclined between about 2:1 (horizontal:vertical) and 1:1. No evidence of "global" slope instability was observed during our exploration; however, the site is located in an area that is generally susceptible to landsliding and the steep banks along the San Geronimo Creek channel may also be susceptible to smaller-scale sloughing, raveling, and sliding. Additionally, removal of toe support by channel scour and erosion may accelerate or exacerbate bank instability. Therefore, the risk of damage due to slope instability is moderate.

Evaluation: *Less than significant with mitigation.*
Mitigation: *New trestle abutments should be supported on deep foundations which derive support from competent bedrock (except the eastern crossing's west abutment, which may utilize shallow spread footings bearing on shallow rock). Recommendations and design criteria for new foundations are presented in the Conclusions and Recommendations section of this report.*

FLOODING

The primary adverse impact from flooding at the project site is anticipated to be damage to the pipeline and/or trestle due to buoyancy or impact by suspended debris during very high creek flows. The project site includes the San Geronimo Creek, which typically flows year-round and drains a considerably large watershed area. Deep incision/downcutting and large boulders within the creek channel are indicative of historic high flows. Therefore, the risk of damage due to flooding at the site is high.

Evaluation: *Less than significant with mitigation.*
Mitigation: *Preliminary plans indicate the new pipelines will be raised relative to the existing alignment in order to be above the anticipated maximum water surface elevation arising from a 100-year flood. If intermediate bents or other structures will be placed within the channel itself, designers should consider the potential for impact by soil, rocks, and other debris suspended in the water column.*

Conclusions and Recommendations

Based on the results of our geotechnical investigation, we conclude that the proposed project is feasible from a geotechnical perspective. The primary geotechnical considerations for the project are the potential for strong seismic ground shaking, providing uniform foundation support for the new trestle structures, and providing appropriate mitigation for potential bank instability, channel scour, and erosion. Recommendations and design criteria to address these and other geotechnical items are presented in the following sections.

SITE PREPARATION AND GRADING

Site grading will consist primarily of shallow excavation to construct new trestle abutments and pipe connections. Site preparation, excavation, and backfill should be performed in accordance with the following recommendations and criteria.

1. Surface Preparation – Clear all trees, brush, roots, over-sized debris, and organic material from areas to be graded. Where new abutments will be constructed, the exposed subgrade surface should be moisture conditioned to near the optimum moisture content and compacted to at least 90% relative compaction (ASTM D-1557) to produce a firm and unyielding surface. Where competent bedrock is exposed at subgrade, scarification and recompaction need not be performed.

2. Excavations - Based on the results of our subsurface exploration, excavations for the proposed construction may extend through a variety of soils and into greenstone bedrock. We anticipate that the majority of onsite soils can likely be excavated with "conventional" equipment, such as excavators or backhoes. Excavations into weathered greenstone bedrock, which generally occurs within a few vertical feet of the channel flowline elevation

(Except at the right abutment for the eastern crossing, where the old railroad grade/current pipe alignment is "cut" into the hillside and underlain by rock at the ground surface), may require special equipment, such as hoe-rams, to complete. While we judge that significant quantities of "hard rock" are unlikely to be encountered during construction (exclusive of excavations for deep foundations), hard rock is exposed at the right abutment for the eastern crossing, and we generally recommend including a clearly-defined line item in the project bid documents for hard rock excavation.

Excavations having a depth of 5 feet or more must be sloped and/or benched in accordance with OSHA regulations. Pursuant to OSHA classifications, loose alluvial deposits encountered in Borings 2 and 4 are "Type C" soils, while all other onsite soils and greenstone rock will generally be "Type B", although hard greenstone rock at the eastern crossing's southwest abutment may be considered "stable rock". Both soil types, but particularly "Type C" soils, will be prone to caving and raveling in open excavations, especially where saturated. Temporary excavations in "Type C" soils should be sloped no steeper than 1.5:1, and excavations in "Type B" materials must be sloped no steeper than 1:1 (horizontal:vertical). If vertical slopes are required at the base of such excavations, they must be shored or braced to a minimum of 18-inches above the top of the vertical slope. The Contractor should be responsible for site safety and should select and maintain and appropriate shoring system for the site conditions and in accordance with OSHA requirements.

3. Fill Compaction –All structural fill, including retaining wall backfill (as applicable), should be conditioned to a moisture content within 3 percent of the optimum moisture content, placed in loose horizontal lifts of 8 inches thick or less and uniformly compacted to at least 90 percent relative compaction. In pavement areas (if any), the upper 12-inches should be compacted to a minimum of 95 percent relative compaction.

   All fill material should consist of soil and rock mixtures that: (1) are free of organic material, (2) have a Liquid Limit less than 40, (3) have a Plasticity Index less than 20, (4) have a maximum particle size of 4 inches, and (5) have a minimum R-Value of 20. We anticipate that most of the soil and rock material derived from onsite excavations will be suitable for re-use as fill provided the maximum particle sizes are less than 6 inches and that materials are properly moisture-conditioned prior to placement and compaction. Excavation spoils deemed unsuitable for re-use as fill should be removed from the site and legally disposed of.

4. Temporary Cut Slopes - Temporary cut slopes will be required during construction of the new abutments. For planning purposes, these cut slopes in soils should be inclined at 1:1 (horizontal:vertical), based on an OSHA Type B soil profile. Temporary cut slopes in rock may be inclined at 0.5:1. Geologic inspection during excavation will be required to verify that the above recommendations are appropriate for the conditions encountered.

   Performance of temporary cut slopes will be heavily dependent on the amount of time the cut is unsupported, seepage and surface runoff over the face, bedding and fracture planes of rock and soil materials, and other factors. Temporary cut slopes may exhibit some sloughing, especially during wet weather conditions, and cleanup of soil and rock debris at the base of slopes may be required. We recommend the project grading contractor be

responsible for the performance of temporary cut slopes, and the above recommendations should be confirmed during construction.

SEISMIC DESIGN

Minimum mitigation of seismic ground shaking includes design of new structures in conformance to the provisions of the most recent edition (2013) of the California Building Code. The magnitude and character of these ground motions will depend on the particular earthquake and the site response characteristics. Based on the interpreted subsurface conditions and close proximity of the San Andreas Fault, we recommend the CBC coefficients and site values shown in Table B below to calculate the design base shear of the new construction. To determine site seismic coefficients, we used the USGS Earthquake Ground Motion Parameters Java application, Version 5.1.0, using the latitude and longitude shown on Figure 4.

TABLE B
2013 CBC SEISMIC DESIGN FACTORS
North Marin Line Stabilization Project
Lagunitas, California

Factor Name	Coefficient	CBC Table/ Figure	Site Specific Value(1,2)
Site Class(2)	$S_{A,B,C,D,E, or F}$	1613.5.2	S_C
Spectral Acc. (short)	S_s	1613.5(3)	2.009 g
Spectral Acc. (1-sec)	S_1	1613.5(4)	0.946 g
Site Coefficient	F_a	1613.5.3(1)	1.0
Site Coefficient	F_v	1613.5.3(2)	1.3

1) Values determined using USGS Seismic Design Maps Web application, http://earthquake.usgs.gov/designmaps/us/application.php, accessed June 16, 2014.
2) Values determined in accordance with the 2010 ASCE-7 standard.
3) Soil Profile Type S_C Description: Very Dense Soil and Soft Rock, Shear Wave Velocity between 1,200 and 2,500 feet per second, Standard Penetration blow counts greater than 50, and undrained shear strength greater than 2,000 psf.

The effects of earthquake shaking (i.e. protection of life safety) can be mitigated by close adherence to the seismic provisions of the current edition of the CBC. However, some structural damage may still occur during strong ground shaking.

FOUNDATION DESIGN

Based on the results of our subsurface exploration, shallow foundations will be suitable only at the southwest abutment of the eastern crossing (location of Boring #3), where hard greenstone bedrock is exposed at the ground surface and there is little risk of undermining by erosion, scour, or lateral spreading. Shallow foundation criteria are shown in Table C below:

TABLE C
SHALLOW FOUNDATION DESIGN CRITERIA
North Marin Line Stabilization Project
Lagunitas, California

Continuous Spread Footings	
Minimum width:	18 inches
Minimum depth:	18 inches
Allowable bearing pressure[1]:	4,000 psf
Base friction coefficient:	0.35
Lateral Passive Resistance[2]:	550 pcf

Notes
1. May increase design values by 1/3 for total design loads.
2. Equivalent fluid pressure. Ignore upper 6-inches unless foundations are confined by concrete slabs or asphalt pavements.

For all other abutment locations, we judge there is significant potential for damage to shallow foundations by a variety of mechanisms, including liquefaction/lateral spreading, creek erosion and scour, and seismically-induced settlement, and the new improvements should be supported on deep foundations which derive support from competent weathered bedrock. We understand the "preferred" deep foundation option is "traditional" cast-in-drilled-hole (CIDH) piers. More exotic systems such as auger-cast piers (ACP) and torque-down piles (TDP) are judged infeasible due to the very large, heavy equipment required which may be unable to access some of the planned abutment locations without extensive pre-construction grading work and/or private bridge modifications.

Based on our subsurface exploration, drilled shafts will encountered loose soils which will be prone to raveling and caving, and which may be saturated during the winter months. Therefore, casing and de-watering will likely be required and should be anticipated by the Contactor. Reinforcing steel and concrete should be placed the same day the piers are drilled, and the holes must be free of loose soil at the time of concrete placement. Where groundwater is encountered, concrete must be placed by the tremie method. In addition, hard greenstone bedrock underlying the loose soils may require core barrels or other specialty drilling equipment to achieve the required embedment. We therefore recommend inclusion of a "hard rock drilling" line item in the project bid documents.

Rock anchors may also be used to resist seismic loads for the southwest abutment at the eastern crossing. Rock anchors should be provided with double corrosion protection. During construction, at least 25% of the rock anchors should be tested to verify performance. Design criteria for CIDH and rock anchor foundation systems are shown in Table D below:

TABLE D
DEEP FOUNDATION DESIGN CRITERIA
North Marin Line Stabilization Project
Lagunitas, California

Drilled Piers	
Minimum Diameter:	18 inches
Skin Friction[1]:	
Loose Soils (upper 5-feet at Boring 1, 8-feet at Boring 2 and 12-feet at Boring 4):	Ignore
Medium-Stiff/Dense Soils:	750 psf
Weathered Bedrock:	2,000 psf
Lateral Passive Resistance[2,3,4]:	
Loose Soils (upper 5-feet at Boring 1, 8-feet at Boring 2 and 12-feet at Boring 4):	Ignore
Medium Stiff/Dense Soils:	350 pcf
Weathered Bedrock:	550 pcf
Rock Anchors	
Minimum Diameter:	6 inches
Skin Friction:	
Weathered Bedrock	2,000 psf

Notes:
(1) Uplift resistance is equal to 80% of the total skin friction.
(2) Equivalent Fluid Pressure, not to exceed 10 times value in psf.
(3) Apply values over effective width of 2 pier diameters.
(4) Ignore where less than 10-feet horizontal confinement exists from face of nearest adjacent slope.
(5) Ignore skin friction and lateral passive resistance for upper 5-feet at Boring 1, upper 8-feet at Boring 2, and upper 12-feet at Boring 4.

TRESTLE ABUTMENT WALL DESIGN

The trestle abutments can act as the shallow foundation or “pier” cap for a deep foundation and should be designed to account for both trestle/pipeline loads and active lateral earth pressures. We recommend that the base of the abutments be located or deepened so as to maintain a minimum of 5-feet horizontal confinement from the nearest adjacent slope. If the trestle will act as a strut between the abutments, restrained earth pressures may develop on the approach side of the foundation. Where abutment walls are free to rotate a small amount (1-2% of the retained height and are not connected to other structural elements, unrestrained criteria should be used. Lateral support can be obtained from either passive soil resistance (i.e. foundation embedment) or frictional sliding resistance of the foundation where shallow rock exists. In addition to the soil

loads, the abutment walls should be designed to resist transient seismic loads. Abutment wall design criteria are shown in Table E.

TABLE E
ABUTMENT WALL DESIGN CRITERIA
North Marin Line Stabilization Project
Lagunitas, California

Foundation	See Tables C and D
Unrestrained Earth Pressure[1,2]	
Level Ground	40 pcf
Restrained Earth Pressure[1,2]	
Level Ground	60 pcf
Passive Resistance	per Tables C and D
Seismic Surcharge[3]	12 x H psf

Notes:
(1) Equivalent fluid pressure.
(2) Rectangular distribution. The factor of safety for short-term seismic conditions can be reduced to 1.0 or greater.

All walls higher than 3-feet require drainage to prevent the build-up of hydrostatic pressure. Either Caltrans Class 1B permeable material within filter fabric, drainage panels, or Caltrans Class 2 permeable material can be used. The drainage should be collected in 4-inch, perforated, Schedule 40 PVC drain line placed at the base of the wall or discharged through weep-holes in the face of the wall. Seepage collected in the drains should be conveyed in a closed pipe system to a suitable discharge outlet well away from the structures. To maintain the wall drainage system, clean-outs must be provided for perforated pipes at the upstream end. Sweep fittings should be used at all major changes in direction. A typical retaining wall drain detail is shown on Figure 5. Retaining wall backfill should be compacted in accordance with the recommendations presented in site grading.

TRENCH BACKFILL

Following trestle construction and completion of new pipeline tie-ins, small sections of new pipeline trench will need to be backfilled. We recommend minimum of 6 inches of non-corrosive sand (or other approved pipe bedding material) be placed in the bottom of trench excavations. The bedding material should be continuous around the pipe and extend at least 6 inches above the top of pipe. The bedding material over the pipe should be compacted prior to placement of intermediate backfill.

Intermediate trench backfill above the bedding material and up to the subgrade elevation may be select fill material or aggregate base, unless otherwise specified. Native soil and rock materials derived from excavations at the site are likely suitable for re-use as select fill, provided they are

properly processed to conform to the fill criteria discussed in the Site Preparation and Grading/Fill Compaction section above.

Intermediate backfill should be moisture-conditioned to near the optimum-moisture content and compacted to at least 90 percent relative compaction. Within pavement or other structural areas, the uppermost 12-inches should be compacted to at least 95 percent relative compaction, in general accordance with ASTM D-1557. The compacted surface must also be non-yielding when proof-rolled with heavy construction equipment. Refer to the Marin Municipal Water District Standard Specifications for additional utility trench backfill requirements.

Supplemental Services

We should review project plans as they near completion to ensure that the intent of our recommendations has been sufficiently incorporated. Additionally, we should be present during construction to verify that actual conditions encountered are consistent with our recommendations and design criteria.

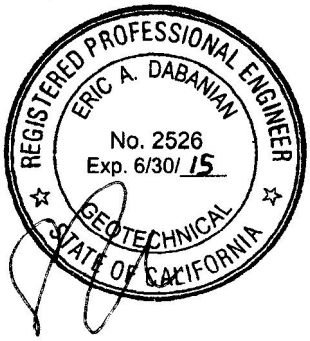
We trust that this letter includes the information you require at this time. Please do not hesitate to contact us should there be any questions or concerns.

Yours very truly,
MILLER PACIFIC ENGINEERING GROUP



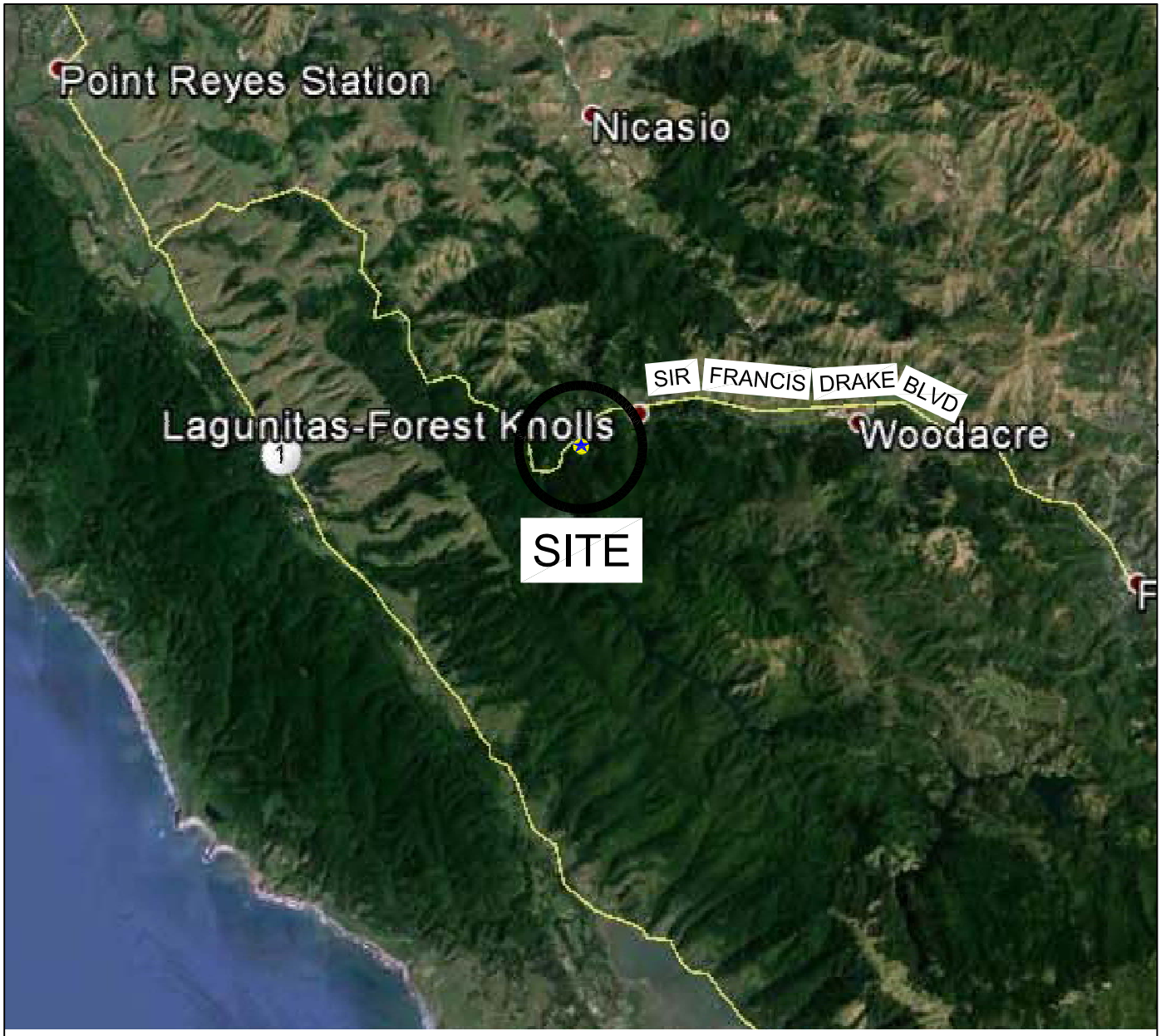
Mike Jewett
Engineering Geologist No. 9020
(Expires 1/31/15)

REVIEWED BY



Eric Dabanian
Geotechnical Engineer No. 2526
(Expires 6/30/15)

Attachments: Figures 1 through 5; Appendix A



SITE: LATITUDE, 38.007°
LONGITUDE, -122.706°

SITE LOCATION
N.T.S.

NORTH

REFERENCE: Google Earth, 2014

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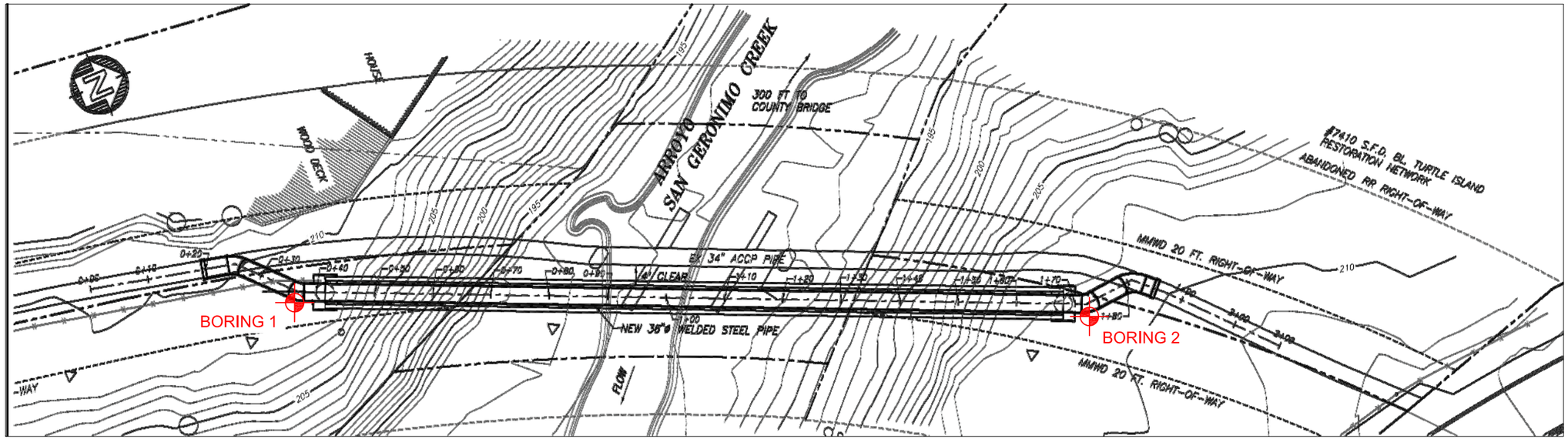
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FILE: 187.491SLM.dwg

SITE LOCATION MAP

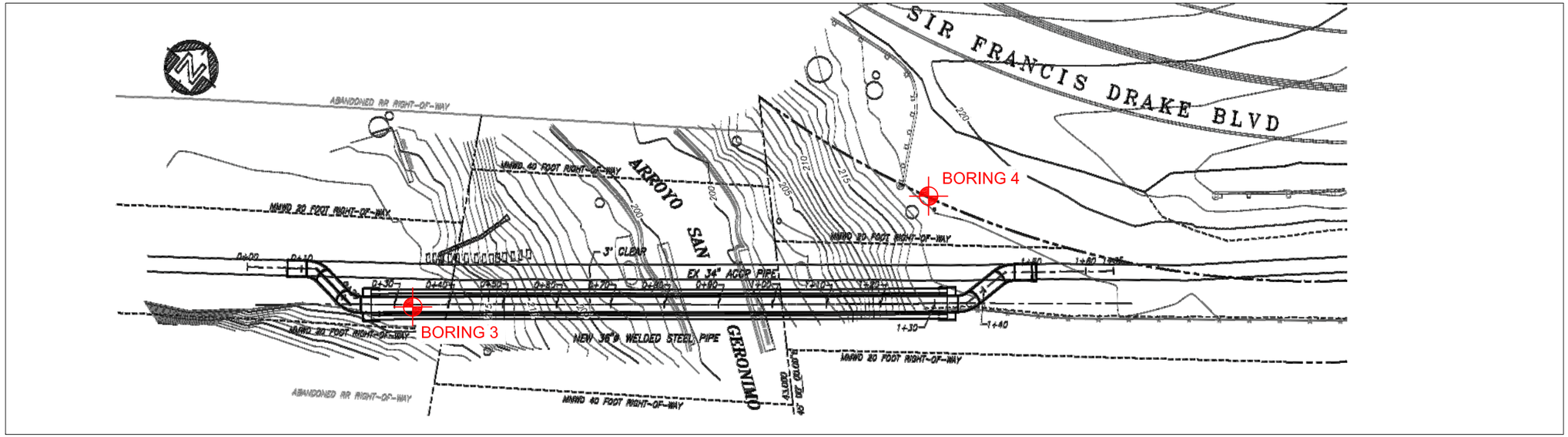
Marin Municipal Water District
North Marin Line Stabilization
Lagunitas, California
Project No. 187.491 Date: 6-17-14

Drawn MFJ
Checked

1
FIGURE



WESTERN CROSSING, 7440 SIR FRANCIS DRAKE BOULEVARD



EASTERN CROSSING, 7349 SIR FRANCIS DRAKE BOULEVARD

BORING BY MILLER PACIFIC, MAY 2014

REFERENCE: Marin Municipal Water District (2014), "Lagunitas, San Geronimo Creek, North Marin Line Stabilization Project Plan & Profile", Sheets 3 and 4 (of 4), Job No. F14003, dated April 2014.

SCALE
0 10 20 40 FEET

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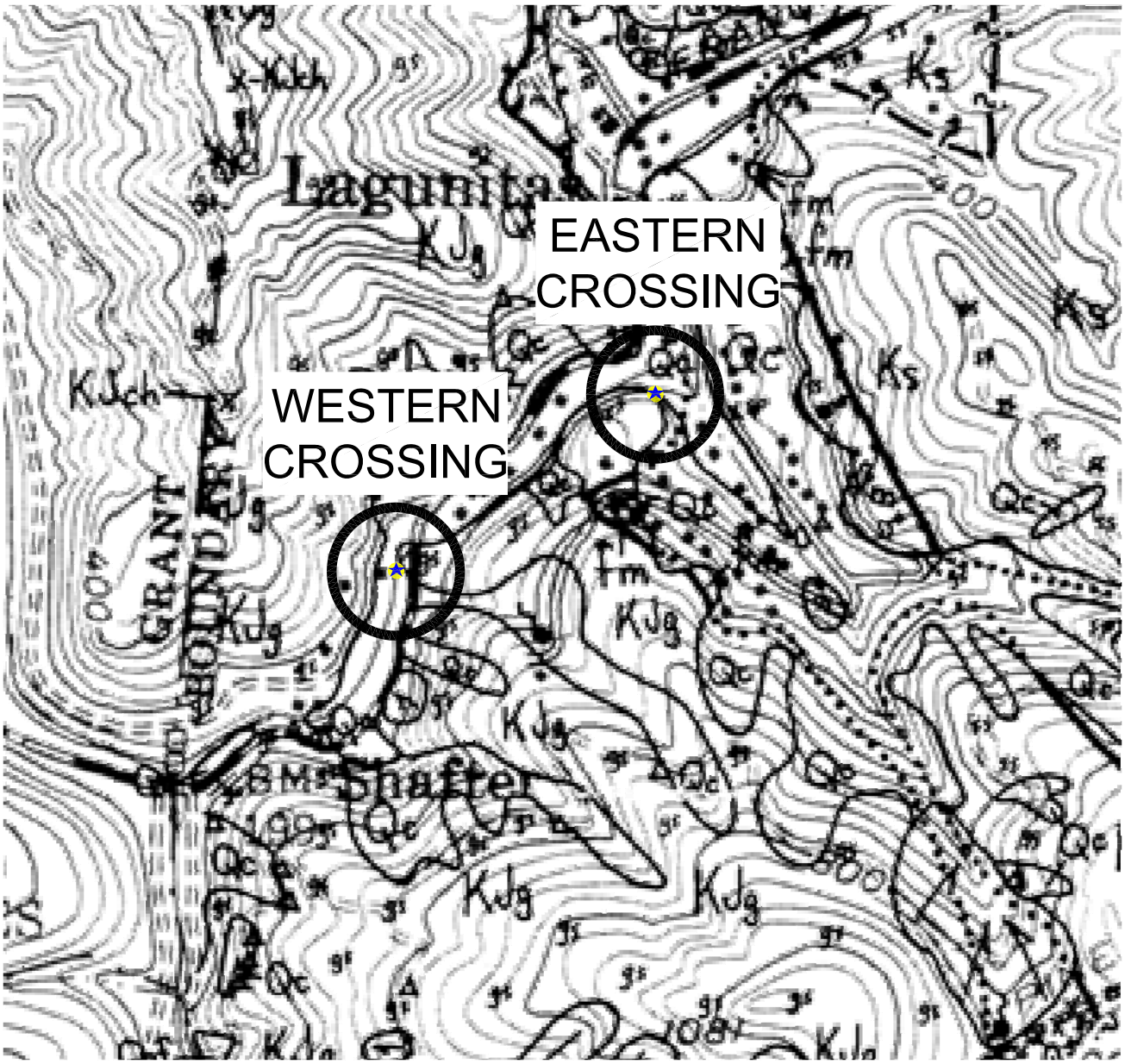
SITE PLAN

Marin Municipal Water District
North Marin Line Stabilization
Lagunitas, California

Project No. 187.491 Date: 6-17-14

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2
FIGURE



REGIONAL GEOLOGIC MAP

(NO SCALE)

NORTH

LEGEND

Qa	Alluvium - Unconsolidated clay, silt, sand, and gravel deposited in stream channel, terrace, or floodplain environments
Kjg/gs	Greenstone - Metamorphic product of sea-floor (pillow) basalt. Typically dark green-gray, hard and strong where fresh; mottled red, brown, or purple where deeply weathered; forms swelling, clay-rich soils.

REFERENCE: Smith, T.C. (1976), "Geology of the San Geronimo Valley Area, Marin County, California" *in* Geology for Planning in Central and Southeastern Marin County, California, California Department of Conservation, Division of Mines and Geology Open-File Report 76-2, Plate 1A, Map Scale 1:12,000.

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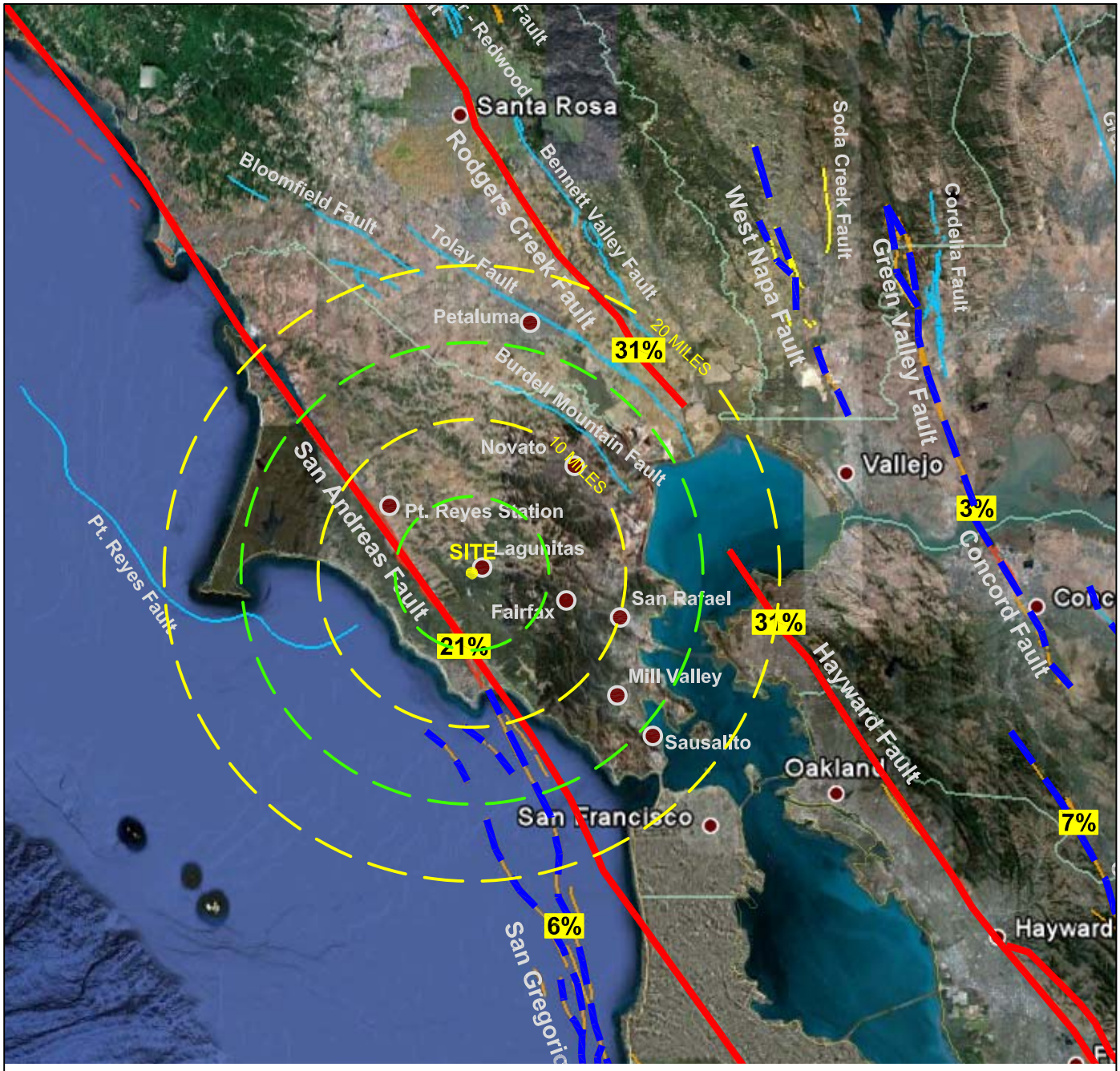
REGIONAL GEOLOGIC MAP

Marin Municipal Water District
North Marin Line Stabilization
Lagunitas, California

Project No. 187.491 Date: 6-17-14

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Checked

3
FIGURE



LEGEND

SITE: LATITUDE, 38.007°
LONGITUDE, -122.706°

NORTH

FAULT	TYPE	CBC DESCRIPTION
	"A"	CAPABLE OF LARGE MAGNITUDE EARTHQUAKES AND HIGH RATE OF SEISMIC ACTIVITY
	"B"	CAPABLE OF LARGE MAGNITUDE EARTHQUAKES OR HIGH RATE OF SEISMIC ACTIVITY

21% PROBABILITY OF M≥6.7 BETWEEN 2008-2038 FOR FAULTS SHOWN. OVERALL PROBABILITY OF 63% IN BAY AREA OF ONE OR MORE M≥6.7 EARTHQUAKES FROM 2008-2038.

REFERENCES:

1) ACTIVE FAULT MAP MODIFIED FROM SUMMARY OF EARTHQUAKE PROBABILITIES IN THE S.F. BAY REGION, 2008-2038, THE 2007 WORKING GROUP ON CALIFORNIA EARTHQUAKE PROBABILITIES, 2008.

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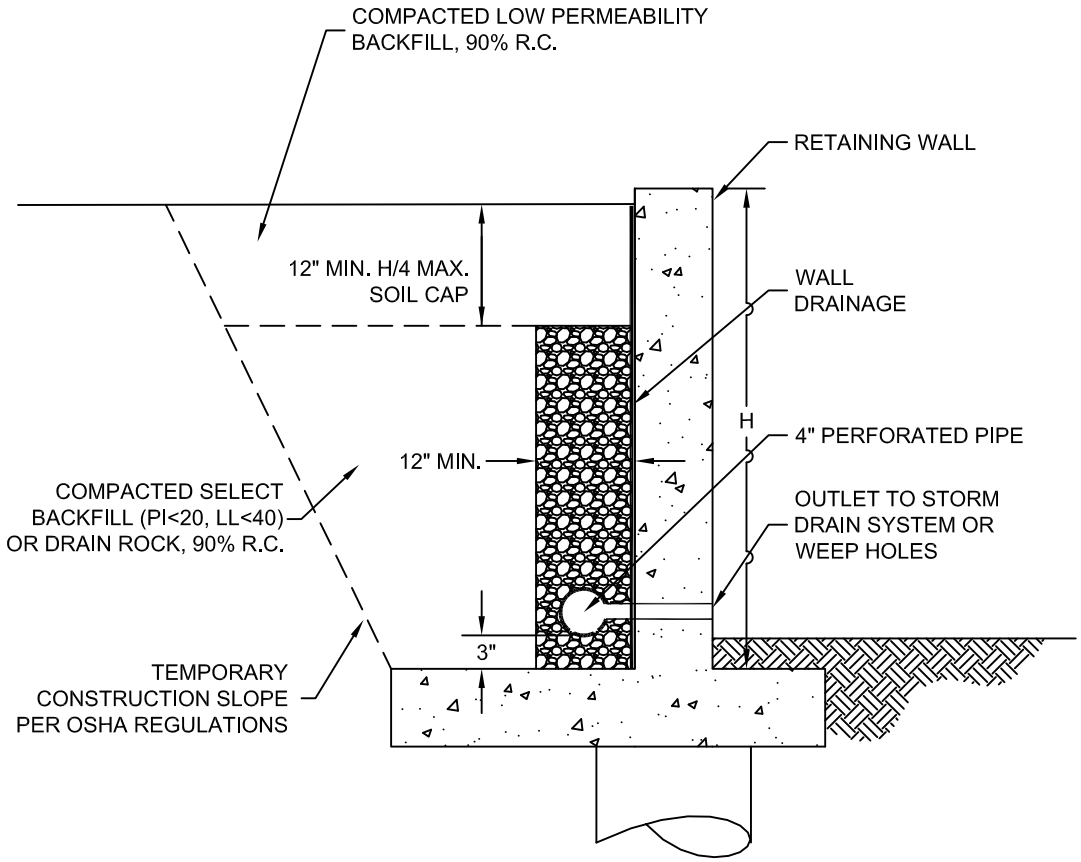
ACTIVE FAULT MAP

Marin Municipal Water District
North Marin Line Stabilization
Lagunitas, California

Project No. 187.491 Date: 6-17-14

Drawn MFJ
Checked

4
FIGURE



NOTES:

1. Wall drainage should consist of clean, free draining 3/4 inch crushed rock (Class 1B Permeable Material) wrapped in filter fabric (Mirafi 140N or equivalent) or Class 2 Permeable Material. Alternatively, pre-fabricated drainage panels (Miradrain G100N or equivalent), installed per the manufacturers recommendations, may be used in lieu of drain rock and fabric.

2. All retaining walls adjacent to interior living spaces shall be water/vapor proofed as specified by the project architect or structural engineer.

3. Perforated pipe shall be SCH 40 or SDR 35 for depths less than 20 feet. Use SCH 80 or SDR 23.5 perforated pipe for depths greater than 20 feet. Place pipe perforations down and slope at 1% to a gravity outlet. Alternatively, drainage can be outlet through 3" diameter weep holes spaced approximately 20' apart.

4. Clean outs should be installed at the upslope end and at significant direction changes of the perforated pipe. Additionally, all angled connectors shall be long bend sweep connections.

5. During compaction, the contractor should use appropriate methods (such as temporary bracing and/or light compaction equipment) to avoid over-stressing the walls. Walls shall be completely backfilled prior to construction in front of or above the retaining wall.

6. Refer to the geotechnical report for lateral soil pressures.

7. All work and materials shall conform with Section 68, of the latest edition of the Caltrans Standard Specifications.

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RETAINING WALL BACKDRAIN CRITERIA

Marin Municipal Water District
North Marin Line Stabilization
Lagunitas, California
Project No. 187.491 Date: 6-24-14

Designed EAD
Drawn MFJ
Checked

5
FIGURE

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APPENDIX A
SUBSURFACE EXPLORATION AND LABORATORY TESTING

A. Soil and Rock Classification Systems

We explored subsurface conditions at the site with 4 exploratory borings drilled on May 19 and 20, 2014. Borings were excavated to depths between 22.5 and 26.5-feet using a track-mounted CME-55HT drill rig equipped variously with 4- or 6-inch solid-stem continuous flight augers, 8-inch hollow-stem continuous flight augers, and HQ-size (2.50-inch inside diameter) wireline diamond-tipped rock coring equipment. Upon completion, each boring was backfilled to the ground surface with neat cement grout.

The soil and rock materials encountered were logged and identified by our engineering geologist in general accordance with ASTM Standard D 2487, "Field Identification and Description of Soils (Visual-Manual Procedure)". This standard is briefly explained on Figures A-1, Soil Classification Chart and Key to Log Symbols, and A-2, Rock Classification Chart. The boring logs are presented on Figures A-3 to A-10.

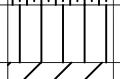
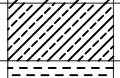
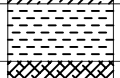
B. Laboratory Testing

We conducted laboratory tests on selected intact samples to verify field identifications and to evaluate engineering properties. The following laboratory tests were conducted in accordance with the ASTM standard test method cited:

- Laboratory Determination of Water (Moisture Content) of Soil, Rock, and Soil-Aggregate Mixtures, ASTM D 2216;
- Density of Soil in Place by the Drive-Cylinder Method, ASTM D 2937;
- Unconfined Compressive Strength of Cohesive Soil, ASTM D 2166;

The moisture content, dry density, unconfined compressive strength test results are shown on the Boring Logs, Figures A-3 through A-10.

The exploratory boring logs, description of soils encountered and the laboratory test data reflect conditions only at the location of the excavation at the time they were excavated or retrieved. Conditions may differ at other locations and may change with the passage of time due to a variety of causes including natural weathering, climate, and changes in surface and subsurface drainage.

MAJOR DIVISIONS		SYMBOL		DESCRIPTION
COARSE GRAINED SOILS over 50% sand and gravel	CLEAN GRAVEL	GW		Well-graded gravels or gravel-sand mixtures, little or no fines
		GP		Poorly-graded gravels or gravel-sand mixtures, little or no fines
	GRAVEL with fines	GM		Silty gravels, gravel-sand-silt mixtures
		GC		Clayey gravels, gravel-sand-clay mixtures
	CLEAN SAND	SW		Well-graded sands or gravelly sands, little or no fines
		SP		Poorly-graded sands or gravelly sands, little or no fines
	SAND with fines	SM		Silty sands, sand-silt mixtures
		SC		Clayey sands, sand-clay mixtures
FINE GRAINED SOILS over 50% silt and clay	SILT AND CLAY liquid limit <50%	ML		Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
		CL		Inorganic clays of low to medium plasticity, gravely clays, sandy clays, silty clays, lean clays
		OL		Organic silts and organic silt-clays of low plasticity
	SILT AND CLAY liquid limit >50%	MH		Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts
		CH		Inorganic clays of high plasticity, fat clays
		OH		Organic clays of medium to high plasticity
HIGHLY ORGANIC SOILS		PT		Peat, muck, and other highly organic soils
ROCK				Undifferentiated as to type or composition

KEY TO BORING AND TEST PIT SYMBOLS

CLASSIFICATION TESTS

PI	PLASTICITY INDEX
LL	LIQUID LIMIT
SA	SIEVE ANALYSIS
HYD	HYDROMETER ANALYSIS
P200	PERCENT PASSING NO. 200 SIEVE
P4	PERCENT PASSING NO. 4 SIEVE

SAMPLER TYPE

- MODIFIED CALIFORNIA
- STANDARD PENETRATION TEST
- THIN-WALLED / FIXED PISTON
- HAND SAMPLER
- ROCK CORE
- X DISTURBED OR BULK SAMPLE

STRENGTH TESTS

TV	FIELD TORVANE (UNDRAINED SHEAR)
UC	LABORATORY UNCONFINED COMPRESSION
TXCU	CONSOLIDATED UNDRAINED TRIAXIAL
TXUU	UNCONSOLIDATED UNDRAINED TRIAXIAL
	UC, CU, UU = 1/2 Deviator Stress

SAMPLER DRIVING RESISTANCE

Modified California and Standard Penetration Test samplers are driven 18 inches with a 140-pound hammer falling 30 inches per blow. Blows for the initial 6-inch drive seat the sampler. Blows for the final 12-inch drive are recorded onto the logs. Sampler refusal is defined as 50 blows during a 6-inch drive. Examples of blow records are as follows:

- 25 sampler driven 12 inches with 25 blows after initial 6-inch drive
- 85/7" sampler driven 7 inches with 85 blows after initial 6-inch drive
- 50/3" sampler driven 3 inches with 50 blows during initial 6-inch drive or beginning of final 12-inch drive

NOTE: Test boring and test pit logs are an interpretation of conditions encountered at the excavation location during the time of exploration. Subsurface rock, soil or water conditions may vary in different locations within the project site and with the passage of time. Boundaries between differing soil or rock descriptions are approximate and may indicate a gradual transition.

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SOIL CLASSIFICATION CHART

Marin Municipal Water District
North Marin Line Stabilization
Lagunitas, California

Project No. 187.491 Date: 6-17-14

Drawn MFJ
Checked

A-1
FIGURE

FRACTURING AND BEDDING

Fracture Classification	Spacing	Bedding Classification
Crushed	less than 3/4 inch	Laminated
Intensely fractured	3/4 to 2-1/2 inches	Very thinly bedded
Closely fractured	2-1/2 to 8 inches	Thinly bedded
Moderately fractured	8 to 24 inches	Medium bedded
Widely fractured	2 to 6 feet	Thickly bedded
Very widely fractured	greater than 6 feet	Very thickly bedded

HARDNESS

Low	Carved or gouged with a knife
Moderate	Easily scratched with a knife, friable
Hard	Difficult to scratch, knife scratch leaves dust trace
Very hard	Rock scratches metal

STRENGTH

Friable	Crumbles by rubbing with fingers
Weak	Crumbles under light hammer blows
Moderate	Indentations <1/8 inch with moderate blow with pick end of rock hammer
Strong	Withstands few heavy hammer blows, yields large fragments
Very strong	Withstands many heavy hammer blows, yields dust, small fragments

WEATHERING

Complete	Minerals decomposed to soil, but fabric and structure preserved
High	Rock decomposition, thorough discoloration, all fractures are extensively coated with clay, oxides or carbonates
Moderate	Fracture surfaces coated with weathering minerals, moderate or localized discoloration
Slight	A few stained fractures, slight discoloration, no mineral decomposition, no effect on cementation
Fresh	Rock unaffected by weathering, no change with depth, rings under hammer impact

ROCK QUALITY DESIGNATION

$$RQD = \frac{\Sigma\,(\text{RECOVERED CORE PIECES} > 10\text{cm})}{\text{TOTAL CORE RUN LENGTH}}$$

Rock Quality Designation (RQD) is defined as the sum of all recovered core pieces greater than 10-cm (4-in.) in length, divided by the total core run recovery (in inches). Core run length may vary for a variety of reasons and RQD should therefore be taken as a "rough" estimation of rock integrity only.

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ROCK CLASSIFICATION CHART

Marin Municipal Water District
North Marin Line Stabilization
Lagunitas, California

Project No. 187.491 Date: 6/17/14

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A-2
FIGURE

BORING 1

EQUIPMENT: CME-55HT with 4-inch solid flight augers

DATE: 5-19-14

ELEVATION: +209-feet*

*REFERENCE: MMWD, April 2014

OTHER TEST DATA	OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	DEPTH meters / feet	SAMPLE	SYMBOL (3)	
		1750 UC	16	26.9	93	0–2 / 0–5			CLAYEY SAND (SC) Medium brown, moist, medium dense, fine to coarse angular sand with ~40% low to medium plasticity clay, abundant rootlets [FILL] Grades medium red-brown at 4.0-feet.
		2100 UC	19	24.1	100	3 / 10			CLAY WITH GRAVEL (CL) Medium red-brown, moist, medium stiff, low to medium plasticity, ~15-20% fine to coarse angular gravel, ~10% fine to coarse sand [COLLUVIUM]
		1700 UC	23	20.1	110	4–5 / 15			SANDY CLAY WITH GRAVEL (CL) Medium red-brown, moist, medium stiff, low to medium plasticity, ~30% fine to coarse sand, ~15-20% fine to coarse angular gravel [RESIDUAL SOIL]
						6 / 20			GREENSTONE (META-BASALT)

NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3 = 0.1571 x DRY UNIT WEIGHT (pcf)
(3) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY

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BORING LOG

Marin Municipal Water District
North Marin Line Stabilization
Lagunitas, California

Project No. 187.491 Date: 6-17-14

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A-3
FIGURE

BORING 1 (CONTINUED)

OTHER TEST DATA	OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	DEPTH meters / feet	SAMPLE	SYMBOL (3)	
			66/11"	12.6	118	20 – 7			GREENSTONE (META-BASALT) Medium gray, hard, strong, crushed, highly weathered, abundant oxidation along fracture/shear planes [BEDROCK]
			50/1"			25 – 8			Boring terminated at 25-feet, 1-inch due to auger and sampler refusal. No groundwater encountered during exploration. Boring backfilled to ground surface with neat cement grout.
						9 30 10 35 11 12 40			

NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3 = 0.1571 x DRY UNIT WEIGHT (pcf)
(3) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY

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FILE: 187.491

BORING LOG

Marin Municipal Water District
North Marin Line Stabilization
Lagunitas, California
Project No. 187.491 Date: 6-17-14

Drawn MFJ
Checked

A-4
FIGURE

BORING 2

EQUIPMENT: CME-55HT with 6-inch solid flight augers and 8-inch hollow-stem augers
DATE: 5-19-14
ELEVATION: +209-feet*
*REFERENCE: MMWD, April 2014

OTHER TEST DATA	OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	DEPTH meters	DEPTH feet	SAMPLE	SYMBOL (3)	
						0	0			CLAYEY GRAVEL (GP) Medium to dark gray, dry, dense, angular greenstone and sandstone fragments to 8-inch diameter, ~15-20% low plasticity clay and trace fine sand infill [FILL/OLD RAIL BALLAST]
						1	5			SANDY GRAVEL WITH CLAY (GP) Medium brown, moist, loose, fine to coarse, angular to subrounded gravel, ~40% medium to coarse sand, ~20% low to medium plasticity clay [ALLUVIUM/POINT BAR DEPOSITS]
			7	5.4		2				Boring caved to 5.0-feet while sampling at 10.0-feet. Switch to hollow-stem auger and re-drill from 5.0-feet.
						3	10			CLAY WITH SAND (CL) Medium brown, moist, medium stiff, low plasticity, ~15-20% fine to coarse sand, trace fine subangular gravel [ALLUVIUM/OVERBANK DEPOSITS]
			8	16.0	102					Note root in sampler at 11.0-feet.
						4	15			
		2300 UC	27	18.2	115	5				Harder drilling noted at 18.0-feet.
						6	20			GREENSTONE (META-BASALT) Dark gray, hard, strong, crushed, moderately to highly weathered [BEDROCK]

NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3 = 0.1571 x DRY UNIT WEIGHT (pcf)
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North Marin Line Stabilization
Lagunitas, California
Project No. 187.491 Date: 6-17-14

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A-5
FIGURE

BORING 2 (CONTINUED)

OTHER TEST DATA	OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	DEPTH meters / feet	SAMPLE	SYMBOL (3)	
			85/12"	19.4	111	20 – 7			GREENSTONE (META-BASALT) Dark gray, hard, strong, crushed, moderately to highly weathered [BEDROCK]
			64 /10.5"	28.0	103	25 – 8			
						9 – 30			Boring terminated at 26-feet, 6-inches due to auger refusal. Groundwater measured at 19.0-feet immediately after exploration. Boring backfilled to ground surface with neat cement grout.
						10 – 35			
						11 – 12 – 40			

NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
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North Marin Line Stabilization
Lagunitas, California
Project No. 187.491 Date: 6-17-14

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A-6
FIGURE

BORING 3

EQUIPMENT: CME-55HT with 6-inch solid flight augers and HQ-size wireline diamond rock core
DATE: 5-19-14
ELEVATION: +218-feet*
*REFERENCE: MMWD, April 2014

CORE RUN LENGTH (IN)	RECOVERY (IN)	ROCK QUALITY DESIGNATION (RQD)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	DEPTH meters / feet	SAMPLE	SYMBOL (3)	
			64/11"			0 / 0			GREENSTONE (META-BASALT) Medium green-gray, hard, moderately strong to strong, moderately weathered, closely fractured with abundant oxidation and minor clay infill along fracture planes [BEDROCK]
						1			Change to HQ core at 5.9-feet.
						5			
18	18	78				2			Grades to clast-supported greenstone breccia with light green-gray angular greenstone fragments to 2-inch diameter in dark gray aphanitic to fine-grained matrix at 6.0-feet.
60	58	82				3 / 10			Grades very hard, very strong, moderately fractured, slightly weathered at 8.0-feet. Note occasional shear planes infilled with secondary mineralization.
60	60	100				4			
						15			Note frequent machine breaks in core sample, cores require heavy hammer blows to sampler barrel during extrusion.
						5			
60	60	83				6 / 20			

NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3 = 0.1571 x DRY UNIT WEIGHT (pcf)
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Marin Municipal Water District
North Marin Line Stabilization
Lagunitas, California
Project No. 187.491 Date: 6-17-14

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A-7
FIGURE

BORING 3 (CONTINUED)

CORE RUN LENGTH (IN)	RECOVERY (IN)	ROCK QUALITY DESIGNATION (RQD)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (pcf)(2)	DEPTH meters / feet	SAMPLE	SYMBOL (3)	
60	60	83				20 / 7			GREENSTONE (META-BASALT) Medium green-gray, very hard, very strong, moderaely fractured, slightly weathered, brecciated [BEDROCK]
						25 / 8			Boring terminated at 22-feet, 5-inches. Groundwater not observed during exploration due to fluid-circulation coring methods. Boring backfilled to ground surface with neat cement grout.
						30 / 9			
						35 / 10			
						40 / 11			
						12			

NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3 = 0.1571 x DRY UNIT WEIGHT (pcf)
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BORING LOG

Marin Municipal Water District
North Marin Line Stabilization
Lagunitas, California
Project No. 187.491 Date: 6-17-14

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A-8
FIGURE

BORING 4

EQUIPMENT: CME-55HT with 8-inch hollow-stem augers

DATE: 5-20-14

ELEVATION: +219-feet*

*REFERENCE: MMWD, April 2014

OTHER TEST DATA	OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	DEPTH meters / feet	SAMPLE	SYMBOL (3)	
						0 / 0			SANDY GRAVEL (GW) Dark red-brown, moist, loose to medium dense, fine to coarse-grained, angular to subangular, ~30-35% fine to coarse sand, ~10% low plasticity silt and clay [FILL]
			12	8.6	108	1 / 5			CLAYEY GRAVEL WITH SAND (GW) Dark red-brown, moist, loose, fine to coarse-grained angular greenstone fragments, ~40% low plasticity clay, ~15% fine to coarse sand [ALLUVIUM]
						2			Hard drilling/chatter noted at 7.0 to 8.0-feet.
			36			3 / 10			Greenstone cobble in sampler tip at 10.0-feet, blow counts inaccurate. Re-drive sampler 11.5 to 13.0-feet.
			29	28.6	89	4			SILTY CLAY (CL) Medium red-brown, moist, stiff, low plasticity, trace sand and fine angular greenstone fragments, abundant rootlets [ALLUVIUM]
		1800 UC	16	21.7	104	5 / 15			Note <5% fine to medium subangular gravels and 4-inch lens of fine sand at 15.5-feet.
			50/5"	13.0		6 / 20			GREENSTONE (META-BASALT)

NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
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BORING LOG

Marin Municipal Water District
North Marin Line Stabilization
Lagunitas, California

Project No. 187.491 Date: 6-17-14

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A-9
FIGURE

BORING 4 (CONTINUED)

OTHER TEST DATA	OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	DEPTH meters / feet	SAMPLE	SYMBOL (3)	
			50/5"	13.0		20	■		GREENSTONE (META-BASALT) Pale green-gray with purple mottling, low to moderate hardness, weak to moderately strong, intensely fractured to crushed, moderately weathered [BEDROCK]
			50/1"			7	⊠		Boring terminated at 22-feet, 7-inches due to auger and sampler refusal. No groundwater encountered during exploration. Boring backfilled to ground surface with neat cement grout.
						25			
						8			
						9			
						30			
						10			
						35			
						11			
						12			
						40			

NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
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North Marin Line Stabilization
Lagunitas, California
Project No. 187.491 Date: 6-17-14

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A-10
FIGURE

North Marin Line Stabilization Project

Lagunitas

Initial Study/Mitigated Negative Declaration – Appendix D

Hydraulic Analysis

Hydraulic Analysis of San Geronimo Creek to Determine Water Surface Elevations at the Two Crossing Locations of MMWD's Raw Water Transmission Line

Prepared for Marin Municipal Water District
Marin County, California



Downstream Pipeline Crossing, Looking Downstream

Prepared by:

STETSON
ENGINEERS INC.

September 2015

Hydraulic Analysis of San Geronimo Creek to Determine Water Surface Elevations at the Two Crossing Locations of MMWD's Raw Water Transmission Line

Prepared for Marin Municipal Water District
Marin County, California

This report has been prepared under the supervision of the following Registered Civil Engineer. The Registered Civil Engineer attests to the technical information contained herein and the engineering data upon which recommendations, conclusions, and decisions are based.

Xiaoqing Zeng, P.E., Ph.D.

Registered Civil Engineer



10/08/2015

Date

Table of Contents

1.0 PURPOSE 1

2.0 HYDROLOGIC ANALYSIS TO DETERMINE 10-YEAR, 25-YEAR, AND 100-YEAR PEAK DISCHARGES 1

3.0 HYDRAULIC ANALYSIS TO DETERMINE 10-YEAR, 25-YEAR, AND 100-YEAR WATER SURFACE ELEVATIONS 1

3.1 Cross Section and Structure Geometry Survey 2

3.2 Hydraulic Model Development and Calibration/Verification 3

3.3 Model Simulations to Determine 10-Year, 25-Year, and 100-Year Water Surface Elevations 4

4.0 REFERENCES CITED 5

1.0 PURPOSE

This report documents the hydraulic analysis of San Geronimo Creek, a tributary of Lagunitas Creek (Figure 1) in Marin County, using the Army Corps' hydraulic modeling program HEC-RAS, version 4.1. The purpose of the hydraulic analysis is to determine the 10-, 25-, and 100-year water surface elevations at the two crossing locations for Marin Municipal Water District (MMWD)'s raw water transmission pipeline replacement.

2.0 HYDROLOGIC ANALYSIS TO DETERMINE 10-YEAR, 25-YEAR, AND 100-YEAR PEAK DISCHARGES

MMWD, a local governmental agency responsible for providing retail municipal water to consumers in central and southern Marin County, CA, has operated and maintained a streamflow gage at the Lagunitas Road Bridge (Figure 1) since 1980. Stillwater Sciences developed a flood frequency curve for the gage (see Figure 2b) as part of the San Geronimo Valley Salmon Enhancement Plan Study (2009) that was prepared under the contract to the Marin County Department of Public Works. Considering the close proximity between the project sites and the MMWD's streamflow gage[1], the 10-, 25-, and 100-year flows derived by Stillwater Sciences (2009) for the streamflow gage (see Figure 2b) were directly used for the hydraulic modeling analysis. The 10-, 25-, and 100-year flows derived by Stillwater Sciences (2009) for the streamflow gage were 2,860 cfs, 3,000 cfs, and 4,420 cfs, respectively.

3.0 HYDRAULIC ANALYSIS TO DETERMINE 10-YEAR, 25-YEAR, AND 100-YEAR WATER SURFACE ELEVATIONS

A concrete weir and a private driveway bridge are located within about 200 ft downstream of the downstream pipeline crossing (Figure 3) and these structures may have backwater effects during the 10-yeay, 25-year, and 100-year flow events. To account for these potential backwater effects, a hydraulic model was developed using the modeling program HEC-RAS. The model domain

[1] The drainage area at the streamflow gage is about 9.0 square miles. The additional drainage area between the gage and the downstream pipeline crossing (Site 1 in Figure 1) is only about 0.3 square mile.

covered an approximately 3,000 ft long reach of the creek (Figure 3); from about 200 ft downstream of the concrete weir up to about 120 ft upstream of the streamflow gage. Including the streamflow gage in the model domain was intended to calibrate the model using the observed water level at the gage. Within the model domain, in addition to the two pipeline crossings, there are four other structures (Figure 3). To develop the HEC-RAS model, Stetson performed a field survey on 9/4-7/2015 to supplement MMWD's recent existing channel survey at the two pipeline crossing sites and floodplain topographic data (Marin County's 50cm DEM, 2013).

3.1 Cross Section and Structure Geometry Survey

Upon field investigation, Stetson determined that a total of twenty three (23) cross-sections would be appropriate for developing the HEC-RAS model (see Figure 4 for the 23 cross-sections). Of the 23 cross sections, Stetson field-surveyed 19 cross sections and 4 cross sections were derived from the MMWD's recent existing channel survey data at the two pipeline crossing sites. Stetson also field-surveyed the geometry of all structures.

The National Geodetic Survey (NGS) benchmark JT9514 (N 38° 00.783 W 122° 41.917), with an elevation of 230.28 ft NAVD88, was used as the elevation control for the field survey. Stetson performed the field survey using a Leica Total Station. For the in-channel portion of the cross-sections, data points were taken at the river top of banks, slope breaks, toes, and river centerline. For the floodplain portion, if accessible, data points were taken to reflect any grade changes.

During the field survey, the owners of the properties at 7377 Sir Francis Drake Blvd and 7395 Sir Francis Drake Blvd reported to the Stetson surveyor that, during the 12/31/2005 flood event, they observed a peak water level of about 0.5 ft and 2 ft above their decks. Stetson surveyed their deck elevations. These surveyed deck elevations plus 0.5 ft and 2 ft were used as High Water Marks (HWM) for model calibration/verification.

Stetson also surveyed the elevation of the gage marker at 4 ft of the new staff gage (on the right side of the creek looking downstream) and found that the new gage datum is 199.21 ft NAVD88.

Starting in water year 2007, MMWD switched the old staff gage on the left side of the creek to a new staff gage on the right side of the creek (looking downstream). The new, right-side staff gage reads approximately 4.1 feet higher than the old staff gage. The staff gages were referenced to an arbitrary datum and historical gage readings did not represent absolute elevations of water in the creek (Balance Hydrologics, 2015). The Stetson-surveyed gage datum of 199.21 ft NAVD88 for the right-side staff gage can be used to convert gage readings to absolute elevations.

3.2 Hydraulic Model Development and Calibration/Verification

Field survey data points were loaded into AutoCAD and horizontally aligned to match the aerial photos (Figure 4). The data points were then imported to HEC-GeoRAS for pre-processing, including the delineation of river centerline, floodplain flow paths, and cross-section cutlines, and calculation of cross-section river stations and downstream flow path lengths. The HEC-RAS model was then created by importing from the HEC-GeoRAS pre-processing results into HEC-RAS. The two existing pipelines are not perpendicular to the channel. A skew angle of 15º for the upstream pipeline crossing and a skew angle of 30º for the downstream pipeline crossing were used in the model.

The model was first calibrated to the 12/2/2012 flow event using the peak discharge of 2,246 cfs and peak gage reading of 13.28 ft from the new staff gage (Balance Hydrologics, 2015) or 212.49 ft NAVD88 (13.28 ft + 199.21 ft = 212.49 ft). The channel roughness, or Manning's n, was adjusted within the reasonable range until the model-computed water surface elevation matched the gage reading. The final calibrated Manning's n was 0.055 for the main channel. This parameter value was considered reasonable as the channel is meandering with grass, brushes, and trees standing on both sides of the main channel (see the photo on the report cover). The calibration result is shown in Figures 5a and 5b. The difference between the simulated water surface elevation and the observed water surface elevation at the streamflow gage was about 0.3 ft.

The model was then verified to the 12/31/2005 flood event using the peak discharge of 3,940 cfs and peak gage reading of 12.30 ft from the old staff gage (Balance Hydrologics, 2015) or 215.61 ft NAVD88 (12.30 ft + 4.1 ft + 199.21 ft = 215.61 ft). No adjustment of model parameters were made to the calibration except that a Manning's n of 0.15 for the floodplain was used in the verification. The Manning's n of 0.15 for the floodplain reflects observations of vegetations, fences, and other obstructions associated with residential use. The verification result is shown in Figures 6a and 6b. The differences between the simulated water surface elevations and the observed high water marks were all within 0.4 ft.

3.3 Model Simulations to Determine 10-Year, 25-Year, and 100-Year Water Surface Elevations

The calibrated/verified HEC-RAS model was then run with the 10-year, 25-year, and 100-year peak discharges of 2,860 cfs, 3,000 cfs, and 4,420 cfs, respectively to determine water surface elevations along the creek at the two pipeline crossing locations. The simulated water surface elevations at the cross-sections are shown in Figure 7 and summarized in Table 1. The bottom elevations of the existing downstream and upstream pipelines are at 202.26 ft and 211.85 ft NAVD88 respectively, which are higher than the simulated 100-year water surface elevations. The existing pipelines are within the creek's banks, the 100-year flow would also be contained within the creek's banks at the two pipeline crossing locations[2]. Figure 8 shows the simulated 100-year water surface elevations presented in a plan view.

Table 1 10-Year, 25-Year, and 100-Year Water Surface Elevations at the Two Pipeline Crossing Locations

Flow Event	Peak Discharge	Water Surface Elevation at the D/S Pipeline Crossing (ft in NAVD88)	Water Surface Elevation at the U/S Pipeline Crossing (ft in NAVD88)
10-Year	2,860 cfs	198.64	208.48
25-Year	3,000 cfs	198.82	208.72
100-Year	4,420 cfs	200.61	210.97

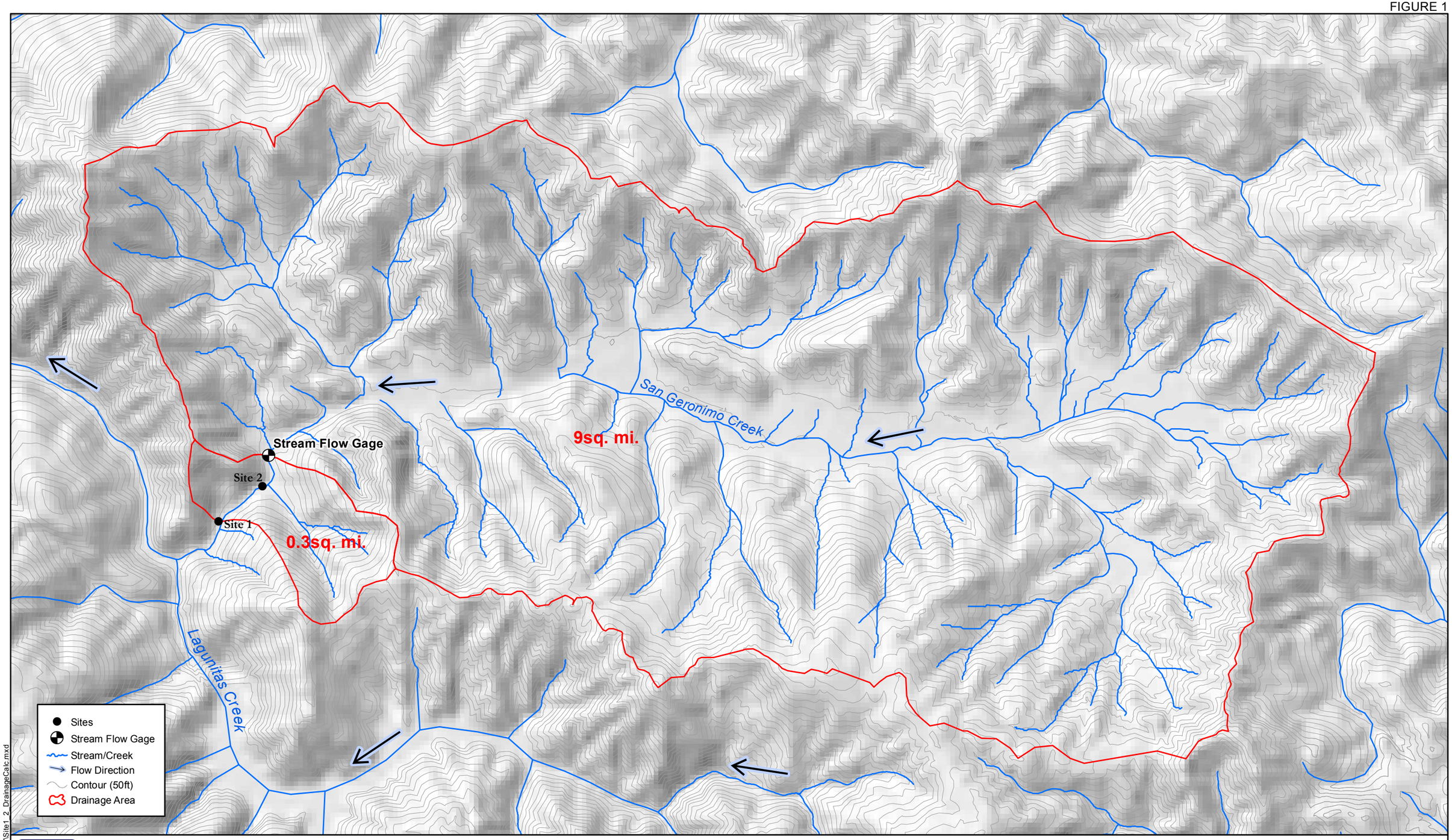
[2] The two high water mark locations are about 500-700 ft away from the two pipelines. The heights of the creek's banks at these two locations are relatively low, resulting overbank flows during the 12/31/2005 flood event.

4.0 REFERENCES CITED

Balance Hydrologics, Inc. 2015. Annual Hydrologic Record and Sediment-Transport Measurements for San Geronimo Creek at Lagunitas Road, Marin County, California: Data Report for Water Year 2014.

Marin County, 2013. Marin County topographic data (50 cm DEM).

Stillwater Sciences, 2009. San Geronimo Valley Salmon Enhancement Plan/ Existing Conditions. Prepared for Marin County Department of Public Works



Document Path: J:\jn2577\Site1_2_DrainageCalc.mxd

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PROJECT SITES AND STREAM FLOW GAGE

0 1,000 2,000 Feet

N

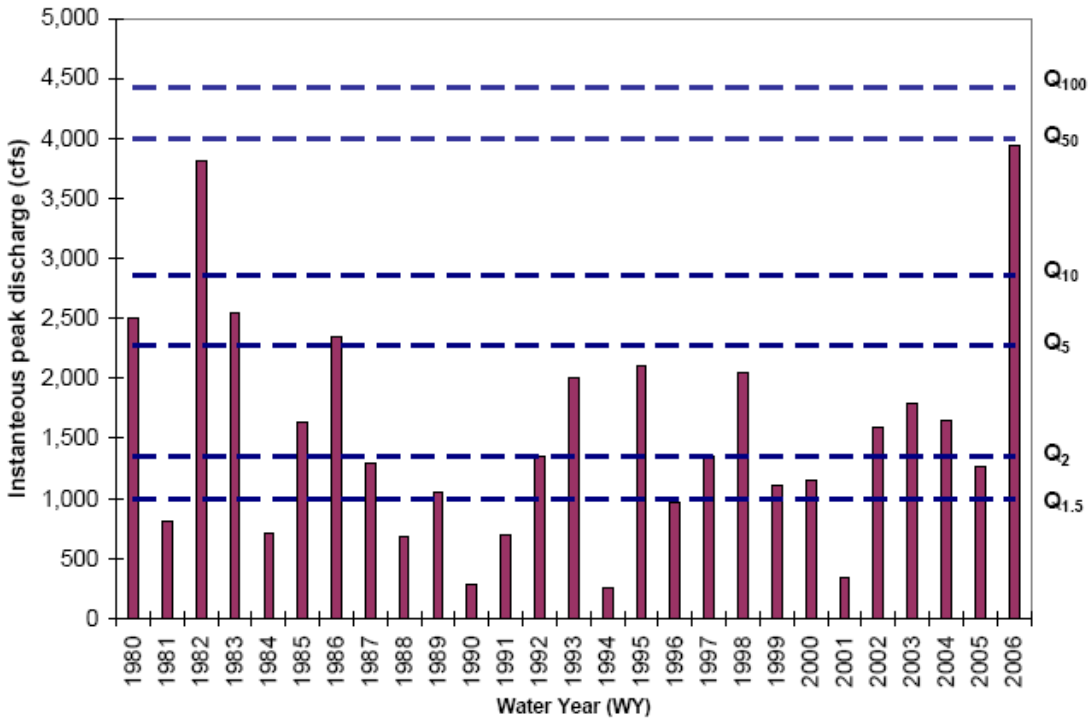


Figure 2a Annual Peak Discharges for San Geronimo Creek at the Lagunitas Road Bridge
(Source: Stillwater Sciences, 2009)

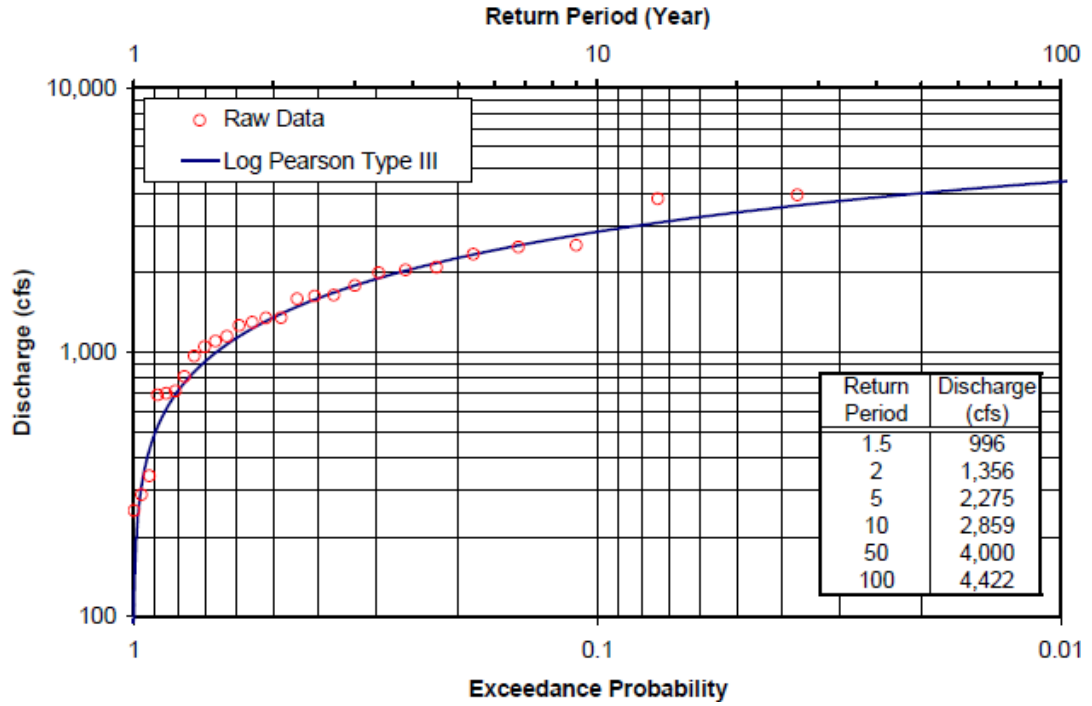
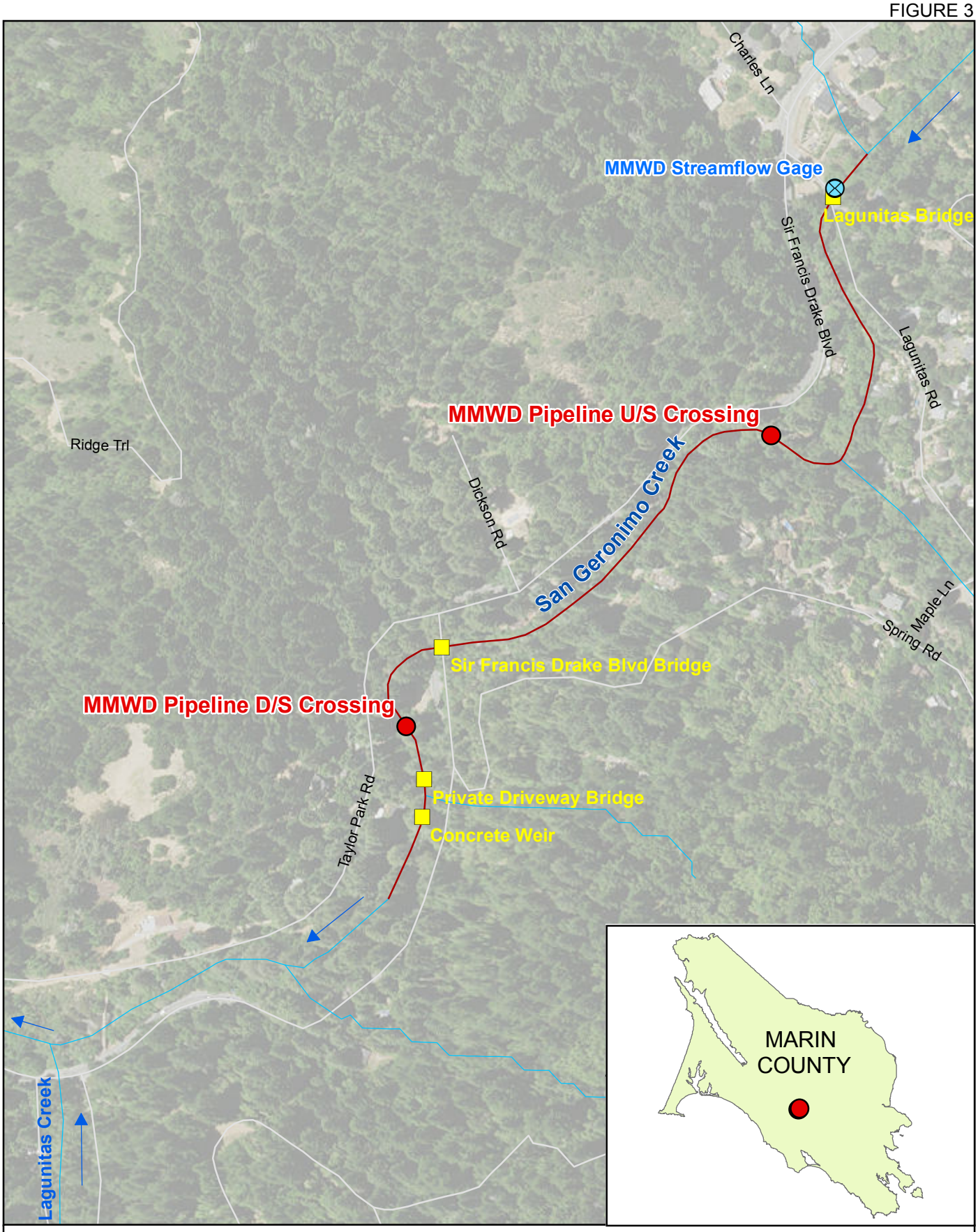


Figure 2b Flood Frequency Curve for the San Geronimo Creek at Lagunitas Road Bridge (WY 1980–2006)
(Source: Stillwater Sciences, 2009)

FIGURE 3



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Project Location and Hydraulic Modeling Reach

Legend

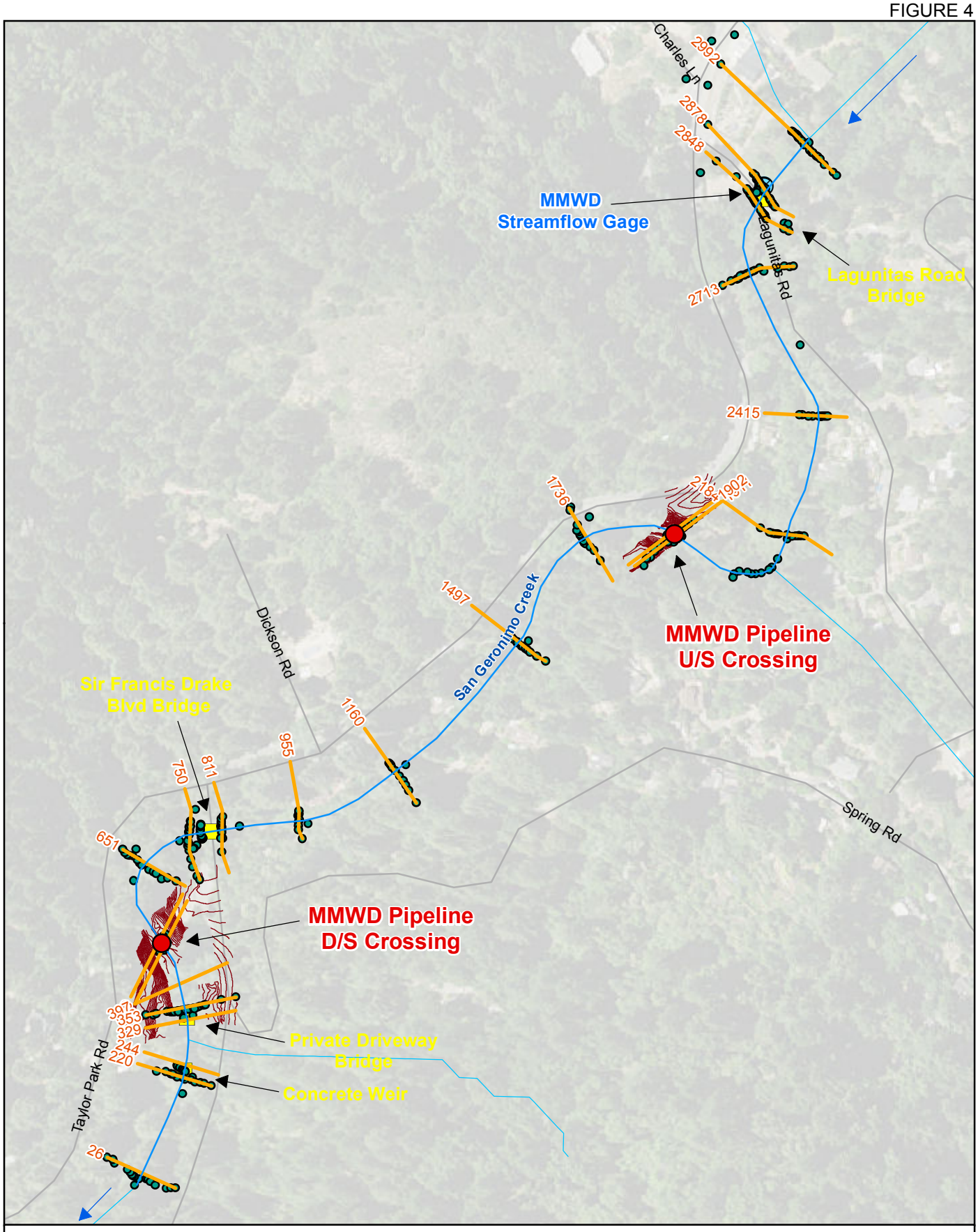
- MMWD Streamflow Gage
- Bridge & Weir
- MMWD Pipeline Crossing
- Modeling Reach

N

0 100 200 Feet

Aerial photo: County 2014

FIGURE 4



HEC-RAS Model
Cross Sections Layout

STETSON ENGINEERS INC.

Legend

- XS Cutlines & River Station
- Stetson 2015 XS Survey
- MMWD Topo Survey
- MMWD Streamflow Gage
- MMWD Pipeline Crossing
- Bridge & Weir

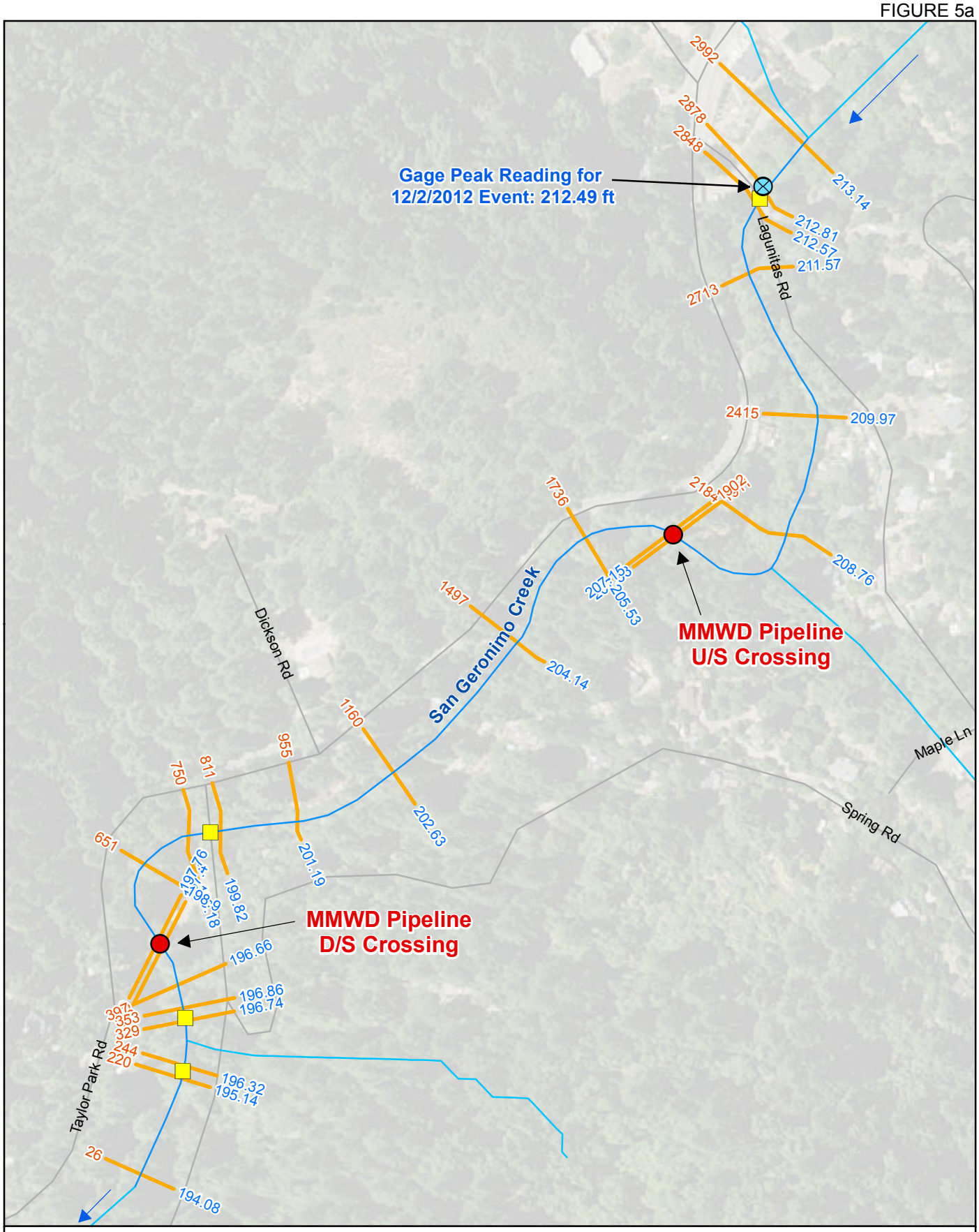
N

0 100 200 Feet

Aerial photo: County 2014

Document Path: C:\DATA\2577\GIS\Fig 2.mxd

FIGURE 5a



Simulated Water Surface Elevations for the 12/2/2012 Flow Event (Peak Flow = 2,246 cfs) – Model Calibration

(Elevation Datum: FT NAVD88)

STETSON ENGINEERS INC.

Legend

- MMWD Streamflow Gage
- MMWD Pipeline Crossing
- Bridge & Weir
- XS, Station (orange), and WSE (blue)

N

0 100 200 Feet

Aerial photo: County 2014

Document Path: C:\DATA\2577\GIS\Fig 3a.mxd

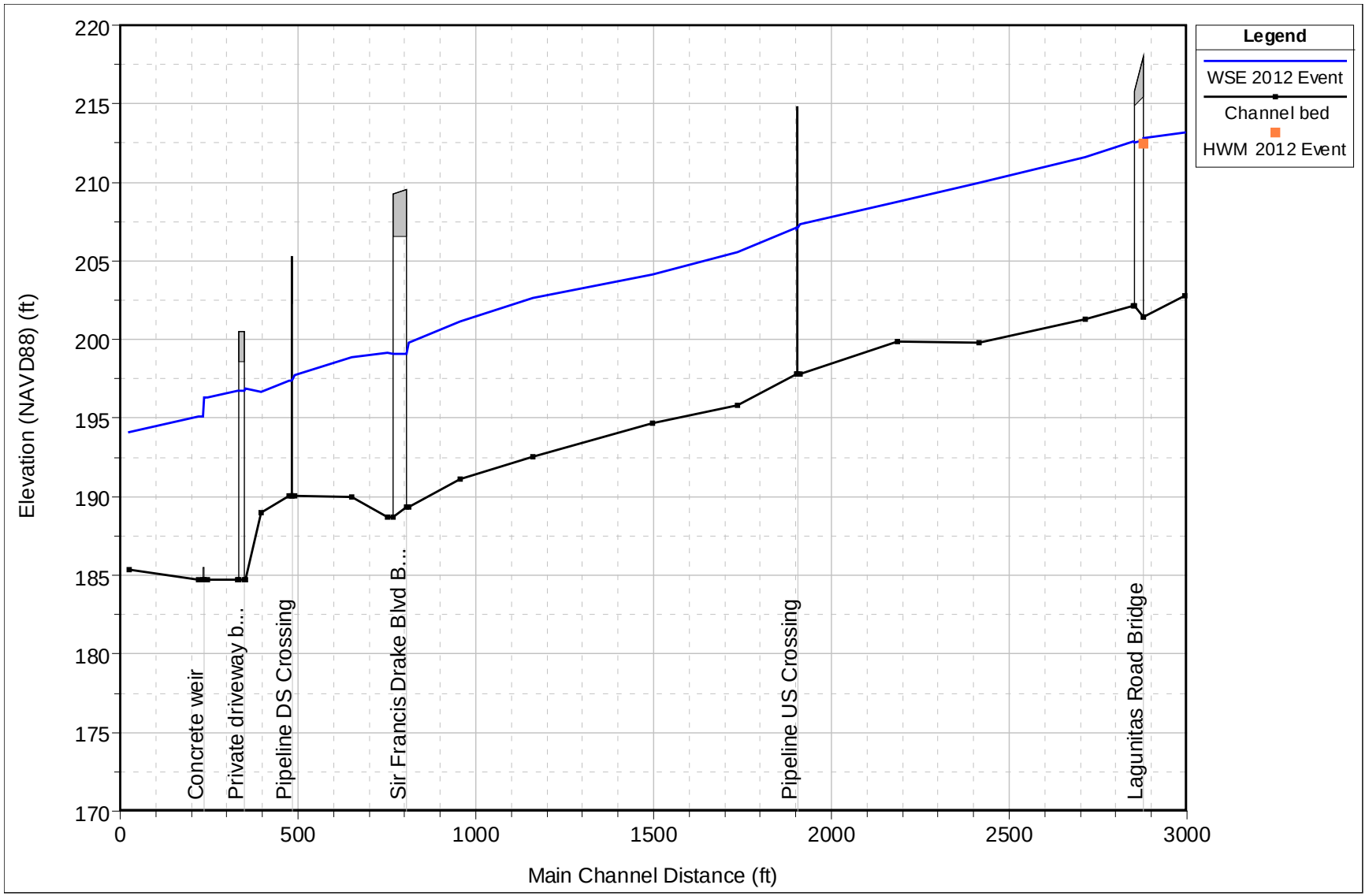
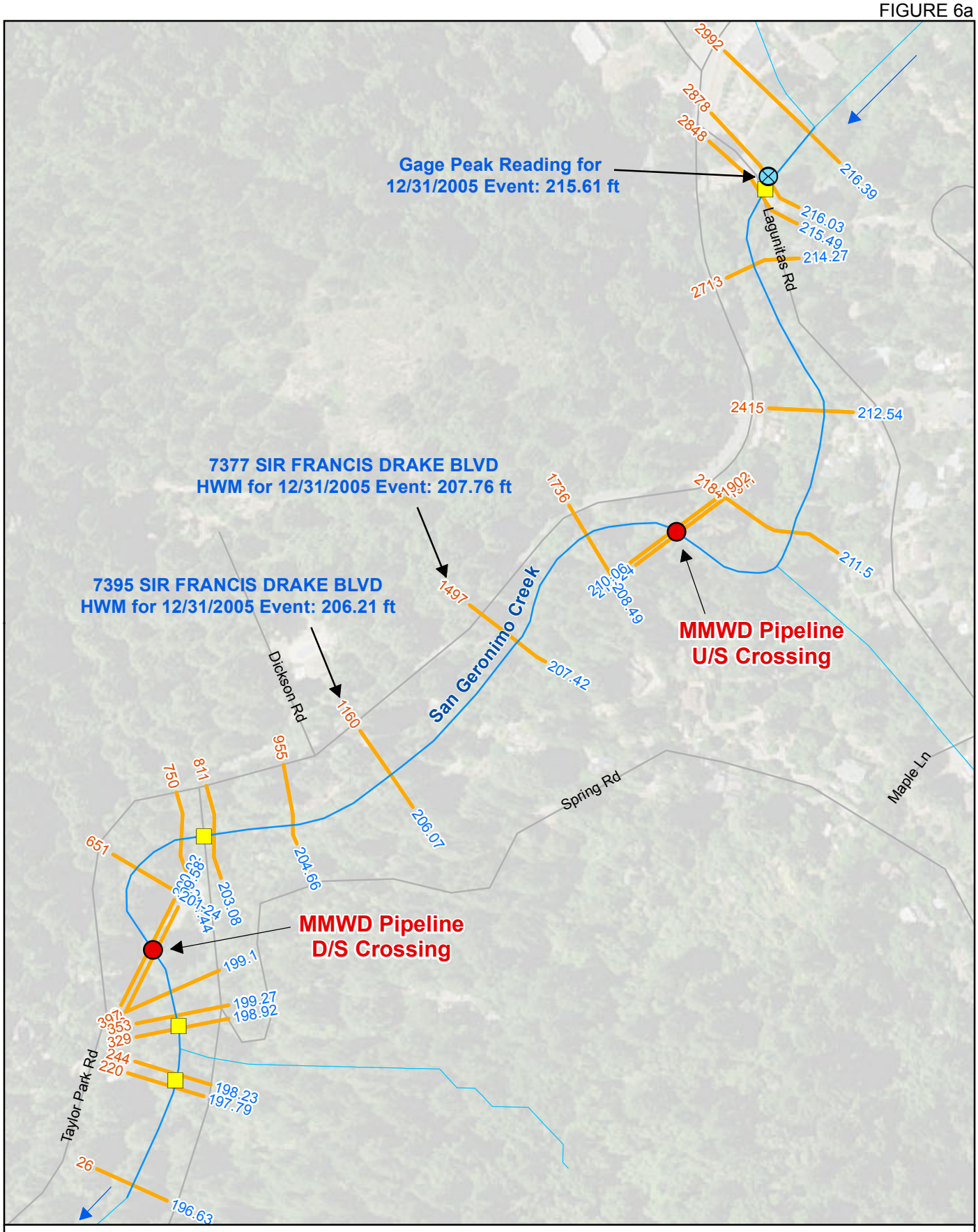


Figure 5b Simulated Water Surface Profile for the 12/2/2012 Flow Event (Peak Flow = 2,246 cfs) – Model Calibration

FIGURE 6a



Simulated Water Surface Elevations for the 12/31/2005 Flood Event (Peak Flow = 3,940 cfs) – Model Verification

(Elevation Datum: FT NAVD88)

STETSON ENGINEERS INC.

Legend

- MMWD Streamflow Gage
- MMWD Pipeline Crossing
- Bridge & Weir
- XS, Station (orange), and WSE (blue)

N

0 100 200 Feet

Aerial photo: County 2014

Document Path: C:\DATA\2577\GIS\Fig 4a.mxd

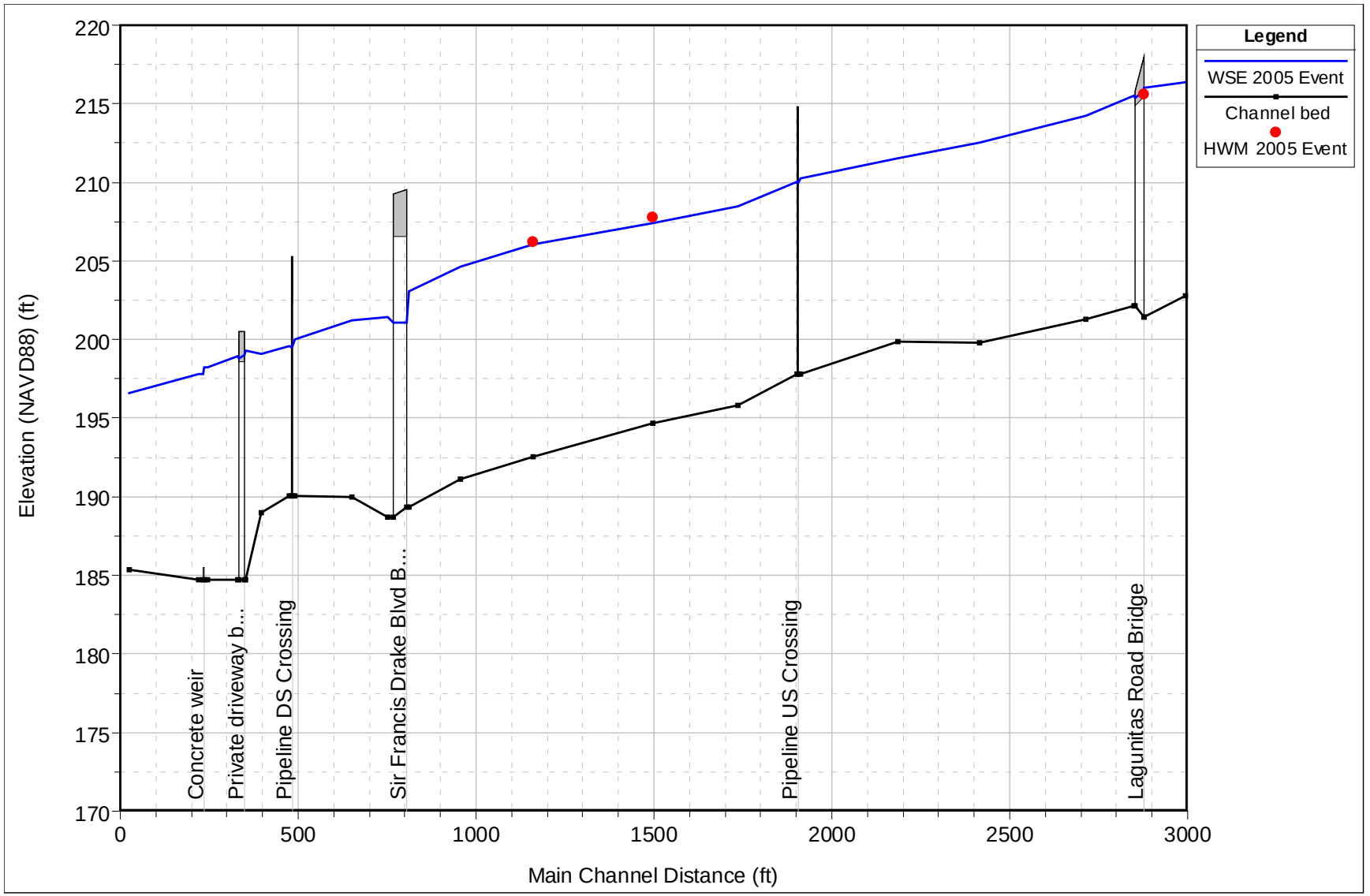


Figure 6b Simulated Water Surface Profile for the 12/31/2005 Flood Event (Peak Flow = 3,940 cfs) – Model Verification

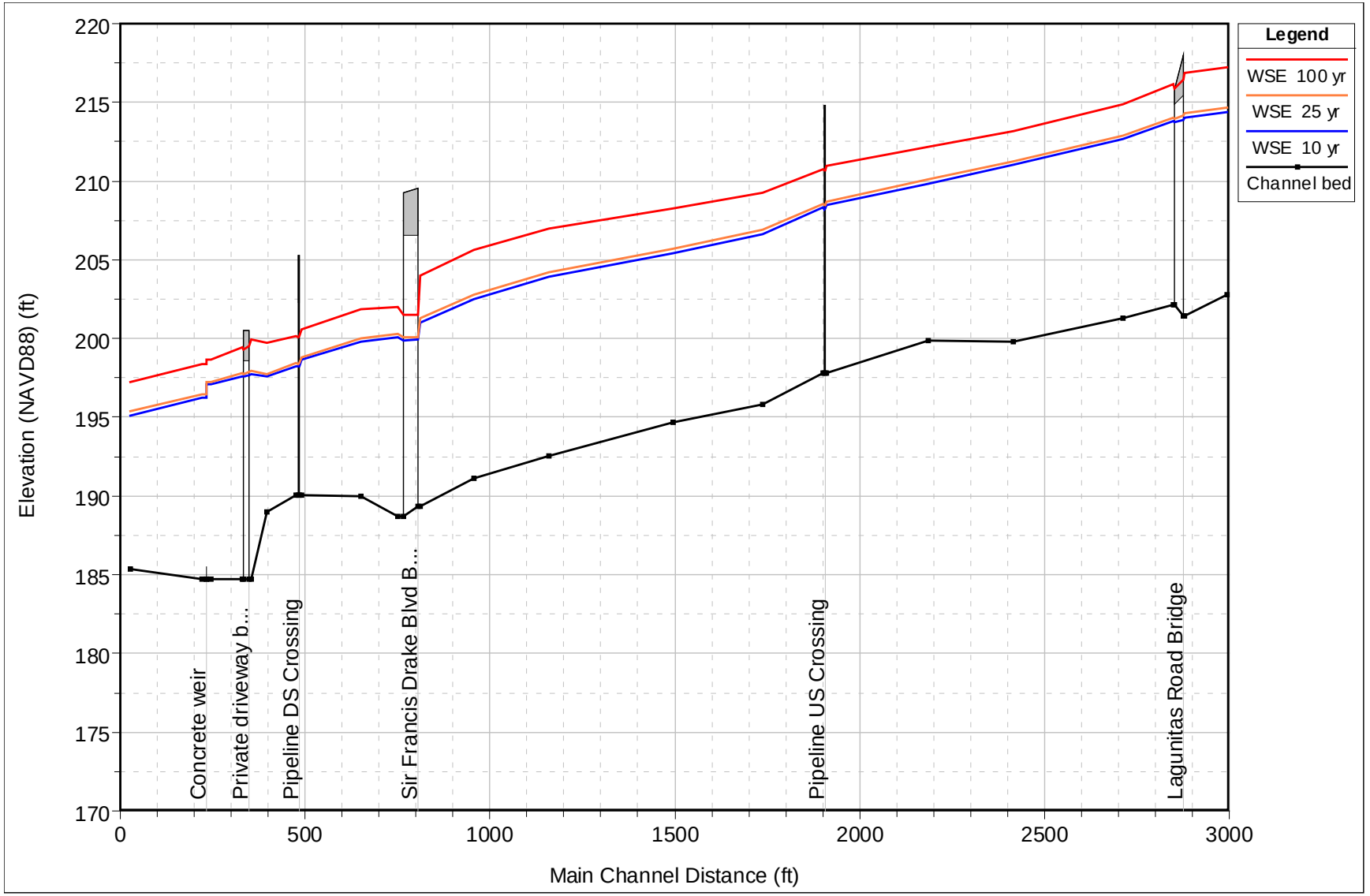
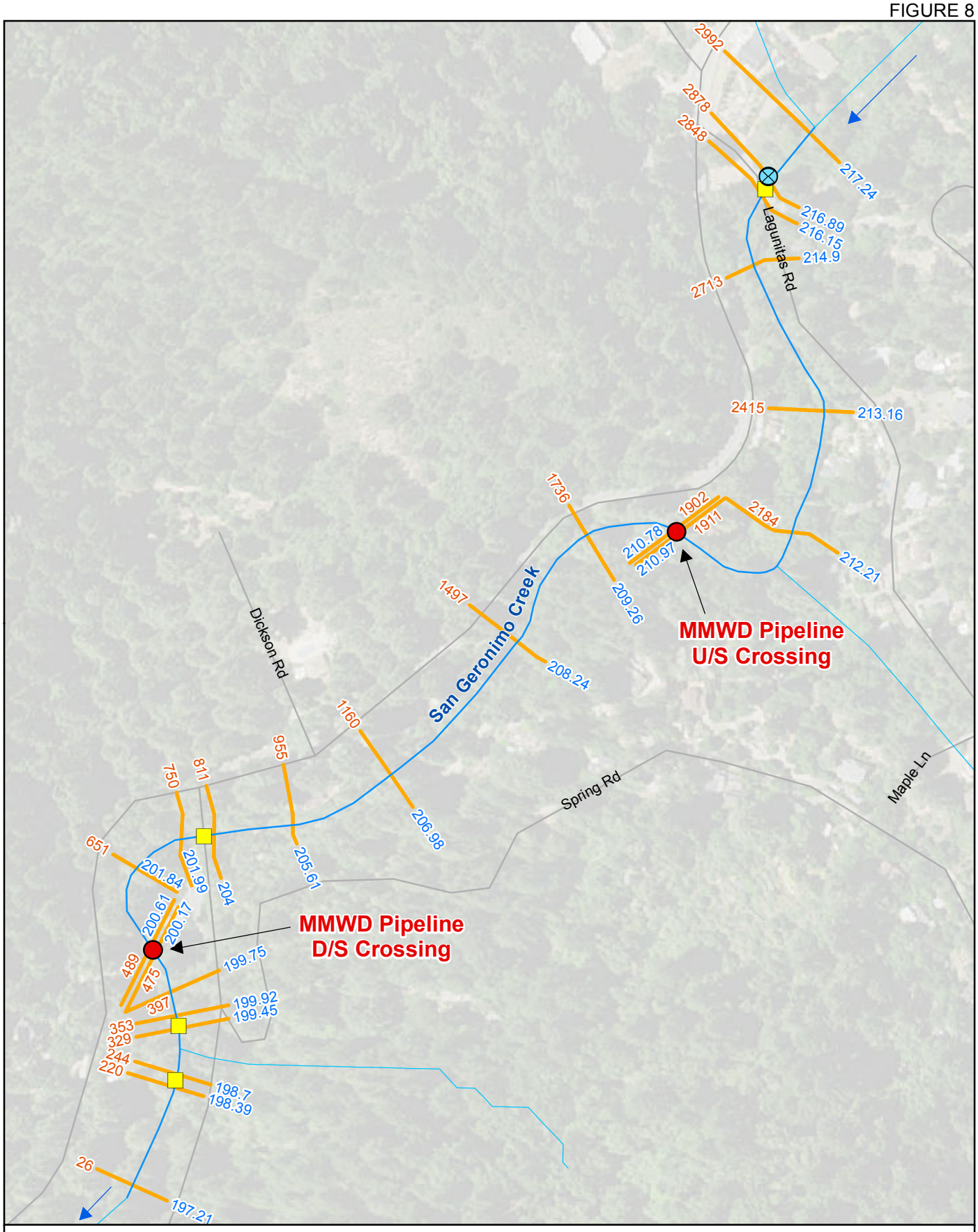


Figure 7 Simulated 10-Year, 25-Year, and 100-Year Water Surface Elevations

FIGURE 8



Simulated 100-Year Water Surface Elevations (Peak Flow = 4,420 cfs)

(Elevation Datum: FT NAVD88)

Legend

- MMWD Streamflow Gage
- MMWD Pipeline Crossing
- Bridge & Weir
- XS, Station (orange), and WSE (blue)

N

0 100 200 Feet

Aerial photo: County 2014

STETSON ENGINEERS INC.

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Appendix B

Standard Environmental Protection Measures

SECTION 18000

ENVIRONMENTAL PROTECTION

PART 1 - GENERAL

1.1 SCOPE

A. The requirements of Division 1 form a part of this section.

B. During the progress of the work, keep the premises occupied in a neat and clean condition and protect the environment both on site and off site, throughout and upon completion of the construction project.

1.2 SUBMITTALS

Contractor shall develop an Environmental Protection Plan in detail and submit to the Engineer within seven (7) days from the date of the Notice to Proceed. Distribute the plan to all employees and to all subcontractors and their employees.

The Environmental Protection Plan shall include, but not be limited to, the following items:

A. Copies of required permits.

B. Proposed sanitary landfill site.

C. Other proposed disposal sites.

D. Copies of any agreements with public or private landowners regarding equipment, materials storage, borrow sites, fill sites, or disposal sites. Any such agreement made by the Contractor shall be invalid if its execution causes violation of local or regional grading or land use regulations.

E. Proposed project site winterization plan.

1.3 ENVIRONMENTAL REQUIREMENTS

All operations shall comply with all federal, state and local regulations pertaining to water, air, solid waste and noise pollution.

1.4 DEFINITIONS

Sediment - Soil and other debris that have been eroded and transported by runoff water.

Solid Waste - Rubbish, debris, garbage and other discarded solid materials resulting from construction activities, including a variety of

combustible and non-combustible wastes, such as ashes, waste materials that result from construction or maintenance and repair work, leaves and tree trimmings.

Chemical Waste - Includes petroleum products, bituminous materials, salts, acids, alkalies, herbicides, pesticides, disinfectants, organic chemicals and inorganic wastes. Some of the above may be classified as "hazardous."

Sanitary Wastes-

Sewage - That which is considered as domestic sanitary sewage.

Garbage - Refuse and scraps resulting from preparation, cooking, dispensing and consumption of food.

Hazardous Mat'ls - As defined by applicable laws and regulations. Undisclosed hazardous material contamination, if encountered will constitute a changed site condition. The District may retain a separate contractor to dispose of undisclosed hazardous material encountered.

PART 2 - PRODUCTS

(None)

PART 3 - EXECUTION

3.1 PROTECTION OF NATURAL RESOURCES

A. GENERAL

It is intended that the natural resources within the project boundaries and outside the limits of permanent work performed under this Contract be preserved in their existing condition or be restored to an equivalent or improved condition upon completion of the work. Confine construction activities to areas defined by the public roads, easements, and work area limits shown on the Drawings. Return construction areas to their pre-construction elevations except where surface elevations are otherwise noted to be changed. Maintain natural drainage patterns. Conduct construction activities such that ponding of stagnant water conducive to mosquito breeding habitat will not occur at any time.

Prevent the Spread of Invasive Species - Precautions shall be taken to minimize the introduction of any invasive weeds or to prevent the spread of existing infestations. Prior to mobilizing any equipment and/or vehicles to the project site they shall be properly cleaned to remove all mud and seed from tracks, tires, and undercarriages. If invasive species are mapped within the project area those sites should be

avoided. All equipment shall be cleaned before mobilizing to different project sites on the watershed. The Contractor shall comply with the Best Management Practices for Transportation and Utility Corridors published by the California Invasive Plant Council, which is incorporated into the Contract by reference herein.

B. LAND RESOURCES

1. Contractor Responsibility

Do not remove, cut, deface, injure or destroy trees, grapevines or shrubs outside the work area limits. Do not remove, deface, injure or destroy trees within the work area without permission from the Engineer. Such improvements shall be removed and replaced, if required, by the Contractor at his own expense.

2. Protection

Protect trees that are located near the limits of the Contractor's work areas which may possibly be defaced, bruised or injured or otherwise damaged by the Contractor's operations. No ropes, cables or guys shall be fastened to or attached to any existing nearby trees, grapevines or shrubs for anchorages unless specifically authorized. Where such special emergency use is permitted, the Contractor shall be responsible for any damage resulting from such use.

3. Trimming

Trim tree limbs overhanging the line of the work and in danger of being damaged by the Contractor's operations in accordance with recognized standards for such work. Remove other tree limbs under the direction of the Engineer, so that the tree will present a balanced appearance.

4. Treatment of Roots

Do not cut roots unnecessarily during excavating or trenching operations. Expose major roots encountered in the course of excavation and do not sever. Wrap them in burlap as a protective measure while exposed. Neatly trim all other roots (one inch in diameter and larger) that are severed in the course of excavation at the edge of the excavation or trench and paint them with a heavy coat of an approved tree seal as directed by the Engineer.

5. Repair or Restoration

Repair or replace any trees or other landscape features scarred or damaged by equipment or construction operations as specified below.

The repair and/or restoration plan shall be favorably reviewed prior to its initiation.

6. Temporary Construction

Obliterate all signs of temporary construction facilities such as haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess or waste materials, or any other vestiges of construction as directed by the Engineer. Level all temporary roads, parking areas and any other areas that have become compacted or shaped. Any unpaved areas where vehicles are operated shall receive a suitable surface treatment or shall be periodically wetted down to prevent construction operations from producing dust damage and nuisance to persons and property, at no additional cost to the Owner. Keep haul roads clear at all times of any object which creates an unsafe condition. Promptly remove any contaminants or construction material dropped from construction vehicles. Do not drop mud and debris from construction equipment on public streets. Sweep clean turning areas and pavement entrances as necessary.

C. WATER RESOURCES

Investigate and comply with all applicable federal, state and local regulations concerning the discharge (directly or indirectly) of pollutants to the underground and natural waters. Perform all work under this Contract in such a manner that any adverse environmental impacts are reduced to a level that is acceptable to the Engineer and regulatory agencies. Refer to Section 02200, EARTHWORK, paragraph on control of water for "dewatering" water disposal requirements.

1. Oily Substances

At all times, special measures shall be taken to prevent oily or other hazardous substances from entering the ground, drainage areas or local bodies of water in such quantities as to affect normal use, aesthetics or produce a measurable impact upon the area. Any soil or water which is contaminated with oily substances due to the Contractor's operations shall be disposed of in accordance with applicable regulations.

2. Chlorinated Water

Take special measures to prevent chlorinated water from entering the ground or surface waters. Dechlorinate chlorinated water prior to discharge.

D. FISH AND WILDLIFE RESOURCES

Perform all work and take such steps required to prevent any interference or disturbance to fish and wildlife. The Contractor will not be permitted to alter water flows or otherwise significantly disturb native habitat adjacent to the project area which are critical to fish and wildlife except as may be indicated or specified.

E. CULTURAL RESOURCES

The project does not pass through any known archaeological sites. However, it is conceivable that unrecorded archaeological sites could be discovered during the construction. In the event that artifacts, human remains, or other cultural resources are discovered during subsurface excavations at locations of the work, the Contractor shall protect the discovered items, notify the Engineer, and comply with applicable law.

3.2 NUISANCE ABATEMENT

A. NOISE CONTROL

1. Location – except as modified in Section 09870 – Coating Systems
Maximum Noise Levels within 1,000 Feet of any Residence, Business, or Other Populated Area: Noise levels for trenchers, pavers, graders and trucks shall not exceed 90 dB at 50 feet as measured under the noisiest operating conditions. For all other equipment, noise levels shall not exceed 85 dB at 50 feet.

2. Equipment
Electrically powered equipment instead of pneumatic or internal combustion powered equipment shall be used, where feasible.
Jack hammers shall be equipped with exhaust mufflers and steel muffling sleeves. Air compressors should be of a quiet type such as a "whisperized" compressor.

All noise-producing project equipment and vehicles using internal combustion engines (including haul trucks) shall be fitted with mufflers, air-inlet silencers where appropriate, and any other shrouds, shields, or other noise-reducing features. These devices shall be maintained in good operating condition so as to meet or exceed original factory specifications. Mobile or fixed “package” equipment (e.g., air compressors) shall be equipped with shrouds and noise control features that are readily available for that type of equipment.

All mobile or fixed noise-producing equipment used on the project, which is regulated for noise output by a local, state, or federal agency, shall comply with such regulations while in the course of project activities.

3. Operations

Keep noisy equipment as far as possible from noise-sensitive site boundaries. Machines should not be left idling. Use electric power in lieu of internal combustion engine power wherever possible. Maintain equipment properly to reduce noise from excessive vibration, faulty mufflers, or other sources. All engines shall have mufflers.

The use of noise-producing signals, including horns, whistles, alarms, and bells shall be for safety warning purposes only.

4. Scheduling

Schedule noisy operations so as to minimize their duration at any given location.

5. Monitoring

To determine whether the above noise limits are being met and whether noise barriers are needed, the Contractor shall use a portable sound level meter meeting the requirements of American National Standards Institute Specification S1.4 for Type 2 sound level meters. If non-complying noise levels are found, the Contractor shall be responsible for monitoring and correction of excessive noise levels.

B. DUST CONTROL, AIR POLLUTION, AND ODOR CONTROL

1. Unpaved areas where vehicles are operated shall be periodically wetted down or given an equivalent form of treatment, to eliminate dust formation.

2. Store all volatile liquids, including fuels or solvents in closed containers.

3. No open burning of debris, lumber or other scrap will be permitted.

4. Properly maintain equipment to reduce gaseous pollutant emissions.

3.3 CONSTRUCTION STORAGE AREAS

A. Store and service equipment at the designated Contractor's storage area where oil wastes shall be collected in containers. Oil wastes shall not be allowed to flow onto the ground or into surface waters. Containers shall be required at the construction site for the disposal of materials such as paint, paint thinner, solvents, motor oil, fuels, resins and other environmentally deleterious

substances. No dumping of surplus concrete or grout on the site will be permitted.

3.4 FIRE PREVENTION

A. Provide spark arresters on all internal combustion engines.

B. Store and handle flammable liquids in accordance with the Flammable and Combustible Liquids Code, NFPA 30.

C. Provide fire extinguishers at hazardous locations or operations, such as welding.

3.5 EROSION AND SEDIMENT TRANSPORT CONTROL

A. Discharge construction runoff into small drainages at frequent intervals to avoid buildup of large potentially erosive flows.

B. Prevent runoff from flowing over unprotected slopes.

C. Keep disturbed areas to the minimum necessary for construction.

D. Keep runoff away from disturbed areas during construction.

E. Direct flows over vegetated areas prior to discharge into public storm drainage systems.

F. Trap sediment before it leaves the site, using such techniques as check dams, sediment ponds, or siltation fences.

G. Remove and dispose of all project construction-generated siltation that occurs in offsite retention ponds.

H. Confine construction to the dry season, whenever possible. If construction needs to be scheduled for the wet season, ensure that erosion and sediment transport control measures are ready for implementation prior to the onset of the first major storm of the season.

I. Stabilize disturbed areas as quickly as possible.

3.6 DISPOSAL OPERATIONS

A. SOLID WASTE MANAGEMENT

Supply solid waste transfer containers. Daily remove all debris such as spent air filters, oil cartridges, cans, bottles, combustibles and litter. Take care to prevent trash and papers from blowing onto adjacent property. Encourage personnel to use refuse containers. Convey contents to a sanitary landfill.

Washing of concrete containers where waste water may reach adjacent property or natural water courses will not be permitted. Remove any excess concrete to the sanitary landfill.

B. CHEMICAL WASTE AND HAZARDOUS MATERIALS MANAGEMENT

Furnish containers for storage of spent chemicals used during construction operations. Dispose of chemicals and hazardous materials in accordance with applicable regulations.

C. GARBAGE

Store garbage in covered containers, pick up daily and dispose of in a sanitary landfill.

D. CLEARING AND GRUBBING

Dispose of vegetation, weeds, rubble, and other materials removed by the clearing, stripping and grubbing operations off site at a suitable disposal site in accordance with applicable regulations.

E. EXCAVATED MATERIALS

1. Native soil complying with the requirements of Section 02200, EARTHWORK, may be used for backfill, fill and embankments as allowed by that section.

2. Spoil Material: Remove all material which is excavated from the site and dispose of offsite in accordance with applicable regulations disposal site indicated in the Environmental Protection Plan. No additional compensation will be paid to the Contractor for such disposal. Include all such costs in the lump sum prices bid for the project. Remove rubbish and materials immediately following excavation.

   Rubbish shall consist of all materials not classified as suitable materials or rubble and shall include shrubbery, trees, timber, trash and garbage.

3. Excavated material may be stockpiled offsite for reuse in accordance with the requirements of Section 02200, EARTHWORK. Offsite stockpile locations shall be legally obtained by the Contractor and shall meet all of the applicable regulations and requirements of this Section. No additional compensation will be paid to the Contractor for such stockpiling and reuse of native soil.

END OF SECTION

SECTION 01000

ENVIRONMENTAL PROTECTION HIGH FIRE DANGER ALERTS AND CLOSURES

Marin County open space is very susceptible to wild land fires during the warm seasons of the year. This includes all "Open Space" lands such as MMWD lands, Marin County Open Space District (MCOSD) lands and any other private open space lands. Contractor must be aware of the possibility of fires at other times also and must use their own good judgment to work in a safe manner to prevent wild land fires. Contractors are encouraged to bring to any fire safety problems they observe or suggestions they may have to the attention of the Engineer. **Smoking is prohibited. This includes no smoking inside vehicles while on open space land.**

Red Flag Warning - Interagency Fire Closure Upon notification from the County Fire Department that a "Red Flag Warning - High Fire Danger Alert" exists for Marin County, Contractor shall suspend work at all affected open space lands. Contractors should monitor fire conditions with the Marin County Fire Department to know when closures are in effect. Contractor shall call the Marin County Fire Department contact the day before at 5 pm (415-499-7191) or otherwise as set by the County, each day to determine the fire conditions projected for the following day and plan their schedule accordingly.

If after 5 pm a high fire condition causes closure for the following day, then that Periods of high fire danger which result in the contractor being required to suspend work shall be considered Unavoidable Delays as described in Article 86 of the Standard Conditions. Additionally, during these periods the contractor may be prohibited from entering the open space lands.

RADIO COMMUNICATIONS

Whenever any work is being performed that may pose a potential fire danger, cell phones or 2-way radios must be on site to permit a rapid emergency response if necessary.

VEHICLES, EQUIPMENT, TOOLS

Trucks, Tractors Heat from exhaust systems can ignite a fire. Do not drive off road or in any area with tall grass whenever possible. Be sure all trucks and tractors are equipped with a fire extinguisher. Inspect trucks and tractors before use to be sure the spark arrestor exhaust system is in good condition and that there are no fires related defects. The Contractor shall not drive off road or park near or drive through tall grasses or other flammable vegetation types without approval from the District Inspector. Based upon authorization by District staff, the Contractor shall remove all grasses and other types of flammable vegetation from the off road work area approved for vehicle access.

Equipment, Tools Heat from power equipment exhaust systems, or sparks from equipment or tools can ignite a fire. Clear a space with a radius at least five feet from the exhaust in which to place equipment such as generators, chainsaws and power weed cutters. Be careful when using tools that produce sparks and be sure spark arrestors are

in good condition. Do not allow heated tools to contact ignitable fuels. If power equipment or tools that produce sparks are in use, a fire extinguisher must be kept onsite. Larger equipment should have a fire extinguisher mounted on it.

Fueling Equipment Before fueling power equipment or tools in the field, clear a space in which to perform the task. Fuel should be stored in a cleared space and, where possible, in the shade. If power equipment stays in one location during the task, store fuel and equipment and perform fueling operation in the same clearing. Be sure equipment is turned off while fueling. Take extra care when fueling heated equipment. Be sure gas spout/funnel is used to avoid spills and that gas caps are kept in place. Remove or dry any fuel spillage prior to starting equipment. During fueling operations, a fire extinguisher should be onsite ready for use.

GRASS AND BRUSH MOWING

Equipment and tools used to perform this fire hazard reduction task could instead ignite a fire. Suspend this task during "High Fire Danger Alert" periods. Use extreme caution in dry areas. Follow all procedures for equipment and tools. Use only non-metallic heads on weed cutters. Do not lay heated tools down in ignitable fuels. Carry a portable fire extinguisher at all times when working or fueling the brush cutter. When a tractor mower is used, a truck with a fire pumper must accompany the tractor. When the truck cannot follow due to terrain or tall grass conditions, then the truck driver must walk, carrying an additional fire extinguisher.

WELDING

Suspend this task during "High Fire Danger Alert" periods, on other hot dry days and when winds exceed five miles per hour. Perform this task in the morning prior to 10 am. Remove grass within a twelve-foot radius of the welding site. Wet the ground and surrounding vegetation prior to welding and every fifteen minutes thereafter. Maintain a portable welding screen around the welder. A truck-mounted pumper must be at the welding site, with the pump engaged during welding. An extra person must be present with no other duty except to watch for fire and operate the pumper.

FIRE SAFETY EQUIPMENT OPERATION

Where a truck with water pump is required, a person fully trained in truck and water pump operation must be present. All operators must be fully trained in use of the fire extinguishers.

Contractors shall have fire extinguishers onsite and follow fire safe procedures.

END OF SECTION

SECTION 02200

EARTHWORK

PART 1 - GENERAL

1.1 DESCRIPTION

This section includes specifications for furnishing, placing and performing earthwork for excavations, shoring, dewatering, backfilling, compaction and grading, at the required lines and grades, as shown on the drawings. The excavation shall include, without classification, the removal and disposal of all materials of whatever nature encountered, except hazardous waste. Water and all other obstructions, that would interfere with the proper construction and completion of the required work shall be removed and disposed of in accordance with the requirements of Section 18000 - ENVIRONMENTAL PROTECTION.

1.2 RELATED SECTIONS

A. Section 02713 - DISTRIBUTION PIPING SYSTEM

B. Section 03400 - CONTROL DENSITY FILL

1.3 REFERENCES

A. ASTM D1557 - Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb rammer and 18 inch drop.

B. ASTM D2216 - Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures

C. ASTM D2419 – Sand Equivalent Value of Soils and Fine Aggregates

D. ASTM D2487 - Classification of Soils for Engineering Purposes

E. ASTM D2844 - Resistance R Value and Expansion Pressure of Compacted Soils

F. ASTM D2922 - Density of Soil and Soil-Aggregate in place by Nuclear Methods (Shallow Depth)

G. ASTM D3017 - Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

1.4 SUBMITTALS

A. Sheeting and Shoring Plan: Refer to General Specifications, Article 11.

B. Samples and Test Results: Furnish, without additional cost to the District, such quantities of import materials as may be required by the Engineer for test

purposes. The Contractor shall cooperate with the Engineer and furnish necessary facilities for sampling and testing of all materials and workmanship. Submit test results for import materials. All material furnished and all work performed shall be subject to rigid inspection, and no material shall be delivered to the site until it has been favorably reviewed by the Engineer, or used in the construction work until it has been inspected in the field by the Engineer.

1.5 DUST CONTROL

Refer to Section 18000, Paragraph 3.2B.

1.6 SITE ACCESS

Access to the site will be over public and private roads. The Contractor shall exercise care in the use of such roads and shall repair at his own expense any damage thereto caused by his operations. Such repair shall be to the satisfaction of the owner or agency having jurisdiction over the road. The Contractor shall take whatever means are necessary to prevent tracking of mud onto existing roads.

1.7 SOILS TESTING

Listed below are the standard test methods to be employed by the District or by the Contractor's soils testing firm. The intent of these tests is to insure the quality of backfill material and the workmanship, methods and final product of the Contractor.

A. In determining the in-place Density of Soil and Soil-Aggregate by nuclear methods, testing shall conform to ASTM D2922 or California Test Method No. 216.

B. In determining laboratory moisture-density relationships of soils, testing shall conform to by ASTM D1557 or California test method No. 216.

C. In determining the in-place moisture content of soils, testing shall follow ASTM D3017, ASTM D2216, California Test Method No. 226.

D. In determining the Sand Equivalent, ASTM D2419 or California Test method No. 217 shall be used.

E. In determining the resistance value, testing shall conform to ASTM D2844 or California Test Method No. 301.

F. Classification of soils for Engineering Purposes shall be in accordance with ASTM D2487.

PART 2 - MATERIALS

2.1 EARTHWORK BACKFILL

The types of backfill material indicated below may be used for backfilling trenches as indicated in the specifications, shown on the Drawings or directed by the Engineer.

A. CLASS 2 AGGREGATE BASE

This material shall conform to the requirements set forth in Section 26 of the most recent CALTRANS Standard Specifications for the ¾" maximum size aggregate. Aggregate grading and quality requirements shall conform to the moving average criteria unless otherwise specified by the Engineer, and shall apply to material both before and after compaction.

Aggregate may include material processed from reclaimed asphalt concrete, portland cement concrete, lean concrete base, cement treated base or a combination of any of these materials. The amount of reclaimed material may account for up to 100% of the total volume of the aggregate used. Reclaimed material shall conform to the grading and quality requirements set forth in Section 26 of the most recent CALTRANS Standard Specifications for the ¾" maximum size aggregate." The Contractor shall be required to demonstrate that the recycled Class 2 aggregate base material meets CALTRANS standards. See the following link to the CALTRANS web site:

https://dot.ca.gov/programs/design/standard-plans-and-standard-specifications

B. SELECT SAND

This material shall be a clean material free of organic or other deleterious substances and of such gradation that a minimum of 90% will pass a No. 4 sieve and not more than 5% will pass a No. 200 sieve. If low chloride sand is required, the chloride content shall not exceed 30 parts per million by weight.

C. PEA GRAVEL

This material shall be a clean material free of organic or other deleterious substances and shall consist of smooth rock with no facets or sharp edges. Stones shall have a maximum size of 3/8 inch, and not more than 5% will pass a No. 16 sieve.

D. CONTROL DENSITY FILL

If CDF is used, see Section 03400 - Control Density Fill.

E. NATIVE BACKFILL

Where use of native soil is directed, prepare native soil as necessary to be free from clods or rocks larger than 3 inches in greatest dimension, and free from organic material and as approved by the Engineer.

F. DRAIN ROCK OR GRAVEL

If drain rock or gravel is required, river run or crushed rock with a maximum dimension of ¾ inch, with no more than 10 percent passing the No. 200 sieve, and with a durability index of 40 or higher shall be used.

2.2 UNACCEPTABLE MATERIAL

Unless otherwise specified, backfill material shall not contain quarry waste, quarry fines, pea gravel, recycled materials and like material. In addition, any material not conforming to the specifications of Section 2.1 or failing performance testing shall also be unacceptable.

2.3 TRENCHLESS TOOLS

The following is a list of manufacturers that supply equipment relevant to the trenchless techniques described elsewhere in this section.

1. "Ditch Witch" by Charles Machine Works, Inc. (Perry OK) 800-654-6481.

2. "Pow-R Mole" by Petersen Underground Equipment, Inc. (Murray UT) 800-325-6419.

3. "Hole-Hog" or "Red Hog Express" by Allied Construction Products (Cleveland, OH), 216-431-2600.

4. "Ferret" by Footage Tools (Weston, Ontario Canada), 416- 746-2911.

5. "GRUNDOMAT" and "GRUNDORAM" by TT Technologies, available from Plank, (Petaluma CA), 707-763-7070.

6. LTA Corporation (Columbia Heights, MN) 612-781-4292.

7. Hacker Industries (Henderson TX) 908-657-3546.

8. ACCU-PUNCH by Vibra King, Inc. (Mankato, MN), 507-387-6574.

9. "Mighty Mole" by McLaughlin Boring Systems (Greenville, SC) 800-435-9360.

10. Grice Industries, 541-341-4644

PART 3 - EXECUTION

3.1 USA NOTIFICATION AND UTILITY FIELD MEETING

The Contractor shall contact Underground Service Alert (USA) (1-800-642-2444) seven (7) calendar days prior to start of each section and shall be responsible for maintaining a valid USA location tag through renewal during the construction. The Contractor shall schedule a utility field meeting prior to any excavation. This shall be so stated in the USA Notification. The Contractor shall be responsible to coordinate the utility field meeting at which time he shall explain the limits and impacts to USA member utilities.

See CA Government Code 4215

3.2 EXISTING UTILITIES

The Contractor shall expose all existing utilities along the trench alignment and at connections prior to commencement of the work on the project for the pipeline installation. This is to be done in order to determine the line and grade of existing utilities, possible conflicts and mismarks. At connections, the Contractor shall expose the existing pipeline to determine the depth at which the connection is to be made and verify existing pipe material and sizes.

If the contractor damages any existing utilities, the contractor shall immediately notify that utility and make repairs satisfactory to that utility.

3.3 PROTECTION OF EXISTING SURVEY MONUMENTS

The Contractor shall not disturb, remove, alter or destroy any existing land survey monument. In the event that the contractor believes that a monument will be thus impacted, the Contractor shall notify the Engineer. The Contractor shall allow 10 working days for the Engineer to establish sufficient data to reset the monument after the completion of the construction.

3.4 SITE GRADING

A. Rough Grading: After completion of stripping, the Contractor shall rough grade cut areas to the lines, grades and contours shown on the Drawings.

B. Proof-Rolling: After rough grading, the Contractor shall proof-roll the areas where on-grade structures are to be constructed in order to detect soft zones. Proof-roll shall consist of passing over all required areas with a loaded scraper, front-end loader with loaded bucket, or other heavy rubber tired vehicle with high tire pressure, in the presence of the Engineer. The Engineer will determine which areas tested by proof-rolling are soft zones that require the Contractor to complete following corrective work.

1. Soft Zone Corrective Work: Remove all soft material as indicated by the Engineer from all soft zones exposed by proof-rolling. Properly dispose of unsuitable material off site.

2. Fill the resulting voids with moisture-conditioned Native Backfill, in level 8-inch uniform layers measured before compaction. Compact with appropriate equipment to at least 95 percent relative compaction.

3. Soft zone corrective work will be considered a change in the scope of project work and will be paid for in accordance with Article 47 "Changed Conditions" of the General Conditions.

C. Scarifying: The Contractor shall scarify, to a minimum 6-inch depth, all areas where fills are required. Moisture condition the scarified surface to within two percent of optimum water content, and compact to minimum 95 percent relative compaction.

D. Fills:

1. Do not place any fill until the Engineer has inspected, tested to his satisfaction, and favorably reviewed the prepared subgrade.

2. Construct fills as shown on the Drawings, true to line, grade and cross-section. Construct fills of Native Backfill unless otherwise indicated. Place material in approximately 8-inch thick horizontal layers measured before compaction, and carried across the entire width to the required slopes. Compact all fills to a relative compaction of at least 90% unless otherwise specified. Properly moisture condition before compaction.

3. The Contractor may be required to overbuild slopes and trim back to the compacted core to achieve adequate compaction of slope faces.

E. Compaction requirements shall be 90% relative compaction. Material shall be moistened as required to aid compaction.

F. Ditches: Cut ditches accurately to the cross sections and grades shown. Take care not to overexcavate ditches, and backfill excessive excavation to grade. Trim all roots, stumps, rock and other foreign matter from the sides and bottom of the ditches. Compact the surfaces of ditch slopes and bottom.

3.5 PAVEMENT REMOVAL

A. GENERAL

Excavation for the pipe installation shall be open cut and shall include the removal of all paving, concrete, soils, abandoned utilities, water, or other objects of any nature that would interfere with the performance of the work.

B. SAWCUTTING

In locations where the pipe is to be installed by open cut method under asphaltic concrete or concrete pavement sections, the outline of all pavement areas to be removed shall be cut prior to removal as required by the local jurisdiction in which the work is being performed. Any cutting that requires water shall be done with a vacuum system that collects all the water and does not allow any water or cutting products to flow into the storm drain. Cuts shall be neat and true, shall be cut completely through the existing pavement section to subgrade and shall be done without damaging adjacent pavement that is not to be removed. No jack-hammer, "drop hammer," or similar equipment will be allowed to cut the pavement. Grinding that results in cuts wider than 0.5 inch shall not be considered as sawcuts. The Contractor shall anticipate that variations in the thickness of paving exist.

C. DISPOSAL

Pavement removed from the pipeline trench shall be hauled from the job and disposed at a County approved disposal site.

3.6 TRENCH EXCAVATION

A. GENERAL

Trench excavation for pipelines shall be open cut, except that service piping may be installed using either open cut or trenchless methods defined later in this section.

The trench shall be excavated to the lines and grades shown on the drawings and in accordance with trench details. If the trench is excavated below the required grade, the Contractor shall refill the trench excavated below the grade with compacted Class II Aggregate Base at no additional cost to the District.

The Contractor shall perform all excavation regardless of the type, nature, or condition of the material encountered to accomplish the construction. No blasting shall be permitted.

B. TRANSPORT OF SPOILS

Backfill stockpiles and excavation spoils which are not immediately loaded and hauled away shall have local approval from local jurisdiction. This material shall be placed on the site away from trenches, street corners, and active work areas and shall be placed in such a manner as to minimize obstruction to traffic. Gutters and ditches shall be kept clear, or other provisions shall be made for the handling of drainage.

C. EXCAVATION FOR VALVE PLACEMENT

Mains shall be lowered below required minimum depths in the vicinity of gate valves 10-inches and larger in size. To accommodate the valve stem, the main shall be lowered as necessary to achieve the following minimum covers:

- For 10" valves, minimum cover of 36 inches
- For 12" valves, minimum cover of 38 inches

D. ALIGNMENT

The Contractor shall conform, as nearly as possible, to the pipeline alignment indicated on the plans unless modified by the Engineer. Whenever vertical or horizontal deflection of the pipe is required to avoid obstructions or where long radius curves are permitted, the degree of deflection at joints shall be approved by the Engineer.

E. EXCAVATION AT BELL HOLES

When bell holes are required they shall be excavated at each point where pipe ends are to be joined. Bell holes shall be adequately sized to permit ease in making the joint. When necessary, bell holes shall be shored and protected in conformance with CAL/OSHA requirements.

F. SHORING

The Contractor shall at all times comply with Safety Regulations set forth in the State of California, Construction Safety Orders and Trench Construction Safety Orders, issued by CAL/OSHA's Division of Industrial Safety. No excavation shall start until the Engineer has received 1) a copy of the Contractor's permit for the project from the State Division of Industrial Safety and 2) a copy of all project notification forms and/or letters that he has forwarded to the CAL/OSHA District office.

Shoring shall follow a District approved shoring plan submitted by the Contractor. In order to prevent cave-ins and protect adjacent areas, excavation in unstable material shall be adequately shored and braced. Shoring shall remain in place until the pipeline has been installed, inspected and the earth compacted around and over the top of the pipe. Upon completion of the work the Contractor shall remove all shoring unless otherwise specified by the Engineer.

G. ROCK EXCAVATION

Wherever the word "Rock" appears in these Specifications, it shall be interpreted to mean any of the following: (1) material in ledges, bedding deposits of unstratified masses which cannot be removed without the use of hydraulic or pneumatic hammers or continuous drilling and blasting, (2) boulders larger than

one cubic yard which, when first exposed, cannot be broken down from their original state with a modern ¾ cubic yard backhoe power excavator or a Caterpillar D8 with a single tooth ripper, in good condition, and cannot be safely transported in a vehicle for disposal, (3) concrete, asphalt or masonry structures which have been abandoned and cannot be broken down from their original state with a modern ¾ cubic yard backhoe power excavator and (4) conglomerate deposits which are so firmly cemented that they possess the characteristics of solid rock and cannot be removed without systematic drilling.

H. TRENCHLESS INSTALLATION OF PIPELINES

Trenchless installation of pipelines shall be defined as installation of pipe using a technique that does not require open cut excavation along the length of the pipe installed. Examples of typical equipment include a pneumatic "mole" or directional bore. Specific techniques may be required in certain areas as indicated on the Drawings.

3.7 DEWATERING AND DRAINAGE

The Contractor shall provide all equipment and labor adequate to keep all trenches and excavations free of water. The Contractor shall keep excavated areas free of standing or flowing water during pipe installation, concrete placement, and backfilling operations by draining or pumping from a point that is outside the structural limits of work and below that of the excavation. The Contractor shall also provide a positive means to assure that no water will enter previously installed pipe. The Contractor is responsible for obtaining and complying with any discharge permits required by any appropriate regulatory authority and shall not direct drainage effluent in such a manner that damage to adjacent property or natural watercourses occurs.

3.8 REFILLING TRENCHES

A. GENERAL

The Contractor shall place backfill material around structures and in other areas, including overexcavation areas, as shown on the plans and as specified by the Engineer. Backfill shall be placed immediately subsequent to installation of the pipeline and appurtenances, and shall be installed in loose lifts not exceeding eight inches in depth. Compaction requirements shall be 95% relative compaction for Class II Aggregate Base Rock and 90% for native backfill to a depth of 18 inches below the bottom of the required paving and 90% relative compaction below that level. Material shall be moistened as required to aid compaction. No foreign materials (blocking) shall be left in the trench.

B. GEOTECHNICAL TESTING

1. TESTING BY ENGINEER

a. The District shall conduct all soils testing. Soils compaction tests will be taken on a random basis, approximately one test per 100 feet (location determined by the Engineer). Where testing is done, one test shall be taken on the lower lift and one on the upper lift of the base rock.

b Testing shall be accomplished in accordance with ASTM D2922 or California Test Method No. 216.

c. The District will bear all costs of testing except that of a failed retest. The cost of $100 per each retest shall be deducted from any payment due to the Contractor.

C. STEEL PLATES

Steel traffic plates shall not be used without the expressed written approval of the Engineer and the local jurisdiction in control of street openings and encroachments. It is the Contractor's responsibility to contact and secure permission for steel plate use prior to construction within each specific jurisdiction. Steel traffic plates, where approved, shall have a non-skid surface. The determination for use shall be made by the Engineer and shall be final.

D. COMPACTION EQUIPMENT, METHODS, AND REQUIREMENTS

1. GENERAL

Care shall be exercised in any method of backfilling to avoid damage to the protective coating or mortar lining of the pipe. It is important that proper precautions be taken to prevent floating of the pipe. The Contractor shall be wholly responsible for any damage resulting from failure to take necessary precautions when placing and compacting backfill. Compaction equipment or methods that produce horizontal or vertical earth pressures, which may cause excessive displacement or which may damage nearby structures, shall not be used. Use of a hydraulic hammer for compaction will not be allowed.

Backfilling shall conform to the requirements of the applicable local jurisdiction or those included in these specifications, whichever is more stringent. In the case of conflict between the requirements, the Engineer shall determine which shall prevail.

The Contractor should note that he shall be required to install impermeable dikes in areas where existing grades are 10% or greater. The Contractor shall be responsible to determine grades. Impermeable dikes shall be made of Type II concrete, or native clay soils compacted to 95%. Each impermeable dike shall be as wide as the trench, a minimum of six inches in thickness and extend from the bottom of the trench to a point 12

inches above the pipe. Dikes shall be located every 50 feet where required.

2. PAVED AREAS

Backfill materials shall be moistened to near optimum moisture content and shall be placed in the trench on both sides of the pipe for the full width of the trench. Sand shall be brought up evenly on both sides of the pipe. Said materials shall be placed into the trench by hand or by approved mechanical methods, and be compacted to provide solid backing against the external surface of the pipe. The Contractor shall not place or compact backfill above springline until the Engineer has inspected and approved the lower portion of backfill. Flooding of this lower portion of backfill will not be permitted.

The remaining backfill shall be placed in uniform horizontal layers not to exceed eight inches in loose thickness before compaction. Each layer shall be dampened sufficiently and uniformly tamped, rolled with a vibratory compactor or otherwise compacted throughout until the relative compaction is satisfactory. Non-uniform compacted surfaces may be rejected. Inundation of this upper portion of backfill will not be permitted. The material between the bottom of pavement and a plane 18 inches below that, shall be worked until a minimum relative compaction of 95% throughout is reached. Material below that plane shall be compacted to a minimum of 90% relative compaction throughout.

Backfill within 10 feet of any mainline valve shall be placed and compacted in 6-inch lift thicknesses. Backfill shall be compacted to within one inch of finished grade prior to placement of temporary pavement. The Contractor shall compact temporary pavement as required in Section 02500 daily on all surfaces where paving has been removed.

Impact compaction machines, such as a “Hydra Hammer”, and backhoe mounted compaction machines, such as a HedShaker, shall not be used. The Contractor shall compact all backfill to the specified relative compaction as it is being installed. Wheel-rolling will not be allowed.

All excavations shall be restored to the elevation of surrounding pavement prior to completion of each day’s work. If any sections of restored trench settles below the surrounding pavement, the Contractor shall re-work the trench to the same elevation as the surrounding pavement each day.

Any backfill material which cannot be compacted to the specified degree will be rejected. Any backfill material which pumps or is not firm will be rejected even if compaction requirements are satisfied. The Contractor, at his expense, shall remove the rejected material and replace it with suitable material.

Particular care shall be taken in the backfilling and compaction of the area around the taps to the main. Hand tamping will be required rather than equipment tamping or rolling.

3.9 FINISH GRADING

Except where shown otherwise in the Drawings, restore the finish grade to the original contours and to the original drainage patterns. Grade surfaces to drain away from structures. The finished surfaces of the tank pad and access road shall be smooth and compacted. The graded surfaces to receive slope protection shall be furrowed to better match the surface of the undisturbed natural areas adjacent to the project site.

3.10 DISPOSAL OF MATERIAL

Any excess backfill material or material rejected by the Engineer shall be removed from the job site by the Contractor. He shall make all necessary arrangements for the proper and legal disposal of excess material, at his cost, and upon request shall provide written evidence indicating approval to use the disposal site.

END OF SECTION

Appendix C

Air Quality Supporting Information

CONSTRUCTION OFFROAD EMISSIONS - UNMITIGATED

Offroad Emissions Summary by Construction Year - For Comparision with BAAQMD Thresholds

Construction Year	CAP Emissions (tons/yr)				GHG Emissions (MT/yr)				No. of Workdays	CAP Emissions (pounds/day)			
	ROG	NOx	Ex PM_{10}	Ex $PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e		ROG	NOx	Ex PM_{10}	Ex $PM_{2.5}$
2026	0.03	0.27	0.01	0.01	50.9	0.0	0.0	51.1	80	0.75	6.65	0.23	0.21
PROJECT TOTAL	0.03	0.27	0.01	0.01	50.9	0.00204	0.00041	51.1	80	**0.75**	**6.65**	**0.23**	**0.21**

Construction Phase	Equipment	Fuel	Number	No. of Days use	Hrs/day used	Total hrs used/year	Construction Year	Hp	LF	OFFROAD Emission Factors (g/hp-hr)							CAP Emissions (tons/yr)				GHG Emissions (MT/yr)			
										ROG	NOx	Ex PM_{10}	Ex $PM_{2.5}$	CO_2	CH_4	N_2O	ROG	NOx	Ex PM_{10}	Ex $PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e
Installation at Site 2	Bore/Drill Rigs	Diesel	1	20	8	160	2026	83	0.5	0.13	1.64	0.04	0.04	525.08	0.021	0.004	0.001	0.012	0.000	0.000	3.49	0.000	0.000	3.50
Installation at Site 2	Excavators	Diesel	1	20	8	160	2026	36	0.38	0.39	3.41	0.10	0.09	587.03	0.024	0.005	0.001	0.008	0.000	0.000	1.28	0.000	0.000	1.29
Installation at Site 2	Cranes	Diesel	1	20	8	160	2026	367	0.29	0.20	1.84	0.08	0.07	527.46	0.021	0.004	0.004	0.034	0.001	0.001	8.98	0.000	0.000	9.01
Installation at Site 2	Dumpers/Tenders	Diesel	1	20	8	160	2026	16	0.38	0.57	4.36	0.16	0.15	571.61	0.023	0.005	0.001	0.005	0.000	0.000	0.56	0.000	0.000	0.56
Installation at Site 2	Air Compressors	Diesel	1	20	8	160	2026	37	0.48	0.51	3.65	0.10	0.09	568.29	0.023	0.005	0.002	0.011	0.000	0.000	1.61	0.000	0.000	1.62
Pipeiline at SFD Blvd	Excavators	Diesel	1	40	8	320	2026	36	0.38	0.39	3.41	0.10	0.09	587.03	0.024	0.005	0.002	0.016	0.000	0.000	2.57	0.000	0.000	2.58
Pipeiline at SFD Blvd	Tractors/Loaders/Backhoes	Diesel	1	40	8	320	2026	84	0.37	0.18	1.89	0.06	0.06	529.71	0.021	0.004	0.002	0.021	0.001	0.001	5.27	0.000	0.000	5.29
Pipeiline at SFD Blvd	Dumpers/Tenders	Diesel	1	40	8	320	2026	16	0.38	0.57	4.36	0.16	0.15	571.61	0.023	0.005	0.001	0.009	0.000	0.000	1.11	0.000	0.000	1.12
Pipeiline at SFD Blvd	Plate Compactors	Diesel	1	40	8	320	2026	8	0.43	0.55	4.14	0.16	0.15	568.34	0.023	0.005	0.001	0.005	0.000	0.000	0.63	0.000	0.000	0.63
Pipeiline at SFD Blvd	Air Compressors	Diesel	1	40	8	320	2026	37	0.48	0.51	3.65	0.10	0.09	568.29	0.023	0.005	0.003	0.023	0.001	0.001	3.23	0.000	0.000	3.24
Repave SFD Blvd	Dumpers/Tenders	Diesel	1	10	8	80	2026	16	0.38	0.57	4.36	0.16	0.15	571.61	0.023	0.005	0.000	0.002	0.000	0.000	0.28	0.000	0.000	0.28
Repave SFD Blvd	Paving Equipment	Diesel	1	10	8	80	2026	89	0.36	0.19	2.07	0.08	0.07	527.71	0.021	0.004	0.001	0.006	0.000	0.000	1.35	0.000	0.000	1.36
Repave SFD Blvd	Rollers	Diesel	1	10	8	80	2026	36	0.38	0.54	3.61	0.15	0.14	586.91	0.024	0.005	0.001	0.004	0.000	0.000	0.64	0.000	0.000	0.64
Connect New Pipe to NML	Welders	Diesel	1	10	8	80	2026	46	0.45	0.47	3.57	0.10	0.09	568.29	0.023	0.005	0.001	0.007	0.000	0.000	0.94	0.000	0.000	0.94
Connect New Pipe to NML	Air Compressors	Diesel	1	10	8	80	2026	37	0.48	0.51	3.65	0.10	0.09	568.29	0.023	0.005	0.001	0.006	0.000	0.000	0.81	0.000	0.000	0.81
Connect New Pipe to NML	Excavators	Diesel	1	10	8	80	2026	36	0.38	0.39	3.41	0.10	0.09	587.03	0.024	0.005	0.000	0.004	0.000	0.000	0.64	0.000	0.000	0.64
Connect New Pipe to NML	Rough Terrain Forklifts	Diesel	1	10	8	80	2026	96	0.4	0.12	1.64	0.03	0.03	528.89	0.021	0.004	0.000	0.006	0.000	0.000	1.62	0.000	0.000	1.63
Connect New Pipe to NML	Other Construction Equipment	Diesel	1	10	8	80	2026	82	0.42	0.28	2.73	0.16	0.15	527.54	0.021	0.004	0.001	0.008	0.000	0.000	1.45	0.000	0.000	1.46
Remove Pipeline segments	Air Compressors	Diesel	1	15	8	120	2026	37	0.48	0.51	3.65	0.10	0.09	568.29	0.023	0.005	0.001	0.009	0.000	0.000	1.21	0.000	0.000	1.22
Remove Pipeline segments	Excavators	Diesel	1	15	8	120	2026	36	0.38	0.39	3.41	0.10	0.09	587.03	0.024	0.005	0.001	0.006	0.000	0.000	0.96	0.000	0.000	0.97
Remove Pipeline segments	Rough Terrain Forklifts	Diesel	1	15	8	120	2026	96	0.4	0.12	1.64	0.03	0.03	528.89	0.021	0.004	0.001	0.008	0.000	0.000	2.44	0.000	0.000	2.45
Remove Pipeline segments	Other Construction Equipment	Diesel	1	15	8	120	2026	82	0.42	0.28	2.73	0.16	0.15	527.54	0.021	0.004	0.001	0.012	0.001	0.001	2.18	0.000	0.000	2.19
Remove Pipeline segments	Dumpers/Tenders	Diesel	1	15	8	120	2026	16	0.38	0.57	4.36	0.16	0.15	571.61	0.023	0.005	0.000	0.004	0.000	0.000	0.42	0.000	0.000	0.42
Cut Piles	Air Compressors	Diesel	1	15	8	120	2026	37	0.48	0.51	3.65	0.10	0.09	568.29	0.023	0.005	0.001	0.009	0.000	0.000	1.21	0.000	0.000	1.22
Cut Piles	Excavators	Diesel	1	15	8	120	2026	36	0.38	0.39	3.41	0.10	0.09	587.03	0.024	0.005	0.001	0.006	0.000	0.000	0.96	0.000	0.000	0.97
Cut Piles	Rough Terrain Forklifts	Diesel	1	15	8	120	2026	96	0.4	0.12	1.64	0.03	0.03	528.89	0.021	0.004	0.001	0.008	0.000	0.000	2.44	0.000	0.000	2.45
Cut Piles	Other Construction Equipment	Diesel	1	15	8	120	2026	82	0.42	0.28	2.73	0.16	0.15	527.54	0.021	0.004	0.001	0.012	0.001	0.001	2.18	0.000	0.000	2.19
Cut Piles	Dumpers/Tenders	Diesel	1	15	8	120	2026	16	0.38	0.57	4.36	0.16	0.15	571.61	0.023	0.005	0.000	0.004	0.000	0.000	0.42	0.000	0.000	0.42

North Marin Line

Energy Calculations - Construction

Source	MT of CO_2
Total CO_2 from Diesel use	50.9
Onsite CO_2 from diesel use	50.9

CO_2 from diesel fuel combustion[a] = 10.2 kg of CO_2/gallon of diesel

[a] Emissions factors per The Climate Registry 2019 Default Emission Factors (Table 2.1 - US Default Factors for Calculating CO_2 Emissions from Combustion of Transport Fuels)

Conversion 1 MT = 1000 kg

Source	Fuel Use (gallons)	Average per year (over 3 years)
Onsite Diesel	4,984	1,661

Retail Diesel Sales by County

(Millions of Gallons)

	2010		2011		2012#		2013#		2014#		2015#		2016#		2017#		2018#		2019#		2020#		2021#		2022#		2023#	
County	Survey Responses	Estimated Totals	Survey Responses	Estimated Totals	Survey Responses	Estimated Totals	Survey Responses	Estimated Totals	Survey Responses	Estimated Totals	Survey Responses	Estimated Totals	Survey Responses	Estimated Totals	Survey Responses	Estimated Totals	Survey Responses	Estimated Totals	Survey Responses	Estimated Totals	Survey Responses	Estimated Totals	Survey Responses	Estimated Totals	Survey Responses	Estimated Totals	Survey Responses	Estimated Totals
Alameda	29	32	26	28	30	36	27	34	19	27	38	49	47	54	51	58	56	62	48	55	47	51	50	53	47	57	43	55
Amador	2	2	2	2	2	2	1	2	1	2	1	2	2	2	2	2	2	3	3	3	2	2	2	3	2	3	2	3
Butte	9	10	9	10	7	9	8	10	8	10	9	11	11	13	11	13	12	13	12	15	10	11	11	13	9	11	10	12
Calaveras	2	2	2	2	2	2	1	2	1	2	2	2	3	3	3	3	2	3	3	3	3	3	2	3	2	4	2	3
Colusa	3	3	2	3	4	5	4	5	2	2	3	4	4	4	2	3	4	4	7	7	10	11	8	11	10	12	16	18
Contra Costa	15	18	19	21	17	20	17	21	12	17	19	24	23	26	24	28	31	34	24	27	22	23	22	28	24	29	22	27
Del Norte	1	2	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	1	2	1	2	1	1	1	1	1	1
El Dorado	6	8	6	7	6	7	5	6	4	6	7	9	8	9	8	10	8	9	8	10	8	8	8	11	9	12	8	11
Fresno	30	33	35	38	33	40	23	29	18	25	39	50	40	46	40	45	46	51	39	49	62	66	52	91	65	85	64	81
Glenn	5	5	4	4	4	5	4	5	4	5	5	6	12	14	16	19	16	17	18	19	17	18	16	17	18	21	20	22
Humboldt	10	12	10	12	10	12	11	14	4	5	10	13	13	14	8	9	7	8	6	7	6	6	9	10	9	11	9	12
Imperial	9	10	8	9	7	8	8	10	8	11	9	11	14	16	11	12	20	22	21	25	22	24	27	27	23	30	26	27
Inyo	3	4	3	4	2	2	3	4	3	3	3	4	3	4	3	4	3	3	3	4	3	4	3	3	3	4	3	3
Kern	111	117	125	129	133	158	118	148	124	171	125	160	131	149	107	121	97	108	96	105	108	116	116	137	190	226	216	238
Kings	7	7	7	8	7	9	5	6	4	6	7	9	5	6	7	7	8	9	8	9	7	7	6	10	7	9	7	7
Lake	3	3	3	3	2	2	2	3	2	3	3	3	1	1	3	3	3	4	3	4	3	4	3	4	3	5	3	4
Lassen	1	1	1	2	1	1	1	1	1	2	3	3	4	4	1	1	1	1	1	2	1	1	2	2	2	2	2	2
Los Angeles	212	235	221	239	205	245	190	239	194	267	257	328	273	309	267	301	228	253	246	276	279	299	206	224	240	295	256	290
Madera	23	24	23	24	24	28	18	23	22	31	26	33	28	31	29	33	28	31	23	24	30	32	36	37	43	54	50	60
Marin	3	4	2	3	3	3	2	3	2	2	2	3	4	4	4	4	3	3	4	4	4	4	4	5	3	5	3	5
Mariposa	1	1	1	1	1	1	-	1	2	2	1	1	1	2	1	1	1	1	1	1	1	1	1	2	1	1	1	1
Mendocino	6	7	7	8	7	9	6	6	4	5	6	7	9	10	6	6	5	6	5	8	9	9	6	10	7	10	7	9
Merced	44	45	37	38	46	55	49	62	49	68	54	69	59	66	38	42	35	39	28	36	28	30	28	33	57	67	55	62
Mono	1	1	1	1	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Monterey	21	23	24	26	25	30	22	27	13	18	23	29	24	28	24	27	24	26	23	26	21	22	20	27	22	27	22	25
Napa	2	2	2	2	6	7	2	3	2	3	6	8	6	7	6	7	6	7	6	7	6	6	6	6	6	7	6	6
Nevada	5	5	5	5	4	4	1	2	4	6	7	8	8	9	8	9	7	8	5	8	7	8	6	8	6	8	7	7
Orange	38	47	36	42	38	46	33	42	37	51	46	59	52	59	54	61	49	55	51	56	49	53	43	46	51	66	55	62
Placer	13	16	13	15	12	15	9	12	10	13	13	16	15	17	15	17	16	17	16	17	32	35	18	20	16	26	18	28
Plumas	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	2	2	3	2	3
Riverside	84	93	87	94	89	107	86	109	100	138	119	152	128	145	131	148	119	132	108	122	134	144	138	146	138	173	158	180
Sacramento	33	37	32	35	27	32	18	21	21	29	28	36	38	42	42	48	41	45	37	41	41	44	40	45	40	51	38	50
San Bernardino	141	149	136	142	158	189	164	206	152	210	198	253	223	252	235	265	176	195	165	178	148	159	184	198	212	258	245	267
San Diego	69	80	64	72	62	74	58	73	67	93	87	111	93	105	92	103	92	103	94	110	88	94	93	117	88	115	94	107
San Francisco	3	3	3	3	3	4	4	5	1	2	5	6	6	6	5	6	5	5	5	5	4	4	4	5	5	6	5	6
San Joaquin	73	75	85	87	84	99	90	113	86	119	102	131	116	131	111	126	105	117	101	113	86	93	94	97	110	128	132	144
San Luis Obispo	12	14	16	18	11	13	9	12	12	17	19	24	20	23	19	21	20	22	20	22	19	20	17	22	20	24	19	22
San Mateo	10	12	8	10	8	10	8	10	4	6	15	19	13	14	15	17	16	17	18	19	12	13	13	16	13	15	10	14
Santa Barbara	13	14	16	17	10	13	12	15	13	18	20	26	22	25	17	19	21	24	18	19	16	17	16	17	18	22	17	19
Santa Clara	23	26	26	28	27	32	28	35	25	35	36	47	30	34	32	36	43	48	33	42	32	35	31	50	37	44	35	45
Santa Cruz	4	5	5	6	4	5	4	6	2	3	5	6	5	6	6	6	6	7	4	6	7	8	6	7	6	8	6	7
Shasta	20	23	19	21	16	19	18	22	13	18	21	27	21	24	22	25	21	24	14	16	13	14	20	22	18	22	20	22
Siskiyou	5	6	11	11	16	20	15	19	16	20	20	26	19	22	18	21	16	17	16	17	17	18	16	18	16	18	16	18
Solano	14	17	18	20	14	16	14	17	8	11	14	18	17	19	22	24	23	25	24	27	25	27	19	30	27	32	23	27
Sonoma	14	16	18	19	13	16	14	18	12	17	15	20	20	23	20	23	20	22	28	32	28	30	26	30	30	35	28	32
Stanislaus	33	36	27	29	25	30	15	19	20	27	26	33	20	22	30	34	32	36	33	35	36	39	44	49	42	56	65	72
Sutter	4	5	2	3	3	4	4	5	2	3	4	5	5	6	3	4	4	5	5	6	5	5	4	4	4	5	5	5
Tehama	31	32	38	39	35	42	37	47	25	35	37	48	35	39	34	38	18	20	17	18	7	8	14	17	22	26	28	31
Tulare	23	25	33	35	27	32	31	39	31	43	34	43	37	42	37	41	31	34	42	45	47	51	54	66	53	70	65	78
Tuolumne	2	2	2	2	1	2	2	2	2	2	2	3	2	3	3	3	3	3	3	3	3	3	3	4	2	3	3	4
Ventura	20	23	32	34	23	27	23	29	25	34	27	34	29	32	32	36	30	33	33	35	29	32	31	35	30	40	28	37
Yolo	33	34	26	27	27	33	30	37	29	40	27	35	32	37	27	30	25	28	24	26	21	22	24	28	30	39	31	35
Yuba	4	4	4	5	3	4	3	4	2	3	2	3	4	5	8	9	11	12	4	5	4	4	4	12	3	5	4	5
Other Counties*	1	2	2	2	1	2	1	1	1	2	2	2	3	3	3	3	2	2	2	3	2	2	2	3	3	3	4	4
Total	**1,285**	**1,414**	**1,346**	**1,447**	**1,327**	**1,589**	**1,261**	**1,587**	**1,226**	**1,691**	**1,592**	**2,033**	**1,742**	**1,971**	**1,717**	**1,937**	**1,602**	**1,777**	**1,559**	**1,756**	**1,624**	**1,744**	**1,611**	**1,883**	**1,846**	**2,290**	**2,016**	**2,316**

2012-2023 data are not directly comparable to other years since an improved methodology is used, but is within 5 percent compared to the previous methodology.

* Other Counties include Alpine, Modoc, San Benito, Sierra and Trinity.

Note: Non-Retail diesel sales, which comprise approximately 34.6% of all diesel sales, are not reported in this chart. Starting 2022 reporting year, California Energy Commission incuding all No.2 diesel, biodiesel, and renewable diesel as diesel product.